CONVOCATION ADDRESSES OF ANGRAU

(1966-2008)

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ANDHRA PRADESH

2008

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(1966-2008)

Compiled by

Dr. K. VEERANJANEYULU
Dr. AZEEZUDDIN MEHMOOD

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2008

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FOREWORD

In one of our convocations, late prime minister, Mrs Indira Gandhi said ".. convocation for all its formality does symbolize the link between knowledge and life". Since inception of our university, in the last 44 years, we have held 40 convocations. Several luminaries comprising eminent scientists, political leaders, academicians, social activists, financial planners through convocation addresses have given their vision and plans to improve the agriculture and social spheres of our life. These addresses also serve as a mirror of our past situations and to judge our efforts to achieve the contemplated progress from time to time.

I am extremely happy that our University Librarian Dr. K. Veeranjaneyulu and his team have come forward to compile these 40 convocation addresses so that it can be an inspiring and nostalgic document for one and all. I commend their efforts and wish that this document would be accessible to one and all who are concerned with Agriculture.

Date: 25
June, 2008

(Dr. P. RAGHAVA REDDY)

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CONVOCATION ADDRESSES OF ANGRAU (1966-2008)

PREFACE

Convocation addresses are indeed treasures to be stored. A cursory glance at them would indeed broaden our mental horizon and acquaint us with the newer aspects of knowledge. We sincerely hope that this storage of the forty Convocation addresses right from the inception of the University up to the year 2008 will prove to be a useful guide to one and all.

We are thankful to the Hon'ble Vice-Chancellor Dr. P. Raghava Reddy for permitting us to bring out this useful compendium. We also owe a word of thanks to all the University Officers whose timely help and support enabled us to execute this task successfully. We are also thankful to Dr. K. Krishna Kumari, Additional Controller of Exams for providing the required information.

Dr. K. VEERANJANEYULU
Dr. AZEEZUDDIN MEHMOOD

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CONVOCATION ADDRESSES OF ANGRAU (1966-2008)

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ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
1st ANNUAL CONVOCATION

5th February 1966

Address by
Sri C. Subramaniam
Minister for Steel, Mines
&
Heavy Industries
Government of India

Rajendranagar, Hyderabad – 500 030

Friends,

I deem it a great honour to be called upon to speak to you today on the occasion of the first Convocation of the Andhra Pradesh Agricultural University. Situated as it is in the heartland of India's agricultural resurgence, I am confident that the University will play a great role in the transformation of our agriculture. I congratulate the Government of Andhra Pradesh and, in particular, my colleague Shri Brahmananda Reddy and the Vice Chancellor on the success which has resulted from their efforts.

In the long perspective of India's economic development, the present decade will have a critical role. It is the time and place for a change from dependence to self-reliance, particularly in the field of agriculture. It may seem ironical that in a year of severe drought in which we are dependent heavily on imports from abroad, we should talk the language of self-reliance. I would defend this because, it is precisely the problems of the present drought which have brought to a sharp focus the need for a scientific reorientation of our agricultural policies. The fact that in the years to come, the demand of our agriculture will rise with increasing population and rising incomes makes it imperative that we adopt concrete measures to strengthen and reorient our agriculture to meet this challenge.

A study made by the Perspective Plant Division of the Planning Commission places targets for 1975-76 at 63.8 million tonnes of rice, 20.5 million tonnes of wheat and 43.1 million tonnes of coarse grains. In terms of totals for food grains the figures represent an increase from 81 million tonnes in 1960-61 to about 151 million tonnes in 1975-76. Similarly in some cases, faster increase is necessary in cotton, sugarcane, jute, groundnut, potato etc.

CROP	1960-61	1975-76
Cotton	5390	13,500 (both in '000 bales)
Sugarcane (gur)	10.6	17.8 Million tones
Jute	3982	9,295 ('000 bales)
Groundnut	4.4	11.1 Million tones

These illustrate the order of effort we need to put in if the economic growth of the country is to be sustained at an adequate level. Indeed, we have no excuse not to reach these targets -we have to gear our organisatjon, order our resources, plan our flow of rupees and foreign exchange in such a way that these targets are made attainable Above all, we have to explore ways and means of benefiting most from science and technology in order to reap from our soils the higher productivity which is implicit in these goals.

Are such increases feasible? Are we not setting too high a set of targets? These are questions which are often put to us. There is a feeling of helplessness implied in these very questions. If India is to progress, we have to shakeoff this attitude of languor and fatalism.

The job is one which can be done. Recently, I was going through a study of the development of agriculture in a number of nations similar to ours. What has been achieved by three of these countries -Sudan, Mexico and Taiwan -with cultural and social backgrounds not far distinguishable from ours, gives me hope that we can do the job given the resources.

Sudan increased its total crop output in the period 1948-63 at a compound rate of growth of 8 percent: Mexico achieved a rate of growth of 6.3 per cent and Taiwan of 4.5 per cent in the same period. This compares with our figure of 3.1 per cent. The crop yield per acre increased in Sudan by 47 per cent, in Mexico by 46.7 per cent and in Taiwan by 84.2 per cent compared to our 32.9 per cent. More revealing indices are the yields of wheat and rice in these countries per hectare. In 1961-63, Taiwan produced 3210 Kgms. of rice as compared to our 1480 Kg. As for wheat, Mexico reached 1680 Kg. per hectare as compared to our 840 Kg. which was the figure attained by Mexico in 1949-53.These statistics serve to show not only the tremendous possibilities ahead of us but also the feasibility of the goals. If these countries that I have mentioned have been able to do this, so should we be.

The secret of success of these countries lay in their erective use of modern science and technology in the shape of intensive use of fertilisers, newer and better seed varieties and improved cropping pattern. We have woven these into our new strategy for agriculture. The response of the cultivator in States like Andhra Pradesh to the new programme has been very heartening indeed. The enthusiasm of the Andhra farmer for the new varieties like Taichung Native-I and fertilisers has put an end the lie to the many academic arguments that are still going on about their utility. Those who, from the groves of academy should have led the revolution are still debating the goals while the revolution is taking place before their very eyes. This is fortunate because nothing can convince farmers more than success of the new programne in conditions of actual cultivation.

Agricultural Colleges and Universities should take an active part in the transformation of our country. A perspicacious study of the Japanese agriculture put up by F.A.O. sometime back pointed out how the agricultural colleges and schools took the new knowledge and new techniques to the countryside in Japan. In fact, Agricultural Universities are themselves modelled after the Landgrant Colleges of U.S.A. which perform in that country a useful role in the triple process of education, research and extension. I hope that before long, Andhra Pradesh Agricultural University will also take on the function of extension in areas in and near Hyderabad. An extension wing in the Andhra Pradesh University will do a good deal to bring science to the farmer and realism to the academics in the college. The feed back of experience from the field to the University is so important in agriculture that I would lay the greatest stress on the speedy initiation of full-blooded extension work by your institution.

I am perfectly aware that the present organisation for extension cannot be completely supplanted by the few educational institutions that we have. Indeed, even when Agricultural Colleges and Universities take on the function of extension, Government will still have to maintain an extension service through the length and breadth of the country This aspect makes it all the more necessary that we should

examine the current performance of the extension service from the point of view of electiveness and implement solutions to the many problems that such an examination would reveal.

The performance of our extension organisation has been admittedly uneven. It was in recognition of the difficulty of spreading our slender facilities that we had resorted to the Intensive approach in the I.A.D.P and I.A.A. Schemes. Even here, our concentration of manpower has been qualitatively and quantitatively inadequate. Governments both at the Centre and the States have become increasingly aware of these inadequacies and we hope to remedy them soon. I would refer particularly to the problem posed by the task of spreading the new varieties of grains and increasing use of fertilisers. I believe that extension services performed by agents of seed distributing companies and fertiliser companies can be a substantial supplement to our facilities. It is from this point of view that I would stress the need for introducing modern techniques of management in the field of seed distribution. Socialism does not mean that we should not copy the improved techniques of distribution that capitalism has developed. On the contrary if a socialist society is a higher form of organisation than a capitalist society, it should bring into being better social and economic organisations. To continue the chaotic ill-ordered disorganised forms of seed distribution is to revert to a precapitalist form of society: It is from this point of view that I would urge the need to set up large-scale organisations in the field of seed distribution. If cooperatives or government can do this much it is better: But the area of activity is so large and so crucial that there should be no fore-closing of doors to enlightened private enterprise also. It is in this context, I would like the idea of joint stock Company participating in the seed business to be examined in the years to come. The National Seeds Corporation will also take an aggressive and dynamic role providing sales and extension services.

Transforming a traditional agriculture like ours involves more than mere inputs of knowledge, incentive and technology: It involves the change of a incentive and technology It involves the change of a whole approach to the problems of rural living. A massive change in Indian Agriculture cannot come about unless the forces of tradition and ignorance are shaken off. The: Community has to move as a whole. This was in fact the raisond'etre of the Community Development Movement. It was our intention to provide through the Community Development organisation sufficient motivation to the people to change over from the traditional to the new age. In some parts of 'India, the Community Development Movement succeeded merely in creating new expectations of a better life. It concentrated on the cultural and social factors of change without adequately emphasising the technological change in agriculture. In some other parts of India the movement over-emphasised public works, etc. to the neglect of the social change. I am not trying to say that there is any known set of techniques for motivating change in all parts of India. The techniques will differ from State to State and time to time. It would only hazard this situation. A village community will change if it sees the prospects of new technology in agriculture. In my view it is only if agriculture and associated activities blossom forth and create possibilities of new incomes that the other changes will follow This is a factor which the architects of social change should keep in mind.

There has been some discussion of the lessons of experience of the Community Development movement during the last 10 or 15 years. Most of the discussion was concentrated on the inadequacies of the administrative system. I concede that this is an important factor. An administrative system which perpetuates the earlier traditions cannot be an effective instrument of change. It was with this view that the movement for democratic decentralisation was started. Unfortunately in many parts of India, this has also degenerated into opportunities for factions. I am also aware that in some areas of the country village democracy has meant a return of power to the feudal forces. In some places, the land- owner has muscled his way into agencies of democratic decentralisation and cooperation. If we are to get the best out of the organisations for national extension and if we are to utilise the agencies of Panchayati Raj for this purpose we must reform these agencies. Our academic institutions and public men should look into the existing organisations and their working and advise us as to how best to make these institutions real agents of change.

One of the important instruments of transformation in countries like Japan has been the village cooperative. A village cooperative which, for various reasons, concentrates only on credit cannot become an agency of change. It becomes far too bound to its problems of recovery and lending. A village cooperative which also discharges some extension function, and participates in marketing of goods produced has a better chance of enabling the villages to change their perspective. Unfortunately the cooperative movement in India has developed its own orthodoxy. There has been some thought devoted recently to this. I hope that in the months to come, we release cooperation from its rigidities. The aim after all is to reach the villagers with services, credits, inputs, extension. The means employed cannot be elevated to ends in themselves. Cooperation is but one of the means -although a primary means -to these ends. I do hope that this will not be interpreted as a criticism of cooperation but as recognition of the vastness *of* our task and the role *of* all reasonable means to attain our ends.

In the agricultural and social revolution we have to bring together our people, we have *to* continually explore means *of* progress. Change itself should not take on rigidity. This is the lesson *of* all evolutions and one which we in India can ignore only at our peril. The sociology *of* change is a complex one. The best minds *of* our age have devoted themselves to it.

If our democratic alternatives to the totalitarian ways *of* social change are to succeed, they should be free of dogmatism and above all, encourage a willingness to experiment. An open society such as ours should not exclude and approach to change merely because it does not fall under our accepted levels. I do hope that the many thinkers and workers active in this field will look into the problem of Indian rural change from this point *of* view and suggest ways *of* speeding it up.

We live in challenging times. The issues that the present age poses to India's youth are complex but at the same time offer great opportunities for innovation, achievement and progress. I hope and trust that those who have passed successfully through the portals of this university will be equal to this challenge and will play a glorious role in the rapid transformation of India's agriculture. May I wish them all the very best of careers and achievements in the national cause.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
2nd ANNUAL CONVOCATION

28th January 1967

Address by
Sri M. Bhaktavatsalam
Chief Minister of Tamilnadu

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice-Chancellor, My young friends, Ladies and gentlemen.

I would like to express to you, at the outset, my gratitude for the honour you have conferred upon me by inviting me to deliver the convocation address of this university today. I come from a family of agriculturists and, in my official capacity, have been associated with agricultural development for a number of years. I have been, and continue to be in charge of the education portfolio in the Government of Madras. I am particularly happy therefore. to associate myself with the convocation in an institution principally devoted to agricultural education and research.

The value of scientific methods of farming and of training persons in the ancient art of agriculture was realised in our country as far back as 1870, but the progress of the few institutions set up to teach agricultural and veterinary science was halting and none too satisfactory. While provision for general higher education in the arts and sciences was made roundabout that time with the establishment of the universities of Bombay Calcutta and Madras, which celebrated their centenary only a few years ago. Agricultural education at the college level was started only at the turn of this century when a course on agriculture as part of the science course was introduced in some five colleges. In the early years very few students were attracted to agriculture, partly because of the general aversion to manual work and partly because of the unattractive rewards it offered. During the thirties, when the Great Depression swept the country the demand for trained workers in agriculture was at its lowest and the prospects of absorbing trained workers brightened only with the initiation of a large number of developmental schemes under the Grow More Food Campaign during the Second World War and the Post-war Period.

The formation of the three Five Year Plans in Free India has opened up new vistas for trained agricultural workers in all fields of specialisation and the demand has been far in excess of supply in spite of efforts to train larger and larger numbers. Today the agricultural scientist has been given the recognition due to him and the country has already started to reap the rewards to such recognition in the development of far-reaching innovations in agricultural technology.

In the agriculturally advanced countries, there is very close relationship between the advance made in the field of agricultural education and research on the one hand and improved farming methods on the other. Agricultural development does not depend so much on government policies and projects as on the level of teaching and research standards achieved. In our country also, the Indian Council of Agricultural Education, and the bodies connected with it, reorganised agricultural and veterinary education at different levels with a view to achieving this end. The Government of India provided assistance for the establishment of five Regional Post-Graduate Agricultural and Veterinary Institutions based on the recommendations of a Joint Indo-American Team. These institutions of higher learning have helped not only to meet the country's requirement of trained personnel but also to step up the quality and number of research programmes.

Land Grant Colleges were established in the United States under the Morril Act in 1872. Initially, agricultural experimental stations were integrated with these

Colleges and later, in 1914, extension services were also brought within the purview of these Colleges At the moment, land Grant Colleges are generally residential Universities, comprising several colleges devoted to science, technology and humanities, all co-operating in offering a type of education suited to different aptitudes. Research, Education and Extension service in agriculture, engineering and Home Economics are fully integrated in these institutions.

The University Education Commission presided over by Dr Radhakrishnan commended this system and recommended its adoption in our country The two Joint Indo- American Teams which went into this question were also strongly in favour of starting agricultural universities on the land Grant Pattern in India with a view to streamlining agricultural education and research in the country. The first Agricultural university on the land grant Pattern was established at Rudrapur in Uttar Pradesh with five college namely (1) College of Agriculture, (2) College of Veterinary Sciences, (3) College of Agricultural Engineering, (4) College of Home Science and (5) College of Basic Sciences and Liberal Arts, all located in a common campus in an area. Encouraged by the results, six more new agricultural universities, two of which are in the south, yours being one of them, have come into being and the progress of these premier institutions is being watched with immense interest by all those interested in the agricultural development of the country Experience of the working of this pattern of Agricultural education, Research and Extension and, more particularly, the experience in the field of my young friends here who are taking their degrees today and others like them will, I have no doubt, indicate whether and if you can reap the fullest benefit from these institutions. Your responsibility as the earliest alumni of this University is therefore a great one and you are, in a sense, path finders and pace setters.

I am glad to learn that your University though only two and half years old, has already certain significant achievements to its credit. A College of Basic Sciences has been established here at Rajendranagar for strengthening and enriching the specialised training to be given to the students of the three faculties during the second and subsequent year of the respective courses, giving them a broad foundation of general education and basic sciences in the first year of the integrated course.

The introduction of trimester system of courses and internal assessment of academic performance of the students is another major academic reform ushered in by your University This keeps the students always on the alert.

I also note that as many as 43 Research Stations and 108 Research Schemes scattered all over the State have been taken over by the University and that research activities are now being recognised to tackle more effectively the regional agricultural problems of the State.

Your recent decision to undertake extension activities in two districts of the State, namely, Hyderabad and Chittoor, with the ultimate object of covering 1he whole State as soon as possible, in order to bring the fruits of research and education to the doorstep of the agriculturists through the pipeline of extension is a

bold and imaginative one and its outcome will be watched with great interest by people all over India.

The strategy of planning, particularly since the beginning of the Second Plan, has been to concentrate on those sectors of the economy such as steel, machine building and production of fertilisers, which will enable us in a short time to reduce dependence on foreign aid. But because they were framed in an environment of peace and security the plans legitimately assumed that a measure of foreign aid would be available to supplement domestic resources and savings in the building up of an economy which could become eventually self-reliant and self-generating. The conflict with Pakistan has, however, taught us a great lesson. To be able to withstand international pressures a nation should not only be politically independent but also economically strong and self-sufficient in vital sectors. Self-reliance not only means freedom from dependence on foreign aid but also involves the establishment by our own effort of an acceptable minimum standard of living for the masses and a continuing rise in this standard. Self-sustaining growth is thus closely interwoven with 'self-reliance'. As the Fourth Five Year Plan has rightly pointed out, we do not aim at any form of autarky nor can we dispense with all imports. No country in the world has been able to do so. What we have to ensure is that the country's requirements will be met from within to the maximum possible extent and that what it must obtain from abroad is limited to what it cannot produce within its borders or finds it uneconomic to do so in terms of comparative advantage and, even more important, that it is able to pay for these imports with its export earnings. A self- reliant and self-sustaining economy should produce sufficient exports to meet the cost of these imports.

This calls for development of adequate export capabilities to meet essential requirements of imports largely from our own resources. With our slender resources, we cannot afford to import both machinery and food on a large scale at the same time. If we are to import food to that extent we have to forego import of heavy machinery. Besides, exports cannot be related merely to the surplus which remains after meeting fully the Supply of domestic consumption. In order to earn foreign exchange, we have to sacrifice those commodities which, in normal circumstances, we might have opted to consume for ourselves. This spirit of self-denial or restraint on consumption is an essential pre-requisite for the attainment of self-reliance. Such restraint on consumption enforced, among other things, through an appropriate fiscal policy is also essential if we are to meet simultaneously the vastly increasing needs of defence and development without generating further inflationary pressures. Apart from restraining domestic consumption and initiating a drive for exports. We should also undertake, in a bigger way import substitution through affording wider opportunities to our scientists and technologists for the exercise of their ingenuity and capacity for innovation and improvisation.

The need for self-sufficiency has been most acutely felt in regard to supplies of food and has lent urgency to programmes of agricultural production. Very rightly, our Five Year Plans have accorded pride of place to programmes of agricultural development. In the past decade and a half, considerable progress has been achieved in increasing agricultural production which has laid the foundations of a progressive and forward looking industry. Inspite of the significant increase in production, the per capita availability of cereals is only around 13 ounces per day. This went down last year to 12 ounces in view of the unprecedented drought that swept

the major part of the country. Agricultural production has registered an average rise of more than three per cent in the Plan period and this is no mean performance. Even so, we have depended upon substantial imports to meet the needs of our population which has been growing at an alarming rate of 2.2 per cent to 2.4 per cent per year. The heavy dependence on import of food grains and the uncertainties surrounding these imports have been responsible for some rethinking on the formulation of the Fourth Plan. In order to be self-reliant in the food front, the framework of the fourth Plan visualises a rate of growth of not less than five per cent for agricultural production. Thus, the production of food grains by 1970-71 is expected to reach a level of 120 million tonnes which is one and one third of what was produced in 1964-65, the best year we have had so far. With this availability, the per capita consumption of food grains would be raised to 16 ounces of cereals and 2.5 ounces of pulses per day in 1971 .The higher targets, no doubt, present a formidable challenge but this challenge has to be faced. If agricultural scientists take it upon themselves to solve the problems that beset our agriculture, I am sure, that the target can easily be achieved and perhaps exceeded. Our jawans have conquered most difficult terrains, and I am sure, our Kisans will not lag behind. The task of assisting the kisans is entirely in the hands of agricultural scientists and technicians. .

Farm output in the United States is estimated to be nearly six times what it was a hundred years ago. The break through in the techniques of farming has been particularly pronounced during the post-war period when productivity became an increasingly important source of growth in farm output. Side by side with the technological revolution, there were rapid changes in the composition of input-mix used in farm production. Use of farm labour decreased sharply while total farm land remained almost unchanged and farmers used increasingly greater amounts of non-farm inputs such as fertilisers, pesticides, machinery and hybrid seeds. An important feature of the technological revolution in farming has been the rise in the resources productivity viz., larger output per unit of input. During the last one and a half decades, productivity has risen at a record rate of nearly 2.00 per cent annually The experience of the United States has shown that productivity is the key to agricultural property in advanced economies and the bulk of the productivity gains may be attributed to improved technology based on sound research. The trends in the agricultural productivity of the United States have offered certain guidelines to gear our research and extension programmes on lines similar to the technological revolution brought about in the United States. While it may not be technically feasible or desirable to displace farm labour by resorting to large scale mechanisation in a country like ours, where holdings are not large and unemployment and underemployment are chronic in the agricultural sector there are immense potentialities for the use of non-farm inputs like fertilisers, pesticides and fungicides and hybrid seeds to push up productivity on our lands. This is the basic strategy of our Agricultural Planning in the Fourth Plan.

Most of our research in the past was directed towards evolving new strains either for improving quality or for meeting the tastes of specific regions. Breeding for disease resistance was a further development, but the increase in yield in the new strains was only marginal and the farmers were more or less in different to the use of new varieties since the change over could not produce spectacular results. With advances in cropping technology, it has now been realised that a three-pronged attack is necessary to realise massive acre yields. The three basic inputs that are to be activated are the plant, its nutrition and, last but not the least important, protection from biological hazards. Most of our existing types do not respond to higher doses of fertilisers even though they yield moderately at lower fertility levels. Scientists have therefore to look for suitable varieties

that would have the physical frame to stand heavy doses of fertilisation and also give massive yields. The evolution of the rice variety ADT. 27. which is cultivated on a large scale in Madras State, is the outcome of a programme of hybridisation of a well adapted Indian variety with high yielding and high fertility Japonica types. To meet immediate demands. several heavy yielding rice varieties like Taichung Native I, and IR-8 are being multiplied and distributed as an ad-hoc measure. But crosses between indigenous rice strains and exotic varieties have to be effected in order to get the best qualities of both so that, before long, high yielding strains wholly suited to our conditions would become available in large numbers. The entire breeding programme has to be re-oriented with an eye to the evolution of types which are disease-resistant and are potentially prolific yielders. The new hybrid strains of sorghum and bajra evolved as a result of the co-ordinated efforts of the scientific workers of the Rockfeller Foundation and the Indian Council of Agricultural Research and its Regional Centres have caught the imagination of the farmers in view of the impressive yields that have been recorded. The earliness and prolific yield potential in sorghum and the extensive tillering and uniform maturity in hybrid bajra, have opened out unlimited possibilities of extending these crops to large areas. There is a great awakening in the country and a keen desire to use better strains and newer inputs. This situation should be taken advantage of for activating an agricultural revolution. The hybrids suited for rainfed areas have come as a boon to the large body of agriculturists who have no facilities for irrigating their land and are entirely dependent on the monsoons. The success of the hybrid millet programme is the success of team work and shows that if we can pool our resources and channelise our efforts in the right direction, prosperity for the entire nation is not difficult to attain.

If we have a careful look at the inter-industry table computed for the country it would be obvious that more than eighty per cent of the gross output moves directly for final uses and less than twenty per cent is demanded for inter industrial uses. This implies that, in our economy, the network of processing industries is not as complicated as in developed economies and there is less dependence of one industry for its input on the output of another industry. Most of the goods do not undergo elaborate stages of processing. The low ratio of purchases of inputs in the case of agricultural sectors, clearly indicates that our farms heavily depend on internal resources rather than purchased inputs. In addition, the farm economy is more family-oriented than market-oriented since the bulk of the output is consumed within the farm itself. In most of the agriculturally advanced countries, a small proportion of the population is able to produce the entire food and fibre requirements of the country and a sizeable quantity for export. All this is possible because of large scale application of purchased inputs and higher productivity realised per unit of input.

So far as our country is concerned, we are only in the pre-take stage of the agricultural revolution and purchased inputs have come to the fore-front only in the recent past. As the economy gains momentum, there will be a great demand for industries producing fertilisers, pesticides, tractor and farm machinery and pumps and motors which support agriculture by providing it with inputs. The latest among the inputs to be commercially produced with success is hybrid seed. In the production of these specialised and varied inputs, a large amount of technical skill and ability is required. With larger use of these inputs there is a need to sue them in varying conditions and circumstances. The production processes will have to become more sophisticated, scientific and need-oriented. If, therefore the country's demand for its various new inputs is to be met quickly and satisfactorily, a large reservoir of agrotechnical skill has to be created and the responsibility for doing this rests on our Agricultural Universities and

Colleges. They have thus a great role to play in training and providing the right type of technical men to meet the growing demands of industries that produce agricultural inputs.

Quite a few agro-industries depend for their raw materials on the agricultural sector. These agro-industries process agricultural products into other edible and non-edible products. Processing units for rice, flour, sugar, oil, tea, coffee, tobacco and fish, dairy plants, bakeries, fruit and fruit canning and baby food plants are some of the agro-industries that have so far been developed in our country There are immense possibilities for greater development of these processing industries and this would create enormous employment potentialities, besides assuring the farmers of a higher return for their produce. But the development of such a large complex of agro-industries in the country will not be possible unless we train large numbers of highly educated specialised agricultural scientists and engineers and an even larger number of technicians and extension workers.

I wish to lay special emphasis on this aspect of agricultural education and training because it seems to me that, as yet, this bias has not made itself *felt.* Hitherto we were accustomed to thinking of agricultural education as a means of training a crop of extension workers and, to a smaller extent, of research specialists. While the need to produce these two categories of trained personnel will be greater still in the future, the need, at the same time is to produce well-trained young men who can enter the field of agro-industry of all kinds, either as employees or even as self-employing small entrepreneurs has to be recognised and met. This diversification, if I may so term it, of under graduate agricultural education is an immediate necessity.

The need to increase agricultural production rapidly has been recognised and given top priority. The efforts of scientists and farmers are alike and directed towards the goal of self- sufficiency. I submit that our goal should even now be defined not merely as self-sufficiency but as production of large exportable surpluses. \We are already exporting sugar; coffee. tea, spices and various nuts. It should not be impossible, if our efforts are purposive and well-planned, to achieve exports of other commodities as well. What is more, we must even now plan for the production and export to other countries of agricultural machinery, agricultural inputs and the end-products of agro industries. Where we are already exporting agricultural raw material or manufactured goods of an agricultural origin, our aim should be to modernise our methods of production in order to cut costs and capture larger export markets. Here we are deficit in production today our aim should be to increase it in order to be able after providing for our own needs, to meet needs in other countries. Agriculture, which is, and will continue for a long time to be, the main industry of the Indian people should and can, provide for the country's earning abroad to a large extent. It does this indirectly through the production of many goods such as textiles and sugar It can do this even more directly The Government of India are specially emphasising the development of export-oriented crops in the Fourth Plan. The success of this effort also depends upon trained agricultural graduates and workers.

I would like to take this opportunity to refer now to our efforts to impart agricultural education at lower levels than the University. In Madras, we have agricultural schools run in State Seed Farms where boys from agricultural families, small landowners mostly are given a year's training in agricultural education with a view to making more

scientifically-minded farmers of them. The training is almost entirely practical with the necessary minimum of theory. While a gratifyingly large percentage of those trained thus go back to agricultural avocations, the tendency among a large number is still to look for jobs under Government. We have also provided Agriculture as a subject of study in the bifurcated school course, but it is doubtful how many of those who take this either go on to study agriculture at the University level or go back to the farm to put their training to practical use. A suggestion has been made recently that Junior Agricultural Schools should be set up in the same manner as Junior Technical Schools to impart agriculture-oriented school education. This is a suggestion well-worth examining. But none of these schemes will work satisfactorily so long as those who benefit from them have their sights only on Government jobs. The position unfortunately is this. Those who come from well-to-do families or even from middle class groups are keen on University education and, even if they think of qualifying in agriculture at lower levels, they do so only because they are unable to secure admission to other courses or because they have an eye on a post under Government at the end of their training. Many of them are also landless and cannot, even if they wished, put their training to personal practical use. In any attempt that we make to re-orient education at the school level with an agricultural bias or to provide intermediate levels of agricultural training, we must recognise and seek to solve this problem. I have already mentioned the need to bear in mind the needs of agro-industry as the engineering diploma holder is in the field of industry. The problem I have mentioned of people joining agricultural schools or bifurcated courses with a view to securing employment under Government may then solve by itself. But I feel that we cannot afford to deal with it on that basis. We should not continue to produce, or take steps that will increase the production of, trained persons who may look only to Government to provide employment for them. May I commend this problem for the earnest consideration of our planners and all those interested in agricultural production and education? There should, I feel, be an effective linking of the specialised training in agriculture given at the secondary school level with agricultural education in the University and, at the same time, the former should in itself be enough to equip the student as a competent agricultural technician. This will enable the school-leavers with agricultural training either to find employment in agricultural extension or agro-industrial work or to pursue agricultural education at the University level.

It is also necessary to impart as much possible knowledge of agriculture. especially agriculture as practised in this country to all students at the elementary and secondary levels of education so that school pupils in this agricultural land of ours do not come out of school without a good knowledge and appreciation of the basic avocation of the country. Basic education has sought to do this to a great extent. Our school syllabi do deal with agriculture and agricultural practices. But I cannot help feeling that this has not been sufficiently emphasised and that the students in our cities and towns in particular have no clear idea of agriculture in the country The recent report of the Education Commission has emphasised the need to give an orientation towards agriculture in all educational institutions. This is necessary if every educated person is to appreciate and help to tackle the problems of agriculture.

We constantly bemoan the fact that our graduates, even those with an Agricultural degree, do not go back to the farm. This, of course, is principally due to the fact that, in most holdings, farming has not been a very paying or profitable proposition and that the richer farmers do not need to have their sons working on the farm. Basically it must be confessed, this has been due to a feeling that farming is a second class occupation and to be avoided, if possible. Can we hope that we will see a change in

these attitudes with farming becoming more lucrative with diversification of cropping and the use of high yielding varieties and scientific methods of agriculture? I think we can. The two processes, namely, the increasing use of scientific methods and pursuit of farming as an avocation by more and more trained men will, I am sure, act as mutual catalysts and result in a rapid development of the agricultural economy. Let me hope that there will be *some* at least among you today who will put to practical personal use all the scientific training received in this institution and act thereby as models for the farmers all-round them to follow.

I would like, before concluding, to refer to a problem that is troubling educationists and administration alike to-day: There is a tendency on the part of students to take to an agitational approach and that again, not unoften, with reference to problems that do not directly relate to them. While it is necessary that students should maintain a close and active interest in all matters of moment, no one interested in the future of the country can approve of their activities lapsing into defiance of the law or a disturbance of the public peace. Discipline at all levels is essential if our nation is to progress. Without the development of a civic sense, a sense of national pride and a sense of discipline, whatever efforts we may make towards achieving a prosperous and powerful India will be futile. All of us here, administrators, teachers and students alike, have to realise and accept the truth of this. May I venture to say that in getting students to realise the need for the maintenance of discipline and to recognise when legitimate self-expression degenerates into reprehensible demonstration, parents and teachers have to play an active part? Would it be wrong to suggest that parents should act as more active sources of counsel and advise them now? I am not implying that parents should keep their children under direct and stern disciplinary control. But when the child becomes the young man, it is time the father turned into advisor and counselor and both father and son recognised this special facet of their relationship. May I therefore say that the fathers should, without interfering with the natural exuberance of youth, let their sons have the direct and sobering benefit of their experience? The teacher is and ought always to be a second father. Much has been said about the lack of a proper teacher - student relationship, especially due to the increase in number of the latter, and the impersonal nature of the bond between them. It has been suggested that the tutorial system, in some form or other should be introduced in order to remedy this. Whatever be the method adopted, it is necessary to my mind, that the closest possible contact is established between the teacher and the pupil and that, by his attainments and conduct, the teacher is looked up to by his students for advice in all their scholastic and campus problems. This, I am sure, will go a long way towards quieting the restlessness that students feel at many of the things happening around them. I know that my suggestions are not new but they are of urgent relevance to-day.

Let me wish you, my young friends who are taking degrees to-day and stepping out into life, a career of service to your country and success in life. It is trite but true to say that your country needs you, especially at the present moment. May you serve her in a spirit of devotion and dedication. There is an air of expectation and a promise of big things to come in Indian agriculture to-day. It will be your duty and privilege to help translate this expectation and this promise into glorious reality. I congratulate you all on securing your degrees. My best wishes go with you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
3rd ANNUAL CONVOCATION

3rd February 1968

Address by
Dr. Jagjivan Ram

Rajendranagar, Hyderabad – 500 030

Friends

I am happy to be here to participate in the Third Convocation of the Andhra Pradesh Agricultural University. The historic city of Hyderabad has a unique place in the country. It has seen the fusion of many values and cultures and has evolved a composite culture of its own. It has been the centre of successful experiments patronage of fine arts. Today it is the centre of agricultural education and research of a state famous since ancient times for its farming skills and productivity. The Andhra farmer has deservedly received praise from several agricultural commissions including the Royal Commission on Agriculture. Agriculturally, Andhra is a miniature India containing in its confines the diverse types of soils and plants which we see in the whole country The wheat crops I see around here would be objects of admiration even among the best farmers of the North Indian Wheat belt. The rice crops cultivated in the delta areas of this State have evoked the admiration of rice experts throughout the world. For those desirous of devoting themselves to the pursuit of Agriculture there is, therefore, a great tradition to sustain and improve. If the modem scientific techniques are blended in right proportion, with the practical wisdom and experience of the Andhra farmer, it will help in creating an agriculture which will rank among the best in the world.

The main aim of an agricultural university which is a new experiment in education is to achieve a complete synthesis of education, research and extension both at the faculty and student level. The assumption behind this philosophy is that a teacher to be elective should not only have considerable research interests but ought to have extension experience as well. Contact with farmers makes a teacher practical in his outlook and aware of the needs of the community An effective feed-back relationship is thus established between a research worker and a farmer: more than in any other field of science in the productivity of all agricultural commodities and farm animals, which is the main purpose of agricultural research and education. The participants in an agricultural revolution must all function in unison with each other to produce an integrated impact. It is for the purpose of instilling such a sense of harmony and team work that we embarked upon the programme of starting agricultural universities on the pattern of the Land-Grant Colleges of the United States.

In referring to the concept of the agricultural university as an experiment, I was only trying to stress that in whatever developmental work we do. there ought to be a mechanism for a constant appraisal of the effectiveness of the techniques employed and for making such alterations in the structural and procedural framework as may be indicated by the experience already gained. It is difficult and futile to attempt a definition of the dividing lines between education, research and extension. What is important is to realise that each of these spheres provides ample scope for the expression of the genius and ingenuity of a person engaged in it. It is, therefore, up to the alumni, both past and present, as well as the faculty members of the universities to devise the best way of allocating definite spheres of responsibility and ensuring that everyone is able to give the best in his own line of activity while working as members of a common team.

Apart from attempting to achieve an effective integration of training, research and extension, the pattern of education in the agricultural universities marks a departure from that prevalent in the traditional universities of our country By and large, we still have an education pattern evolved in Europe during the last century. At the time when this pattern of education was developed, science was still in its infancy. It was possible then for a scientist to make a significant contribution to the advancement of human knowledge and welfare without having to know much about the other disciplines. This situation has. however changed in the last few decades and today it is difficult to add in a significant way to the store of scientific knowledge without team work involving scientists with specialised knowledge in different disciplines. A biologist could function a few decades ago without-adequate knowledge of chemistry or mathematics. It is hence we have groupings such as 'Botany Zoology and Physiology in our universities from the Pre-University stage onwards. This rigid grouping of subjects has had disastrous effect on the breadth and depth of knowledge. comprehension and vision among our students. It is, therefore, our desire that in the new pattern of agricultural education we are developing, ample opportunities should be available to every student to make good for the deficiencies in his early educational career The demand both in India and abroad for the post-graduate students educated at the Indian Agricultural Research Institute at New Delhi, which was the first University in our country to initiate such a pattern of education, is proof of the effectiveness of this new approach. I do hope that the flexibility in course-composition which this system affords is being used with advantage for enriching a student's knowledge and experience.

To students of agriculture, it is not necessary to enumerate the various favourable and unfavourable features of our agricultural situation. It is the duty of a scientific worker to exploit the favourable features and minimise the harmful effects of the unfavourable ones. It must also be remembered that we are racing against time and that in our country every day and every hour counts in determining the ultimate result of our fight against the low per-acre productivity and the resultant hunger. While planning for any agriculture sector the awareness of the time factor and problems as rapidly as possible should always be kept in view.

The low productivity of our land has been a major factor responsible for stagnation in our agricultural production. In the case of rice, the yield in our country is as low as 1.1 tonne per hectare. Because of such a low yield we have to depend upon other countries for a part of our rice requirements even in good season, although nearly 40 million hectares of our cultivated area is under this crop. The arable area and the proportion it bears to the total area of our country is among the highest in the world. In the coming decades, therefore. we cannot expect to augment agricultural production by bringing more land under plough. It is even likely that we may have to plan for a reduction in the existing acrage under cereals so as to make room for growing feeds, fodder and forests. This implies that we have to increase the productivity of our land to attain self-sufficiency as also to provide for our growing needs. In order to increase our agricultural production, we have evolved an agricultural strategy based on intensive cultivation of high-yielding exotic and hybrid varieties of seeds supported by requisite plant nutrients, adequate water-supply and effective plant protection measures. Our farmers have readily taken to this new strategy which has already started revolutionising our agriculture. Agriculture is being

transformed from a mere subsistence occupation to a profitable enterprise. It is a matter of gratification that today pressure is being exerted by the farmers on Government for being provided with all the necessary inputs for the new method of agriculture.

The progress that has been made during the past few years and particularly during the past two years in face of severe drought and scarcity conditions, makes one very hopeful to achieve self-sufficiency in our requirement of food grains. But we cannot afford to be satisfied only with an increase in the quantity of food grains we produce. A qualitative improvement in the diet of our people is an urgent necessity.

In a country like ours where we have a sizeable vegetarian population, this can be brought about only through an increasing shift from the plant-to-man food chain to the plant- animal-man food chain. The dramatic improvement seen in recent decades in, the health and vigour of the people of Europe and North America is due to consumption of food of better quality and greater variety. For example, the average height of an individual in the United Kingdom has risen by several inches during this century largely due to better nutrition. Both the mental and physical faculties are to a considerable degree influenced by the quality of food and therefore unless we pay serious attention to this aspect, we will pay a very heavy price in the future. You must remember that nearly 40 per cent of our population is below the age of 15. The future of the country will be greatly influenced by the mental and physical abilities of this generation. Traditionally, we in India assigned a very honorable place to milch – animals -specially the cow The way she was treated bordered on veneration. Isn't it paradoxical that in a country where the cow has been held in such veneration people have to depend on imported milk powder for meeting their milk requirements? Today we are living in an age where the value of protein with a proper balance of amino-acids for providing necessary nutrients in the diet has been recognised. Milk and milk products are the only source of this nutrition for a large number of our people. Here again we have no time to lose.

We live in what is rightly called the scientific age. The great impact of science on human welfare is clear from the rapid improvement in the average life of people in the various parts of the world. In India, for example, the widespread use of public health measures and preventive medicine has resulted in the eradication of several diseases like malaria, cholera, and plague and reduction in infant mortality Consequently, the death rate has fallen from about 40 per thousand three decades ago to 17 per thousand now. The expectancy of life which used to be only 27 years when we attained independence is now about 50 and it is expected to rise to about 63 by 1975. As a result of all these the population of our country has grown very rapidly and it is expected to reach over 600 million by 1975. The Government has hence taken serious steps to introduce science in the control of the birth rate also and it is our hope that the net growth rate in population can be brought down to about one per cent in he next decade. I am not referring to these facts with a view to repeating the oft-stated apprehension that the dreaded Malthusian relationship between population growth and food production is coming true and that man will be both squeezed and starved out of existence by the beginning of the next century if the population continues to grow at the present rate. My aim is to stress what is not

often realised namely that it is the application of scientific knowledge and achievements of research in fields such as antibiotic development, immunology and preventive medicine that is responsible for such an achievement in the control of the death rate, but that an unbalanced application of science to social-welfare would have serious consequences such as that which we witness in the case of population growth.

Thanks to the foresight of the late Shri Jawaharlal Nehru, an era of planned development was initiated in India in 1951. The agricultural development programmes initiated during the last 15 years have contributed towards an appreciable increase in food production. The minimum production of food grains was 55.5 million tonnes and the maximum 72.2 million tonnes during the first Plan period with an average of 65.8 million tonnes. In the Second Plan, the minimum stood at 66.5 million tonnes rising to 82.0 with an average of 75.3 million tonnes. During the Third Plan period, the minimum stood at 72.3 with a maximum of 88.4 and an average of 80.4 million tonnes. This year, we expect to harvest about 95 million tonnes. Besides this increase in food output, the production of other economically important plants like jute, cotton and sugarcane has also risen appreciably Nevertheless, the steady rise in the imports of food grains during the past 15 years indicates that while progress has been made, the rate of growth in food production has not been adequate to meet the increased demand arising partly from the growth in population and partly from a rise in consumption levels and change in food habits caused by a general increase in the standard of living of our people. The fact that our food problem is in part a consequence of the rise in national income tends to be ignored. It is often overlooked that with the rise in standard of living, coarse grains are replaced by finer grains resulting in a shift in the consumption pattern of food grains. The demand for coarse grains diminishes and consequently their production is affected. It is our country which produces the largest varieties of food grains. Against the half-a-dozen or so food grains produced in other countries, we have hundreds of them. Some of the coarse grains or minor millets were evolved after many .years of trial and experience to suit special soil and rain conditions. Some flourish even in poor soils and with scanty rain fall. These grains have not yet found their rightful place in agricultural research. It is time that our research workers and specialists undertake planned and serious research on these grains also. If they can evolve high-yielding strains of these grains, it will add immensely to our food production. It is imperative that serious efforts are made in all directions for transforming the present scarcity conditions into one of adequate food availability.

Science has shown that the production potential of Indian agriculture is *enormous* at the Indian Agricultural Research Institute. More than ten tonnes of food grains are being produced per hectare per year from the same land with techniques which are within the reach of an average farmer: We have abundant sun-light which is a primary requisite for crop growth. Our water resources, although over-shadowed by the drought of the past two years, are quite considerable. There is hence no occasion for gloom in facing our food problem. It is, however, obvious that any problem which is not faced squarely and solved expeditiously would continue to vex us. Therefore, agricultural programmes should not only be given very high priority in the spoken and written words but should also really receive the first priority in action .and implementation. There is much that can be done with our existing resources by voluntary efforts of the people. If we arouse popular enthusiasm for undertaking

such minor irrigation and soil conservation works which require only earthwork and not much financial outlay, wonders can be brought. People's participation has vast potentialities for rural reconstruction.

An efficient plant, like an effective human being, needs to have an integrated personality. Only when all the aspects of a plant are in balanced harmony will it be able to perform well under good conditions of cultivation. Minds which cannot comprehend the purpose and philosophy underlying the unity and diversity of living forms cannot really cope up with problems of agriculture. We have lost much time in harnessing science and technology for increasing the production of crops and farm animals because of the low stress and support we have given to agricultural research. The rest of the world has taken rapid strides, so that whenever the average yields of crop plants or milk production by cows or egg production by poultry are compared country-wise, we occupy an un-enviable place. We are today paying the price of years of inadequate attention to agriculture, which ought to have become by now our primary industry. But *for* our average rice yield being as low as 1.1 tonnes per hectare, the drought of the last two years which affected only about 2 million hectares out of over 60 million sown to crop plants, should not have stated such a condition of food scarcity. In a country of our dimensions, floods or drought may occur in one part of the country or the other every year: It would hence be unrealistic and short-sighted if we do not base our plans *for* increasing production, providing always a margin *for* unfavourable seasons.

In a vast country like ours where climatic conditions differ so widely it is not possible *for* all States to become self-sufficient *for* their requirement of all agricultural commodities. Some areas are suitable *for* horticulture, others *for* rice and millets and yet others *for* wheat, pulses and oil seeds. Some may produce more jute and others more cotton and others more sugarcane. The whole country has to be treated as a composite whole and the requirements of all areas *for* various agricultural commodities will have to be met from the overall production of the entire count. That is being done. Only by doing so we can get the maximum yield for the areas most suited for different varieties of agricultural commodities.

Andhra has some of the highly productive agricultural areas in the country. Farmers here are hard working, enlightened and receptive to new ideas. That is why Andhra has the proud privilege of time and again coming to the assistance of other deficit States with supply of considerable quantities of rice. It also has some very dry districts. Estimates reveal that, drought may occur in the Rayalaseema and Telangana districts once in three years. Hence work on problems which are relevant to minimising the instability in agricultural production in such areas has to be continued. At the same time new opportunities should be explored where projects like the Nagarjunasagar provide, *for* developing desirable and highly productive cropping patterns.

A word to my young friends who have been conferred Degrees today 'Though your University is young, the Research Institute here is an old one having been established nearly 40 years ago. You have hence a combination of traditions -old and new. I hope, you will absorb the best in both, *for* nothing short of the best in

training and effort can help us to make rapid progress. Let us declare a total war on hunger and poverty and strive to banish them as speedily as we can. In this war you have the privilege of launching the frontal attack. I have earlier given an idea of the various tasks which you may undertake. Remember one thing very clearly. Unfortunately, in our society there is a wide gap between the educated and the uneducated. The educated regard themselves as a distinct class -much superior to the uneducated. It is harmful in all walks of life and in all sectors of society. But it is nowhere so harmful as in agriculture. Unless you identify yourself with the farmer you cannot be effective and successful in your work. The Indian farmer may be illiterate but he is possessed of sturdy commonsense and has an insight into agricultural operations and practices borne out of long experience. Try to evolve a synthesis of your modern scientific knowledge with his long experience. I have no doubt that if you can carry the farmer with you we will win the war against hunger and poverty. I wish you success in life.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
4th ANNUAL CONVOCATION

9th February 1969

Address by
Smt. Indira Gandhi

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice-Chancellor, members of the Faculty, Graduates and Students of the University, Distinguished Guests.

Mr. Vice-Chancellor, you have described your address as prosaic and conventional, but if by prosaic is meant dull, it is certainly not prosaic. It is an honour and a privilege to address this convocation. I am always glad to visit centres of learning and a convocation for all its formality does symbolise the link between knowledge and life. An Agricultural University in particular must deepen our views in life and make our land what Bankim Chandra Chatterji called -"bounteous in water and in produce and glorious green".

As you reminded us, in 1966, I laid the foundation stone for the new complex of the Agricultural University Buildings in Hyderabad and I must congratulate you on the manner in which this vast complex of hostels and laboratories has grown so well and so fast. This- ceremony is being held in Tirupati, a place of pilgrimage which draws the devout from all parts of the country. Traditionally our pilgrim centres have also been centres of learning and scholarship. This is appropriate but after all, is not knowledge itself true religion?

The farsightedness of the Temple Authorities to spend large part of the revenues of the Temple on Education is praise worthy Tirupati is also situated in the Rayalseema area which is periodically subject to droughts and hence is in need of special programmes for help. The last three or four years have vividly demonstrated how greatly agriculture dominates our economy and our entire life. The year of the drought were not only years of lean phases and industrial slowness but also years of political and psychological disquiet. But the harvest of last year which was record one, as well as the promise of a good harvest this year - despite floods, droughts and cyclones -has altered the political landscape and we can see national confidence re-emerging. These good harvests are not accidents but proof of the saying that Fate itself is moulded by character and action. The drought tested the mettle of our people and our people proved their stamina and their heroism. They did not accept the act of Nature with customary Indian resignation. They willed to overcome Nature.

Even before the drought, we had evolved a programme of intensive agriculture. The years of drought served to prove the value of this programme. What is equally heartening is the performance of the farmer which has been good even in area which were not classified as intensive areas. This is because of the general strengthening of the services offered by official and cooperative agencies. A very large effort of the last twenty years in building up irrigation potential and extensive network is at last showing some results. Our recent experience with the use of improved agricultural technology fills us with the hope that we can do all that our people need.

In a country where half the National Income comes from farming, agricultural self reliance is the very foundation of all self-reliance. We have determined that in the course of the Fourth Five Year Plan which will be launched in about two months.

we shall overcome the need to import food. Agricultural self reliance is one of the cardinal objectives of the Fourth Five Year Plan. We are sometimes accused of having neglected agriculture in our earlier plans, but the task which the Nation requires are so many and varied that each of them will find special champions. We do not have a choice between agricultural progress and industrial progress-we need both. We cannot argue about irrigation versus fertilizer-we need both, nor can one progress without the other It was right that we undertook major irrigation works in the First Plan and then turned our attention to major Industrial Development in the subsequent two plans. All over the world, experience shows that Agriculture can be modernised and larger harvests garnered only with the help of a solid industrial structure. It is the industrially advanced nations which have also achieved high production and productivity in Agriculture. Today we are in a position to better correlate industrial and agricultural programme and we propose to do this in the Fourth Plan.

Recently the President cautioned us against being too complacent about the green revolution. A Nation on the march can never rest or be complacent. Our task has only just begun but the green revolution is a fact though not yet a general fact. It is limited to some segments of our vast land and still to reach the small farmer. The lands which depend only on rain have not yet turned from brown to green and it is this small farmer about whom we should all be intensely concerned at the present moment. The new agricultural strategy while it has brought national self-sufficiency within sight, has aggravated rural disparities. The example of the highly affluent nations such as the U.S.A. and Canada are to warn us that by stressing only production, we shall not be able to solve the hard core of agricultural poverty. Recently, there was a report on the pockets of malnutrition which still exist in the United States. Our economists and our agricultural scientists and particularly teachers and students of Agricultural Universities should give deep thought to devise ways of helping our small farmer. The enforcement of ceilings and the redistribution of land to the landless and to the very poor, is a programme which should be expedited. When holdings are small and resources for investment in land are not plentiful, we have to turn to science.

The architect who designed Chandigarh once said “We don't have much money, so we have to think". The Graduates of Agricultural Universities must carry the new technology to our villages and devise new activities for the smaller farmers which would bring them larger incomes from their small holdings. The use of high yielding varieties of seeds, better land management, more intensive use of Animal Husbandry and Poultry farming as well as Horticulture will all have an important share in better farming. We would like our Graduates to go back to the land and to give a new and modern look to our tradition-bound society. We are proud of the contribution of our Plant Scientists to our recent progress. The new seed varieties which they have evolved have been widely adopted. In fact, the demand far outstrips the supply; there is new hope now for cereals but in the matter of rice-cultivation we still have many unresolved problems and disease resistant varieties have still to be evolved for rice areas in different parts of the country: Our recent experience has also shown that quantity alone is not enough and that we must keep in mind consumer preferences as well as nutritional needs. Not far from here in the

Tungabhadra area, farmers have learnt the technique of lift irrigation and they began to derive higher incomes from jowar and cotton. This shows and experience in other parts of the country also shows that the farmer who was long supposed to be the most conservative *of* men has been quick to learn these methods. There is need today for a nation-wide campaign to learn to use water and all our resources as scarce resources. We must extend irrigation facilities but even more important is irrigation improvement. We should popularise land management and water-management. The new technology also asks us to revise some *of* our old notions. For example we have been told for long, that one *of* the main problems *of* our countryside is over population, that is that too many people depend on land, leading to wide-spread rural unemployment or under- employment. Yet intensive agricultural practices created demand for more labour and in some progressive districts, there is today shortage *of* labour In finding answers to unresolved problems in rice, our scientists have also to give more attention to evolving new varieties *of* pulses, and oil seeds as the rural milk and meat. I touch upon some problems and some requirement in agriculture, but one *of* the main tasks before the nation is to make the farmer contribute to true development and to seek benefit from development. Fortunately Agriculture has ceased to be an un remunerative activity In fact, in many areas *of* the country, particularly in the Punjab, farming has been drawing away the people from other professions. We must progressively eliminate the element *of* subsidy in agricultural inputs which are largely going today to the comparatively better off farmers. We must also strive to divert part *of* the additional incomes which have been generated into larger schemes *of* rural development, which will benefit the smaller and the poorer agriculturists.

I have expressed a few thoughts on agriculture but life is not lived in compartments. Life is one and all *of* us whether we are agriculturists or politicians-are all citizens *of* this great country. Science today permeates all aspects *of* life and it must be correlated with purposeful action. We do need new ideas but let us not be swept off our feet by new ideas which also need to be correlated so that neither development nor our lives nor nature itself become unbalanced. In solving one problem, we should be aware *of* creating worse ones. It is important also that those who go in for agriculture or horticulture or forestry take special care to preserve the flora and the fauna *of* this country I have been deeply distressed recently to get letters from different parts *of* the country telling me how these are being depleted and how the face *of* the country is changing and many species are disappearing which we may never be able to have again. In India, we have for too long sought individual salvation. Perhaps that is why as a country. we came to grief. We have now realised that there cannot be salvation for the individual without social salvation in the sphere *of* science or in any other sphere. Working together does count and does make a tremendous difference.

Some one has said that Education is not what a man knows but what he is-what he becomes-but whether it is knowledge or personality which we are after. The question arises to what end we are going to use this. and I think that unless we use it for a higher aim which is the welfare *of* our country, it is knowledge wasted.

The Vice-Chancellor has spoken *of* making education Indian based and I agree with him there; but I think today the most important feeling to inculcate in all our young people is the feeling *of* involvement in the country's future. We would certainly all like good conditions in which to work but I think we should and must work whatever the conditions may be. I should like each student to say "Come what may I shall live and work for my country to make it a better place to leave my mark on it". It was this sense *of* commitment which brought us freedom transforming ordinary men and women into heroes. Today there has to be a new commitment.

Young Graduates, a University passes on the knowledge of earlier generations to a new generation. You have completed the years of preparation and now you will be on your own. I wish you well in life; serve Andhra Pradesh and serve the country well and add to the greenness of land. You are here under the shadow of Sri Venkateshwara and Padmavati. I hope that will not make you more complacent and think that they are going to help you on in life; rather. they should urge you to perform better so that you can be worthy of their patronage. May I give my congratulations to those who have won degree and to those who have won awards and my good wishes to the other students. May you all shine in whatever work you undertake and bring credit to India and to your University.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
5th ANNUAL CONVOCATION

15th March 1970

Address by
Sri V.P. Naik

Rajendranagar, Hyderabad – 500 030

Rajyapalji, Brahmanandaji, Vice-Chancellor, Shri O. Pulla Reddi, Professors, students, ladies and gentlemen.

I am indeed very happy to be associated with the Convocation of this leading Agricultural University of Andhra Pradesh and I feel greatly honoured to have been invited to address this august assembly. Andhra Pradesh has the reputation of being one of the progressive agricultural States in India and is in fact regarded to be a granary for rice in the country. You have also the distinction of having one of the earliest agricultural universities in the country.

As you are aware the very concept of a separate agricultural university is comparatively new to us. The first agricultural university I understand was established hardly a decade ago and even now there are several States which do not have a university exclusively for agriculture. In view of the comparatively small period available for the setting up and development of the university it would be a little premature to judge whether the specific objectives with which these universities were formed have been fulfilled or not. I had, however, an occasion to go through the literature sent to me by your esteemed Vice- chancellor and I am happy to say that your University has made significant progress in several fields in spite of the fact that the university was established only in 1964 and that we have not had much experience in setting up a university different in nature from the traditional universities with which we have been familiar.

So far as agricultural universities are concerned, in the course of time; there should be no problem of agricultural graduates finding employment because unlike the traditional universities the object here should not be to give undue importance to employment but to educate persons who are already committed to the field of agriculture and train them in their requirements. If the establishment of a separate university is really to serve any useful purpose, the students coming out of the university must not merely of coming back to the university as teachers and research workers. In fact, they should prefer to go to the field with their advance technical knowledge. After utilising their knowledge in the field and having gained experience of the practical difficulties encountered there, they should be able to go back to the University for Solution of their problems. The university, in turn, will benefit by their experience and also will be able to acquaint them with the latest developments on the subject. There should thus be a two-way traffic which alone will benefit both the students and the university and also the country.

In order that there should be a greater rapport between the university its past students and the agricultural community in general, some deliberate measures may have to be .introduced. While it may be true that education of fundamental principles in agriculture would be the main function of the Agriculture University, care must be taken to see that in our detailed courses of syllabus and methods of teaching, research and other matters in the field of Home Science, Agricultural Technology, Agricultural Engineering, etc., we do not have a replica of what is being done under these very names in the traditional universities. The education imparted here will necessarily have to contain more practical import with reference to the needs of the

area and the actual development in the various fields as conceived in the areas served by the university It has to be more in the nature of education of the agriculturists in different aspects of agriculture rather than teaching of an entirely new subject not concerned with agriculture. This would not mean that no distinction is to be made for specialised fundamental research in fields like agricultural engineering or technology. The point I wish to make will be more clear by taking an illustration. When we say that we want more agricultural engineers we expect them to know the application of principles of agricultural engineering in day to day agriculture and deal with problems which are comparatively less academic. They may, for example, have to deal with, may be, giving consulting service in setting up small lift irrigation service, digging up of irrigation channels, levelling of land, contour bunding, utilisation of mechanical implements to the best advantage under certain field conditions, improving small implements, using principle of engineering mechanics and things like that, rather than designing a big irrigation dam or more complicated agricultural machinery requiring specialised knowledge of metallurgy etc.

For this purpose, the courses may also have to be sufficiently practical oriented and sufficiently diversified providing insight into new developments. These could be divided into suitable small partitions which could be taken up by the students according to their requirements and as per their needs in the matter of their professions: Some of these courses could be thrown open even to outsiders, who may be interested in subjects like horticulture, plant protection, certain aspects of agricultural engineering, agricultural processing, water management, etc. While, therefore, fundamental research and post-graduate studies may be oriented in a particular direction, the core of education up to under-graduate stage has to be more significantly oriented as to meet the practical requirement of the persons who are already wedded to agriculture or agricultural "custom" service.

It may be worthwhile to introduce a system of direct correspondence Courses under which selected farmers who are interested in getting instructions by correspondence may be encouraged to ask questions and get replies by letters. This service can further be augmented by the well-known practices of holding "Farmers Days", Exhibitions, discussion groups and training camps at strategic points where in progressive farmers could be exposed to the entire new technology and new practices and their curiosities aroused. If this is done properly the students coming out of the university will not feel strangers in the new atmosphere where they will be required to work. The research will not be in a glass-house and there will be no scope for the feeling that the university belongs only to teachers and the pupils. The agricultural community will also regard university as an institution of their own, interested in their welfare.

The modern trend of laying more accent on agriculture is not just an accident. Agriculture is the most important industry in this country It has been widely recognised by now that the main yardstick for measuring country's prosperity is its advancement in the field of agriculture. Practically every aspect of our economy is vitally linked with agriculture. Recent natural calamities like droughts, famines and

floods have shown us how even industry suffers if agriculture fails. As the old saying goes:

At the head of all sciences and arts,

At the head of civilisation and progress,

Stand not militarism, the science that kills;

Not commerce, the art that accumulates;

But agriculture, the mother of all industries,

And the maintainer of human life.

We have accepted a socialistic pattern of life as our creed. It is our intention to reduce the gap between the rich and the poor not merely by imposing more burden on the comparatively affluent but by raising the lot of the common man. Since more than 3/4th of our people are depending on land as a means of their livelihood, it becomes clear that agriculture is the only sector which can have a decisive impact on the general standard of living obtaining in the country.

Luckily, in respect of land as well as in the rich variety of crops that we can grow India is favourably placed. We grow such a variety of crops that not other country can boast of. Our soil also responds magnificently: The more you pour into it, the more. you reap. In no other industry the turn-over is so quick, the return so bountiful and the employment provided so wide. We are, no doubt having difficulties and a large number of areas are still not served by irrigation and they are dependent on the vagaries of monsoons. The holdings are small. The per acre yield to-day stands now here in comparison with the averages obtained elsewhere. But no difficulty is unsurmountable. In fact, by our sustained efforts and planning during the past few years, we have already made a breakthrough and the green revolution is at our door.

I am not a Graduate of Agriculture, but only a farmer: From my personal experience, let me assure you, farming is one of the noblest professions. God has created us but has not provided us with ready means of livelihood. It is we who have to create them and complete the job which He willed us to do. Would you not say that it is as noble and sacred a task as any other nation-building activity? As persons engaged in agriculture, are we not the builders of new India like any other architects and engineers?

The task before us is by no means small. With the introduction of ceilings and other land reforms the future pattern of agriculture would basically consist of small and medium sized land-holdings held by peasant-proprietors. With increasing mechanisation, agricultural labour and traditional methods of agriculture will become more and more expensive and very soon a large majority of cultivators may be compelled to manage and work on their own farms. The society will also have to change its attitude of looking towards persons engaged in pursuits involving manual labour. History has taught us that no country has become prosperous merely on its wits but not unless a, majority of its people were engaged in creative and

constructive activities. Work is in fact worship and there is a special joy in creative employment. Countries like Germany and Japan which were completely ravished during the Second world War have come up and regained their stature simply because of their devotion to hard work. Unless agricultural universities re-orient their programme of action to serve this class of self-employed educated workers, there is a danger of our turning out a large number of graduates and post-graduates seeking employment only in teaching, research and extension. As the capacity of such institutions for providing jobs is limited, it will lead only to more frustration.

It has not been possible for us as yet to completely conquer the uncertainties and hazards of nature. Our excessive dependence on rains makes agriculture a gamble. The uneven distribution of rainfall sometimes causes droughts and at times wet famines. Besides, there are pests and diseases, floods and cyclones which add to this uncertainty By the time we get over one crop failure, we are faced with another. The holdings being small, the creditworthiness of the farmer is also limited. He has no savings of his own to fall back upon. Crop insurance is yet to be introduced. The tendency of the prices to fall immediately in the wake of the harvest and to rise out of proportion to the cost of storage etc. in the lean period has its own adverse effect on the farmer. Many a time, the farmer is compelled to sell under duress and buy the same produce later on for his own consumption at higher rates. Some efforts have, no doubt, been made recently to assist the farmer by guaranteeing 3 minimum price for his produce in advance of the sowing season, by introducing a system of monopoly purchases in respect of the staple food grains and by filling up of adequate buffer stocks so as to regulate market fluctuations. Emphasis is being laid on the other hand to accelerate the maximum utilisation of irrigation potential, on conducting research to evolve high-yielding and hybrid varieties of seed, on the building up of storage, marketing and processing facilities. With the bank nationalisation, the criteria for extending credit have also been shifted from adequate security for the credit to the economic viability of the scheme. All these efforts would, no doubt, provide some extra facilities to the farmer but cannot be the end in them. The only answer is for us to actually achieve increased production and it is here that your expert technical knowledge gained in this university is going to be put to trail.

Realising the difficulties of the small holder and the agriculturalist, the Planning Commission is contemplating to introduce a package scheme during the Fourth Five year Plan. Under the scheme, farm production plans are prepared and the small holders are helped by giving liberal financial help in the form of loans and subsidy for developing the land, developing irrigation facilities and for multiple cropping. Landless labour is also given financial aid in cash and kind for undertaking subsidiary occupations like poultry sheep- breeding, etc. In Maharashtra, a sum of Rs. 25 crores has been earmarked for the operation of this scheme in the Fourth Plan. A similar scheme must be under contemplation in Andhra Pradesh also. I would earnestly expect the young men coming out of your University to study the scheme and to reach their extension technique and expert knowledge to the small holder who is the weakest link in our war against poverty.

Increase in production alone is not going to be the panacea to our adversities. The agriculturist must get a due share in the profit with a good beginning in this direction. A large number of co-operative sugar factories, spinning mills and rice mills have come up and the farmer is gaining more and more confidence into this hitherto unknown field. The graduates coming out of the university with their knowledge of engineering, processing and marketing are bound to play a very useful role in creating and strengthening such institutions wherever they decide to settle in future.

Like agriculture, animal husbandry and dairy have also remained somewhat neglected in the past. Although the country has a vast cattle population, our live-stock is not rich, our milk yield per cow has not shown much improvement. Our chronic scarcity areas look barren. Not many attempts have been made as yet even to grow grass on them in a systematic manner. I am told your university has taken up a small project of reclaiming 100 acres at Rajendranagar for growing nutrient grass for cattle on soil largely barren with scanty rainfall. I do wish that the experience gained is made available to others so that such areas throughout the country could be put to more profitable use.

Before, I conclude let me congratulate you young men who have obtained degrees on your creditable achievement. You will. no doubt. live up to the traditions of high ideals and service to the community and thereby bring a good name to your almamater As you all know India is undergoing a change and the coming decade is going to be crucial in converting our age-old poverty into prosperity. In achieving this goal. You have only climbed one step and much more of sustained and arduous effort still lies ahead with your dedication and undaunted spirit. I am sure you are going to play a notable role in promoting agriculture and bringing welfare and prosperity to the nation. I wish you all the best.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
6th ANNUAL CONVOCATION

5th April 1971

Address by
Sri V.V. Giri

Rajendranagar, Hyderabad – 500 030

I am extremely grateful to your Vice-Chancellor and my old and esteemed friend, Shri Pulla Reddy, for affording me this opportunity to be here to deliver the Sixth Convocation Address of the Andhra Pradesh Agricultural University. It has been my proud privilege to be the first Chancellor of the first Agricultural University at Rudrapur in Uttar Pradesh. This University modelled on land Grant Colleges of the United States of America was a precursor to many more institutions to be started in different parts of the country. The Agricultural Universities and institutes of research have played a pivotal role in the development of a new agricultural technology in India.

Ten years ago there was a widespread feeling that Indian agriculture had a low potential. There were fears about the capacity of India and other less developed countries to feed their growing population. This .mood of pessimism and gloom has *now given* way to an air of self-confidence and we have a new hope in our agricultural capabilities This dramatic change in the situation has been brought about by the rapid development of the new agricultural technology. Our food grains production has risen from the low levels of 72 to 74 million tones recorded in the drought years of 1965-66 and 1966-67 to 99.5 million tonnes in 1969-70 and 101.05 million tonnes in the current year. These figures are significant. But even more significant is the change in minds and attitudes of an increasing number of farmers, many of whom are responding to the new technology and practices with a buoyancy that could be thought of hardly possible some years ago. Scientists and research workers, through hard work and unstinted devotion, have indeed opened new vistas for agricultural progress.

I am particularly happy to note that your University which started seven years ago, has made a note-worthy contribution in bringing about an awareness towards developing our agriculture on a scientific basis. Many projects that have been undertaken have taken the results of research to the practical fields. The purposeful work done by your research workers has helped in releasing several high-yielding varieties of rice, jowar sugar cane. cotton, chilli and wheat.

While I appreciate the technological changes that have taken place in recent years leading to a breakthrough in food grains production, I would repeat that what has been achieved so far is significant but not adequate. A great deal more remains to be done. We are not yet free from the vagaries of the monsoon and there are too many imponderables in the agricultural situation. The formidable problem of agricultural organisation has to be tackled in all its manifold aspects if we are to provide a durable foundation for the progress of the Green Revolution.

Rice, which is our major food grain.. has thrown up problems and challenges which our scientists are trying to meet assiduously and with confidence. Among coarse grains, while hybrid bajra is doing well, there are problems faced by cultivators in regard to hybrid jowar and maize, which have yet to be solved. The desired increase in production in India in the coming years, hinge on the solution of the different problems encountered by different crops. I, therefore, consider them deserving of prior attention by the scientists. I am happy that in the case of rice, eleven new varieties suitable for different agro-climatic regions have recently been released, and we might well be on the threshold of a breakthrough in rice technology

for India. I hope the co-operative endeavour of scientists. extension workers and administrators would lead to an early fulfillment of this objective.

The green area includes much more than the area under cereals. Green revolution should, therefore, also imply that changes comparable to those in cereal introduction are brought about in regard to pulses, vegetables, fruits, oil seeds, other food crops, fibre crops, fodder, etc. While pulses are a source of protein for a large number of people in India, the cash crops have value in sustaining the new attitude of the farmer towards investment in agriculture. Demands are going up and so should production. I understand that in the last two years efforts to evolve high-yielding varieties and improved scientific techniques in respect of some of these crops have been intensified. Some new varieties of pulses and cotton have been released for adoption. In the interest of providing balanced diet and meeting the industrial requirements of agricultural raw materials, a great deal of research and extension effort is called for in bringing about a breakthrough in these crops. The success of the experiments and demonstrations in multiple cropping establishes the need for the introduction of short duration varieties of several of these crops in the cropping pattern, depending upon local conditions.

While we welcome a rapid growth of production, we cannot shut our eyes to some of the social aspects of the green revolution. There have always been disparities in wealth and incomes resulting from qualitative and quantitative differences in land holdings. In India such differences have become wider of late. Though the new technology is neutral to the size of holding, the benefits of this technology and of institutional finance and extension machinery have not spread fast enough among small farmers. It is not the fault of the new technology that the income gap between large farmers on the one hand and the smaller farmers and farmers in dry areas and agriculture and labour on the other has widened. What we need is more technology suitable for the small farmers and dry areas. Even more. we have to find more resources and facilities and carry out structural reforms to take advantage of the new technological transformation of agriculture.

In the interest of social and economic stability of the nation and its progress, it is imperative that the income disparities are narrowed. In the last one year Government of India has already undertaken massive and concrete nationwide programmes for helping the small farmers, marginal farmers, agricultural labour and dry areas. Programmes involving an outlay of about Rs.400 crores to be incurred by the end of the Fourth Plan are being taken up. About 2.3 million families of small farmers would benefit in 46 districts in which small Farmers Development Agencies are being set up to ensure supplies of credit, inputs and services to these farmers. Over one million families of marginal farmers and agricultural labour would benefit from a programme for widening employment opportunities through encouragement to the production of subsidiary foods for which the market is readily available in industrial townships and other urban centres. A rural works programme has been taken up in chronically drought affected areas which would provide employment to lakhs of under- employed and unemployed people in every season and improve the infrastructure for agricultural production. In dry areas of the country 24 projects are being taken up for research and development. For the districts, which are not covered by the above programmes, a Crash Programme for Rural Employment is

being taken up. An amount of Rs. 150 crores would be spent in the remaining three years of the Fourth Plan and employment opportunities would be provided to over 4 lakh people. These programmes are a beginning in the right direction. Scientists and research workers have an important role in evolving innovations and techniques which can enable the government to further the aims of economic and social progress of vast millions of rural population.

Adoption of the advances of science and technology can both depress employment and also increase employment. Higher profits might induce large farmers to purchase machinery and equipment and dispense with labour This would lead to aggravation of the unemployment problem. On the other hand, it can also lead to vastly increased opportunities of employment since the cultivation of high-yielding varieties and adoption of new technology call for greater care seed treatment, sowing, weeding, fertilizer application, plant protection and water and soil management. There is also more work involved in the harvesting of the larger crop, its handling, transport, processing, etc. It is important to develop a harmonious balance in the use of men and machines. Gandhiji had cautioned that modern machines and tools should not be used as a means of exploitation of others. We have to ensure that modern technology is adapted to suit our conditions and to help in increasing the well-being of the largest number of people.

After centuries of stagnation, our people are on the move. We must realise that in the history of nations, there is hardly a parallel to what we are attempting today in this ancient land of ours. We have an enormous population-14 per cent of the world's total crowded into just 2.4 per cent of the world's land-surface. The demand of our people for a fuller and richer life is irresistible and nothing less than a radical transformation of our society can guarantee them the fundamental rights enshrined in our Constitution. This revolutionary transformation of our traditional society has to be accomplished by an open society dedicated to parliamentary democracy. Unless our people's enthusiasm, willing co-operation and sustained and disciplined effort are yoked to the mighty endeavour of national reconstruction, we will not make much headway. We have just witnessed in India a massive and peaceful expression of the will of the people. They have demonstrated as never before their faith in a democratic secular and socialist society. With the great mass awakening, the time is now propitious for launching an all-out effort for the eradication of poverty and unemployment. I have devoted considerable thought to the problem and have placed my considered views before the country in my book "Jobs for Our Millions". There is hardly any time to lose. The expectations of our people are high and we will have to satisfy them. We must produce tangible results in the next one or two years.

We must take urgent and effective steps on a war-footing with the primary aim of generating mass employment, combined with rapid economic growth. A labour-intensive technology to absorb the entire man-power surplus through all channels of development is called for. To begin with, I would urge the creation of a net-work of country-wide multipurpose pilot projects. These projects should be manned by a 'dedicated task force of picked men and women who should be the instruments of rapid socio-economic change.

In the course of the next decade or two, we should have a net-work of collective farms and co-operative farms throughout the length and breadth of the country and thus putting every bit of land into productive use and assuring every employable person adequate work and a living wage. These cooperative farms should become the focal points of national endeavour.

The immediate problem in developing countries like ours is rural poverty which is inextricably tied up with the problem of raising the efficiency of the agricultural sector: I consider the building-up of the necessary infrastructure for greater agricultural productivity as of foremost importance. If only we could enlarge the small farmers' interest in progressive' agriculture, through a network of co-operative multi-purpose farms, a major task would have been accomplished.

The sources of land allotment for these projects are the lands left surplus consequent on the implementation of land reform legislation, Bhoodan lands, and waste lands already with Government. The aim should be to utilize every inch of available land anywhere, Even rocky lands could be made use of for setting up small units operated on power for the collection of gravel for road-building.

As in most other activities in life. so in agriculture the co-operative approach is the best. In India. where the land holdings are very small. it is impossible to expect progressive farming or higher productivity. It, therefore, becomes inevitable for the small farmers to come together in a co-operative way and thus get the benefits at least to some extent of large scale farming and larger resources. The co-operative approach, not only to agriculture, but also to industry and other forms of economic activity will lead us to the goal of socialism to which we are pledged. Survival as a small unit in the face of the stiff competition can be achieved better through co-operation than by any other form in a technologically advancing world.

To begin with, the co-operative farms will consist of the vast tracts of uncultivated land in large blocks. In the first year or two. the colonists would all be engaged in reclamation, tractorisation and construction of the irrigation potential. Many of our land allotment programmes have failed because no attempt was made in the initial stages to reclaim the waste land or provide irrigation through tube-wells, tanks and other wells involving deep drilling by mechanized processes. It should also be a condition precedent that no ownership rights are conferred in the colony. The ownership of land should vest in the State, and the colony should be treated as a means of livelihood.

In the selection of colonists, an attempt should be made to combine the various skills necessary for making the cooperative farm a self-contained production unit. From among educated people, civil. mechanical and electrical engineers. agricultural science graduates. animal husbandry men, co-operators, forestry men. teachers, medical and health personnel. should all be recruited. One of the aspects that should be borne in mind is to make each one of these farms a factor for national integration. The composition of the colonists should be such as to ensure a fair mixture of people from different states and different cultural and aesthetic

background and faiths. Assuming that each farm has an area of roughly 1,500 to 2,500 acres the total number of families employed should not exceed 100.

The colonies should be ideal settlements, self-sufficient in all aspects of rural life and economy. Every colony should have community facilities such as a school, cultural centres, parks with radios, gymnasium. co-operative credit agency of a bank, etc. When reasonable facilities and amenities are available on the spot, the craze for trekking to the cities will disappear.

The colonies may be single village or multi-village settlements, depending upon the compactness and extent of the land available. In either case, each village unit should be about 1200 acres for settling 200 unemployed persons and their families. In case larger blocks are available, the area should be divided into village units so that such dispersal will enable the settlers to be within easy reach of their agricultural holdings, and will also make the whole area pulsate with life and animation. All members of the colony should contribute 'Shramdan' towards all productive activity This is in confirmity with the ideal of developing self-reliance among the beneficiaries.

Each settler should be given a homestead of 500 square yards for building a house, cattle-shed, poultry pon and kitchen garden. The settler's quarters in its final shape should have a minimum accommodation of two rooms, a kitchen, store and bath, all elegantly designed. The pattern of cultivation should be mixed farming with horticulture, animal husbandry, pisciculture and cereal crops, combined in reasonable proportions for mutual benefit. In order to create interest in farming and relieve the boredom of conventional methods of cultivation, mechanization and improved bullock-drawn expedients should be introduced, as far as possible.

In these colonies, other aspects of the rural economy should also be developed. Agro-industries like gur-making, crystal sugar manufacturing, oil crushing, paddy hulling, flour grinding, bee-keeping, canning of fruits and vegetables, processing of dairy products, poultry, repairing of farm machinery and also training in small-scale industries, should be established, depending upon the availability of raw material, power connection etc.

Employment opportunities will be fruitful only when the seekers of employment are willing to work hard. The efforts of the State and society will be nullified if the beneficiaries accept the opportunities in the spirit of "doles". They owe a duty to utilize the opportunities not only to help themselves but to promote the well-being of the nation as a whole.

While the use of fertilisers to increase production is to be welcomed, we have to see that the fertility of the soil in the long run is also maintained. One of the foremost problems in this direction that we should keep in mind is that the ecological balance of nature is kept up and regular and periodical testing of the soil is conducted. !n this connection, I would suggest the setting up of soil testing

laboratories in every college where science is taught so that the facilities could be available to the farmer at his door-step.

I have dealt with at length with the problems facing us and I hope those of you who are taking the degree at this Convocation will spearhead the movement for the return of intellectuals possessing a mastery of modern technology to our villages. Mahatma Gandhi remarked over 40 years ago that divorce between the intellectual and labour is the bane of our agriculture. I am glad that this position is changing for the better and more and more of our educated people are taking to agriculture. That agricultural development can pave the way, for a rapid growth of agro-industries and job opportunities is very clear from what has happened in States like the Punjab. The rapid rise in per capita income of people of the Punjab is mainly due to more and more progress in agricultural improvement. Thanks to the more extensive and easy availability of credit, it should now be possible for other parts of the country to make similar progress speedily. I hope you will be the harbingers of a new life for our country-side. I wish you God-speed in your endeavours.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
7th ANNUAL CONVOCATION

30th April 1972

Address by
Sri P.V. Narasimha Rao

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice Chancellor, Members of the Faculty, Graduates, Students of the University and Friends,

I am deeply conscious of the honour you have done me by inviting me to deliver the Convocation Address. Behind the outer veneer I think you will find that I am basically a farmer. I come from a farming family and like to think that I am a progressive farmer.

I have always been interested in education and in educational institutions. I thus feel doubly honoured to be called upon to speak today at the Convocation of the Andhra Pradesh Agricultural University, principally devoted to agricultural education and research.

Yours is one of the earliest Agricultural Universities to be established in this Country. It has done pioneering work in many fields. It has amply justified the concept behind the establishment of agricultural universities on the model, of Land Grant Colleges.

Agriculture was an important component of the fabric of Indian life in the olden times. In one of the ancient texts, Manu says:

"One must know how to sow the seed;
one must judge the condition of the soil,
the quantity required and by
how many factors it will multiply"

This was very practical advice, not likely to be bettered in its essentials even today. Agriculture has been basic to man's progress from times immemorial. India was a land of plenitude and systematic agriculture. There was a tradition of irrigation works being constructed and maintained by the rulers; the farmers paid rents and taxes. An Englishman wrote from India as early as in 1616 that "the plenty of all provisions was very great throughout the whole country and every one may eat bread without scarceness".

Subsequently, there was foreign domination. and we had to undergo a number of vicissitudes. After Independence, our developmental plans have clearly recognised the importance of agricultural development forming a firm base for development in other sectors. To a fair extent, I think it can be said that we have succeeded in our aim of increasing agricultural production.

Where does Indian agriculture stand today? In particular what is the place of Andhra Pradesh in the mosaic of national agricultural development?

Food production in the country is going up steadily The situation is comfortable, particularly in wheat. Such an outcome would have sounded optimistic five or six years back. That there has been such phenomenal progress is due to the

efforts of our agricultural scientists and lest we forget our alert and able farmers. There is however still need to increase the production of cotton and oilseeds.

It is the popular belief that the progress in food production has not been as much in the South, as in the North: that a production break through has come about In wheat. but not'; in rice. I do no want to go in depth what is important today is to apportion responsibilities for development. no to apportion responsibilities for development. We in the Ste should ensure that institutions like the Andhra Pradesh Agricultural University fashion the tools required for agricultural development, and that these are used by the farmers. The administration has to have, more than even the proper orientation to agricultural policy. It should develop a basic empathy with the farmer's point of view. New relationships have to be built up and institutionalised between the policy makers, the administrators. the scientists and the farmers.

More than 40 per cent of our rice production in the State comes from the coastal districts with assured irrigation. The newly-developed high-yielding varieties are not catching up in this tract in *kharif-* apparently because they run into cyclonic weather and floods at harvest due to their short duration. The University will be giving a great push to rice agriculture in the State by breeding improved kharif varieties for this tract. I am confident that, with a proper appreciation of the extent to which our present developmental efforts can be extended for maximising results, and with the arrival of varieties with appropriate duration and other desirable characteristics, we will achieve significant production increases in rice in the near future.

In rabi rice, the contribution of high-yielding varieties is steadily rising. In West Godavari district, for instance, 80% of the rabi area is under such varieties. There is similar progress in other districts, though not of this magnitude.

In cotton, our farmers have brought 50,000 acres under superior strains in Nagarjunasagar Right Canal area, starting from scratch two years back. In Telangana, cotton has again come to be grown in a big way in Karimnagar and other districts, once well known as cotton tracts.

In milk production, it can be said that we are on the verge *of* a white Revolution. With assured marketing of milk, cattle development has taken on added fillip. In oilseeds, Sun- flower has made an impact on the farmers in a mere one season, and promises to be an important oilseed crop *of* the future.

What I should like to emphasise is this. While physical results are important. The pre- disposing conditions for progress are equally important. The participation by farmers *of* all categories, big or small, in modern agricultural technology is steadily on the rise. This is a heartening sign.

What are the pointers to action that can be said to arise from all this? That we should realise that the climate for change and progress is very much present. For agriculture to prosper, for the crops to thrive, it is not only the weather that must be kind. but even more it is necessary that the over-all climate for progress should be favourable. Such a climate exists now. Farming is coming to be considered as profitable occupation, *if* not a career. The time is gone when agriculture carried such imponderable risks that even a well-to-do farmer in such conditions "would fast rise from affluence to penury". Farming has not only become respectable, in some cases it has become even fashionable. The respectivity of the young farmers to scientific advances in agriculture is particularly remarkable. Farming is well on its way to becoming a scientific occupation. Old ideas are fading out. The days are over when advice on farming could be handed down from father to son. The present pace of progress is such that in ten years the books will have to be rewritten.

Technological breakthroughs have occurred in the agricultural Sciences; if not in all crops, at least in some; if not in all areas, at least in a few favoured tracts. The Andhra Pradesh Agricultural University has been a participant is such progress, in releasing new varieties of rice, particularly suitable for cold areas in Telangana; in evolving a composite bajra for dryland areas. There have been useful contributions in other crops as well.

But we must realise that before a technological break through can become a production breakthrough at the field-level, a number of problems have to be tackled. Our real success will be decided on how best we tackled the second problem. With the present pace of scientific advancement, it looks as if research' will always be in advance of man's ability to profit from it.

Agricultural Research cannot be considered in isolation from the general, social and political fabric of the country The Andhra Pradesh Agricultural University as a major force for agricultural change in the State has necessarily to be a partner in this process. There must be an adequate recognition on all hands that transforming our agriculture is not merely a research or an administrative task. It is transformation of a social structure, a way of rural living.

There is a saying that the right tools always come along at the right time. This does seem to be the case today The new plant-types, which have the ideal architecture and the physiological potential for high yield, have come at a time when the basic groundwork has been laid for the production and distribution of the essential inputs like fertiliser and chemicals, and when there is keen anxiety on the part of the farmer to make progress. The social and political climate in the country at the present time is also extremely favourable for stilling the disruptive forces which arise from lop-sided development or undue distribution of gains to any section of society.

The problem in India is not merely to fashion the tools of scientific progress. This is being done in an increasingly successful measure. The bigger problem is to train the community in the proper use of these tools, and to ensure that the benefits from such production flow equitably to all sections.

The most important factor to be considered in this behalf is the progressive implementation of land reforms, and other regalitarian measures. With these measures, we will not only be able to even put the distortions in development, but also impart in ever increasing measures the primary motivation to the farmer to better his lot by adopting the ways of scientific agriculture. This is precisely the context wherein a good deal of realistic thinking and planning have to be organised. The agricultural technology of tomorrow has necessarily to be one suited to the small. The formulation of cropping patterns or the application of inputs, the strategy has to suit the size of the farm of tomorrow and the economic condition of the farmer. The grandiose schemes of yesterday however impressive they may have been, will have to be given up, or at best retained for purposes of demonstration.

It is to be noted, however, that all the favourable factors in agriculture today apply more to the irrigated tracts where the new agricultural technology is of direct and immediate impact. The problems of dry land agriculture are more intractable and no easy solution is in sight. No doubt, a whole range of scientific tools is being forged for benefiting the precariously-irrigated, rained areas. But no dramatic changes seem to be in sight. This is the section where there is a greater agricultural population and where any immediate gain, even of a modest order and not on the dimensions of a breakthrough, will have beneficial results on a broad front. I do hope that the Andhra Pradesh Agricultural University will identify this opportunity and concentrate on it. The situation in this respect in our State is specially favourable, with the recent establishment of the International Crops Research Institute for Semi Ari Tropics near Hyderabad, to conduct research on these problems.

I feel that an opportunity exists today for the Andhra Pradesh Agricultural University to broaden out into new fields. While much of the present research is productive. there is need to go on into a wider spectrum. to have a "systems analysis" approach to the gamut of problems relating to agricultural development. Inter-disciplinary research of the type conducted in your University is a productive field of endeavour. It would be even more productive if we could spell out the parameters for research in such a way that they encompass the national priorities laid down for agricultural development. Fruitful fields for effort on these lines may lie in increased attention to stabilising dry land agriculture in the arid portions of Telangana and Rayalaseema; in development of fodders that can fit into such conditions; in carrying out research on the agro-economics of new crops and varieties offered by research to the small farmer, particularly to the small farmer or tenant benefited by land reforms or by assignment of land by Government.

It is necessary in this view that the Agricultural University comprehends the entire canvas of agricultural production processes. It is already a specialist institution in the purely technological disciplines in agriculture. It can be something more. It can use its resources of trained brain-power to evaluate performance constantly and advise the policy-makers on some of the extra-disciplinary factors influencing agricultural development and help ensure balanced agricultural development.

"Balanced development" may be an ideal difficult to attain. It is said that the only balanced agricultural economies are those that are stagnant at a low level of

productivity. But striving towards the ideal would become even more difficult in the absence of a specialist institution, a "think-tank". to constantly appraise the problems. It is this role that I think your University can usefully play in our State.

Another important problem in agriculture is that of prices. Today a situation has arisen where the producer on the one hand and the consumer on the other are depicted as sworn enemies, with absolutely irreconcilable interests. Governments are at their wits' end, most of the time, doing this tight-rope-walking. The oft-detested middleman comes in only for verbal condemnation, while getting away with his profits all the time. I think it is time that a specialist body like the Agricultural University takes up this matter in all its ramifications and spells out price structure patterns which harmonise the interests of all concerned. The modern theories and practices of optimization etc.. should be made applicable to agriculture and the problems thrown up in this process should be satisfactorily solved. The next important issue for consideration is the quality and content of teaching effort in the University. I must compliment the authorities of the University in keeping up the high standards of the past. There is, of course, always scope for further improvement. We could ensure that more of the teaching effort is in fields of immediate practical utility and field application. This is an important problem because it is only when the agricultural scientist can function also as a field-technician that the community and the farmer will benefit from the investment made. The agriculture graduate must thus be trained to be a field oriented problem-solver. As Dr. Borlaug said:

> "The plants can speak to you, but cannot shout. If you are seated at the desk in the office, you will never hear them. If you are out in the fields with them, they will tell you. 'I am a good plant. I have a strong stem and a good grain-head.' The only way I know for a scientist to be effective in solving food production problems is for him to get out and work. Sweat and get dirty in the fields".

To this end. the University should train the young graduate in the basic diagnostic skills to recognise problems and advise farmers. The teaching and research wings of the University should not be only integrated. as observed by the National Agriculture Commission, but teaching should be intimately tied to extension problems. Just as a doctor is attached to a hospital. it is essential and indeed obvious that the agricultural undergraduate be closely associated with the farmer's field which is his hospital. I may go a step further and add that given the will and the goodwill, agricultural scientists can convey every private farm into a research laboratory and every small farmer-even an illiterate farmer-into a willing and enthusiastic collaborator in significant research projects. The farmer will stop short at nothing provided he is convinced that something is being done for his own ultimate benefit. As a dreamer. I am waiting for the day when this situation obtains in our country.

A word at this juncture about employment prospects. I am painfully aware that quite a few of those on whom degrees are conferred today may not find employment immediately, particularly if they rely on entering Government Service. It has always puzzled me why, when it is considered normal for a medical graduate to aspire for

private practice. We do not enable agricultural graduates to set up private farm consultancy services. It would be good if the University could locate openings for such work. Scope for this may particularly exist in the various districts in our State where schemes for Small Farmers. Marginal Farmers. Agricultural Labourers and Dry Land Agriculture are under implementation. There is also enormous scope for agriculture graduates to take up the challenge of developing unproductive but potential good land which is available in plenty in our Country. If the graduates are themselves landless, land could certainly be assigned to them. Details in this behalf could be worked out and a sustained programme of land development could be drawn up with the participation of agricultural scientists. provided of course, that they are willing to participate.

I congratulate those who have been awarded degrees today and wish them well. The path ahead of them may not be entirely smooth. But the goal at the end is well worth the hard work they will have to put in to reach it.

Jai Hind

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
8th ANNUAL CONVOCATION

27th August 1973

Address by
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I feel privileged to be here today to share the joy of those who have just taken their degrees and would soon be spearheading a movement for the scientific upliftment of the agrarian economy of different parts of the State. The farmers of this State are well known for their initiative, hard work and practical wisdom. In fact, the Royal Commission on Agriculture pointed out about 45 years ago that in the Godavari and Krishna delta that the system of agriculture followed has attained a very high standard the cultivation of rice has reached a marked degree of perfection and the wisdom' of many agricultural proverbs stands unchallenged by research.

Unfortunately, the progress in maintaining this high revel of farming efficiency has been poor and consequently the average yield of rice per hectare in Andhra Pradesh during 1971-72 was 1579 kgs. in contrast to the All India average of 1114 kgs, In contrast, the average yield of rice was over 4.000 kgs. per hectare in many developed and developing nations of the world in 1971. Interestingly it was in this State that the high-yielding varieties programme was started in rice in a big way during 1964-65, starting with the dynamic Taichung Native-1 seed multiplication programme initiated by the late Dr G, V. Cha!am. In spite of the favourable conditions for rice cultivation in Andhra Pradesh referred to by the Royal Commission on Agriculture. the production of rice, the consumption of fertilizers and the flow of credit all remained rather static until recently. As a consequence, the "wheat revolution areas" of Punjab and Haryana started gaining supremacy in rice cultivation also and are fast becoming the major suppliers of rice to the national food grid. I am, however happy that Andhra Pradesh has made determined efforts during the last one year to retain the "rice crown". The State Department of Agriculture has distributed over 6200 tonnes of seed of high yielding varieties during *this kharif season* and the coverage under high yielding varieties may be 50-60 per cent in the state as a whole. Farmers themselves are determined to challenge traditional proverbs and it would therefore be not surprising if the Telangana and Rayalaseema regions soon emerge as major rice bowls in the State, since it has become clear that the *kharif* season of upland area is as productive as the *rabi* season of coastal delta.

The Royal Commission on Agriculture had also paid tribute to the work done in this State on the control of red rot disease of sugarcane, improvement of Agaves in Anantapur, breeding of Ongole cattle in Nellore district and improving the breed of bufaloes in Guntur district, The Sugarcane Research Station at Anakapalle will be completing 60 years of outstanding service this year and on behalf of all the agriculture research workers, I would like to offer our humble tribute and very best wishes to this state of this research centre, The contribution of this State and the Hyderabad area in particular to our grape industry is well known and Anab-e-Shahi has become a household name in all parts of the country. It is also fortunate that the main campus of the Andhra Pradesh Agricultural University is located near Hyderabad, a city characterised by numerous scientific, educational, industrial and cultural initiatives. There are several institutions of high learning and scientific research in this city, providing the Agricultural University with a great opportunity for developing cooperative links. The different departments of the Osmania University, the National Institute of Nutrition and the CSIR Regional Research Laboratory are working on problems of relevance in improving biological productivity and to overcoming malnutrition. The Administrative Staff College has been devoting attention to problems of management in the agricultural sector. The national

headquarters of the coordinated projects on dry land farming, rice and *sorghum* are also located here. More recently Hyderabad has become the home of an international institute dealing with problems of improving and stabilising the yield and income of farmers in semi-arid areas. It is fortunate that the International Crops Research Institute for the Semi-Arid Tropics has as its Director an eminent scientist who played a significant role in the growth and development of Agricultural Universities in our country as the Chairman of the Government of India Committee on Agricultural University development. The campuses located at Bapatla and Tirupati also provide excellent opportunities for developing strong centres of research in addition to their current role in education.

Sri Venkateswara University at Tirupati has several very eminent scientists and the Agricultural Campus should develop co-operative programmes of research with them. The Agricultural University concept represents the first serious attempt in our country to link education with research and productivity This concept, if properly implemented, would help us to arrest the growing alienation of education from the realities and demands of day-to- day life. It is fortunate that the Andhra Pradesh Agricultural University started with a clear mandate of being the agent of the State Government for conducting research all over the State in agriculture, animal husbandry and fisheries. Through its various research centres and through the Krishi Vigyan Kendras (Agricultural Polytechnics) which are proposed to be established during the Fifth Plan, the University would have ample opportunities for helping to convert the natural endowments of the State into wealth meaningful to the people. A recent study of Prof. R. Evenson of the Yale University has shown that agricultural research programmes in India have been the major determinant of change in rural income. He has also found that regional disparities in productivity are correlated with the extent of investment on research. The north western part of our country which has made a large investment in agricultural research has shown a truly remarkable economic performance. In contrast. Uttar Pradesh, Madhya Pradesh. Andhra Pradesh and Maharashtra, which had shown modest gains in agricultural productivity during the 1950s failed to show any marked increase during the sixties owing to a relatively static investment on research. Dr Evenson has also shown that every rupee spent on research in India on sugarcane has yielded a return of forty rupees. A recent analysis of the effectiveness of the research carried out under the auspices of the U.S. Dept. of Agriculture has indicated that the key to success lies in the agricultural research system being finely attuned to the immediate needs of its clients. In an editorial on agricultural research the "Science" magazine cites the following example to illustrate this point.

> "The fine tuning is evident in the response of the system to the attack of corn blight in 1970. Within a year the blight was controlled, and corn and meat were saved. The credit is shared by farmers, seedsmen, and scientists. Confining myself to science, I have measured the response in terms of published research on the blight. In the 2 years before the epidemic, there were only six publications on the subject; in the year of the blight, there were 18; and in the 2 years since there have been 91 publications. In the short time since the epidemic, 62 percent of these reports have come from experiment stations using their own resources, and 22 percent more have come from the U.S. Dept. of Agriculture alone or with the experiment stations. Clearly the

response of agricultural researchers to a problem of their clients and nation was elective". (Science 181, August 10, 1973).

I would request the staff and students of this University to examine whether our own research, education and training systems are attuned to the needs of our farmers. Do we re-deploy our resources whenever we have a challenging task facing us? What did we do last year, other than moaning over drought? Are we fully capitalising on our autonomy and flexibility that can be enjoyed by the research and training system in Agricultural University and for providing which the research responsibility was transferred from the State Government to the University? I would request you to ponder over these questions.

I am aware of the commendable work this University has done in identifying sources of gall fly resistance in rice, developing varieties of sugarcane suitable for early and late crushing, evolving the ragi variety Sharada, detecting phosphorus and zinc deficiencies in the soil and in poultry and cattle breeding. Nevertheless, this is a time when we should think more of what we should do rather than of what we have done in the past. The drought of 1972-73 has had such wide repercussions on every sphere of our economic life that it may take a few years to recover fully from the setback. Therefore, all our thought and energy should be diverted to tasks which can be successfully implemented whether or not scarce material like cement or steel is available. In this State, for example. the principal crops are rice, *jowar* and millets, pulses, groundnut, castor cotton, tobacco, chillies, sugarcane, fruits and vegetables. In all these cases, arrangements for the supply of good and disease-free seed alone can make a substantial impact on production. One of the important causes for the low yield of groundnut is poor plant population arising partially from poor germination of seeds. Seed is one vital input which we can produce irrespective of the availability of cement or steel. Similarly, fertilizer shortage can be compensated to some extent by introducing pulses in the rotation and by tapping sewage water for agriculture. Therefore, while developing our strategy for immediate agricultural growth we should adopt such approaches which can be implemented successfully under the constraints facing our economy. In other words, we should constantly explode possibilities rather than brood over difficulties.

During the last decade we made a very significant advance in increasing the production of *rabi* crops from 23.7 million tonnes in 1964-65 to 42.7 million tonnes during 1971-72. In contrast, *kharif* crop production has remained practically stagnant, the production during 1964-65 and 1971-72 being 65.6 and 62.0 million tonnes respectively This is an unfortunate situation since it is during the kharif season that we receive most of the monsoon rains. Even during 1972-73, an agricultural year characterised by low and uncertain rain, yields ranging from 25 to 33 quintals per hectare had been obtained with new jowar varieties in All- India Coordinated trials. Jowar hybrids gave as much as 35 to 40 quintals per hectare at many locations. Although in adverse seasons, some loss in yield is inevitable, there is great scope for minimising the loss. Even during the rabi season, studies have shown that the cultivation of early maturing hybrids, advancing planting dates and the supply of a little fertilizer before sowing could help to obtain 20 to 40 quintals per hectare of *jowar.* The Andhra Pradesh Department of Agriculture deserves to be congratulated on the lead it has given to the rest of the country through its intensive rabi, *jowar*

programme. The data collected in Khammam district have shown that the average yield in farmers' fields with hybrid jowar has been of the order to 30 to 60 quintals per hectare, in contrast to 10 to 20 quintals per hectare for local varieties. Besides demonstrating the superiority of hybrids during rabi, this programme is an outstanding example of what can be done in the succeeding rabi season in the event of failure of kharif rains.

The average national yield of jowar at the end of the Fourth Plan period is likely to be only 543 kg. per hectare and according to the projections of the Planning Commission, which has assumed an annual growth rate of 2.4% compound in productivity the average yield per hectare in 1979 will be only 611 kg. The average yield of jowar was more than 4000 kg. per hectare in several rich as well as poor countries of the world. Even in 1971 Andhra Pradesh is capable of achieving a quantum jump in jowar yields, provided new varieties and hybrids like 604, 302, CSH.5 and others can be rapidly multiplied and distributed and inexpensive measures like timely planting and application of moderate doses of fertilizers popularised. I request you to experience the thrill of proving the planners and prophets of doom wrong.

Similar is the case with reference to rice where the Planning Commission expects only a 3.3 percent compound annual growth rate in productivity during the 5th Plan period. If this is all we are capable of achieving, the average yield of rice in our country will be 1375 kg. in 1979. In contrast, many nations in the world, both developed and developing, have an average yield exceeding 5000 kg. per hectare. Even now as I mentioned earlier, the average yield of rice in Andhra Pradesh though somewhat higher than the national average is still for below what can be easily accomplished. Nearly 80 per cent of the irrigation resources of the State are committed to rice. Besides the century-old Krishna and Godavari anacuts and the Kurnool-Cuddapah canal, the Nagarjuna Sagar and Pochampad projects have opened up new vistas in production. I request you to work for doubling the average yield of rice within the next few years through a management revolution. Fertilizer use efficiency must be improved and leaching losses should be minimised, through better water management and split application of fertiliser Data from the All-India Coordinated Project on Soil test crop response as well as from the All-India Coordinated Rice Improvement Project which have clearly indicated the ways of maximising the return from the investment on fertilizer. I hope through the "Management Mini-kits" now being distributed and through national demonstrations and operational research projects, the University and the State Department of Agriculture will try to raise the average yield of rice in the State to at least 2000 kg. per hectare by 1974-75.

There is no way of improving the real income of our rural population without improving the productivity of our major crops through scientific soil and water management. There is also no way of releasing land for other essential needs like additional production of oilseeds, fodder, feed, fuel and forest without increasing the productivity of crops like rice and jowar substantially, thereby releasing the marginal land under these crops for other uses. A Task Force on Nutrition of the National Committee on Science and Technology headed by the Director of the National

Institute of Nutrition has shown that we need to step up oilseed production by 3 to 4 times, if we are to provide for a minimum consumption of 30 to 40 programmes per head per day. The need for additional consumption of fats and oils, which are both concentrated sources of calories and vehicles for some vitamins in the body is not realized by the richer people, because of the fact that in the developed nations there is a move for reducing drastically the per capita intake of fat due to excessive intake of fat acting as trigger for certain kinds of heart disease. The position in our country .is, however very different and there is urgent need for raising the per capita consumption of fats and oils from the present level of 10 gms. per day. Fuel is another need of our villages to which we have practically given no attention. You may be interested to know that among the five minimum guarantees of the Chinese Govt. provision of fuel is one, the other being food, clothes, education for children and an honourable funeral. Without arrangements for fuel supply, it will not be possible to save organic mater for the soil and all talk of organic recycling will be futile.

An important task of the Agricultural University, should be the integration of information coming from different departments into a scientific land and water use plan for every block of the State. This can be done successfully if scientists working on crops, soils, water and animals including fishes, look at the problems of an area in their totality. In such parts of the State where land is the most limiting factor we must optimise the use of land. In areas where water is the most limiting factor we must maximise the income per litre of water. I am aware that in this State mixed farming has been the primary way of life with farmers. The Ongole breed of cattle has been used in cattle breeding programmes not only in our country but also abroad, particularly for transferring resistance to tropical diseases. The best mutton type of sheep is also raised in this State, which has nearly one-fifth of the total sheep population of our country. I am glad that both the State Government and the Agricultural University are according high priority to livestock and poultry research and-development programmes. We have centres here under our All-India Coordinated Project for evolving better dairy type cattle, mutton type sheep and strains of high laying poultry birds.

For a successful animal production programme we have to pay coincident attention to genetic improvement, health care, nutrition and processing and marketing. Foot and Mouth disease is posing a serious threat to the cross-breeding programme in dairy cattle and has to be paid greater scientific attention. Similarly animal nutrition programmes require much more serious attention if we are to realize the full genetic potential for yield both by indigenous and crossbreed animals. I am afraid that we are not serious enough in our animal production programmes in attending to nutrient supply. Rapid progress in animal production in the United States was facilitated by the availability of a good protein source like soyabean and of low cost fertilizer which could be used for producing economically the needed quantities of fodder and feed. In contrast, fertilizer is very expensive and protein sources are scarce in our country. Therefore, animal production programmes should be based upon realistic estimates of the fodder feed, fertilizer and water burdens of the plant- animal-man food chain that we can bear: This University has taken a step in the right direction by providing an opportunity to the two-year emergency diploma holders in veterinary science to undergo a condensed training course for acquiring a

graduate degree in veterinary science. In our education programmes, there should be an in-built provision for recurrent training.

I also hope that this University will develop a strong research base in fisheries. One of the oldest fish farms in our country organized on scientific lines is in Sunkesula and it is in this farm that Murrel culture was attempted for the first time. Studies conducted under the All-India Coordinated Research Project on Composite Fish culture have shown that even in Sunkesula, where the water is highly alkaline, fish production could be increased from the present 200 kg. per hectare per year to over 1500 kg. per hectare per year. It is important that the University intensifies research on both coastal and in land aquaculture, since a greatly expanded fish production would not only help in improving protein supply to human beings but also for animals. In taking up such a programme, however we must constantly remind ourselves of the need of maintaining a proper balance among nutrient supply fish renewal and fish catch. You must have heard of the anchovy crisis in Peru where suddenly fish production has dropped from over 12 million tonnes per year to about 4 million tonnes. Such a big drop is partly due to a periodic ecological disturbance in the sea and partly because of over-fishing. The tragic part of the story is the great dwindling in the population of guano birds for which anchovies constituted the main food. With the drop in guano bird population, the stock of world's finest natural fertilizer will also get depleted. The drop in Peruvian fish catch had its repercussions on the poultry feed industry of the richer nations, which will now have to substitute soyabean for fish meal. This in turn has led to a steep rise in soyabean price. As a result, a country like Japan has recently released nearly half a million tonnes of rice as animal feed in order to save the high cost of imported soyabean. This illustrates the inter-dependence of biological and production factors and the consequences of one adverse event on many other seemingly unrelated events. It is hence in Universities like APAU that scientists should look at problems on the basis of a systems approach.

Investigations on the potential productivity of the Andhra coast have indicated that the living resources of the sea are considerable. The circulation pattern of the sea water along the coast and its high nutrient content, especially from April to July, provide evidence of high primary production. The shell fish resources are practically untapped now. Large quantities of tunas also occur off the Andhra coast. If we generate more R & D effort in marine fisheries we can greatly expand the possibilities of providing employment for people in the coastal areas. In spite of Andhra Pradesh having a coast line of about 970 km. the annual fish catch is only of the order of 80,000 tonnes, caught by about 50,000 fishermen. The Krishna-Godavari estuaries with thousands of hectares of low lying land inundated by saline water can be turned into highly productive areas by employing fish and shrimp culture. The ICAR has selected Kakinada as a major centre under the All-India Coordinated Project on transportation of fresh fish and Masulipatnam for a centre under the project on "Biology and Resources of marine prawns". A concerted effort by the Agricultural University and the State Department of Fisheries can lead to substantial benefit for the people of the State.

In whatever area one looks at scientifically a great scope for rapid progress becomes visible. For example, the economic advantage of growing cashew as a

forest plantation becomes evident from the data collected at Perali of the Guntur forest division of the Andhra Pradesh Forest Dept. By adopting proper manuring as well as plant protection measures, a yield of 6.21 kg. per plant has been obtained. The cashew research station at Bapatla deserves congratulations for the work it has done in developing high yielding hybrids and selections of cashew. I am glad that the Forest Deptt. of Andhra Pradesh has planted extensively these high yielding selections. This kind of programme needs to be expanded as early as possible and knowledge concerning the scientific management of cashew should also be spread to other areas. Similarly 25 years of work done on chillies at Lam has led to substantial economic benefits. However there is considerable scope and need for further research on chillies, coriander and turmeric. The multiplication and distribution of good coconut seedlings also need attention in order to spread to cultivators and reap the advantages of the research work being done at Razole.

We should take steps in every area to replace palliative measures with positive advance action and preparation. I believe, for example, that the Famine Codes promulgated from 1883 onwards have been an excellent device for providing relief and employment in drought affected areas. During the post-independence period, there has not been any significant change in the provisions of the Famine Codes, except that these provisions are not being strictly enforced. With the data fast becoming available from the work of the All India Dry land Farming Project and in future from ICRISAT, it should be possible for us to develop in the place of the Famine Code, a Drought Code which outlines for each agro-ecological region a list of anticipatory measures and alternative cropping strategies which ought to be adopted when there is evidence of the incidence of drought. This kind of programme may involve steps like –

(a) Maximising production and altering cropping patterns when necessary in irrigated areas;
(b) Mid-season corrections in crop planning in unirrigated areas; and
(c) Introduction of crop life saving research techniques in the drought-affected areas.
(d) Building up of appropriate seed and fertiliser buffers to implement the drought cropping strategy.

We find there is a growing accomplishment gap in our country as a result of our inability to convert scientific findings into production advances. The accomplishment gap arises from deficiencies in the areas of communication, input distribution, resource availability and social organization were dedicated and technically competent leadership becomes available at the village level resulting in the development of an appropriate social organisation. Progress can be fast as has been demonstrated so well at Gaddipalli by one of the former Professors of this University.

Our population is often referred to as our major handicap. If, however we will stop thinking about handicaps and difficulties but concentrate on profiting from possibilities, our population can become our major source of strength. If we are to benefit from this strength, I am afraid that we have to undergo a process of what

Illaich has described as "de-schooling" or what the Chinese call "re-education". While de-schooling or re-education may be important for those who have been trained in a status quo philosophy the process of re-education can become the new method of education itself in our Agricultural Universities and Krishi Vigyan Kendras. The most important educational aims under this system have to be the acquisition of practical skills, in addition to theoretical knowledge and the development of self-confidence and the will to win.

May I appeal to both the Faculty and students to get actively involved in this task of rural development? In the Indian Council of Agricultural Research, we would like to promote the involvement of students at least during a few weeks in a year in a major development project like the Dry-land farming project or rice or jowar production project or in the Intensive Cattle Development Programme. Programmes for mass participation of youth ought to be so designed that wherever possible students live as paying guests in the houses of farmers in the villages rather than live separately in tents or hostels. Programmes like pest control and water management provide excellent opportunities for demonstrating the economic benefit that can accrue to the farmer if certain operations are carried out together The pace of spread of water harvesting and other techniques as well as the use of improved implements in dry farming areas can be accelerated by planned student programmes.

In all these tasks the Home Science College of this University which already has an excellent research training record should be fully involved. The contribution of rural woman to agricultural development is not generally fully appreciated. Home Science Colleges can not only play a part in nutrition and health care programmes but also in areas like tailoring, mixed and multiple cropping patterns to the needs of both child and adult nutrition. The work done in the Home Science College here on nutritionally synergist mixtures like jowar and soyabean can be translated into appropriate mixed cropping practices in the field.

It is ironical that in rich nations, there is a greater degree of public and youth participation in development work than in poor countries. The National Campers and Hikers Association of the United States for example has organised a campaign this summer for the detection and killing of gypsy moth, which causes harm both to fruit and forest trees through the use of sex attractants. Before a car leaves one picnic or camping place for another, this will help to arrest the spread of this serious pest. I hope all of you will have ample opportunities to enjoy the thrill of deploying your scientific knowledge for promoting agrarian prosperity. I congratulate all of you who have taken degrees today on your academic accomplishments and wish you success in your life and work.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
9th ANNUAL CONVOCATION

20th March 1975

Address by
Sri J. Vengal Rao

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor. Mr. Vice-Chancellor, Members of the Board of Management. and of the Faculty, Graduates, Students of the University and Friends.

Let me at the outset express my appreciation of the privilege that has been given to me to deliver the Convocation Address of this University today: It is indeed' a pleasure to find oneself amidst such a distinguished body of scientists, progressive farmers and administrators and to me who has had the good fortune of being associated with this University in its earlier years, this is, in a sense, a happy home-coming.

It is perhaps a truism-but none-the-less a fact -to say that the progress of our country depends essentially on the success of our programmes for agricultural development. If we have to attain economic strength and maintain high political stature among of Nations, it is essential that we achieve self-sufficiency in agricultural production and eliminate all time dependence on foreign supplies in the basic necessaries of life. It is not merely a question of growing what we need. What we should really aim at is the development of agricultural surpluses in strategic fields which will, in turn, generate resources for accelerated growth in all sectors of our economy:

The problem is easily stated, but you may well ask what is the solution. In finding a solution to this problem one must bear in mind the special features of the-Indian situation against the background of which all our measures will have to be devised. We have no doubt large extents of arable land consisting of different soils and located in different agro- climatic zones. This, while it provides an opportunity for cultivation of a wide variety of crops, also poses the challenge of evolving different agricultural technologies. We have a number of perennial rivers, but there are also areas which are critically dependent on the vagaries of an erratic monsoon. We have a large number of small holders, the size of whose operational units may be viability in foreign countries. We have a big agricultural labour force, but little capital. All these circumstances highlight the need to evolve solutions that are suited to the Indian condition. It is not possible straightaway to adopt devices which have been found successful in foreign countries where different conditions may prevail. There is also another factor: viz., the compulsion of time. We shall not only have to develop, but develop fast. We are trying to compress in this country in a few years -what has been achieved over decades and centuries elsewhere in the world.

It is basic to our National philosophy that programmes for development are inter-related with efforts to ensure the equitable sharing of the benefits that are realised from such development. In concrete terms this means that the increased incomes generated through the application of improved technology can no longer be the monopoly of the privileged few, but will have to be distributed over a wider base. This will call for not only regulatory measures, such as land reforms, but also the extension of special supporting services to the small and marginal farmers.

I am mentioning all these aspects because in my view Agricultural University has an important role to play in devising and implementation of these programmes.

To my mind Agricultural Universities and the State Administration are equal partners in this challenging task. While it is the responsibility of the Government to provide the necessary infrastructural and administrative support for implementing these programmes, it is for the University not only to devise optimum solutions but to take an active part in testing them on the field and in regularly monitoring the progress achieved in their implementation. The Agricultural Scientist of today cannot merely be a repeater of dogma. He has to be an innovator and path-finder and a guide to the policy-maker and it is to the Agricultural Universities which are the principal institutions for imparting instruction and training in agricultural science that we look for creating the conditions of work and study that facilitate the emergence of such original talent.

It is indeed a matter for satisfaction that in our State after a long spell of stagnation seem to have attained a break-through in agricultural production. This is due among other factors, to the fruitful work done by our research scientists in the Universities and elsewhere and its successful application to field conditions. But there is no room for complacency. The growth in population, the need for larger supplies of raw-materials for agriculture based industries, our export requirements - all call for continued and sustained endeavour to promote the development of both food and non-food crops, Our Research Scientists and our Extension workers have plenty of challenges and opportunities before them to improve upon their performance and to ensure the continued growth of the agricultural economy in this State and in the country.

While I have dealt with general aspects I would like to take this opportunity to refer briefly to two or three specific problems of importance in the context of the present day The first relates to economic use of irrigation water. Fortunately for us Andhra Pradesh is endowed with Nature's bounty in the form of perennial rivers like the Godavari and Krishna. But even these waters are not unlimited and as days go by the pressure of demand on these limited supplies is bound to grow. It is essential therefore that the Agricultural University and the Research Scientists devote increased attention to the optimum use of irrigation water. This I may call not only for remodeling or redesigning of some of our drainage and irrigation systems, but also for the adoption of new or improved cropping patterns. We cannot afford to waste any water and every drop will have to be used to the maximum advantage.

The second aspect which I would like to stress is the need to evolve an appropriate institutional framework for the supply of input and services to the farmers, particularly to the small and marginal farmers. There is, of course, a constraint imposed by the overall limitation of supplies; but even apart from this, one hears of the difficulties faced by the farmers in securing inputs and services in time and at reasonable cost. There is an urgent need, therefore, to devise a mechanism by which frames can conveniently secure the inputs and services within the easy reach of their farms. This is a subject to which the Agricultural University could give thought and come up with appropriate solutions.

The third aspect which I think calls for more intensive study is the need to devise a proper system of marketing of agricultural produce. Today complaints are

often voiced that the full benefit of increased production and increased prices do not accrue to the producer on account of a faulty system of marketing. It is essential that we should recognise our systems of marketing particularly in respect of commercial crops which are subject to wide ranging variations in prices with a view to ensure that the benefits of increased agricultural output are equitably shared between the producers and the consumers without being appropriated by unscrupulous middlemen. The devising of such a system should be a fruitful field for agricultural research.

I am happy to learn that the Agricultural University will be initiating courses leading to Ph. D. in certain disciplines next year: I also understand that the University has sought support for establishing two major Research Centres in the river valley projects and that it will be taking part in operational research programmes of agricultural development. These are all steps in the right direction; but besides a vertical development in its existing fields of study there is need simultaneously to consider a horizontal expansion of its activities. We have reached a stage where agricultural development is linked with the development of animal husbandry. farm forestry and fisheries. I would commend for the consideration of the University an expansion of their field of study to cover fisheries also.

Before I conclude I have a word for the young Graduates passing out of this University. I can appreciate that on account of the difficult employment situation there has developed amongst our graduates and students a sense of disappointment and frustration. It is my hope that as a result of our expanded and accelerated developmental programmes both in Government and in industry opportunities for employment in the coming years will show an upward trend. I am glad also to be informed that the University curriculum has been reorganised so as to make it more job-oriented. So far as Government are concerned. they would be prepared to consider with sympathy the implementation of useful programme which while providing much needed services to our agricultural community will also serve to provide gainful employment to our agricultural graduates.

I now congratulate all those who have taken degrees and achieved distinctions and awards and wish all of you the best of luck and success in life.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
10th ANNUAL CONVOCATION

6th October 1976

Address by
Sri Annasaheb P. Shinde

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice-Chancellor, Members of the Board of Management, Outgoing Graduates, Ladies and Gentlemen.

Let me at the outset express that I am very pleased to have this opportunity to address the Tenth Convocation of the Andhra Pradesh Agricultural University. I consider it a privilege, both as a politician particularly interested in the development of agriculture and as a student for practical agriculture, to visit and communicate with Agricultural University Faculty and students. I have always enjoyed visiting Andhra Pradesh. a State rich in natural resources and cultural heritage.

Partly due to its strategic location but mainly due to the agroclimatic suitability to a variety of crops -rice, millets, pulses, oilseeds and cotton -Hyderabad has attracted a variety of educational and research institutions. In addition to Osmania University the National institute of Nutrition, CSIR Research Laboratory, and International Crops Research Institute for the Semi-Arid Tropics, are all working on problems of relevance to improving biological productivity and overcoming malnutrition. Administrative Staff College and the National Institute of Community Development are giving attention to problems of management in the agricultural sectors and techniques of rural development. A number of ICAR coordinated Projects, for example Dry land Farming on Rice and Sorghum have their Headquarters at Hyderabad. Central State College for Agriculture is the latest but an important addition. Rich in physical resources as well as with a tradition of high standards of agricultural production and management, Andhra Pradesh rightly deserves all the attention it has received and the place of pride it enjoys in the field of agriculture.

I wish to share with you, today, my thoughts on the role of agricultural universities in our fast changing society: The Agricultural University movement started about fifteen years ago in this country and several of the Agricultural Universities including Andhra Pradesh have now been functioning for over a decade. It is time. therefore. to review the progress each of these institutions has made, to identify the handicaps they have suffered from and take corrective measures to rectify the deficiencies. It is. therefore. proposed to set up at the National level an Agricultural University Review Team to undertake this evaluation and make recommendations for improvement. It is also proposed that each agricultural university should carry out a self-evaluation in advance to facilitate the National Review Agricultural Universities which were intended to be essentially service oriented institutions. The service function was to be achieved through strong programs of applied research relevant to the agricultural development of the State and high quality education. There is no doubt that Agricultural Universities are much stronger institutions, facility and faculty wise, compared to the traditional Agricultural Colleges. But a great deal remains to be desired by way of high quality and relevant education. Practical training of the graduates is the weak link. The outgoing graduates do not seem to have the self-confidence to tackle the field problems independently. They are ill-equipped for self-employment. This is perhaps because sufficient emphasis has not been given to 'learning by doing'. Although Agricultural Universities have been contemplating introduction of the village-service-period' during the span of the First Degree Course, by and large. The idea has not been

implemented. I am glad to learn that Andhra Pradesh Agricultural University has plans to introduce semester long practical course with effect from December, 1976 which will require students to work in the villages for at least one crop season. I was also pleased to learn that a Reader in Economics of this University ventured to leave his safe job and went back to his land in his native village. He has since assumed leadership of a vast cooperative covering about 50,000 acres of land under intensive farming through lift irrigation. I have no doubt that such examples can be multiplied manifold if our education system is suitably oriented to produce self-employed graduates.

So far Agricultural Universities seem to have yield with each other for extension of programmes particularly post-graduate programmes and not so much for improvement of quality. It is necessary to emphasise quality of education and develop suitable measures of quality. Perhaps the percentage success in national tests for scholarship admissions or employment would be one of the valid measures of quality. Also there has been more emphasis on specialisation and not so much on diversification of courses to meet the needs of agriculture and rural society. For example the pace of introduction of courses in the fields of nutrition, population education, communication methods. cooperative training has been rather slow.

In order to be relevant, agricultural education must be need based and ecologically oriented. Applied and adaptive research being the source of all new knowledge and technology has, therefore, special significance to agricultural education. Without research an education would become text-bookish and sterile. That is the reason why in agricultural university system the goal is to achieve close integration between research and education. It follows, therefore. that the constituent colleges of agricultural universities must simultaneously develop as strong centres of regional research. In an agricultural university system, therefore, the worth of a constituent unit will be judged not by the number of graduates it produces, but by its contribution through research to agricultural development in the area of its location. Development of sufficient research capability should. therefore, be the principal criteria for starting post-graduate courses.

I have been keeping in close touch with the developments of agriculture in Andhra Pradesh. After a long stagnation period, agriculture in Andhra Pradesh and particularly rice production has picked up and Andhra Pradesh has surpassed all other States in rice procurement this year. You are all aware that because of substantial increase in production of rice in Andhra Pradesh. Govt. of India has recently decided to modify rice zones. I am sure that this will give impetus to Andhra farmers for further production efforts, land ease marketing and storage problems. But it has to be ensured that such policy decisions are implemented for a long-term basis. Though much needs to be done to raise productivity Andhra is emerging as a granary of the South and leading state in food production in the country. This tempo needs to be sustained so that country is not required to import rice any more in future but should be in a position to set apart a part of the surpluses for export.

Time has come when agricultural universities should undertake Operational Research Projects to find out the effectiveness of their recommendations under

actual field conditions. The emphasis in research should shift to various facts of integrated rural development, and development of crop-livestock-fish integrated systems of farming based on recycling principles. We should realise the importance of energy conservation and USI3, and pay more attention to develop production technology based on renewable forms of energy.

Cooperation between State Governments and Agricultural Universities in areas of research and extension has been a controversial issue, ever since the Agricultural University System has come into existence. However the national policy in this regard is now clear. Agricultural Universities should concentrate on fundamental and applied research, education and extension training, and the State departments should conduct field verification trials, demonstrations and arrange appropriate packages of services to farmers. It would be wrong for either University to divert too much of its attention to developmental work or for the State Department to undertake research and educational programmes. There should be an Apex Body under the Chairmanship of the Chief Minister in every State to co-ordinate the functions of the State Departments and Agricultural Universities. Also there should be only one Research Coordination Body in the State, responsible for all types of agricultural research-fundamental, applied, adoptive, and operational. I hope the State of Andhra Pradesh is taking suitable steps to achieve this organisational set-up to harmonize inter departmental relationship and ensuring smooth functioning.

In addition to external productivity in the form of graduates and now technology, internal efficiency needs to be equally emphasised. Very little attention seems to have been given so far by our educational institutions to this aspect of conservation and use of valuable resources. Internal efficiency is to be viewed in terms of utilisation of available staff, space, equipment and other resources. Often this weakness has its roots in defective planning, but each institution has an obligation to improve the efficiency of operation if we have: to maximise returns from our scarce resources.

I am glad to learn, the State Government has amended the Andhra Pradesh Agricultural University Act of 1963 to bring it in line with the provisions of the Model Act circulated by the Indian Council of Agricultural Research and that the Vice-Chancellor is now the Chairman of the Board of Management.

Indian agriculture is making rapid advances and this is attracting world-wide attention. One of the main contributory factors that has been the strong research support the Government of India and State Governments is the extension of agriculture. Agricultural Universities must continue to make contributions in this and provide strong research support to agricultural developments. There are still many important sectors of agriculture where much needs to be done in the field of research.

In rural areas there are many pressing problems. The basic problem of course is to raise productivity of all crops and maintain a sustained growth rate. Without prosperous agriculture, our villages will always remain backward and, therefore,

alround prosperity has to be brought about in our villages. It should be ensured that this prosperity enables our rural poor to find more avenues of employment and also enables them to share this prosperity.

I wish to congratulate all those who have obtained their degrees today. I need hardly remind you that beyond the portals of the University begins your career in the real world which would at times be very demanding of your competence and capabilities. I am sure, with the knowledge and skill you have acquired at the Andhra Pradesh Agricultural University, you will be able to tackle them all. One only needs to remember that the process of education is a continuing life-long process and never ends with the Degree Award.

I wish you all very successful careers and all that is best in life.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
11th ANNUAL CONVOCATION

Address by
Sri B. Sivaraman

Rajendranagar, Hyderabad – 500 030

Madam Chancellor, Mr. Vice-Chancellor, Members of the Board of Management. the Faculty, the graduates and students of the University, Ladies and Gentlemen"

May I thank the University for extending to me the privilege of addressing this Convocation. I have seen this University grow and flower and today it is spreading its fragrance over the entire field of agriculture in the State of Andhra Pradesh. For long years, the productivity of the agriculture in the State of Andhra Pradesh had stagnated badly. For the last few years, starting from a period of active co-operation between the University and the Department of Agriculture there has been perceptible and rapid growth in the output and variety of agricultural growth in the State" By now there is a close coordination between the research faculties and the extension workers in the State which enables many programmes in the field of new introductions and changes to be implemented with the least possible delay. This process has been further refined by bringing into the coordination system the Central Institutes and coordination programmes located at Hyderabad. The establishment of the International Crops Research Institute for the Semi-Arid Tropic (ICRISAT) at Hyderabad had further strengthened the back up to Andhra agriculture which if wisely used can place Andhra Pradesh at the forefront of the agriculturally developed states in the country. New challenges are coming up and a time has come to do some introspection towards improvement.

Water and land are the two capital constraints that control agricultural development. In the use of both we have been profligate but the State is now well aware of the limitations of both. On the other hand, the population is growing and pressure is increasing on agriculture to provide employment and sustenance to larger and larger numbers. Whilst water land and population are concrete entities, the climate which leads to the variations in the growth is extremely variable in .large parts of the state. Science and administration appear to give us a hope that this unequal equation is solvable provided we are able to introduce both effectively. The productivity per unit of land, per unit of water and per unit of time will have to be continuously increased with the help of science so that the demands of the population growth can be managed and, at the same time, a better living given to those dependent on agriculture. Is our system sufficiently oriented to meet this challenge?

The objective of productivity per unit of land, per unit of water, per unit of time, requires that there is close understanding of the vagaries of the climate which is a major variant in the environment for agriculture. Meteorology records the climatic situation regularly for many regions in the country. From out of the massive records it is possible to evolve a possible pattern of rainfall in the region and also express the possible deviation in the various parts of the season. The strategy of growth will have to be evolved on this base taking into consideration the safe period when probability of deviation may not be very large" To this base we have to add our knowledge about the behaviour of the soil. The same rainfall has different returns in growth in different soils for obvious reasons of retentivity and availability This leads us to the science of land shaping for proper moisture retention and moisture control in the environment as it is. The plants use of moisture for growth is dependent on the plant type and the evapo-transpiration in the season in the area. For adjustment of the

plant to the environment, the agronomist, the pathologist and the related scientists along with the breeder has to find the answer: The entomological and mycological risks in the environment requires experts in these fields to link up with the breeder and the agronomist to find a safe answer. The breeder may be given the correct frame for breeding but he may not find the necessary germplasm to fit his research. The radiologist and the chemist has to come to the help of the breeder in evolving chance mutations which may have an answer We can go on multiplying the disciplines that are involved and the interplay of them. Considering the limitations of land and water and the hazards of the climate and the rising population, the objective of productivity per unit of land, per unit of water per unit of time has to be a continuous process leading to greater and greater productivity to balance the population growth and the requirements of the economy The problem can be tackled only by close coordination and co-operation in a multi-disciplinary research environment.

Some serious introspection is needed to see whether the present research ethos in our agricultural universities is congenial to the objective of multi disciplinary programme research. The output of all systems is initially shaped by the structure of the system itself. Research is in a hierarchical frame divided into disciplines and mini-disciplines. In the normal functioning of the research system, each discipline is, more or less, working in a water-tight structure. The quality of output will ultimately depend substantially on the fair availability of funds. The various mini-disciplines within a discipline have to depend for their share on a centralised distribution system. Allotment may not be on the need, but on the importance that the centralised system gives to the particular mini-discipline. There is very little of inter-disciplinary dialogue or discussion or working between the various disciplines or mini-disciplines. The entire research ethos is highly individualistic or mini-discipline oriented. This is not the fault of India alone but of most research organisations. For the first time, we broke through this barrier in our coordinated research projects. These were multi disciplinary projects with a project objective. This approach has received encomiums from the outside world. Even then, the National Commission on Agriculture found that the frame of research. is too constrained to meet the objective of developing technology for the field application of research. The National Commission on Agriculture has pointed out that the fundamental back up to the coordinated project is not systematic and this may be a hindrance to the advance of the project itself. Fundamental, applied and adaptive research are all to be interwoven before' the knowledge can be usefully utilised in the field. Some attempt has been made to answer this problem off field-oriented application in what are called 'operational research projects'. Here again, unless the intention was to develop the entire research through the operational frame itself. it was obvious that the operational research project will have to depend on the backing given by the research system itself. Unless, therefore, the research system can handle a multi-disciplinary research programme, we shall not be reaching the goal we desire.

We cannot say that the bulk of the research workers are motivated by the pure thirst for knowledge and discovery. A research service is as much a way of livelihood for the intelligent as many other services. There are no doubt rare exceptions who can continue to reach for knowledge under grave physical and environmental difficulties. No doubt, many of the breakthroughs in the scientific field

is the result of work of such rare beings. But multi disciplinary research has to be by a large number of research workers getting together and slogging at the problem. These are people who normally seek betterment in the scientific field and would like to grab the opportunities for getting on. Opportunities are on offer from various institutions in agricultural research giving hopes of a better living in the research field of the worker or a substantially related field. He has to compete with many other workers seeking the same opportunity. The main criterion for judging a scientific worker is to consider the number of and importance of the scientific papers he has contributed. This naturally makes him give importance to items of research which can be done by him alone or with as few a number of people as possible so that the credit, if any may not be dispersed. This gives predominance in the scientific field to entirely limited objectives in single disciplines or one or more similar disciplines getting together Under the Indian conditions there is another particular aspect of gaining recognition in international circles which seems to be a guiding principle for our scientists. I cannot do better than quote Dr Y. Nayudamma who was the former Director-General, Council of Scientific & Industrial Research. In a document on Current Imperatives for Rural Development" he has observed as follows:-

"India is credited with the third largest technical manpower in the world but the impact of science and technology is yet to be felt to the desired extent. The reasons are quite apparent".

The scientists in the developing countries tend to undertake researches which are in fashion, internationally. This is not only because of the training and temperament developed, studies abroad etc. but also because the incentives, awards and rewards are loaded in favour of this system. In these countries, a scientist may get judged by the papers he publishes in international journals and the number of international conferences he attends. It is only after getting recognition on the international platform that he is recognised in his own country

Therefore, if the Indian scientific community has to be diverted to do research on technologies relevant to the needs of the Indian people, the award and reward systems have to be re-oriented appropriately.

As a result, not only is the Indian scientist not multi-disciplinary research-oriented, he is trying to copy the west where research is becoming more and more particularised into mini-disciplines. The multi disciplinary research we want, does not give much opportunity for any large break-throughs in the individual disciplines concerned in the project. It is more a question of getting together knowledge we had accrued and adjusting them to a programme result. This work is very much like the work done under the guidance of foreign experts in many developing countries where the experts develop programmes in the field in a team work with local scientists. This problem was examined in some depth by Dr M.S. Swaminathan as Chairman of a High-Level Team of Technical Advisory Committee of the World Bank looking into the working of the International Rice Research Institute at Los Banos. In the Committee it was observed as follows :-

"Scientifically, they work under the professional handicap of maintaining a 'low profile' while taking substantial responsibility for research programmes from which they derive little or no opportunity for scientific publications".

Even in international circles. scientists find difficulty in working in programmes where they cannot get material for scientific papers or the credit for the scientific findings. Therefore, the entire system of credit in the scientific field does seem to be against the idea of multi- disciplinary research as such and particularly research which is oriented to field problems.

This over-emphasis on individual disciplines and mini-disciplines is no accident, but. in my view. a necessary development from the system of education now being given in the agricultural universities. The student is taught most of his science in the laboratories of the universities and in small field experiments mostly pot experiments. They have no idea of the environmental factors and the variables under which crops and animals have to survive in the domestic conditions. The National Commission on Agriculture had emphasised the need for every agriculture university providing for a practical education of a student during his tenure in the university immediately afterwards. This education had to be, if possible, throughout the year to understand a multi cropping system or at least over a full season so that problems of cropping in a season are fully understood. Except for Pantnagar University where because of the availability of large areas of land, such education is now in the system, very few other universities are in a position to give this basic practical approach to the science. Thus when the student leaves the portals of the University his knowledge is only based on test tubes and pots. When a student does not understand the implications of his science even within his discipline. how much more can we expect him to understand a multi-disciplinary approach in the science. These are the people who proceed to postgraduate and higher levels of competence in science and have finally to be the guides and participators in the necessary multi-disciplinary research approach. One cannot escape the conclusion that there has got to be substantial rethinking in our agricultural universities to prepare the human material who can in future be the participators in multi-disciplinary research. Then only, can we expect any substantial result in the practical field of agriculture.

The failure to involve the student in a practical appreciation of his science in the universities has the other deplorable result that the student when he leaves the portals of the university does not feel confident enough to handle the subject in practical field work., either by himself or as an advisor: Whereas we claim that modern agricultural science can support a green revolution. this knowledge is not in the student when he leaves the portals of the university. He doesn't feel confident even to improve the agriculture in his own family The farmer is waiting for proper technical guidance to take his legitimate part in the green revolution. He is not behind in any response. In Andhra Pradesh there is an excellent indication of the farmers' approach in villages in the deltas opting to have their own agricultural advisors. Andhra Pradesh has developed a system by which villages can opt to hire on a sabbatical system agricultural officers from the Department for two or three years. This scheme which started more than two years ago, needs watching. Similarly the experience of the Kaira District Cooperative Milk Producers Union Limited, otherwise known as AMUL shows how farmers joining together are in a

position to engage a large number of top level veterinary experts at high salaries. Indian agriculture is in a position to pay a large number of our agricultural graduates and veterinary graduates a good income. Provided these graduates are able to lead the farmers in an aggressive and profitable agriculture. This obviously needs a different type of education in the university. This, of course. is not a deficiency in agricultural universities alone but probably in our entire educational system. May, I therefore on this important occasion request those of you who are in-charge of the welfare of this University and the welfare of agriculture in Andhra Pradesh to take a lead in making this University a fit vehicle for meeting the needs of agriculture in Andhra Pradesh.

Before I conclude, may I congratulate all those of you who are receiving your degrees today. The life before you will be tumultuous in a competitive world. Education does not end with your leaving the secluded cloisters of the university You have to adjust yourself to the opportunities that will come before you for employment. Opportunities today in the country are vast only if all those concerned with programming and development identify the opportunities and try to fit you to the opportunities. Much of the opportunities will be self employment and employment outside government. Only by keeping yourself continuously in touch with your science and developing your practical application can you become useful citizens by applying your science for the betterment of the country. I wish you all a successful and useful career and all the best in life.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
12th ANNUAL CONVOCATION

28th January 1979

Address by
Dr. C. Gopalan

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor. Mr. Vice-Chancellor, Members of the Board of management, the faculty the graduates and students of the university, ladies and gentlemen:

I deem it a privilege to be here with you and to offer my congratulations to the young scientists who have taken their degree here, today You have now been formally inducted into our expanding a national crops of agricultural scientists, of whom the country can, legitimately, feel proud.

Of all the challenges which confront scientists of the present-day world, the challenge of Global Hunger is perhaps the most formidable, and the one that poses the greatest threat to the very survival of Mankind; and in meeting this challenge, agricultural scientists have indeed to play a major role. The manner in which our agricultural scientists and the farmers in our country-side, have, so far responded to this challenge has, no doubt, been heartening ; but the battle has, by no mean, been won. The desperate race between population growth and food supplies may, infact, be entering its crucial phase by the turn of the century: and new initiatives and imaginative thrusts in agricultural technology and food science will become imperative for human survival. Two world-famous institutes devoted to nutrition and agriculture -namely, the National Institute of Nutrition-and the International Crop Research Institute for Semi arid Tropics-are located here in Hyderabad, and, so, one may confidently hope that, at least some of the exciting new leads in agriculture and food science will originate from here in the next two decades; and that some of the scientists working in this University may contribute to these new advances. A future of promise, excitement and challenge, therefore, awaits you.

India's record in food-grain production since independence. has earned wide recognition. . Our annual food-grain production which stood at about 55 million tons in 1950 has now risen to nearly 120 million tons. a performance that may be considered satisfactory though not as impressive as that of some other countries. We have yet to register major gains in harnessing our vast marine food resources. Our performance in the field of animal husbandry and in the matter of effective utilisation of our cattle wealth leaves scope for considerable improvement. Even in the matter of food-grain production, our success has, by no means, been uniform, as between different major food crops and as between different regions of the country. India may well emerge as a major Agricultural Power, as was indicated by our distinguished scientist Dr Swaminathan. But there is no room for complacency The Agricultural Revolution has hardly begun; it has by no means finished. We have still a long way to go before we can even claim to have achieved optimal mobilisation of all our available food resources. Indeed, even the maintenance and consolidation of the current tempo of agricultural development will call for considerable ingenuity and resourcefulness, and continued vigilance. In order to meet the nutritional demands of our growing population, our food-grain production may have to be stepped upto about 140 million tons by 1982-83. To bring about qualitative improvement in our dietaries. we need to step up our production of pulses, oil-seeds, vegetables and fruits, milk and milk- products and poultry products. We need to plan for a sound edible oil economy and this needs extensive research and extension work.

We have to intensify efforts in the field of post harvest technology in order to avoid wastage of food in the field and during processing and storage. We are now beginning to see the true dimensions of the problem of fungal contamination of foods arising from poor storage. Outbreaks of fatal liver disease attributable to consumption of fungus-infected food grains have recently been reported from some parts of our country. This is undoubtedly a serious health hazard. Our surveys show that under the conditions in which food grains are stored in our rural areas, a wide range of common food-stuffs. are contaminated with poisonous fungi. Safe and relatively inexpensive methods of drying and storage of food grains, capable of application at the village level have to be developed and promoted. Recurrent outbreaks of severe liver disease in the tribal populations of Madhya Pradesh have been found to be due to the contamination of food grains with poisonous weeds. Simple method of eliminating such weeds have been identified but this knowledge has to find application at the village level.

We cannot escape the fact that sometimes new technology may bring with it new problems. Thus, we are discovering that some of the new high-yielding varieties of millets are specially prone to ergot contamination: and the clinical picture of ergotism associated with these millets is apparently different from that associated with rye. Apparently the alkaloidal profile of ergot contaminating these mille Its is some what different from that of ergot infesting rye. Clinicians must be taught to recognise this new type of ergotism and technologies must be devised to contain this problem. There is also the interesting indication that construction of huge reservoirs for purposes of irrigation may bring about changes in the soil chemistry in the environment which may be reflected in the nutrient composition especially the trace-element composition of the food grains grown in the area. The dramatic aggravation of the fluorosis problem in the Nagarjunasagar area is an interesting example. These instances, however, are not arguments against the development and application of new technology; rather they are a warning that a new technology may not always be an unmixed blessing, and will call for preparedness to anticipate or solve unforeseen repercussions.

An important area which merits systematic study is the possible danger arising from indiscriminate use of pesticides as part of crop-protection and storage operations. With the added liberal use of insecticides in vector control operations by health agencies, the danger of environmental pollution from insecticides and pesticides cannot be lightly dismissed. The interesting suggestion from a recent study carried out by the National Institute of Nutrition that the selective concentration of insecticides by some aquatic food sources can lead to serious diseases in the human should provide added warning. Research for developing biodegradable innocuous pesticides will prove rewarding from the point of view of promoting yields as well as ensuring consumer safety. The field before you is thus very vast indeed.

As a health scientist, let me, however look at agricultural development from the point of view of human health and welfare. The augmentation of food production is not an end in itself; it is only the means for better nutrition and for improved health. We have now discovered to our great disappointment that mere increase in food production, however impressive. need not necessarily be reflected in significant

improvement in the health or indeed, even the nutritional status of populations. Thus, the remarkable increase in India's food-grain production during the last three decades, has made no significant dent on the problem of malnutrition in the country. To a certain extent. this may be explained by the fact that the increase in food production has been considerably offset by concurrent increase in population. Even so. the per capita availability of food. in the country has increased, since agricultural development has managed to outstrip population growth. The important underlying reason of course, which has been repeatedly emphasised, is, that, because of glaring socio-economic disparities and wide-spread poverty among large sections of people, there is considerable maldistribution of our available food sources. Thus, while, on the one hand, there is an apparent glut and food surplus posing problems of storage, and leading to optimistic forecasts of food exports, on the other hand, there are vast pockets of chronic starvation with millions of children in the country suffering from varying grades of malnutrition. I have said elsewhere, and I may repeat it here; if all the available food in the country can be distributed equitably in accordance with physiological needs, even at the present level of food production and population, the problem of malnutrition in the country will be greatly mitigated. It must be recognised that such vast socio-economic disparities which reduce food consumption and effective demand by large sections of the people apart from leading to malnutrition, will adversely affect and dampen agricultural development as well. A comprehensive and enlightened programme of agricultural development. should therefore aim at not merely meeting the overall food needs of the nation as a whole but also at generating greater opportunities for gainful employment in the rural areas thereby increasing the purchasing power of people below the poverty line. It is heartening to note that this aspect of agricultural development is now receiving increasing attention; but it must be recognised that the problem of rural poverty is not one that can be solved by agricultural policies and agricultural scientists alone.

It is strange, and perhaps significant, that in most discussions on food production, while a great deal is said about varieties of food grains, about fertilizer inputs, irrigation and pesticides, very little is said about the quality and conditions of the human resources which are involved in agricultural operations. Landless agricultural labour represents the worst- exploited, and the most poverty stricken section of our country's labour force today and yet it is this section which has contributed so magnificently to our most outstanding national achievement since independence.

The worst ravages of malnutrition are to be found among women and children of rural agricultural labour. Prof. Panikar carried out an important study recently among agricultural labour households in the Kuttanad area of Kerala, an area which has been in the very forefront of the new agricultural technology. To quote Prof. Panikar, "this region (has) stayed ahead of (its) counterparts elsewhere in Kerala in the spirit of innovation and adoption of modern agricultural technology". The recent introduction of double-cropping in this areas was also expected to reduce the intensity of underemployment. In spite of these apparently favourable circumstances, Professor Panikar's study showed that the agricultural labourers of Kuttanad face acute unemployment and underemployment. Among those employed. a person on the average got work only for a little over one third of the number of days in a year. For this reason, in spite of fairly high wage-rates, the actual per capita income

among the families of agricultural labour households in this area was less than one half the state income per capita. The average intake of calories was only 66% of the minimum of 2200 calories per head per day, even in the harvest season where employment conditions were relatively more favourable, it falls to 54% of the minimum level during the rest of the year The nutritional status of women & children in such families can be easily imagined. These observations are in line with the findings of the National Nutritional Monitoring Bureau of the National Institute of Nutrition.

In another recent interesting study Profs. Johri and Pandey, described the "inexorable forces which drive sections of our rural population into the abyss of poverty and destitution" In this study covering 4 states, they found that 78% of the rural labour owned no land; an additional 16% owned less than 0.5 acre, leaving a mere 6% owning more than 0.5 acre. According to them. "destitution is the natural culminating point of a process that ensures the gradual transfer of all economic assets, principally land, into the hands of a small minority of powerful classes. Gradually, small farmers become marginal farmers and then join the ranks of the landless agricultural workers. The wages and the working conditions of the landless labour provide a typical example of the outcome of an unorganised labour market in the context of a feudal social structure".

There are those who argue that modern intensive agricultural technology has tilted the scales against the small and marginal farmers and has actually contributed to increase of socio-economic disparities in rural communities. Even if this be so, this cannot be an argument against the impressive scientific and technological advances which have so richly contributed to agricultural production; but it is a powerful argument in favour of institutional changes in the rural set-up which will ensure that the fruits of agricultural development percolate to the weaker sections of the community.

Impressive gains in food production will have no meaning and make no great impact on the malnutrition problem. When large sections of the very labour force contributing to such increased food production are denied even the minimal benefits of agricultural development are themselves subject to chronic starvation and malnutrition.

An isolated minimum wages policy cannot achieve much in the face of wide spread unemployment and underemployment. Nor can the problem be solved by emergency - relief operations or hastily conceived "food-for-work" programmes.

What is needed is a policy which will ensure minimum real-income levels throughout the year to meet basic requirements of food, clothing and shelter for a family of four (two adults and two children). In many of our villages today even basic minimal health care facilities are not available; and the services of the Primary and subsidiary health centres in our present public health system do not reach out to most of our villages. Environmental sanitation in the rural areas is, to say the least, still very primitive. Under the circumstances. vast sections of our rural population are caught up in a vicious cycle of malnutrition and infection, which are the attributes of

the poverty syndrome. Thus. a considerable proportion of our rural labour force is not only unemployed but is also unemployable. It is to be hoped that the new programme of the Government of India of inducting health workers at the village level will bring about some improvement in the health situation or poor rural communities. However, in the ultimate analysis, neither an isolated health programme nor an isolated agricultural development programme can bring about the needed transformation of rural societies. An integrated programme of rural development comprising mutually reinforcing components designed to generate productive jobs. increase real incomes, raise productivity, encourage family-planning and education. and provide basic minimal health care is essential. It is through such all round development that we can expect to narrow current socio-economic disparities and eliminate the present paradoxical spectacle of mounting food surplus on one side and continuing malnutrition on the other agricultural development should be the logical spear-head of such a programme of national development. Should this happen. the benefits of agricultural development will be expressed not merely in terms of increase in food production, but in terms of the improvement in the quality of life of our people and in the promotion of their health. welfare and happiness which it has promoted. In this great task. agricultural universities have a pioneering role to play.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
13th ANNUAL CONVOCATION

25th April 1980

Address by
Dr. A.B. Joshi

Rajendranagar, Hyderabad – 500 030

Hon'ble Chancellor, Sir. my respected friend and Vice-Chancellor of this University, Shri Raghottama Reddy, distinguished guests, scientists and academicians, young student friends and other friends.

I am greatful to you all, and especially to Raghottama Reddy Garu, for the kind invitation which has enabled me to be amidst you on this important event in your academic calendar. The pleasure is all the greater because of my past association with this University as an erstwhile member of your Board of Management, and in many other capacities. which makes this for me a kind of reunion. In passing, I must admit, frankly and happily that behind my presence here this afternoon. there has been an element of family compulsion! It has been for me a great personal pleasure to have known Raghottama Reddy Garu for many years and I am full of admiration for the valuable contributions he has made in the founding and development of this University. Therefore, his fraternally imperative: "You must come" could just not evoke anything else but an obedient, positive response from my side! Moreover since my joining. three years ago. the Mahatma Phule Agricultural University in your neighbouring State of Maharashtra, these personal ties have been superimposed by ties of institutional fraternity in the form of the Coordinating Committee of Agricultural Universities in the Southern Region of India. This institutional family circle, which has brought together the Agricultural Universities in Andhra Pradesh. Karnataka. Tamil Nadu. Kerala and Maharashtra, have provided us an opportunity and a forum to put our heads together, share experiences mutually and work together in the service of Agriculture in this region of the country through purposeful partnership and through a critical examination, discussion and mutual stimulation of our respective programmes in the areas of agricultural education. research and extension education. It is a very important and worthwhile task.

For almost the entire part of my professional career my involvement was primarily with a National institution. namely the Indian Agricultural Research Institute (IARI) and the National apex organisation, namely the Indian Council of Agricultural Research (ICAR) both of them located in the national metropolis and both of them having an All-India outlook and responsibility. But that is not to say that. because of that location, I did not have the occasion to be exposed to the Agricultural University system in the country which has individual State responsibility. The truth is quite the contrary; and happily so : because it is only the individual parts that make a whole. In fact, a major reward for me personally stemming from that context and that location, is the many friends and beaming familiar faces which I see in this University; in many other Agricultural Universities in India and in fact in the national and international agricultural research institutes. not only in India, but in numerous countries across the globe. Moreover, as most of you in this gathering would know and as I myself recall it with great nostalgia, the All-India Coordinated Research Projects. sponsored and operated on a national scale by the Indian Council of Agricultural Research over the past two decades. knit us all. central research institutes of the ICAR system and the Agricultural Universities, into a national scientific fraternity which today has become a . force to reckon with and whose joint impact on the agricultural research and development in India has indeed been historic. This life-force, so to say, was, as everyone in the country unhesitatingly admits, responsible for the major breakthrough in agricultural science and technology which was largely instrumental is ushering into this country since the mid-1960s, the era of the Green Revolution on

more than one front which brought about a sea change in the Indian national agricultural scenario.

The 20-year-old Agricultural University movement in India began in July 1960, with the setting-up of the first such university at Pantnagar in Uttar Pradesh. The Andhra Pradesh Agricultural University, the fifth university, was established in June, 1964. Today, there are 21 agricultural universities in India -"atleast one Agricultural University in each state", as was recommended by the Kothari Commission, during the mid-1960s. Jammu and Kashmir and some of the smaller States are the only areas left in the country which do not as yet have agricultural universities of their own. However, we distinctly recall the big question mark that was writ large on the faces of the majority of the leading lights of the academic world, and in the loftiest portals of educational policy-making and administration of the country when the agricultural universities came in for discussion at that time. "Why and where for this new case in the Indian Universities system? "they asked! They were not convinced that this concept fitted into the then accepted norms and concepts of what makes a university and what it stands for. But, at long last and happily so, the doubts were dispelled and, as I said earlier, the Kothari Commission blessed this concept and recommended that each State should have at least one agricultural university In this historic context, it is most gratifying for me to recall today that, some years ago. a former chairman of the University Grants Commission. while attending a meeting in the ICAR. made a very bold statement which, as well listened to him, filled us with some amazement and, of course, with a great deal more of relief and satisfaction. He said that, while at one time the elite of the educational hierarchy in the country was not very appreciative, and perhaps it was to an extent even suspicious, of the *raison d'etre* of the agricultural university system, everyone now is fully convinced that if there is any educational system in India which has a direct relevance to the social system in the country at large, it is undoubtedly the agricultural university system. In fact, the learned academician went on further to say that the system, which is often called the "traditional", or the "general" universities system, will have to struggle hard to seek and find for itself such relevance and, to that end, it will have to orientate itself suitably in order to impart to its own educational approach and programmes this most vital element of social relevance which is inevitably essential for any educational system anywhere in the world.

These glowing compliments paid to the Agricultural University system were neither untrue, nor undeserved. It swelled our hearts when we heard them. It should however be remembered that while the wish to be admired is a natural human instinct and desire, it is at the same time a great weakness too. For is it not true that nothing can be wholly true or good just as nothing can be wholly false or bad? Praise ought not to lull a man, or an institution, into self-complacency, which leads in the direction of stagnation, nor should criticism lead to irritation and conflict. In fact, both praise and criticism should lead a man, or an institution, to "introspection" and they both should act as a spur for further action and progress. Introspection is the essence of progress. Like the Adya Shankaracharya every man, or institution, should ask himself or itself the question day in a day out to whom do you belong, where have you come from, what do you stand for, what are you doing, and where are you going? That is why, ever since I heard those words of wisdom in the ICAR meeting referred to earlier: and more especially so after I joined Mahatma Phule and started

watching the agricultural university system from a closer angle than I had the opportunity to do before, the two words: "social relevance" have always stood before my eyes and have been rising in my ears, confronting me with a naggingly perpetual question mark, It is my wish today to make these two words the focal point of what I wish to lay before you this afternoon. In doing so, I do ask myself the question whether this is the appropriate time and occasion for a harangue, whether you would be in a mood to listen to it, and whether I shall be able to attempt to do what I wish to within the brief time spread of a convocation address. Therefore I shall crave your indulgence on all these three counts and with your permission attempt to at least draw an outline.

Let us look at the Agricultural University system as it stands today twenty Years after its inception. In doing so, let us first recapitulate the fundamental principles, tenets, concepts and purpose behind the establishment of the Agricultural Universities. The concept was .to achieve, in the whole range of activities of the University the fullest of functional integration, staff wise and programme wise, of the trinity; education, research and extension education, and do away with the watertight compartments and fragmented manner in which the three activities were carried on in the different States of India in the pre-Agricultural University era. The idea was to reorganise the institutional set up relating to agricultural development in each State on the principle of a wholesome division of labour and ensuring at the same time that such division was functionally complementary and additively effective, and not retrogressively divisive. For agricultural development, considering its numerous faces and mutually-interacting activities, is an enormously huge task which a single-institution mechanism cannot wield effectively. Orchestrated endeavour on the part of more than one institution is therefore very desirable and indeed inescapably essential. Thus, the Agricultural Universities were to be charged with State-wide responsibility for research, in all the major areas and disciplines, so that dynamic programmes of production-oriented, problem-solving research were forged for generating new and distinctively-superior agricultural technology 'which the farmer would find feasible and economically-viable under his local conditions and through which agricultural production, productivity and income levels would increase perceptibly. The second important charge on these universities was to impart high-quality education, which would be far from being textbooks, but which would incorporate and imbibe the latest results of research and thereby revitalise the syllabi, curricular and co-curricular instructional programmes, and strengthen both the theoretical and practical aspects of teaching so as to create a cadre of young men and women who would see in realistic perspective the entire gamut of agriculture in their own State, as also in India as a whole, together with its diverse problems and potentials, and who, during their residence at the University, would be able to acquire all the necessary farming skills so as to be able to carry out with full confidence all the crop and animal production operations with their own hands and who would thereby become good practical farmers in their own right and emerge as effective leaders of change and agricultural progress in rural India after leaving the portals of their respective alms matters. The third responsibility, that of extension education was, so to say, a missionary function in which the university and its staff and student community. would engage in a meaningful, mutually-interactive and mutually-beneficial dialogue, in a kind of feed-on and feed-back mechanism, with farmers and farm leaders at the rural level and with the government departments

(such as those dealing with agriculture, animal husbandry, irrigation, fisheries, forestry and related activities like quality-seed production, agricultural banking, agro-industries and rural development) and with the grass-root level institutions (like the Zilla Parishads, Panchayat Samiti's and Gram Panchayats) which are charged with the functions of planning and execution of agricultural production and development programmes in the State. To this end, the ICAR, in cooperation with the Agricultural Universities, evolved model syllabi for the governance of these universities in such a manner as to adequately fulfil these ideals and objectives.

How far these lofty ideals were translated into action in the different Agricultural Universities in the country is quite a different story and, unfortunately. one that does not make a wholly pleasant reading. It must be remembered. however that when we see the seamy side of this garment, it does not necessary mean that the Agricultural University system in the country as a whole failed, entirely or even largely to come up to the expectations that were anticipated from them. But it could certainly be said that things have happened in a far different manner than they might have been. The aberrations were many and were of a rather serious nature.

The ICAR, more especially since it reorganisation in 1965. has pumped in crores of rupees, over the past decade and a half or more, for the development of Agricultural Universities in each State on sound lines. It has liberally given massive financial assistance without which the Agricultural Universities would just not have developed to the extent they' have today been able to extensive aid was given, and is being given, for campus and farm development, for the development of laboratory and teaching facilities, for library development, for setting up new departments, for staff and student amenities, for research through ICAR's ad hoc project grants and several times more massively for developing strong research programmes on a country wide scale, on crops. animals and diverse other fields and areas of research, through the well-known AII-India Coordinated Research Projects. Generous aid has been given for extension education activities, for setting up Krishi Vgyan Kendras and for numerous other things. The idea was to create and develop strong institutions, in the country as a whole, with high capabilities for excellent-quality research' and high-quality education. The manner in which this organisation of agricultural research, extension education which has been built up in India, at the National and State levels, has been admired throughout the world. However In this context, it would be interesting to make an exercise to ascertain, in quantitative financial terms, what ICAR did for the Agricultural Universities in each State and what the individual States themselves contributed for the development of their own Agricultural University. I am sure the picture will be revealing.

On the other hand, what happened in the States does not make an entirely happy story. Some Universities developed in an excellent manner and became examples for all the others to emulate. Some of these, rather few in numbers, were fortunate enough to receive excellent moral and financial support from their respective State Governments: one. of them shaped beautifully despite the apathy and niggardly support given to it by its own State. These good universities developed dynamic and imaginative research programmes of their own, over and above the support they received from the !CAR under the All-India Coordinated Research

Projects in which too they have been actively participating, evincing good leadership in the respective areas of research. The educational programmes and facilities which they have established are the best that can be had anywhere in the country They developed very good departments of extension education, established excellent, direct liaison and rapport with the farming community and also forged very healthy University- State Department linkages and relationship thereby creating a wave in their respective States whereby worthwhile extension and training programmes were forcefully spearheaded and which instilled great faith and respect for the Agricultural Universities in the eyes of the farming community as also in those of the State Governments.

At the other end of the spectrum, retrograde rivalry set in many States between Agricultural Universities and the State Departments of Agriculture and Animal Husbandry; the latter harboured ill will and a feeling of having been dispossessed, and developed a spirit of bitterness towards the Universities. Some States, instead of establishing agricultural universities as separate institutions, as was done in many other States, set up these institutions as a part of the "general" university system, inclusive of the paraphernalia of the affiliated college system, which should just not have been done that way Because, in the Agricultural University system, affiliated colleges are an anathema. Some States deliberately did not, and still have not, transferred State-wide research responsibility to the Agricultural Universities or , where the transfer was made, it was made only partly and the State Departments continue to have their own parallel research programmes and research establishments. In more than one State, so to say the existing old wine, a stale one at that, was put into the new bottles of the Agricultural Universities. Existing government agricultural colleges, including home science colleges and private affiliated colleges, were straight- away absorbed into and amalgamated with the Agricultural Universities without duly examining whether scientific and technical considerations, or financial resources, warranted such action. It is often difficult to muster trained scientific manpower adequate in terms of numbers, quality and experience, to establish even one good agricultural university in a State. Despite this, some States, guided more by regional and parorchial rather than technical and rationalistic considerations, merrily went ahead and established more than one Agricultural University unmindful of the colossal additional financial burden that such action entailed. In multiple campus universities, Constituent Colleges vied with one another again on regional and parochial grounds, insisting that they too will take up post-graduate instructional programmes when they were actually not strong enough to effectively run even a good undergraduate programme. In some States, establishments dealing with our agricultural education, such as agricultural schools and Gramsevak Training Centres, were transferred to the Agricultural Universities, which was not done in many other States. Some Universities statutorily set up, as an integral part of their governance bodies known as Senates or Courts, which the ICAR Model Act never recommended. As would be expected, these bodies became, at best, fifth wheels to the coach and, at the worst, they were of nuisance value.

Some of the universities, which were progressing on ideal lines, made their research and teaching faculties strong, very carefully selecting their research and teaching academic staff, whether drawn from Government Departments or recruited directly from the open market, thus making their Faculties truly all-India in character

taking the best talent that was available anywhere in the country. For staff recruitment, they set up selection committees entirely consisting of top-notch scientists and experts from outside the State; in some cases, even the Vice-Chancellor did not sit on the Selection Committees. At the other end of the spectrum, provision was made in the statutes of some universities whereby non-scientists and non-professionals were made members of selection committees for recruiting academic staff, with obvious results! The Boards of Management or Executive Councils of many Universities, instead of accepting the recommendations of the selection committees as they were made, spent long hours hotly discussing individual candidates whether they figured or not on the panels recommended by the selection committees, whereas research schemes and proposals were passed within a matter of minutes. In some Universities, promotion of teaching and research staff, by seniority alone, was provided for under the statutes when it is well-known and appreciated in all academic circles that promotion on the basis of seniority in service alone tantamounts to laying premium on mediocrity As far as I know, such" promotion system by seniority alone is not found, nor is it provided for in any of the central research institutes of the ICAR, nor in other Agricultural or "general" universities. The long- term damage which such system of promotion, in addition to recruitment based on State or regional preferences, does to the quality of the academic staff is woeful and effects, in turn the quality of education and research in the university which can only be imagined.

It is not my desire to make the list of aberrations as long as it actually is. The purpose here is only to illustrate the point that, while the setting up of lofty ideals and traditions is extremely desirable for an academic institution building and for achieving real, substantial progress in the setting up of good programmes of education and research by which alone a good quality, ideologically-inspired and technically-well-equipped younger generation could be created. These ideals and concepts can be dashed to the ground, and the future of the nation mucked up and marred, by the whims and fancies of those bent on not doing the right things for reasons other than rationalistic. This not to say that things must be done all over the country in a uniform, regimented manner: It also must be conceded that there can be more than one way of doing things properly and well. Not again, does one insist that all institutions must be built up as if they were cast from out of one single die. Variation is in the nature of things, and in fact it is the essence of life, and universities and other educational institutions can, and they really should, shape and develop themselves according to their own genius and ethos. But the deviations which I have pointed out above are not of that nature. They are indeed bizarre aberrations stemming from whims, fancies and non-challant recalcitrance. My own feeling has all along been that ICAR has been far too patient, for far too long a time. However, I also know that ICAR had very good reasons for doing so. But, then, a stage comes, and .I think it has come when one cries in desperation: "enough is enough". I may be saying hard things, which ought never to be said, at least on an occasion like this. I am familiar with the wise Sanskritadage "Tell the truth; tell pleasant things: but do not tell the truth if it is unpalatable. But some one, at some stage, has to call a spade a spade. I do so with utmost humility with no intention to injure any feelings in any quarters, and for very good reasons, and would exhort the ICAR to examine if, in their own thinking even at this stage, the time has not come to discontinue, or to substantially reduce, financial assistance to recalcitrant States and Universities! After

all, ICAR can not for ever be the Santa Clause for all the Universities for all the time. Eventually, the responsibility for high-level agricultural education and research and the responsibility for adequately and fully funding these essential activities for real agricultural progress and development at the State level, rests with the States themselves.

If corroboration of what I have said above is needed, one has only to look at the Report of the Review Committee on Agricultural Universities (1978) appointed by ICAR under the/chairmanship of Dr: M.S. Randhawa, commonly known as the Randhawa Committee Report. The inaugural address delivered, at the first meeting of that Committee in 1977, by Shri Jagjivan Ram, the then Union Minister of Agriculture and Irrigation and President of ICAR; opens with these significant remarks.

The terms of reference of the Committee have been made specific so that you can concentrate on the important question of developing an educational system best suited to the conditions of, our country. Education. whether general or specialised, has so long succeeded in producing elites. What we require, specially in the field of agriculture, is non- elite graduates with motivation for self-employment in agriculture and with competence to identify and resolve practical field problems. Although the gospel of dirty hands is frequently preached by our educationists, the practice of equating university education with 'white- collar' jobs still persists. One can understand this practice persisting in social sciences and arts subjects, but I fail to understand why we have not been able to shake of this pernicious practice in technical and vocational education"!

If the President of ICAR felt compelled to ask the above question. almost in desperation, 17 years after the first agricultural university was established in .India, it should be an eye- opener for us all! The answer is patently clear. If the students are white-collared, it is because the teachers are 'white-collared'. If the student has to be changed in his attitude. as he must be to serve tomorrow's Indian Agriculture, the teacher must first shed his 'white-collar'.

About Home Science education. Shri Jagjivan Ram had this to say:

"Another question which I have to request you to examine is the reorientation of Home Science education to suit Indian homes and rural needs. Even more than the agricultural graduates, Home Science graduates tend to be drawn from towns and cities. Very few of them seem to utilise fully the knowledge they have gained from their education. Nearly 10,000 home science graduates are being produced by our universities, both general and agricultural. It has been estimated that there are over one million matriculates among women living in our villages. Can’t they be trained by our Home Science Colleges? What steps should be taken to derive benefit from this valuable human resource?”

Shri Jagjivan Ram concluded his address by saying:

"I would request you to pay the greatest attention to questions bearing on the effective use of the most precious of our assets - a hardy, hard working and receptive farming community".

The conclusion is obvious, considering the country as a whole, our agricultural education patently does not as yet seem to have become fully relevant to the needs of the rural areas in which all of our agriculture takes place.

The strategy, which Shri Jagjivan Ram suggested on that occasion, had these four elements: (1) Every University should have adequate farm land, animal sheds, fish ponds, etc.. for providing opportunities to students for learning by doing; (2) Universities can run additional ‘earn while you learn' projects in a wide range of fields-soil testing, tractor and implement -repairs. seed production. animal production. poultry production, aqua-culture, etc. ; (2) The Universities should organise suitable production and protection campaigns at periodic intervals; and (4) We should have a system of internship, before the final year in the College, in a suitable State or private farm, the tenure of which could probably be one crop season in the case of annual crops. The numerous, useful recommendations, which Randhawa Committee has made, include all or most of the points which I have made earlier.

If you visit any agricultural university today you will often hear the words: practicals, work experience, 'earn while you learn', internship training, being parroted around, but. are we certain that these schemes are being implemented with the true spirit behind them, or they are being carried out just in words?

I think we, in all the agricultural universities, should do an in-depth introspection on these and many other things which are vital to imparting true social relevance to our agricultural education. In adopting the 10+2+3 pattern of education recently some universities have thought it fit to have the 10+2+4 pattern, many others are bent on going ahead with 10+2+3, some are intending to cap the 10+2+3 pattern with the addition of a one-semester internship training programme. Have we adequately and deeply discussed this on our own campuses? Could the 10+5 pattern be more appropriate for agricultural universities?

Some years ago, we organised a seminar at IARI on the relevance of post-graduate education in IARI. Before that, Pantnagar had very fruitfully organised such a seminar on the relevance of undergraduate agricultural education. In these seminars, both teachers and students participated in an extremely enjoyable manner and with a healthy attitude of mutual give-and-take. Among the many conclusions drawn in the IARI seminar the following were the foremost: (1) Our Bachelor degree programme should aim at producing a broad based, practical-oriented, crop/animal production specialist; (2)The objective of the Master's degree programme should be to produce a broad-based subject-matter-specialist ; (3)The Ph.D. programme should only be for the few highly intelligent and research-inclined "self- starters". I think we have made too much of the Ph.d. degree, which seems to have become "Cheaper by the dozen" ! Time does not permit me to dwell on this matter any further

I would, however, suggest that we discuss these and other relevant concepts in depth, with full and creative student-teacher participation, in each University and also at the level of the Indian Agricultural Universities' Association and at the highest level in ICAR.

Although research is the essence, and in fact the sine qua non, for real agricultural progress, time permits me today to say only this: if we have advanced quite far and indeed dramatically and admirably so after, the bleak 1947-65 era, the further going is likely to be quite an uphill task. Only 20 years hence, that is by 2000A.D., our human population which is already around 64 crores today would have reached an astounding figure ranging between 86 and 100 crores according to various estimates. If we now annually produce food grains around 126 to 130 million tonnes, the demand by 2000A.D. is expected to be around 180 million tonnes or more. We shall still be considerably short in pulse and oil seeds production. And we have to produce all this without the possibility of being able to bring any more land under the plough. In this endeavour; we shall have to face serious shortages of inputs, like diesel oil, electricity, fertilisers, pesticides, etc., both in terms of quantities available and the extent to which costs of these items, as also of labour and other essential inputs, will escalate. More than increasing and stabilising agricultural production at high levels, farming has to be made remunerative, cost of production will need to be reduced substantially. There will have to be more crop for every drop of water and for every grain of fertiliser and pesticides used. Above all, levels of incomes of farmers would have to be stepped up substantially. Therefore, just the commodity approach to research is not going to be enough. Technology for whole farm profitability, in which crops as well as animals will have to figure together, will have to be developed through farming systems research. Thus, in the true sense of the phrase today we have to run to keep ourselves at the same place; if we wish to get some-where, we shall have to run at least twice as fast as that.

Your Excellency, my colleagues and student friends, I must, I think, pause here. Before I do so, I sincerely congratulate you all on the occasion of this thirteenth convocation. I particularly wish to congratulate all my young students friends who have very deservedly won their degree certificates and prizes. They should, and I am sure they will, spur you to motivated and energetic action without which Indian Agriculture cannot see brighter days. What you will be able to do for Mother Agriculture after you leave these portals of high knowledge will indeed reflect the quality of education you would have received here and the inspiration with which you would have been fired during your stay in this, your alma mater. Society will judge the degrees which you have earned today by the contribution you make, and also appear to make, to National agricultural progress. Dr D.S. Kothari, a former Chairman of the University Grants Commission, used to say that the Ph.D. degree should be subject to renewal every five years! That is true for all academic degrees! They. we must remember, are a means and *an* asset and they constitute so to say a valuable initial capital. They should mark the beginning, and not the end of a worthwhile and worthy professional and academic career for you all.

I thank you very much indeed for your patient ears!

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
14th ANNUAL CONVOCATION

3rd May 1981

Address by
Dr. O.P. Gautam

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice-Chancellor, Graduates of the year, ladies and gentlemen.

I feel privileged and deeply honoured to have been invited to deliver the Convocation Address at this occasion of the 14th Convocation of the Andhra Pradesh Agricultural University at Rajendranagar. Normally I feel a certain degree of diffidence about accepting invitation to make speeches before such a distinguished audience. In this case I accepted with pleasure partly because of my long association with the Agricultural Universities Development Programme but mainly because of my immense respect for the vice-Chancellor, Shri J. Raghotham Reddy, for his practical wisdom and pragmatism.

It is a matter of great satisfaction that APAU has developed into one of the leading Agricultural Universities in the country and has made an impact not only on the agricultural development in Andhra Pradesh but has also contributed substantially towards country's food production. The credit for this must go to the leadership this institution has enjoyed in succession since its inception; to the dedicated faculty of the university and the vision and foresight of the State Government in providing the required support and direction.

I must acknowledge that the Indian Council of Agricultural Research has had all through the most favoured treatment from both the university and the State Government. The Agricultural Research Complex that we see here at Rajendranagar today bears an eloquent testimony to the very close working relationship that ICAR and APAU have developed with mutual advantage. It is largely due to the State Government's progressive policies and foresight that Hyderabad today is the hub of research and educational institutions both national and international.

Traditionally, the convocation address refers to the roles and responsibilities of the outgoing students who are on the threshold of their professional careers ready to take a plunge and face the struggle of life, but .I would not like to commit the mistake of advising today's young men about qualities and virtues which I do not possess myself. I offer my congratulations and very warm felicitations to all the outgoing graduates of the year on their hard earned and well-deserved degrees.

Permit me this afternoon, ladies and gentlemen, to share with you some of my ideas, largely the preoccupations of my job as Director-General of the ICAR which also happen to be our common concern, namely "the Research Strategies for Accelerated Agricultural Development".

Production Advance

Thirty years ago we set our goals to make the country self-sufficient in food. Today, we are self-sufficient. This year we hope to achieve a record production of about 132 million tonnes of food grains compared to 45 million tonnes in 1950. This three-time increase in food grains production within a period of 30 years has been possible largely due to improved production technology developed by our Research Institutes and Agricultural Universities and adopted by our farmers. The main

contribution to the food production came from wheat and rice. Wheat production has tripled over past 15 years. Similar production advances have been registered in the case of sugarcane, cotton and potato. We have yet to make a significant impact on the production of oilseeds and pulses which are mainly grown in the dry farming areas under precarious soil moisture conditions and without much fertiliser application.

Research advances made in the areas of dry land agriculture, saline sodic land. reclamation, milk production, poultry production and fish culture have also started to register an impact on production and productivity introducing at the same lime an element of diversification and stability in our agriculture. Lactation milk yield of a cross-bred cow is about four times (3200 litres) than that of a desi cow. Improved strains of poultry now available give 260 eggs a year compared to the previous average of 50-60 and a fisherman can grow 3000-4000 kg of fish per hectare under composite fish culture where he grew 600 kg earlier. Given the adoption of improved technology doubling of production at least over part of the dry farming area is an achievable goal.

In spite of availability of adequate food grains in the country there is a great deal of malnutrition. Particularly among the poor who do not have purchasing power due to unemployment/underemployment. A production problem has now become the problem of equity and distribution.

Although food production has made significant progress, average yields on the national basis continue to be relatively low. It is generally agreed that only a small part of the technology (15-20%) is finding application on farmers' fields and our farmers are generally harvesting one-third or one-fourth of the crop yields which are now possible in many cases. The average yield of wheat in U.P:, for example, is 14 quintals per hectare as against the demonstrated potential of 60-70 q/ha. Improved Brassica varieties give 20-25 q/ha compared to the national average of 6 q/ha. We must bridge this yield gap.

Although major breakthrough in crop yields is not in sight, there is consensus that we must increase the rate at which we are making advances in agricultural research in order to at least maintain and increase the reservoir of knowledge which is the very basis for all new technology.

An important lesson that we have learnt from our experience over past 15 years is that no progress in agricultural production is possible without the availability of sound technology. Fortunately, this is one area where the country had laid sound foundations for continued progress in years to come. India today has one of the largest physical infrastructure in agricultural education and research in the world. We have today 34 Central Research Institutes and 21 Agricultural Universities covering almost all the States. Besides these basic institutions, there are the All India Coordinated Research Projects (56) which are run in mutual partnership by the Research Institutes and the Agricultural Universities. Having established this national research grid, the main emphasis in the years to come would be on qualitative improvement and increased research output per scientist. We must keep reminding

ourselves that progress of agriculture can be sustained only with a dynamic research and training base. Without this base, success would be short lived.

Since we reorganised the agricultural research and education system in the sixties, our scientists have developed varieties of a number of food crops together with associated package of practices. They have demonstrated that given the wherewithal, proper incentive and working conditions, they can achieve well-defined goals set for them on time-bound basis. However, there is no room for complacency. Food-poverty-population syndome calls for massive mobilisation of national resources and quick action. Technological possibilities do exist and offer firm base for hope that malnutrition and poverty can be alleviated. However, pronouncements of technological capabilities should not .lead us to believe that the food problem will be solved without serious effort. In order to meet the needs of our growing population, we must continue to increase production, control population growth and enhance income and purchasing power of the rural poor The next decade is crucial. What happens in next ten years would determine our long range success or failure.

Technology Transfer

One greatest concern at the moment is the transfer of technology that has already been generated and the wide gap that exists between the actual and potential farm yields. It would appear that the gap is more an extension-cum-management-cum-policy gap rather than a technology gap. A critical socio-economic analysis only would identify the relative role of different constraints for each situation. This is one priority area in research where collaboration with social scientists would have a high payoff. We place high premium on the role of technology and importance of research, but only if it is organised to reach and benefit the rural poor.

Stability of Production

Attaining stability in production is another major concern. Emphasis is therefore, being given to bring maximum area under irrigation both for increasing as well as stabilising production. The target is to bring 113-5 million ha under irrigation by the year 2000. But even after realising the full irrigated potential. about 55 per cent of the area would remain rainfed. Hence the continued importance of dry land agriculture.

Today, about 70 per cent of cropped area is rainfed, which contributes 50 per cent of the production of oilseeds and pulses and 45 per cent of cereals. In 100 million hectares of the dry farming areas. mean annual potential evapo-transpiration exceeds the mean annual rainfall, and these semi-arid areas suffer chronically from drought, soil erosion and wide fluctuations in production. Therefore. unless we optimise production under dry farming conditions our goal of stability may not be achieved. It is in this context that the dry land agriculture project was started about 10 years ago. Since then appropriate technologies for stabilising crop production to some extent have been developed. Adoption rate of technology in dry farming areas is even slower: Although doubling of yield is a distinct possibility, element of

uncertainty and high risk serve as disincentives and farmers are, therefore, shy to adopt improved package of practices. They need low cost technologies. Although dry land agriculture is at the threshold of a major revolution, only an imaginative look at research strategies would seem to hold the key to future improvements. Researchers will have to carry out water-balance studies, develop crop genotypes especially suited to inter-cropping systems so as to benefit from allelopathic elects of associate crops. Also, the plant physiology and agro-meteorological base of dry farming needs to be strengthened a great deal.

Need for research on factors determining stability of production has become increasingly important. The major factors causing yield variations are weather pest epidemics and public policies. Under dry farming conditions. climate accounts for more than half the variation in crop yield. Through an integrated approach. Efficient soil and water conservations and management for each watershed area. crop planning based on yield and stability characteristics, adoption of alternate land use strategies, water harvesting and crop life saving techniques, it is now possible to stabilise crop production to a greater extent than was considered possible some years ago. However the more we strive to achieve stability in production in the face of aberrant weather as well as pest incidence, the more we feel the need for strengthening agro-meteorological research.

The Changing Research Trends

With accelerated growth of agriculture, our problems have not decreased, only the nature of problems has changed. The problem of subsistence agriculture is giving place to problems oriented agriculture. Significant shifts are taking place on the research front. Efforts to develop photo- insensitive cultivars in order to confer wider adaptation, improved harvest index and shorter crop duration have made it possible to introduce altogether new multiple cropping system under irrigation as well as assured rainfall areas. Crops are moving to non-conventional areas and to non-conventional seasons. Changes' in genotypes and locations have necessitated significant changes in cultivation practices.

Emphasis is changing from single crop research to "cropping systems" and "mixed farming systems" research. Accordingly, new farming systems with varying combinations of crop-livestock-fish components are emerging. Development of sylvi-pastoral system, multi- level farming around plantation crops and polyculture in fish farming are likely to be subjects of more intensive research in future.

Enhanced use of irrigation, fertilisers, high plant population and dense crop canopies have resulted in a micro-climate more favourable to pest and disease epidemies. Under conditions of intensive agriculture, problems of water management, pest management, crop nutrition and pesticide residue analysis are becoming more and more complex. Marketable surpluses have given rise to second generation problems such as storage, marketing and processing. Accordingly, post-harvest conservation is becoming as important as production itself. Focus now is on problems of backward areas and small farmer-how to diversify his cropping, his

income source, production capabilities, his employment opportunities, and how to enable him to share the benefits of development.

The focus is changing from production-factor research to resource-conservation research. For example, soil and water conservation, watershed management, conservation of fauna and flora, energy conservation and conservation of post-harvest food losses both in quantitative and qualitative terms. Likewise, priority is shifting to resource-use efficiency.

Crop planning in relation to eco-system and scientific land-use planning have been weak links hitherto. Agro-forestry and desertification are emerging as new areas of vital importance for research. Energy plantations and bio-mass production systems likewise are becoming important in the context of energy shortage.

Resource Conservation for Sustained Agricultural Development

While the need for forging and introducing new technologies for increasing yield is urgent, the process of man-made damage to agricultural assets while is proceeding unabated has to be stopped. We must realise that the prerequisite to sustainable development is conservation of natural resources both living and non-living.

The ecological system in India is currently under great stress due to growing pressure of human and livestock population. The forests are being denuded, marginal lands are being cultivated, grasslands are being overgrazed. There is soil erosion in the uplands and sedimentation and floods downstream. Desertification is on the increase and the renewable resources are getting depleted. The very resource base of production is under threat. The challenge is to make ecological resource more productive and less hazardous.

Land is a basic and inelastic source and it takes nature about 300 years to form I cm l' of top soil, but 6000 million tonnes of soil is being eroded every year and with it are carried : away 8.4 million tonnes of nutrients, which is more 1han what we are using at present. About 150 million hectares of the land area is subjected to water/wind erosion. About 25 million hectares suffer from water logging (3 million hectares) salinity (4-5 million hectares); alkalinity (2.5 million hectares); ravines (4 million hectares) and shifting cultivation (3 million hectares). About 20 million hectares are affected by flood! Inflow of sediments into *reservoirs* is over 200 per cent more than the planned inflow. Hence the urgent need for soil conservation and reclamation.

Water is the key resource for further development of our agriculture, but efficiency of applied irrigation is only 30 per cent in India at present as compared to 80 per cent in Israel. About 30 per cent of the irrigation water is lost through conveyance channels before it reaches the fields. We must, therefore, minimise the waste and optimise the management of available water resources.

India is endowed with immense diversity of fauna and flora. This has been an invaluable source of genetic variability for our breeding programmes. It was to conquest these resources that the National Bureau of Plant Genetic Resources was established to carry out exploration, collection and utilisation of plant genetic resources. Similar Bureau are to the established for collection and preserving animal and fish germplasm resources. One of the important tasks of NBPGR would be to introduce and promote the culture of underutilised plants such .as winged beans, jojoba and Euphorbia.

Crop Production Technologies

Crops account for major part of our food supply They are also cheap source of renewable industry raw materials. Therefore, researches on biological processes such as photosynthesis, biological nitrogen fixation and cellular approaches to plant breeding that control and limit productivity are particularly crucial and relevant to crop improvement. Improved efficiency of photosynthesis holds key to the future adequacy of our food supply. Green plants are primary harvesters of free solar energy. They are net producers of food and energy on a renewable basis. Therefore, all farm practices must aim at increased appropriation of solar energy in the plant system. Agriculture is basically a solar energy processing machine, yet few studies of photosynthesis have been focussed on crop productivity and bio-mass production. The whole intent in agriculture is to collect and store solar energy as a renewable source of food, feed and fibre in plant and animal products and to do it with utmost efficiency.

Conventional selection and hybridization techniques have given us super strains of rice, wheat, maize and sorghum and many fruit and vegetable crops. Combining high productivity, high nutritional quality and disease resistance would pose a continuing challenge to the plant breeders. Development of salinity resistance in plants would indicate that genetically controlled plant nutrition will surely play an increasingly important role in the future crop production. We hope that in not too distant a future our scientists would be able to master the cell culture and protoplast fusion techniques for making distant crosses to synthesize new species and genotypes.

Resistance breeding is still the area of high priority This would include poly-resistance to diseases and pests, cold and drought resistance and even resistance to toxicity of certain micronutrients. With the different cropping systems coming into vogue there would be need to evolve varieties suited to high density mono-culture, inter-cropping and three dimensional canopies. Varieties with crop canopies that provide maximum interception of light, which make the maximum use of carbon dioxide and which have a pattern of root development to enable extraction of nutrients and moisture from different depths would be required, if agricultural production is to be increased through intensive cropping techniques. These newer varieties may have to possess on optimal blend of vertical and horizontal resistance to the important pests and diseases. Multi-lines would be needed to create genetic and inter-regional barrier against epidemics.

High payoff agricultural technologies for the future will not only be those which result in increased production and high yields but also those which are sparing of resources. They would be the ones which would increase demand for under-utilised labour resources and provide more work days per year and more productivity

Fertiliser-Use Efficiency

An important aspect of future research would relate to the fertiliser-use efficiency. Only 25-30% of the applied nitrogen is actually utilised by the plants. Balance is lost due to denitrification or leaching. There is thus need to strengthen research on nitrogen-use efficiency, particularly under humid conditions. In order to reduce losses of applied nitrogen through leaching in light soils, because of denitrification of nitrates in submerged soils. and through volatilisation of surface-applied urea, techniques of using nitrification retardants and slow-release fertilisers will have to be developed, using indigenous material such as neem cake.

Even more important is the phosphorus-use efficiency in the present context, since phosphorus is a non-renewable resource and has to be largely imported from abroad. Under conditions of intensive agriculture, micronutrient deficiencies are also appearing and limiting production. It has become necessary, therefore, to study efficiency of different forms of micronutrients for various farming systems with residual effects taken into account.

Nitrogen Fixation Research

One of the most important thrusts will be in the area of nitrogen fixation research. Efforts are being made to expand the range of plants that can utilise atmospheric nitrogen and grow without applied nitrogenous fertilisers. We should increasingly adopt cropping systems with legume as a component and work for genetic improvement of both host-plants and micro-organisms. Research efforts should be stepped up to improve the biological nitrogen fixation associations with grasses, cereal grains and other non-legumes using bacteria such as spirillum. Biologically fixed nitrogen is slow-release nitrogen and, therefore. losses from nitrification/ denitrification, which now approximate over 50% of fertiliser nitrogen, could be reduced to half.

Research to improve nitrogen fixation in plant has taken two directions: in one, researches use recombinant DNA techniques to attempt to transfer the nitrogen-reducing ability of certain bacteria into plant cells. So far this transfer has been done successfully from bacterium to yeast. This is a step towards transferring such genes to higher plants. The other direction of research uses more classical plant breeding and biochemistry techniques to enhance the efficiency of naturally occurring associations between the nitrogen- fixing bacteria and the plant. The range of plants that require fixed nitrogen from soil bacteria is wider and includes some grasses and cereal crops like rice, corn and wheat. Spirillum is a free-living bacterium which is stimulated by the presence of grass roots. The bacterium rhizobium that fixes nitrogen in legumes behaves differently. Research is being intensified to identify super-symbionts in rhizobia with properties of high infectivity

wide host range, capability to fix nitrogen regardless of nitrogen constraints and efficiency of ammonia delivery to the host.

The unique symbiotic association of Azolla and blue green algae (Anabaena azolla) provides another potent avenue for biological nitrogen fixation. It is reported that Anabaena living with Azolla can produce nitrogen 12-20 times higher than nitrogen fixed by free living bluegreen algae. Moreover, Azolla is not only a nitrogen producer but is also an effective weed suppressor.

Organic Farming

Our dependence on fertiliser imports may continue for many years despite an enormous investment in creating indigenous capacity The escalation in the international prices of fertilisers and their difficult availability have been a serious problem to our agricultural growth. Our strategy, therefore, is to enhance efficiency of applied fertilisers and step up the use of bio-fertilisers by developing them as part of an integrated nutrient supply system. More extensive use of legumes and green manures in cropping systems and of bluegreen algae and Azolla in rice culture should form an important part of the strategy. In this context there is renewed interest in organic farming, viz. Soil conservation practices, use of legumes in crop rotation, proper residue management and recycling of crop wastes, minimum tillage, weed control by biological and mechanical means and use of organic manures. The aim is to minimise use of chemicals. It is possible that both the chemical and organic farming practices may have to be adjusted in a judicious mix. The immediate question to be answered. however, would be -"Could the use of organic manures and bio-fertilisers enable us to harvest crop yields comparable to those obtained under energy intensive agricultural systems?"

Pest Management

The annual food losses from pests (insects, diseases, weeds, rodents and nematodes) are truly enormous. All major crops suffer losses before harvest and after harvest. Unscientific crop planning, cultivation of large areas under single varieties and inadequate plant protection measures lead to widespread pest epidemics. Apart from resistant varieties, one of the growing needs of the day is "real time management of agricultural system" and institution of "effective, integrated pest management" and "pest surveillance" services. There has to be more than single line of defence, namely resistant varieties improve management, biological control, carefully timed application of chemicals-all in concert.

Energy Management

On the one hand, our agriculture is getting more and more energy dependent with increasing use of fertilisers, irrigation, pesticides, etc.; on the other the energy for crop drying, food processing, transport and storage is decreasing. In the wake of energy shortage, we are trying to tap solar and wind energy as well as biogas resources. Animal energy also needs to be nurtured and used effectively in irrigation,

transport and other purposes. We should also launch programmes for harnessing both renewable sources of energy and nutrients for on-farm use. Proper development, utilisation and conservation of renewable energy should be the appropriate policy in agriculture. This would also lead to decentralisation of control of energy.

We should develop agronomic practices and technologies in which productivity improvement is not accompanied by a heavy loss in energy conversion efficiency. Biological nitrogen fixation through both grain legumes and fodder legumes offers an effective means of saving non-renewable energy.

Basic research on increasing the photosynthetic conversion of solar energy and on biological fixation nitrogen is essential to any comprehensive programme of research on energy both because of increased efficiency of crop production and reduced use of fertilisers. Agricultural lands may soon be needed to produce crops which will provide alternative or supplementary energy sources to fossil fuels. .It is clear that agriculture and forestry have a key role to play in developing energy conservations practices in search for new sources of energy and in adopting the present food and fibre system to changing energy resources.

Selective Mechanisation

There is need for mechanisation system for producing more food, and at the same time to put more people to work more electively. Mechanisation should lead to more manhours per unit area per year; more work days and more uniform distribution of work over the years. There is need for selective mechanisation to enhance yields and to minimise losses.

Strategy for Accelerated Development

There could, of course, be no blueprint for accelerated development for every situation, but the most desirable approach would be the combination of commodity oriented production programmes, defined regional campaigns to increase productivity and income and synchronized and coordinated Government services. Development oriented institutions ' like Agricultural Universities must be directly involved in development programmes. Their contribution to development rather than their own growth and prosperity must be the measure of success. Agricultural universities should assume planning and policy making role and play much greater role in human resource development and in the training of both the policy makers on the one hand and the beneficiaries of the development, the rural poor on the other. .

Our universities must train cadres of people who understand national goals and objectives, who command basic farming skills, who are well grounded in agricultural science technologies and who are capable of acting fast.

Re-adjustment of Research Strategies for Continued Pay Off

Available evidence supports that agricultural research has been the most profitable investment. Research is costly but the pay of on such investments is high indeed. It is difficult to separate the effects of research from other factors. New technology only serves as a catalyst and often triggers investment and other production factors. The value of such catalysts is difficult to isolate. Our research system must keep readjusting its goals and strategies to ensure it on a continuing basis.

It is certain that future research is going to be more complex, more difficult and more costly. There would be need to step up mission-oriented basic research particularly with most efficient methods of harnessing and harvesting from the atmosphere abundantly available sunlight, nitrogen and carbon. Investment in research will have to be increased substantially. Basic research will have to receive the attention of nation's top scientists and the best research institutions.

Yield stability, low risk bearing capacity, low cost and profit maximisation are some of the characteristics we should keep in view while developing scale neutral appropriate technologies for our small farmers. We need to develop technologies which will be suited to group action. Above all, there is need to put available technology to actual use. The time between a discovery of the technology and its adoption must be minimised. We need to make greater investment not only in research but for diffusion of knowledge also. What should receive greater attention in future are the subtle but very real non-technological barriers to a production advance.

Constraints Analysis

Evaluation of technological barriers to increased yields can be best done by biologists. They are also the ones who can foresee problems and estimate pace of production advance. But all biologists are not trained to think comprehensively about agricultural development or in the planning of it. New generation of leaders with strength both in biological sciences and economics and with development orientation is needed for such a planning.

Reporting Research Results

There is one weakness that our scientific community should seek to correct. It is our failure to make the significance of our scientific evidence known to non-scientists in a non- technical language. Our clientele consists of two main categories, namely the politicians, the planners and bureaucrats on the one hand and the farmers and technicians on the other hand. The gap in perspective between scientists and the political leaders must be narrowed and bridged.

Provision of-adequate food for the growing population and the alleviation of poverty are obviously the foremost challenges to our scientific community as the twenty-first century approaches. Increasing agricultural productivity is essential to both. Besides utilising the technologies earned through research, there would be need to remove resource illiteracy and complacency about the seriousness of the problems that lie ahead. The problem of 'Accelerated development and food sufficiency may seem formidable, but it is not Insoluble. We must meet the challenge if we are to survive as a self-respecting and proud nation.

I extend to the outgoing graduates my best wishes for a very successful career and a life of fulfilment.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
15th ANNUAL CONVOCATION

7th May 1982

Address by
Dr. H.R. Arakeri

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr: Vice-Chancellor, Members of the Board of Management, the faculty graduates of the year, students, ladies and gentlemen;

I consider it a great privilege to be associated with this important Annual function of your University. I am grateful to the Board of Management, the Vice-Chancellor in particular for giving me this opportunity to be present on this occasion. I am happy to extend my *warm* greetings and congratulations to the graduates of the year.

Your University has been fortunate in having good State Government support and excellent leadership in the founder and successive Vice-Chancellors. It is one University where the Vice-Chancellors have been drawn from different sectors. They have been eminent administrators, public men and technologists. I am sure that the University has gained a lot from the leadership and input provided by these successive eminent personalities. The flavour and blend of contributions made by them and the vision with which the development, right from its inception, has been planned and implemented are reflected in every activity the University is carrying on to-day. I take this opportunity to wish the present Vice-Chancellor all the best in his endeavours to scale further heights. I would like to congratulate the staff for their contributions to the development of this University and hope that they will continue to do so in the future.

This campus which used to be just a research station has developed into a University campus. On this campus are located many ICAR Projects as well as National Institutes including the National Academy for Agricultural Research Management. And not very far from this campus are the International Crops Research Institute for the Semi-Arid Tropics, National Dryland Project, National institute for Nutrition and many others. It is a great advantage to have such institutes and centres in the vicinity from many points of view It could as well be disadvantageous in some respects. But I do not wish to elaborate on these. I leave it to your discretion. I, however, hope that there is the needed collaboration and co-operation between the University and the other institutes and centres located on the campus and in and around the city of Hyderabad. It is the State University which has to provide the leadership and develop appropriate mechanisms for effective collaboration between all the organisations engaged in research, teaching and even extension functions connected with agriculture in the state of Andhra Pradesh.

We have been talking about co-ordination and interdisciplinary approach in all our activities for long. It may however, be seen that what we observe in this regard is far short of what is desired. In many cases, under the guise of co-ordination, what is being attempted is subordination. In the case of inter-disciplinary activities too, a lion's share is claimed by one discipline at the cost of the others. The most important pre-requisite of co-ordination is to have an open mind to understand the importance and need of other disciplines. One should be ready to give and take. If this is not the attitude, there will be retaliation resulting in a break away. At the same time, there should be freedom to think, express and act independently. Otherwise, the participants of co-ordinated and inter-disciplinary programmes can never be expected to perform in the manner desired, for obtaining fruitful and satisfying results.

The teacher is the backbone of every university. It is the duty of every other functionary including the Vice-Chancellor to provide the needed support to enable the teachers to put forth their best in all their activities. The teacher at the same time is also required to realise that however distinguished he may be in his own field, he cannot achieve results if he does not have the co-operations and support of not only his colleagues in his own discipline as well as in the other disciplines, but also from the administrative, technical and supporting staff. It is for those who are in the administration to encourage a full play of symbiotic process between the teaching and other staff members. This is the only way to achieve the results that are expected of any university And it is only by such results that the university will be judged. Its achievement will have to be ultimately reflected in the fields of the farmers spread around the thousands of villages in the State.

Agricultural development is a long drawn process with its beginnings in research laboratories and farms and ending in the final production and consumption of various agricultural commodities. There are many organisations involved in performing various tasks at various stages in this process. One organisation is responsible upto a certain stage and the next stage has to be taken over by some other organisation. It is more like a relay race. It is only when there is smooth takeover from one runner to the other that it is possible to win the race. It is for these reasons that I mentioned earlier that co-ordination is necessary between all the members of the team in this game of agricultural development. No one organisation can run the entire track alone. The responsibilities have to be shared. Smooth and quick transmission from one organisation to the other is the cardinal prerequisite for attaining, success in this task. I earnestly hope that functionaries in the university realise their responsibilities and play their due role to their own satisfaction in particular and to the satisfaction of public at large in general.

On this occasion, I would like to raise certain issues concerning agricultural development for consideration by members of the faculties, graduates of the year and the students graduating in the future.

The State of Andhra Pradesh has many special features. It is one of the States which has a surplus of foodgrains, especially of rice. It is known for its tobacco, grapes and some other commodities. It is the home of the fine breed of Ongole cattle. The State has made good progress in poultry and a few other animal production activities. It is one of the States leading in mechanisation and in the use of fertilisers and pesticides. The greatest asset of the State, however, is the enlightened and hard working peasantry It is hoped that this asset will be put to full use for the good of the country and the State.

Land and water resources are not unlimited. There is, therefore, increasing realisation that they must be put to efficient use. It is attracting attention all over the world. Agricultural Universities will have to intensify studies in this field with a view to developing an empirical method for optimising the use of land and water resources in the country Such studies will also provide agricultural policy options at various levels regarding appropriate land use with a view to maximising agricultural production.

The country is richly endowed with land and water resources but it cannot be said that the same are being used wisely:

Total extent of arable land in the world is about 1.5 billion hectares; it forms just 11% of the total geographical area. An area of 3 billion ha. is under pastures, ranges and meadows and 4.1 billion ha. is forests forming 20 and 30 per cent respectively. As much as 37% of the area is unusable for growing any vegetation. .

Comparatively, land use data in India indicate that about 45% of the total geographical area is under cultivation, 22% is under forests and 15% is not available for cultivation. As much as 11 % is classified as uncultivated land (pastures + miscellaneous tree crops-culturable wastes) and 7% remains shallow. The cultivated land contribute to the national wealth to the extent of about 50% and forests contribute about 1.5%. The rest of the area i.e. 33% is not contributing anything. While there is tremendous scope to further improve the productivity of cultivated and forest areas, there is a need and scope for exploring the possibilities of putting uncultivated areas to productive use.

Successful agriculture is possible only when there is a requisite supply of water either through direct rainfall or through irrigation. Occurrence of rain is a natural phenomenon. There is not much that one can do about it although some success stories can be found in recent years regarding artificial rain making. The distribution as well as the total amounts of rainfall show much variation from year to year. Long range studies have also shown that there is no significant evidence of any trend or periodicity in either of them. The prediction of rainfall has, therefore, remained elusive. Even then, some kind of pattern is evident if monthly amounts are taken into account. Using the rainfall data available in the country for about a century, patterns of rainfall in different places have been studied and understood along with probable variability There are 174 rainfall patterns in the country and Andhra Pradesh has about 30 patterns.

Studies further indicate that more than 75% of the geographical area of the country receives 10 to 20cm. or more of rainfall per month at least for three months in a year which is sufficient to grow successfully one crop. It is only some parts of Rajasthan and Deccan Plateau which receive very low rainfall and are really scarcity areas. Andhra Pradesh has only 10% of low rainfall area.

It is these low rainfall areas that require urgent irrigation support. It must, however be said that irrigation would help stabilising production in all the zones low as well as heavy rainfall; but the low rainfall areas are likely to benefit most. It is interesting to know that sufficient attention has not been paid to get water to these areas. Even the recent irrigation proposals will probably provide more water to humid areas rather than arid and semi-arid tracts. It is necessary that we study all irrigation propositions with the main objective of providing water to areas which need it most. Agricultural Universities should be deeply involved in the formulation of agricultural plans including irrigation proposals. Participation is minimal at present.

Rainfall of 30 cm. or more per month for three consecutive months, which is observed to be sufficient for raising paddy crop, forms a very small part of the State

along the coast of Andhra Pradesh. Yet paddy is a dominating crop, but with irrigation support.

The disturbing situation, however, is that the crops grown in vast areas in the country are such that the rhythm of water consumption by crops grown does not fit in well with the rhythm of water supply through soil. Every place has a certain soil type, the water holding and supplying capacity of which can be studied without much difficulty. The rhythm of water needs for different crops can be worked out through agronomic and physiological studies. Detailed studies in this respect are wanting. Unless water supply and water need rhythms fit in, successful growth of crops cannot be expected.

There are many examples of such misfits. Paddy is being grown in many parts of the country where rainfall is not sufficient to support this crop and as a result productivity is very low. Just changing over from paddy to other crops like maize, will result in a three to four- fold increase in productivity. Very low yield levels of rainfed cotton are observed in some districts in Karnataka, Maharashtra and Andhra Pradesh. Even wheat yields under rainfed conditions are not high in these parts. It may be advantageous to replace these crops with some other more drought resistant crops like safflower under dryland situation.

The situation in irrigated areas is not much different. The tendency all over the country and more so in the Southern States is to prefer paddy to other crops in irrigated tracts. The situation in Andhra Pradesh in 1978-79 was that rice was grown on an area of 3.9 million ha, 93.7% of which was irrigated. Out of the total gross irrigated area of 4.1 million ha. in 1976- 77, an area of 3.3 million ha. was allotted to rice and the rest to other crops.

The agricultural strategy for South India will. therefore, have to restrict growing of paddy to the areas where rainfall is sufficient and also to reduce the area under irrigated paddy to the minimum. With the water saved, other crops. which will provide more nutritious foods can be grown. Attempts should be made to introduce forage crops, vegetables, pulses, cotton and oilseeds in rotation with cereals under irrigation. In short, the objective should be to develop and adopt mixed farming systems suited to different climatic conditions under rainfed as well as irrigated areas.

It is in this regard that considerable research has to be carried out to suggest appropriate crops and mixed farming systems for different regions of the country.

Climatic conditions in major parts of the country are such that it is possible to resort to multiple cropping provided moisture supply either through rain or irrigation !s adequate. Although conditions are favourable, the area under double cropping has not been to the extent feasible and possible. The scope for double cropping in rainfed and irrigated tracts is considerable. It is possible to bring about 50 million ha. area under double cropping by 2000 A.D. bringing the gross cultivated area to 200 million ha. In this respect again considerable research has to be carried out not only with a view to developing agro-techniques suited for double cropping but also with regard to financial outlays desired, animal and machine power requirements, marketing infrastructure needed etc. Farmers will be in a position to adopt changed

cropping patterns only when they find that it is economically advantageous to do so and wherewithals to enable them to adopt the recommended practices become available without much difficulty.

Water resources of the country are good. It has been estimated that the country receives 400 million hectare metre of water every year Out of this, 105 million hectare metre can be used for irrigation purposes. More than half has already been utilised. The remaining can be harnessed during the next 50 years. Possibilities are that by 2000A..D, 60 million ha. of the net area or 84 million ha. of gross area will be brought under the irrigation.

The important question that needs active consideration is water use efficiency. There is a lot of discussion regarding the need for conjunctive use of ground and surface water and that of minimising the losses that occur in the water distribution systems. But the aspect of the conjunctive use of rain and irrigation water has not attracted the attention it deserves. The productivity of many crops could be increased considerably just by preponing the sowing time with protective irrigation Studies should be carried out with a view to assessing the possibility of increasing the productivity of various crops by providing supplemental irrigation to rainfed crops. The aim should be to enhance the efficiency of the use of rain water by supplementing it with irrigation water. By doing so, crop yields can be stabilised over vast areas. Dry-cum- wet irrigation strategy is supposed to have this objective in view But in reality this objective has not been achieved. Such a strategy would need drastic changes in the planning and working of irrigation projects. Projects are planned and worked, taking into consideration the engineering aspects rather than the agricultural aspects. For example. making water available for irrigation before the monsoon begins, even if it amounts to storage of water through summer. would enhance the yield of groundnut. jowar maize etc.. considerably. One supplemental irrigation at a critical stage would result in considerable increase in the yields of many crops. Are our projects planned and worked with such an objective in view? Are the required data to plan and work the projects with such aims available ? These are some of the questions required to be considered exhaustively and appropriate strategies evolved.

India is an agricultural country and it is likely to remain so for a long time to come. Percentage of active population working on land is much higher in India as compared with many other countries. In 1977 it was as high as 60.4 as against 11.5, 3.4 and 2.5 in Japan, Belgium and U.K. respectively on an average, holding size in U.K. and Belgium was 50.7 and 8.35 ha. as against 2.30 in India and 1.1 in Japan. Per capita sown area has come down to 0.20 in 1981 from 0.35 ha. in 1931.

Pressure of population on land is high. The position will not be different in 2000 AD and even beyond. This means that more than 100 million rural persons will have to find employment before the close of this century. How many of us are aware of this situation? Have we understood the implications of this problem? Have we carried out any studies in this regard and made recommendations as to how this problem could be tackled? Unless this gigantic problem of employment is resolved, there is no hope of redressing poverty in this country. Unemployment and poverty are closely linked. Agricultural Universities will have to address themselves to this task in right earnest. My experience in this regard is that very few scientists are

interested in this kind of work. Universities may have to devise their own way of getting this work done quickly and in the proper manner Some of the questions to be answered are: Can agriculture absorb such a large number of employable persons? How many of them can be employed in production activities? What scope exists for employment in supplies and services and also in post-harvest stage operations? What is the scope for employment in different agro-climatic regions?

India is a country of small farmers and will remain so far a long time to come. On an all India basis, 54.6% of the farm holdings were marginal in 1976-77, cultivating an area of 0.39 ha. of land on an average. Comparative figures for Andhra Pradesh were 46.6% and 0.47 hectare respectively. Percentage of small farmers was 18, cultivating 1.42 ha. of land on an average. The picture is not very different in Andhra Pradesh. Only 3% of the farmers were classified as large farmers having holdings of 10 ha. and above. The average holding of the large farmers was 17.3 ha. In gross numbers there were 45.3 million marginal farmers, 14.7 small, 2.44 large and 19.85 medium in the country.

We have been developing and advocating recommendations comprising improved varieties and their production and protection techniques. In earlier periods, individual improved practices were recommended and demonstrated. And now. since the last 20 years, the recommendation kit consists of a package of practices for different crops and regions. Improvements have been made and offered for adoption with regard to livestock production and other activities too, but independent of crop production activities. At no stage has there been an integrated approach. It is not only necessary now to make available an integrated agricultural technology as a whole for each holding, taking the land. water and other resources available or can be made available into regard but also to indicate to what extent the quality of life of farmers as a whole can be improved? We have to indicate what crops the farmer can grow; what other livestock production and other activities he can undertake; and also what kinds of trees he can raise for fuel and other wood products. The packages consisting of various integrated agricultural technologies will have to be such that about 60 million families of small and marginal farmers are able to live above the poverty line. The problem is further complicated by the fact that these small and marginal farmers are mainly dryland farmers. It has been shown that by using the available dryland technology it is possible to increase the productivity to about 2 tonnes of grains per hectare. The question to be answered is whether it is possible to help farmers having upto 2 hectares of dry land to go above the poverty line? If so, what is the mix of technologies that can be offered for various situations under which 60 million farmers are working? The Andhra Pradesh Agricultural University has to develop and offer alternative technology packages to about 4 million farmers tilling one hectare of mostly dryland area around 30.000 villages spread all over the State. The problem is that of small size. Small may be beautiful but it is problematic too. Resource base is narrow and risk bearing capacity is almost nil.

I take this opportunity of suggesting to you to apply your mind to this gigantic problem and come up with solutions in the shortest possible time. The country was written off as a hopeless case by the world Community in the middle of sixties. It has been possible to buy some time through the so-called high-yielding varieties technology. However, the time is now running out. The decade of 1980s is crucial. It is in this decade that we have to go over the hump. There is no model available in

the world from which we can benefit. We have to develop a new model suited to our conditions. It is possible to do so provided the required attention is paid to develop and spread area- specific integrated agricultural technology suited to small farmers. It is only then that the country can hope to march ahead and set an example for countries having similar situations. I wish you all success in your efforts in this regard.

I have tried to place before you some of the issues which need the attention of all of you in general and the faculty in particular The graduates of the year would be naturally looking forward to understanding the role that they would be required to play. They have many avenues to choose from, according to their own aptitudes. As a research worker; you have a chance to participate in the fascinating programmes going on all over the World and in the Country. The problems the world is facing at present and is likely to face in the future are multifarious. I would just illustrate but a few problems that need immediate attention in the country as also in your own State. You have enormous opportunities to play due role in the current and in the future programmes either at the national level or at the State level.

Then there is so much to be done as a teacher. You know what is expected of teachers and how many of your teachers fulfil the criteria of an ideal teacher as conceived by you. At least some of you must have been dreaming of becoming exemplary teachers. Universities and other educational institutions are in need of such ambitious and dynamic persons to work as teachers.

The other vast field that needs men of a different kind of calibre is extension and development. Unfortunately, the feeling is that there is not much scope for talented people in extension and development activities either in the University or in the State organisations. Well-qualified people are not inclined to work in this most important area of agricultural development. Many join this line as the last resort and that too with considerable hesitation and reservation. Realisation is still to dawn on the employers as well as employees that it is in this area that well-trained personnel capable of understanding and solving field problems on the spot are required. They have not only to understand and solve the existing problems but also foresee, and then take the required measures well ahead of time to either stall or remedy a situation when problems come to the surface. Farmers know the value of such extension specialists and respect them much more than the most powerful authority that one can think of. The sense of self-satisfaction that one derives from working under such situations cannot be expressed in words. It is for the administration to develop and maintain a proper atmosphere to encourage talented persons to enter and work in the extension line. It is considered by many that this is the weakest link in the chain of agricultural development. Talented people remain in a line provided they have an opportunity not only to use their talents fully but also to develop them further. I would like to point out that enterprising people do not wait for some body to create opportunities for them. It is for us to struggle and create what we want for doing our best and also to further development not only from a personal angle but also from the point of view of rendering service to others.

Post-graduate degree holders think that the district level is not a place for them to work. They consider it below their dignity to work with farmers at the field level. Even the bachelor's degree holders working at taluk or district levels tend to

move out as soon as they acquire their post-graduate degrees either on their own or under special staff upgradation programmes. It is very unfortunate that this feeling should be found every where and at all levels and spheres. I hope that at least some of you will consider entering into existing avenues in extension and development spheres and open new vistas for others. In extension jargon, some of you have to be early adapters and set the pattern for late adapters. All those who are prepared to come forward to be early adapters will have my best wishes.

There are yet many other opportunities for the current and future graduates coming out from the portals of agricultural universities. Activities in the sphere of agriculture are expanding. Supplies and services organisations including financing institutions are expanding their activities to meet the increasing demand for scientific and market farming systems. replacing the age old traditional systems. A very large number of trained personnel are required by this expanding sector: I hope universities will make necessary changes in their teaching programmes to meet the needs of agri-business and supplies and services organisations. Sufficient attention has not been given to meet this felt need. I wish that all agricultural universities would consider carefully this issue which is of considerable importance and has been identified as of immediate concern.

Farming on your own also has its own charm, dignity and monetary reward. It is for some of your enterprising young men and women to enter the field of private farming and enjoy the benefits that accrue.

Whatever avenue you may choose to enter in the next stage of your life after graduation, I would like to tell you that if you have money uppermost in your mind, you will never be happy as a researcher; teacher or extension worker. You have to look within for satisfaction in all these positions. If you compare yourself with all those who are making a lot of money, then you are bound to feel miserable. Instead of feeling left behind by accepting and remaining in such positions, it will be better to quit and try your luck in other areas where you feel there are better opportunities for making money. This does not mean that opportunities for advancement are not very bright for those who choose research. teaching and extension careers.

Status, authority and other perks that go with positions in some of the All India or State Service Cadres are different from the prestige and self-satisfaction that go with positions in agricultural services. I would, therefore, advise you to enter an avenue which is likely to provide the best fit between what you have in mind and what is possible taking realities of life into consideration? Think before you choose and once you have chosen. strive hard to get maximum satisfaction from what you have chosen. There lies great wisdom in it. The great saint Aurobindo of Pondicherry said that every human being is born with a purpose and for a purpose. One has to strive to understand what this purpose is. I wish you all success in this task.

Congratulating the graduates and thanking the University once again. I close praying for the best for all of you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
16th ANNUAL CONVOCATION

31st December 1982

Address by
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I feel privileged to have the opportunity of delivering the Convocation address of this University for a second time. As an honorary alumnus of this university I feel happy whenever I come here and see the progress taking place in enhancing the impact of the educational and research programmes of the University I wish to pay my tribute to the builders of this great institution. I congratulate the graduates of the year on having had an opportunity to study at this university, and on their academic achievements.

We are meeting on the eve of the New Year. According to FAO. the grain stocks in the world may reach a record level of about 300 million tonnes during 1983. At the same time, the number of persons going to bed hungry in the world will also grow although 1984 was the target year identified by the World Food Congress held in Rome in 1974 for achieving freedom from hunger. Hunger therefore remains high on the agenda items discussed by those who live in the world of words. For example. the eminent Panelists drawn from different parts of the world who met in Rome on the occasion of the world Food Day on October 16. 1982, concluded: "We believe that it is indeed possible to end world hunger by the year 2000. More than ever before, humanity possesses the resources, capital. technology and knowledge to promote development and to feed all people, both now and the foreseeable future. By the year 2000, all the world's people and all its children can be fed and nourished. Only a modest expenditure is needed each year -a tiny fraction of the total military expenditure which amounts to about $ 650 billion a year. What is required is the political will to put first things first and to give absolute priority to freedom from hunger".

While on the one hand grain mountains in some countries and long queues for free or subsidised grains in some others co-exist on spaceship earth. the problems faced by small farmers are growing in intensity and diversity Low farm management efficiency and high input costs are tending to increase both the cost of production and risk. The farmer is unable to save adequately for investment on the land and thereby raise its productivity. While the new technologies developed by this and other Agricultural Universities and ICAR institutions as well as by ICRISAT and other international agricultural research centres are scale neutral with regard to their relevance to farm holdings of different sizes, they are not resource neutral. There is no getting away from the fact that inputs are needed for increasing output. Only when all farmers have access to the needed inputs and are able to use them efficiently through a proper blend of non-monetary and monetary inputs, there is all round agricultural progress. The transition from a traditional to modern agriculture is accompanied by a growth in the importance of non-land inputs, particularly of management or putting all the pieces together in a manner that synergy is generated.

Poor farm management efficiency is reflected through many indices. A good example is the correlation between irrigation and productivity and intensity of cropping. The index of multiple cropping invariably lags behind that of the index of irrigation in most of our states.

Inadequate farm power. poor on-farm management of water and low investment on complementary infrastructure such as land consolidation and levelling and drainage all reduce the return from the investment on irrigation.

According to the report of the Agricultural Prices Commission on price policy for wheat for the 1980-81 crop, "Cost of production studies have shown that the wheat economy has become a high cost economy. Despite the technological break through in the cultivation of wheat, the per unit cost per quintal has shown an upward trend over time. The cost of production of wheat in Punjab rose from Rs. 61 .04 per quintal in 1970-71 to Rs. 99.45, Rs. 101.39 and Rs. 108.57 per quintal in 1975-76, 1976-77 and 1977-78 respectively This trend needs to be arrested through optimum application of non-monetary inputs".

It is the duty of all of us who have the privilege to work in the field of agricultural research and education to analyse the operational implications of this conclusion. Such an analysis should be made in the context of (a) the gradual decline in the size of an operational holding, (b) the increase in the number of landless labour families and (c) the growing increase in the capital requirements for the modernisation of agriculture under conditions where the surplus income available to farmers for re-investment on land is going down. As a result of many contradictions within the production and consumption system, we find examples of the world of the economist Ricardo prevailing in many developing countries. In this world, very high land prices co-exist with low productivity and low wage rates. It is in this context that the farmers, scientists, extension workers, political and administrative leaders and all others concerned with agricultural development in Andhra Pradesh have to be complemented on the relatively better advance made by this state in improving productivity I would like to cite the data for the relative share of area and yielding the growth of output data from the Economic & Statistics Directorate. Ministry of Agriculture. Government of India):

Region	**Percentage contribution of area**		**Percentage contribution of Yield**	
	1950-51 to 1964-65	1965-66 to 1979-80	1950-51 to 1964-65	1965-66 to 1979-80
All India	39.6	18.5	60.4	81.5
Andhra Pradesh	32.4	2.5	67.6	97.5

While we should take pride in the progress made in the farm sector since Independence, there is no time to relax since demographic pressures leave no option except to strive for a continuous improvement in productivity per unit of land, water labour, energy and time. The famine of jobs will have to be fought along with efforts to win the battle against hunger. Agricultural Universities will have to work on technologies the can help to ensure that the demand for labour increases fast, than its supply and that the supply of food increases faster than its supply and that the supply of food increases faster than its demand To achieve this, social scientists and biological and physical scientists will have to work together Systems of small farm

management will have to be developed which will enable the marriage of individual initiative with group endeavour. In the People's Republic of China, where land is socially owned, a household responsibility system of crop production has been superimposed over social ownership of land. This provides a mechanism for blending collective management of some aspects of farm operations such as water harvesting and utilisation, plant protection and post-harvest technology with individual enterprise and incentive. We need to do the reverse since under our conditions land is individually owned. Can social or group management of certain key farm operations related to elevating and stabilising yield per unit of cash input be superimposed on individual initiative and ownership rights? Obviously this has to be done by the farmers themselves. The Agricultural University can help by demonstrating how enlightened self-interest demands that farmers living in a watershed or a village attend to some aspects of farm management together. Demonstrations to show how the interests of the individual and of the community are both served better under an individual ownership cum-group. Actions system of small farm management will have to be laid out, since to farmers, who live in a world of action and not of words, the only meaningful source of conviction is personal experience.

Mahatma Gandhi and Vinobha Bhave expressed their conviction that only *a Sarvodaya Society,* which is another term for a high synergy society can help us to face successfully complex socio-economic problems. I plead with all of you to work for *a Sarvodaya system of small farm management* since I cannot see any other way of helping our rural population to escape from the Ricardian trap of low productivity, low labour wage rates and high land prices. Demonstrations on the Sarvodaya Small Farm Management System are urgently needed both in irrigated and dry-farming areas. The technologies for this purpose are available in the fields of watershed management, integrated pest management, etc.

The VI Plan has accorded high priority to the development of a national food security system, since a global food security system is likely to emerge only when developing countries build strong national food security systems. A successful National Food Security System should have the following six major components:

a) Ecological security designed to protect basic life support systems;

b) The production and post-harvest phases;

c) Social security for providing the needed purchasing power to the rural and urban poor;

d) Drinking water security;

e) Nutrition education; and

f) Population stabilisation.

I hope you will all get opportunities to contribute to the building up of such a system. If we are to make a worthwhile contribution in research, education or extension, it will be necessary for us to be aware of sensitive and interlocking concerns of farmers. If we pay closer attention to the experience and intuition of farmers, our work will be more relevant to their needs and will find ready acceptance. At present, our contacts with farmers tend to be predominantly through the media of pre-set questionnaires and on- farm testing in farmers' fields. Through the devices we generally seek to confirm what we already suspect. We must consider other methods which will help to carry the best the farmers' experience and the best in modern technology. This will call for a Sarvodaya society of farmers and farm scientists and extension workers. It is for bringing about the emergence of such a mutually beneficial interaction that Agricultural Universities were established. You as the latest among the soldiers going out of the portals of this University should always keep in view the fact that in our work the supreme consideration is the farming family. We live on the earth as guests of the green plants and of farmers and fishermen. Let us repay the debt we owe them through the power of science and education that have been conferred upon us through the portals of institutions like our Alma Mater. I wish you much happiness both in your personal and professional life.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
17th ANNUAL CONVOCATION

26th December 1983

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Despite a ten thousand year old history agriculture in may parts of the world continues to be of a subsistence kind based on traditional practices. The high-yield agriculture which is now practised in North America, in most parts of Europe, and in countries like Japan and Australia. is a relatively recent development going back nearly fifty years. This can be seen from the fact that large yield increases even in the developed countries have been possible only during the last thirty years or so. Thus the productivity of some of the important crops like maize and sorghum has seen a remarkable increase in the United States during the twenty five year period starting from 1950. In the United Kingdom. the average yield of wheat has increased more or less linearly over the same period. The progress has been equally spectacular in Japan. which now has one of the word's highest rice yields.

The process of transformation of traditional agriculture leading to these high crop yields has been made possible by two major developments. First. the accelerating pace of industrial revolution in the western world has made it possible for their farmes to use a wide range of farm inputs like chemical fertilisers and sell their produce at incentive prices following increased consumer demands. Second, important findings in the fields of mineral nutrition of crop plants, Mendelian techniques of crop improvement, plant protection chemicals and mechanisation have helped to lay down the framework of a more scientific agriculture. Basically, the high productivity of modern agriculture is a function of favourable geno - type-environment interactions made possible by our ability to manipulate and assemble genes from diverse sources and use a wide range of inputs derived from fossil fuels and related products which until recently have been cheap, abundant and readily available.

Crop improvement in the developing countries

Most developing countries could not take advantage of these developments for giving a new direction to their agriculture. Several factors have contributed to this failure. For one thing, these countries were largely bypassed by the Industrial Revolution and it is only now that they are making a beginning in this direction. For another many of them could maintain some balance between low crop yields and. relatively small human populations kept in check by disease epidemics. Also, the cultural evolution of these countries had placed greater emphasis on simple living including the plant-human food chain rather than the plant-animal-human food chain which has been an important driving force for change in the agriculture of western countries. This balance, however, was seriously upset in the 1960s when many of these countries on gaining political independence started to organise major programmes of public health. These measures resulted in a sharp decline in the death rate and the consequent population pressures have forced many of them to review their programmes of agricultural production. In a recent Report the International Food Policy Research Institute has projected that the gross deficit of the major food staples of the developing countries will total 120-143 million tonnes in 1990, depending Oil the rate of their income growth.

The new policy decisions

The policy decisions for the modernisation of agriculture in the developing countries have many important implications. One of the most important of these relates to the creation of a new research infrastructure for it is clear that a more productive kind of agriculture must be spearheaded by a new kind of production technology. Looking back over the past 20 years, it seems remarkable that a number of developing countries have succeeded in reorganising their agricultural research services in order to make them more effective for the new tasks. The fundamental change has been with regard to the administrative frame- work and the organisation within which agricultural experimental stations function in these countries.

In developing countries, institutes of agricultural research have formed an integral part of the Departments of Agriculture with policy making and administrative control resting with the civil servants. Also, the personal management policies and the operational procedures for the functioning of these institutes have been similar to those evolved for the secretariat-based staff. The Indian experience in changing this old pattern is particularly relevant. India a major reorganisation of research services has been brought about in the last 20 years by transferring the federal (central) research institutes from the administrative control of the Ministry of Agriculture to that of the Indian Council of Agricultural Research (ICAR). The Council, organised and funded by the Indian Government. is headed by a senior scientist and enjoys considerable autonomy in its management of research in the country. It is the Director-General of the Council, assisted by a team of other scientists from different disciplines with considerable experience in management of science. who administers the programmes of agricultural research in the country Also, it is these scientists working in close consultation with the scientists of the central institutes and the agricultural universities, who decide on priority areas of research and the infrastructure needed to support them. The Council funds a network of 39 central institutes located in different parts of the country. The Director-General reports to the Minister of Agriculture who acts as the President of the Council.

A reorganisation of agricultural research has also been brought about during this period in the states. In these, responsibility for research and teaching has been transferred to the newly set-up agricultural universities. There are 23 of them now functioning in the different states-leaving the Departments of Agriculture free to organise programmes of transfer of technology through their extension services. The agricultural universities in India function on the pattern of the Land Grant Colleges in the United States. They maintain close links with the staff of the Department of Agriculture and the extension service. It should be noted that even though the agricultural universities derive their statutory powers from the University Grants Commission of the Ministry of Education. It is the Indian Council of Agricultural Research and the concerned state government which monitor their progress in the field of teaching and research. The funding support for the agricultural universities comes from the respective state governments and from the Council.

Research coordination

The developing countries already *face* a serious challenge in increasing their food production and the situation is expected to worsen in the closing years of the century. Nothing is going to be more important for the continued political and social stability of these countries than their ability to meet heir growing food needs. Agricultural research systems in the developing world must be able to respond to these needs in the face of increasing population pressures. The Coordinated Crop Improvement Projects organized by the Indian Council of Agricultural Research provide one example of the mechanisms which are now being evolved for this purpose, These projects involving the participation of scientists from a large number of central institutes and state agricultural universities have been conceived as an instrument to mobilise the country's limited scientific resources for focusing attention on the various problems of agricultural production and finding erective solutions to them in the shortest possible time. The Projects help to generate inter-institutional and interdisciplinary interactions, ensure complementary in the research programmes of different stations, provide a mechanism for joint evaluation of the new technologies evolved by their scientists and arrive at collective recommendations for the release of their technologies to farmers. The emphasis is on defining the objective and goals clearly laying down priority and identifying the most relevant experimental approaches. A high degree of accountability based on continued monitoring is built into the system. The Coordinated Crop Improvement Projects may not quite correspond to the "customer-contractor" model proposed by Lord Rothschild to the British Government for organising research activity with a practical application in view. The customer in the model is the Head of the Department who needs a new or improved technology while the contractor is the Chief Executive of the Research and Development organisation. In the case' of the Coordinated Crop Improvement Projects, the customers are the Secretaries of the Departments of Agriculture, while the contractor is the Director -General of the Indian Council of Agricultural Research with his network of the central institutes and the agricultural universities.

Organisational structure

The Council has organised 24 coordinated research Projects on different crops or groups of crops including rice, wheat, maize, sorghum, millets, pulses, oilseeds, cotton, sugarcane, plantation crops, fruits, vegetables and fodder crops. These and all the other All-India Coordinated Projects including those in the field of livestock production account for nearly 25 per cent of the research budget of the Council. Typically, a Coordinated Crop Improvement Project consists of a National Coordinating Centre and a number of cooperating Centres located in the different agricultural universities and the central Institutes, depending on the distribution of the particular crop in the country. The Coordinating Centre headed by a Project Coordinator and assisted by a small group of scientists from different disciplines is located in one of the central institutes or agricultural universities, more commonly the former. The Project Coordinator is appointed on the basis of his recognised position of scientific leadership in his field as his personality contributes significantly to the success of the Project. The Coordinator exercises little direct control over the Cooperating Centres, which for all practical purposes are an integral part of the institutions in which they are located. He must maintain close contacts with the

Directors of the central institutes and Vice-Chancellors and Directors of Research in the agricultural universities to ensure that their scientists implement the research programmes assigned to them.

The main components of the priority areas of research are identified in the ""“All-India Workshop" of the scientist from the different Co-operating Centres. The Workshop is held atleast once a year when a review of the results obtained at the deferent centres during the previous season is presented by the Coordinator in a consolidated from. Also, the Workshop provides the opportunity to plan the programme of work for the next year on an All-India basis. The impression one carriers of thee workshops is of strong interdisciplinary, inter institutional interactions in the formulation and execution of research programmes. There is also an element of healthy competition between the different Centres of the Project.

The identification of the Cooperating Centres in the Project begins with a delineation of the different agro-ecological regions in the country over which a particular crop is distributed. Thus, the All-India Coordinated Rice Improvement Project recognises eight different zones of rice production in the country which together cover a wide range of agro-climatic conditions including the irrigated and rainfed rice lands. the latter spread over different situations such as the uplands characterised by considerable moisture stress and the lowlands where water logging is a serious problems following heavy rains. Also rice is grown under very deep water conditions in lands which are visited by floods in most years. There are different zones of the All India Coordinated Rice Improvement Project. Normally each zone would be having a number of Cooperating Centres depending on its size. Each Cooperating Centre is provided with a team of scientists drawn from different disciplines like plant breeding, agronomy, plant pathology, entomology, soil chemistry and crop physiology The Council makes separate allocation of funds for the Cooperating Centres over and above the regular budget of the institutions in which they are located. The team of scientists provided in the different Centres help to strengthen the research programme on a particular crop. It should be explained that in addition to these scientists, a regular complement of scientific staff is already available at each of the Centres as part of the normal research activity of these institutions. The two groups of scientists are expected to be integrated into a single functional unit for the purpose of coordination; unfortunately this does not always happen.

The Project Coordinator not only monitors the work of the different Cooperating Centres. He, with the help of his team of scientists. also organises a research programme of his own. This is designed to have a service role. The Coordinator is not expected to compete with his own Cooperating Centres. He strengthens them with a flow of new genetic materials introduced from different parts of the world and developed by his own scientists. He also acts as a link between the Cooperating Centres of the Project and international crop research institutes like CIMMYT and IRRI established by the Consultative Group on International Agricultural Research for exchange of genetic material.

The future frame work

A possible danger in India's agricultural situation today is that the progress made in the past 15 years may make us complacent and may lead to wrong conclusions with regard to the policies and the planning frame-work, which we must continue to evolve for the future. If we take into consideration India's requirements of food grains in the year 2000A.D., which are now estimated to be nearly 250 million tonnes. It becomes important to recognise that the country must improve upon its past performance of 15 years. It is estimated that during the current crop season of 1983-84, India will be harvesting an all time record production of more than 142 million tonnes of food grains achieving the target laid down in the Sixth-Five Year-Plan. This achievement shows that the country will continue to increase food production in the years to come. This, however, is not the issue. The real problem is that we need much higher rates of growth both to be able to produce an additional 100 million tonnes of food grains towards the closing years of the century and to close the yield- gap which continues to exist in our agriculture. The last 15 years have seen a significant increase in crop yields but on a national basis our productivity continues to be much lower than that of the advanced countries like the USA, most parts of the western Europe and above all, countries like Japan, Taiwan and South Korea. These yield-gaps could be closed over a long period of time but time is not on our side. India cannot afford at slow progress of this kind. The next 17 years must see an accelerated effort to push up India's crop yields to levels comparable to those of the developed countries.

This is not the only problem which Indian Agriculture faces today. We continue to have serious shortages in our production of pulses and oilseeds which generally remind us that our technology of agriculture production in the drylands has not had a great deal of impact. The long term strategy to increase the yields of pulses and oilseeds must be based on improved management practices including adoption of soil conservating and water harvesting technologies, application of small doses of chemical fertilizers, pesticides and use of improved implements. The farmers in states like Andhra Pradesh. Madhya Pradesh, Maharashtra, Gujarat, Rajasthan, Haryana. eastern Uttar Pradesh and large parts of Bihar practicing dryland agriculture have learnt through experience that there is considerable risk involved in taking a good crop because of uncertain rainfall and because of the insect pests and diseases. They are, therefore, not prepared to invest in new technologies. The foremost need is to give to the farmers a dependable package of practices which will help to minimise the risk and increase production and profitability.

The problem of dryland agriculture also reminds us that an over-emphasis on a purely genetic approach will not help to solve the problems of low yields in these regions. While we have made considerable progress in evolving high yielding hybrids in crops like Sorghum and Pearl Millet and also in some of the oilseeds and pulses, in the absence of our ability to improve moisture conditions in these lands. the genetic potential for yields finds only a limited expression. It is important that we now recognise that research in dryland agriculture will have to be spearheaded by the soil scientists including the soil physicists and the water technologists. It is this group of

scientists which must help to improve the soil moisture conditions before the high yielding varieties can be successfully introduced.

Unfortunately, a great deal of research in these disciplines has remained confined to laboratories. Soil and water scientists will have to work increasingly under field conditions if the results of their researches are to find application. The plant breeders have a supporting role under these conditions. This kind of analysis calls for major policy decisions in evolving new research priorities and directions and the Agricultural Universities and the ICAR institutes must prepare themselves for this new direction. Already, we have lost considerable time in over-emphasising the genetic approach.

The fundamental issue which I am now raising relates to a fuller modernisation of Indian agriculture. We must not forget that what has been done in the last 15 years is merely a beginning. The progress made has touched only a very small segment of our total agriculture and we continue to employ traditional technologies to a very great extent. A total technological transformation which must be the goal of a more modern agriculture will require intensive research efforts, which in turn, must be planned and supported by important policy decisions, and wherever necessary with a re-organisation of the existing research infrastructure.

Agricultural University Movement -The Second Phase

The country can take legitimate pride in establishing as many as 23 Agricultural Universities in the last 25 years. Nothing like this has happened before in the world of agriculture. Looking back over the 25 years period, it seems remarkable how responsive our administrative frame-work has been in bringing abut a research re-organisation of this kind. Most other developed countries are still grappling with this problem. The bureaucrats who are often criticised have acquitted themselves well; they have not opposed the changes in creating a new research infrastructure even though it often means taking away their well established administrative empires. The question now is whether the scientists can show an equal degree of responsiveness and resilience.

The first phase in establishing the Agricultural Universities may be considered to be over. Most of the Agricultural Universities are now fully functional and they no longer have the teething troubles encountered in the earlier years. 'The State Governments have been very generous and the Indian Council of Agricultural Research has made very important contributions in their growth. It is now for the Agricultural Universities to prepare themselves for the second phase of their mandate. They must now consolidate their resources of scientific staff, laboratories, equipments, field facilities and assets of many other kinds. They must now mobilise all these resources to increase the research productivity for- their scientists so that the country has a constantly improving production technology of a more diversified kind. I have already referred to the many tasks which remain unfulfilled including the problems of dryland agriculture.

The Agricultural Universities and the ICAR Institutes must ask whether they are preparing themselves for the scientific leadership which will be increasingly needed to generate the new technologies and to accept more difficult challenges. It is clear that many important decisions will have to be taken to create centres of excellence indifferent areas of crop production research in order to foster a more balanced and rapid growth of our new agricultural technologies.

One of the important steps which we should be taking in this direction is to identify scientists having potential for leadership and foster their scientists having potential for leadership and foster their scientific growth on a long term basis. Agricultural Universities are fortunate in having a large number of scientists, but we do not always create conditions where they can give their best. It is clear that research scientists can give their best on the basis of the specialisation which they attain after many years of hard work. Scientists in today's world tend to be specialists in one particular field of research and it is not good policy to transfer them frequently from one job to another which runs counter to a sound policy of building scientific leadership. We should be able to promote scientists on the basis of their past performance so that they do not have to change jobs frequently.

Another important requirement in the context of the Agricultural Universities and the ICAR Institutes is the integration of the entire research state in a department for a combined effort for solution of some of the most pressing problems. The Coordinated Projects of ICAR have been conceived to strengthen the research capabilities of the Agricultural Universities; the purpose has never been to create two separate groups of scientists within a department with little interaction between them. If the present practice of allocating ICAR resources for a specified group of scientists in the Cooperating Centres has not helped to promote the integrated approach in research management. it would be better if funds are made available to the Agricultural Universities without insisting on the creation of a separate group of scientists. The ICAR and the Universities through mutual discussion should evolve the structure of a viable scientific group in a particular department to provide research support for the different Coordinated projects. With the available funds both from the ICAR and the state Governments a cohensive group should then be constituted with responsibility resting with the head of the department and the scientists working with him to participate in the All-India Coordinated programmes. At present the Coordinated Projects suffer because only a limited number of junior scientists are associated with them and many of the posts remain vacant because of the two separate sources of funding. Further-more, the Director of Research in the University should be able to generate necessary inter-disciplinary linkages between scientists of the different departments to make sure that scientists from different disciplines work on a particular crop in a complementary manner. Thus. the breeder should have the fullest possible support from his colleague in the department of agronomy. plant pathology, soil sciences, plant physiology and other departments. This should be done without fragmenting the different departments and without hindering the growth of a particular discipline. Overall. we need much greater research planning and monitoring of the Coordinated Crop Improvement projects than what we have at present. We certainly do not require two different kinds of research programmes in a particular department -one under the Coordinated

Research Projects and the other with the funds-from the State. The two teams of scientists must be fully integrated.

New Management Infrastructure and the Agricultural Universities

Twenty years ago the foremost task was the creation of high genetic potentials of crop yields. making use of the techniques of genetic reconstruction. We have already succeeded in this to some extent and the process is being continued. The need today, as I have argued above, is to diversify our production technology so that soil and water management, disease and pest control, optimum levels of mechanisation and other production factors receive much greater attention than in the past. Even if all this is done, the yield gaps will not be automatically closed. We do not seem to appreciate that no modern agriculture can be sustained with technology alone. It needs a great deal of management support. While we recognise the value of industrial and business management, we are seldom conscious of the role of management in modern agriculture. Farmers in the western countries have increased their yields 2-3 times in the last 30 years and the main reason for this is that they have been able to organise and mobilise a large number of resources and management skills. Indeed, in countries like the U.S.A.. the farmers have been increasingly replaced be agribusinessmen. The problem in India is: How do we provide modern management support to million of our farmers who are not in a position through their own resources to practise such sophisticated kind of agriculture? The answer obviously lies in the creation of a new management infrastructure. It lies in organising our extension services which have done a good job in the last 15 years. The important question however is whether extension services can now be transferred into Management Centres offering a wide range of services and planning inputs to our farmers. In a transformation of this kind, the Agricultural Universities will have to play a vital role. They will have to train the extension staff into techniques of management. In my view; most of our Agricultural Universities will be called upon to organise new Department of Agricultural Management for he benefit of the field staff of the Department of Agriculture. These extension scientists working in the field will have to be trained not only in communication skills but also in management skills. Their job increasingly will be to undertake a micro level planning for each and every farmer. Based on a survey of farmers in a particular region and their need; their potential for increased production will have to be carefully analysed. Following these surveys, the extension staff will have to organise services of various kinds such as those relating to soil and water management and pest and diseases control. The Agricultural Universities. thus, must plan for a new role in training the extension staff of the Department of Agriculture.

Another responsibility which the Agricultural Universities will be called upon to take increasingly will relate to the organisation of national demonstration on a large area basis. In the 1960s and early 1970s. the scientists of the Agricultural Universities succeeded in demonstrating that the new production technology can be highly effective on farmers' fields. This provided the conviction for the adoption of the new technology. However, these demonstrations were aimed at single farmer although the multiplier effect was kept in view. We have now reached a stage where we should be organising demonstrations of this kind on a large area basis. The

Agricultural Universities and the ICAR Institutes in association with the Departments of Agriculture should be able to upgrade agriculture in an entire region through these demonstration programmes. This would mean testing of many more technologies under farmers' own conditions than what we have done in the past. Thus the agricultural physicists have been claiming that the techniques of soil compaction and the techniques of chiselling can help to increase production in dryland conditions by creating more favourable moisture conditions. None of these techniques has been demonstrated under farmers' own conditions. This must be the logical evaluation of the earlier approach of national demonstrations. The demonstrations earlier were carried out mostly by the plant breeders and the agronomists. The present day demonstrations with emphasis on development of a consolidated area approach will have to be carried out on a multi-disciplinary basis with scientists from such disciplines as soil and water management, agricultural engineering and plant protection scientists having a particularly important role.

My main purpose this morning has been to suggest that the country has succeeded' in creating a fine research infrastructure in the last 20 years. The next 20 years from *now* onwards must see that the resources created during this period are mobilised fully and used more effectively to bring about rapid transformation of our agriculture so that it becomes truly modern comparable to the best in the world. This in my view is the research challenge of the 1980s.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
18th ANNUAL CONVOCATION

15th April 1984

Address by
Dr. V. Kurien

Rajendranagar, Hyderabad – 500 030

Chancellor Sharma, Vice-Chancellor, members of the faculty, distinguished guests, students and friends.

When I was honoured by the request to deliver this Convocation Address, my surprise and pleasure was, I must admit, mixed with some considerable apprehension.

Although I have been associated with some agricultural endeavours and enterprises, I am by no means an expert in this field. To follow the distinguished agricultural scientists and others who have addressed previous convocations of this university causes me no little trepidation. However, to speak to those whose lives are and will be devoted to the agricultural growth of this country is an opportunity I cannot forego.

Convocation is an end but more importantly a beginning. It is therefore a time when anticipation of the future is more important than reflection on the past. Those of you who will today receive degrees have completed what is but the first and with due respect to your administration and faculty -perhaps the least important part of your education. Your degrees certify you as one of our nation's educated elite; how you use what you have learned, and how you build upon it is of far greater importance and will be the more difficult challenge. Your future examinations will be set not by the university but by our nation's farmers who, today, comprise our nation's greatest asset. one whose potential is yet to be realised.

A few weeks ago, in his first address to the nation. our new Prime Minister said that our first priority is the eradication of rural poverty Those in this audience who recall the early days of independence will well remember that then too. eradication of poverty in our rural areas was the nation's foremost goal. Yet, poverty persists. While progress has been made at the fringes of the problem, today nearly half of our rural population remains poor And because they are poor; they lack the resources, the education, the energy and the will to escape from poverty.

Why, we must ask, has the problem of poverty proved so intractable? Its elimination has been the first national priority for nearly forty years. Poverty and the problems associated with it have been studied and analysed by our finest economists, sociologists and social scientists. Our best scientific talent has been deployed to develop the technologies that will liberate our rural poor. Our plans, and the resources that flow from them. have focussed on amelioration of rural poverty. Yet the problem remains.

I would draw your attention to a rather striking paradox. Considerable and justifiable pride is taken in the great strides made by our agricultural sector in the last two decades. As recently as the mid-1960s many were convinced that, as a nation, we could not feed ourselves. Last year we produced a staggering 150 million tonnes of food grains; this year we shall equal or exceed that record, continuing on a path of progress that has few parallels. Yet, while production leaps, poverty persists. The rural poor -those who produce the cereals, the oilseeds, the cotton, jute, pulses and

spices -show little gain from their efforts. Is it not curious that in a year of record production, farmer income has not increased dramatically; is it not equally puzzling that consumer prices have increased, increases that tax that other class of underprivileged, the urban poor?

There is an unfortunate explanation for this paradox: exploitation. It is the traders and the middlemen who have been the major beneficiaries of our green revolution. Let us, however, give them their due. They have created marvels of vertical and horizontal integration to finance, procure, process and market a major portion of our nation's agricultural production. Consider, if you will, only the logistics of moving cereals, vegetables, fruits, and oilseeds to Hyderabad, not only from the far reaches of Andhra Pradesh, but from every corner of India. One can only admire such a system. And, one would admire it were it not for the fact that in , the absence of control and competition, it exploits not only both producer and consumer but operates with margins that allow for substantial inefficiencies and waste.

No doubt some of you have asked yourself the question I will now pose: how can such a situation persist in a democratic society? Is not one of democracy's merits, its capacity to redress such problems of exploitation? The answer, whether fortunately or : unfortunately, is not a simple yes. Democratic decision making must weave its way through a web of conflicting demands. Decisions in a democracy must, of the nature of the system, respond to pressures rather than simply resolve issues on their merits. It is an unfortunate fact that on issues that affect them, our rural poor exert little or no pressure. Weighed down by the problems of day-to-day life, even of survival, they are no match for the pressures of the urban elite, the traders and middlemen.

Let me digress for a moment to tell you something of my own experience for it offers both an illustration and, perhaps the outline of a solution.

It was just at the dawn of our Independence that I found myself -much against my will might say -posted to the little town of Anand in Kaira District, Gujarat. It was there that I got mixed up with some rather remarkable people who were grappling with this very problem of exploitation. Kaira District produces milk, far more milk during the flush season than can be consumed there, or in the surrounding areas. And so, the milk was purchased by traders and a private dairy who would send it to Bombay. The profit, needless to say went to the dairy-not to the farmers. Shri Tribhuvandas K. Patel and his colleagues believed that through cooperation, the farmers of Kaira District could strengthen their position. As you know, they were proved right. But, it was not without a struggle and not without learning that our efforts could not succeed unless we became involved not only in trading, but in supporting production, in processing, and in the marketing of dairy products. We also learned that the rural poor could command a major enterprise and, in so doing, earn a far greater share of the consumer's rupee. But to do so, the farmer's power had to be linked with the expertise of professional management, management that would represent their interests effectively, persistently and with integrity.

The success of our efforts in Kaira District soon led neighboring areas of Gujarat to seek our help in organising their dairy farmers into cooperatives. As the successes began to multiply, the then Prime Minister, Shri Lal Bahadur Shastri, decided that the same approach should be the basis of national dairy development policy and, at his instance, the National Dairy Development Board was established. This led to Operation Flood.

What is Operational Flood? It is not simply a dairy development programme. It is the organisation of 10 million farmers, giving them a platform to articulate their needs, to demand a better place under the Indian sun. The basis of Operation Flood is giving power to the producer by combining their energies and great resources with the talent and commitment of professional management. It is therefore appropriate that some have dubbed Operation Flood the "White Revolution", for it is a revolution -not only in production, but in creating a constituency of farmers who, served by professional managers, can exert pressures in their own interest thereby participating effectively in our democratic process. It is no accident that the incomes of dairy farmers have increased. They are organised and they have a voice. We can also take some pride in the fact that because their organisations are managed professionally, and because they are efficient, price increases to the consumer have been moderate.

This revolution has not taken place without opposition. It has been opposed by some politicians, by some bureaucrats, by middlemen merchants and traders. Yet this coalition of vested interests who don't want the poor to emerge, who feel threatened when the poor gain access to the stage of democratic decision-making, has failed. They have failed because of the very fact that the farmers have organised. And they have failed because the salvation of India is that in high places, in all spheres, there are people of good intentions, of good will and of ability. Such people have not only welcomed the poor to the arena of democratic decision-making, but have actively supported and encouraged this process.

The Government of India, beginning with Pandit Jawaharlal Nehru, has encouraged what we call the Anand Pattern of Cooperative development. As I mentioned, it was Shri Lal Bahadur Shastri who was instrumental in creating the National Dairy Development Board so that the Anand Pattern could be extended to every part of the country. It was Smt. Indira Ghandi whose encouragement and support was vital to Operation Flood and, very recently to creating an alternative structure for vegetable and fruit marketing on the Anand Pattern. And it was Shri Morarji Desai who saw the Anand Pattern as the way to replicate the success of Operation Flood with oilseeds and edible oil.

Whether with milk, with vegetable and fruit, or with oil, organisation of farmers into cooperative enterprises is the first step toward releasing our rural population from the bonds of poverty. By their command over procurement, processing and marketing, the farmers ensure that their share of the consumer's rupee increases providing them with a remunerative and reliable return on their investment. Increased and stable income creates the conditions for further investment in production and productivity, an effort supported by the cooperatives which provide the services and inputs the farmers require. When the cooperatives achieve an influential share of the

market -as they have in milk and dairy products -this forces the trade to conform, to compete with fair prices to the farmers locally regionally and nationally; empowers the rural poor, giving them a strong voice in our democratic process. It has probably occurred to you that if cooperatives are a solution to rural poverty why does poverty persist? After all, today in India we claim to have one of the world's largest cooperative movements more than one hundred and fifty thousand cooperative organisations exist in our rural areas.

To understand why cooperatives have not succeeded in reducing poverty, we must understand a bit of history Cooperation has existed in our country from time immemorial. But the cooperative movement organised by the British, and ruled by a Registrar was alien to our culture and our genius. With Independence, cooperaties, along with Panchayats and village schools, were seen as one of the three pillars of development. But, while political power had been transferred, the approach to cooperation remained the same, we forgot the words of Ghandhiji who said: "Cooperation, which is rooted in the soil, always succeeds". What we promoted were cooperatives rooted in the infertile soil of Government Departments of Cooperation, created simply as an extension of the bureaucracy, a soil in which they might exist, but where they would never flourish. We ignored the lessons of cooperative pioneers such as P.L.N. Raju and Kashlnath Rao Mukpalkar who built cooperatives from the bottom up, empowering the farmer, not the bureaucrat.

These and other pioneers of the Indian cooperative movement, men of great vision, saw that cooperatives could transform our rural areas, empowering our farmers and allowing them to direct their own destinies. They were convinced that cooperatives would strengthen democracy at the grassroots as our rural people learned to wisely use the power of one man with one vote. They believed that economic justice would be advanced by the lessons of cooperation where rich and poor: Hindu and Muslim, Brahmin and Harijan unite for the common good.

Increasingly these dreams have been dashed against the rocks of politics, bureaucracy and disregard for the fundamental principles of cooperation. Cooperation, a people's movement, has been officialised, bureaucratised, politicised and neutralised. It is not necessarily wrong for a political leader to serve as a cooperative leader; what is wrong is when such leaders put political interests above the principles and purposes of cooperation. Only if cooperative leaders behave with decency, honesty and integrity can cooperation succeed as a powerful instrument of constructive change in our villages. As Mahatma Gandhi once said, "The cooperative movement will be a blessing to India only to the extent that it is a moral movement". While we can be encouraged by the example of Andhra Pradesh -which I understand is in the process of revising cooperative law to return cooperatives to their members -its example is but a small glimmer of hope on an otherwise dismal horizon. Those of you who leave the Andhra Pradesh Agricultural University today will soon be in the front lines in the war against rural poverty. Your struggle will be a peaceful one, but one of great importance to the future of our nation. Some of you will be involved in the research and technologies that increase productivity; others will extend to the farmers of this State the information and inputs they need to exploit that research. Some of you will become involved with the procurement and marketing of agricultural commodities. A few of you, in some years, will be

responsible for the policies and strategies of agricultural development in Andhra Pradesh and the nation,

The task you face is a difficult one. The pace of change is slow and there will be many obstacles and failures. You will discover that not all will welcome progress; there are those who will oppose you. You will need courage, the courage to be patient and to recognise that your work is not that of a day or a year but of a lifetime. You will need the courage to recognise a problem or a failure as the opportunity to learn. You will need the courage to continue to be a student and the humility to recognise the unlettered villager as the wisest of teachers.

I hope that there will be those among you who will be a inspired by the cooperative movement as I have been, who will share the vision of those of us who believe that !f we are to eliminate poverty it must be. can only be, through cooperation. There is, after all, no greater responsibility no greater challenge than to be the employee of our nation's farmers. , It is in this role that your education, your skills and your commitment can be harnessed to the immense strength of our rural population in the common effort to eliminate not only poverty, but to build a strong, proud and just nation.

I wish you all well.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
19th ANNUAL CONVOCATION

22nd February 1986

Address by
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Rajendranagar, Hyderabad – 500 030

I am glad of this opportunity to come to Hyderabad, the city of glamour par excellence and seat of art, culture and refinement. This cosmopolitan capital of Andhra Pradesh has opened up new visits to our cultural heritage in language, literature, music, art, architecture. science and technology:

At the outset, I offer my warm felicitations to the young men and women who have been conferred degrees and distinctions by the University at this Convocation. It is a great moment in their academic career With knowledge comes wisdom and humility which is a prized possession and which enriches one's personality. Knowledge is a great blessing from God to man. My young friends. you belong to a generation which has to play a crucial role in nation building. The nation has great hopes from you and I expect you to dedicate yourselves to the great task of national development and. thus, justify the heavy investment that your parents and the country have made in your education.

The Andhras are a virile people, proud of their traditions said Gandhiji. "They are devoutly religious people capable of sacrifices. Much is expected from them by the country". The Andhras have not belied Bapu's expectations. They have played a sciiltillating innings and performed the hat trick -a unique honour of putting three stalwarts in a row at the helm of affairs of our country as Presidents - Sarvepalli Radhakrishnan. Zakir Hussain, Varahagiri Venkata Giri. By coincidence they were all Vice-President before they became Presidents. For their services and wise counselling a grateful nation honoured them with the highest reward - Bharat Ratna. After this Ratna trio again it was from Andhra Pradesh that my distinguished predecessor Dr. Neelam Sanjiva Reddy was sent to occupy the Chair of that August office. Another Speaker of Lok Sabha from Andhra Pradesh. Shri M. Ananthasayanam Ayyangar was also a very gifted personality:

In the first convocation address to the Andhra University Dr. S. Radhakrishnan stirred deep chords when he said "We the Andhras are fortunately situated in some respects. I firmly believe that *if any part of India is capable of an effective sense of unity it is Andhra".*

In replying to the civic address at the Hyderabad Corporation Dr Zakir Hussain declared nostalgically: "In solitude. whenever I asked my heart which is the place you love most? quick came the answer -Hyderabad -my birth place".

I would like to make special mention of Prof. N.G. Ranga. from whom like perennial Ganga has flowed unceasing persistent. and consistent effort for the betterment of the farmers and the downtrodden. This dynamo of energy has been ever active and eloquent during the last 50 odd years for the welfare of the poor, oppressed and deprived sections of society. Witty and magnetic he continues to be the rallying point of the young and the old.

Sports are an integral part of education. Andhra Sportsmen are known for their skill, stamina and agility. After the multi-splendoured C.S. Nayudu, smashing vizzy the great Ghulam Ahmed, the mantle has now fallen on that young prodigy - Azharuddin who is the first cricketer in the world to score three consecutive centuries in three successive test matches. It was the great poet -scholar -King Krishnadeva

Raya of the magnificent Vijayanagar Kingdom who said "I am a lover of Telugu. Exquisite among all the languages is Telugu.

Telugu is known for its sweetness, beauty and power of expression. Tyagaraja's krit is the divine musical compositions which give joy and happiness to music lovers the world over. This krit is embodies eternal truths, beauty and wisdom of Indian philosophy Language is no barrier for the unity of the hearts and the minds.

On this auspicious occasion I would like to emphasize that you have chosen the noblest profession of agriculture. Tiruvalluvar says: "However wise men may roam about in 'search of wealth, for their food they have to follow the tiller of the soil", since he is the foundation of the world organisation and .agriculture is certainly the best of professions. The country has given you opportunities to learn at a great deal of learning under the guidance of specialists of renown. You have acquired knowledge, skills and attitude to guide your conduct of life. I hope you would utilize these qualities to help the poor, needy and the ignorant.

It has been our tradition from thousands of years to make valedictory exhortations to the students. Here are some commandments from Taittreya Upanishad. They underscore moral and social values which could be cultivated by constant practice and yearning for perfection.

DO NOT SWERVE FROM THE PATH OF TRUTH
You have to know your truth and live by it.

DO NOT SWERVE FROM YOUR DHARMA- : your act of faith
Your Dharma is of an agriculturist.

DO NOT NEGLECT SOCIAL WELFARE.

DO NOT NEGLECT YOUR CONTRIBUTION TO ACHIEVING PROSPERITY (Social Economy)

DO NOT NEGLECT STUDY, RESEARCH AND PROPAGATION OF KNOWLEDGE.

LOOK AFTER YOUR PARENTS. TEACHERS AND GUESTS.

DO GOOD ACTIONS ONLY.

A very pragmatic approach to right conduct is recommended -Follow only what was good in your teacher's life. You will meet betterment than your teacher. Follow them.

Whatever you give to others, give with respect not scornfully as if throwing crumbs from your well garnished table. Give with joy, with humility, with fear, with sympathy and kindness.

All education is self education, nothing can be taught. You have to learn “Raise yourself by your own effort. Do not degrade yourself. You are your best friend. You are your worst enemy. Self affirmation, self development helps unfolding of inner strength. Education is the manifestation of the perfection already in man.

The force of individuality makes the mustard seed into a mountain. Its weakening reduces the mountain into a mustard seed. Mere reading of books, collecting more information, facts and knowledge is no education. Education is not loading but quickening the mind.

May God fire you with the force of a tempest, for the waters of your sea are calm and still? The book cannot be your solution, for you are only a reader; it has not been revealed to.

Upanishads (literally sitting devotedly near) display the most scientific spirit in connection with spiritual enquiry: They are inspired by constructive doubt as the most modern men of science. Chandogya Upanishad refers to the; story of a young man who returns home after 12 years of higher studies. He had become conceited thinking himself a well read. Full of pride in his learning, he was arrogant. One day Shwetaketu's father said to him:

"Fetch me the fruit of that Nyagrodha tree"
"Here is one, Sir"
"Break it"

"It is broken Sir,"

"What do you see there?"

"These extremely tiny seeds"

"Break one of them"
"It is broken Sir,"
"What do you see there?"
"Nothing Sir."

The Father said "My son that subtle essence which you do not perceive there, of that very essence this great Nyagrodha tree exists. Believe it, my son that which is the subtle essence, in it all that exists has itself. That is the truth. That is the Self And Shwetketu

THOU ART THAT

It is a challenge to thee to make thyself what thou knowest, thou can't be. Acquisition of knowledge and skills, science and technology is not only for earning a livelihood but for the benefit and service of others as well. Mahabharata contains one hundred thousand verses 8 times the size of two European epics and 'Odyssey' which together have 12 1/2 thousand verses. Its author veda Vyasa says that the quintessence of this great epic is contained in the simple assertion:

The great good is to help others.

The great evil is to harm others.

I neither desire kingdom, nor heaven nor liberation from the cycle of births and deaths; I desire only to relieve the suffering of the sorrow stricken

Food and life are in separable. Therefore, food production has always been the central concern of mankind. One cannot conceive of life without tood. Anna is Brahma. As the hymn from the Vedas says:

Mortal men live upon the earth by food and their inherent strength. Moreover, all the world over from Mesopotamia to Mohenjodaro. agriculture has cradled culture and civilisation. In one of the most poignant homages paid to our motherland, India has been described in Bande Matram by Bankim Chandra Chatterjee as -

A land fertile and verdant, cooled by fragrant breezes. Society and state have prospered as long as the tillers of the soil, the farmers in their fields, were not disturbed. In ancient India the crops were not damaged even in the enemy territory. Whenever, on the other hand, the peasants were oppressed and exploited, the country was brought to the brink of ruin.

Our Prime Minister, Shri Rajiv Gandhi, with all the energy and enthusiasm, which comes with youth, is very keen and conscious to see that development in this sphere is so planned as to reach the grassroot levels so that the common man is benefited. In spite of phenomenal progress, much remains to be accomplished. It is to the remaining tasks, not so easy, that we must address ourselves, particularly those of us who have chosen the agricultural sciences as their field of study and are poised today at the threshold of a challenging career. The opportunities are exciting. Agriculture is the most important source of renewable wealth. It can sustain integrated projects to secure for the villager food, fodder fuel and fertilizer. Popularisation of horticulture can contribute significantly towards increasing incomes and enhancing nutrition in rural areas. There is great scope for improving soil, plant and animal health in most parts of the country. Advances in genetic engineering and technology can be applied to make breakthroughs in farming and ,animal husbandry. Coping with these challenging tasks promises to be rewarding both professionally and personally.

All the new seeds and fertilizers in the world are of little value if the farmer in the countryside does not know how to put these to good use. The access to expertise and availability of resources are of crucial importance. In fact the main basis of studies in the Agricultural Universities rests on three important functions viz 'Agricultural Research' for acquiring new knowledge, "Agricultural Education' for transmission of new knowledge and 'Agricultural Extension' for application of new knowledge in the field. In the context of the Indian agriculture it is the last which is most important. It is a great pity that the rich potential of agricultural extension has rarely fulfilled its promise. An Agricultural University should, therefore, have an integrated approach through a balanced development of research. teaching and extension education. The University cannot afford to do anything less than this if it is to serve as an effective instrument in rapidly modernising agriculture.

Humanity. we must remember, can never vanquish hunger with technological weapon alone. Man, whether wielding the sword or the plough-share, is always more

important than the implement. Greatest success an be achieved only by those who dare to reconcile the realm of ideas with the domain of physical. productive labour. You, who have for the past few years experimented and excelled in gleaning modern laboratories, should never lose touch with the earthy fields outside or forget the rich traditions. Only the root, firmly planted in native soil, can support healthy growth.

As you step out of the portals of this temple of learning, with your heads held high in justifiable pride of achievements, I should like to conclude with a little friendly advice. You should always resist the temptation to sell your expertise to the highest bidder nor offer advice condescendingly to the less fortunate brethren in the villages where it is most needed. Elitism only undermines the initiative of the poor peasants. Listen to Gurudeva Rabindra Nath Tagore in Gitanjali –

"He is there where the tiller is tiling the hard ground,
Where the path maker is breaking stones.
He is with them in sun and in shower
His garment is covered with dust.
Put off thy holy mantle and, evenlike him,
Come down on the dustry soil.
Come out of the meditations and leave aside thy flowers and incense!
What harm is there if thy clothes become tattered and stained?
Meet him and stand by him in toil and in sweat of thy brow"

I see here many distinguished men of achievement. I hope that they will establish a tradition of leadership in research, so far as the agricultural science are concerned. It has been rightly said that if science doesn't advance in research. it languishes and becomes stagnant. It is, therefore, very essential that those who are dealing with sciences would bear this in mind. Friends, coming years shall be full of struggle and trials of all kinds. There shall be moments of elation as well as occasional disappointments. I am sure, faith in yourself and the love for your country shall help you overcome all obstacles.

With these words I once again congratulate the young Scientists who get degrees and distinctions today. Happy memories of this day shall encourage you to persevere and excel. I wish you all success in life.

Thank you very much.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
20th ANNUAL CONVOCATION

3rd February 1987

Address by
Dr. Abid Hussain

Rajendranagar, Hyderabad – 500 030

Madam Chancellor, Vice-Chancellor, Members of the Faculty, Distinguished Guests, Students and friends.

May I, at the very outset, express with deep sincerity my sense of gratitude to Excellency Madame Chancellor for asking me to address the Twentieth Annual Convocation of the Andhra Pradesh Agricultural University. Though Agriculture has not been the subject of my study, yet you have been good enough to ask me to address the students of Agricultural University. Indeed, no Indian wherever he may be placed or however employed he may be, could remain relevant, if alienated from the concerns of agriculture and matters of consequence to it. It is that which binds me with pursuits of your University and I am happy to be here to speak to you on this important occasion.

I offer my congratulations to the graduates of the year who, by their hard work and disciplined effort, have attained their degrees and some of whom have achieved distinctions also. 1'm confident that the same qualities of mind and discipline of work exhibited during their University courses would be continued by them which will help them to earn higher positions of work, creativity and public approbation. The central truth is that "there is an intimate connection between the mind of men and the moving spirit of the universe". This maxim applies to individuals as well as to nation.

I do hope, Madame Chancellor that your University is turning out boys and girls not merely possessed of learning but also endowed with a purpose and a vision. That is the supreme test and the function of any University. Let us advance the cause of millions in this country who depend for their future on grinning of India, who want to be pulled out of the poverty syndrome. That's a precious cause. Let us cling to it and let's help India to once again become a great country.

Today I wish to speak on future of Indian agriculture and the role of Agricultural Universities. The growth of the Indian economy since .the beginning of the planning era is characterised by notable structural shifts in the composition of output. The share of agriculture and allied sectors declined from 59 per cent of gross domestic product (GDP) in the First Five Year Plan period (1951 -56) to 38.6 per cent in the Sixth Plan period (1980 -85). The share of mining, manufacturing and construction increased from 14.7 per cent to 21.1 per cent of GDP over the same period. Infra-structure and services sector have shown a marked increase in their share in GDP over this period. These changes are in line with the expected structural shifts as a concomitant of development. However, agriculture continues to remain an important sector of the Indian economy Agriculture, besides contributing around 38 per cent directly to GDP, influences significantly. the growth of other sectors of the economy. In terms of employment generation, agriculture still accounts for more or less half of total employment measured in terms of standard person years and about 60 per cent of total number of workers are dependent on agriculture. Poverty in India is observed to be associated with the performance of agriculture.

If we look at the consumption basket of the population, we find that about 65 per cent of the total consumption expenditure in rural areas and about 60.% of the total in urban areas is spent on food. For the population group which is just around the poverty line, food expenditure constitutes about 75 per cent of the total

expenditure in rural areas and about 71 per cent in urban areas. Expenditure on foodgrains alone constitute around 36 to 37 per cent of total expenditure in rural areas and around 23 to 24 per cent of total expenditure in urban areas. These proportions for people below the poverty line are much higher. Hence, the availability of food (supply) and the price of food products have significant impact on the consumption levels of the poor: On the other hand, a decline in agricultural production curtails the income and employment of a large section of the population reducing in effect their purchasing power: It is not surprising, therefore, that the performance of agriculture and the poverty status of the population are so directly connected.

This brings in the question of food supply -Indian performance in this respect and the prospects. The first half of this century presented a picture which very nearly confirmed to the Malthusian gloom about population growth outstripping the growth in food supply. The available evidence shows that the per capita production of foodgrains in India in the first half of this century was declining inspite of the fact that this was also a period marked by very low rate of growth of population. The population was growing at about 0.8 per cent per annum while the rate of growth of agricultural production is estimated to be around 0.3 per cent per annum during this period. The First Five Year Plan, therefore, rightly paid attention to the development of agriculture with particular emphasis on food production.

The period sine the beginning of the First Plan has seen significant strides in agricultural development. The long term rate of growth of agriculture (in terms of value added) over the period 1950-51 to 1983-84 has been 2.20 per cent per annum, while the rate of growth of population over the same period has been 2.03 percent. Over the period 1950-51 to 1974- 75, the trend rate of growth in agriculture was 2.06 per cent per annum while in the latter period, i.e. 1974-75to 1983-84 it has been 2.30 percent per annum. The pace of population growth during this ear has increased because of many developmental factors, but agriculture has maintained a slightly, though not sufficiently, higher pace of growth.

In 1950-51, the output of food grains was about 51 million tones, which reached a level of 70 million tonnes in 1954. and a peak of 152 million tonnes in 1984. The output for 1986 is estimated at around 151 million tonnes. During this period there has also been a significant growth in the production of fruits, vegetables, fishes and products of animal husbandry, which is also reflected in the diversification of the food basket of the population. The main achievements on the food front have been that the need to import food grains have been eliminated, and prices have been stabilised through maintenance of adequate stocks. The production also shows growth with relatively more stability. However, since poverty is mainly defined in terms of calorie deficiencies, i.e. deficiencies of food intake in relation to a certain minimum requirement, and still about 37 per cent of the population is below the poverty line, our food requirements, in absolute terms, are not fully met. An estimate in the perspective of the year 2000, taking into account the population growth and its changing age structure, projected increase in per capita income and the expenditure elasticities for food grains. Keeping the target of reducing the poverty level to a low of 5 per cent of the population, would place the food grain requirements at about 240 million tonnes by the turn of the century.

The increases in food grain production have been achieved by a combination of factors -increasing exploitation of the basic natural resources i.e. land, water and environment: improvement in agricultural practices helped by extension and community development services: increasing use of inputs like fertilizer and pesticides. technological break-through by way of evolving high yielding and improved varieties of seeds and a package of economic policies and market interventions. While it is difficult to precisely segregate the contribution of thee factors to agricultural growth, it can be seen that some factors have been more important in certain phases of development.

In the initial stages there was a significant extension in net area sown, from 119 million hectares in 1950-51 to 133 million hectares in 1960-61 and further to 141 million hectares in 1970-71. Since then the net area sown has fluctuated around 141 million hectares reaching a maximum of 143 million hectares in some 'years, but without increasing trend. Thus the increase in net area-sown in the first decade of planning was about 12 percent and that in the second decade was about 6 per cent where after we seem to have reached the limits of land which would be additionally brought under cultivation. This extension of net cultivated area was accompanied by expansion of irrigation facilities. Net irrigated area increased from 21 million hectares in 1950-51 to 25 million hectares in 1960-61 and to 31 million hectares in 1970-71, and the gross cropped area increased from 132 million hectare in 1950-51 to 166 million hectares in 1970-71. Fertilizer consumption increased from less than one kg. per hectare in 1950-51 to nearly 14 kg per hectare in 1970-71. After the year 1970-71, net sown area has not expanded, as already described. However irrigation expansion and increases in fertilizer application, have continued. Net irrigated area increased to 40 million hectares in 1982-83. Gross cropped area increased to 173 million hectares, and fertilizer application increased to 36 kg/ha in 1982-83 and 46 kg/ha in 1984-85.

The high yielding variety of wheat was introduced in mid-sixties. and since then improved varieties have been introduced in respect of many other crops. However the results of this technological revolution depended on irrigation, fertilizer application and on increasing use of other chemical inputs. Significant increases in agricultural production in general and food grain production in particular since mid-sixties are due to increases in yields. All-India average yield of food grains in 1950-51 was 552 kg/ha. It increased to 738 kg/ha during the years 1966-69 and further to 1163 kg/ha in 1983-84. Yield of wheat increased from 655 kg/ha. in 1950-51 to 1851 kg/ha. in 1983-84 and yield of rice increased from 668 kg/ha to 1458 kg/ha over the same period. Constrained by expansion of irrigation, the green revolution has still not covered a large part of the country the potential for yields of wheat and rice, with the known technology and better management when average farm conditions are 4 1/2 to 5 tonnes per hectare.

We have already almost exhausted the possibilities of bringing in more land under cultivation. Infecting the growing need for housing, expanding industrialization and spread of infra-structure may further encroach upon some of the cultivated land. A significant source of augmentation of cultivated land has been irrigation which makes multiple cropping possible. Spread of irrigation also helps in insulating agriculture against the vagaries of monsoon. The created irrigation potential was about 68 million hectares in 1984-85, which. at the need of the Seventh Plan is

targeted to reach about 81 million hectares. On the basis of existing technology and costs of water diversion, the ultimate irrigation potential, a little or. the conservative side, is estimated to be 113.5 million hectares. A higher estimate of ultimate irrigation potential, which takes into account the possibilities of large sale inter-basin transfer of water, is about 148 million hectares. Even if this potential were to be realised, a significant proportion of land would remain without irrigation. Expansion of irrigation is also handicapped by environmental constraints.

India has so are experienced a *resource-intensive mode of agricultural production,* inspite of technological break-through in the form of green revolution. There is increasing dependence on irrigation water. Intensity of the crops has gone up and there is increasing need for use of chemical inputs like fertilisers. insecticides and pesticides. The increasing input-intensity of agriculture is indicated by the observation that when gross value of production in agriculture increases by 10 per cent, the value added in agriculture increases only by a little more than 6 per cent. This pattern of input use also has adverse environmental side effects. Though there is still a vast gap between the realised and existing potential of yields and production based on existing technology in about 15-20 years we will exhaust our potential of water availability jut as we have exhausted the potential of expansion of net cultivated areas.

The future of Indian agriculture lies, thus, in an effort to reduce the resource-intensity of agriculture. There are two lines of possibilities open to take us in this direction. One is to improve the resource-use efficiency through improved management practices, and reallocation of resources to more resource conserving uses. The sample scope is this, the other is the line of a scientific breakthrough in biotechnology the enormous possibilities of which are already seen on the horizon. In both of these two lines, Agricultural Universities and Agricultural Scientists have to play a leading role. The agriculture of the future has to be characterised by *Science-intensive mode of production.*

On the point of resource-use efficiency, a few problems come readily to mind. All know that water is a very scarce resource, in a way it is more scarce than the land itself, because all the land which can use water productively cannot be supplied with it, and besides its agricultural uses, there is a growing demand for water for industrial uses and for human consumption. Yet, this is one resource which is most wastefully managed and used. There is enormous scope for reducing water losses in irrigation systems, partly through more scientific operation of the irrigation systems and better modes of conveyance, and partly through improvement in agricultural and land management practices. Scientific research could also be directed to evolving strains of plants with better water retention capacity so that frequency of water application is minimised. Related to water-use efficiency is also an issue of resource allocation. One could think in terms of alternative land use pattern, or more particularly alternative crop pattern which gives higher returns to water. Attention has to be paid, for example, to viable substitutes of crops like sugarcane which perhaps is the most heavy water consuming crop. Environmental impacts of such crops are also adverse. Widespread irrigation also raises the level of humidity in the atmosphere and increases the incidence of pests and diseases on the crops. Preventive and corrective measures to these problems will have to be evolved.

There are innumerable areas for applied research in the context of agriculture of the future.

It is a matter of concern that the increases in crop production in India have come about mainly in the irrigated areas-the large areas under rainfed farming which constitutes almost 70% of the country's available land being bypassed. This has accentuated problems of regional and even local disparities. Oilseeds and pulses, which are in short supply in the country, being grown largely in rainfed areas have not registered any appreciable increase. Indeed the per capita availability of these two commodities is now lower than before. The Prime Minister has constituted a Technology Mission for increasing oilseeds production to the level of self-sufficiency by the end of VII Plan period and it is hoped that Agricultural Scientists would play a decisive role in this time bound programme. Agricultural Science would have to evolve robust technologies for dry land agriculture.

Of considerable promise in the field of agricultural research is the effort to bridge the gap between the proven potential and the actual yields on the farm through adaptive research to suit the varying agro-climatic and socio-economic conditions. A complaint relating to agricultural development in the country often heard is that while technology is available to increase yields considerably -even several fold in some crops, -the farmers do out have access to the same. Lack of adequate extension support to transfer of technologies was identified as the missing link and the Government of India is now assisting the States, through a series of World Bank (IDA) Credits, to reorganise and strengthen extension. Thus 17 States have during the last 9 years adopted Training and Visit (T&V) system of extension. I understand that the system has enabled States to successfully transfer the results of research to the farmers enabling them to reap higher harvests. At the same time several technological components recommended by research are not taken up by farmers-apparently due to their unsuitability especially to the resource poor farmers operating under risk prone conditions. Research should strive to identify constraints faced by farmers under their uncertain environments and tailor made technologies to suit their needs.

Agricultural Scientists have to identify the emerging issues of the future and focus their research activities on those issues. But what is even more important is to make the results of science adaptable in the common socio -economic conditions. In socio-economic terms agriculture has to take into account the low investable capacity as well as limited risk- bearing capacity of small and marginal farmers and those in the tribal areas. The task of spreading the results of Science cannot be left to administrator alone -this is as much a task for the Scientists to handle, as doing the basic research.

Bio -technology opens up many interesting and exciting possibilities and has great potentials of reducing the resource-intensity of production process in agriculture. It opens up the possibility of breaking the yield barrier in major crops, reducing dependence on non- renewable sources of energy developing resistance to pests and diseases in plants and animals, and biological nitrogen fixation, thereby reducing the need for using chemical inputs. Bio -technology thus appears to be an answer to the twin problems of the future -the resource intensity of production and environmental erosion.

If one recalls our old agricultural practices, crop rotation with a leguminous crop was used as an essential practice to maintain soil fertility for better yields. Due to pressure on land for other remunerative crops, coupled with availability of chemical fertilizers this practice of crop rotation has become out-dated in many areas. In the year 1888 itself it was recognised that a micro-organism, known as Rhizobium, had capacity to convert the atmospheric nitrogen into a usable form in association with legumes. Since then, other free living bacteria and blue green algae capable of fixing atmospheric nitrogen into the soil were found. The water fern, *Azolla* is being extensively used in South East Asia rice soils to augment nitrogen, if one an incorporate the biological nitrogen fixation process into modern agricultural practice it can cut down the cost of fertilizer inputs drastically. Attempts are also being made to transfer this nitrogen fixing character which is present in micro-organisms into crop species. The conventional breeding programmes commonly require 8-10 years for evaluating and releasing a new variety. It also requires considerable amount of land. Whereas, through tissue culture technique a new variety can be developed in 2-3 years and the breeder can evaluate 100 million cells, each a potential plant in a laboratory .

On the energy front, it has been estimated that for production of 1 kg of food, 2 kg of non -renewable energy (fossil fuels) is consumed. In agricultural programmes one should pay attention for the utilisation of agricultural residues both as source of energy and organic manure. This is possible by subjecting the agricultural residues for anaerobic digestion to get biogas for energy purpose and the effluent from this process as organic manure. I understand that at the A. P. Agricultural University research is under way to identify microbes capable of converting crop residues into biogas.

Researchers in several countries are making attempts to apply the new tools and techniques for crop improvement. It has been possible to produce wonder plant such *Sun- Bean/through* protoplast fusion of sunflower and the leguminous plant, French green bean. Tissue culture techniques have been practised in forestry species such as jack pine, Prunus and Red wood in U.S.A. In Italy a group of fruit growers have organised a Co-operative tissue culture lab for propagation of a number of fruit crops such as peaches, cherries, strawberry, blueberry, and pine apple. In Malaysia and Singapore, micro propagation through tissue culture has been commercially exploited for large scale planting of oil palm. In France and U.S.A. tissue culture techniques have been commercially in use for multiplication of a number of Horticulture and Ornamental plants. In our own country, saplings of coconut and oil palm were stated to have been obtained through tissue culture at the ICAR laboratories. At A.P. Agricultural University tissue culture technology has been standardised for rapid multiplication of rose.

In China, Scientists have been able to produce another culture derived rice varieties which have yielded potential of over 8 tons/ha. About 1,00,000 ha. of wheat and 2,00,000 ha. of rice are grown with improved varieties developed through haploid tissue culture techniques in China. Sugarcane varieties resistant to Fiji disease and sugarcane mosaic virus produced through tissue culture are in cultivation in Fiji and Taiwan. In India also successes have been reported in isolating disease resistant varieties in potato and Sugarcane through tissue culture.

In future, thee genetic engineering techniques could be used to produce new disease resistant, salt resistant and drought tolerant varieties, in various crops. It is also possible to cross distantly related species through protoplast fusion to produce somatic hybrids in plant species which cannot hybridize sexually It is possible to incorporate nitrogen fixing genes by genetic engineering techniques into crop plants by which they can produce their own nitrogen supply so that the external application of fertilizers can be minimised. Biotechnology thus holds immense promise to break the yield barriers and user in a new phase of Green (and indeed a greener) Revolution and therefore should receive the support of the Government and the Universities in the country.

There is yet another direction which requires added emphasis in the context of agriculture of the future. Traditionally, agricultural processing has been a step or a number of steps removed from agriculture itself. As a consequence, processing infra-structure has not adequately responded to the processing needs. Transportation of unprocessed commodities has been costlier and certain high value but perishable crops could never get a hold on the ground except on urban fringe. This had depressed the production of high value crops, and has given rise to multi-layer intermediation between the farmer and the consumer, increasing the price-spread between the two. In fact a lot of potential output is wasted because of inadequacy of processing infra-structure. A glowing example is that inspite of acute shortages of edible oil, only a fraction of the total cotton seed available is processed for oil. Spread of soyabean cultivation is inhibited due to lack of processing facilities and examples can be multiplied. What milk cooperatives in Gujarat could do to raise the production of milk is a pointer in this hopeful direction. In order to realise full potentials of agricultural production, to give better returns to the farmers for his efforts, and to generate more employment as well, the future agriculture will have to be a combination of farming and processing, narrowing down the difference between agriculture and industry However, this requires an organisational revolution, green revolution alone is not enough. While basic farming activities will have to be carried on by large number of small farmers, processing infra-structure will have to be created on a large scale, also requiring block specialisation in farming activities. This might have to be organised on cooperative basis. Agricultural Scientists will have to pay attention to this aspect of agricultural development as well.

One of the significant landmarks in agricultural development of the country in the post independent era is the establishment of Agricultural Universities -the first one being established in 1960 at Pantnagar: Now there are 24 of these institutions. These Universities have played an important role in the development of agriculture in this country. I am happy to know that, in keeping with the objective ,A.P. Agricultural University is playing a key role in the development of Agriculture in the State. The development and release of a number of rice varieties suitable to the different agro-ecological situations in the State. which the farmers readily accepted, have enabled the State to reach its present status of the premier rice growing state of the country. Similar contributions in sugarcane through release of high quality cane varieties resistant to red-rot enabled the industry to increase sugar production although the area and productivity of cane are more or less stagnant. The State has also emerged as a major cotton growing state with its production rising to 13.34 lakh bales in 1986 from a meagre 0.8 lakh bales in 1971. Of late the crop is subject to a devastating attack of 'white fly' pest resulting in a decrease in area and production. It is hoped

that the University Scientists are alive to the problem. In the field of animal sciences, considerable progress has been made in developing new breeds of cattle, sheep and pigs to improve their productivity and profit to the farmers. I am told that the pioneering work on rabbits in the University has enabled farmes to take up commercial farming of rabbits in the State.

The Faculty of Home Science has developed close links with several organisations and has emerged as a leading centre for research in foods and nutrition and training of functionaries in women and child welfare organisations in the State. I am particularly impressed with the attempts made by the University to expose the undergraduate students in Agriculture to the rural environments by including a Semester's stay and work in villages as part of curricular activity enabling them to develop the right perspective about rural life and understand the constraints faced by the farmers. Indeed, I commend this type of activity
to all those involved in training students in Agriculture.

It is gratifying to see that the Agricultural Universities in the country have generally justified their creation and indeed have been instrumental in ushering in an era of agricultural prosperity at least in the well endowed agricultural areas in the country. But in the context of a Science and Technology oriented future, the country will demand much more from Agricultural Universities and Research Institutions and the burden of this demand will have to be carried by you, young men and women, Scientists. Great contributions are not always made by a flash of the genius, but by a sustained endeavor and a sympathetic understanding of the environment -scientific and social. While objectivity and detachment may be necessary for scientific experiments and evaluation of results, involvement and participation are necessary for proper perception of the problems and for deciding the application of science. My appeal to you, young scientists, is to actively participate in the process of development and to get emotionally involved with the Indian problems. I'm sure you will, and thus out of the anguish of present conditions will be born a strong and stable India.

I thank you once again, Madam Chancellor for the honour you have done me by asking me to address the students of this great University and my thanks are real and warm.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
21st ANNUAL CONVOCATION

18th February 1988

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Planning For Agriculture: The Next Phase

I propose in my presentation to first discuss the main thoughts behind the current agricultural planning strategies. This would be followed by an assessment of problems arising from recent, particularly Sixth and Seventh Plan experience and their impact on land the water management strategies in the Seventh and Eighth Plans. This will also be related with agricultural planning issues which are highly integrated with land and water management strategies and institutional relationships in the Agricultural sector.

Significant development took place from the Fifth Plan onwards on strategic modelling of sub-sectors for public sector investment and policy choices. This was particularly so for the agricultural sector. It was realised that the crux of the planning of agricultural supplies was realistic assessment of available resources, the possibilities of the transfer of technology to the field level, given the behavioural constraints of automistic production agents in the system and the development of estimates of realisable agricultural potential in the medium term and the long term. Each of these aspects needed to be designed and developed with care. In countries like India, the first feature of agricultural supply planning as postulated as a realistic estimate of land as a binding constraint. Alternative methods which introduce land as a binding constraint in an agricultural plan was advocated. They all relied on the feature that irrigation investments permitted increases in cropping intensity. Irrigation permitted the possibility of multiple cropping by bringing additional land under cultivation and by permitting the same land to be used more than once. In addition, analysis of the past showed that the application of the new technology was related with the provision of assured water supply. Since the new technology on account of its photo-intensivity properties, permitted shorter duration crops, this factor by itself permitted further increases in cropping intensity. It has been accepted that the agricultural sector should not be treated as a bargain sector in a national plan and, while every effort should be made to optimise yield levels through extension programmes etc., the provision of necessary inputs i.e. land development. irrigation facilities, should be made with conservative assumptions of yield.

Agricultural and Land and Water Management Strategies

The JNU-PPD study completed by Bhalla and Alagh had also documented this role of irrigation on agricultural development. The elasticity of agricultural productivity with reference to irrigated intensity was estimated between 0.15 to 0.27, if the fertilizer variable was excluded. The elasticity of agricultural productivity with reference to cropping intensity was also estimated between 2.31 to 31.9.

These features of Indian agricultural experience in the early Seventies were used for agricultural planning. Thus, the "Agricultural Sub-Model" of the Fifth Five Year Plan prepared in 1975 argued: that State level data corroborates the findings of earlier disaggregative studies that in certain regions of the country, food grains growth is primarily explained by factors. such as irrigation or multiple cropping, while in other pockets it is due to the water-seed-fertilizers technology.

In the Sixth Plan, yield has risen in every major crop. In cotton, the aggregate statistic hide the dramatic shifts taking place towards the extra superior long varieties. Sixth Plan targets for wheat, sugarcane, jute and mesta yields were achieved. Wheat yield target of 17.5 qtls/hectare was exceeded as the triennium average yield for 1984-85 was over 18 qtls/hectare. In rice, the target of 15.24 qtls/hectare has been achieved. Also, the food grains target of yield of 11.47 qtls/hectare was exceeded as the achieved yield was 11.70 qtls/ hectare. The yield target for sugarcane and jute and mesta was also achieved. But area expansion under crops is not taking place at all as postulated in the Plan and, infact, in the recent period, growth is almost entirely explained by productivity increase (Table-1). This means that cropping intensity and irrigation intensity are probably not increasing at the planned rates, since the expansion of irrigation potential has been considerable. Cropped area is stagnant in rice and wheat, has only marginally increased in sugarcane and has fallen in other principal crops apart from oilseeds. It is clear that the land augmentation targets of the Sixth Plan were not achieved.

Land augmentation and land development strategies will, therefore, need to be closely looked at in the Seventh Plan and planning methodologies scrutinized in this connection. In this context, apart from re-examining some of the parameters used in agricultural supply modelling in the Plans, questions of more elective use of water are extremely important and lead to interesting planning choices.

The Seventh Plan provides that the elasticity of GCA to GIA will rise substantially as compared to that postulated in earlier plans. Thus, growth emerging from a more optimistic view on growth of land is a larger part of the postulated total growth. Growth in fertilizer consumption per hectare of land which has by now already crossed 50 Kgs./hectare is also postulated to taper off. Considerable justification has been given for the expected increase in yield in the Seventh Plan by the empirical work reported on Eastern Regional agriculture. The mid-term review of the Seventh Plan has intensively reviewed the whole question of input provision for the target of a fast expanding agricultural sector since, in fact, area growth is no longer taking place. This feature has to be noted and provided for in the investment and policy planning for the future. Realistic planning for agriculture is very important since it needs to be recalled that agricultural growth has been the razor's edge of Indian Planning.

Finally, the drought must not distort our vision of Indian agriculture. The Indian farmer has performed very creditably and policy support for agriculture and rural development programmes has very high returns. The long term growth of output in the agricultural sector has been 2.64 per cent annual from 1949/50 through 1985/86. Growth since 1967/78 (post- Green Revolution phase) at 2.68 per cent is slightly higher. There has been no slowing of growth in the early Eighties. In fact, taking triennium averages for the period 1978/79 to 1984/85, growth is higher at 3.47 per cent annual, but estimation of short term growth trends in Indian agriculture is hazardous on account of the impact of the weather factor. In the recent period, a notable feature is the improved performance of rice. In fact, some slow down in wheat growth is compensated by the increase in rice growth. Also pulses and oilseeds have been growing faster: An interesting and important feature of agricultural growth since 1979/80 has been that output change is almost entirely

explained by productivity growth and hence growth of land as an input is minimal. Output growth since the Sixth Five Year Plan is 3.47 per cent compound annual and productivity growth 3.46 per cent. In the earlier phase (1967/68 onwards) more than a quarter of the agricultural growth was area based. The first two years of the Seventh Plan have been drought years. In 1985/86, rice and wheat production went up in a dramatic manner. Last year, however, the drought affected these crops also, although the decline was not of the magnitude in earlier drought years. In recent years, the impact of bad weather has been more pronounced on coarse grains and oilseeds. showing that the impact of recent planning measures on rice has to an extent succeeded but the dryland strategies have as yet to make a significant impact. There is little evidence to suggest that output growth has slowed down in Indian agriculture, since recent production performance can be attributed to adverse climatic factors, but the priority to investment, extension and institutional development for the agricultural sector and rural development has to continue.

Table -1

Output Indicators for Agriculture Long Term and Recent

		Output Growth Through 1985-86			Productivity Growth Through 1985-86.		
Sl.	Crop	1949-50	1967-68	1978-79[1]	1949-50	1967-68	1978-79[1]
1.	Rice	2.52	2.54	3.47	1.60	1.92	3.06
2.	Wheat	6.00	5.64	5.48	3.18	3.15	4.21
3.	Coarse Grains	1.36	0.66	0.77	1.27	1.55	1.55
4.	Pulses	0.32	0.65	2.44	0.17	0.29	2.31
5.	Foodgrains	2.64	2.74	3.35	1.73	2.30	3.23
6.	Groundnut	1.84	0.98	0.91	0.54	0.96	0.61
7.	Rapeseed and Mustard	3.27	3.17	9.08	1.53	1.89	7.38
8.	Oilseeds	2.00	1.65	4.35	0.71	1.28	2.85
9.	Sugarcane	3.00	2.70	2.03	1.15	1.11	1.93
10.	Cotton	2.43	2.35	0.47	2.01	2.34	1.59
11.	Jute & Mesta	1.63	2.68	3.15	0.66	1.32	2.79
12.	All Cropos	2.64	2.68	3.47[2]	1.54	2.03	3.46

1. Triennium ending 1979/80 compared with triennium ending 1985/86
2. Source: *Economic Survey,* 1986/87.

In States like Bihar and West Bengal, growth of food grains as a whole in the last decade has been low. In these States. as also in States like Maharashtra. Karnataka and Tamil Nadu, growth of gross cropped area is very low in relation to growth of gross irrigated area. Therefore, cropping intensity is not rising in relation to irrigation growth as planned (Table -2). These are labour surplus rainfed areas and dry land areas. land management questions are extremely pertinent here in relation to more optimal use of water This aspect has been highlighted in the Seventh Plan and it has been shown that land development in these areas is a highly labour intensive effort. Both the Special Rice Introduction Programme and the Watershed Development Programme provide that NRER RLEGP or IRDP components can be integrated into such programmes. The details of such integration have to be worked out on a priority basis. In high productivity areas like Punjab, the quest for increased productivity growth has to continue. Germ Plasm research for higher yield and related management issues have to be resolved.

Apart from an emphasis on raising yields and assuring price support in dryland and rainfed crops, land augmentation and land development strategies will

need to be closely looked at in the Seventh Plan and the planning methodologies discussed earlier scrutinized in this connection. In this context, apart from re-examining some of the parameters used in agricultural supply modelling in the plans, questions of more effective use of water are extremely important and lead to interesting plan in choices. It is important to emphasise that the choice available in terms of potential investment decisions to control and conserve water application is extremely large. The following are illustrative of the major choices:

a) Improved regulation of main canal and branches to reduce operation losses. Completely automated operation, for example. could reduce such losses by about 50 per cent;
b) Lining of distribution systems at the tail-end upto different levels. i.e., lining of branches, lining upto 100 cusecs or lining upto 8 hec. level. This could reduce losses anywhere between 10 to 15 per cent of the water released at the head work;
c) Improved operation techniques for the total system including careful design of buffer storages at different levels of the conveyance system, but particularly at the lower level. In addition to reducing losses this would also introduce considerable flexibility in irrigation planning, which may become important particularly in large irrigation commands where the cropping conditions are of diverse type and crop stress requirements are severe;
d) In addition. the administrative and political aspects of water control will need to be solved;
e) Such modernisation schemes will be expensive and will need to be selectively pursued.

The economists' skills, together with agronomic data. are important to get more realistic impacts of irrigation on cropping patterns. Acreage allocation studies with reference to relative price, irrigation, rainfall variables and/or relative profitability are very common in Indian agricultural economics, but have been made use of in irrigation planning only recently. Once the crop water requirements are worked out for different areas. the whole question of surface and ground water use needs to be carefully considered. Particularly in view of ecological considerations of water logging elects of indiscriminate applications of surface water. Again here. recent advances in the modelling of ground water aquifers need to be put into practice on a more extensive scale. Finally there are questions of working out the inter-regional net benefits of water allocation. Given more precise yield estimates and the cost of delivering water, the use of cost of cultivation studies would give such estimates. Quantified social consideration e.g. the need to bring in social wage rate objectives in relation to poverty and unemployment consideration can be brought to bear on the benefits of water allocation inter-regionally once such exercises are done. A few examples of such planning exist already but they need to be applied on a more extensive scale. It may be noted that a land and water management plan in India will be labour intensive in the sense that land development investments have high labour requirements and finally the employment intensity of agriculture will rise with improved water use and control of wastage of water. The ICAR has a long tradition of work on water management. This work has now to be integrated with the new

technological possibilities of improved planning possibilities for conveyance and use of surface water and its integration with ground water also increased possibilities of cropping intensity which has to be an objective of agricultural research.

Table -2

Cropping Intensity, Irrigation Intensity and Foodgrains Production at the State Level growth. (in percent per annum) 1974/75 to 85/86

S.No.	State	Area	Output	Yield	GC.A.	G.I.A
(0)	(1)	(2)	(3)	(4)	(5)	(6)
1	Andhra Pradesh	-1.40	2.23	3.68	-0.86	0.96
2	Assam	1.22	2.55	1.32	1.53	--
3	Bihar	-0.96	1.17	2.15	-0.94	1.64
4	Gujarat	0.57	2.75	2.16	0.98	6.11
5	Haryana	0.12	5.60	5.47	1.07	3.72
6	Himachal Pradesh	0.45	-0.32	-0.76	0.58	0.72
7	Jammu & Kashmir	0.76	2.41	1.64	1.12	1.41
8	Karnataka	0.35	0.01	-0.34	0.30	2.30
9	Kerala	-2.13	-0.77	1.39	-0.54	-3.97
10	Madhya Pradesh	0.56	3.58	2.90	0.58	5.41
11	Maharashtra	0.19	0.79	0.60	0.59	4.05
12	Orissa	0.77	3.19	2.40	2.88	5.42
13	Punjab	2.54	6.92	4.27	1.71	3.06
14	Rajasthan	0.57	2.07	2.39	1.20	3.82
15	Tamil Nadu	-0.79	0.59	1.39	-0.99	-0.87
16	Uttar Pradesh	0.91	5.49	4.54	0.99	3.67
17	West Bengal	-1.27	0.27	1.55	0.24	2.19
18	All India	0.25	3.09	2.83	0.62	2.90

Apart from the miracle varieties in cereals even a seed like Shankar 6 appreciably reduced the duration of extra superior long cotton. But this has not happened in jute or in upland and deep water paddy crops.

Another feature of the emerging Indian economy requiring attention is the whole question of the susceptibility of land and the relationship between water land and population pressure. An earlier Planning Commission study had shown that the elasticity of labour demand per rupee of output with regard to land productivity was around-1 .This, of course. does not mean that the elasticity of employment to output would be negative, for with output growth and land augmentation. labour demand would increase. But technical change in the agricultural sector generally tends to reduce the demand for labour per unit of output. However a property of the new technology is its neutrality across size scale of farms and its land augmentation capability. The photo-insensitivity properties of the miracle seeds, for example, leads to shorter duration crops which in turn permit higher cropping intensity The heart of the matter, therefore, is to use water as a scarce resource and to spread its use both through time and space in a manner such that the carrying capacity of land is

augmented in relation to the requirements of human need. This is perhaps one of the major ways with which the country can face the demographic pressure expected on its land reserves during the last decade and a half of this Century.

Recent studies show that the pattern of agricultural growth is now more diversified than earlier. Districts in Eastern U.P. and parts of the Deccan, which showed low or negative growth in the past, are now showing development. In the period 1963/64 to 1971-72, 71 Districts accounting for 26.78 per cent of area recorded negative growth .These Districts fell to less than 40 in the period 1963/64 to 1977/78. This, of course. was a dramatic improvement. Correspondingly, the number of districts showing growth rates between 1.5 to 4.5 per cent increased from 106 to 162. accounting for 54.24 per cent of the area, as compared to only 33.47 per cent earlier. Districts falling in this modal growth class now account for more than half (51.95 per cent) of aggregate agricultural output as compared to around a third (33.47 per cent) earlier. The equally interesting aspect of this growth was that it was taking place in regions which were earlier thought of as particularly disadvantaged. These trends should give us confidence for planning for a more diversified agricultural growth pattern.

Regionalisation of Indian Agricultural Planning

The emphasis on a more evenly spread agricultural development strategy and the compulsions behind operationalising it have led to the search for appropriate regionalisation of Indian agricultural plans. For agricultural regionalisation, the important thing is to concentrate on agro-climatic features, particularly soil type, climate including temperature and rainfall and its variation and water resources. The cropping pattern regime would to a large extent be determined by such features. The temptation to use broader principles of regionalisation needs to be resisted since past experience suggests that for sectorial regionalisation questions, the better approach is to concentrate on specific features related with agricultural development.

A useful approach would be to start with an attempt at coordinating the available agronomic studies, agricultural data and to bring together the concerned disciplines at one place so that an attempt can be made to initiate the process of planning with available resources and to strengthen the process, in the light of experience as it is accumulated. A number of attempts have been made to regionalise the Indian economy. The *National Commission on Agriculture,* in its Volume on Climate and Agriculture (Part IV) has built up cropping patterns at a highly disaggregated level of talukas. These studies are much too detailed a level to initiate planning exercises at the national level. Dr A. Mitra, in his outstanding work on *Levels of Regional Development in India,* had divided the country into 7 natural regions, 31 sub-regions and 89 Divisions, as follows;

India	Regions	Sub-regions	Divisions
	7	31	89
1. Himalayas	1	3	9
2. Northern Plains	1	6	20
3. Central Hills and Plateaus	1	8	27
4. The Deccan	1	4	15
5. The West Coast Plains	1	5	11
6. The East Coast Plains	1	3	5
7. Islands	1	2	2

Seven regions are somewhat aggregative and 31 sub-regions much too highly disaggregative for initiating planning exercises for the agricultural and related sectors at the national level. For example. at the level of 7 regions, the Northern Plains are one region and it is quite obvious that a line drawn in U.P would separate the wheat-growing from the paddy-growing region and these have very different characteristics.

Planning Commission in 1964 had developed the concept of Resource Development Regions and Divisions of India. In November 1978 a very well known monograph was 1. prepared by Dr. Miss P. Sengupta and Dr. Mrs. Galina Sadasyuk and published by the Registrar General of the Census. The Planning Commission study had assembled data on physical conditions, topography soils, geological formation, rainfall, cropping pattern and development of irrigation and mineral resources for each district of the country. On the basis of this data. the country was divided into 14 Resource Development Regions and the Islands economies were listed as the 15th Region. The Sengupta-Sadasyuk study had a separate Chapter on Agricultural Regions and land Use Efficiency (Chapter6). Regions with homogenous climatic conditions were classified as macro regions. Agricultural regions in meso form were the physical divisions of natural regions and those in micro form were crop combination regions. The country was divided into 4 macro agricultural regions, 11meso regions and 60 micro regions.

The 11 meso regions of Sengupta-Sadasyuk study and the 15 Resource Development Regions of the Planning Commission study are the logical alternative choices for initiating agricultural planning studies. The alternative regions are as follows:

Sengupta-Sadasyuk Agricultural Meso Regions	Planning Commission Resource Development Regions
1. Western Himalayas	1. Western Himalayan Region
2. Eastern Himalayas	2. Eastern Himalayan Region
3. Dry North-Western Plain Aravalli Hills, Saurashtra and Kutch Peninsula	3. Lower Gangetic Plain Region
4. Dry Peninsular Plateau Region	4. Middle Gangetic Plain
5. The Upper & Middle Ganga Plain	5. Upper Gangetic Plain Region
6. Sub-humid Peninsular Plateau	6. Trans-Gangetic Plain Region
7. Sub-humid Coastal Region	7. Eastern Plateaus and Hills Region
8. Eastern Plain	8. Central Plateau and Hills Region
9. Peninsular Plateau	9. Western Plateau and Hills Region
10. The Eastern Hills and Plateau	10. Southern Plateau and Hills
1. Western-Coast Region	11. East Coast Plains and Hills Region
	12. West Coast Plain and Ghats Region
	13. Gujarat Plain and Hills Region
	14. Western Dry Region
	15. Island Region

A number of Regions in the two classifications are common. The Planning Commission Resource Development Regions classification seems useful to initiate the planning exercises being discussed. Each regional planning exercise could, if considered necessary consider sub-regions for detailed work.

Diversification and Employment

It is, of course, true that wide based agricultural development is a major instrument of diffused employment and income growth and yet it is important to realise that possibly the labour content of agricultural output may to an extent *fall* with the spread of the new technology and diffusion of technical progress in agriculture. Diversification of the agricultural arid rural economics will, therefore, need priority. An emphasis on regionalisation of agricultural planning techniques can provide a focal point for such diversification.

Agricultural plans can be prepared for each one of the fifteen regions and if necessary sub-regions within them, which will not only include cereal and non-cereal crops but also non-crop based sectors including animal husbandry, forestry, fisheries and agro-based industries. The plans thus prepared can carefully assess the resource developmental potential of each region, environmental aspect of development, employment and income generating potential of the sector and the possibilities of the application of latest technologies and the developmental technologies for future growth. The present system of excessive emphasis on centrally sponsored schemes and programmes for every region of the country can be replaced by projects/schemes more suited to the needs of each region.

In the current drought year many of the problems discussed earlier gain greater urgency. The highest priority has naturally to be given to the logistics of arranging food grains, water, fodder and employment in the areas of crop failure and water scarcity. However. this is also a year to emphasise expenditure on schemes of water development particularly those which conserve water or improve its conveyance and use-eficiency. Also soil and land development works have to be given high priority These are all labour intensive works and would simultaneously help in the employment generation objective of the drought fighting programme. Programmes like improvement of irrigation distribution systems, minor irrigation, watershed development, drainage and soil conservation and rural infrastructure in general are examples.

Watershed Development

Development of ground water and watershed development are very important priorities for the national economy. Watershed development in particular is a concept on which emphasis has been recent. A number of experiments are presently under way. There are the Centrally Sonsored Schemes. In a few States, externally aided watershed projects are in operation including World Bank, EEC financed and bilaterally financed projects. ICAR is also emphasising agricultural development on selected watersheds. Finally some very exciting work is being done by NGOs like the Society for the Prevention of Wasteland Development and other groups. An interesting feature of the work of some of the voluntary groups is that the cost estimates of features like contour bunding, check dams, land levelling and digging of percolation tanks and soil conservation work is lower than that in official projects. Also voluntary agencies have interesting proposals of integrating rural development schemes like NREP, RLEGP and IRDP with watershed development schemes.

Finally groups like the SPWD and the rani Panchayat of Shri Vilas Rao Salunkhe lay considerable emphasis on contributing from the farmers and beneficiaries and this is of very high importance. Detai!ed studies are now showing the importance of the involvement of diferent institutional groups, the farming communities, landless labourers and government agencies, *for* any serious attack on land use planning problems. We should now quickly take stock of the existing experiments under way and design the more ambitious schemes we have in mind *for* the Seventh arid Eighth Plans.

An aspect of Indian agriculture which needs to be more carefully studied is the fact that some dry land agriculture regions are showing relatively high value added per worker. Thus after Punjab and Haryana, States like Gujarat and Karnataka which have very low irrigation intensities are showing relatively high value added per worker. These regions have benefited *from* concentrating on "high valued' crops. Behind these "trends" however is probably organisational and institutional systems which have led to successful commercialisation of agriculture, including relatively successful cooperative rnarketing systems. Improved price support operations *for* commercial crops and strengthened marketing systems are important aspects of the strategy of reducing the uncertainty of dryland agriculture and internalising the benefits of the available technologies. These policies will have to be an important part of the overall strategy as Indian agriculture moves over to a more regionally diversified from its earlier "favoured crop-region" pattern.

The new agro-processing technologies also have many land saving properties. With proper control more value added can be extracted from the same land based raw material or energy input. Also since improve agro-processing technologies involve recycling, they have fewer adverse environmental consequences. A large scale fully instrumented sugar factory can reduce conversion costs of sugar by over 40 per cent over a traditional plant. New paper plants are not polluting.

The institutional setting of Indian agriculture has to be thought of not only in terms of improved delivery of land augmenting resources like water/seed and fertilisers, particularly to small farms. improved agro-processing and marketing techniques, but also of land reform. Redistribution of land to those who till it and security of tenure are important preconditions to improving the productivity of land and employment in agriculture. The Prime Minister's recent letter to the Chief Ministers in this connection will have to be hastened up in terms of action plans.

The Thrust Agricultural Plan: 1988/90

At the meeting of the Planning Commission held on January 13, 1988, the Prime Minister had desired that in view of the findings of the mid-term review of the Seventh Plan by the Planning Commission, an operational plan should be designed at the agro-climatic regional level and that this Plan should be specific and be based on concrete action points. Technology should be a part of this plan and detailed monitoring must be provided for as an aid to the management of the Plan.

Some preliminary exercises have been done at Delhi to identify at the district level the specific sources of growth of each one of the important food grain sectors. The existing levels of productivity and performance in the past have been looked at, as also performance in areas like the utilisation of irrigation potential, cropping intensity and fertilizer application per hectare.

This exercise was genuinely multi-disciplinary involving the experience and the skills of agricultural scientists, irrigation engineers and agricultural and water management planners and policy makers. Specific irrigation projects have been identified and the districts delineated in which with concrete action during the next two years water can be delivered to the field. Also, irrigation commands have been identified in which with the completion of field channels and improvement of regulation systems, impounded waters can be delivered to the field in a more reliable and efficient manner. This in turn would mean that available water could be utilised over a larger area. It is of very high importance that these exercises are supplemented with a Water Operation Plan. For each command, in which either the ongoing irrigation project is being completed or more action is taken on improvement of distribution systems. A detailed water operation plan must be delineated, which indicates for each crop season the amount of water which will be available assured water supply should be made available in a normal year and the additional waterings may also be available in a good year in the hydrological cycle. Responsibilities must be fixed for execution of works and the implementation of the water plan. In a number of States in the delta regions of the country a more extended programme of shallow tube well irrigation for small farmes could give immediate results. Also in some of the irrigation commands in the eastern regions facing important problems of drainage, such a tube well programme will decongest the land and improve its productivity. A shallow tube well programme with focus on small farmers needs priority.

The ICAR have made preliminary assessment of the constraints and crop management strategies which need to be looked at for each cropping each district of an agroclimatic region. In many specific districts context, it is the opinion of experts that improved pesticide management strategies and of nutrient application at the proper time and in the proper combinations will have an important contribution to make. Agricultural Universities have an important role to play: Realistic attempts have also to be made to unclog the cooperative credit mechanism so that after the years of drought, the Indian farmer gets the working capital to move over to a high level of productivity.

The planning exercises done at Delhi were a first attempt at putting together the available information and posting in concrete terms the methodology of putting together land, water resources and agricultural technology at the District level and to targeting for specific outcomes i.e. tonnes of gram, number of waterings and so on. The State were expected to give the national policy makers and planners, alternatives in a reasoned and quantitative dimension. The Central agencies would help the States in the final plan chosen in operational terms. For example, the Central Water Commission (CWC) could help in the design of an operational plan for

water in a project, or engage, if necessary consultants for this purpose. The Central Ground Water Board (CGWB) would help in delineating ground water aquifers for immediate exploitation and the ICAR and the Universities help with optimal practices back up on the seed strategy.

Achieving agricultural outcomes is not just a question of financial resources. To give an example, only available internal resources have been used in the exercises that have been conducted in Delhi and the results sent to the States. The final outcome consists of a plan admittedly tentative which, if it had been given to an outside consulting agency would have probably cost lakhs of rupees to build up. Financial resources alone will not meet the objectives of improved agricultural output since the States and the Agricultural Universities are rich with experience and with dedicated officials in the agricultural research, agricultural development and Irrigation Departments. But if, for the mobilisation of these facilities, some additional resources are required, it should be possible for us to provide such resources. With the goodwill and the support that the agricultural sector has been able to muster, such resources must come either through financial institutions or through the State and the Central budgets.

You may like to notice that these exercises are at the level of agro-climatic regions. They provide a first cut of more detailed exercises of planning for agro-climatic regions which will have to be undertaken for the Eighth Plan discussed earlier. A number of plans already approved in the State Plan have a district/regional focus. These include the Special Rice Production Programme, the National Oilseeds Development Programme, the National Watershed Development Project, projects for soil conservation in catchment areas, command area development projects and, of course, the large programmes of the State Governments. Every effort will have to be made to integrate these projects with the Action Plan for agriculture and to optimize results. I only wanted to take this opportunity to give you a feel of the many exciting vistas opening for agricultural planning and to assure you of the challenging prospects. I wish you all the best in the future in our common endeavours.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
22nd ANNUAL CONVOCATION

3rd February 1989

Address by
Dr. N.S. Randhawa

Rajendranagar, Hyderabad – 500 030

Madam Chancellor, Vice-Chancellor, Members of the Board of Management, Members of the Faculties, Distinguished Guests, Students and Friends.

May I at the outset express my gratitude to Her Excellency Madam Chancellor, distinguished Vice-Chancellor and Members of the Board of Management for giving me an opportunity to address the Twenty second Annual Convocation of the Andhra Pradesh Agricultural University, one of the premier institutions in the country.

With this convocation, this esteemed institution is adding another batch of well-trained agricultural technologists to the national pool of scientific manpower. I congratulate the young scholars on receiving their degrees in this convocation. You are indeed fortunate to be the alumni of this distinguished institution and you can justly feel proud of your academic achievement, which is culmination of your sincere and sustained efforts for prolonged periods in the pursuit of science. Your efforts and achievements deserve our appreciation. As members of the agricultural scientific community you will have to work very hard to improve agricultural growth particularly when the share of agriculture to the national income has been gradually declining during the last 4 decades. At this juncture it would be worth remembering that in enabling you to earn your degree, the nation has made substantial investment on you. This investment has been made with the belief that the country and the state of Andhra Pradesh would get higher dividend than what it could by investing these funds in some other fields of development. You, therefore, owe it to the state and the country and its people to optimize this investment through a high degree of relevance and quality of your contributions to the advancement of agriculture and betterment of the rural people.

I am aware that the Andhra Pradesh Agricultural University belongs to one of the earliest group of half a dozen agricultural universities established in 1964 by incorporating the then existing 3 Agricultural Colleges, 2 Veterinary Colleges and a Home Science College. These institutions have a distinguished history of producing some of the best agricultural scientists in the country. Immediately after its establishment, the State government of Andhra Pradesh entrusted the state wide responsibility of agricultural research, education and extension education to the university by transferring 41 research stations. Subsequently the university has established 18 more regional research stations taking into consideration the needs of the various agro-climatic zones of tne state. I compliment the university and the State Government in providing infra-structural facilities for multi-disciplinary research on identified problems in each of the agro-ecological zones.

Currently, the university offers academic programmes in 6 disciplines, viz. agriculture, veterinary and animal sciences, agricultural engineering, home science, horticulture and dairy technology, with an intake capacity of 750 undergraduates and 400 post-graduate students. I understand that the State Government has taken a decision to start three more agricultural colleges taking into consideration the manpower requirements in various regions. Generally the Council does not favour the proliferations of academic institutions, which at times are established without adequate survey and appraisal. I hope that such a decision has been taken after

careful consideration of the manpower needs and sufficient funds have been committed to ensure the quality.

I am very happy to learn that since mid sixties the university had developed and released 33 varieties of rice, 10 varieties of pulses, 23 varieties of millets, 3 varieties each of groundnut and sesamum, 2 varieties of sunflower 10 varieties of sugarcane, 6 varieties of chillies and several improved varieties of horticultural crops. The university's research efforts have also succeeded in stabilising the agricultural production and also increasing the productivity of rice, sorghum, maize, chillies and cotton. The total food grain production which was 56.22 lakh tonnes during 1965-66 reached a record level of 18.82 lakh tonnes in 1984- 85. Thus your state registered a growth rate of 3.16 per cent against the all India growth of 2.7 per cent and is one among the 5 states of the country which had shown positive growth in production compared to its population growth (2.06).

I am aware that behind this success story there were sustained efforts of a large number of scientists, able leadership provided by successive Vice-Chancellors, supported by the political will and liberal assistance given by the State Government of Andhra Pradesh and excellent support rendered by its farming community Occasions like this remind us to pay our gratitude to all those who have contributed to this success.

Linkages with National and International Institutes :

Andhra Pradesh is very fortunate that in addition to its own strong agricultural research and education network, it has an access to several national and international institutes which are located in this state. ICRISAT is working on five rainfed crops, namely groundnut, pigeonpea, gram, sorghum and pearl millet. The Institute has done outstanding work in developing varieties of these crops with inbuilt resistance to abiotic and biotic stresses unique to semi-arid tropics of the world. These technologies have great relevance to our needs in Andhra Pradesh. I am happy to learn that the state is taking an advantage of these researches for the benefit of its farmers. Similarly among the National Agricultural Research System, the state of Andhra Pradesh holds a major share with 3 central institutes, viz. National Academy of Agricultural Research Management, Hyderabad; Central Tobacco Research Institute, Rajahmundry; and Central Research Institute for Dryland Agriculture, Hyderabad; 3 Project Directorates viz. Rice Project directorate, Hyderabad; Oilseeds Project Directorate, Hyderabad and Poultry Project Directorate, Hyderabad, 2 National Research Centres on Sorghum and Allied Fibre Crops, 14 Regional Research Stations of different ICAR Institutes and about 60 units of All India Coordinated Research Projects at the various research stations of the Andhra Pradesh Agricultural University. The University has maintained very cordial working relations with both national and international institutions. Being associated with these institutes, I convey their grateful feelings for all the assistance provided by the university and the Andhra Pradesh Government in fulfilling the research mandates of each of these projects.

Although these institutes have international and national research obligations, it is important that the university cashes on their presence in the state. The resources for Science and Technology support to agriculture are both scarce and highly competitive. The University may explore the possibility of savings which can accrue from the presence of these institutes in Andhra Pradesh and can invest these on some other critical areas.

Agricultural Scenario

The country has received international appreciation for its achievements in the agricultural sector, from a net importer of food grains till mid-sixties, we *were* able to build a comfortable food grain stock in eighties ranging from 13.67 million tonnes on 1.7.81 to 28.23 million tonnes on 1.7.86. During the favorable rainfall year of 1983-84, the country achieved a peak production of 152.37 million tonnes of food grains. Since then we have not been fortunate and have been facing aberrant weather conditions in the following four years when the food grain production decreased to 145.54, 150.44, 144.07 and 138.50 million tonnes during 1984-85, 1985-86, 1986-87 and 1987-88 respectively In spite of the worst drought faced by the country during 1987-88, we had a comfortable buffer stock which enabled us to face this calamity with only marginal imports of food grains during the year 1988. The country is again fortunate to receive well-distributed and above-normal rainfall during the year 1988-89. In spite of localized severe flood damage in some states and failure of North-East monsoon in Tamil Nadu, we hope to achieve the target set for production of 166 million tonnes of food grains and may even surpass it by a few million tonnes.

Occasions like this provide us an opportunity to analyse our past achievements and appraise our preparedness to face the future challenges. The analysis brings out the following strengths and weakness in our capability to ensure food and nutritional security for our feature populations:

(1) Inter-regional and inter-commodity disparities continue to stare on our faces.

(2) During the last two decades, the shortfall in food grain production has been averaging around 10 million tonnes in the years of moderate drought and varying from 14 to 22 million tonnes in the years of severe drought when compared with an earlier favorable rainfall year. We have to work very hard to narrow down these fluctuations. There is some consolation that with gradual increase in the gross irrigated area from 28 m ha during 1960-61 to 68 m .ha during 1987-88, we have been gradually improving the resilience of our agriculture and the peaks and troughs representing agricultural production have not only been moving up but also the shortfall has been decreasing.

(3) The country has the largest water resources in the world. We have yet to develop an integrated approach in their use and optimise their efficiency. The productivity of irrigated crops continues to be very low with a national average of around 1.8 to 2.0 t/ha.

(4) The contribution of agriculture to the national income has fallen from about 59% during 1950-51 to around 32% during 1986-87 with only a marginal decrease in rural population from 82% to 74%.

(5) Most of the gains have come from areas of favourable environments with assured irrigation under highly intensive agriculture and over mining excessive withdrawal of ground water is a threat to the stability of agriculture in these regions.

(6) With an increase in the biotic populations (human and animal) our agriculture has been moving to areas with very severe limitations of site and environment, thereby threatening their ecological security. This demands a careful appraisal of land- use systems.

(7) According to the Seventh Plan document, with improved income and a higher consumption expenditure, the food requirements are projected at 215 kg/caput/ annum for the year 1999-2000AD. Therefore keeping in view the food requirements of a projected population of 1 billion during 1.999-2000AD, post-harvest handling and storage losses, requirements of seed and animal feed fulfillment of export commitments, the total food grain production will have to be scaled up to 250-270 m. tonnes instead of the often quoted figures of 225-245 m. tonnes. Therefore, the challenges are going to be more demanding than in the past.

After an overview of the national scene, it is appropriate to have a broad view of the regional and the state scenario. In the four southern states, the area under food grain production is around 20.8 m. ha out of which 7.6 m. ha is under irrigated and 13.2 m. ha is under rainfed food grain crops. The food grain production in the quinquennium ending 1975. 1980& 1985 averaged around 21.93, 24.47 and 24.97 million tonnes respectively The food grain production in the latest four years, 1985-86, 1986-87, 1987-88 and 1988-89, is expected around 25.41 m. tonnes.

With an average food grain availability of around 178 kg grain/caput/annum and an estimated population of around 17.9 crores during 1988, the region fails to meet the requirements of food security for its population. It leaves a deficit of around 7 million tonnes of food grains. Looking at the natural endowments of the region, the ultimate irrigation potential, the potential created and utilised till 1985-86 are estimated at 9.2, 6.1 and 5.54 million ha. respectively. The region has the potential of producing 35 million tonnes food grains even if it realizes 50% of the genetic potential of the currently available crop varieties with a goal of 2.5 and 1.25 tonnes per hectare from irrigated and rainfed crops respectively

After achieving inspiring gains in the first 15 years of the Green Revolution, we seem to be reaching a hump which is a source of concern to all of us. It is indeed heartening to know that this University not only shares this concern but also has been preparing itself by discussing the issues through organization of national and international seminars I have not doubt that we will be able to evolve strategies for not only realizing a larger share of the potential from currently available improved

varieties and associated technologies but will also be able to break the ceiling on yield by using newly emerging tools of genetic engineering and biotechnologies.

Planning Based on Agro-Climatic Zones

Our Prime Minister has been drawing our attention to the requirements which the agriculture in the coming decades should fulfill. Sustainable agriculture needs to cash on the climatic advantages, be in harmony with its environment, be economically competitive, and should ensure social justice and. Equity. This can be best achieved if we utilize the information generated in delineation of agro-climatic zones and the research infrastructure developed/ strengthened under the National Agricultural Research Project. The state of Andhra Pradesh has been divided into seven agro-ecological zones.

I am happy to know that the University has made significant advances in the establishment of Zonal Research Stations and sub-stations in each of the seven zones to take up location-specific and need-based researches. It has also prepared a model status report for the Krishna - Godavari Zone delineating different agro-ecological situations within the zone. This status report is being used by other universities for the preparation of status report for zones under their jurisdiction. For efficient dissemination of research technologies, the University has established linkages between research and extension agencies and constituted Zonal Research and Advisory Committees in each zone. The feedback from the extension officers has brought considerable relevance to the research programmes. In the second phase of NARP the emphasis is on better management of resources basic to agriculture and its diversification. It is hoped that with further strengthening of the agro- ecological zonal committees and the continued support to these by the State Government, we will be able to develop our agriculture best suited to each of these eco-situations.

Soil Resource Inventories

Soil resource inventory is a basic pre-requisite for evolving a sound land-use plan and delineating efficient agro-climatic cum cropping zones. The ICAR. through its National Bureau for Soil Survey and Land-Use Planning, in collaboration with various state soil survey agencies has undertaken this task on a mission mode. It is expected that by 1990, soil resource maps of different states in 1 : 2.50,000 scale will be made available. which will be a of great use in land use planning and the extension of generated technology to similar soil units. The scientific manpower in this area is far from adequate. The Agricultural University may strengthen this area of soil science in its faculty and can establish a remote sensing cell for application in agriculture. I learn the State Government has not so far established a soil survey unit in the Department of Agriculture. For better land-use planning, it is appropriate to initiate action in this direction. The Zonal Centre of AIIILU &SS unit of the Department of Agriculture, Govt. of India located at Hyderabad can help in the planning and establishment of this unit.

Rainfed Agriculture

The gross irrigated area in Andhra Pradesh is about 43% of the gross cultivated area in the state and food grains occupy about 60% of the total cropped area. This underlines the importance of scientific methods of rainfed agriculture not only for increasing agricultural production but also to ensure stability in production against the vicissitudes of weather conditions.

ICRISAT, CR IDA and the ICAR centre located at the Agricultural Research Station, Anantapur, have developed improved dry farming technology for vertisols (Black soils) and red soils (Alfisols) which occupy 25% and 66% respectively of the land area. These techniques are being demonstrated on an operational scale in farmers' fields as model watersheds at Chevella, Maheshwaram and Yerracheruvu in collaboration with the related development departments. which clearly indicate that by adoption of the improved technologies it is possible to easily double the production from drylands. The Agricultural Research Stations representing different agro-ecologial regions of the stage may take the lead in refining the general soil and water conservation and agronomic technology recommendations Into specific packages suited to the local soil and weather conditions. Much attention needs to be given in the areas of cost-effective methods of water harvesting and reuse, soil-water balance models and crop growth prediction models, vegetative 'bund' as a component of soil conservation measures, energy-efficient improved implements and alternate land use systems for the arid and semi-arid areas of the state so as to enhance the production of food, fodder and fuel wood and thereby the income and employment generation potential from these lands. I am glad to know that the APAU and CRIDA are concentrating their research efforts in these directions.

Another crucial area for ensuring stability on production from dry lands is adequate medium range weather forecasting to guide cropping and agricultural operations. To augment our capability in this area, the Govt. of India have sanctioned a mission mode project on medium-range weather forecasting. Each of the seven zonal research stations of APAU will be strengthened with meteorological instruments and hooked into this network for data collection, interpretation and forecast. DST is the nodal department for coordination of this network and will be working in close collaboration with ICAR and SAU research network.

The coastal districts in the state are prone to the vagaries of cyclone and tidal waves. Research efforts may be bestowed to generate appropriate cultivars and cropping systems for the localised situations which can evade or affected to the least by such hazards. We can hardly forget the devastating elects of the cyclone of 1979. It may be appropriate to intimate studies on disaster management which will permit us to develop strategies and contingency plans which could be readily available to meet such exigencies.

Irrigated Agriculture

It is heartening to note that the availability of miracle seeds triggered of the Green Revolution. However, sustenance to this revolution was provided through the expansion of irrigation. With availability of water, the farming community developed confidence of realizing the productivity potential of miracle seed and made investment for procurement of other production inputs. Some problems, such as, low irrigation efficiency, a wide gap in created and utilized irrigation potential, rising water table, development of salinity lack of equity in water utilisation and declining trend in crop productivity have to be tackled for sustainability of irrigated agriculture. These problems have largely resulted from lack of complementarity in utilization of the component of water resources, namely surface, ground and rain waters in a command area. An immediate need is to develop system management for composite use of these composite resources. The State Agricultural University and WALAMTARI, which presently work in isolation, have to work in unison to develop human and technological resources to achieve it.

Integrated Nutrient Management

Nutrient use in the State of Andhra Pradesh is 79.2 kg/ha ranging from the highest of 230 k/ha in West Godavari, 171 kg/ha in Nellore and 159 kg/ha in Krishna District to the lowest of 30-32 k/ha in Ranga Reddy, Kurnool and Nalgonda. For enhancement of agricultural production, nutrient use has to increase. Chemical fertilizers, which are fossil-based and scarce, are highly costly input. Majority of the farming community consists of small and marginal farmers; many among them do not have access to capital or credit to make the necessary purchase of fertilizers. Bio fertilizers can provide a cheap source of supplying nutrients to the soil. They are cost-effective supplements to chemical fertilizers and are of critical importance for stepping up crop productivity.

With agricultural intensification, the problem of depleting soil fertility is coming up. Nutrient indexing representing different levels of management in the even agro-ecological zones of the state is imperative for devising integrated nutrient management strategy involving organics and in organics. Nutrient management in dryland merits major attention for the reasons that they constitute a larger sector of agricultural system in the state, are major producers of oilseeds and pulse crops, and the crop productivity is low. The development of appropriate physical and personnel infrastructure to deal with these imperatives is a necessity

Integrated Pest Management

In the last few years, Andhra Pradesh has faced resurgence of white fly two times and at least once in the case of Heliothis. Though a number of reasons have been attributed for this problem, by far the most important is the excessive and indiscriminate use of insecticides by the cotton farmers. Out of the estimated Rs.600 crores of pesticides used in the whole country, pesticides worth Rs.37 crores are used in Prakasham, Guntur and Krishna districts alone, mostly on cotton. Research has shown that there are a number of key mortality factors that can keep these pests

in check. However farmers take no risk and apply heavy doses of insecticides on a normally fixed spray schedule.

The development and adoption of reliable IPM strategies for control of these two pests is of paramount importance. Pesticide usage should only be need-based with strict adherence to the economic injury level for the crop. For erective timing of control measures, IPM systems require accurate prediction of population build-up and outbreaks. Research needs to be focused on development of forecasting or prediction models and also for providing means for implementing the forecasting programmes. Surveillance activity must be strengthened by developing relevant monitoring and forecasting procedures. In addition, keeping in view the environmental needs of our times, we must intensify our research for conservation and augmentation of natural enemies of pests and on finding novel approaches to pest control, such as use of pheromones, insect growth regulators and microbial control agents. APAU being alive to these issues has strengthened its research programmes in this critical area.

Livestock Production

In the recent past there is an increasing emphasis on diversification of agriculture both in the rainfed and irrigated areas where horticulture and anima! husbandry provide excellent alternatives. The rainfed areas with acute limitation of site and environment are better suited for crop cover in the form of silvi-pasture land use system. This vegetation can be judiciously utilised for livestock rearing.

Andhra Pradesh possesses excellent breeds of livestock such as Ongole. a draft cattle breed, and Nellore and Deccani breed of sheep. In the coastal Andhra Pradesh upgradation of local buffaloes with Murrah has led to the development of a high producing breed called Godawari. The Ongole Cattle and Godawari Buffalo Breeders Associations have been very active in improvement of these breeds. Livestock and poultry contributes 700 crores per annum to the income of the State. Andhra Pradesh occupies the first place in the country in egg production and second place in broiler production. The achievements in the poultry husbandry sector are most inspiring.

The state has great potential for increasing milk production, specially in the coastal areas, with high-intensity of irrigated agriculture based on high producing buffaloes and crossbred cattle. Andhra Pradesh was one of the earliest states to take up cross-breeding in cattle on an extensive scale. There is also great scope for increasing meat production from broiler poultry and sheep and goat. Andhra Pradesh has also taken up commercial breeding of rabbits for meat production.

The state has a long coast line of 974 kms. and a large continental shelf with large , potential for marine fisheries and coastal brackish-water aquaculture.To meet the balanced food needs of the human population of the State, there will have to be much larger growth in milk, eggs, mat and fish production. It will have to be 9.4% in case of milk and 4.7% in case of fish. There are new bio-technologies now available

which ought to be utilised for genetic improvement of cattle and buffaloes and protecting them from disease problems.

Engineering Inputs in Agricultural Production

As one of the agriculturally leading states, engineering inputs to agriculture are necessary to achieve further increases in agricultural production and for keeping agriculture economically viable. In hot and humid coastal Andhra Pradesh, rice-based farming is must predominant. There are numerous manual, animal and power-operated equipment for seedbed preparation, transplanting spraying and dusting, weeding, harvesting, threshing etc. Improved bullock- drawn puddle~ harrow-cum-puddlers. and roto tilling save tirrler energy, cost and also give higher yield than puddling with country plough. Manual power tiller and self-propelled rice transplanters have reached the commercialisation state. Improved serrated sickles are now in manufacture and are being used in large numbers. Tractor and power tiller. front mounted vertical conveyor reaper windrowers, commercialised in 1982-83, have made mark in certain areas and their manufacture and use is spreading. International Rice Research Institute type axial flow paddy threshers and multi crop threshers have been commercialised. I am sure many among these have great relevance and utility to Andhra Pradesh farmers.

Semi-arid Telangana and Rayalaseema areas practise essentially dry farming where timeliness in farm operations specially seed-bed preparation, precision in metering and placement of seed and other inputs are vital. Agricultural mechanisation is an essential component for a successful dry farming strategy. Moisture conservation demands deep tillage at least once in 2-3 years which is not possible with average pair of bullocks. Seedbed preparation when the soil moisture is optimal saves lot of time and energy Being rain-dependent, the 6ptimal soil conditions persist for only short periods. It is only with larger farm power sources and matching implements that one can finish the job in time. Farm power and implement constraints need to be removed. There are manual bullock- drawn and power-operated seed-cum-fertilizer drills that need to be adopted and popularised in the state. Mechanical weeding using wheel-hoes and cultivators in line-sown crops is not only economical but the resultant mulch also conserve moisture. There are seeders and planters available for sorghum, groundnut, castor pigeonpea etc. that need to be adopted.

All farm equipment need not be owned by each and every farmer Rather it would be desirable to evolve farm machinery management models that take advantage of higher mechanical efficiency of larger size machines and more commercial use through custom servicing. It is found that educated rural landless youth can be excellent custom service entrepreneurs. Do we consider them eligible for bank loans? Every introduction of a new equipment should be accompanied with after-sales service, spares, repair and maintenance facilities, in the absence of which it would be a misadventure. I hope the university and the state government are alive to these issues.

High production and productivity do not necessarily mean more income to the farmers specially in the absence of appropriate postharvest technologies. Harvest and post-harvest losses continue to be high. Post-harvest technologies appropriate at rural threshold need to be developed that minimise qualitative and quantitative damages at the farm, trader and domestic level. Also there is a need to have processes and modernised equipment that can enable the farmers and rural entrepreneur to add value to their marketable sumluses and have primary processed products for rural houses and livestock at economic costs. Rural agro processing can create more olf-farm employment opportunities and can contribute to overall economic development. The concept of "Agricultural Refineries" that fractinate biomass for optimal use need to be operationalized.

Agricultural productivity is linked with direct and indirect energy inputs to agriculture. Rural agro-processing needs shaft power and process heat. In a village ecosystem cooking is the single largest energy -consuming operating causing ecological concerns for ever increasing demand of fuel wood. Thus we have compulsions of conserving commercial energies, supplementing and substituting with new and renewable sources of energy

Engineering inputs are also needed for development and optimal explicating of soil and water resources. To meet their challenges we need trained agricultural engineers. The State Agricultural University has a vital role to play in generating adequately trained manpower to address to these issues.

Agricultural Education

In the field of Agricultural Education, APAU has an established reputation in producting high quality graduates and post-graduates in all the major fields of agriculture and allied sciences. The graduates and post-graduates of this institution have fared well in different R&D sectors of agriculture in the national and international arena. This university has been introducing innovative educational programmes and reorienting curriculum according to the changing needs. I am happy to know that this was the first university to start the 10 point scale of evaluation as an improvement to the system followed by other institutions. As you are aware state agricultural universities system in India is based on the Land-grant Pattern. of America. Since the establishment of first state agricultural university at Pantnagar in 1960, it has been reorienting its infrastructure from time to time to meet the needs and available expertise in our country Originally it was envisaged as mono-campus institutions having a number of colleges and departments under a unified administration. Now most of the agricultural universities have established subsidiary campuses having separate educational programmes which necessitate the need for revising the model act keeping in view the problems that have been arising due to the complexity of institutions at distant locations in the same university. The Scientific Panel on Agricultural Education and its sub- committee referred to as Deans Committee have done an excellent job in over-viewing the educational programmes and ensuring uniformity of curriculum in various faculties of agriculture in all the state agricultural universities in the country I am happy to note that APAU has implemented the recommendations of the Deans Committee 1985.

You may be aware that the Government of India have decided to strengthen rural institutes to deal with the problems of rural development more effectively. Rural development is a complex problem in which agriculture constitutes a vital component and agricultural universities can play an important role.

These rural institutes are expected to offer teaching/training programmes in the area of rural management, rural health and welfare, agricultural technologies and rural engineering including agro-based industries. The emphasis will be on integrated rural development. While studying the impact of the establishment of agricultural universities the USAID had constituted teams of eminent international educationalists and scholars who have suggested to reorient the curriculum so that state agricultural universities can play an effective role in developing manpower who could take up assignments in the area of rural development.

It was very thoughtful of the Association of Agricultural Universities to identify a theme entitled "Agricultural Universities and Rural Development" for in depth discussion at their annual convention at Trivandrum in December 1988. The deliberations centered around conceptual aspects, current status and future involvement and potentialities of these programmes in the agricultural universities. The general consensus was that agricultural universities are not equipped to handle programmes relevant to all aspects of rural development. However, keeping in view the limitation of resources, the rural institutions if located in the campuses or in the close vicinity of the agricultural universities can draw upon the rich experiences of these institutions in training manpower and dissemination of technologies relevant to the rural scene. In the light of the above studies it may be desirable to reorient our teaching/training programmes to meet the requirements of rural development.

I have endeavoured to share some of my thoughts on very important and visible issues. I am sure there are many more which are engaging the attention of the enlightened faculty of this university.

Once again I offer my congratulations and very warm felicitations to all the new graduates. Their immediate problem will be of seeking employment consistent with their professional attainments. Currently around six thousand positions of professional scientists representing different disciplines of agriculture are lying vacant in various state agricultural universities and ICAR research institutes. Therefore, I see a wide market for professionals adequately trained indifferent disciplines of agriculture. Although it is enshrined in the Agricultural Research Service of the Government of India and is also provided in the state and bye-laws of several agricultural universities that every scientist in his career should spend some time in the remote and neglected areas including the rural areas of the country however, there continues to be an inbuilt urban bias in our personnel policies. The educated youth continues to prefer towns to the rural areas due to the lack of essential infrastructure and facilities for the equality of life that is desired. In spite of these impediments, I would urge the young graduates to take up the challenging jobs as agricultural technologists/ scientists to service the rural areas for improving the quality of life of rural masses. It may be appropriate to involve the students during

their academic careers in projects/ programmes which may eliminate the mental version to work in the countryside.

In the end I would again offer my sincere thanks to the Madam Chancellor the esteemed Vice-Chancellor and the distinguished members of the Board of Management of this University for providing me an opportunity to visit your beautiful campus.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
23rd ANNUAL CONVOCATION

19th February 1990

Address by
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Dear graduating students of the year, Honourable Chancellor, Mr. Vice-Chancellor, members of the Senate and Faculty distinguished guests, ladies and Gentlemen. It is a great pleasure and privilege for me to be here as the Chief Guest to address this convocation. I thank the organiser for this opportunity.

The convocation is indeed a unique event in the process of one's academic achievements. It is a time to review and reflect and it is time to think of the past performances and prepare for future programme especially for graduates today. I would like to congratulate all those who are graduating today and wish them a prosperous future.

Your community has made a significant contribution as agricultural scientists in ushering in the Green Revolution to feed millions and make us self-sufficient in a reasonable time frame. The main challenges before you all now is to create a similar revolution not only in areas like Punjab. but also in major states and districts allover the country This will indeed require new technology new outlook and new tools to bring benefits to all agro- climatic zones. I would like to use this opportunity to talk about the role of information technology in agricultural development.

We all recognise the fact that technology today is a highly complex business with a great deal of implications on social, political and economic activities. In general, Technology is seen as something urban elite, alien, modern, exotic, and to some extent fancy. Technology is hardly seen as a mechanism for problem solving. The tools that provide us with mastery to dominate nature and solve problems is normally known as technology which for a long time has shaped and reshaped, changes and re-changed the world we live in.

For millions of years man interacted with nature without any technology to exploit basic resources like water and forests. Agriculture came into wide-spread existence only some 10,000 years ago. As a part of agriculture. man started to abandon hunting, gathering, and wandering as his primary activity and focused on organising inputs for land, labour and water at one place -to create conditions and an environment for permanent settlements.

This created the need to organise information to increase interaction in a community. It must be emphasised that there were great civilizations with scientific traditions in the history but only in the 18th century did science become successful ill Europe. Transforming this world thus has created prosperity and progress all over the globe. All this has happened in a very short period of time. The same European technology has created miracle in Asia, Africa and elsewhere in eradicating Small Pox, improving Communicating, and making the green revolution possible. Many of these technologies had to be effectively applied in local conditions to be simple, user-friendly and cost-elective. In our country a great deal of talent exists in our developments in agriculture; self service and many vital areas of basic needs e.g., many of the western technologies in agriculture have been designed for the free hold and large farms while we in lower GN P Nations, need these to be packaged for small farmers and small holdings.

There is a great deal of challenge in this area for our own agricultural scientists.

Regarding Information, I must begin by saying that it is starting point for 'knowledge and knowledge is essential for any initiative, and only from initiative comes action to act. Information technology has changed significantly in .the last 20 years. The merger of communication and computer technologies has given an impetus to an entirely new set of products, services and structures all over the world. I believe that no other technology in the also 300 years has had an impact, information technology is going to have on the way we live and the way we work. Microelectronics has become so pervasive that now it is seen in Government, business. Universities, Industries, and even in homes Information automatically brings about, opens accountability and connectivity which leads to a new discipline. Information knowledge was driven approach to problem solving. It has an impact on productivity efficiency. material management and overall cost of various products and services. Information is also considered as power and is difficult to share.

In the Western world, information is being used for automation, robotics. artificial intelligence and many other new frontiers to explore new products and new markets. In our country information technology can be effectively used to expedite the process of modernisation aimed at providing basic needs like water, food, shelter etc. Though information technology has direct implications on travel, planning, economy development, communication, data base management and other activities, normally little recognition is given to the fact that this is equally useful in meeting basic human need& Information technologies in agriculture can be electively beneficial in the following areas:

Agricultural Research, land records, remote sensing, weather forecasting, database management, material management, marketing, distribution and pricing, communication and coordination.

In agricultural research computers are already used in large numbers. As agriculture research begins to rely more on biotechnology tissue culture and other new disciplines computational powers to innovate and experiment becomes very critical. Manipulating genes with long strings in real time is not feasible without proper processing power. All agricultural research institutions need large gene banks and associated data bases to monitor and manage rare specimens and new developments. All large agriculture universities working in the fore fronts of new technologies need expertise in computer science and usage, integrated with knowledge in agricultural science. If we are to make a significant breakthrough in productivity, using new biotechnology in agriculture we need to breed people with sound knowledge in agricultural science as well as computer science. This is one of the challenges our young graduates must experience. It is your generation who will bring biotechnology into the forefront of the new agricultural revolution. This will have an impact not just on food production but also on the environment and ecology. We need to develop process for our trees to grow faster, for our crops to take shorter time to grow and for us to use less chemical fertilizers and for seeds to be more pest resistant and productive.

Remote sensing of our environment and ecology is already being accomplished from satellite and other sources using powerful communication and computer technologies. Agricultural remote sensing has advanced to the level today where we can distinguish 20 different varieties of soybean from satellite imagery alone! Coupled with remote sensing, digital signal processing can be used to improve resolution and obtain finer details than was available in the past. Part of this process is also related to weather forecasting which is so very critical to our farmers. We are already using super computers for weather forecasting to help our farmers plan their productivity. Work is already underway to develop new generation processors to help us accomplish similar objectives at lower costs using indigenous capabilities in hardware and software.

Computer could also be very effective in modernising our land records. Our present manual system is not equipped to handle the information that is generated to maintain thee records. As a result our farmers are put through under difficulties in obtaining records in time. If land records were available on computer, it will be instantly accessible to all concerned at the push of a button. I believe that modernisation of land records using modern information technology would help the process of land reforms. But whenever we initiate this kind of a bold initiative in our system there is an inbuilt resistance to change from vested interests. They benefit from a status quo and as a result stall initiatives and innovations. It is extremely important to recognise that these road blocks can only be eliminated by pressure from below and user commitment to change the vested interests.

In a country of our size and magnitude with varying agro climatic zones, we need a large agriculture data base on a variety of items and issues of interest to the industry farmers and research scientists. Only through modern information system, this type of data base is viable and accessible. Through a centralised data base, standardised and relevant information would be available to all concerned irrespective of their position in the job hierarchy This will allow us to share knowledge more equitably at all levels.

We know that of all the food we produce, an estimated five million tonnes is lost to rodents because of poor storage facilities and poor material management practices. It is extremely important to use modern information systems with modern inventory management techniques in agriculture to prevent this waste. In this modern world, without computers, it is difficult to manage material movement, identify storage facilities and associated transportation to districts and deliver supplies on time. These modern systems are also required for marketing, sales and pricing activities. It is believed that through larger access to organise information of agricultural prices and other produce, farmers will eventually benefit rather than the middle man. The power of information however will only be meaningful when it reaches the small farmer.

Another important part of information technology is information culture. This demands a whole new style of management in Research and Development, industries, marketing, distribution and many other areas of productivity. Information brings about equality. It systematically breaks traditional work hierarchies to create

an egalitarian work environment. It brings about a new work environment, new work ethics and new work standards. It brings objectivity and analytical capabilities to decision making and development. It systematically focuses on performance as opposed to patronage. These are the most important aspects for the young agricultural scientist.

No doubt, their world is going to be different that the world we live in today. They are on the threshold of a new revolution with global economy which is becoming more and more competitive. New technologies are expanding horizons beyond boundaries that we could never before imagine. These developments the world over must be recognised by our young agricultural scientists while preparing their plans for the future. Only through a proper understanding of these trends and processes would young scientists have the ability to make a meaningful and innovative contribution to further our agricultural revolution.'

The world over, the shift is from agricultural to industrial economies and towards information and knowledge driven ones that creates a new service society with new objective. We must take these trends into consideration and recognise the fact that less and less people will have to produce more and more in the coming decades to feed our millions.

Finally, I urge our new graduates to be conscious of their role in the process of nation building. This will demand not only an understanding of agricultural technology and the associated role of information but also a concern for new management methods which will be critical to their functioning in the future world. Besides technology they still require knowledge in many other areas of management, inter-personal relationships, team work, strategic thinking etc. I firmly believe that we are ready to take of in many areas of development because of our resource of sound technical talent. However to expedite this process we need to direct and develop young talent. I must say that for this we need young men and women like you, who are skilled, confident concerned and committed to work with ability to make quick decisions people like you who are sensitive to the changing world around us.

It is only through individual and collective efforts like this that a bio-tech revolution in agriculture will become a reality.

Thank You!

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
24th ANNUAL CONVOCATION

2nd February 1991

Address by
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Honourable Chancellor, Vice-Chancellor, Members *of* the Board *of* Management, Members of the Faculties, Distinguished Guests, Graduating Students and Friends.

May I at the outset express my gratitude to all *of* you for giving me this opportunity to address the 24th Annual Convocation *of* the Andhra Pradesh Agricultural University.

The Convocation is a milestone in the life *of* every student. I would like to congratulate all those who are graduating today and wish them a bright and prosperous future. It is a great pleasure and privilege for me to share in the joy of the graduating students assembled today. I am particularly glad to be in Andhra Pradesh a State with a glorious history and a radiant cultural heritage.

During the last 40 years *of* planned development in our country growth with social justice has been the central theme *of* our planning. No doubt. we have made a lot *of* progress. Immediately after independence, the problem uppermost in our mind was to create the required infrastructure for our industrial and agricultural production. We wanted to be self- sufficient in food production. The real breakthrough, however, came by the end *of* the sixties with availability *of* high yield wheat and later *of* high yield rice varieties. This ushered in the era *of* **"GREEN REVOLUTION"** in the country. The food grains production, which was only 50.82 million tonnes in 1950-51, has risen to 170.65 million tonnes in 1989-90. The: yield rate has also increased from 553 kg/hectare to about 1400 kg/hectare during the same period. This resulted in increasing per day availability of food grains from 394.9 grams/day in 1951 to 496.6 grams/day in 1989.

Increased production *of* food grains has been mainly achieved through bringing more area under irrigation, high yielding varieties and consumption *of* high doses *of* chemical fertilisers. Thus, irrigated area under foodgrains has increased from 17.8 per cent in 1950- 51 to 32.7 per cent in 1986-87. The area under high yielding varieties has increased from 15.38 million hectares in 1970-71 to 63.71 million hectares in 1989-90 while consumption of NPK fertilisers has increased from 65.6 thousand tonnes in 1951-52 to 12,200 thousand tonnes in 1989-90. In the case *of* cash crops like cotton, jute, sugarcane, the production has increased from 2.75 million bales to 11.41 million bales; 3.11 million bales to 8.35 million bales; 57.05 million tonnes to 222.63 million tonnes, respectively during 1950-51 and 1989- 90. India was the first country to evolve hybrid cotton which changed the production pattern significantly. Now the country is poised to export extra-long staple cotton which we used to import two decades ago. Our progress not only in agriculture and irrigation, but also in the industrial sphere is something about which we can be rightly proud *of.*

Inspite *of* all the developments we have made during the last 40 years, the fruits of development have not reached to the millions *of* our masses in our country 30 per cent *of our people continue to live in conditions of* abject poverty even as per the current official definition *of* the poverty line, which in my personal view is not poverty line, but some kind *of a* survival line to keep body and soul together. The

concept of poverty line in our official literature corresponds to a per capita daily calorie requirement of 2400 in rural and 2100 in urban areas. You will all agree with time that human beings need something more than just food converted to caloric value. If we take this into account, it will not be wrong to say that more than 50 per cent of our population continues to live in poverty. Because they do not have any purchasing power, we get an illusion that we now have surplus food grains. If only we can put reasonable purchasing power in the hands of this 50 per cent of our population who have been left out completely from the fruits of development, we will find that our present food grains production is too insufficient to meet the needs of our country. 70 per cent of our population continues to be in the rural areas. Amongst the people who are poor 82 per cent are in the rural areas. The urban poor also belong to the rural areas, which have been forced to migrate to urban areas with a hope to have better livelihood. So in reality the problem of urban poverty is nothing, but a spillover of the rural poverty problem.

The Green Revolution, as I had stated earlier has indeed helped us to increase our agricultural production. During the initial euphoria of the Green Revolution, agricultural scientists used to stress the fact that the "Green Revolution technology is scale neutral" -meaning thereby that the technology can be used with equal efficacy irrespective of the size of land holding of a farmer: Now all of us know that even if the technology is technically scale neutral, it is not *resource neutral.* To be able to take advantage of the new technology it is necessary for the farmer to have credit purchasing power to buy fertilizers, seeds, pesticides, and other inputs at a time when they are less expensive in the market. Similarly he needs marketing support. Because of these facts, it is well known that the bigger farmers have benefited much more from the improved technology in agriculture as compared to the small and marginal farmers. In some of the areas the new prosperity brought about a situation where the small and marginal farmers have been completely marginalised. We wanted social justice, but if we introspect, I am sure all will agree that the opportunities created by the new technology in agriculture have not benefited every one in society equally. We need to think of corrective for this situation. We look upon the young students who are graduating today to ponder over these issues and act as agents of change to help bring a new socio- economic order in our country.

I have myself been thinking about these issues for the last some years. I will like to share with you some of my thoughts on how we can proceed to usher in a new era of social and economic justice in our country with active involvement and full participation of our people. To begin with I feel that we should have an integrated approach to development. Even the education given in agricultural universities at the moment is rather compartmentalised. In this University you learn discipline like agriculture, agricultural engineering, horticulture, dairy technology animal husbandry, agricultural extension, etc. While knowledge of these subjects will be of immense value, to be able to apply the same in our village situation. a broad understanding of soil management, water management, manpower management and education related to integrated rural development should also form a core input for all students since agriculture and rural development are intimately inter-related.

We are beset with a lot of problems. Some of the problems which are of utmost importance to us are:

The uncontrolled population increase in our country is a matter of grave concern. Even at an assumed growth rate of 2.2 per cent by the year 2000, the population of India will be about 105 crores. As per my information. the growth rate is between 2.4 to 2.5 per cent. The efforts to control the growth rate have not succeeded. The requirements of all the essential commodities and articles, energy raw-materials, educational, health and other facilities will increase proportionately. It is essential for each one of us to scrupulously observe family planning since family planning is closely linked with social and economic conditions of the people. The war for successful family planning has to be fought simultaneously on several fronts and naturally it calls for integrated efforts and integrated approach.

Nearly 50 per cent of our lands are waste or barren lands. The country has been losing green cover at the rate of about 1.5 million hectares every year. If this process of deforestation is not effectively halted, India may soon be converted into a horrible desert.

Changes in atmospheric chemistry such as air pollution, acid rain, ozone, depletion, build up of green house gases have been a matter of great concern. Physical condition of the earth has been worsening year after year.

Rapid industrialisation and urbanisation have created several problems including filthy slums and traffic congestion. Is it not necessary to prevent the influx of people from rural areas to cities by providing employment opportunities. educational, health and other facilities and a decent living in rural areas?

While on the one hand we have launched our own satellites into space. there are many villages in our country without potable drinking water throughout the year and without all weather approach roads.

Unless we do something in a determined fashion, 52 per cent of the illiterate persons in the world by the year 2000 will be in India alone.

It is sad, but true that 42 years after independence, we still have 6 lakh scavengers in the country engaged in cleaning dry latrines. The dream of Gandhiji to bring about complete **"Banghi Mukti"** is still to be achieved. Though surprising, 85 per cent of our people have not yet seen the face of a latrine.

Growing unemployment amongst both the educated and the uneducated is a challenge to which we must respond. Growth of employment over the past two decades has at an average been lower than the rate of growth in the labour force. The employment content of economic growth has been steadily declining from one quinquennium to another

The Gulf crisis, ever since it started in August, 1990, has raised various imponderables. Even when the 15th January, 1991 deadline was set by the U.N. Resolution for the Iraqi withdrawal from Kuwait, nobody could predict what exactly will happen after 15th January 1991. Now, the war has started in the Gulf. We do not know how long the war is going to last. One thing that is certain is that the Gulf war will have a profound impact not only on the Indian economy, but on the world economy at large. This crisis has once again brought into focus the necessity for our country to become self reliant in various sectors of our economy so that we get at least somewhat insulated from external economic shocks. Time has come to review our policies and strategies towards development. Here, our rural sector and the scientists engaged in this area including all of you have a vital role to play.

The founding fathers of our great Nation carried on the struggle for independence with the dream of setting up a Sovereign Socialist Secular Democratic Republic in which all citizens will be able to enjoy Justice, Liberty, Equality and Fraternity assuring the dignity of the individual and the unity and integrity of the Nation. These noble principles have been enshrined in the Preamble to our Constitution. During recent years, some of the basic values on which our nation has been built have been coming increasingly under stress. It is the duty of our younger generation to protect the basic principles.

I have listed out some of the challenging problems facing our country not with a view to paint a bleak picture. but to focus attention on the complex set of inter-related issues to which solutions will have to be found by our young friends, who will be coming out into the world of work from the academic cloisters of this University after receiving their degrees today.

To remove disparities and to provide economic and social justice and a decent living to the millions of masses in the country is the real challenge. To achieve this what is needed is a new philosophy based on our experience and appropriate technology to take care of the small and the smallest.

There are 5,57,137 villages in India as per the 1981 census. Our of this, 4,06,723 villages, namely, 73 per cent of the villages have a population of les than one thousand. Almost 50 per cent of the villages have a population of less than 500. To provide all basic amenities to a large number of small village is a very costly proposition. One of the things which we can think of is regrouping a cluster of small villages into a single big habitation. Such an experiment was successfully carried out in Keny and became known as the "Ujama Experiment". This approach can substantially reduce the money which we have to spend to provide various infrastructural amenities like health, education. power; etc. A village or a cluster of villages having regard to the natural conditions has to be treated as a unit for planning and integrated development. Top priority for integrated rural development ought to be the direction of our planning. This is possible only with the total participation of the people in the process of development.

Agricultural research needs to be re-oriented with a pro-poor bias. In our country traditionally, the poor people's diet consists of coarse cereals like bajra,

tapioca etc. We should find methods to increase the productivity of these cereals also. The point I wish to make is that even agricultural research is not neutral. We should always ask the question "Who will be benefited?" "Will this benefit the poorest of the poor in our country?"

We need to give priority to minor irrigation planned for mini watersheds. Major or medium irrigation projects should be allowed, wherever their requirement is imperative and unavoidable only after a very careful scrutiny Proper rehabilitation of out sees in the beneficiary zone and at least fie times additional green cover must be a condition precedent before allowing any new major or medium irrigation projects. Our aim should be to conserve every drop of water wherever it rains and prevention of soil erosion through proper water and soil management. In this regard our approach is very clear I call it **"DAEE"** Programme-

- Development (D)
- Asset Generation (A)
- Employment Creation (E)
- Environmental Protecting(E)

With an anticipated population rise earmarked at 105 crores by the turn of the century the food grains requirement is envisaged at 240 million tonnes -an increase of about 50 per cent of our current production. This is a conservative estimate. As I had mentioned earlier, the moment additional purchasing power is put in the hands of our poor people. The country will find it difficult to remain self-sufficient in food grains for long. To meet this challenge and achieve a break-through in agricultural productivity, we need to lay greater emphasis on higher water use efficiency. Agro-technical scientists in advanced countries have evolved micro irrigation system since the sixties. These have been adapted to vastly different agro climatic conditions in several arid countries such as the Middle East, Israel, Australia and USA. Under drip irrigation, increase in yield upto 230 per cent have been recorded. The input cost of fertilisers, weedicides, pesticides, power and irrigation have been also noted to decrease by as much as 30 per cent. Till now, in the name of irrigation we have been watering the land rather than watering the crops or trees. This needs to be changed to a system where we water the plants using drip or sprinkler irrigation systems. This will not only help us to conserve water, but avoid damage to the soil.

The problems of rural industrialization and rural unemployment are two sides of the same coin and while looking at one problem the other is also to be kept in mind. On the one hand, because of pressure on land we are witnessing a rural exodus to the cities in search' of gainful employment. On the other hand, large wastelands are remaining unutilized, particularly when 80 per cent of our wastelands are culturable waste. The twin method of arresting this trend is –taking up agro forestry, horticulture, sericulture, and various such systems to make our wastelands productive and to establish industries in rural areas, particularly agro and agro processing industries.

In this connection, it is worth mentioning about the special scheme launched by the Maharashtra Government for *developing* villages into ideal ones based on self

efforts. The scheme provides special incentives including employment to poor land leaders who work on their fields to make their wasteland productive. On the basis of the local endowments, the villagers are encouraged to have their dairies. poultries. fisheries, etc.

Provision of fodder for cattle in rural areas is equally important. Since years it has been customary to graze cattle on open lands, belonging both to the Government or to the private people. Unless arrangements are made to provide fodder to protect the existing cattle. it may not be possible to protect the existing forests or the new afforestation programmes. All animals in rural areas must be stall-fed and proper arrangements to supply fodder at a reasonable price have to be made.

I have already made a mention of the problem of wastelands and the need for developing these wastelands. At present, it is estimated that nearly 175 miilion hectares of land in our country has been degraded for certain reasons. Out of this, about 150 million hectares suffer from serious water and wind erosion, about 7 million hectares area affected by salinity of alkalinity, about 6 million hectares are affected by water logging, 3 million hectares by shifting cultivation and another 9 million hectares are affected by river action and other reasons. At one end a concerted Action Plan is needed on a location specific basis for reviving the utility of these lands. On the one hand 50 per cent of our people are poor while on the other hand 50 per cent of our lands are wastelands. It is possible through proper management of waste land and manpower to bring together and make both of them. productive. I would like to mention that the Planning Commission has resolved to make the wastelands productive so that one third of our area is brought under green cover arid which in the process generate employment for millions of our masses. I need not reiterate that this is a challenge for our young friends to accept.

I have endeavoured to place before you some of my thoughts on issues which are of importance to all of us in our country. I have no doubt that many of these issues are already receiving the attention of the distinguished faculty members of this University This institution has contributed noticeably to the agricultural development of Andhra Pradesh and made commendable progress for the benefit of the farmer in this region and beyond under the able leadership of your Vice-Chancellor.

I once again offer my congratulation and best wishes to all the new graduates. Agricultural students could be effective instruments in ushering in a socio-economic transformation of our villages and rural India. Ours is one of the most fortunate countries blessed by nature. We have all sorts of climatic zones, hundreds of big and small rivers, beautiful nature, shining sun and dense forests in some areas. Nature showers on us nearly 400 million hectare metre of water every year. Unfortunately, we have so far failed in utilising this tremendous natural wealth. Let us resolve to join hands so that our great natural potentials are thoroughly harnessed. I am sure this is the only way to acquire new heights of economy and lead millions of our masses and our country to progress and prosperity. I am sure the young graduates of this University will find translating this dream into reality, a challenge worth pursuing.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
25th ANNUAL CONVOCATION

30th December 1992

Address by
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Hon'ble Chancellor, Mr. Vice-Chancellor, Members of the Board of Management, Members of the Academic Council and Faculties, dear graduating students, distinguished guests, ladies and gentlemen.

At the outset, I express my sincere thanks to the Chancellor, Vice-Chancellor, Board of Management and faculty members for giving me this opportunity to address the 25th Annual Convocation of the Andhra Pradesh Agricultural University (APAU). It gives me great pleasure to be here as the chief guest and to share the joy of the graduating students. I would like to congratulate all those who are graduating to-day and wish them a bright and prosperous future and. a happy NEWYEAR.

I am glad to learn of the rapid strides made by the APAU during it's 28 years of dedicated service in the welfare of farming community

Andhra Pradesh is predominantly an agricultural state well known for its crops of rice, mesta, cotton, chillies, tobacco. turmeric. mango. grapes, Ongole breed of cattle, Nellore breed of sheep, fish and poultry etc. The Bangenapalli variety of mango and Anab-e-Shahi grapes are considered as the choicest varieties of fruits. The State contributes about 8 to 9% of the country's total food grains production. It is surplus in food grain. contributing 10 to 15 lakh tonnes of food grains annually to the Central pool. Andhra Pradesh is known as the Rice bowl of South India. The productivity of major crops like rice, maize. sorghum. sugarcane. cotton. chillies and blackgram in Andhra Pradesh are much above the country's averages. In production Andhra Pradesh occupies one of the first two positions for rice, groundnut, castor. chillies. mesta. F.C.V. tobacco and turmeric. Andhra Pradesh has revolutionised the production of blackgram in coastal Andhra Pradesh, producing around 15 to 18 quintals per hectare. The state registered an impressive growth rate of 2.8% in foodgrain production between, trienniums 1969-70 and 1990-91.

APAU's contribution towards the growth and development of agriculture is commendable. I am glad to know that the high yielding rice varieties released by the University occupy 71 % of the total rice area in the state. Some of the crop varieties and hybrid like Swarna. Samba Mashuri, Dhanyalakshmi and Tellahamsa in rice; Harsha. DHM-10S Trishulata, Varun, Madhuri in maize; Godavari in finger millet: Bhagyalakshmi Andhra Jyothi and LCA 235 in chillies; Sagaramuthyalu in safflower have become very popular in other states. Sugarcane varieties released by the University that are resistant to red rot disease served the sugar industry extremely well. Besides improved crop varieties. the varieties that are resistant to red rot disease served the sugar industry extremely well. Besides improved crop varieties, the University has also developed several crop production and protection technologies, which had changed the scenario of the state of Agriculture. Equally impressive is the achievement of the University in the improvement of cattle, sheep, goats, poultry piggery and fisheries which transformed the rural areas. Andhra Pradesh has shown the way for "White" and "Blue" revolutions significantly transforming the village side. For poultry production the state occupies pre-eminent position in the country today.

The relentless efforts of agricultural scientists in-India, since independence resulted in significant improvement in food grain production and ushered in the "Green Revolution". This helped to feed the country's growing millions thus averting famine and starvation deaths belying the forecast of some doomsdayers. During the period from 1950-51 to 1990-91, the production of food grains, oilseeds and cotton has more than triplets and that of sugarcane production four times. The food grain production increased from 50.82 million tonnes in 1950-51 to 176.23 mullion tonnes in 1990-91 while the productivity increased from 553 kg/ ha to 1382 kg/ha during the same period. Similarly the total oilseeds production has gone up from 5.16 million tonnes to 18.50 million tonnes and that of cotton from 3.04 million bales! (of 170 kg each) to 9.76 million bales during the same period. Sugarcane production has increased from 57.05 million tonnes in 1950-51 to 240.3 million tonnes in 1990-91. How- ever, the total pulses production has only marginally increased from 8.41 m.t. to 14.1 m.t during the above period. The country registered commendable progress in production of livestock (milk, eggs and wool production) and fish. Milk product in has gone up from 27 to 53.7 m.t. egg production from 1832 to 21 00 million eggs and total fish production from 7.52 to 41.41 lakh tonnes during the same period.

However, these gains are neutralised by the enormous increase in our population. At the current rate of growth of population, which is estimated to reach 100 crores by 2000 A.D, the food grain requirement are projected around 225 to 245 m.t. for the year 2000AD. The oilseeds production needs to be stepped up to more than 24 m.t. by that time. With the improvement in standard of living and purchasing power and decrease in death rate, the demand for food is likely to be more.

Hitherto, increase in food production came mainly from expansion in area under different crops, adoption of high yielding varieties, bringing additional area under irrigation and fertilizer usage. During the last four decades the gross cropped area and irrigated area under food grains have increased from 97.32 m.ha and 17.6 m.ha in 1950-51 to 119.7 m.ha and 40.5 m.ha in 1987-88 respectively.

The area under High Yielding Varieties (HYVs) has increased from 15.5 m.ha in 1970-71 to 63.9 m.ha in 1990-91. Similarly the consumption of NPK fertilizers has increased from 0.66 lakh tonnes in 1951-52 to 138 lakh tonnes in 1991-92. The per hectare consumption of NPK fertilizers has increased from 0.6 kg to 75.4 kg during the same period.

The scope for bringing additional land under cultivation is very slim. The per capita availability of cultivated area was 0.48 ha in 1951: 0.20 ha in 1980 and is expected to be hardly 0.14 to 0.15 by the year 2000AD. Thus we are required to produce more and more food from less and less land available for cultivation. This is the greatest concern which all of us are facing. Agricultural Scientists, planners, policy makers and administrators will have to gear up to face this challenge. Fortunately enough, the genetic potentiality of the existing crop varieties and technologies is more than two times than what we are getting on an average now. It is very essential to bridge this gap in future and increase the productivity however, enhancing productivity in irrigated areas beyond a point has it own limitations. Though irrigation potential was developed for 76.36 m.ha in 1988-89 it is estimated

that still 2/3rd of the country remains rainfed. Due to lack of stability in production in rainfed areas, the country suffers from year to year fluctuations in food grains production. Inspite of several research institutions working on rainfed agriculture for the past several decade, the result of research of dryland agriculture did not benefit the farmers and significant improvement in yield levels could not be achieved in the dry tracts of India. This is an area for introspection for all of us.

Since a large part of the country is rainfed , concerted efforts should be made to increase the yields of rainfed crops to bring stability in dry land farming and food grain production.

Among the several production constraints, management of the two basic resources - land and water are the key issues for agricultural production both in irrigated and rainfed areas. Agricultural production is hampered with problems like soil erosion and, rain water runoff in rainfed areas, while floods, water congestion and impeded drainage, poor management or irrigation water and problem soils are common features in irrigated areas.

In rainfed farming, proper management of soil and water based on watershed approach would minimise the risk factor and enable the farmers to adopt improved crop production practices and invest on inputs like better quality seeds, fertilizers and plant protection measures. Having recognised the importance of basic resource development in dryland agriculture, watershed development programmes were initiated during the VII Five Year Plan for increasing and stabilising agricultural productivity in rainfed area and this was given high priority during the VII Plan.

Large areas of the country suffer from soil problems like salinity, alkalinity, acidity etc., reducing crop yields by 30-50 per cent. Similarly large areas are available as cultivable wastes which can be brought into cultivation. With the establishment of Waste Land Board, these areas have come into focus and several programmes are being taken up for their improvement. The newly reclaimed areas should be first considered to provide forest cover, while the rest of the areas can be utilised for selected crops like arid horticulture, silviculture, fodder and fuel trees, pastures, fodder grasses etc., of dependable productivity. Experience elsewhere has shown that such waste or wasted lands can be put to more profitable use through integrated crop and animal systems rather than with crops and cropping systems alone. In recent times, the emphasis is on alternative agriculture through alternate land use based on land capability.

Though rapid strides were made in agricultural production in India, inter-state and inter-regional disparities still persist in agricultural development. In order to minimise the instability and regional imbalances in agricultural production, the Planning Commission initiated an exercise, in 1988, to decentralise the formulation of plans for agriculture development on the basis of agro-climatic regions. The country has been divided into 15 broad agro-climatic zones and Andhra Pradesh State comes under two zones viz., East Coast Plains and Hills Zone (Zone-XI) and Southern Plateau and Hills Zone (Zone-X). In terms of goals, the Project is proposed to be dovetailed with the goals that are Nationally agreed to for achievements in VIII

Plan targets and beyond. Major thrust is given for the development of land and water resources, the two key inputs for agricultural development.

A conscious effort should be made to promote utilisation of fertilizers, irrigation and on the inputs in the less developed areas, as there will be greater return for each unit of the input applied. There is also a need for incorporation of environmental considerations in our strategies for accelerating farm production for embarking on a course of sustainable development. In future, the agricultural research institutions should aim at the development of technologies that are economical to the farmers and are environment friendly like integrated pest management, integrated nutrient management, preserving biodiversity, moisture conservation tillage etc.

The future agricultural development plans should aim at food security nutrition security, export promotion, rural employment generation and poverty alleviation.

In spite of enormous increase in population from 361.1 millions in 1951 to 843.9 millions in 1991, the per capita availability of food grains rose from 394.9 g/day in 1951 to 510 g/day in 1991. Thanks to the Green Revolution which helped in achieving self sufficiency in the production of food grains and other commodities. Notwithstanding all these still about 40% of our population are below the pover1y line. Many people do not get the normal required calories, which the FAO has fixed at 2240 per head per day.

With the implementation of strategies for the development of agriculture and allied sectors, as envisaged in Agro-climatic Regional Planning, the production of different food, commercial and horticultural crops as well as the animal and fish products is expected to increase significantly in future. Part of this produce could be exported to earn the much needed foreign exchange. The total value of exports of agricultural products has risen from RS.164 crores in 1984-85 to Rs3613 crores in 1990-91, contributing 9.91 and 11.1 per cent share of exports of agricultural products to total exports from India.

It is estimated that about 10-15 per cent of foodgrains and 30-40 per cent of fruits and vegetables are lost at harvest and post- harvest stages. Every effort should be made to minimise this colossal loss of agricultural produce. Cutting down losses at harvest and post-harvest stages itself adds to the production of the country Mechanical harvesting during the harvest season to avoid excessive shedding and weather aberrations, providing dryers and mechanised aerators to handle moist stalks and grains at on-farm, community and market level and educating all the concerned on storage of food grains will help in cutting down the pre and post harvest losses.

Post-harvest technology and development of value added products in the rural sector not only help to minimise the post-harvest losses but also add to employment generation and better returns to the farming families. The future of

India, I believe, lies in the establishment and development of a large net work of agro based industries in rural India to generate employment and wealth in the rural areas. This will also reduce migration from villages to cities.

Mechanisation of India's agriculture to a certain extent is essential to bring in efficiency, precision and timeliness in operations, particularly in case of multiple cropping systems under irrigated conditions. Even under rainfed conditions, with reasonable amount of rainfall, mechanisation without losing sight of the well adopted age old implements like gorru, guntaka, etc., are required for taking up timely operations and conservation of moisture to facilitate raising more than one crop in a year. There are a number of low cost, easy to operate implements developed by ICAR and Agricultural Universities and they should be popularised. The next agricultural revolution should come through agricultural engineering.

India is said to have the largest number of personnel working in the transfer of technology programmes, yet it appears it is not giving the required results. So far the women were not given the due importance and recognition in agriculture. The extension mechanism has been largely aimed at extending knowledge to the male members in the village though many of the agricultural operations and decision making are carried out by the women. A time has come to review our extension system and ensure greater participation of women in the transfer of technology programmes. In this direction, ICAR has decided to establish a National Research centre on women in Agriculture at Bhubaneswar.

The much awaited Agricultural Policy Resolution has been approved by the Union Cabinet and has been presented to Parliament also. I am happy to inform you that the Agricultural Policy Resolution recognises farm research as an essential ingredient for over all agricultural development and making agriculture a profitable enterprise. Out of 17 major challenges identified in the resolution as facing Indian agriculture, 10 are related to agricultural research. I appeal to the farm scientists and all concerned to reorient agricultural research policies for attaining the goals of the Agricultural Policy. The main challenges identified in the policy are accelerating all round development, evolving economically viable and location-specific technologies, increasing the Efficiency of input use; promoting value addition in agriculture, meeting technology needs of farm women and other disadvantaged sections of rural society, meeting challenges of emerging ecological imbalance and promotion of use of alternative and renewable resources of energy for agricultural purposes, developing areas of untapped potential and promoting capital formation in Agricultural sector.

Our country is endowed with abundant natural resources both land and aquatic. We have the widest ecological diversity suitable for cultivation of a wide variety of crops. There is an immense potential for Animal Husbandry and Aquaculture development. Our farmers are very receptive to new ideas and are enterprising. It is our duty to provide them with economically viable technologies and the necessary inputs to enable them change our agricultural scenario significantly.

Before I conclude I once again offer my congratulations to all the new graduates and post-graduates. I urge the young graduates to boldly face the challenges of the country and usher in a new socio-economic revolution in our rural India. I appeal to the young graduates to dedicate themselves to work for the betterment of the farmers and in turn for the welfare of the state of Andhra Pradesh and the Nation.

I request each one of you to strive hard to bring credit not only to yourselves and your parents, but also to your alma mater –the Andhra Pradesh Agricultural University. My best wishes are with you for success in each of your endeavours at furthering the interests of your own and of the Nation.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
26th ANNUAL CONVOCATION

30th April 1993

Address by
Shri Bhanu Pratap Singh

Rajendranagar, Hyderabad – 500 030

Chancellor, Shri Krishan Kant Ji, vice-Chancellor Dr. M.V. Rao, Distinguished Scientists, Guests, and Students of the University.

By inviting me to be the Chief Guest at the XXVI Convocation of this prestigious Agricultural University, you have bestowed a great honour on me. For this, I am grateful to you. Convocation is a happy day for those students who having completed their courses, have been awarded degrees. I congratulate them and wish them a bright future.

Andhra Pradesh is amongst the seven major states of India, in which growth in food grain production has outstripped growth in population. Andhra Pradesh is also number one in poultry production and coming up well in fisheries & horticulture. I have no doubt that credit for all these achievements goes largely to this University.

The very fact, that you have invited me shows, that complacency about the agricultural policy, pursued thus far has given way to fresh thinking on the subject. I will feel more than rewarded, if some of my ideas promote new thinking not only amongst the seniors assembled here, but also amongst the students, who will soon be looking for gainful employment.

In the short time at my disposal, I will try to convey to you my thoughts on two aspects of the agricultural situation in the country. The first is the potential and performance of our agriculture and the second is farming as a career for our young educated persons.

But before that, for a proper perspective, first let us take a quick look at the overall economic situation faced by our country

India is today under great financial stress. During the two years from March '91 to March '93, external debt on India has increased at an average rate of more than Rs. 150 crores a day. The balance of trade position, instead of improving, has worsened making the country more dependent on external debt.

Leaving the upper creamy layer of the society which constitutes only 10% of our population, 90% of Indians, if considered as corporate nation, would be the poorest in the world, or very close to it. Even Dr. Manmohan Singh in his budget speech has said "Without reforms, India would face the certain prospect of entering the 21st century as just about the poorest country in Asia".

Whether the new reforms will produce the desired results is a debatable point, but one should be thankful to Dr. Manmohan Singh, for conceding the fact that if we don't deviate from the old beaten path, we will soon be the poorest nation in Asia.

Unemployment in the country measured by the number of registered unemployed on the live registers of Employment Exchanges has been increasing at an average rate of 1.5 lakhs per month during the period 1980-81 to 1990-91.

Capital formation in the farm sector as a per cent of the total in the country has sharply declined from nearly 18% in early eighties to less than 8% in 1990-91.

The disparity in incomes of agriculturists and non-agriculturists has been widening rapidly. In early seventies it was 1 :2; now it exceeds 1 :4. This is reflected in the differences in quality of life between the 3/4th of the population living in villages and the 1/4th living in cities. Total death. infant mortality and illiteracy rates are respectively 55.2. 68.6 and 66.7 percent higher in villages than in cities.

In productivity Indian agriculture remains amongst the most backward; our yield per hectare of food grains is no more than two-third of the world average. Food grain production has been stagnating during the last four years at a level. which is in sufficient to feed the nation even at our inadequate level of nutrition. In five years from 1988 to 1992, the country has imported exports of 6.9 million tons of food grains.

After nearly four decades of planned development of the country more than 60% of India's agricultural production potential remains unrealized, 22% of the total cultivable land remain uncultivated. Most Indian villages continue to be "unlivable" in the sense that they lack the basic necessities of life, such a good schools, hospitals, dependable power supply transportation and communication facilities.

No doubt since independence, our country has made some progress. But the rest of the world has not been standing still. When we compare our achievements with those of other countries, we find that they have moved faster ahead. Progress depends on the advances made in the field of science and technology It is undeniable that achievement in the field of Science & Technology during the last fifty years far outweigh the achievement of the previous 200 years. Therefore, it is self-deluding to compare our present with the past. The more relevant comparison is with the contemporary world. Which I am sorry to say is not at all flattering to us.

What is the reason for our continued backwardness? Why are we facing such a serious economic crisis? Is it due to lack of natural resources in the country? Is it due to lack of talent in the country? Or is it, due to wrong strategy of development which we have been pursuing since independence?

In my view, India is richly endowed by nature. 'We do not lack talent. Though our population is vast, our resources, particularly in agriculture, even on per capita basis are no less than the average of the world.

Our failures can be attributed only to inverted priorities which we have been pursuing since the mid-fifties. We gave priority to industries over agriculture. We paid more attention to the development of systems than to human beings. Just as no durable building can be constructed without first laying down a solid foundation, no nation can be set on the road to progress, without first developing its human and the most abundant natural resource. In case of India the most abundant natural resource is our agro-climatic condition. This claim is based, not on theoretical considerations, but on irrefutable facts. In the world as a whole the percentage of arable to the total land area is only 11.0. In India this percentage is 51.5. Our climate also being moderate, makes it possible for us to grow two crops in a year whereas in most parts

of the world due to severe winters, only one crop can be grown in a year. On per capita basis India has nearly the same area under grain cultivation, and nearly twice as much under irrigation, as the rest of the world.' Per capita grain area in the world is 0.130 hectare against the Indian average of 0.125 hectare per capita irrigated land in the world is only 0.045 hectare against the Indian average of 0.088 hectare. However our grain production per hectare as said earlier is much less than the world average.

The first question which we should ask ourselves is whether we should make determined efforts to achieve the full potential of our agriculture which is nearly two-and-half times our present production should we remain content with a growth rate which just enables us to meet our domestic demand at the current inadequate level of consumption? In deciding this issue the following facts need to be considered :

Poverty in India cannot be eradicated or even reduced, so long as agriculture, the main profession of nearly two-third of our population remains as backward as it is currently both in productivity per hectare and in productivity per worker.

The incremental capital out-put ratio (ICOR) of agriculture has always been much lower than that of manufacturing. On equal investment agriculture also generates more employment. Undoubtedly GNP per capita in India would have been substantially higher and unemployment much less, if investment in agriculture had been proportional to its contribution to the national income.

The benefits of improved agriculture accrue to the poorest income group in the country.

The problem of an increasingly adverse trade balance cannot be resolved without fuller realisation of the rich potential of our agro-exports.

According to the FA.O. in 1990, our average productivity of cereals was 1893 Kg. per hectare against the world average of 2802 Kg. per hectare. If we attain even the average productivity of the world-let alone the higher productivities of the developed countries, we would have more than 90 million tons of surplus food grains available for export. This quantity is more than what the U.S.A., the largest exporter of food grains in the world, is currently exporting. If we can find buyers for our surplus food grains, we will be in a position to earn 13.5 billion dollars annually in foreign exchange.

Poverty cannot be eradicated by sweet words or false assurances. Nor can it be removed by doling out state charity. Poverty can be removed only by enabling our farmers to produce more through better education, training and equipment' and ensuring that the benefits of higher production accrue to them, through a more socially just marketing system.

Amongst the many factors. which determine productivity in agriculture. the most decisive one is the kind of social support, which agriculturists get from the rest of the society. Social support emanates from a sense of gratitude towards

agriculturists for providing food the first requirement of mankind. This however, is not quantifiable and therefore, not comparable amongst various countries of the world. Hence a new concept, which takes into account only monetary transfers has been developed. This is called. "Producer's Subsidy Equivalent" or P.S.E. in short. This can be defined, as payments received by agriculturists. in excess of what they would have received, if the Government had not intervened in free marketing of agricultural produce. PS.E. includes direct and indirect payments by Government and also increased payments to farmers by consumers. made inevitable by imposing ban on import of cheaper farm products form abroad. The U.S. Department of Agriculture in their publication "GATT &AGRICULTURE" has reported the average P. S. Es. for 17 countries. for a period of 5 years from 1982-86. The highest P.S.E.. plus 70%, was in Japan. followed by S. Korea, Mexico, E.C.C.. Canada. and U.S.A. where it was plus 25%. It means that in these countries. farmers received 25 to 70% more than what they would have received under condition of free trade. In four countries, viz., Pakistan, Nigeria, India and Argentina, P .S. Es were negative. In India it was minus 18%. It means farmers in India received 18% less than what they would have received, if the Government had not intervened in free trade. This figure has been arrived at, after deducting from the total losses suffered by farmers due to Government interventions, the amounts spent by Government for providing to farmer input assistance and infrastructural support. It is significant, that in all the countries, in which P. S. Es were found to be negative. Productivity of agriculture was much below the average of the world. In other words, wherever farmers have been exploited, agriculture has remained backward.

I do not plead for subsidy to farmers in India, comparable to what their counterparts are getting in the developed countries; but I do maintain. that anti-farmer interventions, by the Government, in free marketing of farm products, must now come to an end.

While a national Industrial policy resolution was adopted as early as 1940, which has since been under constant review, no Agricultural Policy Resolution was considered necessary till recently. It is true that "Grow More Food" campaigns were launched, land reform laws were enacted, and support prices were announced; but the aims of all these, were other than the realisation of the full potential of Indian agriculture, economic uplift of the rural masses or maintaining the viability of the farm sector

From whatever angle, one looks at the economic problems of our country the solution lies in faster and fuller development of our agriculture. But how can it be achieved? I can do not better in succinctly stating what needs to be done, *than* to quote only one sentence from the Agricultural Basic Law in Japan. It reads like this. "It would be the governments' responsibility to raise agricultural productivity and close the gap in income and welfare among the farm and non-farm people."

It is not that Japanese leaders alone had realized the need to maintain income and welfare parity between farm and non-farm workers; in our constitution too, the following is laid down as one of the Directive principles; The state shall strive at reducing inequalities in income status, facilities and opportunities, not only among individuals but also amongst groups of People engaged in different vocations.

There is hardly any difference between the above Directive principle of our constitution, and what has been laid down in the Agricultural Basic Law of Japan. The only difference has been in implementation. The Japanese Government has honestly implemented their Basic Law, whereas in India, our policy-makers have conveniently forgotten this and other Directive principles of our Constitution.

The new Agricultural policy should proclaim as its main objective, the implementation of the aforesaid Directive principle of our Constitution. If that is done, there would be no difference of opinion, nor any difficulty in finding ways and means in its implementation. But if this is not accepted as the guiding principle of our new Agricultural policy; whatever else might be said in it, it will amount to no more than beating about the bush.

The true test of implementation of the aforesaid Directive principle will be to see:

(i) Whether the same policy of liberalization now applicable to the industrial sector has been extended to the farm sector as well, by removing all restrictions on processing, movement and trade of farm products; and

(ii) Whether at least 50% of the plan expenditure is allocated to provide villages with the necessary inputs for progress viz., link roads, warehouses, cold storage processing plants, electricity, and above all better education for rural children.

I lay great emphasis on education, because I consider it an essential input for agricultural growth. No country of any significant size, with illiteracy as high as it prevails in rural India, has yet succeeded in achieving higher productivity in agriculture.

Let me now briefly place my views on the other subject of my talk viz., agriculture as a profession for the educated youth. There was a time in India, when it was said;

It means that the best profession is agriculture, the next is that of trading, the worst is service, and begging is the last resort. But that is no more. Service particularly Government service, is now the most coveted profession. Vast majority of those, who are now engaged in agriculture, are in the profession, not by choice, but because they could not find an alternative employment. Government policies are largely responsible for down-grading the profession of agriculture. But besides that, there are many serious discomforts and disadvantages in living in a village. One can endure discomforts, but what can one do in a village to provide good education to his children or to secure medical treatment for his family members. There are, however, disadvantages in other professions too. In Government service, one loses his freedom of speech, and quite often suffers undeserved humiliations in silence at the hands of his superiors. One has to retire quite early and if honest, has hardly anything to bequeath to his successors. On the other hand, a farmer can retain his job, as long as he likes, and can pass on the fruits of his long labour to his successors.

However, the most crucial point is income. As far as I know, a post-graduate in agriculture, if he is fortunate to get a Government job, is likely to get a salary of about Rs.4000/- a month or Rs.48000/- per year. Can a farmer earn this kind of

income on a holding of average size, which at present is about 1.6 hectares? The reply to his question is both "No" and "Yes". Before I explain how it is both "No" and "'Yes", I would like to say; that income from farming does not depend mainly on the size of the farm, but on capital invested on it-both in monetary terms, as well as in technological know-how Many farmers in developed countries are earning many times more than *Rs.48000/-* annually from their glass houses, built over no more than one-fourth of an acre. No doubt. this is an extreme example. But there certainly is the possibility of earning an income of more than *Rs.48000/-* annually on 1.6 hectares of land, provided one gives up conventional farming, i.e. production of grains: and takes to horticulture and animal husbandry. Fortunately, the Government does not intervene in the processing and marketing of fruits, vegetables and animal products. Hence their prices have risen to about the same level as have the prices of "all commodities". While the terms of trade are very harsh against producers of grains, that is not so in case of producers of fruits, vegetables and animal products. From my own experiences, as well as information gathered from experts, I can say that one can earn a net profit of more than Rs.48000/- annually from a holding of 1 .6 hectares by producing fruits, like Banana, Papaya, Guava, Lemon, Mango, Litchi, Grapes and vegetables like hybrid Brinjal, Tomato and Cabbage. Plant propagation and seed production are even more rewarding. Animal husbandry, poultry keeping, goat keeping, pisciculture and dairying are no less profitable. These enterprises can also be combined. But for success in these specialized lines of agriculture. lot more capital and expertise are required. Acquiring of expertise should be no problem for post-graduates. in agriculture. If they can raise the necessary capital, in which the Government should help them. They should not curse their fortunes, if they fail to get Government jobs. Instead, they should take to modern horticulture and animal husbandry In fact, the Government should establish them as model farmers at its own cost, which should be recovered from them in 25 yearly easy instalments. For most farmers, "seeing is , believing". One model farmer can be far more effective in introducing new farm techniques in villages than a dozen extension workers, employed by Government.

To develop self-confidence among students, that they could earn a decent living from: farming, the agricultural universities should reorient their teaching as well as research programmes. "Earning while learning" should be an integral part of the teaching programme. Each student should be given a plot of land and asked to earn from it, as much as he could. Research should be reoriented to cater to the needs of small farmers. Instead of trying to achieve higher productivities of different crops, research should now aim at evolving cropping systems, which give maximum monetary returns per unit area and per unit man-power employed.

I had taken the decision to take to farming more than 53 years ago, and I have not repented it even once. Though I have not become a millionaire, I have been able to meet all the essential needs of my family. And above all I have been able to save my self-respect and *freedom* of speech, which one loses even if one occupies the highest position in Government. By adopting agriculture as a profession one can also take part in politics, when feels impelled to do so: and also to give up when one is disgusted with it, as I have done in my life. Even now I consider that agriculture is the best profession for those who value their freedom of thought speech and action.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
27th ANNUAL CONVOCATION

7th April 1994

Address by
Shri K. Vijaya Bhaskara Reddy
Chief Minister
Andhra Pradesh

Rajendranagar, Hyderabad – 500 030

Chancellor, Sri Krishan Kantji, Vice-Chancellor, Dr. M. V. Rao, Members of the Board of Management, Members of the Academic Council & Faculties, Distinguished Scientists, Guests, Staff and Students of the University and Friends.

It gives me great pleasure and a sense of pride to be the Chief Guest at the 27th Annual Convocation of the Andhra Pradesh Agricultural University I express my sincere thanks to all of you for giving me this opportunity to be with you to day and deliver the convocation address.

Convocation is a unique event in the life of every graduate. I would like to congratulate all the students who are graduating today and wish them a bright and prosperous future. f hope that the education imparted to them in this University will prepare them to graduate from the University of life also.

Andhra Pradesh Agricultural University is the biggest of its kind in the country today. It has 13 teaching institutions and 67 research stations spread over the entire state. I am happy to know that about 18,500 students have passed out from the portals of this University since its inception and a number of them have brought fame to their alma mater. Sustained efforts of the scientists of the University have resulted in the release of a total number of 202 improved crop varieties. The University has brought distinction to the State by being the first in the country and second in the world, next only to China to develop and release rice hybrids. I congratulate the scientists of this University for this unique achievement. I am also happy to know that the crop varieties and technologies released so far continue to enjoy the confidence of the farmers in Andhra Pradesh and other States.

Agricultural Scenario

The relentless efforts of the agricultural scientists in India have helped in changing the agricultural scenario from that of subsistence at the time of independence to that of some surplus exportable position at present. During the period from 1950-51 to 1991-92, the production of food grains has increased from 50.82 million tonnes to 175 million tonnes, while the productivity increased from 553 kgs per hectare to 1374 per hectare.

This is undoubtedly a commendable achievement. But as a person coming from the agricultural community and one well versed with the agricultural scenario in the country I feel many a time that a country which has all the potential of marching as a number one agricultural power in the world has been aiming merely at self-sufficiency and little surpluses at times, but not striving to become the world number one exporter of the agricultural commodities. I can say with authority that there is large untapped agricultural potential, not only in Andhra Pradesh. but in many other states of our country: the total value of which if realised would be nearly equal to half of our national income.

Every one of us is aware that at present our productivity of most crops is relatively lower than the world and Asian averages. For instance, the productivity of paddy in China is about 4000-5000 kgs per hectare. Or take the example of pulses. Despite having the word's second largest area under pulses cultivation, our country imports these products worth over As. 400 crores every year: India's average pulse

production has been hovering around 0.6 tonnes per hectare, compared to more than twice that much of most Asia-Pacific countries. For instance, in Australia the average per hectare production of pulses is 1.5 tonnes and even in Pakistan it is one tonne per hectare. Because of the low productivity of the pulses in the country, the per capita intake of protein-rich pulses has decreased from 80 grams per person daily to just 42 grams and this is one of the causes for increasing malnutrition among the poorer sections of our society. We have undoubtedly done well in the filed of Oil seeds, milk and fish ushering in Green, Yellow, White and Blue revolutions respectively. The total oil seeds production has increased from 5.2 million tonnes to 20.6 million tonnes. The milk production has increased from 17 million tonnes in 1950-51 to 56.4 million tonnes in 1991-92 and egg production from 1032 millions to 2202 million eggs and fish from 7.5 lakh tonnes to 41.6 lakh tonnes during the same period.

It is universally acknowledged that Indian agriculture has immense potential to charge the socioeconomic fabric of the country and transform it from a mendicant nation to a power to be reckoned with. Therefore it is imperative on our part to fully tap our agricultural production potential.

Let us now touch upon, briefly the agricultural scenario of our state ,Andhra Pradesh, the 5th largest state in the country and a predominantly agricultural stage known as ANNAPUANA and granary of the South. Agriculture contributes 37% to the GDP of the state as compared to 33% of the country. The state is endowed with rich natural resources. It holds 2nd rank in rice production in India and every year contributes about 30 lakh tonnes of rice to the Central Pool. It occupies first rank in the country in the production of a number of crops like Chillies, Tobacco, Turmeric and Mesta and second rank in the production of castor and sunflower.

The state has the largest potential area of 4.5lakh hectares for Oil Palm cultivation. It is known for its Banganapalli variety of Mango and Anab-e-Shahi grapes both considered as the choicest varieties of fruits in India. One of the richest resources that nature has endowed the State is the long coastal line of 974 kms useful for the development of aquaculture.

One strikingly distressing feature about the agricultural scenario in our state is the stagnation in the yields of important crops like paddy and sugarcane. The introduction of Hybrid rice varieties in the state from this year will I am sure lead to the increase in the per hectare yields of paddy. The sugarcane yields are stagnant for the last two decades at around 70 tonnes per hectare. The area under millets is reducing year after year though this has not affected the total production of the millets in the state. There is also unequal development of agriculture in the different regions of the state. While coastal areas and other deltaic areas which have assured irrigation under canal systems have prospered agriculturally, upland areas of North coastal districts and Rayalaseema and Telangana regions are lagging behind. There is need to identify the strengths and weaknesses of the different regions in the state and suggest suitable strategies to remove these regional imbalances. It is in pursuance of this objective, that the State Government has prepared a Comprehensive Agricultural Development Project and posed it to the World Bank for

assistance. I am also happy to know that this University shares the concern of the Government in this regard and has organised Seminars to identify the constraints and suggest measures for development of agriculture in North coastal districts and Telangana region and a similar Seminar is proposed to be organised for Rayalaseema region shortly. Concerted and dedicated efforts on the part of young scientists graduating today are essential to tackle some of these challenges.

Future thrusts

In my perception, the important issues which need attention. in future Indian agriculture are:

1) In spite of impressive growth in the production of food grains during the last 45 years, productivity of the important crops in India is far below the average productivity of several countries in the world. In spite of increase in per capita availability of essential commodities in India, the per capita consumption continues to stay at a very low level compared to developed countries.

Added to this is the relentless growth of population. This Population explosion is throwing a never ending challenge to the policy makers, planners and scientists to step up agricultural production. According to the National Commission on Agriculture, India needs between 220-230 million tonnes of food grains by 2000Ad to feed an estimated population of 1000 million mouths, as against the present level of 175 million tonnes. With increase in the standard of living, the demand for food grains would further increase, while the per capita net cultivated land is decreasing.

2) Land and Water constitute the basic resources for agricultural production. The future of Indian agriculture depends heavily, if not entirely, on how well these two basic resources are managed. Our future research and developmental efforts should be in the direction of harmoniously balanced and ecologically sustainable agriculture in which soil and water conservation and their scientific management become very crucial.

Here, I would like the scientists of this University to undertake documentation of traditional farming practices in vogue in the state. Such a documentation will be rewarding as some of the practices are not only scientific but also of low-cost and practical. For instance, if mulching is practised on a large scale, it will not only reduce the problem of weeds but also reduce the number of wettings to a crop.

3) There are vast areas of waste lands in India, which should receive high priority. It is estimated that about 130 million hectares of land in our country is degraded and suffer either from serious water and wind erosion. salinity or alkalinity and water logging. It is also distressing to note that large parts of forests are also deforested every year Continuous deforestation. it is feared. would lead to irreplaceable loss of topsoil. silting of tanks, reservoirs and rivers resulting in floods. fall in ground water levels etc. leading to ecological imbalance A concerted action plan is essential on a location specific basis for reclamation of problem soils and for

bringing the wastelands into proper use. Apart from the reclamation of the land. a strong research thrust is needed to identify management practices and crops that are suitable to these lands. In areas where food crops cannot be grown economically the possibility of growing fruit trees or fuel plants or fodder crops should be explored.

4) Andhra Pradesh is endowed with good river systems like Godavari, Krishna, Tungabhadra. There are also a host of minor tributaries in the State. The Government is aware of the urgent need to complete the major and medium irrigation projects to harness river water and renovation of tanks. We have declared 1993-94 a Minor **Irrigation Year** and drawn up a programme to spend Rs.360.00 crores on construction of check dams and percolation tanks etc. These minor irrigation works will help in increasing the levels of ground water in the State. There is every need to exploit the ground water more judiciously, 76% of ground water potential in the state remains to be tapped. This huge potential has to be exploited judiciously to expand irrigated area. Conjunctive use of irrigating water from all kinds of wells with that from canals and tanks should receive high priority, since water is a crucial commodity, the University should give more thrust in its research for development to efficient and judicious water management technologies.

5) Another area which needs attention is rainfed agriculture. About 2/3rd of net sown area in the country is rainfed. In Andhra Pradesh large tracts of Rayalaseema, Telangana and North and South Coastal areas are under rainfed conditions. Rainfed farming suffers from instability in production and the element of risk is high due to uncertain weather conditions. Although a number of organisations are conducting research and developing varieties and technologies suitable for rainfed agriculture, much progress has not been achieved in raising the productivity of crops in the dry tracts of the country on a sustained basis. There is, therefore need to increase and stabilise the production in rainfed areas. Watershed based community approach appears to be crucial for success of rainfed agriculture.

6) Realisation of benefits from the Green Revolution and the latest developments in biotechnology depend to a great extent on the use of seed of improved varieties. However the country is confronted with inadequate supply of improved varieties of seeds and planting material. The production and supply of quality seeds therefore needs to be stepped up to meet the growing demand and to increase agricultural production.

7) The per capita availability of cultivated area which was 0.48 hectares in 1951 is expected to decline to as low as 0.14 hectares by 2000AD. Thus, agricultural production has to increase from the limit land available. Fortunately the genetic potential of the existing crop varieties and technologies is enormous. As the resources in our country are scarce, we have no option but to exploit the potential of modern technologies for increasing the agricultural production. The potential and application of bio-technology in such areas as hybrid seeds, tissue-culture, genetic engineering, bio-insecticides, milk production, fish farming and the areas should be explored and exploited fully.

I think that the Bio-technology is an economic necessity because only a vertical growth in productivity can increase incomes from small holdings.

In this context, I would like to say a few words on the status of research in agriculture in the world. In the past most of the breakthroughs in agricultural research came from the universities -mostly in U.S. -which were state funded and the results of the research were in the form of papers published in prestigious journals and freely available to the whole world. Today, however, the most significant breakthroughs are being achieved in laboratories of the giant multinational corporations and the products of the research are covered by patent laws and intellectual property rights and marketed at exorbitant prices. What is particularly distressing is the trend emerging of late on some of the multinationals funding the research activities in the universities in return for patents on the finished products, thereby even hijacking the best scientific brains in the Universities.

It is in this context that I would like to appeal to Scientists of our agricultural universities in general and the A.P.A.U. in particular to focus their research to the field requirements of our farmers by continuously interacting with them. I have earlier complemented the University for its research in the hybrid rice. But at the same time, I would like to point out that China which until a few years ago was lagging behind India in agricultural research has now overtaken us and has doubled its rice production through large scale introduction of hybrid varieties. China with the same area of land under irrigation as India is producing today two and half times more food grains than us. I have no doubt that our scientists can also produce similar results if they take up this challenge in all earnestness.

8) The craze for taking up paddy wherever there is water must go. Andhra Pradesh with its diverse soil and climatic conditions is well suited for growing a wide range of fruits, vegetables and flowers. Important fruit crops like mango. banana, grapes, citrus, sapota, guava are grown in large areas of the state. The state is famous for its Banganapalle mangoes and Anab-e-Shahi grapes all over India. Totapari mangoes are exported either as fruitor as pulp. Spices and condiments, betelvine, medicinal and aromatic plants and a wide range of flowers are grown in the State. Plantation crops like cashew and coconut in coastal areas, coffee and pepper in hill areas and Oil Palm in coastal belt have great potential. Horticultural crops offer tremendous opportunities and challenges for entrepreneurs to develop appropriate by products for internal use and export. The low rainfall areas of Rayalaseema and Telangana are well suited for growing arid zone fruits such as ber, pomegranate, seethapal etc., Similarly the Rayalaseema and Telanagana regions are also well suited for the growth of Neem tree which can give manifold benefits to our country. The Agriculture University should give much emphasis to research on these crops and develop suitable varieties and technologies for their profitable cultivation. Similarly we should develop mushroom culture which is a multi-million dollar international industry on a large scale, particularly when it can be done at farm level.

9) Andhra Pradesh occupies a prime of place in animal wealth, fisheries and poultry production. It occupies the first place in egg production and second in broiler production in India. Marine, brackish and inland water resources of the State defer tremendous scope for fish and prawn culture. The state is famous for its majestic Ongole breed of cattle, which is a prized animal in India and several Latin American countries where it is called as "Brahmo bull". I am happy that APAU and Ongole Cattle Breeders' Association has recently organised a big Ongole Cattle show at Guntur. The State is also famous for its Nellore and Deccani breed of sheep. Though the state has large population of buffaloes, ducks, goats, sheep etc., research facilities available for their' improvement are meagre. The University should intensify research for improvement of cattle, buffaloes, sheep, goats, poultry, ducks, turkey, quails, fish, prawns etc.,

10) The coastal districts in the sate are regularly subjected to the vagaries of cyclones. Cyclones play havoc with the lives and property of the farming community. There is need to minimise the human, crop and ecological loses from Cyclones through proper monitoring and development of appropriate prediction models for relief operations. The agricultural scientists should always be ready to develop alternate cropping patterns, disaster management practices. reducing pre-harvest seed sprouting and quality impairment during and after cyclones.

11) Apart from natural hazards, plant and animal diseases cause enormous loss to the farmers. In this context, I would like to raise the issue of the indiscriminate use of pesticides in our State. Andhra Pradesh has the dubious distinction of using the highest quantity of pesticides in several commercial and cost crops. I hope our farmers will not succumb to the high voltage publicity of pesticide marketing companies promising bumper returns. We must also realise that only integrated pest management measures will ensure eco-friendly and sustainable agriculture which has become the need of the hour.

Similarly, our animal wealth is also prone to various diseases most of which can be controlled or even eliminated with the available technologies. I am happy that the university is closely associated with the national campaign being launched to eradicate foot and mouth disease from cattle.

Recently the Gumboro disease in poultry has caused wide spread destruction in the poultry industry resulting in the death of more than 25 lakh birds.

12) Although Andhra Pradesh has made significant progress in agriculture, a wide disparity exists in the nutrition intake of people and we have both caloric and protein malnutrition. It is in this context. that the research and development activities of the Home Science Faculty should be strengthened, and geared up to meet the minimal, nutritional standards of the people. I am extremely happy to learn that the Home Science scientists have distributed 22.000 audio-cassettes with nutrition and health messages through folk songs for the ICDS programmes in the State. I am told that they have also developed improved smokeless chulah for efficient utilisation of conventional energy (firewood), low- cost water filters, fuel efficient cooking devices

for use of rural families, infant foods based on sorghum-soyabean, Sorghum chickpea and wheat-soyabean, fiber-blends for furnishing and stimulation material for children etc. All these have to be popularised among the rural people.

13) One of the weaknesses in the agricultural development appears to be the tardiness with which the modern technologies are percolating to the farmers. Unless these technologies reach the farmers quickly, significant increased production can not be achieved in the near future. The village extension workers, who are responsible for transfer of technology at the grass root level, are of late not professionally trained or acquainted with the latest practices and developments. The present transfer of technology system should be critically reviewed for its timeliness, effectiveness and utility. Extension in Animal husbandry, fisheries, horticulture, agro-forestry should also be strengthened. Strong research and extension linkages between the developmental departments and the Agricultural University would help in effective dissemination of technologies generated. Women should be given due importance in the transfer of technology as they play a crucial role in the villages. They perform a wide range of agricultural operations and also influence decision making. They should be educated and trained on priority basis. Biotechnology tissue culture, production of hybrid seed, silviculture, sericulture and product development from raw- materials are some of the important areas where women could contribute for the development.

14) The avowed objectives of planning are ensuring development with social justice and removal of poverty. However, the benefits of planning, as a matter of fact, have not fully reached the deserving and needy masses resulting in social and economic inequalities. The socioeconomic disparity is further expanding due to unequal distribution of wealth. Since over 70% of our population lives in rural areas and 33.4% of rural people are below the poverty line, the Government of Andhra Pradesh has launched the Rajiv Gandhi Technology Mission for Rural Poor with a view to focus attention on the application of Science and Technology for the development of rural people. The basic philosophy of the emission is to take Science and Technology to the door steps of the rural poor by dovetailing Science and Technology inputs into the rural development programmes. The target groups comprise SC, ST, BC, women and other weaker sections of the Society largely living below the poverty line. The Mission will be tackling the issues on a mission mode approach to improve the quality of life and promote income generation. The action programme of the Mission is in the key human need areas like agriculture, energy education, health, sanitation etc.

15) Despite many plans to provide jobs, the growth of unemployment is unabated. It is estimated that by 2000A.D. nearly 200 million additional jobs have to be created. Large section of village population, nearly 72%, in India, is engaged in agriculture compared to just 2% in USA.

The situation emphasizes the need to develop agro-based cottage and other industries in the villages to tackle the problem of unemployment, besides diverting some of the labour force from agriculture to industry. Post-harvest technology and

development of value-added products are also critical for generating employment in rural areas. There is an urgent need to develop appropriate cost-elective technology so that, at least first stage of agro processing like de-corticating and processing of Groundnut, ginning of cotton etc. is carried out at village level itself for higher value realisation.

16) In these days of financial stringency, I am happy to inform you that the World Bank is extending financial aid to this University for strengthening teaching infrastructure and research development under Agricultural Human Resource Development Project and Comprehensive Agricultural Development Project. I hope that this financial assistance would go a long way in improving the teaching standards and Research capabilities of the University

I am happy to inform that the Agricultural, Policy resolution recently approved by the Union Cabinet recognises farm research as an essential ingredient for overall .Agricultural Development. Out of 17 challenges identified 10 are related to Agricultural Research, I appeal to the farm scientists and other concerned developmental authorities to reorient agricultural research for attaining the goals of Agricultural Policy. The main challenges identified are: accelerating all round development in agriculture sector, promoting value addition to the agricultural products, meeting challenges of emerging iconological imbalances and promotion of alternative sources of energy

Finally, I advise the young graduates to emulate the example of Israel in the field of agricultural development. Israel being one of the smallest of nations, half of the size of our Mizoram State, generated so much surplus that agricultural products particularly vegetables and fruits are supplied to almost all the European Markets through out the year. The agricultural scientists achieved a break-through in overcoming seasonal barriers in agricultural production. I do not find any reason why India with its vast resource of diverse climates, soil, water, scientific community and enterprising farmers should not emerge as "one of the leading agricultural countries of the world and export a wide variety of horticultural, agricultural and animal products. We should develop appropriate export policy to encourage export of agricultural commodities.

Before I conclude, I once again congratulate and offer my best wishes to all the new graduates. Agricultural graduates could be effective instruments in ushering in socio-economic transformation of rural India. Let us resolve to exploit the rich natural potential of this country and improve the standard of living of our people. I am sure the young graduates of this University would contribute their mite to translate this dream into reality.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
28th ANNUAL CONVOCATION

7th February 1996

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His Excellency the Governor of Andhra Pradesh, Shri Krishan Kantji, Hon'ble Vice-Chancellor Dr. M. V. Rao, respected Dr. Norman E. Borlaug, Dr. Verghese Kurien, Dr. Timothy Reeves, members of the Board of Management, Deans, Members of the Academic Council, distinguished guests, faculty members, recipients of the degrees and honours, students, ladies and gentlemen.

I am extremely pleased to be here with you on the occasion of the 28th Convocation of the Andhra Pradesh Agricultural University. I extend my heartiest congratulations to all those who have earned their degrees and merit awards through their hard labour and dedicated efforts. Equipped with the new knowledge, you are stepping into the world where you have to take up the new challenges concerning globalization of agriculture.

I am particularly privileged to be invited to address this convocation when two of the world famous personalities, who have dedicated themselves for the cause of food and nutrition. are being honoured today I feel that the University is honouring itself by awarding the Degree of Doctor of Philosophy (Honoris Causa) to Dr Norman E. Borlaug and to Dr. Verghese Kurien. These two humane personalities by the sheer dint of their foresight, commitment and hard work have completely transformed the scenario of food and milk production of the developing countries They are known as the father *of* the Green Revolution and the White Revolution, respectively the world over. Their contribution in terms of increased food and milk production in India is needed invaluable and the entire nation is grateful to them.

Convocation day has a special significance in the life of the young graduates as well as for the faculty members. who have worked hard to turn out skilled graduates rearing to go ahead in life. It is also time for us to pause, look back and take stock of the quality of the training imparted. Today, we are living in an era of "knowledge explosion". The frontiers of science are expanding. new facts are coming to light, new challenges are being thrown up every day. Therefore, it is the responsibility of the Universities to ensure proper Human Resource Development so as to equip and freshen up our young graduates with newer knowledge. practical skills matching the demands of modern agriculture as well as agri- business.

RECENT ACCOMPLISHMENTS

Agriculture sector has continued to be the backbone of our national economy The sector contributes 28% to the GDP with 70% of the country's population engaged .in agriculture, as compared to 2-7% in the contemporary developed world. Fortunately our agricultural production has kept pace with the population growth rate of 2.1% per annum. Compared to 51 million tonnes of food grain production in 1950-51, we have achieved record food grain production of 192 million tonnes during 1994-95, and a buffer stock of over 36 million tonnes. The oilseed sector, which is primarily rainfed, has had a spectacular achievement of doubling the production (above 22 million tonnes) in the last seven years and exports of oilmeal, oilcake and minor oil is now twice the amount of the ever highest import bill on edible oils. Developments in horticulture, livestock, milk. fish and poultry production have also

been of a high order: India today, is the largest producer of fruits and second largest producer of milk and vegetables .AII these visible indicators give us a message that agricultural science has helped in the overall growth and development of our society It has also given us the self respect and the confidence to feed our ever growing population without much imports. Our progress in the agricultural sector has been very impressive and we can take legitimate pride for ushering in not only the Green Revolution in the country but also so in changing the country's status from that of "begging bowl" to that of "self sufficiency".

The APAU which was established in 1964, has played a key role in ensuring quantum jump in agriculture production in the State of Andhra Pradesh. The alumni of the University today occupy important positions in various organisation of the state, country and abroad. The quality of education imparted by the University can be rated to be one of the best. This can be judged by the results of this University competitive examination. I would like to compliment the Vice Chancellor Dr. M. V. Rao, the faculty members and the students for their tremendous efforts in improving the quality of our Agricultural Human Resource. I am sure, the University will continue to make rapid strides in this direction and put forth the relevance of our agricultural education in the right perspective. Today, Andhra Pradesh occupies the third position in rice production in the country and also enjoys a distinct advantage for the certified seed produced in the country Despite the vagaries of monsoon and natural calamities. the state has done exceedingly well in increasing the agricultural production. The agricultural productivity also has shown an increase over the years, especially in relation to rice, groundnut, tobacco, sorghum etc. Despite increase in the agricultural production, there is still scope for increasing the productivity further. Andhra is uniquely placed as it is blessed with rich natural resources as well as a hard working farming community. It is a mini India in itself where all kinds of crops and commodities are grown. Excellent support, efficiently managed by the State Government and outstanding research contributions of APAU have been instrumental in bringing about economic reform and raising the status of the farming community. Therefore, I would like to see the university to concentrate its future efforts in enhancing the agricultural productivity The University must take advantage of newer technologies and direct research in the priority areas of bio- technology, integrated pest management, agri-business, bio-pesticides. computer science application, etc.

We must go in for required diversification of agriculture and restructuring of our cropping systems where we have comparative advantage. Andhra Pradesh provides ideal environment for the horticultural crops that have the potential for export. The aim of the post-harvest technology research should be how to reduce the losses during the transport. It should also ensure proper nutritional quality. Rather than just concentrating on the export of the agricultural produce. should we not develop value added products for export. to earn more. Is it not an irony that we export soyabean rich in protein at a much lower price and import pulses from abroad? Future thrust of our research must be on -susceptibility of cropping systems, ensuring soil productivity; reducing environmental pollution, reducing dependence on costly agro-chemicals, maximising nutrient availability through exploitation of microbes, maximising water and nutrient use efficiency. The emphasis now the world over is on changing from project approach to that of the programme mode research.

Times have changed and individual research as in the past may not suffice in today's context. Hence, inter-disciplinary linkages need to be established and encouraged at the intra and inter institutional level.

New Challenges for the Indian Agriculture

While on the one side we derive satisfaction from our past accomplishments, on the other, we find daunting tasks looking ahead. We are adding one Australia or one Malaysia every year and our population growth rate of 2.1% is still on the higher side. Despite the record food grain production and buffer stock, India has over 200 million impoverished people. Globally, 800 million people are food insecure, while 185 million pre-school children are underweight. Over 1 billion people in the world today live on incomes of a dollar a day or less. The gap between the rich and the poor is also widening.

Secondly, access to food is a bigger socio-economic problem confronting us today. We have not only to increase the productivity but also ensure profitability and incomes through on-farm/off-farm employment opportunities. Issue of sustainable agriculture is much more relevant today. In future, we will have to produce more per unit of land with less of chemical inputs. We will have to diversify our agricultural activities to raise incomes and Will have to be globally competitive with respect to the quality of our products and their cost of production.

These are the challenges, which are not easy to overcome. Obviously there is no room for complacency. We must address these in a long term perspective and evolve suitable strategies which would enable us to reduce both poverty and hunger. Failure to take action will lead to persisting hunger and poverty; continuing degradation of our natural resources, increasing conflicts over scarce resources and widening gap between the rich and the poor. Therefore, we have to act and act fast and fortunately we still have the remedial options left with us. It is globally felt that if proper support is given to the agricultural research and education, we can overcome the problems of food insecurity, malnutrition and degradation of our natural resources.

In our vision for 2020, we must aim to ensure that "every person has the access to sufficient food to sustain a healthy and productive lie, where malnutrition is absent, and where food originates from efficient, effective, and low cost food systems that are compatible with sustainable use of natural resources". This is a challenge, which we must accept and reinvigorate all our efforts to attain this objective.

Agricultural Human Resource Development (AHRD)

To propel Indian agriculture into the 21st century the quality, technical skills and the management of agricultural manpower must improve in consonance with rapidly changing needs of our society both nationally and internationally. If the

education imparted is not tuned to the current and future realities, the national research, extension and agri-business systems will be adversely affected despite large investments in infrastructure, extension network and scientific institutions.

There is a wide spread consensus that the quality of graduates in various disciplines of agricultural sciences is depreciating and that there is an urgent need for the SAUs to accord priority towards upgrading the quality and standards of higher agricultural education. Major problems facing the SAUs are academic in nature such as internal grading, lowering of qualifying standards and decline in teaching ability. Students in most SAUs come from the same state which tends to perpetuate parochialism. There are no incentives to excel in teaching. Teaching methods and curricula are out-of-date, and physical facilities, equipments and teaching aids are in poor condition being more than three decades old. The old teaching methods and note memorization in learning are over-emphasized. There is a need for establishing clear links between course work skills, which would enable them to assess new changing situations and to make rational judgements about options and alternatives.

There is also little emphasis in the present curricula on preparing our undergraduates for career in agriculture or agri-business outside government service, also there is no readily available mechanism in the present H AD system to remedy this mismatch. Private employers often have to invest significantly both for the inducting and on-the-job training of young graduates in order to make up for existing weaknesses of the educational system. Also there exists an imbalance relating to intake and human resource needs. Advance planning and student placement and couselling is often lacking in most of the institutions which needs to be addressed on priority:

The change either due to the stimulus of external environment or to the internal pressure, can not remain static in any dynamic system. The only alternative to change is decay. Any vibrant, forward looking organisation sensitive to forces of change has to have a set of integrated and interrelated initiative in HAD. The problem acquires complexity because it is not only acquisition on simple skills but also knowledge attitudes and more important the values. These together constitute the work culture of any organisation and the nation and we must strive to achieve excellence in all of them.

HRD is a necessary concomitant of all dynamic systems for stability and attaining equilibrium with external forces. Without HRD organisations can’t grow Any diversification or an effort at renewal should be preceded by matching the HRD initiative. AII improvements in systems and services have to have a component of HRD. If the organisation wishes to assume leadership role, it has no option but to launch comprehensive HRD programmes to match with these efforts.

Information is knowledge and knowledge is an essential and basic capita:. There is infirmation explosion around the globe and our farmers and scientists have to keep pace with these developments. This is possible only if our Institutions are connected to the international networks and have access to international data bases

and information on emerging technologies. ICAR has undertaken an elaborate network in plan involving NIC and ERN ET and connecting ICAR Institutes, SAU's etc. with the objective of dissemination of information and sharing of knowledge.

Human resource development is directly linked with the education and *vice-versa.* The standards of education imparted by the universities leave much to be desired. We should adopt a culture which encourages us to keep our doors and windows open so that noble thoughts can infiltrate from all directions. We should not allow ourselves to be moribund. Since the time we adopted the 'Land Grant System' for our Agricultural Universities, the teaching, course curriculum and the system of education has almost remained unchanged. In many cases, the infrastructure and teaching aids need improvements. The present time demands that we tune our agricultural education curriculum with the changes that are taking place.

In order to revamp the system, the Council has launched an ambitious Agricultural Human Resource Development (AHRD) Project of about Rs. 240 crores using the World Bank support. In the AHRD, we have tried to address these issues. We have even gone a step further to examine the policy issues which may need to be changed to make higher education more relevant to the present day needs.

AHRD NEEDS

Establishing a seat of learning and its infrastructure is a cost intensive activity. To make it affordable, it is highly subsidised. Therefore, as a social obligation, running of an educational institution has been the responsibility of the government. However now this public funding is coming under close scrutiny and review, there is a growing demand that such institutions of research and education must become self-supporting to some extent. This may make the funding position tight and the institutions have to become more relevant and meaningful by producing quality graduates and appropriate technologies acceptable to its clientele.

The teachers or the faculty members would be the prime movers in the scheme of HRD. Therefore, the improvement of the competence of teachers would receive a high priority. Suitable schemes to identify the core teachers, developing teaching norms, institutional system or mechanism for evaluation of teachers and students and developing educational technologies and pedagogy would be the corner stone of future strategy and will include:

(i) Recasting the curricula at all levels is necessary in order to meet the emerging requirements of management skills, problem identifying and solving attitude and communication skill and techniques. In view of the importance of biodiversity eco-based planning and sustainable agriculture, frontier areas in science will have to be strengthened. Launching routine conventional sources without assessing their usefulness and acceptability would be quite wasteful in terms of manpower and funds. Such courses with little ability to change through a 'switch on' and 'switch off' mechanism is bound to create a wide gap between the requirement and availability of manpower Such efforts are likely to be counter productive.

(ii) Establishment of an appropriate mechanism to ensure quality education and uniform norms and standards is essential. The council has recently approved the setting up of an Accreditation Board to address these issues.

(iii) To meet the changing needs after foundation courses, excellence in specified areas are imperative. This would call for a long term perspective plan based on our requirements in the changing scenario. To be effective and relevant, assessment of future requirements for human resources and planning well in advance will be helpful. In this endeavour a forward looking group such as Plan Implementation and Monitoring Cell (PIMC) needs to be set up for monitoring the changes and to suggest commensurate adjustments needed.

(iv) Inbreeding is a serious impediment in educational institutions and has been a singular factor contributing to lowering of standards. Hence, it is proposed to fill up *15%* seats at the under graduate level and 25% seats at the postgraduate level based on All India Examination. This would not only eliminate the ill elects of inbreeding but would also inculcate sharing of experiences and the utilisation of excess institutional capabilities besides ensuring our concept of national integration at education level.

(v) Due to high costs involved, it would be appropriate if the training in the frontier areas of science such as biotechnology, computer science and its application, environmental science, GIS, etc. is imparted with greater efficiency and quality in selected Centres of Excellence.

(vi) Job-oriented education is our priority. Therefore, launching of vocational courses should go hand in hand with the development of schools of thoughts, establishment of centres of excellence, recognition of meritorious students and teachers imparting higher education, etc. These issues are receiving the attention of the Council.

(vii) lack of programmes in educational technology and management have resulted not only in insufficient application of modern teaching methods and aids in the agricultural educational system but have also deprived the students from innovative pursuits during the process of learning. This mismatch is being removed through organization of suitable structured programmes.

(viii) Much of the infrastructure and equipments available in the Agricultural Universities have also become obsolete and unserviceable. This has a direct bearing on the standards and quality of education. Therefore, assistance is being provided to the universities for the improvement of classrooms and laboratory facilities, replacement of obsolete equipments and other instructional and support units such as farms, workshops, libraries etc.

(ix) Scarce resources need structural adjustments among and between public, private and voluntary institutions. Reorientation of research and development system to harness the most from the limited resources would call for search and research for

a system capable of tuning as per existing and upcoming needs on a time scale. As such, an agricultural systems research with policy implications would be essential in the future.

(x) Suitable provisions need to be made for training the teachers in advanced fields of education and subject matter; their participation in refresher courses and academic gatherings like symposia/conferences/seminars, etc. These surely would enhance the teachers's own level of knowledge and thereby help him in imparting the course curriculum effectively.

(xi) The faculty members should be given sabbatical leave for enhancing their professional skills. Sabbatical leave should be viewed not only as an opportunity for an individual to improve his level of knowledge and pursue the vocation of his choice but also in developing institutions by judiciously utilising the expertise available elsewhere for an overall national development. I am glad to say that the Council has approved recently the guidelines for the sabbatical leave.

In spite of the fact that APAU is a participant in the AHRD programme, it is necessary to focus on the establishment of Manpower Advisory Council (MAC) which every participating state will have to establish to project the manpower requirements on both short and long term basis.

Knowledge is wealth and unless we keep pace with the advancing knowledge, we would not be in a position to give required benefits to the farming community. We are already establishing a network under ARIS which will provide opportunities of information search through Internet and ERNET.

The economic liberalisation and globalization of Indian agriculture has thrown open new challenge and opportunities. We are very fortunate to have varied climate and ecosystem, which can be exploited for economic benefits by cornering a large share of export market. We already see change in our approach in agricultural sector There is now much greater integration of the private sector with the Universities to work in a partnership mode. In order to make these linkages effective, it has to be ensured that the graduates that come out of the university system have skills matching the requirements of industry and agro-business, so that the industry does not have to spend time and money on further training. It calls for a total re look at some of our formal and informal training programmes.

EPILOGUE

In the existing climate of tight funding and strong competition. there is widespread demand for transparency and accountability. In a centralised administrative set up participation of larger sections of academicians and researchers is limited. This needs to be reversed and responsibility with accountability down the line has to be encouraged. This would result in larger participation and in improving the planning and implementation of our educational programmes.

Any reform is not without a 'cost' and that cost has to be met through our determination and hard work. We must ensure that the proposed 'change' brings in minimal dislocation and helps in self-introspection, discipline and accountability The effort should be to create the best working and learning environments for our university teachers and students. Once this is attained, rest would follow The Council has recently instituted the best teachers' award as well as the best institution award. In addition, the Council has approved five faculty awards for each university to promote excellence in teaching. We have also doubled the prize money of the Jawaharlal Nehru Award for young scientists and have also instituted the best young women scientists' award to encourage further the role of women in agriculture. We believe that such token catalytic support would pave the way for proper recognition of talented teachers and provide required incentive for excellence in education. In my own perception, the human resource development in agriculture can wait no longer at this stage.

Friends, I have tried to present to you the emerging scenario and to address changing needs which call for major structural reforms in our agricultural education. This is a challenge which has to be met to derive benefits from globalization of agriculture and development of new liberalised economy. The responsibility for the major structural reforms lies on the shoulders of administrators, educationists and the young and talented scientists. In the past, we have succeeded against all odds and I am confident that in future also we would succeed. What we need is to provide our young generation with a proper environment for flowering of their talents. We have already initiated major reforms based on in-built incentives, autonomy of operation, accountability and applying new principles of human resource management; I am confident that with our hard work and dedication, we would not only be achieving food grain production targets set for the near future but would also be having a major share in the global agricultural exports.

I would like to impress upon the new graduates that in whatever capacity you are placed, continue to be inquisitive and learn more about new technologies and options. The nation will be proud of you and the farmers will be indebted to you if you can nurture and grow two seeds where only one grew before. To obtain degree is one aspect, but to prove worthy of the same is much difficult. I am sure, you will work dedicatedly towards success in your life.

I wish to thank the university authorities for giving me this opportunity to share some of my thoughts with you. Finally; my best wishes to all the graduating students for a very productive and an illustrious future ahead. My best wishes and salute also to our two legendary figures Dr. Borlaug and Dr. Kurien for all that they did for the people of this nation.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
29th ANNUAL CONVOCATION

9th January 1998

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The Challenges Ahead - Winning the Development Race

The Honorable Chancellor Dr. Rangarajan, Vice-Chancellor Dr. Subba Rao, Members of the Board of Management, Members of the Scientific Council and Faculties, Distinguished scientists, Guests, staff and graduating students.

It is a great pleasure, and a special privilege to be considered as a Chief Guest at the 29 Annual Convocation of this great University.

I would like to thank you for giving me this unique opportunity to be with you and to deliver the Convocation Address.

This University has a special place in my heart. In 1994, I came here to discuss with the leaders of this institution the concept of a new project that was to be financed by the World Bank to support agricultural education, research and extension in India. This University staff and leaders made valuable contribution to the design of an innovative project that was named: "Agricultural Human Resources Development Project" which was signed by the World Bank and the Government of India in 1995.

The project provides support to the Governments of Andhra Pradesh, Haryana, and Tamilnadu, to modernize the agricultural sector. The project would promote changes in the way the states develop and employ human resources with the aim to make them reproductive.

This University has been a pioneer in implementing this project, which is the first phase in a long-term program to improve agricultural human resources development.

We cannot over emphasize the importance and the valuable contribution of higher agricultural education in India for the following reasons:

Let us took at some numbers -when this University was established in 1964, the population of India was close to 500 million people. India produced then about 60 million tons of grain and cultivated about 24 million hectares of irrigated agriculture.

What happened in the last 33 years since this University was established?

At the University level, it produced close to 20,000 graduates many of whom are leaders in agriculture in Andhra Pradesh and elsewhere. The University has matured, and established its name on the world scientific map. It has developed research methodologists, released new cultivars, and produced impressive generations of agricultural leaders of world class quality.

What is happening at the State-level?

Agriculture continues to be the mainstay of the Andhra Pradesh economy. About 70 per cent of the population earn their livelihood from agricultural activities.

Overall growth of the state's economy and the success of its poverty alleviation efforts largely depend on agricultural performance. Crop production constitutes about 85 percent of agricultural value added, though the shares of livestock, fisheries, and forestry are growing fast. Rice is the dominant crop, capturing about one-third of the total cropped area. Other major crops are groundnuts, pulses, sorghum, cotton, and sugarcane.

Because of the large size and importance of the sector, agriculture has always been the focal point of economic policies and budgetary allocation in Andhra Pradesh. Investment in irrigation infrastructure has captured over 40 percent of total public investment. Public expenditure on agriculture has been about 12-14 percent of total public expenditure. This share has been relatively stable over the years. In addition, agriculture has received large irrigation and power subsidies, which together amounted to 2.8 percent of the state's Gross State Domestic Product (GSDP), or 7.8 percent of agricultural value added in recent years. Large resource transfers together with heavy import protection (provided by the central government) led to a rapid agricultural growth in 1980s, particularly in rice, pulses, groundnuts, and cotton, despite in efficiency in resource allocation created by price distortions. Average rate of growth reached 4.7 percent a year during 1980/131 to 1988/89.

However, misallocation of public expenditure on agriculture, weak cost-recovery, price distortions, and inefficiency in delivery of public services started taking their toll after 1988/89, and agricultural growth sharply declined to 1.8 percent a year since then. Slowdown is observed in most commodities; rice production actually declined from 12.9 million tons in 1988/89 to 11.8 million in 1995/96. While a more detailed analysis is needed to fully understand the slowdown, the following factors may be significant. The fall in rice production was due largely to a fall in cropped area under rice, which in turn was caused by a decline in area under irrigation since 1989/90 because of growing inefficiency in the public canal irrigation works and water management (Table 1). Stagnant prices in real terms particularly for rice and sorghum were also contributing factors. In addition, irrigation and input subsidies have been overemphasized in agricultural policies, and rainfed agriculture, which constitutes about 60 percent of the cropped area, has been largely neglected in research and investment. As a result. yields in rainfed agriculture have been substantially lower in AP than in all India.

Table 1: Value Added and Input Use in Agriculture

	1980/81	1985/86	1989/90	1990/91	1991/92	1992/93	1993/94
Net irrigated area (m ha)	3.5	3.5	4.3	4.3	4.3	4.0	3.9
Gross irrigated area (m ha)	4.3	4.4	5.5	5.4	5.4	5.1	5.0
Net sown area (m ha)	10.7	10.4	11.1	11.0	11.0	10.5	10.4
Total cropped area (m ha)	12.3	12.1	13.3	12.2	13.2	12.8	12.7
Fertilizer use (m tons)	0.6	0.9	1.5	1.6	1.6	1.5	1.5

Source: AP Directorate of Economics and Statistics

2

To accelerate agricultural growth, reforms need to be initiated both by the central and state governments. The key reforms made by the central government,

would affect all states, would entail further liberalization of agricultural trade, both foreign and domestic, to provide for a more favorable price environment and incentives for regional specialization, and efficient resource allocation in agriculture. Deregulation of the sugar industry and elimination 'of small-scale industry reservation policy, which would particularly effect groundnuts and rice milling, dairy products, and food processing in AP, are especially important. Trade liberalization in the oilseeds and cotton industries is essential for the long-term growth of the rainfed agriculture.

The key reforms by the state government would include (a) reprioritizing government expenditure on agriculture with an emphasis on cost recovery in public irrigation and power, allocating larger funds for 0 & M, rural transport and market infrastructure, and research and extension services, particularly for rainfed crops; and (b) raising the efficiency and quality of public service delivery (e.g., public irrigation, research and extension services) and government sponsored programs in rural areas (e.g., rural infrastructure, watershed programs, anti-poverty programs).

Social Development in the State

AP's social development indicators show a somewhat mixed picture in comparison with. other states (Table 2). For some indicators, AP compares favorably even to the average of the six fastest growing states. while in others it is poorer. General health indicates - that Infant mortality rate and the crude birth rate -are better than in India as a whole. In contrast the indicators of education show a relatively worse situation in AP: both total literacy and female literacy in AP are substantially below the all-India and six state averages.

There are two sets of estimates of the incidence of poverty in India; official estimates and the Expert Group estimates. Both estimates are based on the same national sample survey data but use different methodologies 1 .The proportion of AP's population below the poverty line in *1987/88,* the latest year for which data are available at the stale level, was 27% according to the both estimates (Table 2).

Table 2: Comparative Social Development Indicators

	Andhra Pradesh		Six states*		All India	
	1981	1991	1981	1991	1981	1991
Poverty (%) /a	43.6	26.6	44.2	23.0	48.3	25.5
Poverty (%) /b	40.0	27.2	47.4	35.3	51.8	39.3
Literacy (%) /c	35.7	44.1	48.1	55.6	43.7	52.1
Female literacy	24.2	32.7	34.0	42.4	29.8	39.3
Crude birth rate /d	31.6	25.8	30.4	27.8	33.8	29.9
Infant mortality /e	86.0	73.0	86.3	65.1	110.0	80.0
Sex ratio /f	975	972	964	935	935	927

*Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, and Tamil Nadu

a. population below poverty line in 1977/78 and 1987/88, official estimates
b population below poverty line in 1977/78 and 1987/88, Expert Group

estimates
c. for total population of seven years and older
d. per '000 population, three year moving averages
e. per '000 live births
f. females per 000 males
Source Planning Commission 1993: CMIE 1994

The National Scene

India has made remarkable progress in agriculture during the last thirty years. It produced more than 190 million tons of grains in 1996, three times the production of the country when this University was established. India also doubled the irrigated areas to about 60 million hectares at a cost of 85 billion dollars. The green revolution is spreading in many poor districts in north east India where poverty is stubborn and development is slow.

The race between poverty, hunger, and development in India is as challenging as ever.

Concerns about lagging agricultural production and rapid population growth, as well as inadequate food distribution systems, have focused the attention of the policy makers on the concept of food security. FAO defines food security as a "state of affairs where all people at all times have access to safe and nutritious food to maintain a healthy and active life" There are about 270 million who lack food security in India. Either they cannot grow enough food themselves, or they cannot afford to purchase enough in the domestic marketplace. As a result, they suffer from micronutrient and protein energy deficiencies in their diets.

Although the national economy probably produces enough food to feed 950 million people in India and even more, if it were distributed equitably, this food is not readily available to many millions of people. Natural resources, population, and agricultural production technologies are distributed unevenly around the country. Some regions produce more food than they need for domestic use, while others do not produce enough to assure access to adequate diets for all of their people. Thus better distribution of food is an essential component of any strategy to improve food security.

Population growth, along with changes in people's living standards and dietary preferences, largely determine changes in the demand for food. Throughout history societies have raced to keep the food supply equal to or ahead of population growth. The race has not always been won, as the history of widespread malnutrition and famines exists.

As living standards have risen in many parts of the India, more people have chosen to eat meat and dairy products regularly rather than to continue living almost entirely on grains such as rice, corn (maize), and wheat. As people consume meat and dairy products instead of consuming grain directly, more grain must be produced to maintain the same caloric value. When used to feed livestock, grain provides

humans less than half as much food energy as when consumed by people directly. Today nearly 40% of the world's grain production goes to feed livestock. This trend makes it more difficult to feed the world's poor, who often cannot afford to eat meat at all.

The Challenges Ahead

There are four major challenges for all of us who are working in the agricultural sector: reduce poverty, enhance economic growth, increase food supply to *meet* the needs in the developing countries which could double to meet its needs in the next generation, protect and reverse the environmental degradation of natural resources.

a. Reduce Poverty

In India more than 250 million people are compelled to live below the poverty line, which is defined as less than Rupees 40 a day. More than 150 million people are hungry. Many more are at risk of micronutrient deficiencies (vitamin A, iodine, and iron).

Despite urbanization, nearly three-quarters of the poor will continue to live in rural areas well into the next century, so it is crucial to address rural poverty now. The significant majority of the rural poor depend on agriculture for most of their meagre livelihoods. Others depend on associated nonfarm activities. Many of the rural poor live in regions where arable land is scarce, agricultural potential is low, and drought, floods, and environmental degradation are common. Of the nearly 250 million poor in India, 70 percent live in rural areas. Access to basic human needs-education, potable water, health care, and sanitation-is far less available in rural areas. The problems of malnutrition, low life expectancy, and high infant mortality are more severe in rural areas. Ensuring adequate growth of food supplies is therefore not enough. It matters where agricultural production takes place and who receives the associated income. Only if more rapid agricultural growth occurs in districts with impoverished rural populations, can rural farm and nonfarm incomes rise sufficiently to enable the rural poor to afford more and better food. And only if the many millions of men and women smallholders are equipped to participate in agricultural growth, will rural poverty be reduced and wages for unskilled labor rise in rural and urban areas. It is for this reason that efficient development strategy calls for further policy and institutional changes in serving the agricultural sector. The strategy should concentrate on development activities on the smallholder economy.

b. Agriculture must foster Economic Growth

No country has had a sustained impact on reducing poverty without continuing positive economic growth. For most developing countries agricultural growth is essential to economic growth. Very few low-income countries have achieved rapid non-agricultural growth without corresponding rapid agricultural growth. Most of the developing countries that grew rapidly during the 1980s experienced rapid agricultural growth in the preceding years. For example, China's

remarkable annual economic growth rate of 9.5 percent during the 1980s and 1990s was preceded by rural and agricultural policy reforms in the late 1970s and early 1980s. Indonesia and Thailand also experienced strong agricultural growth prior to the period of high non-agricultural growth, which continues today. Agricultural growth stimulates economic growth in non-agricultural sectors, which result in increased employment and reduced poverty. Sustained non-agricultural growth, particularly in the poorest countries, is not likely without first addressing agriculture. An adequate linkage of the rural and urban economies through the food marketing system is essential to foster growth of the national economy and sustainable growth of the rural economy.

c. Future increases in food supplies must come primarily from rising biological yields, rather than from area expansion and more irrigation.

Why? Because land and water are becoming increasingly scarce. Most new lands brought under cultivation are marginal and ecologically fragile, and cannot make up for the land being removed from cultivation each year because of urbanization and land degradation. The sources of water that can be developed cost-effectively for irrigation are nearly exhausted, and irrigation water will increasingly need to be reallocated for municipal and industrial use. Therefore, production on existing land will need to nearly double.

The challenge is world-wide, and both technological and political in nature. The technological challenge is enormous, requiring the development of new, high-productivity, environmentally sustainable production systems. It is not more of the same. Private firms must be induced to develop and apply much of the new technology required. However, there are large areas of technology development that are of little interest to the private sector, including subsistence crops or truly public goods, such as some aspects of natural resources management. It is here that public sector finance is critical -at international, national, and local levels. Yet, in many countries, research capacity and funding are stagnating or even declining. The political challenge has received much less attention. All major regions of the world must contribute to cost-effective and sustainable food supply growth. The challenge can be met only if international and domestic policies, institutional frame works, and public expenditure patterns are conducive to cost-effective and sustainable agricultural development. Otherwise, the required technologies will not be developed and adopted, the supportive infrastructure will not be built and maintained, land and water will not be allocated to their highest-valued uses, and farmer's will not have incentives to maintain and improve the natural resources on which their livelihoods depend.

But today several major regions and many developing countries are agricultural under performers or even dropouts. They have institutional frame works and agricultural polices that discriminate against the rural sector, under invest in technology development and dissemination, maintain inappropriate agrarian structures. lock up arable land in low-productive systems, undervalue natural resources and therefore waste them, seriously under invest in the health and education of their rural populations, discriminate against private sector initiatives in food marketing, and fail to maintain existing or invest in new rural infrastructure.

Unless, these policies, institutions and public expenditure patters are corrected the world will not have abundant food supplies, the major achievement of twentieth-century agriculture. Greater emphasis on agricultural development is needed and warranted as a prudent Investment that will provide them with significant benefits

d. Environmental degradation must be reversed

Hundreds of millions of private farmers, large and small, men and women, are the stewards of the vast majority of the globe's renewable natural resources, They recognize the importance of maintaining and enhancing their productivity, and , have ,shown that they can do so, given proper incentives. But the resources are severely undervalued by inappropriate accounting methods, policies, and institutional frameworks. Of the world's fresh water used by people, agriculture uses more than 70 percent for irrigation, Unsustainable agricultural practices are : major contributors to non-point source pollution. Deforestation remains a critical issue, with 25 hectares of forest being lost every minute. The global challenges of desertification, climate change, and loss of biodiversity require major efforts. If production per unit of land is to nearly double in the next 30 years, the policy and institutional failures that cause or contribute to the negative environmental impacts of agriculture must be reversed, and sustainable production systems developed, encouraged and applied.

These challenges are the focus of the Consultative Group for International Agricultural Research (CGIAR).

The Global context in which the CGIAR Functions

The CGIAR was established in 1971 in response to specific global circumstances, including predictions of widespread famine in South Asia: optimism about the capacity of newly-developed, high-yielding strains of rice and wheat to help raise productivity in rice and wheat etc, to unprecedented levels; and instill confidence among policymakers that sustained international agricultural research could make an invaluable contribution to development.

A Vision for the CGIAR

The goal of the CGIAR is to conduct research that will help liberate the deprived and disadvantaged from the grip of extreme poverty and hunger. The defining terms of the CGIAR's vision are: a healthier, better nourished human family; reduced pressure on fragile natural resources; and people-centered policies for sustainable development.

For the very poor, most of whom depend on land for their livelihood, the way forward is through increased agricultural productivity that does not degrade the natural resources based upon which productivity depends. Sustainable agriculture is at the core of human development. Research generates new technologies and knowledge that is drived during the development process while conserving natural resources.

The CGIAR is only one component of the global agricultural research system. Its effectiveness depends both upon the results of its research and on its role as a catalyst and bridge builder, creating and fostering productive partnerships. The research agenda of the CGIAR Centers have five major thrusts: increasing productivity; protecting the environment: saving biodiversity; improving policy; and fortifying national programs in developing countries.

The Contribution of CGIAR Centers

There are 16 international agricultural research Centers supported by the CGIAR System. The record of these Centers over the last 25 years illustrates the Centers' significant contributions to the development of most of the National Agricultural Research Systems. The activities of the Centers have generally complemented government activities and indeed, often provided essential services that would have been difficult to supply from other sources. The Centers research programs on particular commodities had a stimulating effect on national research spending on these same commodities in many countries, particularly for cereals and potato. The latter represent food crops as a commodity group important for smallholders, and a group that was perceived to be receiving too little attention in developing countries in the early 1980s. The interdisciplinary team approach used by the Centers to address the practical problems faced by farmers had been widely adopted. Center training programs and technical assistance had successfully transferred improved research methods to the National Agricultural Research Systems. The important impact was the Centers' contribution to encouraging national researchers toward solving farmers' problems by promoting a farming system perspective. Professional interaction between Center staff and national scientists in the regional programs sponsored by the Centers has provided substantial stimuli for better performance in the National Agricultural Research Systems, which has been reinforced by the development of networks for particular research interests or problem areas.

Note on Collaboration between ICRISAT and ANGRAU in Training and Fellowships Program

The collaboration between ICRISAT and ANGRAU has been a model for successful joint research and training between national and international agricultural research systems.

Continued and successful collaboration between ICRISAT and ANGRAU exists since 1977. This collaboration provides oppor1unities to the graduate students of ANGRAU to work as Research Scholars and to complete their thesis research at ICRISAT. While ICRISAT provided the research facilities and expertise of its Scientists for guiding students' research, ANGRAU has admitted ICRISAT nominees for the degree programs at ANGRAU. Thus, 107 graduate students from ANGRAU came to ICRISAT to do their thesis research. 39 for Ph D program and 68 for M.Sc. Degree course. Thirty- one candidates nominated by ICRISA T at the request of 11 countries' national programs were admitted by ANGRAU for either Ph D or M Sc. Degree courses. These Scholars came from Brazil (1), Ethiopia (3), Ghana (2), Iran

(1), Kenya (5), Mali (1), Mozambique (1), Somalia (10), Sudan (3), and one each from Thailand, Vietnam, and Yemen. These data reflect the strong relationship between ICRISAT and ANGRAU.

I look forward to further strengthen this valuable relationship, and to build strategic alliance with all of you, as you proceed to make your contribution to the challenges facing us in the years ahead.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
30th ANNUAL CONVOCATION

27th November 1998

Address by

Dr. Saiyed Raza Hashim
Member – Secretary, Planning Commission, New Delhi

Rajendranagar, Hyderabad – 500 030

Your Excellency Mr. Chancellor, Mr. Vice-Chancellor, Members of the Board of Management and Academic Council, Deans, Directors, Distinguished Guests, Students, Ladies and Gentlemen.

I am very happy to be here on the occasion of the Thirtieth Annual Convocation of Acharya N.G. Ranga Agricultural University, and I consider it an honour to be associated with this event. For the University it is an important annual event but for the students who are going to receive the degrees today, this event is a landmark in life. It is from here that a journey into the world of action and responsibilities begins. In part this would be a journey into coping up with the given situations and circumstances, but in good part this could also be a journey into shaping those situations and circumstances. The students who have had a good opportunity of gaining knowledge from an Institution like this University would, I suppose be able to devote a larger part of their work in shaping the future of this country along the desired lines. Let me congratulate you on receiving your well deserved honours, degrees and prizes, today.

Agriculture has been an important sector in our economy and it will continue to be important in future for employment, income, food security and poverty eradication. Technology is going to play an important role in our agricultural development. And it is through establishing a lead in relevant technology that we can contribute to the growth and development not only of agriculture but the entire economy. We need to appreciate the sustaining character of our agricultural economy and confront the problems and issues that are emerging, so that we are able to evolve a policy response that does justice to our individual aspirations and the collective potential as a nation, in a changing global and domestic economic environment.

The agriculture sector in India can be characterized as one dominated by peasant households. A gradual fragmentation of the land holdings has resulted in a continuous rise in the proportion of marginal and small farmers. The recent Agriculture Census indicates a drop in the average size of operational holdings from 2.3 hectares in 1970-71 to less than 1.6 hectares in 1990-91. There were as many as 107 million holdings in 1990-91. Of this, over 59 per cent of holdings were categorised as marginal, i.e. below one hectare. The small farmers, i.e. those operating on a holding of 1.0 to 2.0 hectares, accounted for about 19 per cent of all holdings. Thus, the marginal and the small holdings; together accounted for over 78 % of the total, operating 32.5 per cent of the area. As against this, the 'large farmers', i.e., those operating more than 10 hectares accounted for just 1.6 per cent of the holdings and only 17.3 per cent of the operational area.

An agricultural system dominated by marginal and small holdings, and under increasing pressure for raising productivity and production to maintain food security and to cope up with global competition, places, complex responsibilities on the policy regime. There is an argument that the removal of land ceiling on agricultural holdings would permit a reorganisation of agriculture on commercial lines so that scale economies could be exploited to push the economy on to a higher growth path. However, such suggestions have to be judiciously considered. To begin with, given

the operational holding structure, nearly 64 per cent of the work force is engaged in agriculture. While there will be some reduction in the proportion of employment in agriculture as the non-agricultural sectors, particularly because the services sector grows at a faster pace, the agriculture sector would continue to be the mainstay of the economy for quite some time, so far as the absorption of labour force is concerned, as labour absorption in relation to growth(employment elasticity) is much lower in non- agricultural sectors. Agriculture corporatisation will surely result in displacement of labour. In addition, the de-peasantisation, i.e., the transformation of small and marginal farmers into agricultural labour, that is inherent in such a process, is likely to have an adverse impact on the alleviation of poverty. It has been seen that the incidence of poverty is the highest among the landless agricultural labour. The small or a marginal farmer not only uses family labour intensively to consolidate his production gains but he also operates on the labour market to supplement his income. Land productivity of small and marginal farmer is very high because he uses labour very intensively. It is, therefore, essential to have a development strategy that does not impose a radical change on this land holding structure. Needless to say, our policy regime as well as agricultural research and technology has met this challenge quite successfully. The "Green Revolution" technology bundle comprising the high yield variety of seeds, chemical fertilizer and assured irrigation is "scale neutral". At the same time, recent research has demonstrated that unbundling of this package and its partial application along with the availability of credit has also brought about appreciable increases in crop yields.

It would be reasonable to suggest that while Indian agriculture is now moving on to a growth path of close to four per cent per annum as compared to a lower historical growth rate of around 2.7 per cent in food grains (and 3 per cent for agricultural sector as a whole), almost the entire expansion of output is explained by increase in crop yields. The contribution of growth in area, in the expansion of output, is almost negligible. Availability of land for agriculture may even decline in future. Hence the production growth in agriculture has to depend on productivity growth and has to be, necessarily, technologically driven. We have to plan for an output expansion that meets the demands of a growing population through the use of appropriate technology and, at the same time, ensure that such a technology permits the absorption of labour. In the present circumstances, this is possible only through a judicious approach to the diversification of Indian agriculture, both diversification in the cropping system and the regional diversification.

This brings us to yet another feature of Indian agriculture relating to the tremendous diversity in local resource endowments and agro- climatic conditions that prevail across the country. In the first phase of our agricultural development the immediate concern of the policy planner was to obtain a certain amount of self-sufficiency in the production of foodgrains, particularly when 'the west' had categorised India as a lost case -consigned to meet the' Malthusian prophecy' of large scale starvation. Hence, the focus was on meeting the requirement of cereals for a growing population, by concentrating on region and the crops that were most likely to yield the desired outcomes. In the process, though we did attain self-sufficiency in the production of foodgrains, at an aggregate level, it also meant overlooking the full utilisation of the diverse agro-climatic potentials. Regionally more

balanced development of agriculture also ensures better food security at the household level. Now, we are approaching the second phase of our food security planning when food security becomes the natural outcome of growth processes in agriculture and is sustained by an efficient and competitive production system.

Apart from its contribution to growth, our high priority to agriculture arises from two particular concerns, namely, the concern with the problem of poverty and the related issue of food security. Experience has shown that agricultural development has the most profound impact on poverty situation. Poverty has been brought to appreciably low levels only in those regions where agricultural productivity has increased. This is simply because agriculture is the industry of masses in true sense and directly and indirectly involves more than three-fourth of country's population.

Ensuring food security to the people of the country has been and remains an important objective of development strategy. Food security is based on two elements. One is availability of adequate food, in particular food grains, in the country. The other is people's capability to have an access to that food, which, in turn, depends on their income and the price of food grains. For ensuring food security, one has to work on both of these fronts. Adequate availability of food for a large country like India can only be based on near self-sufficiency in food production and by maintaining buffer stocks. Food supply can be balanced by imports only at the margin. Experience has shown that dependence on imports for large quantities may be quite risky especially in times of crises. Access to food is ensured by generating adequate employment opportunities and by moderating food prices. Our systems of public procurement for buffer stock operations as well as the public distribution system have been particularly important instruments in achieving the goal of food security. We have been operating this system at a substantial cost to the nation but this cost is justified more than adequately by the stability that this lends to the economy and the social system as a whole.

With an income elasticity of demand of most agricultural products around 0.5 or more, a population growth of about 2 per cent per annum and a per capita growth in income of 3.5 to 4 per cent per annum, was observed in recent years. Agricultural production has to expand at the rate of around 4 per cent per annum if we have to ensure a reasonable level of food security in a non-inflationary manner. Moreover, a faster rise in per capita income generates a growing demand for non-food items like sugar, milk, oil, eggs, vegetables and fruits and other non-food crops. The decade of eighties saw an almost doubling of per capita consumption of these items. Thus, we have to plan, not only, for a rising demand for food grains but also for a rapid expansion in the demand for non-food grains and non-crop based sectors like fishing. Domestic demand would continue to be the major source for growth, with external trade playing a role on the margin. Indian agricultural research will have to adjust to these trends.

Since 1950-51 we have grown by a little more than 2.5 times in numbers but our food grain production has gone up by almost four times. It today stands at nearly 200 million tonnes. This spectacular achievement in the expansion of food grain production is however not at all uniform either across crops or across the regions.

Thus, for instance, production of wheat has gone up by more than 10 times, that of rice by 4 times, of coarse cereals by about 2 times and of pulses by less than 2 times only. Similarly, one can easily identify few regions of high productivity -Punjab, Haryana, Western Uttar Pradesh, deltaic West Bengal and Coastal Andhra Pradesh, Tamil Nadu, Kerala, coastal and eastern Karnataka and parts of Maharashtra. These high productivity regions are skirted by medium productivity regions followed by regions of abysmally low agricultural productivity such as South Deccan and the middle Ganga plains. These imbalances in agricultural development have yielded significant changes in consumption patterns across the country. At the same time, through the impact of an expansion in agricultural production on employment opportunity, though, incidence of rural poverty has come do significantly over the years, yet pockets of chronic poverty remain. One-third of the Indian population subsists under the normatively defined food-poverty line. There are, however, some encouraging signs. A study commissioned by the Planning Commission and undertaken by Professor G.S. Bhalla of JNU brings out some very *interesting features of development of Indian agriculture since 1980. The period 1980 to 1995 marks a major departure from the earlier trend in several aspects. First, the -growth rate of the value of output not only accelerated during this period, it also spread to many states which had hitherto been left out. A most interesting development was the extension of the green revolution to the eastern region and rapid growth due to crop diversification in the central region. In addition, there was a revival of growth in the southern region. In the central region, many areas in Rajasthan and Madhya Pradesh, northern Maharashtra,* Andhra Pradesh and Karnataka, recorded high growth. .Despite a slow down, the north-western region continues to grow at a respectable rate.

Another important development during this period was that there was a distinct change in cropping patterns away from coarse cereals towards oilseeds and other commercial crops. This shift from coarse cereals to oilseeds was particularly strong in the central region but was also evident, though to a lesser extent, in the southern region. Again, there was a shift from coarse cereals to wheat and rice in the northwestern and the eastern region. However, agricultural growth and crop diversification was not accompanied by any significant change in labour force diversification. Although there was a visible decline in employment elasticity in agriculture, a large proportion of the labour force continues to depend on agriculture. During 1980-1995 there took place a significant increase in the productivity of (male) agricultural workers across all the regions of India. In most instances, the growth of output far exceeded the growth of labour force thereby resulting in rapid growth in male agricultural worker productivity. This is likely to lead to a much higher wage levels and incomes in large parts of India. This, in turn, has the potential of triggering a process of rapid growth in non-agricultural sectors through input, output and consumption linkages.

The Ninth Five Year Plan gives a very high priority to agriculture. In order to ensure food security and make India hunger free, a Special Action Plan is being formulated. A quantum jump is envisaged in the production of non-cereal food. To achieve the projected levels of production, a regionally differentiated strategy based on agro-climatic condition and resource availability has to be adopted. In high

productivity areas where there is high irrigation and high input use, the thrust will be on diversification of agriculture towards high value crops through creation of required infrastructure and establishment of linkages with agro-processing industry and exports. In low productivity-high potential areas like Eastern and North-Eastern States, the strategy would focus on flood control, drainage management, irrigation facilities, particularly minor irrigation, better input delivery system supported by extension. In low productivity areas of Central Plateau region where there is water scarcity, the emphasis will be on development of efficient water harvesting and conservation methods and technologies, suitable irrigation packages, watershed approach and appropriate farming systems which economise on water use. In the ecological fragile regions the strategy would be to develop ecologically sustainable systems of agriculture based on horticulture, social forestry, etc.

Besides developing infrastructure facilities and good input support system, the technology is going to be a major player in increasing the agriculture output. The State Agricultural Universities (SAUs) and ICAR Research Systems have indeed done a commendable work in developing location specific technologies. The Acharya N .G. Ranga Agricultural University has contributed significantly.

Adequate supports need to be provided to the research system so as to develop the modern technologies relevant to the present situations and future care. Technology is going to be the most important factor in future development. Information technology will also play a vital and crucial role in developmental activities, particularly agriculture sector. To provide adequate technology information to the farmers, the Krishi Vigyan Kendras (KVKs) will be opened in each and every district. Besides the modernisation and maintenance of agriculture research, infrastructure facilities would be given the required support. Agro-Climatic Regional Planning Units and Agro Information and Planning Bank setup by Planning Commission will develop region specific knowledge and information base with a view to reach out to the farmers, the planners and all other agents of development.

The human resource development for agriculture sector has .remained a neglected area in the past. A significant qualitative up gradation of human resources in agriculture research, extension, production system and in other related activities has to be achieved if agricultural development has to proceed at a faster pace. The ICAR and SA U s have to strengthen in-house manpower expertise for giving focused research attention in the areas of commercial agriculture such as floriculture and sericulture, establishment and maintenance of cool chain, modern post harvest and processing technologies, etc. For all these, the State Agricultural Universities have to playa major role and would have added responsibilities.

Agriculture has been a bright spot in our national performance. Still vast potentials of development exist in this sector. With the help of science and technology and with the most modern education in agriculture, we should be able to realise all that potentials for the benefit of our people. Young scientists and professionals have a lot to contribute. Let me wish you, young women and men, who have received degrees today, a bright and fruitful future. Nation depends on you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
31st ANNUAL CONVOCATION

Address by
Sri Ismail Serageldin
Chairman, CGIAR

Rajendranagar, Hyderabad – 500 030

Mr. Chancellor, Mr. Vice-Chancellor, Members of the Faculty, Graduates, Students and Staff, Distinguished Guests, Ladies and Gentlemen.

I feel a special affinity with the people of this great country. I feel privileged to be in a land ennobled by the touch of destiny. In that spirit, I am delighted to be in this 400-year-old city in a historic state, where pride in past achievements moulds easily with a vision of an equally great future. It is, I am told, a vision of a future in which Hyderabad is synonymous with Cyberabad, embracing the best of the new, and mastering the technology of the 21st century, soaring to new heights that excite the human spirit, but never breaking loose from its cultural moorings.

The arts and architecture of Andhra Pradesh, the world-renowned music and dance, the value placed on education, the development of agriculture and irrigation, and a deeply felt sense of scientific curiosity, define this state. Its people are known to be entrepreneurial, culturally vibrant, intellectually animated. Successful efforts by Andhra Pradesh to reduce poverty place it second among fifteen major Indian states in which poverty trends have recently been measured. Nevertheless like the rest of India, it continues to confront many complex challenges.

The self-fulfillment of all the people, Chief Minister Naidu has said, requires Andhra Pradesh to follow “a path of sustainable growth and development with a clear focus on enhancing the quality of life of the poorest segments” of society. In this quest, the role of Acharya N. G. Ranga Agricultural University (ANGRAU) is exceptional. ANGRAU is exceptional because of its:

Single-minded devotion to the “queen of the sciences”.

Commitment to using agricultural science to serve the needs of the poor and hungry.

Respect for indigenous knowledge as manifested for instance, in arrangements of each graduating class to live and work among farm families, absorbing their accumulated wisdom.

Direct support to farming communities, with over 8000 farm women and men benefiting annually from the work of the university’s Farmers, Science Centres and Agricultural Marketing Committees.

I am deeply touched and honored by the opportunity to join a distinguished line of predecessors who have delivered the commencement address at this university. We of the CGIAR respect ANGRAU’s consistent and successful efforts to be a center of learning that combines percept with practice. We are encouraged by the collaborative programs that the university has developed with ICRISAT and IRRI. Many more opportunities for working together lie ahead.

Allow me today to treat four themes:

The development challenge ahead:
The role of agricultural science in responding to this challenge
The future of agricultural research, and
The institutional and societal values that must govern the pursuit of scientific excellence.

The last set of issues is obviously challenged to the University tomorrow and its role in nurturing science for the benefit of humanity.

Development – India's Unfinished Agenda

My friends,

Gandhi once said that human development would truly be achieved only when all the resources of society have been successfully used to" wipe every tear from every eye". Inspired by this moving definition, independent India has formulated plans, adopted policies, and mobilized resources that were expected over the long term to help conquer hunger and poverty.

Despite, the persistent and evident poverty in India, the country's achievements are substantial. The most outstanding and significant of these has been the revolution in agricultural production that transformed an India that could not feed its 450 million inhabitants to an India that produces enough grain for the caloric coverage of 950 million persons and recording a surplus of 33 million tons of grain. This agricultural transformation prevented the famines predicted by the doomsayers of the 1960s, and remain, without question, one of the great human achievements of this century.

Here are the facts:

Cereals output in India has risen from 80 mill t (1966) to 221 mill t (1996) – an increase of 176 percent over 30 years.

Cereal yields increased by 156 percent over the same period.

India is the world's second largest producer of rice, after China.

Rice yields increased by 170 percent.

India is now the world's second largest wheat producer, behind China but ahead of the US.

Wheat yields increased by 167 percent.

Agricultural land under irrigation increased from 25.9 million ha (1964) to 48.0 million ha (1994) i.e., by 85.3 percent.

This remarkable transformation, largely on the same amount of land, was made possible by political will visionary policies, sound decision-making, effective policy implementation, the engagement of both the public and private

sector in a powerful national enterprise, and the crucial contribution of science and scientists.

India's scientists and their colleagues in the international agricultural research system produced new technologies that were used to increase the productivity of a quintet of crops selected for a special effort: rice, wheat, maize, sorghum, and pearl millet. The new technologies that caused an unprecedented upsurge in their productivity have their detractors whose concerns must be met, as we move into the next phase of agricultural development. But nothing, I repeat, nothing, can change or challenge the reality that application of the new technologies saved millions from starvation or death. For this, the credit goes to scientists and farmers.

As former Minister of Agriculture C. Subramanian, the father of modern agriculture in India, says: "Indian Scientists responded to the challenges in a magnificent way. More than that, the farmers were prepared to take risks. They were prepared to use new varieties. That is how the green revolution became a reality".

Remarkable as these achievements are, the persistence of hunger and malnutrition is an important reminder that production is a necessary but not sufficient condition to cope with food security and poverty reduction. Attacking these problems is a more complex task that requires a multi-dimensional perspective for food security is a physical, environment, economic and social issue. Food security is tied to poverty reduction. It is about:

not just production but also access
not just output but also process
not just technology but also policy
not just global but also national
not just national but also household
not just rural but also urban
not just quantity of food but also quality

All of these dimensions make the issues of food security part of a bigger whole where the contributions of many policies, disciplines, institutions and actors come together to confront the nexus of problems relating population growth, environmental sustainability, poverty reduction, agricultural production, distribution, marketing, credit and so many other factors leading to the empowerment of the poor, especially women.

So even as we celebrate our achievements we must confront our shortcomings. Much has been done, but much remains to be done.

India, despite its impressive achievements on many fronts, still faces formidable problems.

Large numbers of people remain trapped in the lowest depths of poverty. The percentage of poverty has declined, but the absolute number of

the very poor has increased. Some 312 million Indians remain below the poverty line, unable to procure the very basics of human existence. The oppressive burden of poverty is most seriously felt in rural India where three out of four Indians live. Some 77 percent of India's poor are rural.

Moreover, the heartening picture of progress presented by statistics of the "average" are distorted by the disparities that abound in India: between women and men, between castes, between city and countryside, between prospering and impoverished regions.

So, as I said, much has been done, but much more remains to be done.

Let me remind you of some disquieting realities:

Every minute 48 children are born in India: every minute the population increases by 42 people.

53 percent of India's children under five years of age are malnourished, suffering the pangs of silent hunger. 30 percent of the country's newborns are of low birth weight. India is second only to Bangladesh in the proportion of children malnourished.

Infant mortality rates are among the highest in the world, although they have dropped from 146 to 70 per thousand births between the 'fifties and the nineties'.

The maternal mortality rate of 437 per 1000 births accounts for a quarter of maternal deaths worldwide. More than half of India's women are anemic.

Life expectancy at birth has doubled since independence to 61 years – lower than many Southern countries including the Maldives and Sri Lanka.

The female literacy rate is 38 percent, approximately the same as in sub-Saharan Africa and less than half the rate in China.

Over 140 million hectares are affected by water and wind corrosion.

Over a million hectares are damaged each year as a result of shifting cultivation.

Environmental issues are mounting – falling ground water tables, salinization, water pollution etc.

Most forests are degraded and productivity is low. About one third of all forests have a crown density of less than 40 percent.

Thus, India having successfully responded to the challenge of productivity and production must now address the much more complex set of

inter-linked challenges that surround food security, poverty reduction and environmental conservation. This triple challenge also has agriculture and agricultural research at its center.

India is not alone in facing these challenge of the future. For the triple challenge is, indeed, universal. India, however, is unique – along with China – in that your success here will spell the chance for success in the rest of the world. Failure here will doom the vulnerable elsewhere, especially in the food importing countries of Africa. What Indian Scientists will do in transforming Indian agriculture in the next generation matters not only to India but to the world. A regression of India from surplus to deficit country would result in a price increase in internationally traded commodities with subsequent increases in food prices and enormous negative impacts on the poor everywhere.

The Critical Role of Agricultural Science

My friends,

I am not going to spend time explaining that agriculture in central to development and poverty reduction, it is. The evidence is overwhelming. Nor am I going to spend time enumerating and explaining the importance of sound policies, flexible and responsive institutions and all the other factors that produce a vibrant rural sector, which is the foundation of environmentally sustainable and socially equitable development. You know that already, I will however assert here that to respond effectively to the challenge of population growth, poverty, and food insecurity and environmental protection it is essential that the agricultural transformation of the next generation reach the small-holder farmer in the rural parts of India and indeed of all the developing countries. Without that, we will witness the paradox of continued production with hunger, continued economic growth with poverty, continued commercialization with marginalization.

Let me not go into details on this question of what kind of agricultural policies and actions will reach the small holder farmer and the rural poor. There are many parts to this picture from credit to access to land to technology to so many other factors. Rather, I want to focus on one part of that complex picture. The part that confronts this community more than any other: the challenge to Agricultural Research and how it must transform itself it is to help transform agriculture in the future.

Even with effective policies, responsive institutions and a proactive outreach program to provide the poor with access to financial services, agricultural renewal will not occur if the technology of agriculture does not change. It is here that the importance of agriculture research is crucial. The challenges facing global agricultural science in the next century are arguably greater than at any previous time. After the next generation, all indications are that demographic pressure will begin to subside, and that with the generation after that we will be moving towards a stable world population. In the meantime, the world will have acquired an additional three billion persons,

and India will have probably acquired an additional 500 million persons. 500 million additional mouths to feed, from the same amount of land and water! Nobel laureate Norman Borlaug calculates that to meet projected food demands, by 2025 the average yield of all cereals must be 80 percent higher than the average yield in 1990.

These enormous global and national challenges must be met in an international political environment which is a dangerous mix of complacency, fiscal constraints, and fundamental disagreements. There is a lack of appreciation of the need to support – both nationally and internationally – public goods research, that which by definition will not be done by the private sector but which remains of enormous long-term importance.

I am therefore delighted to see here today, my friend Dr. Paroda, who has made a remarkable effort to strengthen the Indian National Agricultural Research System, an effort that the World Bank has also supported. Sir, I salute your enormous efforts and achievements in that important enterprise.

The Future of Agricultural Research

The world requires redoubled efforts to improve plants, encourage better farming techniques, including prudent management of soil and water resources, so as to meet the ever increasing food needs of a growing population without reliance on excess use of chemical additives. This can be achieved only through more and better research. There is no doubt that if humanity does not invest adequately in research, productivity increases will not occur. But it is not just more research, and not even more high quality research that is need. It is research that involves all the actors in this domain. Agricultural research, as has been shown by this university, must involve the farmers in the fields, the NGOs, the universities, the national and international public and private sectors. Each has a distinctive contribution to make. They must all be linked to a common purpose, a true coalition of the caring.

We must also ask what kind of research is required if we are to achieve sustainable productivity increases that benefit the small holder farmer. Towards this end, let me suggest that we need a double shift in the research paradigm.

The first shift is the contextualization of crop research. This is well known to all of us, but has not yet been achieved: that is the integration of the crop specific research, which has been so successful in the past, into a broader more holistic vision that brings in the concepts of sustainability, and looks to achieving results through increasing the productivity and profitability of complex farming systems at the small holder level. It involves recognizing the synergies between the management of livestock, agro forestry, food and cash crops, and aquaculture – all on a hectare or so. It involves integrated management of soil, water and nutrients. It involves working with nature rather than against it. Integrated pest management and attention to post harvest losses. It involves attention to the socio-economic realities of the farmers themselves, with adequate attention to gender issues.

This holistic approach that contextualizes the more focused crop specific research is going to be essential to achieve rapid adoption on the ground with concomitant transformation of the agricultural reality in India and throughout the developing world. The task is to intensify small-scale complex agricultural production systems sustainably, while preventing damage to natural resources and biodiversity and improving the welfare of farmers. Doubling the yields of complex farming systems in an environmentally positive manner is a challenge that will not be easy to meet. It is even harder than pushing the yield frontier on a particular corp. But without daunting challenges sciences dies.

The second shift is to harness the genetic revolution. We must utilize the most cutting edge work associated with genetic mapping; molecular markers and biotechnology to accelerate the breeding process and achieve the promise of all that science can do for the poor and the environment. This revolution in the biological sciences has both promise and problems. We must find ways for realizing the promise while avoid the pitfalls.

Biotechnology – one of many tools of agricultural research and development – could support the mission of environmental protection, poverty, reduction and food security by helping to promote a sustainable agriculture centered on the small-holder farmer in the developing countries.

Biotechnology has become a lightening rod for an increasingly visceral debate with opposing factions making strong claims of promise and of peril. Allow me to be more dispassionate in a discourse that befits scientists.

First, biotechnology is a continuum of activities, many of which are so routinely incorporated in current research and practice that they elicit no quarrel. From genetic mapping to tissue culture to marker assisted selection in breeding, much of this is being done routinely. Although as a parenthesis, I would emphasize the need to phase out anti-biotic markers rapidly. Rather it is the engineering of transgenic crops, the insertion of new genes into a plant that is the issue, and it does indeed raise a host of ethical, safety and Intellectual property issues. These need to be addressed without losing sight of the potential benefits of the new technologies.

The promise of biotechnology as an instrument of development lies in its capacity to improve the quality and quantity of crops and livestock, swiftly and effectively. The time required to identify and eliminate unfavorable traits through traditional crop breeding is greatly reduced. Hit-or-miss concerns are diminished. Increased precision in plant breeding translates into improved predictability of the resulting products in desirable areas, such as performance and survival.

These advantages have already been used to meet four specific goals, says a study on transgenic crops by a distinguished international panel chaired by Noble laureate Henry Kendall. They have enabled scientists and

farms to: Change product characterizes, such as the starch content of potatoes: Improve plant resistance to pests and pathogens that afflict a variety of staple food crops including corn and rice; Increase output by exploiting hybrid vigor, delaying crop senescence so that they would produce food beyond the period when a non-transformed plant is productive, and by inducing early flowering: and Improve the nutritional value of foods.

That's on the productivity side. The Kendall Report points out that the potential promise of agricultural biotechnology for natural resources conservation and sustainability could also be important. For instance, the development of disease and insect resistant crop varieties and micro-organisms for bio-fertilizer production cause less dependence on chemical pesticides and fertilizers; Increased production/ productivity resulting from improved crop protection will reduce the need to open new areas (e.g. forest lands, fragile lands) for agricultural production; and Genetically engineered plant can hyper-accumulate toxic elements/ substances from problem soils.

In 1998, the global area of transgenic crops increased by 250% to 27.8 million ha. from 11.0 million ha. in 1997. The US led the field in 1998, as before, with 20.5 million ha. of transgenic crops representing 74 percent of the global area, followed by Argentina – 4.3 million ha. (15 percent), Canada – 2.8 million ha. (10 percent), Australia – 1 million ha (1 percent) and Mexico, Spain, France and South Africa each with <0.1 million ha. (less than 1 percent). Some 84 percent of the World's transgenic crops were grown in OECD countries, about the same as in 1997 (86 percent). The five principal transgenic crops grown in 1998 were (in descending order) soybean, corn/maize, cotton, canola/rapeseed, and potato. More flexibility in terms of crop management (particularly important for herbicide tolerant crops),decreased dependency on conventional insecticides and herbicides, higher yields and cleaner and higher grade of grain/end product.

Global sales from transgenic crops were estimated at $75 million in 1995. Sales tripled in 1996 and again in 1997 to reach $ 235 million and $ 670 million respectively, and doubled in 1998 to an estimated value between $1.2 and $ 1.5 billion. Thus, revenues from transgenic crops have increased by approximately twenty fold in the four year period 1995 to 1998. The global market for transgenic crops is projected to increase to $3 billion or more in 2000, to $ 6 billion in 2005, and to $20 billion in 2010. Biotechnology driven consolidations in the form of acquisitions, mergers and alliances continue to be a dominant feature of the biotechnology industry. In the last three years alone, corporations commercializing transgenic crops and involved with seeds, agricultural chemicals, and the life sciences have been engaged in more than 25 major acquisitions and alliances valued at $ 15 billion, and this consolidation is expected to continue.

So, the biotechnology revolution is here. It is relevant to the problems of the world. But for many of us, it raises important questions relating to ethics, intellectual property rights and bio safety. Protects have been made against the spread of biotechnology and protect movements have developed in many parts of the world: for example, Kenya and Zimbabwe in Africa:

Bangladesh, India, Indonesia, Malaysia, the Philippines, and Sri Lanka (Asia); Denmark, Germany, the Netherlands, Sweden, and the UK (Europe); Argentina, Chile, Ecuador and Peru (Latin America); Canada and the US (North America); and Australia.

Some of the concerns come from Scientists who fear that "novel" products will destroy agricultural diversity thus changing agricultural patterns into unrecognizable and uncontrollable forms. Many protests have been made by civil society institutions on ethical or ecological grounds. The dominance of the private sector has raised fears that this will create a new phase of comparative disadvantage and increase dependency in the South.

Also very much at issue are patenting and intellectual property rights (IPR). Supporters of patenting point out that if the private sector is to mobilize and invest large sums of money in agro bio technology R and D it has a powerful claim to protecting and recouping what it has put into the exercise. On the other side of the argument is the fear that patenting and the exercise of IPR will lead to a monopolization of knowledge, restricted access to germplasm, controls over the research process, a selectivity in the focus of research, thereby, increasing marginalization of the majority of the world's population.

These concerns cannot and must not be ignored. Effective regulatory mechanisms and safeguards need to be universally installed so that the impact of agro biotechnology is both productive and benign. The critical issue is that every instrument of agricultural transformation should be mobilized in our efforts to feed the hungry and help the poor.

Take the so-called Terminator Gene Technology. In the CGIAR, we have announced that we would not release any germplasm that contained technologies that would prevent small-holder farmers from holding and replanting seeds. We are, in fact, doing the opposite. We are pursuing the apomictic gene to assist small holder farmers replant hybrids.

But this does not mean that we should ban study of the terminator technology. It is certainly legitimate to study the sophisticated science of the terminator technology, and learn from it, or seek out possible benign applications of that technology, such as a platform that would bond novel transgenes in desirable varieties thus providing protection against their potential escape through unwanted gene flow.

On the other hand, we should also be careful of the long-term effect of technologies, even if their application is benign. For example, if terminator technologies were to become very widespread, even if economically feasible and advantageous to the small holder farmer, what would become of the constant introduction of variability that farmers bring into the gene pool of interesting plants through their localized activities?

I have no answers to any of these questions, but I believe that it is the function of science and scientists to explore them. In these explorations we should be guided by ethical and safety principles, while still respecting the right of the private sector to earn decent return on investments. We should seek to ensure that the benefits of new technologies are harnessed to help the poor out of their misery, and we should be watchful to remain true environmental stewards of the earth.

Knowledge is the key that will open the door for wise an safe access to all new technologies. We must all work together to ensure that knowledge is a source of improvement and empowerment, and not an instrument to entrench and aggravate inequity.

This question of knowledge, its production, assimilation and mobilization for the tasks of humanity and the world is the last theme that I wanted to address with you today. For if the preceding discussion of the double shift in the research paradigm addressed the content or a program of research, the challenge is going to be increasingly to create the climate and values in which the excellence of the research is guaranteed. That is the most important challenge to Universities such as yours, and to the institutions of agricultural research you will be going to whether they are public or private.

The Values of Science

We live in a world where the rising inequities between the rich and the poor are everywhere, nationally and internationally. But these inequities are probably even more acute in the domain of knowledge, at a time when the world is hurtling towards the information-based society.

There is a vast and growing gap in the production and availability of scientists and engineers between the North and the South (3800 per million population in the USA vs. less than 200 in the South, as of 1990). This is purely on the quantitative side, and does not speak of the quality of the training or the resources at the disposal of the scientists. In addition, scientists in the developing countries suffer from problems of access, visibility and recognition.

Ill-equipped as we are, we are confronted by an amazing information explosion. Matching this information explosion is the explosion in computing and communications. Today, more than a billion e-mail messages pass between 50 million users, and the volume of traffic on the Internet is doubling every 10 months. Sales on the internet are predicted to reach 5% of all sales during the next decade… a sum of over $3 trillion! (Economic Times - February 5, 1999).

Conclusion

What can India do? Very much. One out of every six persons on earth is Indian. India is a leader of the South, with the capacity to blaze trails that others will follow. Your success is the key to global success.

The Indian agricultural research community commands international respect. All of you – students, teachers, graduates, administrators – are part of that community. Once more, for the next generation, you face the challenge of turning science into a dynamic instrument of societal progress. For all of us, whatever our calling, depend on agricultural science. We are all the guests of the green plants and those tend them: and the animals who use them.

But mobilizing science is not jut a matter of brandishing new technologies. Jawaharlal Nehru made the point clearly when he said in 1961:

"Modern technology is not just a matter of getting a tool and using it. Modern technology follows modern thinking. You can't get hold of a modern tool and have an ancient mind. It won't work".

Will you today recommit yourselves to nurturing in your work and in your lives the scientific values that can serve as the key which will open the door to vistas of progress? I am confident that you will. So, let us all use our resources, harness our intellect, and direct our knowledge to reach that promised land when hopes are fulfilled and aspirations are met. Let us, together, commit ourselves to build a world of which Gandhi would be proud, in which truly every tear is wiped from every eye. It can be done. It must be done. It will be done.

Thank you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
32nd ANNUAL CONVOCATION

15th February 2000

Address by

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Plant Biotechnology: Research and application for Sustainability and Welfare of Humankind -A Millennium Goal

Namaskaram and "Shubodayam"

Hon'ble Chancellor, Mr. Vice-Chancellor, members of senate, faculty, other guests and my dear students, I extend my heartiest congratulations to all those who are getting their degrees and meritorious awards today. Na Shuba Ashishlu; my best wishes and greetings.

It is my proud privilege to address this convocation of which, I thank, the Hon'ble Chancellor and the Vice-Chancellor most respectfully. Convocation is a unique event in one's academic career. I can feel the excitement, the thrill of receiving the degree as also those who get meritorious awards. It is this feeling which becomes an inspiration for our future efforts. I am sure my dear young students, you would kindly appreciate that rewards and distinctions are meant to enthuse in all of you -a sense of commitment, a desire and motivation for better performance.

Beautiful and historic city of Hyderabad today is buzzing with scientific activities. On the one hand, we see a major transformation in terms of information technology developments and on the other hand, there are traditional universities and research institutions along with many modern institutions which are engaged in most advanced research covering all disciplines of science & technology. I am very confident that the way the city has embraced the information technology, very soon it will also become a major player in the field of second most important area for the next century i.e., Biotechnology.

The subject area for this address has three components i.e. plants, biotechnology and sustainability of the research and application efforts to benefit the humankind; considering these as major goals for the present millennium, I will illustrate my ideas with some examples.

Plant resources

Plants have been an integral part of humankind going back to 2500 BC. Even our vedic literature has references to the plants. As given in Sam Veda: (0 God, bring peace to us, comfort to our cows and horses and to our people. Ensure peaceful growth and development for our herbs and plants).

There are 13-14 million species constituting the global bioresources and about 1.75 million have been identified and described. We are aware that unicellular organisms have genes ranging between 100 to few hundreds depicting the enormity of magnitude of genetic diversity harboured by these species.

India is rated as 10th amongst the plant rich countries and has the 4th position in Asia. We are a centre of agrodiversity and we harbour more than 50% of the world's plant species occurring mostly in our forests or outside them. There are

about 47,000 species of plants estimated. The Indian Gene Centre represents one of the 8 important Vavilovian centres of origin of crop plant diversity and cultivated plants and their wild relatives. It is immensely rich in medicinal and aromatic plants. There are about 20,000 species of angiosperms and 9500 species of ethnobotanical importance.

Biotechnology

As per the European Federation, Biotechnology is regarded as the integration of natural resources and engineering in order to achieve the application of microorganisms as well as parts thereof and molecular analogues for products and services. The application of cellular and molecular biology, the principles of genetics and plant breeding and recombinant DNA technology to understand the plants, their basic functioning and how they can be modified has opened up entirely new vistas for research & development. It is with this, we are obtaining improved plant products with desired traits. Isolation of genes for abundant proteins, combining molecular genetics and chromosome maps, understanding the evolutionary relationship of the members of the plant kingdom would enable the scientists to co-relate the responsibility of a plant to pathogen or to abiotic and biotic stresses in terms of set of proteins and genes. With the advent of the techniques of molecular fingerprinting, research in genomics and proteomics, the field of biotechnology has advanced very fast. With this knowledge, it would be possible to break the barriers of fertilization to allow the transfer of a desired character from one plant or organism to another plant. The scientists can identify appropriate determinants of male sterility; we can extend the benefit of hybrid seed technology to many crops of importance. It is the utilization of hybrid vigour, research on apomixis and many other areas that we can translate plant biotechnology research for the benefit of the farmers. According to P .H. Abelson (former Editor-in-Chief, 'Science), the genomic revolution is paving the way to a Third Technological Revolution. It's genesis lies in the application of rDNA technology to solve biological problems. The work of Arabidopsis genome, Rice genome and many other important plant speices has already shown the way for new applications of plant biotechnology specially the gene technology. It is through such innovative research, the country is preparing towards a plant genome based industrial development.

The Nobel Prize discovery of the double helix structure i.e. the self-replicating genetic material DNA with double helix and complementary strands is the key to molecular biology and the work of Watson and Crick found the answer to this question: "How genes replicate and carry the information" (History of Molecular Biology -Michel Morange). It is very beautifully described in this book that what is molecular biology in the life ,sciences. At the end, it is written that the molecular biologists will have to rediscover the complexity and richness of the living world while the evolutionary biologists will have to acquire the new disciplines, tools and concepts. This conversion, feels the author, will be one of the major scientific events of the early 21st Century.

Sustainable Development

The word sustainable development came from the Commission on Environment and Development which defined it as the Development that meets the needs of the person without compromising the ability of future generations to meet their needs. Biotechnological research and application on a sustainable pathway in harmony with environment would be the goal of the scientists for the 21st Century.
With a strong and diverse infrastructure for research in plant biotechnology and the needed human resource, several important genes have been isolated, transformation achieved, cloning and sequencing of at least six genes done and a large number of transgenics have been developed specially *Brassica Juncea* with barnase and barstar genes. A major initiative to develop transgenics in cotton, rice, moongbean and tomato for resistance to biotic stresses has been launched by the Department of Biotechnology. These are important not only from the view point of the product and process development but for preparing ourselves for the new millennium to meet the challenges of food and nutritional security.
In the middle of the 20th century, famines were a common phenomenon in many countries in Asia and Africa. Now they have become memories of the past. India is a good example; every time the monsoons failed, we paid through loss of millions of lives, human and livestocks. The last famine was in 1943-44 in Bengal when around 15 lakh people died of hunger. The situation changed dramatically after independence. Our greatest achievement was becoming self-sufficient in food production.

The agricultural scientists have made significant contributions in ushering this revolution to feed millions and made us food sufficient. Agriculture sector in India supports 70% of our population which will stand at 1 billion mark in May this year; world population has reached 6 billion. The land holdings are small and because of continuous population growth they will further be differentiated. The carrying capacity of the land is limited world over. New technology, new outlook and new scientific tools are required to solve such emerging problems in future.

Acharya N.G. Ranga Agricultural University established in 1964 has played a key role in attaining quantum jump in agriculture production in the state of Andhra Pradesh because of the dedicated work of AP AU scientists. Agricultural productivity has shown an increase over the years, especially rice, groundnut, tobacco, sorghum. Today Andhra Pradesh occupies the third position in rice production in the country and also enjoys a distinct advantage for certified seed production. The scientists in this University are today certainly in the driving seat with a determination to bring about major transformation in the agriculture productivity and efficiency.

Sustainable development is a common goal world over, of scientists, administrators and planners and finally that of States. Among the broad range of technologies with the potential to reach the goal of sustainability, biotechnology in food production, renewable raw material and energy, population 'control and bioremediation are key players. However, in some cases the environmental impact of bio- technological applications has been misjudged; in other cases, expectations are too high. We need a balanced outlook based on scientific facts.

How it can be achieved? Already, a whole range of technologies have been developed or adapted; renewable energy systems; new materials; environment - friendly chemicals; transport and processing systems; and new monitoring and evaluation methods. **Biotechnology** -and its tools could play a major role in most of these areas: sustainable food production; renewable materials and bioremediation.

Sustainable food production

The projected world human population of 6.17; 8.35 and 11.00 billion by 2000, 2025 and 2050 AD would require for greater vertical agricultural growth through almost 100% productivity enhancement in the next 50 years; an area expansion at a rate of about 2.6% would no longer be contributing to same extent as we go along. The same would be true for Indian population that is likely to cross 1500 million mark by 2050 AD. In 1978, when essay on population by Thomas Malthus was published, global population was 930 million. The challenges are formidable. Approximately 42% of crop productivity is lost to competitions with weeds and to pests and pathogens and many crop varieties have nearly reached their biological and physical limits of productivity. Thus potential key contributions from biotechnology research to remedy this situation would be:

* Producing more food on the same area of land, reducing pressure to expand into the wilderness, rain forests and marginal lands, which support biodiversity and vital ecosystems.

* Reducing post-harvest losses and improving the quality of fresh and processed foods, thus boosting the realized nutritional yield per acre.

*Displacing resource and energy intensive inputs, such as fuel, fertilizers or pesticides, thus reducing unintended impact on the environment and allowing those resources to be used for other purposes or to be conserved for future.

* Adoption of sustainable practices such as conservation tillage, precision agriculture and integrated crop management.

Plant biotechnology would help to develop crop plants with inherent resistance to drought or salt. A special challenge is also to develop plants that do not exhaust the soil fertility.

Over the next 8-10 years, it is likely that many important plant genomes will be completed, sequenced and the function of a large number of genes regulating plant development will be analyzed. Genes responsible for resistance to agronomically important pests, fungi, bacteria and viruses will be isolated and exploited in agriculture. Seeds with commercially valuable oils, proteins and starches will be developed, and such transgenic "crops will be assimilated into agriculture. Therefore, many plants will be created to offer new options to consumers and industries; this will lead to the development of a more environmentally friendly agriculture with novel crop architecture.

Biotechnology companies are now investing billions of dollars in consolidating to ensure access to the rapidly growing markets, all the while investing billions in further research and development. The public debate about the future of agricultural biotechnology is more mature today as the public has become better informed and sees more clearly the benefits and risks associated with biotechnology.

The speed with which this new technology is being commercialized is amazing. In 1996, there were 1.7 million hectares of transgenic crops. There were 11 million hectares in 1997, and about 28 million hectares have been planted in 1998. In 1999, the global area of transgenic crops has increased to 40 million ha. which is 44 % more over the previous year. The global sale of transgenic crop products has increased from 75 million US dollar in 1995 to 235 million US dollar in 1997 and is excepted to grow to 15 billion US dollar by 2010.
Future efforts in the genetic engineering of plants should be focused towards the two main areas:

i) Modifying plants for food use: **For this we need R&D for: .**

* Productivity enhancement
* Reducing crop losses due to biotic and abiotic stresses
* Reducing post-harvest losses
* Development of value added food products

ii) Developing value-added food products: **Research will be necessary on :**

* Altering the fatty acid composition in vegetable oils
* Improving protein quantity and quality
* Increasing the starch content
* Increasing the vitamin content in plants
* Edible vaccines

The Department of Biotechnology has made concerted efforts in supporting various programmes in the area of plant biotechnology since 1990. Initially six centres for Plant Molecular Biology were established to generate trained human resource. Efforts have been initiated in identified areas of relevance to our country in plant genome research. Also to utilize the molecular biology tools to identify important genes and to manipulate these to generate transgenic plants with novel traits, a National Centre for Plant Genome Research (NCPGR) has been set up at JNU, New Delhi recently. We are also planning to join the International RiceGenome Sequencing Programme in collaboration with ICAR.

Chromosome number 11 has been choosen because it carries genes for a number of Important agronomical traits. The project would help accumulate fundamental data, the application of which will help to produce genetically modified rice plants. Our participation in the programme would lead us to acquire technology associated with high volume sequencing project, the use of which could be extended to many other crop improvement programmes. Science is international and we must benefit from all types of research efforts which would take India to a "new development agenda" based on principles of modern science.

We are concerned about the excessive use of pesticides which is detrimental to sustainable development. A whole range of alternative solutions to control plant pests are available; natural predators and pathogens, biopesticides, insect derived chemicals such as pheromones. Also engineering of insecticidal genes from *Bacillus* into crop plants has been carried out successfully in the last couple of years. In 1998, 22% of the area planted with maize in USA consisted of Bt crop. The true solution in my view is a combination of various biocontrol means and traditional methods, such as alternating crops, growing different plant speices together, creating refuges and using agrochemicals in moderate amounts. In conjunction with this, it is equally important to develop biofertilizers, use the nature's microorganism factory for providing the needed Nitrogen to plants. An integrated Nutrient Management approach based on formulations developed through traditional and new biotechnologies is called for on a large scale.

Plant Tissue Culture

Plant tissue culture has now gradually become a commercial venture with the creation of a strong research base. A number of R&D projects have been supported in Universities / research institutions for developing production oriented protocols for complete regeneration of economically important crop plants; forest trees, horticulture and plantation crops. Forest trees include many high yielding agroforestry species. Protocols are available for nearly 20 species -important ones being teak, bamboo, eucalyptus, popular, coffee, pepper, cocoa, tea, saffron, sugarcane etc. Six region specific hardening units have been established in arid zone, temperate and eastern zone. Two tissue culture pilot plants (TCPP) have been set up for demonstration of large scale micropropagation of elite forest trees through tissue culture and over 50 lakhs plantlets produced and field demonstrated in 5000 ha. in 17 states. Now the TCPPs have been converted to micropropagation Technology Parks(MTP). The MTPs are an effective platform for transfer of proven technologies to the enterpreneurs. A number of technologies have been transferred to the industry. The department has recently approved a National Facility for Virus Testing and Quality Control of Tissue Culture raised plants to ensure that the planting material supplied is healthy and true to type.

Biological control of plant pests:

The concept of integrated Pest Management (IPM) has emerged with increasing realisation of the importance of. sustainable agriculture. Biological control fits very well in the IPM concept of plant protection. Many leads have emerged and taken up for large scale production of biocontrol agents. The efficacy of different biopesticides has been successfully demonstrated in area of 60,000 ha. covering important crops like cotton, rice, chickpea, sugarcane, groundnut, sunflower, safflower, black gram, pigeonpea, green gram and other pulses, cauliflower, tomato and other vegetables. Popularization of biopesticides technology is an important component of the programme and as such several workshop-cum-farmers melas were organized in different states. About 20,000 farmers have benefited by attending the training programme and demonstrations.

Biofertilizers:

A Systematic impetus for research and technology development to this area has given a big push to new technological interventions and large scale demonstrations in the farmers field. High nitrogen fixing strains of rhizobia and blue-green algae suitable for various crops and agro-climatic regions have been isolated and their efficacy has been demonstrated in field conditions. The increase in paddy yield with application of blue-green algae ranged from 13-16.67%, whereas in pulses and oilseed crops, application of rhizobium resulted in yield increase in order of 5-13.5%. A network programme on 'Integrated Use of Biofertilizers in Nutrient Management' for specific cropping systems prevalent in the various agroclimatic zones in the country has been taken up. A technology has been developed for mass production of Endo-mycorrhiza and transferred to a company for commercialisation.

Renewable raw materials

All materials of organic origin are of major importance to sustainable development, simply because they are renewable, as opposed to non-organic materials(metals, minerals) and fossil carbohydrates. Each year approximately 170 billion -200 billion tons of biomass is grown, of which no more than 3 % is used directly by humans: 2 billion tons of wood, 1.8 billion tons of cereals, 2 billion tons of other crop plants. Renewable materials will replace non-renewable materials on a large scale in the 21st century.

The growing of plants for industrial uses(e.g. oils, fats, fibres) is certainly not a new concept. In developing countries, they are an important source of export earnings, although they compete with food crops for arable land and water. In industrialized countries, plants for non-food uses are considered to be alternative outlets for the use of fallow land. In Europe, 6 % of maize, 1.8 % of sugar, 18% of molasses, 6% of oil plants and 1.5-2% of milk proteins are used for non-food purposes.

Plant-derived products, such as starch, sugar, oil, fatty and other acids, enzymes, cellulose and proteins are already used in cosmetics, detergents, solvents and as plastic additives, lubricants, textiles, soil conditioners and other industrial products. The use of such bioproducts has considerable impact on the society in terms of energy saving and waste reduction. One example is the use of degradable ink from soybeans for printing, which makes paper recycling cheaper.

Biofuels are considered to be an alternative source to fossil fuels, although fossil fuels cannot be completely replaced by them as there. is insufficient arable land to meet the total energy requirement. Examples of biofuels include:

- ethanol obtained by fermentation from plants rich in sugar and starch (e.g. beets, cereals, potatoes);
- the ethanol derivative ethyl-tertiary-butyl ether (ETBE);
- methanol from oil plants (such as rapeseed);
- organic wastes; and wood.

Bioremediation

Bioremediation is a very promising money spinner world over, specially in developed countries. Numerous laboratory trials have demonstrated the capability of microorganisms in biodegradation and biosorption. Genetic engineering can certainly improve microorganism's efficiency, whereas the maximum use of their capabilities presumably can only be achieved under the controlled conditions of bioreactors. Plants have shown to have the capacity to absorb heavy metals. Examples include *Thlaspi* sps (Cadmium and lead); *Zea mays and Alyssuns* (lead and nickel). The normal accumulation level of plants varies from 0.1 to 100 mg (per kg plant mass), in exceptional cases, 1-3% can be reached. In the case of oil spills, the complex nature of crude oil demands the application of various microbial strains. Although over 30 general of oil degrading bacteria and fungi have been identified, it is still difficult to produce the right microorganism balance for each type of oil.

Biosafety and awareness

There is immense need to develop biosafety protocols for transgenic research and field trials and also strengthen the toxicology testing centres, particularly in the developing countries. It is essential for the scientists to play a pro-active role and systematically conduct animal trials and human trials on the safety of the genetically modified (GM) foods. Environmental and health hazards need to be addressed. One has to ensure proper implementation of biosafety protocols which are available in the country. It is also absolutely essential to create awareness in public; organise public forums, lectures, workshop etc. on the impact of new technologies. Removing the fear from public and giving a clear perception to people is necessary. In this rapidly advancing information -communication age, it is not at all difficult.

How do we proceed

For ensuring food security two aspects which need to be taken note of are : i) the food availability, and (ii) nutritional security. Bioengineering and gene technologies are paving way to develop transgenic varieties which will bring about enhanced productivity as well as improved nutritional quality. A glaring example is the recent work carried out by a Swiss scientist Ingo Potrykus in producing transgenic rice which will reduce the Vitamin A deficiency, affecting 40 million children and iron deficiency affecting 1.4 billion women in the world.

Having the necessary expertise and the tools of biotechnology available to the scientists, biotechnology is well poised to ensure food security for the 21st century. How are we going to do this unless we bring about a total shift in the agricultural research paradigm. On the one hand we recognise that biotechnology research would enable us to bring about poverty reduction, environmental conservation and a pathway of sustainable development, specially in the developing countries; however, on the other hand, many questions and concerns have also been raised with regard to ethical, biosafety, IPR issues. Even a small group of scientific community has a fear that novel approaches and genetic engineering may probably destroy the

agricultural diversity. Therefore, we have to take note of these and proceed on the basis of a clear understanding of the science, environmental aspects, ethical and biosafety regulations. It certainly would be important to develop new partnerships, new teams and introduce an interdisciplinary approach. We will also have ,to move fast, keep note of what is happening elsewhere in the world. But our approach has to be specific to the Indian problem. We will need to generate enormous scientific data, analyse them and then make use of these for policy decisions. A marker assisted, molecular breeding programme would be certainly beneficial.

A judicious approach for strategic research, product planning and effective collaboration will help to support biotech growth in India.- Partnership with global biotech industries would have a major impact on India's own business markets i.e. agribusiness. Our research technology base will continue to develop its strengths in high tech areas such as biotech and info tech, such endeavours would bring about a crucial transition from bulk formulation or software producer to the developer of innovative products for the International market. We can be a global player in commercial biotechnology in the country once our goals are well defined, focused and directed; however the foremost priority would be to meet the national needs.

I have tried to cover briefly the areas in which India has strength and we can be the lead players in the new millennium, both in terms of catering to our domestic requirements and enhancing the export potential. Without going into the details of the phytomedicine potential, let me just touch upon it. About 70% of Indian population is still depending on traditional systems of medicine for their primary health needs. There is a recent world wide resurgence in this system and a conservative estimate of medicinal plant related trade is over US $ 60 billion and the demand shows a steep upward trend and is expected to raise to US $ 5 trillion by 2050 AD. There are 47 major modern pharmaceutical plants based drugs in the world market and the prediction is more than 330 drugs to be discovered. The sale in the first year of the anti-cancer drug, Taxol was more than 200 billion US dollar. In India, there has been a steady increase with ~5,000 -17,000 important medicinal plants in the country. The export is growing @ 26%. In the last 5 years, it has already gone to Rs. 600 crores and with the biotechnological inventions such as application of tissue culture technique, *in vitro* multiplication of our recalcitrant species, genetic fingerprinting, production of secondary metabolites in bioreactors, development of new herbal compounds through transformation, bioprospecting of biological resources for new genes and molecules, we can leap frog in future.

Biotechnology of plantation crops is yet another area which will not only benefit in terms of economic progress, but would be a source of livelihood for millions of people in the country. These occupy about 2% of the total cultivated area; foreign exchange earning is about Rs. 8900 million annually; i.e., 3/ 4th of export earning of all our agricultural commodities. Tea, coffee, cashew, spices are all very important. India being a legendary land of spices in production, consumption and export, there can be manifold increase in productivity and quality with molecular tools. India shares a global market with 47% in volume and 26% in value. The application of tissue culture technique for rapid clonal multiplication, for generating

disease free stock, stress tolerant varieties etc. can yield rich dividends to boost our exports.

It is not possible to give the details of the benefits in the form of products which can be derived from plant biotechnology research. Just to cite a few: important therapeutic proteins, vitamins, starch, fatty acids, different types of flavours, edible vaccines and many novel drugs all these can be produced with intensification of research efforts. The canvas is too broad and the potential is immense.

To conclude

In concluding, let me draw the attention of my dear young students to some realities of life which they will face. The greatest challenge for all of us in the 21st century is to ensure that the talents and capabilities of the students and the young scientists and the younger generation are fully nurtured and supported so that they bloom into a major force and become "change agents" for the socio- economic progress of this country.

Just look at the enormity of the bioresources we have, the variety of ecosystems, different traditions and cultures. Can't these attract your attention, curiosity and the desire to know them, study them and discover new ideas, new products, new concepts relating to the living beings? The whole area of science and in particular, biology and biotechnology offers tremendous scope for the younger generation to embark on programmes and activities which will not only satisfy their intellectual caliber, but would generate a strong knowledge base; novel products, techniques and technologies of direct benefit to humankind. It should be very clear to you that in choosing your future career, you should be proud of the India's strength, the glorious past of this country, the renowned scientists who shaped Indian Science and most importantly, future requirement of this great nation. In all these endeavours your interest in science would motivate you for a career based on scientific research and its application.

Let me remind you of the words of the greatest scientist India has /produced, Sir C V Raman, the Nobel Laureate. How vehemently he articulated while delivering the Convocation Address at the Madras University in 1942:

"If you ask me what is the greatest industry of a Nation- the key industry -I have no hesitation in saying that it is the production and diffusion of knowledge. ...There is no nobler work for a man or an institution than to bring up a young generation in health and strength and in the vigour of intellectual and physical activity".

We are all very confident that the youth in this country is capable of generating a strong, deep and useful knowledge base as an economic power to develop a society where people will be hunger and disease free and will have an opportunity to earn their livelihood on the principles of sustainable development. Also, this knowledge base would be your strength, your livelihood and would ensure for you a life based on rich value system. Fear of God is the beginning of wisdom. It is a clear dictum in our Upanishad too: "***Prajnanam Brahma -"Knowledge is God"***

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
33rd ANNUAL CONVOCATION

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Accelerating agricultural growth -Some issues and approaches

Mr. Chancellor, Mr. Vice-Chancellor, Members of the Board of Management and Faculty, distinguished guests, Graduates and my student friends:

I am delighted to be here today on the occasion of the 33rd convocation of ANGRAU. To be invited for delivering convocation address by ANGRAU, a premier institute of the country with creditable research contributions and excellent academic achievements is a unique honour. I thank the Board of Management and the Vice Chancellor for this special privilege they have given me.

Agricultural prosperity is a priority concern of the nation. All of us gathered here are closely involved in improving the performance of the agricultural sector. In the past fifty years, this sector has made significant progress and made valuable contribution to the national economy. But, of late, the growth rate of agriculture is slowing down; it causes serious concern.

There is urgent need to accelerate agricultural growth to address issues on food security, nutrition adequacy, rural income generation, employment and poverty. We have achieved food security but the per capita availability of food has not increased significantly. 65 to 70% of our people depend on agriculture for their livelihood. Contribution of agriculture to GDP is steadily declining. The rural poor are the worst hit. Urban-rural divide, and regional disparities are on the increase. To achieve a desirable rate of 7% annual growth in the national economy, agriculture must register not less than a growth rate of 4 %. Now, it is around 2 % and is on a declining trend. What are the constraints and opportunities for accelerating agricultural growth? What should we do for achieving higher growth? Generating thought and action on this subject would benefit us.

Net area devoted to agriculture is shrinking. Competing demands on water are on the increase. Demographic changes, economic growth, and social transformations exert strong and competing demands on the finite natural resources, Pressure on land is high and it would increase sharply in future squeezing land from agriculture and land based rural occupations. With improving standard of living, urbanization and industrialization demand on water by various user interests is on the increase. Share of water for irrigation, therefore, would decrease. Pollution of water and degradation of land and soil, unless regulated effectively, would increase. Future gains in agriculture would have to come from a shrinking natural resource base through better preservation and management.

Technology is the main driving force for agricultural growth. The green revolution technology package, that helped us to achieve self-sufficiency in food grains production, has lost its steam. New outstanding breakthroughs in agricultural sciences and technologies are not in sight. Our hope for a brighter future largely rests on anticipated contribution of biotechnology. For immediate gains, focus must be on improving the efficiency and effectiveness of the R&D system.

With growth in population and change in life styles, demand for agricultural produces, in terms of volume, kind and quality, is changing fast. This trend for more and wider range would accelerate in future. Supply side of agriculture would need to match the expanding and changing market demands of both internal and export markets. Besides quantity and quality, cost of produce would emerge as a major factor of concern with WTO sponsored unrestricted market access. Unless Indian agriculture becomes competitive in quality and cost, imports would increase and export opportunities would fade- out.

Is WTO agreement a serious threat to our agriculture? Or is it an opportunity for growth? Consequent to the Uruguay Round negotiations, pressure for liberalization and globalization of agriculture are growing. The focus is on three major issues:

a.) further reduction and eventual elimination of restriction on both internal and external trade in agricultural products; b.) reduction and eventual elimination of input subsidies; and c.) putting in place an IPR regime for seeds and plant varieties and allowing transnational agribusiness to operate freely in the country. Lot of debates and discussions on WTO related agreements on agriculture sector are going on in the country. The emerging consensus appears to be in favor of allowing market forces to operate with adequate social protection.

Management of change is a challenging task. Any change produces fear, fear of the unknown and serves as a threat, a threat for stability and existing order. Change could serve as an opportunity for growth as well. Democracy, capitalism, liberalized global trading, human rights, and environmental concern are some of the major concepts vigorously promoted by the new world economic order or power centers. We, in India, cannot get away from this global trend (or pressures, should I say?) and live in isolation; we will have to manage these concepts and related adjustments diligently and diplomatically by bargaining for terms most advantageous to us. There is always trade- off in international negotiations. Our national government is sensitive to this issue and is evincing keenness in securing sufficient flexibility for our domestic policies in agriculture to take care of the country's food security and rural employment concerns. Let us hope that farm interests would be adequately protected.

On the positive side, WTO agreement provides an opportunity to promote export trade in agriculture. Even now around 20% of national exports relate to agricultural commodities. This could be expanded further, provided our efforts are directed at improving quality and competitiveness of our produces.

A major handicap for us in export trade is the fragmented production base operated by a large number of small farmers with limited reach for modern technologies, capital and market intelligence. This handicap can be surmounted by joint action. Dr. Kurian, the architect of milk revolution, has shown the way by organizing successfully milk production, processing and marketing chains throughout the country by uniting innumerable and highly scattered small-scale milk producers into a massive cooperative movement. His efforts have turned the nation as the

largest. producer of milk in the world. Let us face WTO on two fronts: diplomatic front for safeguarding our national policies and social interests and management front for securing a larger share of the world market by improving agricultural productivity, quality and competitiveness.

Since independence, the national and state governments have been spearheading economic growth and social welfare through public policies and direct investments. The state is now involved in a wide array of assorted activities employing massive manpower. This is causing severe strain on the state finances. Generally, it is felt that state intervention in developmental efforts on such a scale and range is neither needed nor sustainable any longer; even now assets created at great public cost are languishing for want of adequate maintenance and upkeep. The state would have to reduce its sphere of direct involvement and facilitate local groups and private sector to play more active role in development. Without peoples' involvement, it would be difficult to sustain the gains of development and properly maintain common assets.

In a fast changing environment with expanding internal demands and export opportunities, handicapped by shrinking natural resource base and growing environmental concerns, future spurt in growth in agriculture would primarily depend upon efficient management of resources. Our focus must be on improving the performance of the production base by assisting our farmers in improving their efficiency and increasing farm output. To support their efforts, availability of appropriate basket of technologies backed by effective public policies and supportive services would be critical.

RESEARCH SYSTEM

At present, technology development is largely supported by public funds. Private sector research effort is limited and is largely confined to commercial areas with assured quick returns. So, the effective performance of public funded research system would be a major factor in accelerating agricultural growth. The Science Congress recently held at Delhi, recommended a larger allocation of 2% of agricultural GDP to agricultural R&D for accelerating growth. A larger funding support would certainly be helpful; more than that, I strongly believe, better management of the existing resources is the key to success.

We have established an elaborate national research system with ICAR and its institutions at the national level and State Agricultural Universities with regional research units at the state level. A review of the total research system for improving efficiency and effectiveness would be useful. For addressing our immediate concerns, I would strongly plead for an area-centric approach through improving the performance of the Zonal Research Centers.

The country has been demarcated into a number of distinct agro climatic zones. Farming problems and potentials differ from zone to zone. For providing location specific support, Zonal Research Centers (ZRCs) have been established at each agro climatic zone, allover the country, at great public cost as 'an integral part

of the State Agricultural Universities. This grass root research linkage, closest to farmers, is an excellent arrangement for providing most effective and appropriate technology options to the farming community. Despite heavy investments, unfortunately, this link vital for providing effective service has not been adequately developed and enabled to function efficiently. This weakness should be remedied.

ZRCs should be assigned primary responsibility for generating, scouting, screening, and integrating technologies for promoting sustained development of the agro climatic zone. Agriculture development must be viewed in a broader frame to include natural resources conservation, and all land and water related pursuits followed by rural people. The ZRC should act as the brain trust and prime mover for development. Its mandate must be redefined and its structure and functions must be recast.

The ZRC must survey the land and water resources of the zone and plan for optimum use of the natural resources. Soil fertility maintenance and management must receive great attention. Also, water conservation and use must receive equal attention. Pollution and environmental hazards must be studied,and controlled and if possible, eliminated. The water balance of the zone must be reviewed and measures for effective use of irrigation resources and conservation of moisture of rainfed tracts must be designed and promoted. Efforts must be directed at using every single cent of land and each drop of water productively. Community assets must be preserved, developed and protected. The ZRC must develop, besides technology, public policies and suggest administrative measures for effectively ensuring conservation and development of natural resources, owned both by public and individuals.

While designing research agenda, focus must be on productivity enhancement, quality improvement and reduction of cost of production to make our produces competitive in the markets, both domestic and international. Technology development and selection must address issues on land and water management, crop management including horticulture, tree farming, and livestock development. Research output must be environment friendly and must serve both irrigated and rainfed agriculture. Mixed farming as well as specialized farming, according to potentials and soundness of economics, must be promoted.

With establishment of strengthened ZRCs, smaller research units within the zone can be, with advantage, phased out. Instead, on-farm research involving progressive farmers must be promoted. Involving farmers in selection of suitable technologies will quicken adoption process.

Skill development and enhancement are two prerequisites for sustained development and increased income generation. ZRCs must play a dominant role in Human Resource Development (HRD). Farmer education with responsibility for distance education must form yet another segment of responsibility of the ZRCs. Distance education and supportive institutional training courses must be varied in character and assist in technology transfer, entrepreneur development and skill development for a better livelihood.

There are good potentials for export-trade using Biotechnologies; these must be exploited. As in the case of **IT** industries, the nation has an advantage in productively using biotechnologies for producing seeds and seedlings and choice flowers for export. Through farmer training, these technologies must. be popularized by ZRCs.

Service facilities for testing soil, water, agricultural inputs, and processed products must be available at the ZRCs and operated on commercial lines. These facilities must be accessible to public and private organizations and individuals.

The ZRC must have close liaison with district administration and must be managed by a board comprising scientists, farmer interests and development agencies. Public funds should support the institution based on a three- year plan, which must be reviewed and refined on an annual basis.

There must be a clear division of responsibilities between the ZRCs and the main campus of the State Agricultural Universities (SAUs). The main campus, endowed with better resources, should focus on basic research, frontier areas of development "and macro policy issues. All research activities needing controlled conditions and intensive laboratory support with sophisticated equipments can be undertaken, with advantage at the main campus. A refinement of research approach and agenda at the state level would necessitate changes at the national level. National research system should minimize its direct involvement in field research and focus on macro policy issues and direction setting with funding assistance and implementation guidance.

EXTENSION SYSTEM

It is often said that even with available technologies, there is wide achievable productivity gap in the field and this gap must be closed through effective extension service. We have a vast public funded extension service in the country. Private efforts at extension are limited and confined to largely product promotion. How to make public funded extension service more cost-effective and perform better is a major concern in agricultural development?

In the early fifties, with the introduction of community development movement, we started with a reasonably sound extension system most suited to our needs for promoting development. Ten well-trained extension workers with responsibility for social and economic development were placed at the village level in each community development block and they had close support of a team of extension officers located at the block headquarter. Over-time, we moved away from the multipurpose extension concept, established parallel and independent extension service for each department, and expanded staff strength on many occasions too rapidly with inadequately trained manpower at the grass roots where professional competence is needed most.

Have all these changes brought about strength to extension? My view is, certainly not. At present extension service for agriculture is target-oriented. It is

loaded with too many subsidy-oriented programs sponsored by the national and state governments. Its focus on development is fragmented. It has good linkage with research but suffers from too many supervisory layers and a large but inadequately trained field personnel. Extension service for areas like livestock development, fisheries and farm forestry is weak and in certain cases non-existent though there is strong need for these services.

The setup and staffing of extension service differs from state to state. How to restructure the service and make it cost-effective would merit priority attention of the states. Reintroduction of Panchayatiraj with constitutional amendment, rapid changes in information and communication technologies and mounting cost on staff expenditure and the need for accelerating development make this task all the more urgent.

Two immediate changes in extension process would be, in my view, beneficial. First, it would be desirable to move from 'message-based' extension process to a 'broad-based farm management' extension approach. Extension in co-ordination with ZRCs must plan for better land and water use. It must address issues on natural resource conservation and judicious use, soil fertility management, pest and disease management, crop production including horticulture, fodder development and tree farming. It should follow river basin and watershed as units for planning for natural resource conservation and management. It must be alive to market trends and guide the farming community in improving quantity and quality of production through economically and environmentally sound technologies. A recasting of responsibilities of extension service on these lines would be of help in improving effectiveness of the service.

Second, it would be rewarding to shift from contact-farmer approach to group approach' for disseminating technologies. Group approach would facilitate better involvement of the farming community in promoting individual economic pursuits as well as on collective action critical for activities like natural resource conservation and use, and marketing. Forming Farm Groups in each and every village and working through them in promoting technology adoption and sustainable accelerated agricultural development is advocated for early adoption.

Andhra Pradesh has established a pioneering lead in working development programs through group approach. The 'Water-Users Association' established in the river basins and tank commands have done tremendous service in improving O&M functions. The Vana Samrakshana Samithies(VSSs) have helped to rehabilitate brown forests into rich multi-functional forests with thick green canopy. Without peoples' participation investment of even millions of rupees would not have helped to bring about the change in forest cover achieved through VSSs within a short span of time.

So has been the experience in Assam where the Field Management Committees have played a tremendous role in promoting community irrigation and cropping intensity through diversification to commercial crops. Through collective

action more things can be got done. Let us focus on unleashing the hidden mighty force in the village community for productive purposes.

Public Policies and Services

Besides appropriate technologies, effective public policies and efficient services are essential to promote and sustain accelerated development of agriculture. The rich dividend we got during the early phase of the green revolution was largely as a result of the synergetic interaction among technology, public policies and supportive services. Thanks to well-conceived and coordinated efforts, we could emerge fast as a proud nation with food security despite growth in population.

Our investments in infrastructure such as development of irrigation, power, transport, communication, storage etc. and provision of services like research, development and rural credit etc. have helped us, in the past, to develop agriculture significantly. Today we are able to buy Himachal Pradesh apples throughout the country in and out of season. Eggs and fish produced in Andhra Pradesh are sold in plenty in far away Assam and other Northeastern states. Milk trains flow from Mumbai to Kolkata daily.

Investments in infrastructure development and services have added a new purposeful dimension to agriculture production and marketing. But, as I said earlier, the social, economic, political and technology environments are changing fast and we have a long way to go in modernizing agriculture. So, it is critical to review, adjust and intensify our public policies, investments and services further in favor of agricultural growth.

Among the various initiatives required in this sphere, I would like to flag a few issues that merit, in my view, priority attention. Reducing poverty and increasing rural income are two cherished goals of the nation. Accelerating growth in agriculture would certainly help in addressing these two issues. But, too much or over reliance on agriculture for poverty alleviation would be faulty.

Improving employment potential is an effective and sustainable measure to address poverty. At present, 65 to 70% of our people are dependent on agriculture for their livelihood. Of this, a large number is landless rural labor force. Rural poverty is high, anywhere between 35 to 40 %. Agriculture is a seasonal occupation and scope for employment in rainfed tracts where poverty is at its worst is indeed very marginal. Agriculture alone cannot provide full and productive employment to such a large number.

For agriculture to remain competitive despite being largely a smallholder operation, use of factors of production including manual labor would have to be optimized. Selective mechanization of agriculture is one option that would merit our deep consideration. Directing public efforts at weaning rural people, particularly labor, from exclusive dependence on agriculture and providing them with accessible opportunities to earn dependable higher income from alternate employment, would

go a long way in mitigating rural poverty and promoting agricultural growth and rural income generation.

To achieve this twin goal of 'reducing pressure on land with wider opportunities for better employment and improving farm production efficiency', our policy efforts must be directed at skill development of the rural people through education and training, and widening scope of non-farm employment by attracting capital flow to the rural sector. Our policy initiatives must not be narrowly focused on agriculture; it must address rural development issues in its totality and that would benefit the whole rural community and agriculture. We need markets, jobs, and investments; our policies must be directed to achieve them.

Rural economic growth must not be just uni-dimensional and top-down in character. Opportunities for people to participate freely in deciding their future must be created. Exploitation of the poor must be prevented. The community must be built around economic activities. Organizing people into small interest groups for securing economic gains would be rewarding.

The Self-Help Group program in operation is doing a lot of good in building up the confidence of rural people in working together for improving their economic and social conditions. This program merits to be developed as a strong national movement for building up grass root initiatives in developing the community. The Self-Help Groups can be asked to address various issues like agricultural and off-farm development, population control, adult education, clean and green of the environment etc. For nursing this movement, associating committed social volunteers and NGOs would be highly useful.

Of late, capital investment on agriculture is declining; this trend must be reversed. Public investment in agriculture and rural development must be stepped up. In addition, serious efforts must be initiated to attract private capital for agriculture. Both direct investment on farming and investment on agro processing and manufacture of value added products for internal and export markets must be encouraged.

With land reforms in place, there is reluctance to invest on agriculture and related ventures. Government restrictions on trading and movement of agricultural produces act as additional dampers. It would be highly helpful if restrictive policies are reviewed and removed early. To encourage corporate capital investments, restrictive land reforms related to rainfed lands, particularly wastelands, could be reviewed and revised. Plantation crops are now under corporate farming; what harm would happen if wastelands are also made available to corporate farming? This issue merits a national debate.

To overcome hassles on assured supply of good quality raw materials at reasonable cost imposed by a fragmented production base, it would be prudent to promote contract farming on the lines of sugarcane industry with adequate legal safeguards for both the industry and producers. With introduction of corporate and

contract farming, flow of private capital for the farming sector and introduction of modem technologies would be faster.

With effective technology development and transfer, with assistance of sound public policies, services, investments and peoples' involvement, let us work towards accelerating agricultural growth. Our vision, aim and strategy must all be directed at transforming agriculture from a prosaic way of life to that of a dynamic, vibrant commercial venture. Let us give new vitality to our agriculture.

Finally, a few words exclusively for my young friends who are at the threshold of a new phase in their life and career: You have chosen a noble profession, a profession of working closely with plants and animals for the welfare of humanity. Love your profession and cultivate professional pride. Love plant and animal life and develop compassion and empathy for the rural people. Above all, constantly bear in mind that you are one of the few privileged persons in the country who could get the benefit of higher education at society's cost. The society has enabled you to get this distinguished education and the society has a right to expect you to repay your debt by rendering an efficient and productive professional service. I am sure, you will do that. God bless you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
34th ANNUAL CONVOCATION

3rd April 2002

Address by

Dr. Panjab Singh
Director General, ICAR & Secretary, DARE
New Delhi

Rajendranagar, Hyderabad – 500 030

His Excellency the Chancellor, Dr. Rangarajan, The Vice-Chancellor, Prof. Subba Rao, Members of the Board of Management and the Academic Council, Members of the Faculty and Staff, Distinguished Guests, Graduates of the year, Students and Friends.

At the very outset, I express my sincere thanks and gratitude to His Excellency the Chancellor of this prestigious University for inviting me to be here to-day. It is a fact beyond any doubt that, no citizen of this Country, whosoever it may be, could afford to remain cut-off from the concerns which affect farming in this great country and matters of consequence to agriculture. It is this very same concern which binds me with the pursuit of agriculture. The State Agricultural Universities such as ANGRAU have been established with great expectation more than three decades ago and these institutions have earned a pride of place among the academic arena in India. I have been following the progress of the State Agricultural Universities not only because of my current assignment in National Agricultural Research System (NARS) but also because of my close association as a Member of the Faculty and as an administrator in some of such Institutions of higher learning. This association binds me intensely with the pursuits of this University. As all of you are well aware, the Acharya N.G. Ranga Agricultural University has been recognised as one among the Best in the country and the Institution has received the coveted ICAR Best Institution Award. The performance of its students in the ICAR Competitive examinations for admission to Post-Graduate Courses has also been exemplary and won recognition by the ICAR. The successive Vice-Chancellors and the Faculty, present and past, have had a prominent role to play which culminated in this honour being bestowed on this University. The Faculty, University Administration, supporting and technical staff deserve appreciation.

I am in the midst of two distinguished personalities to-day who have been honoured by our Country for their contribution to National development. His Excellency, the Chancellor of your University Dr. Rangarajan is a person of excellent academic eminence, administrative capacity and a great visionary. He has been honoured with the distinguished National Award 'PADMA VIBHUSHAN'. The State of Andhra Pradesh is particularly fortunate in having a person of such eminence as the First Citizen of the State. I offer my congratulations to his Excellency, the Chancellor, Dr. C. Rangarajan.

Yet another personality of eminence is your Vice-Chancellor, Dr.I. V. Subba Rao who by dint of his commitment and perseverance has been striving to make this University the best in the Country. His profound knowledge and commitment are not only valued but also being utilized by the Council. He heads two important panels of ICAR on University Governance and sectoral committee on Governance and Personnel and Financial policies of Accreditation Board. Currently, he is shouldering the responsibility of the President of Indian Agricultural Universities Association. I was particularly delighted when I learnt that he has been chosen for the 'PADMA SHRI' Award which is a great honour bestowed by the Union Government on persons of eminence.

I offer my sincere good wishes and congratulate Dr. I.V. Subba Rao on this occasion. I offer my best wishes and congratulate the Graduates of the Year who have by their disciplined effort and pursuit of academics have earned their degrees, many of whom with distinction. I do hope His Excellency the Chancellor Sir, that your University is training boys and girls who not only have possessed a degree but also have a purposeful vision for the future. They have a great cause to pursue and are expected to help the Indian farmer known for his resilience and hard work, to make this country great and evergreen. This is a noble cause. ICAR stands by your side in this endeavour. Let us pursue it together with all the vigour and effort at our Command. I need not remind the graduates of the year that if the country is proud of its capabilities and has not bowed down to pangs of hunger and food scarcity in the international community, it is because we are most comfortable on the food front. Internal stability of the economy has been achieved by producing enough food and even generating surpluses in several agro-based commodities like rice, wheat, pulses, poultry, eggs and milk. This is one of the greatest achievements for which the major credit should go to the farmers and the will and vision of successive Governments both at the Centre and the State. We, as Scientists, Teachers and Extension workers have all played a critical catalytic role in this transformation of the country from a 'Ship to Mouth' existence to that of 'Farm to Ship' reality.

Future of Indian Agriculture

To-day, I wish to dwell upon some crucial issues related to future of Indian Agriculture from the perspective of a Scientist and Technocrat. Soon after independence, the country's leadership had the foresight to adopt planning as the bench mark for development. The Vision of the luminaries involved in administering the Country at that time has enabled us to achieve phenomenal progress in the successive Five-Year plans. To day we can look back with a sense of satisfaction that our growth in Agriculture, Power, Manufacturing and Services sector has been unparalleled if we consider the resources available at our command. The past nine five year plans have succeeded in achieving the targets set, to a large extent. Failures, of course have been there, as is true with any other economy, elsewhere in the World. But the concept of phased and planned development itself, has given us an opportunity to look back and examine the causes of the many successes and the few failures.

i) Planning and National Development

Growth of the Indian economy since the beginning of the first Five Year Plan is marked by significant shifts in productivity. These shifts are all the more evident In Agriculture. The production and the resultant productivity of farm based commodities have exhibited exciting positive shifts. The food grain production which stood at 51 Million tonnes during the 1st five year plan period has now reached 209 Million tonnes generating surpluses, which have created problems of storage. More than this, these surpluses have also generated problems of price realization. The input-out put ratios, in terms of investments at the farmers level are also becoming skewed, causing a worry. The inputs are becoming costlier due to normal process of inflation, whereas the sale price of outputs, appear to be unable to absorb the

inflationary shocks. Therefore, the primary concern and a cause for serious steps to be taken is to make agriculture a profitable enterprise. Taking into consideration the dynamics of internal economy and the need to assist further in the process of capital formation in the rural sector, we may have to continue for some time to come, to increasingly provide support to the Indian farmers to lessen their burden on input costs. Even developed countries do this, to keep their economy in good health. Then why not we ?

ii) Future Challenges

But the major challenge before the Scientists is, to find ways and means of cutting input costs, so that agriculture as a profession, becomes economically profitable. There was a time in the sixties when we went in for recommendations which involved yield maximization strategies at any cost. If we targeted to increase yields of a crop such as rice from 2 t/ha to 6t/ha, we simply advocated fertilizer responsive varieties and increased rates of irrigation, fertilizer and pesticide application, without regard to economic or ecological sustainability. To-day we have realised that yields have been stagnating and soils are degrading in quality, and water in quantity. The Agro-technological revolution has traversed a full-circle. We have reinvented the immense worth of traditional knowledge. We have now institutions and individuals who have specialised in documenting indigenous technical knowledge. This at a time when we are talking of the developments in biotechnology, fertilizer technology and Information Technology appears very strange. Strange as it might seem to be, it is now a well realized fact that to achieve sustainability of production in agriculture, a blend of Indigenous knowledge and developments in modern technology is essential.

The first six decades period of the 20th Century was one of despair and frustration as the country was struggling to keep pace with population pressures and food production. Around 1965-7G the miracle of "Green Revolution" happened. This transformation helped to sustain our National pride and sovereignty.

We are now at a crucial stage as far as Indian Agriculture is concerned. We are very competitive in frontier areas of Science and Technology such as IT, Biotechnology, Remote Sensing and Space Technology, Material Science, Nuclear Science and Non conventional Energy Resources. The way we have been managing our national agricultural research and education system has gained international attention. These strengths have provided us with an excellent opportunity to use them to achieve advances in crop and livestock productivity. But what is important is, any such positive shift in productivity should be sustainable and should not create any further damage to ecology and environment.

A bottleneck to achieve further progress in agricultural productivity is that, so far we have laid emphasis on increasing productivity without realizing the necessity for post-harvest processing, value addition and marketing of farm produce. This mismatch is a real threat and we have to correct this situation. There is an urgent need to enhance capital formation in agriculture to enable farmers to gain access to

technologies leading to value addition, market intelligence, approach to markets and earn a fair farm gate price.

Agricultural productivity and sustainability call for better care of land and water, promoting scientific exploitation of water resources, restore fertility of degraded and infertile land, promote community based water conservation and utilization.

iii) Agricultural Education

During the past decade, the Indian Council of Agricultural Research started to play an increasingly proactive role on matters concerning agricultural education. Recognizing that education is an important instrument of economic and social change, the ICAR has initiated steps on improving the quality and relevance of agricultural education, training to trainers and strengthening the capacity to develop and manage agricultural human resource. The other initiatives put in motion includes admission to State Agricultural \ Universities for UG and PG programmes through All India Entrance Examination to reduce inbreeding and to inculcate national integration, award of National Talent Scholarship(NTS),Junior and Senior Research Fellowships (JRF & SRF). The ICAR is extending support for students for undertaking education tours, development of instructional material and support for establishment of Educational Technology Cells, establishment of students Counselling and Placement Cell, organizing All Agricultural Universities Games and Sports Meet, Inter Agricultural Universities Youth Festival and Students Elocution Contest.

Rural Agricultural Work Experience (RAWE) and associated in -plant training and students Internship Scheme have been launched. A stipend is provided to the students for undergoing RAWE. These initiatives have started showing results. During 10th Five Year Plan there would be greater emphasis on access to information technology, establishment of more centers of advanced studies, greater technological empowerment to women, vocationalization of agricultural education, support students participation at national and international fora. Greater flexibility in course programmes, transfer of credits etc. and multi-faculty approach to teaching are on the agenda of the Council.

At present, the agricultural education and research in India are primarily supported by public funds. However, with greater emphasis on privatisation and globalization, the concept of public funding of education is coming increasingly under review and there is a gradual shift towards making the public funded research and: education self supporting. It is being argued that by doing so, the education and research would become more relevant and applicable to the society, because, only those technical institutions and academic disciplines which produce quality graduates and generate appropriate technologies would survive the competition.

iv) Transfer of Technology

The country has experimented with several models for the transfer of technologies with varying degrees of success. Some technologies, though proven to be effective at the research institution level, are not taking off. This has led to introduction of new concepts, such as the institution -village link project. The farmer is now emerging as the key consultant for developing technologies, which ultimately should support his requirements.

Rapid advances in information technology, space science and communication have opened up new avenues for the farm and animal science graduates to apply these advances to agriculture and rural development. They can establish knowledge centres in villages. With the vast advances in information and communication technology, it is now possible to establish virtual class rooms in villages with possibilities of two -way interaction. There is a need to enhance investments in application of information and communication technology for agricultural and rural development. These unlimited opportunities which are now within our reach, open new vistas for our extension services. A time has come to evaluate the utility of our extension services, which perhaps has to be reorganised to infuse the challenges **of** the developments in Information technology and communication management. The extension services should be enabled to harness these potentials through proper sensitisation and training.

v) Agriculture and Indian Economy

The share of agriculture and allied sectors to Gross Domestic Product was 59 percent during first five year plan period which declined to 38.6 per cent in 1980-85 i.e. the 6th five year plan Currently it stands at 27.1 percent of GDP (1999-2000). The contribution of manufacturing, mining and construction industries increased gradually, reducing the share of agriculture to the nation's GDP. Of course these changes are inevitable and are expected in a developing economy. There is however no doubt that agriculture will continue to be the backbone of Indian economy. Agriculture and allied activities, besides contributing directly to GDP, have profound influence on other sectors of the economy. The sector is the major provider of employment. About 60% of the active workforce still depends on agriculture. Poverty, employment and performance in agriculture continue to be related to GDP of the country.

Agriculture of Andhra Pradesh -Some Critical Issues.

I would like now to dwell briefly upon certain crucial aspects of agriculture and its development in Andhra Pradesh. Citizens of Andhra Pradesh have been in forefront in all walks of life right from the period of Freedom Struggle in the country. The state contributed several stalwarts who fought for India's freedom and those who helped in running the Govt. at the helm of affairs right from the period of its independence. They have occupied prestigious positions of President, Vice-President, Prime Minister, Speaker of the Loksabha, which is a unique distinction for the state.

Farmers of the State are known for their hard work and entrepreneurship. They have a great tradition for agriculture and know the value of land and water very well. The farmers have migrated and moved out of the state to pursue agriculture and prospered very well. We find them in nook and corner of every state well settled in farming. This is true with the students of Andhra Pradesh also. We find them doing well at National level selections for fellowships, admissions for higher studies and for employment. The University should be proud of them.

This University has a long history and tradition of serving the farmers of this agriculturally important state which is the fourth largest in the country. The University has been governed since its inception by stalwarts in administration during the establishment period and by mature technocrats subsequently. Because of their dedicated efforts, the University has emerged as one of the Best Agricultural Universities in the country.

In the early stages, the University magnanimously provided its valuable land and other resources in favour of several ICAR, National and State Institutes for their establishment. Because of this, the ICAR could have so many of its institutes on this large and beautiful campus. It could be considered as second headquarters of ICAR. I wish the bonds and linkages will continue to strengthen and prosper further in the years to come.

When the state was formed in 1956, it lagged behind the all India averages in many respects. Now, it runs parallel or slightly above the National path of progress in the field of agriculture, enjoying the prime positions in the production of major crops. Agriculture employs over 65 per cent of population and contributes around 26 per cent of GSDP.

Land available for agriculture is shrinking due to its diversion for non-agricultural purposes. The gross irrigated area and cropping intensity have been steadily increasing and now stand at 45 per cent and 124 per cent respectively. Compared to the reduction in the contribution of agriculture towards GSDP (56 to 26 per cent over the last 4 decades) the percentage of agricultural workers to total workers did not change significantly.

The area under food grains, particularly of millets, excluding maize has been declining fast, giving way to crops like cotton, groundnut, castor and sunflower. The area and production of maize have been fast increasing. The production of food grains, despite decline in area, has increased over the years because of productivity gains and stands at 160.271akh tonnes (2000-2001) compared to 64.2 lakh tonnes at the time of formation of the State in the year 1956. The state contributes around 5 million tonnes of rice every year to the central buffer stocks. Cotton cultivation is extending to non-traditional and unsuitable areas. Because of various reasons, . it has attracted several socio-economic problems in the state. The state continues to enjoy its monopoly in chillies, turmeric and mesta. Soybean and oil palm have also gained ground. Crop diversification from food to non-food crops, though justified from farmers' point of view, needs to be regulated cautiously from the food security point of view.

The state occupies first few positions in respect of area, production and productivity of several crops which can be further improved with the will and support of the Government and the University.

The University has contributed immensely to the progress of agriculture in the State. It has several firsts to its credit in all the spheres of its activity in the country. The University was the first to release rice hybrids in the country. The improved varieties of rice developed by the University are popular in several other states and occupy about 25 per cent of the total rice area of the country. Rice farmers across the country are appreciative of the efforts of the University for breeding excellent varieties of crops such as rice, castor, maize, pulses, sugarcane and chillies.

With the establishment of District Agricultural Advisory and Transfer of Technology (DAATT) Centres, innovative farmer education programmes using communication technology and farmer-scientist interaction at various levels through effective mechanisms, could be introduced. ANGRAU has won the hearts of the farmers and enjoys their goodwill and confidence. The University is among the first few agricultural Universities to utilize the assistance effectively under World Bank aided National Agricultural Research Project during 80s and AHRD project from mid nineties and again now under the aegis of National Agricultural Technology Project.

As we look ahead, several sweeping changes of fundamental nature are redefining the context and challenges of development. Globalisation is throwing up exciting challenges and opportunities for agricultural development. Information Technology is eliminating distances and eroding borders and time. Andhra Pradesh and ANGRAU are already ahead of others in these aspects. Your state has deliberately set ambitious goals in its Vision 2020. Let us not limit our achievement by not dreaming big and not aspiring high. The state aims at an average annual growth rate of 6 per cent in real terms over the next 25 years with four fold increase in agricultural GSDP. With a long coast line, good port infrastructure at Kakinada and Visakhapatnam, major and minor irrigation systems of rivers Godavari, Krishna and Tungabhadra, the State has a great potential to achieve its Vision in agricultural development.

Since ages, Andhra is known for its quality rices. Its strength can be exploited further. Rice exports can be a long term opportunity for the state. Japan and other neighbouring countries could be an important market. However, requirement and the prices offered are often volatile and farmers and traders should be vigilant of these trends. The state has a vast opportunity for dairy development and stands next to rice in contributing towards agricultural economy. Co- operatives are doing well in this sector. Increased productivity and value addition are the crucial issues which should receive attention in future. The poultry industry has struck deep roots in the state and is poised to emerge as India's poultry giant. The contribution of late Dr. B. V. Rao, in this sector's development has been significant. The rain fed areas of the state are ideally suited for development of poultry industry. The State has achieved great success in this sector contributing to higher productivity and providing direct and indirect employment to thousands of rural youth and women in the ecologically

disadvantaged drought-prone rainfed areas of the state. Sericulture is another enterprise that has emerged as a profitable activity in dryland areas of the state.

The State is fast turning out to be a horticultural giant in the country. It is the second largest producer of fruits and one of the largest vegetable producing states in the country. It accounts for about 30 per cent of mango and 50 per cent of citrus fruit production in the country. The *Banganapalli* mangos are in great demand throughout the country and are also exported. Because of the varied agro-climatic conditions the state enjoys, prospects for growing and marketing of a variety of fruits, vegetables, flowers and ornamentals for local and international markets are unlimited. The state leads in chilli production and productivity in the country. It has good potential for production and processing of mango, citrus, grapes, banana, pineapple and sapota. The processing and value addition are critical and need greater R & 0 support and attention. The rain fed regions can be profitably put to remunerative production and processing of medicinal and aromatic plants.

ANGRAU undoubtedly has come to full expectations of its peers and stakeholders. It is my considered opinion that all the State Agricultural Universities have by and large justified their existence. The SAUs have the mandate to develop adaptable technologies and assist in their spread among the farmers. The Indian peasantry continues to demand more from the farm Universities and Research Institutions. The burden of responsibility imposed by this demand has to be carried more and more by the young men and women who have graduated to-day and by future prospective graduates present here in large numbers. I appeal to you, young men and women, to actively and emotionally get involved and participate in this process of development. Please be prepared to get sensitised to the problems facing Indian agriculture and the resilient and hard working farmers of this country. If only we meet the expectations of the farmers and work with the same commitment they have for the welfare of the country, we can make this country a great one among the League of Nations. I have great hopes in you.

My heartiest congratulations to all those who have received their degrees and medals today. I consider this to be the most memorable moment in one's life, since this is reward and recognition of the strenuous efforts made by each one of you. It takes you to yet another milestone of long and arduous journey towards success in life. On this occasion, I am pleased to convey to you my best wishes for the endeavours you have planned for the future. It is also an occasion to get bountiful of inspiration from your Alma Mater and teachers and do your best to remove the scourge of poverty, hunger and malnutrition from the country and strengthen further the social fabric of our society. Once again, I wish you all every success and happiness in your careers.

His Excellency the Chancellor, the Vice-Chancellor, Members of Board of Board of Management and Academic Council, I thank you all once again for the honour done to me by inviting me to address the students of this famous seat of learning and research institution of repute.

I wish the Graduates of the year all the best in their future career.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
35th ANNUAL CONVOCATION

11th March 2003

Address by

Sri Sompal
Member (Agriculture)
Planning Commission

Rajendranagar, Hyderabad – 500 030

Excellency Chancellor Shri.S. S. Barnalaji, Respected Vice-Chancellor, Dr. I. V. Subba Rao, Revered Heads and Members of the Faculty and Administration, Distinguished Guests and Media Persons, Dear students, Ladies and Gentlemen.

I deem it as a great honour and privilege that I have been asked to deliver the 35th Annual Convocation address of this esteemed University named after a great son of India, Prof. N. G. Ranga. Apart from being a prominent freedom fighter and political leader, he was an eminent scholar, economist, a practicing farmer, vocal parliamentarian, social reformer and above all a simple, sensitive human being. Paying my tribute to him, I become nostalgic, as my uncle and father, Late Shri Jagdev Singh Siddhanti and Raghuvir Singh Shastri, had been his colleagues in the Lok Sabha, when I had many occasions to interact with him and hear him speaking. His mastery of facts and figures was superb, articulation par excellence and oratory mesmerizing. It is because of the hard work, sacrifice and vision of leaders like Prof. Ranga that we are living and prospering in a free India today. The best tribute to such dignitaries is summed up in these words of Veda: Lokakritah pathikrito devanam yajamahe.

The people who have given us this world and the ways to live herein, must be worshipped and the best way to worship them is to uphold the values that they gave us. Today's event the convocation, friends, provides us an occasion to scan the scenario, reflect on where we wish to go and chart an action plan. To use the Upanishadic phrase: Krato smara, kleeve smara, kratum smara, which means: *Let us recall what we have done, where we have erred, and what we have to do.*

On a look back we find that the 20th century has witnessed a series of remarkable scientific discoveries and technological breakthroughs. The pace of these innovations has further enhanced during the later half, and more so the past 25 years. Standards of living have been rising albeit, at rates differing considerably from country to country and between social groups within the countries. This all-round progress has along with itself, brought a large-scale disenchantment and disillusionment. Rising unemployment and continuing inequalities have created a sense of exclusion among growing numbers of peoples in rich as well as poor countries. Human kind is becoming increasingly aware of the threats to social and natural environment. So, at the end of the 20th century, the humanity is caught on the horns of a dilemma with developmental imperatives on the one hand and the deleterious effects thereof on the other. A greater feeling is ensuing that the present pattern of all-out economic growth is neither an ideal way of material progress with equity nor sustainable in terms of natural resources.

An atmosphere of rising uncertainty is haunting the world community today. The initial euphoria, which marked the end of cold war, too is losing ground. Even since 1945, when the second world war had ended, after taking a toll of 50 million people, 20 million people have died in around 150 wars. Tensions continue to smoulder and flare up between nations and ethno-communal groups, which, to a large extent, are the consequences of a build up of social and economic injustices. The question being often asked is how we can learn to live together in the so-called global village unless we manage to live together to which we naturally belong to -the

nation, the region, the city, the village, the neighbourhood and the family. Not a misplaced question at all and is quite central to the democratic way of life. Obviously, there is no other choice but to overcome the multifarious conflicts that are becoming more and more visible as well as sharper day-by-day. Some of these are the conflicts between: i) the global and the local, ii) the universal and the individual, iii) tradition and modernity, iv) long-term and short-term, v) need for competition and concern for equality of opportunity, vi) extraordinary expansion of knowledge and human beings' capacity to assimilate it, vii) the last between the spiritual and material.

Education has to face up to this problem in a more comprehensive manner than ever before. The aim has to be an all-round personality development in harmony with social development as stated earlier. A renewed emphasis is required to be placed on the moral and cultural dimensions of education enabling each person to understand others better. It must, however, be understood that on the initial end of acquisition the process has to be endogenous and must begin with an inner voyage. The milestones of this inward journey are knowledge, meditation and self-introspection including self-criticism. If this can happen then everything else falls into place. At the delivery end, for education to be really useful for all the people with diverse backgrounds, application of knowledge and technologies has to be with reference to the absorption capacity of a particular society and respect for human identity and integrity.

The need for educational facilities is also growing exponentially on account of the brisk pace of population growth. The total population living on the globe was 5.57 billion in 1993, which has reached 6 billion plus by 2000 and is expected to be around 10 billion by 2050. It is interesting to note that 90 to 95 per cent of this growth has taken place in developing countries. The second factor is the globalization. International trade is no more a border paradigm, nor it is confined to trade in goods. International exchange now is multi-dimensional and includes goods, services, technical know-how, technologies and skilled labour. Financial markets too are becoming more and more inter-dependant and volatilities within individual countries are making ripples felt in other countries, and sometimes globally. Crime is also getting globalized in a big way. The ease with which money and information cross borders facilitates the illegal trade in drugs, arms, nuclear materials and even human beings. Not only that, it is helping establishment of terrorists and criminal networks and a spread of money laundering activities. Another disturbing trend is that researchers and business people in the poorest countries find themselves excluded and the knowledge gap is getting further widened. These tendencies are reaching serious proportions, even in the well-off societies and rich countries. Modern education has, therefore, to find ways to meet the newer requirements and tackle these problems.

Coming to the Indian scenario, we find that the country has covered a lot of ground since independence. During the past decade we have been one of the ten fastest growing economies of the world. Our foreign exchange reserves have reached a record and comfortable level of $75 billion. Inflation at less than 5 per cent has been within reasonable limits. Even in the wake of a global slowdown and

crumbling of East European and South East Asian economies, our economy and currency have shown strength and resilience. On top of these, our democracy has got stabilized, while many others have been continuously facing threats and getting jeopardized.

Our greatest achievement, however, has been in the field of agriculture. We are no more in an era of chronic shortages and dependence on imported food to fill the bellies of . our teeming millions that we were facing during the initial 25 years of independence. The memory of year 1968 may still be fresh in the minds of many. This was an year of drought and the PL-480 food assistance being provided by the USA had already been called off. Neither we had enough food nor foreign exchange to buy food from abroad. The then Minister for Food and Agriculture, Bharat Ratna Dr. C Subramanyam was sent out to look for food. On his return, when confronted by the media persons at Delhi Airport to know about his experience, Dr. Subramanyam replied in a choked voice "God may not create another such opportunity that we have to go begging for food". It was under these circumstances that the strategy of giving a big push to food production was conceived. We embarked on a mass irrigation development programme and brought in the dwarf high yielding varieties that could take high doses of inputs and produce more. The Plan did pay rich dividends, which is testified by the fact that the year before we had reaped 211.3 million tonnes of food-grains as against a paltry 51 million tonnes in 1951. This grand success of India has been acknowledged universally as the Green Revolution. The prophets of doom, especially some western observers predicting acute shortage of food in India by 1975, have been proved wrong. The juggernaut has not stopped at producing food-grains alone. Now, with 84 million tonnes of milk production per annum India is the largest producer in the World. In vegetable and fruit we are second to China and Brazil. In fish we are at the third position. In sugarcane, oilseeds, cotton, jute, coffee, tea, rubber, potato and spices we are amongst the top producers of the world; and in tune with the green revolution, we are calling these as the white, yellow, brown, golden and blue revolutions. The credit for this grand success goes to the grit of our toiling farmers, vision of our policy planners, but on top, to the commitment and dedication of our scientists. Let us salute them.

In spite of this tremendous success there are a few disturbing trends, some of which are continuation of the old problems, whereas others, the consequences of the green revolution. The paradoxes and the imbalances that we are facing are as under: i) disparities between the irrigated and the rain-fed areas, ii) constricting land resource and its gross misuse, iii) imbalances in agricultural production, iv) imbalances in soils, v) imbalances in nutrition, vi) presence of toxic residues and deficiencies of nutritional elements in the food chain, vii) pollution of air and water, viii) plateauing yields and rising costs, ix) the rural and the urban divide.

The first of these is straightaway attributed to the availability or non-availability of water. The consequence is that the per hectare yields in the irrigated areas have reached in the vicinity of four tonnes, while in the rain-fed areas these continue to linger around one tonne. Despite the development of huge irrigation potential, even now only 40 per cent of Indian agriculture has assured irrigation and the remaining 60 per cent is dependant on erratic monsoon. The twin menaces of floods and

droughts continue to co-exist in the country. On the one hand the ground water tables are receding at an alarming pace and large areas have already been declared as dark and grey, on the other 8 million hectares of land is water logged because of blockage of natural drainage systems, over-irrigation and seepage of canal systems. Large tracts of lands are saline, alkaline etc. known as the problem soils.

A huge land mass approximately 77 million hectares is lying unutilized and its rich top soil is getting eroded every year. Indiscriminate and reckless conversion of productive land into non-agricultural uses like urbanization, industrialization and infrastructure is taking place. The per capita availability of land has come down to a mere 0.14 hectare and is expected to go down further. The land records are in shambles, which is the major cause of avoidable litigation and tension in rural areas quite often culminating into violence. Consolidation of land holdings has been done only in a few States of the country. Fragmentation of land holdings has rendered about 78 per cent of holdings economically unviable.

The imbalance in agricultural production is equally bizarre. At one stage last year, we had a pile up of 62 million tonnes of food-grains in the central stores, and even now it is about 52 million tonnes. Still, the reports of non-availability of food and starvation continue to come in. Secondly, there is an abundance of three items, viz., rice, wheat and sugarcane or sugar. As against this, continued shortages of oilseeds and pulses are being experienced. Consequently, edible oils and pulses are regularly imported. Similarly, huge quantities of timber and wood based products like paper pulp are to be imported, which can be grown on the vast waste and forest lands lying unutilized.

Due to intensive mono-cropping pattern, soils have started getting fatigued. The texture, structure and biology of the soil are changing adversely. A creation of hardpan below the surface is being observed, which is so hard as cannot be penetrated by even the tree roots, not to say of crop roots. Nine out of sixteen micronutrients like zinc, iron, manganese, sulphur and the NPK have been found depleted on a long-term basis in the over-exploited areas of green revolution. This, in turn, is now manifesting in form of deficiencies of micronutrients in food items. Its impact on human health can be judged by the fact that around 25 per cent of Punjab's rural population has been found suffering from diabetes. Two factors have been identified as responsible for this syndrome. The first is the lack of physical exercise because of mass mechanization of agriculture; the second is on account of zinc deficiencies in edible items. Therefore, the doctors have to prescribe supplemental doses of zinc to diabetic persons.

The mono-cropping pattern, in addition to depleting soil fertility have posed a great threat to our multiple cropping systems and bio-diversity, which needs a serious review. Securing our multi-crop agriculture is essential not only for our food security, but also national security. If we stop producing some of our traditional commodities, such as oilseeds and pulses, as is being suggested by some globalization savvy economists and administrators, we may have the experience of 1968 repeated, which Dr. C. Subrahmaniam had warned against. Conservation of bio-diversity is equally imperative. Efforts are on, the best way, however, is the in-

situ method, that can best be ensured by keeping the traditional cultivars in commercial cultivation.

Here a word on the advantages and disadvantages of the high yielding and traditional varieties is essential. Out of my personal experience I can tell you that the traditional varieties and breeds provide better nutrition, resistance to vagaries of nature and disease, and are less costly to produce and maintain. The genetically modified items have their limitations in terms of balanced availability of nutrient elements and over mining of micronutrients from soils, hence sustainability. For want of space and time, here it would suffice to say that biotechnology is a very powerful tool, but its one-sided eulogisation and indiscriminate use may be dangerous. Hence the path has to be treaded with caution.

The nutritional divide is also becoming more pronounced. The rich are having their arteries choked because of over-feeding and the poor do not have enough food and nutrition. Malnutrition amongst the women, especially nursing mothers and the children is more acute, which is the main reason for many a physical deformity and under-developed brains. In addition to deficiency of micronutrients listed above, presence of toxic residues in the whole food chain is causing numerous health hazards including carcinogenic diseases, kidney failures and membrane erosion and so on.

Urban sewage, industrial effluents and heavy use of chemicals in agriculture like fertilizers, insecticides, pesticides, fungicides and weedicides have created an almost insurmountable problem of pollution of water as well as air. Its adverse effects on human and animal health are quite obvious. The ozone layer is reported to be depleted and long-term climatic challenges are taking place. Several species of animals, birds, useful insects, which are beneficial for human- beings and more so for agriculture, have either vanished or are on the verge of extinction. The microbial population, which is responsible for converting valuable micronutrients in the soils into plant available form, is reducing at an alarming rate.

The micro economic consequence of the above phenomenon is the plateauing of yield and the rising costs, which is clearly brought out by investigations conducted in the high intensity cultivation areas. This is a pointer not only to un-sustainability of environment and health, but also, production systems.

The gaps between rural and urban incomes, which used to be 1:2 till the decade of 1960s have increased up to 1:6 or so. Just take the case of water. A survey conducted a few years ago indicated that per capita consumption of water in the 5 metro cities of India, Delhi, Mumbai, Bangalore, Chennai and Calcutta is 287 litres per day, while in rural areas this is a meagre 17 litres. More than 20 per cent of our population do not have access to clean drinking water, housing and basic health services. Mass unemployment in rural areas is pushing the youths to unlawful activities. This gap in living standards has been made more perceptible by the information explosion. The rural people have started feeling a sense of jilt and exclusion. Same is true of education. Whether its availability or quality, the rural and the poor do not have equal opportunity.

The investment in agriculture as a percentage of GDP has been only 1.3 per cent for the last three Five Year Plans. Taking the overall investment in the economy as 26 per cent and contribution of agriculture to nation's GDP approximately 25 per cent, agriculture must have received minimum 6.5 per cent of GDP as investment. If one goes by the 56.7 per cent direct employment provided by agriculture, then it qualifies to get 15 per cent; and if by 69 per cent population being dependant on agriculture, 18 per cent should come to this sector. In spite of the 18 per cent of institutional credit mandated to flow to the agriculture sector, never more than 15 per cent has actually been lent. Usually, it has been in the vicinity of 12 per cent.

Terms of trade have historically been adverse for agriculture right since the British days. Unfortunately, the British policy of keeping agricultural prices suppressed with a view to make cheap food available to the vocal urban population and organized labour and cheap raw material to industry has been continued in the post-Independence era. The process of liberalization started in 1991 has almost completely bypassed agriculture. All sorts of restrictions on movement, stocking, financing, trading, processing and export of agricultural products have never allowed the agri-economy to reap the benefits of markets. In case of shortages these restrictions are made more stringent and imports are resorted to freely. However, whenever there is a glut and as a consequence thereof prices fall below the minimum support prices declared by the Government, adequate price support is not forthcoming. Uncertainties of nature still continue to haunt India's agriculture. The risk management devices like agriculture insurance have yet to be in place. All quantitative restrictions having been removed as part of WTO requirements, restrictions on exports of most agri-commodities are maintained. All processed items can be imported into India but many agro-processing industries still continue to be subjected to prohibitive and restrictive regime of licensing. Agriculture, therefore, has by and large become an unviable profession. This is borne out by the fact that gross capital formation in agriculture, as a percentage of total capital formation in the economy, has come down from 21 per cent to a mere 7.1 per cent since 1971. A more marked decline has been observed in the public sector, where GCF has come down from around 18 per cent to 4.9 per cent. Terms of trade have all through been hovering between 82 per cent to 95 per cent causing large-scale transfer of funds from the agriculture sector to the non-agriculture sectors through the subtlety of price mechanism.

So far as the role of agriculture in the overall economy of India is concerned, it continues to be pivotal. Its contribution to GDP is 24.2 per cent, direct employment 56.7 per cent, population dependence 69 per cent. Fourteen per cent of our total exports come from agri-exports. Two-third of the labour force and 3/4th personnel of our military and para forces come from rural areas. All the food-grains and nutrition are provided by the sector. Basic raw materials for our major industries like sugar, cotton textiles, silk, food and milk processing and jute etc. are supplied by agriculture. Everybody now recognizes that -more than 40 per cent of the market for the products and services of other sectors exists in rural areas. One role, however, has never been recognized and that is the financial resources contributed by the sector for economic development. This fact comes to fore if we have a look at the credit deposit (C:D) ratio of the rural branches of nationalized banks, which is around

30 per cent. This implies that only 30 per cent of the savings of rural people put in the banks are given as credit in rural areas, the remaining 70 per cent go to finance non- agricultural activities like industry and urban development. The extreme is the case of Bihar, where this ratio is only about 20 per cent.

It is becoming more and more evident now that the present pattern of economic growth is highly unsuitable for India. The proof is provided by the low employment elasticity of 0.16 per cent as compared to 0.52 per cent till the beginning of Eighth Five Year Plan. This means that we are embarking on a hi-tech jobless growth making disparities and mass exclusion more and more apparent and accentuated. The recent report prepared by the famous economist Dr. S. P. Gupta, my colleague member in the Planning Commission, has clearly indicated that the whole organized sector of our economy taken together provides only 9 per cent of the total employment in the country. More disturbing is the finding that the organized sector has hardly any scope of additional job generation. It is the unorganized sector, mainly agriculture, rural and small industries, transport and tourism etc., that is expected to create more job opportunities. The conclusion is that an economic growth measured by per annum change in GDP and even per capita incomes is not a correct indicator. The most intriguing part is that most of the investment in the economy, including' public investment, is going to the sectors which have relatively higher Incremental Capital Output Ratio, known as ICOR in economic jargon, which can be seen in the following table:

		Eighth Plan		Ninth Plan		Tenth Plan		Share of GDP (%)	
		Growth Rate (%)	ICOR	Growth Rate (%)	ICOR	Growth Rate (%)	ICOR	2001-02	2006-07
1.	Agriculture & Allied activities	4.69	1.59	2.06	4.05	3.97	1.99	24.7	20.5
2.	Mining & Quarrying	3.59	10.74	3.81	5.44	4.30	7.99	2.3	1.9
3.	Manufacturing	9.77	6.67	3.68	18.37	9.82	7.77	15.3	16.7
4.	Elect, Gas & Water Supply	5.50	18.00	6.46	15.43	7.99	14.97	2.8	2.8
5.	Construction	3.56	1.74	6.82	1.00	8.34	0.99	6.0	6.1
6.	Trade	9.06	0.54	5.86	1.09	9.44	0.91	12.7	13.6
7.	Rail Transport	1.95	27.94	4.70	9.87	5.40	14.66	0.9	0.8
8.	Oth. Transport	8.42	4.41	5.63	6.09	7.54	5.37	4.9	4.8
9.	Communication	14.31	7.25	17.14	5.28	15.00	8.33	1.7	2.3
10.	Financial Services	10.21	2.23	8.93	1.35	11.69	1.56	6.3	7.5
11.	Public Administration	3.91	7.82	9.21	4.09	6.43	5.45	6.6	6.1
12.	Other Services	6.22	4.19	8.19	3.70	9.26	3.53	15.8	16.8
	Total	**6.54**	**3.43**	**5.35**	**4.53**	**7.93**	**3.58**	**100.0**	**100.0**

The above table makes me concerned on one hand and confident on the other to appeal to the conscience of the decision makers, and also opinion makers, especially the academics and intelligentsia, including the passing out students to ponder over these negative tendencies and policies. We are all duty bound to generate public opinion and informed debate on these issues. I must tell you a secret. The politicians can afford to ignore anything, but public opinion. This is the most potent weapon to sensitize them.

India's agriculture still has a great potential to offer and the conditions in our country are ideal. As against 11 percent of the total global land being arable, India has around 52 percent of its land cultivable. All the 15 major climates found in the globe are available in India in some shade or the other. Right from the snow-clad peaks of Himalaya to the hot humid climate of Southern Peninsula, zero to 50 mm of rain in Thar desert to the highest rains (13000 mm in Cherrapunji), 46 major soil types out of the 60 in the whole world, varying sunshine patterns and other conditions make India possess the most diverse conditions ideally suited for round the year production of agricultural products including fresh vegetables and fruits. Approximately 48,000 plants species and 89,000 living species account for 12 per cent and 17 per cent respectively of the global genetic resources, while we have only 2.4 per cent of land. ICAR document reports as many as 1,20,000 rice varieties, out of which 30,000 have been traditionally cultivated by Indian farmers and 5000 vanished since the advent of British in India. We have more than 1,000 varieties of mango alone. 32 breeds of cattle, 14 of buffaloes, 40 of sheep, 20 of goats, 8 of horses and 6 of camels and several pack animals like mules, asses, yaks and so on make India the richest country in the world in terms of bio-diversity. Two of the twelve hot spots identified in the world are in India, one in the North East and another in the Silent Valley of Kerala. Same is true of the insects and microbes, an exhaustive list of which is yet to be prepared. This richness is further enhanced by the traditional culture and wisdom of Indian agriculture. The Royal- Commission on Agriculture Report published in 1930s' acknowledges existence of agriculture in India for more than 10,000 years. Over and above these, we have the second largest army of scientists and technically trained personnel in the world.

Medicinal and aromatic plants offer us another great opportunity. As per the information available with the Planning Commission, international trade in these plants and substances was $66 billion two years ago, and is expected to cross $100 billion this year. Fifty per cent of this is in the hands of China and India's share is less than one per cent. A list of 9,500 such plants has been prepared, but their commercial cultivation is yet to begin. So far, in India these have been only slaughter harvested making some of the species almost extinct. Our traditional systems of Ayurveda, Sidha, Unani and Tibbi have used these for thousands of years and provide profuse details about the formulations. This potential needs to be utilized by promoting cultivation and value addition with adequate forward and backward linkages, technological and financial support.

What is required is the unleashing of Indian agriculture and adequate financial and policy support. The 77 million hectares of land, if allotted to rural people, can provide employment to more than 10 million working persons, add to the purchasing

power of the people, which is the only lasting solution to the scourge of mass poverty and hunger. It can produce more food, nutrition and substitutes of agri-forest products currently imported. In the arena of exports also we can emerge as the major exporters of quality food-grains, fresh vegetables and fruits, fish and other aqua-products. Our native seeds and breeds reared under natural and organic conditions, which is essentially a labour intensive enterprise, can contribute to the national economy in a big way. Removal of all restrictions on agricultural products, processing and exports and adequate financial and policy support, however, are imperative to realize the tremendous potential.

No analysis of Indian economy, particularly agri- economy, would be complete unless a brief mention is made of the newly emerged WTO regime of international trading. Without going into many details, it would be appropriate to analyze only a few aspects. First of all, the experience of the past 8 years since the final Act of WTO was signed in Marakkesh in 1994 and became operative in 1995, clearly proves that the system has neither been fair nor equitable, as it was promised to be, at least for the developing countries. The rich countries have failed to carry out their promises of bringing down subsidies to their agriculture, known as the Aggregate Measure of Support. The bad news is that all of them have since hiked the support e.g. European Union from 38 per cent to 40 per cent and Japan from 68 per cent to 70 per cent. Only last year, the United States of America have announced $180 billion as additional assistance to their agriculture sector. Heavy subsidies to their agri-exports still continue. They have been indulging in the gimmick of shifting the subsidies from the Amber Box to the Blue and the Green to hoodwink the developing world and wriggle out of the commitments. There have been several instances of Sanitary and Phyto-sanitary measures being maliciously used by the rich countries to block exports from developing nations. Intellectual propriety rights are also being rigged and misused, firstly by imposing unacceptable legal formulations on developing countries and secondly by granting spurious and vexations patents to their own researchers. Many examples of plundering of the genetic material and traditional scientific wisdom from the tropical countries have come to the fore. The cases of patenting the frog skin for treating skin cancers taken from an African tribe and the neem, haldi, basmati, rice from India, jeopardizing poor countries' prospects are now public knowledge. All this is not only impeding our export effort but posing a great challenge to our internal economy as all these tend to create undue advantage for the rich and disadvantage for the poor nations. There is, therefore, no level playing field available to us. In the matter of patents, particularly in the field of agriculture, I have suggested that the claimer of patent should be asked to make a declaration to disclose the origin of germ plasm and undertake to pay royalty therefore. A failure to make such a disclosure, or a wrong one, should be made punishable with fine as well as sentence in the rules of WTO Act.

Dear conferees, education is a lifelong process. Today, your formal education has come to a higher stage, but not ended. The real, and applied one is to begin now onwards. Wherever you go, and whatever you do, you are expected to carry the image and stamp of this great University, your Alma Mater. On this occasion on behalf of everyone here, I congratulate you all and extend my good wishes for your bright future and in conformity with our tradition do the following Updesha : *Sat yam*

vada, Dharmam chara, Swadhyayan ma *pramadah, Matriman devo bhava, Pitriman devo bhava, Acharyavan devo bhava, Aiswaryavan devo bhava, Tejasvi bhava, Yashasvi bhava.*

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
36th ANNUAL CONVOCATION

19th February 2005

Address by

Dr. Mangala Rai
Secretary, DARE & Director General, ICAR
Krishi Bhavan, New Delhi

Rajendranagar, Hyderabad – 500 030

Excellency, Governor of Andhra Pradesh and Chancellor, Shri Sushil Kumar Shinde Ji, Hon'ble Vice-Chancellor, Dr. S. Raghu Vardhan Reddy, Members of Board of Management, learned Members of the Faculty, Distinguished Guests, and Media Persons, Dear Students, Ladies and Gentlemen.

I deem it to be a matter of great pleasure and privilege for me to address 36th Annual Convocation of Acharya N.G. Ranga Agricultural University. Acharya N.G. Ranga was a prominent freedom fighter, a parliamentarian, an eminent scholar, economist, a practicing farmer, social reformer and above all an embodiment of human values. He was a staunch supporter peasants who fought for the cause of farmers in the country and a Gandhian to the core. Pt.. Jawaharlal Nehru, the first Prime Minister of our country had once remarked in Parliament, "Who can forget the peasants in this House while Ranga is fighting for them?" I wish to avail this opportunity to pay my respectful tributes to him.

At the very outset I heartily congratulate the students who would be receiving their hard earned degrees and awards and also their worthy teachers who spared no efforts to impart a high quality education and inculcate rich values to shape your personality. My compliments to the entire staff and students of this University for securing second place in the number of Junior Fellowships for the year 2004 besides a recipient of ICAR Best Institution Award (1999) and Best Performance Award (2000) during earlier years.

India, over the years, has developed a strong Agricultural Education System. Establishment of State Agricultural Universities (SAUs) on the pattern of Land Grant Colleges of the United States of America was a very positive policy decision in reorganizing and strengthening Agricultural Education in India. Presently, there are 38 SAUs (including 4 Veterinary and Fisheries Universities), 5 DUs (4 of these are ICAR Institutes), 1 CAU, and 3 CUs having agricultural faculties. There are 210 constituent colleges of these Universities. In addition there are more than 100 private colleges, affiliated both to SAUs and General Universities, which also provide agricultural education.

The contributions made by SAUs and ICAR Research Institutes, as partners of the National Agricultural Research System (NARS), are well recognized. The Green Revolution, with its impressive social and economic impact, may not have been possible without the significant contributions made by these centers of agricultural education, research and extension.

The post green revolution scenario has thrown open new challenges and problems which necessitate to : (i) consolidate the benefits of green revolution by responding to concerns of sustainability, profitability and productivity, (ii) address the problems of poverty, malnutrition, equity and unemployment, (iii) remain sensitive to stakeholders perspective, (iv) adapt to upcoming knowledge and frontier science subjects and (v) create awareness and knowledge on emerging issues of new economic order. These new developments and challenges call for continuous capacity and competence building through reengineering education and training.

The human resource developed by Agricultural Education System has been instrumental in agricultural transformation in the country. However, with need for new knowledge and skills becoming more challenging than ever, Agricultural Education System would have to keep pace with the rapid technological, economic and social developments taking place globally to remain relevant. Henceforth, enhanced efficiency and productivity will be the key determinants to effectively respond to the needs and challenges of emerging scenario at the local, regional, national and global levels.

I would like to make a mention of a study conducted by the Applied Manpower Research Institute (AMRI, 2000) which indicated that 43% of the agricultural graduates and 23% of the post graduates were unemployed after completion of their degree programmes in 1999- 2000. Same study, based on the current employment scenario, predicted that the annual national demand for agricultural and veterinary graduates is about 7,000 and 1,550 respectively. By 2010, the cumulative gap i.e., excess supply over demand at current employment rates, will be 34,000 for agricultural graduates and 6,000 for veterinary graduates. Further restriction in employment will reduce opportunities in the public sector.

Unemployment rate measured on current daily status basis, had declined from 8.3 per cent to labour force in 1983 to 5.99 per cent (20 million) in 1993.,94; however, it rose to 7.32 per cent (27 million) in *1999-2000* and about 9.21 % (34.85 million) in 2001-02. Unemployment among youth in rural areas has increased between 1993-94 and 1999- 2000 from 9.0% to 11.1% among males and from 7.6% to 10.6% among females. The average annual growth rate of employment for the year *1999-2000* was 1.07 % of which rural employment grew at 0.67 % and agricultural employment at a very low rate of 0.02 %.

Since self employment does not yield sufficient income, small cultivators shift towards wage employment, either in rural areas as landless agricultural labour or in the urban informal sector. Accordingly, casual wage labour in rural areas increased from 29.7% of rural employment in 1977-78 to 37.4% in *1999-2000.* To be able to attract the youth and educated into self employment, there is a pressing need to improve income from the work opportunities for self employment in rural areas. Given the fact that a large part of the produce in rural areas is disposed off as unprocessed, there is tremendous scope for creation of higher income self employment opportunities in rural areas. The natural process of economic growth related shift from primary to secondary and tertiary sectors is not fast enough to address the issues of increasing unemployment, poor quality of employment, educated unemployment and massive under employment in agriculture. More than 50% of the over one billion population belong to the age group up to 21 years. Unless agriculture becomes economically rewarding, it will be highly difficult to attract or retain youth in farming. Growing rural unemployment and urban migration are triggered because of our inability to generate gainful employment in rural areas not just by increasing population.

In the present scenario of increasing human and livestock populations; decreasing man to land ratio; degrading soil, water, climate' and biodiversity

resources; decreasing total factor productivity and recycling dangers of chemicals in animal/human chain; reorientation in agricultural research and development efforts is called for to enhance and sustain productivity and profitability. As the sector is by itself self employment oriented, the thrust of policies to develop self employment opportunities should be to:

- encourage steps to improve productivity and reduce waste and also convert so called waste into wealth.
- encourage value addition as it would be difficult to compete effectively and enhance monetary returns on the investment made.
- establish better markets: integrate supply chains through terminal markets in all major cities
- encourage exports specially of organic produce

By selling fresh and raw produce, the farmers are getting less price. But, by processing and offering value added, finished and packed products, the commodity will be made available year-long. By prolonging the shelf life it can be exported within and outside the country, enabling the producers to get much better prices. The gluts during peak season and soaring prices in the off seasons can be eliminated. However, the country has not learnt lessons out of the past sad experiences and thought of creating necessary infrastructure for refrigerated transport, cold storage, processing, grading, value addition, product development, by product utilization of the agriculture, horticulture, animal and fisheries produce; the cutting edge technologies are not available for the secondary and tertiary sectors.

With about 150 million tones of horticultural produce, India is the second next to China. The horticulture sector employs 1.66 crore with 50% self employed, 30% waged and 20% salaried. The sector is labour intensive (84.33 mandays/acre or 34.18 mandays/Rs.I000 production for food grains). As such growth of horticulture is the comer stone for creating self employment opportunities in agriculture.

Animal Husbandry is another area of importance needing pin pointed attention. It provides job opportunities to about 20 million persons, not including persons employed in sale, re-processing and transport of animal products at secondary market level. "Access to asset" is the pre-condition for any self-employment activity. In comparison to land, livestock are more than proportionately controlled by the poor. There is a high potential for demand driven growth. It also insulates against the vagaries of weather like drought, and ensures some livelihood particularly when crops are lost.

Development of appropriate perennial vegetation based technologies for rehabilitation of 1 07 million ha waste lands has the potential to enhance productivity, create additional employment avenues and also provide resilience to 142 mha arable land through soil and water conservation and sequestering carbon in soil. A three fold increase in the rate of afforestation, from about 1.23 million ha per year is required, to increase forest cover from the present 23.03% (75.70 m ha) to the national goal of one-third forest/tree cover by 2012. Every two hectares of additional area under plantation of forest crop can generate year-round employment for one

person. As such there is scope to upscale employment generation from the present level of 246 to 850 million mandays per year.

The soil and water conservation measures developed for maintaining watersheds have the potential to reduce run off from 42 to 14% and soil loss from 11 to 2 t/ha. Technology of reclamation of alkali soils has been adopted in 1.0 million ha in Haryana, Punjab and Uttar Pradesh, have the potential to be further extended. The watershed management technology is generating 215 mandays/ha/annum during implementation phase and 20 person days/ha/annum sustainably in post implementation phase.

The premium price for IPM products which are produced under IPM umbrella will be economic security for IPM practitioners to increase their income and create economically viable market in urban area. This will also provide nutritional quality to agricultural and horticultural products. The generation of additional employment for mass collection of immature stages of crop insect pest, damaged plant parts by school boys and girls will provide pocket money to the school children.

Bee keeping is an important input in Agriculture. Its promotion in various field and horticultural crops mainly towards pollination of crops and Honey can be promoted successfully by the unemployed rural youth. Rearing of Apis mellifera and Apis cerana indica is not that difficult and for that scientific know how is available at almost all the agricultural universities and in number of the ICAR Institutes. According to an estimate we required 7 million bee colonies for optimum pollination of just 12 important crops. Only 1.5 million bee colonies for optimum pollination of these 12 crops are available at present. Therefore, there is a great scope for development of bee keeping in rural areas to generate additional income by way of Honey sale and an additional advantage of Pollination of Crops.

Seed production of field and horticultural crops, vegetables, fruits especially low-volume high-value hybrid seed, fish seed production and hatchery-establishment, multiplication of planting material in vegetatively propagated crops including potato, tissue-culture facility for rapid multiplication and sapling production including micro-propagation, enhancing the supply of quality germplasm and semen in animals, and value enhancement in seed using techniques like seed treatment, seed coating, seed pelleting etc. are the promising areas. Further storage facilities, cleaning and grading facilities, seed testing, seed transportation, certification and regulatory support etc. would add to the job opportunities.

The advent of a new global trade regime not only brings into focus concerns of global competitiveness of produce and system sustainability but also necessitates a sound and customized policy support. Our National Agricultural Research System, in the past, has been successfully responding to the ever-evolving concerns and there is no reason why it should not be poised to do so in the years ahead if appropriately supported with much needed means, mechanisms and system with a dynamic policy environment to flourish.

Productivity and profitability enhancement in tandem should be our key to success. In this endeavour, cutting-edge technologies will play a pivotal role. Owing to the increasing complexities in accessing the rapidly advancing science and skills in developed countries, it becomes imperative to achieve self-reliance in areas like biotechnology, information and communication technology, geographical information system, and water and energy management and policy analysis. Judicious and balanced diversification is a viable approach to enhance income and employment, minimize risks and allow efficient and sustainable use of natural resources.

Our strategy accordingly has to be a coordinate of productivity enhancement, minimizing production losses through risk management, processing and value addition, commercialization taking off from market intelligence and has to be efficiency-mediated that needs to factor in several dimensions. Major approaches for productivity enhancement would be use of hybrid technology, genetic modification using biotechnology in field and horticultural crops, animals, fish, microorganisms and supplying quality seed, planting material and strains breeds to diverse end-users and using proven location and system specific agro-production and protection technologies. A realistic estimate for post harvest loss reduction at the present level of available technologies is that about 45-50 million tonnes of additional food valued at about Rs. 40,000 crores could be made available annually, provided primary and secondary post harvest processing activities are timely undertaken in the production catchments.

So far, the efforts have been to use only a fraction of the total biomass produced and discard the rest as waste. In some cases, the magnitude of wastes has been larger than those of the usable fractions. Not only this surplus, biomass needs to be processed for value addition; it creates additional employment and leads to cleaner and sustainable environment. Several very useful products have been obtained from these 'wastes'. Despite being referred to as 'waste' it is in fact a potential source of raw material for the production of economically valuable products. An estimate of agricultural by-products from all crops, livestock and fisheries sector indicates these to be about 700 million tonnes annually. It is estimated that only 25% of this by-product is presently utilized. A suitable value addition to match it with the requirements can convert this waste into wealth. The recycling and reuse of the 'so called agricultural waste' will create beneficial activities, which will directly mitigate environmental problems and improve economy.

In view of the small and scattered farm holdings and resource constraints of majority of our farmers, strengthening co-operatives, self- help groups, apna mandi type of institutions, and contract farming assume significance. The markets have to play a decisive role for the survival and success of farming in the coming years. The present level of mechanization, estimated to be about 25% needs to go up to 40% by 2020. The mechanization would need to be region, crop and stakeholder specific. There are several areas of agriculture, horticulture, livestock and fisheries sectors that have not received the same level of mechanization attention as has been provided to the food grain sector. Mechanization, therefore, has to be more extensive for encompassing horticultural crop, livestock and fisheries production systems. In fact, it is here that we envisage incorporation of precision engineering

technologies to match the existing demands of input, with appropriate supply systems to maximize the returns. The mechanization must suitably address the issues of gender equity, employment, and safety and, therefore, long term sustainability.

There are a number of laboratories under ICAR, CSIR, ICMR, State Agricultural Universities, General Universities and private sector industry/NGOs that are working on food processing but have very little functional linkage. It is high time to realize and harness the mutual strengths of various stakeholders in a partnership mode to develop the processing sector. Public-public and public-private linkages, bi or multilateral, must be established and supported.

The Indian farmer has demonstrated in fair measure that given the right technology and guidance, he can deliver. Our outreach machinery has done reasonably well in the past. However the rapid pace of information and technology generation certainly calls for augmentation of extension efforts. In this endeavour concept of establishing agri-clinics in the rural areas and run by agricultural/veterinary graduates needs to be encouraged so that the farmers are able to access desired information, services, advice and remedies to their problems in shortest possible time be it soil testing, identifying plant diseases, providing prophylactic cover to livestock and birds or treatment of sick animals etc.

Besides the food processing and agri-clinics, the Agro-tourism is a recent development that provides newer means of income generation in the rural areas. Agro-tourism is seen as a subsidiary industry to farming. The urban visitors enjoy a unique experience in the countryside. Agro - tourism promotes learning and inculcates interest in heritage and enjoy 'real' India. This will definitely provide to children, an education which is not available in a classroom. Hence, the agro-tourism is a potential self-employment generating venture and needs to be promoted.

We will have to build indigenous capacity to develop our human resources. In this endeavour, course curricula will call for revision to enhance relevance and practical utility of education through diverse subjects to serve the cause of employment and country's economic development. The focus of change in agricultural education should be to build and inculcate entrepreneurship and professionalism. It is important to recognize that a creative vision is an integral part of the entrepreneurial process and nurturing creativity can have far reaching benefits on the process of innovation. In agriculture entrepreneurs need to possess a strong vision and strategy. One should be capable enough to define own goals, strategy and plans, with flexibility to adapt to changes in the external conditions. The role therefore, has to be multiple i.e decision maker and worker.

In order to define the knowledge profile of para-professionals, besides, building pedantic knowledge and practical skills in a particular vocation, the prospective candidates should be provided with opportunities to gain information and knowledge on village life, rural livelihood means, natural resources and native ecological principles of their use, traditional practices and beliefs vis-a-vis modern techniques on raising diverse crops, livestock including their varieties and breeds,

crop livestock interaction, grassland management, post harvest technology in the light of WTO, necessary use and maintenance of farm implements and machinery, practical exposure to general field problems and basic expertise in employing and linking present day communication means for interpreting weather advisories and market trends.

Entrepreneurship training to prepare graduates for setting up farm advisories and services (agribusiness and agri-clinics) should not be treated as a separate activity of teaching and learning. In place of current practice of imparting training after graduation, building entrepreneurship competence and spirit should be integrated into the re-scripted course curricula. In order to support service needs of diverse production systems, each SAU/institution must offer a basket of region-specific entrepreneurship courses. In pursuance of that objective, erecting necessary infrastructure for practical sessions and building faculty competence to teach refashioned courses were identified as the frontal strategies and investment initiatives.

In order to promote entrepreneurship it is necessary that our institutions/SAUs should extend guidance/counseling to potential entrepreneurs on how to develop an economically viable project, organize resources, understand basic economic principles of supply and demand, factors which influence price, common risks and problems likely to be encountered in agri-business marketing strategies, Information on market analysis, industry trends, sources of finance, consumers needs etc. Extending relevant information to farming entrepreneurs on production, marketing, management and other related issues must receive our priority attention especially with regard to resources for small-scale ventures.

Therefore we need to prepare agricultural graduates who are capable of starting their own agri-business, preferably in the rural areas, so that they not only create their own jobs but also are able to generate employment for others as well. In essence, agricultural education system will aim at producing professionals and academicians who are self- confident, self-reliant and self-competing individuals.

It will, thus be essential to introduce necessary structural changes to reflect modem realities, challenges and opportunities. The revised curricula should include new courses in areas like bio-diversity, sustainability, IPM, INM, Environmental Science, Agri-business Management, Bio-technology, Agri-meteorology, Agro-ecology, trade and export, GIS application, Computer Science, Precision Farming, Post-harvest Technologies, Value Addition and core subjects of electives covering the alternate farming issues for self employment/ employment etc.

It will be a must for the Agricultural Education System than ever to innovate course curricula suiting to concerns and issues relevant to real life use. During the early part of the establishment of SAUs the academic programmes were structured to produce graduates who became primarily technology agents. In the present era of specialization and development in modem sciences it is necessary that agricultural education is restructured in a manner that the graduates coming out are able to meet the challenges with determination, zeal and commitment. They must prove to be the

job creators and not the job seekers. For this to happen, universities would develop and strengthen both formal degree and non-formal degree educational programmes, bring academic excellence relevant to future needs.

Dear students, education is a lifelong process, you have to remember that your formal education has come to a higher stage, but not ended. It has actually begun now and equipped with knowledge and skills you have just crossed the first stepping stone. I urge all the new graduates to be conscious of their role in the process of society and thereby nation building. I wish to quote Mother Teresa's words "Make us worthy, Lord, to serve those people throughout the world who live and die in poverty and hunger. Give them through our hands, their daily bread, and by our understanding love, give them peace and joy."

I hope you will carry the image and stamp of this great University wherever you go and whatever you do. On this occasion, I congratulate you all and wish you all the best and only the best in future.

Thank you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
37th ANNUAL CONVOCATION

2nd February 2006

Address by

Dr. Anil Kakodkar
Chairman, Atomic Energy Commission
&
Secretary, Department of Atomic Energy
Government of India

Rajendranagar, Hyderabad – 500 030

His Excellency Shri Rameshwar Thakur, Governor of Andhra Pradesh and Chancellor, Acharya N.G. Ranga Agricultural University, Dr. S. Raghu Vardhan Reddy, Vice-Chancellor, Distinguished Members of the Management and Academic Bodies of the University, Members of the Faculty, Students especially those Graduating today, Ladies and Gentlemen.

Let me express my gratitude for the opportunity to be a part of the 37th Annual Convocation of Acharya N.G. Ranga Agricultural University, Hyderabad. I feel privileged to be here once again. I recall that I was here in 2003 to participate in a national seminar on 'Radiation Technology for Enhancing Food Security, Safety and Trade' hosted by this University.

Prof. N. G. Ranga in whose name this University has been named was a prominent freedom fighter, an eminent parliamentarian, a great scholar, a fighter for farmer's rights, a well known social reformer, a true Gandhian and above all a person who stood for high human values. I wish to avail of this opportunity to pay my respectful tributes to him.

Let me also use this opportunity to congratulate all the students who are graduating today. My special compliments to those who have distinguished themselves in their respective examinations. I wish all of you success in your next endeavors. May your dreams come true.

Convocation is a solemn occasion in the annual calendar of an institution of higher learning. It is a memorable milestone in the career span of a student, his or her mentor and indeed everyone connected with the pursuit of knowledge in the University.

I strongly believe that education is the route to enlightenment and a tool for empowerment. If carried out effectively, education can transform our youth into a huge 'human capital' and make India one of the most powerful nations of the world. We have a unique opportunity of empowering nearly half of Indian population that would be of young capable age at a time when most of people in developed countries would get past their productive age. We thus have tremendous potential to forge ahead in this knowledge economy driven competitive world. We can maximise this potential by preparing our youth to play an effective and constructive role at national as well as at global level.

We are all too familiar with the capabilities of the Indian mind. India has been making important contributions to the global knowledge pool for ages. This process continues even today. I often wonder why is it that, with the existence of such a capability for original thinking, we remain vulnerable to foreign dependencies. To my mind this arises on account of a disconnect that has come about between our knowledge activity and its transformation into robust technology. While the new knowledge which is the output of basic research is shared globally, sharing of technology is not without constraints and costs. There are barriers arising out of commercial, strategic, political and such other considerations. Building technologies out of our own knowledge pool within the country is thus of crucial importance.

Further, if we remain dependant on foreign technologies, we can never become world leaders and we cannot survive the global competition unless we achieve global leadership at least in some areas where we have strengths. This is the challenge before our education system which must produce empowered youths who can pull the country up the ladder and not be a baggage causing drag to upward movement.

It is indeed a great privilege and honor for me to be associated with the proceedings of the Convocation of this great agricultural institution. This is one of the largest and one of the prestigious agriculture universities in the country, and the only one in the state of Andhra Pradesh with several teaching campuses, regional research stations, and district level agricultural advisory and technology transfer centers. The university has played a pioneering role in the green revolution, especially in rice, that was ushered in the sixties. As a result we not only produce enough food today but generate surpluses. We stand among the largest producers of agricultural and horticultural produce in the world. People of this country owe a great deal to the national agricultural research system in general, and some of the agricultural universities like yours in particular, for their contributions towards the comfortable food security situation that the country enjoys today.

For a country of our size both in terms of dimension and population one green revolution is not enough. As our population increases, the resources diminish and become more expensive, there is a stronger need for another revolution that would sustain and fortify the gains of the previous one. This revolution can be achieved with the recent developments in biotechnology, information technology, and newer discoveries in science and engineering. In attaining the second Green Revolution, sustainability will remain the key word. Agricultural activity should provide remunerative returns on investment while maintaining the ecological balance.

Indian agriculture is beset with problems related to high cost of inputs, lack of suitable varieties, inconsistent quality, poor post-harvest management and very high post-harvest losses. These problems have reflected on our global competitiveness. For remunerative returns, agricultural produce should meet the market needs and standards. The farm produce should be of good quality, available in plenty, and amenable to processing for value addition. It should be able to withstand the rigors of handling, storage, transport and distribution, and, in the global context, should be able to meet the requirements of international quality and quarantine.

Thus, as a nation we not only need to increase our agricultural productivity, but also focus our attention on conservation and post- harvest management of our agricultural produce. In another 20 years our population is expected to reach nearly 1.4 billion, requiring additional 60-70 million tonnes of food grains. Development and use of high yielding, disease-resistant and stress-tolerant varieties assumes great significance in this respect. However, a significant portion of this requirement can be met merely by saving the post-harvest losses and value addition to the raw produce. Post-harvest technology for conservation and value addition is going to play an increasingly important role in the new world order. The appropriate conventional and newly emerging high technologies could play a significant role toward this end.

Though the Department of Atomic Energy is better known for its contributions towards national security and energy security, its efforts in solving problems related to food security, healthcare, and other areas of human development are also significant. Some of the technologies including desalination of water, nuclear agriculture, radiation processing of food, industrial, healthcare and medical products are now ripe for deployment on a large scale for the benefit of society. The Department is pursuing the deployment of these technologies in a mission mode. Let me give you some examples.

Nuclear technology has played an important role in increasing crop productivity by providing mutants with desirable agronomic traits. Radiation is a potent tool in the development of mutants that either of their own or after crossing with other genetic stocks can lead to the development of new varieties with superior and desirable characteristics. Our major emphasis has been in oil seeds and pulses. With an active collaboration of the agricultural universities and the Indian Council of agricultural Research, 26 elite Trombay varieties have been developed at Bhabha Atomic Research Centre (BARC). These varieties, released and gazette notified for commercial cultivation include 13 oil seed crops (10 groundnut + 2 mustard + 1 Soybean), 11 pulses (4 blackgram, 5 Greengram and 2 pigeonpea) and one each of rice and jute. Besides, a few more varieties have been identified for release by ICAR State Agriculture Universities. A photoperiod insensitive mutant of *Sesbania rostata,* developed by BARC is showing promise as a source of green manure. In a span of 55 days it can fix 120-150 kg of nitrogen per hectare.

Among the Trombay varieties released for commercial cultivation from BARC, TAG 24, TG 26 in groundnut, TAU 1 in blackgram and T ARM 1 in green gram became the most popular varieties in the country. During the last few years groundnut and blackgram varieties developed at BARC constituted 30 and 40% of the annual national breeder seed indent, respectively. I understand that Seed Corporations like NSCL (National Seed Corporation Limited), MSSCL (Maharashtra State Seed Corporation Limited) and APSSDC (Andhra Pradesh State Seed Development Corporation) are producing large quantities of foundation and certified seed of our groundnut varieties in several Districts in A. P. such as Anantapur, Kurnool, Kadapa, West Godavari and Krishna, and distribute seed to the farmers. Besides, there are several progressive farmers who became the seed suppliers and spokespersons for our ground nut varieties in Maharashtra, Karnataka, A.P., Gujarat and Rajasthan. As a result, there is a horizontal and vertical spread of these varieties through seed corporations and farmers in all the groundnut growing states including AP. Farmers in Marathwada region in Maharashtra brought a revolution in groundnut production as well as productivity by cultivating BARC varieties like TAG 24, TG 26, TPG 41 and TG 37 A in Rabi season. These varieties appear to have wider adaptability to grow in different agro-climatic conditions.

Similarly, our black gram variety TAU 1 alone has covered over 95% of area under black gram cultivation in Maharashtra. So also our mung varieties which are disease resistant are popular especially in rice fallows. A new mung variety TM-96-2 which is jointly developed and evaluated by BARC and this university (ANGRAU) in AP is being recommended for rice fallows.

There are also other dimensions to nuclear agriculture. To cite a few examples, radiation technology can be used to eradicate pests of agricultural importance. By a method known as, SIT (sterile insect technique), it is possible to eradicate problematic pests such as red palm weevil, cotton bollworm and fruit flies. Radioisotope tracers have been used to study the nutritional requirements of plants. These studies have enabled optimization of fertilizer inputs to agricultural crops.

Research at BARC has resulted in protocols for large scale multiplication of banana, pineapple and sugarcane through tissue culture techniques. Technology for banana has been transferred to user agencies.

Besides crop improvement, radiation technology is used to reduce post-harvest losses. Food preservation using radiation involves controlled application of energy of radiations such as gamma rays, X- rays, and accelerated electrons to food and agricultural commodities. The technology can complement and sustain agricultural productivity. It provides an effective alternative to fumigants, which are being banned .and phased out due to their deleterious effects on human health and environment. Radiation processing controls sprouting in bulbs and tubers, and destroy insect pests in stored cereals, pulses and their products. It can also overcome quarantine barriers in exportable agricultural commodities including cut flowers. Based on the research done in BARC and other research centers in the world, advantages of food preservation by irradiation have been clearly demonstrated and Government of India has cleared several items for radiation processing. Setting up of such plants is expected to reduce the percentage of food that is lost by various causes and provide a method for improving food hygiene and facilitate export. Two such plants, one for low dose applications and the other for high dose applications have been set up by the Department and are already in operation. MoUs have been signed with 14 private entrepreneurs including one in AP, Out of these four plants set up by private entrepreneurs are already commissioned. Others are at various stages of planning, construction and commissioning. Radiation processing would soon be recognised as a formal procedure for quarantine treatment of food and plants, thereby further enhancing export potential of these products.

India has a large cattle population that helps to sustain its agriculture.. The country has emerged as the largest producer of milk in the world. Animal health needs more attention, primarily for improving yield of milk and qualifies of meat. India is also emerging as one of the major producers of marine and aquaculture products.

A barge mounted 50 m3/day capacity desalination plant is under construction at BARC Mumbai. This would be an important demonstration of this technology for the benefit of people in water scarcity coastal areas. The Tsunami affected villages in Tamil Nadu have benefited from RO-based 5000 liters/day capacity desalination plants.

The waste water sludge generated by a sewage plant is very odorous and contains a high level of pathogens which limit the reuse of this waste which is otherwise a rich source of nutrients. Its disposal in the present form is an economic

loss to the country. Further treatment of the sludge to reduce odour and pathogens is therefore necessary before the beneficial utilization or recycling of solid sludge can be recommended.

The high-energy gamma radiation from cobalt-50 has the ability to inactivate the pathogens with a very high degree of reliability and in a clean and efficient manner. BARC, in collaboration with Vadodara Municipal Corporation has established a Sludge Hygienisation Research Irradiator (SHRI) at Vadodara to demonstrate this upcoming technology and gain operating experience. The operational experience has established that a radiation dose of about 3 kGy delivered to the sewage sludge ensures removal of more than 99.99% of disease causing bacteria. The sludge has been tested as manure in the agricultural fields and the results are very encouraging. The irradiated sludge can also be used for growing friendly "nitrogen fixing" bacteria like rhizobium and azobactor to produce bio-fertilizers.

Similarly, a large amount of biodegradable solid waste is generated everyday in urban and rural households and also in agricultural operations. It is estimated that 400-500 gm of biodegradable waste is generated per person per day. All this waste is left in dumping grounds causing a health hazard. BARC's Nisarg-Runa plant for solid waste management offers a 'zero garbage, zero effluent' method for waste management. A conventional plant can handle only cow dung and/or human waste. Nisarg-Runa plant can process almost any biodegradable wastes from kitchen, vegetable market, agriculture farms, cow dung, dry leaves & abattoir. There is a good potential for energy generation in this biphasic biomethanation plant. Eight such plants of capacity 1 to 5 tonnes/ day have already been installed including 2 by Brihanmumbai Municipal Corporation and more are under construction and planning.

These two technologies together have the significant potential for 100 % eco-friendly waste recycle in urban and rural areas with production of manure and generation of energy.

Translation of such developments to large-scale deployment for the benefit of society is however a much bigger challenge. This involves not only an adequate attention to technical issues but also to several other areas such as entry barriers, financial risks in the early stages of technology implementation, societal awareness and response and others. Thus science and technology based development should need involvement of not only the scientists, engineers and doctors, but also of sociologists, economists and communicators.

The Department of Atomic Energy has encouraged linkages with other institutions in the country including universities, for promotion of research and development in the areas of mutual interest and relevance. This has been mainly done either through BANS sponsored research projects or direct inter-institutional collaborations. We consider universities and institutions collaborating with us as our partners in progress. I am happy to learn that a fruitful collaboration has developed between BAAC and ANGRAU through a BANS sponsored projects and I understand this collaboration will grow further in the years to come.

Agricultural graduates have a major role in taking Indian agriculture to greater heights. Some of you would opt for higher research and others would join different domains in agriculture sector. Those of you who opt for scientific career need to focus on the problems of Indian agriculture rather than the glamorous problems dictated by the western laboratories. The emphasis should be on solving local problems and needs. For the field officers the challenge is to take the modern scientific developments and knowledge from laboratories to farmer's field. Farmers should not be conceived as mere passive receivers of technologies but as ones who have a large reservoir of knowledge which the scientists can use. Farmers must have access to information based on sound science, which will help them to take right decisions on how best to use management options in an efficient and effective manner. Farmers should be empowered with the knowledge of the latest technologies, practices, weather and market information thus making agriculture and agricultural enterprise, a rewarding profession by increasing returns on investment.

Our higher education system must empower our youth to feel confident about addressing the issues of development based on scientific and innovative inputs tailored to the needs of our society. We should prepare experts rather than just activists to carry the development forward. We have to find solutions that make a big difference to the living standards of millions of under-privileged without compromising sustainability and the environment around us. That is the challenge we all must meet on the basis of what we have learnt, the skills we have acquired and our further work in the area of technology, economics and sociology.

My best compliments once again to the young students graduating today. May all your dreams be realized on the basis of your hard work and the capabilities you have acquired in this university. I do hope that in the existing highly competitive environment, you would be successful and make all of us, your parents, your teachers, your friends, your University and above all your country proud of your achievements. I also do hope that you would maintain in you a spirit of trusteeship and while you rise higher, contribute in whatever you can, to your roots, to the society and the country where you grew up and the Institutions that prepared you to raise higher. Good Luck to you all.

Thank you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
38th ANNUAL CONVOCATION

4th September 2006

Address by

Dr. Y.S. Rajasekhara Reddy
Chief Minister of Andhra Pradesh

Rajendranagar, Hyderabad – 500 030

His Excellency, Chancellor, Shri Rameshwar Thakurji, Vice-Chancellor, Dr .S. Raghu Vardhan Reddy, Members of Board of Management, Members of Academic Council, Members of Research and Extension Advisory Council, Distinguished Guests, Faculty, Staff and Students of the University, Graduates of the year, Representatives of Media, Ladies and Gentlemen.

I am extremely pleased to be here with you on the occasion of the 38th Convocation of Acharya N G Ranga Agricultural University. At the very outset, I congratulate all the students, who are graduating today and my special compliments to those who will be receiving awards and medals.

As all of you are well aware that Acharya N.G. Ranga Agricultural University has been recognized as one among the Best State Agricultural Universities in the country and received the coveted ICAR Best Institution Award in the year 1999 and Best Performance Award during the year 2000, besides securing the second highest number of Junior Research Fellowships for the year 2004. The University is accredited by the University Grants Commission (UGC), Indian Council of Agricultural Research (ICAR) and Veterinary Council of India (VCI) and degrees conferred by it are globally recognized. The performance of the University in fulfilling its mandate of imparting education, conducting research and extending transfer of technology in agriculture and allied fields is commendable. ANGRAU is a multi-campus State Agricultural University spread over the entire state of Andhra Pradesh. Consequent to the formation of Sri Venkateswara Veterinary University at Tirupati during 2005, the Colleges, Research Stations and Polytechnics of the Veterinary faculty were brought under the control of the new University.

In response to the contemporary academic scenario and to meet the human resource requirements of agribusiness, food processing, biotechnology and allied .sectors, the University has introduced seven interdisciplinary programmes, which include two (Commercial Agriculture & Business Management and Food Science) at undergraduate level and five (Agri Business Management, Agricultural Biotechnology, Veterinary Biotechnology, Environmental Science & Technology and Food Science & Technology) at postgraduate level.

I am pleased to note that about 30000 students have graduated from the portals of this University since inception. A large number of them have joined in various public and private organizations both within and outside the country and brought laurels to their *Alma Mater.* Sustained efforts of the scientists of the University have resulted in release of 328 improved varieties and hybrids of different crops and development of improved technologies to solve the problems of farming community. The technologies developed include rice-fallow pulse production, crop diversification, integrated pest management, integrated nutrient management, organic farming, watershed management, improved *doruvu* technology, farm mechanization, post harvest technologies, embryo transfer technology in Ongole cattle, artificial hatching of *Emu* eggs, vaccine for Blue Tongue disease in sheep, vegetable dyes, value addition, eco-friendly textiles, drudgery reduction and other entrepreneurial technologies. I am also happy to know that the crop varieties

released and technologies developed so far continued to enjoy the confidence of the farmers not only in the state but also in other states.

It is heartening to know that ANGRAU also has at its credit four patents by developing low cost ice-cream freezer, multi purpose fish vending display table, pneumatic pressure boiling vessel and technology for making jaggery powder. ANGRAU is playing a major role in producing large quantities of breeder and foundation seed of rice and other cereals, pulses, oilseeds, fibre and vegetable crops every year and supplying to government and other agencies involved in seed multiplication and supply chain of Andhra Pradesh, which is considered as Seed Capital of India. The University is carrying out interdisciplinary research on seed production and protection strategies under National Seed Project (NSP) at Rajendranagar. A grant-in-aid project worth of Rs.170.39 lakhs has also been sanctioned to ANGRAU by Ministry of Food Processing Industries, Government of India, for setting up of a Quality Control Laboratory for Food Testing and also a Training Centre for Quality Management, at Rajendranagar.

ANGR Agricultural University is carrying out all its extension activities through a network of units located through out the State. In order to reinforce and strengthen the farmer- scientist interactions, ANGRAU has reorganized the extension system by locating the scientists at district head quarters, who operate in close collaboration with the line departments. Accordingly, 22 District Agricultural Advisory and Transfer of Technology Centres (DAATTCs) were established. The significant achievements of these DAATTCs include formulation of mandal wise and farming situation wise cropping plans for each district. The Scientists of the University, posted at Farmers Call Center *(Parishkaram),* answer farmers' queries over phone and this centre is drawing the attention of farmers through out the State.

I congratulate the faculty, staff and students of this University for these unique achievements. Hailing from a farmers' family, I have better understanding and clear perception with the agricultural system and the problems encountered by the farming community of the State. The University deserves my special compliments for its active role in all these years in giving much needed technological support for solving the location-specific problems of respective crops in different agro- climatic zones of the State. In the wake of new problems being faced by the farming community of the State, with special reference to changing cropping patterns, change in pest and disease pattern and to meet the challenges that are arising due to globalization, liberalization and commercialization of agriculture, the time has come to restructure the agricultural education, reorient the research and revamp the transfer of technology strategies.

An Overview

Andhra Pradesh is the 4th largest State in the Country in terms of area and 5th in terms of population. The agriculture sector accounts for 30 per cent of the Gross State Domestic Product (GSDP) and employs 70 per cent of the rural work force. Therefore, bringing out an accelerated growth of this prime sector is vital for generating more income and employment opportunities and to alleviate poverty. The

major crops grown in the state include rice, maize, pulses, cotton, sugarcane, chilli, groundnut, castor, sunflower, vegetable and fruit crops. Almost 28 per cent of gross cropped area and 50 per cent of the area under food crops is under rice cultivation. Though rice crop is the largest contributor accounting for almost a quarter of State's Agricultural GDP, the growth rate of production decreased to 1.9 per cent during 1990 as against 2.9 per cent during 1980s. In terms of productivity, the State stands first in maize, chilli and mango; second in groundnut, castor and sunflower and fourth in rice and sorghum. About 43 per cent of gross cropped area in the State is under irrigation, as compared to national average of 37.5 per cent.

The State of Andhra Pradesh is a Horticultural giant and the growth rate of Horticultural sector has been around 10 per cent in the last decade. The State contributes 28 per cent of mango production, 50 per cent of lime and lemon production, 22 per cent of pineapple production, 7 per cent each of grapes and banana in the Country. Milk production constitutes 11 per cent of A.P.'s Agricultural economy and its share is next only to rice. Poultry is another crucial sector with 1/3 rd of country's egg production and 18 per cent of broiler chicken being supplied by the State. Another promising sector is fisheries, which recorded 10 per cent growth rate during the last decade and Andhra Pradesh accounts for 1 5 per cent of marine fish exports of the Country.

In Andhra Pradesh, large tracts are under rainfed conditions. Rainfed farming suffers from instability in production and the element of risk is higher due to uncertain weather conditions. Therefore, there is need to increase and stabilize the production in rainfed areas. I hope, the University will give more thrust to research on dry land agriculture / horticulture to improve the productivity in rainfed areas.

The fluctuations in food grain production, owing to natural calamities such as floods and drought, have caused corresponding variations in per capita availability of food grains. Given the vicissitudes caused by deviations from normal weather, especially deficit rainfall, there is an urgent need to bring more area under assured irrigation.

The Coastal districts in the state are regularly subjected to the vagaries of cyclones and floods which cause enormous loss to the lives and property of the farming community. There is an urgent need to minimize the human, crop and ecological losses from floods and cyclones through proper monitoring and development of appropriate prediction models for relief operations.

The agricultural scientists should develop alternate cropping patterns and suggest technologies for disaster management, reducing pre-harvest seed sprouting and quality improvement during and after the flood and cyclonic situations.

Despite 43 per cent of gross cropped area in the State is under irrigation, the cropping intensity is below the national average. As part of diversification, coconut on the bunds of irrigated areas in Coastal districts and mango on the bunds in watershed areas should be popularized.

As all of you are aware, that Andhra Pradesh State has launched *Jalayagnam* during the year 2004 to complete major and medium irrigation projects to harness river water and for renovation of tanks. In this programme, 31 major and 18 medium irrigation projects are being taken up, of which 8 projects are nearing completion. On completion of all of these projects, an additional 40 lakh hectares of land will be brought under cultivation and this will facilitate a quantum jump in productivity. The University should give more thrust in its research for development of efficient and judicious water management technologies.

Undoubtedly, the State consumes quite high farm inputs in terms of more pesticides, fertilizers, irrigation water and draft power than their counter parts elsewhere in the country for producing one unit of out put, thus leading to increased cost of production. I am happy to know that the University has already initiated research in this direction, to reduce cost of cultivation by 15 per cent and to increase the productivity by 15 per cent in major crops grown in different agro-climatic zones of the State.

Horticulture Mission

Keeping in line with National Horticulture Mission in terms of growth and rural employment generation per unit area, the Government has launched State Horticulture Mission, which envisages holistic growth in horticulture through research, technology promotion, extension and marketing. The mission is to enhance horticulture production to the level of 300 million tones by 2011 -2012. This can be achieved by crop diversification to ID crops through dry land horticulture including vegetable cultivation and aforestation with minor fruit crops and value addition. One of the strategies of State Horticulture Mission is to facilitate Capacity-building and Human Resource Development. The Government of Andhra Pradesh has identified three Agri Export Zones based on varied agro-climatic conditions of the State to export grapes, mangoes and gherkins grown in different districts of the State.

There is a tremendous scope to propagate a large number of medicinal and aromatic plants, which provide raw / base material for preparation of *Ayurvedic* and other indigenous medicines in the state. The University has to take up planned research on these crops to bring awareness among the farming community with regard to their cultivation, processing and marketing.

The major constraints encountered in processing and export of horticultural products in the state include high cost of land development, predominance of small and marginal farmers, lack of modern post harvest infrastructure and transport, cold storage facilities, non-adherence to the quality standards imposed by the importing countries and pesticide residues.

By harnessing the available resources more effectively under the guidance, technical expertise and help from the ANGRAU, APEDA and other public and private sectors agencies, the State can forge ahead in improving the production, processing

and export of various fruit, ornamental, medicinal, aromatic and vegetable products more effectively at national and international level.

Education

Quality of agricultural education is a fundamental prerequisite for ensuring sustainability of farming system and bringing prosperity of farming- community. If we continue to neglect quality in Agricultural Education, India will become increasingly marginalized in world economy and suffer from relatively slow agricultural growth and development.

We can take an advantage of the liberalized economy and specially the provisions of WTO, if our education provides analytical skills, exposure to international marketing, international quality standards, etc. In this context, ANGRAU has started WTO Cell at Rajendranagar campus, to maintain all the requisite information pertaining to WTO and Agriculture, specially with reference to impact on Agriculture of Andhra Pradesh.

There is a need to broaden the curricula being followed by the Universities so as to reflect more comprehensively national and global vision of the food and farming systems. Teaching programmes must remain relevant to production issues confronting the stakeholders. This calls for right sizing, down sizing or restructuring educational programmes in State Agricultural Universities (SA Us) with emphasis on developing entrepreneurial skills.

I am happy to note that the University has increased the intake capacity of B.Sc. (Horti.) from 30 to 60 and proposed to start three new Horticultural Colleges in the State to meet the growing demand for trained graduates in horticulture. In the context of globalization and WTO, the University should intensify its research and development efforts to boost production and quality of fruits, vegetables, spices and flowers to meet the global demand and standards for export promotion.

I am pleased to note that ANGRAU has been entrusted with the responsibility of revision of UG course curriculum pertaining to agriculture by the IV Deans' Committee of ICAR headed by Prof. S.L. Mehta and coordinated by the Dean of Agriculture, ANGRAU, Dr. M. Sudarshan Reddy. I compliment the University for the revision of course curriculum, in tune with the changed agricultural scenario, by laying more emphasis on hands on training and in preparing the students for professional skills and entrepreneurial development.

It is a happy augury that ANGRAU is stepping in this direction by introducing new programmes in areas like Agri Business Management, Biotechnology, Environmental Science and Food Science, in addition to starting of polytechnics offering diploma programmes in agriculture, horticulture, seed technology, animal husbandry and poultry in all the districts of the State. The University has established an Educational Technology Cell at Rajendranagar campus, with the main objective of imparting training to the faculty for capacity building in these frontier areas.

Farm graduates should be trained to undertake agricultural intensification, diversification and value addition in an, integrated manner. The graduates should become job creators and not job seekers.

The stress and emphasis in the future should be directed towards more skill oriented and entrepreneurial development education. The process of education in agriculture should be oriented towards its clientele.

In addition, agricultural education should focus on social relevance, particularly concerning with issues such as poverty, gender equity, malnutrition, sustainability and regional imbalances. Agricultural education must get out of the regional framework and has to take on the role of continuous education where the process of education is adjusted to the needs of illiterate, unskilled farmers and farm households.

Research

Issues related to productivity, over exploitation of water, soil and environmental resources, fast urbanization, increasing demand of agricultural production are throwing up challenges to the policy makers, planners and scientists to step up agricultural production as the gains of Green Revolution are fading away resulting in depletion of buffer stocks and import of food grains. In addition, the food grain production in the state declined from 160.27 lakh tones in 2000-01 to 131.41 lakh tones in 2004-05. That is why in recent years there has been very serious concern of increasing productivity and profitability with sustainability.

In the context of the need for second Green Revolution, the University has to gear up in conducting research in the emerging frontier areas such as Biotechnology, Information Technology, Water Management, Diagnostics, Food Processing, Resource Management, etc for narrowing the gap between the research plot yield, extension plot yield and average yield at the farmers' levels.

Realising the importance of Water Management, ANGRAU has recently started Water Technology Centre at Rajendranagar Campus to concentrate on research pertaining to technologies on Water Management and also entered into Memorandum of Understanding (MoU) with the Netherlands Government and Food and Agriculture Organization (FAO) to take up research in Water Management under the A.P. Water Management Project. I also place on record that a laboratory for providing International standard facilities and infrastructure for carrying out research in biotechnology has also been coming up under AP-NL Biotechnology project, at an estimated cost of Rs.5 crores, at Rajendranagar.

Situation specific, area based and problem solving technologies should be developed to suit the socio-economic conditions and resource base of small and marginal farmers. Rainfed farming should receive intensified research and development (R&D) attention. More research efforts are needed to take care of pre-sowing, pre-harvest production technology requirements and post-harvest needs to improve quality, prevent losses, improve shelf life, value addition and so on.

There is a need to replace the seeds of major crops grown in the State to boost the staggering production levels. I place on record that ANGRAU is supplying sufficient quantities of breeder and foundation seeds of different field and horticultural crops, to public and private agencies, for further multiplication in the seed production chain. In this context, I urge the University to gear up for the supply of large quantities of breeder and foundation seeds for their multiplication in seed production chain to achieve 100 per cent seed replacement in all districts of the State. I advise the University to patent all the released varieties and developed technologies and popularise them widely.

I am glad to know that two projects viz., (i) Mega Seed Project with an out lay of Rs.6.5 crores to improve Seed Replacement Rate of field and horticultural crops and (ii) Distinctness, Uniform and Stable (DUS) project at an out lay of Rs.93.25 lakhs with the objective of preparation of plant variety protection under DUS testing through ICAR -SAU system were sanctioned to ANGRAU under X Plan.

Indiscriminate use of fertilizers and pesticides could not be prevented or avoided, in spite of the well-known facts about their ill effects. It is very difficult to monitor pesticide application on crops and regulate their usage. However, there is need to minimize pesticide and fertilizer usage by adopting Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) technologies respectively, which will reduce cost of production of crops and drives agriculture towards sustainability. Research and development efforts on the production and popularization of non-pesticidal components of IPM such as use of botanical pesticides, parasites, predators, bio-agents like viruses, bacteria and fungi have to receive greater attention. Therefore, INM and IPM should receive top priority for research and adoption among the farmers.

Extension

The University has excelled in transfer of technology with its several innovative and novel programmes, like DAA TT Centres and Farmers' Call Centre. We need strong research and extension linkages between developmental departments and the University, which would help in effective dissemination of technologies generated among the farmers, thus leading to a significant increase in production to meet the future challenges.

It is pertinent that we enhance our responsiveness of agricultural research, education and extension to the development needs of the agricultural sector of the Country in general and of the State in particular. The marginal, small and medium farmers, who are totally dependent on agriculture for their livelihood support, need the attention and support of all of us. Therefore, I appeal to the young graduates, farm scientists and other concerned developmental authorities to reorient agricultural education and research for solving the problems and constraints faced by the farming community in the State.

To strengthen for inter institutional linkages at global level, I am happy to note that the University has entered into MoUs with selected Universities in USA and

Europe, USDA and FAG in frontier areas like Biotechnology, Soil and Water Management, Food Processing and Resource Management etc. for sharing facilities and infrastructure and strengthening inter institutional cooperative arrangements for mutual benefit. In addition, ANGRAU has submitted four projects under US-India Agricultural Knowledge Initiative Programme for taking up collaborative research work with US Universities. I hope that these MoUs would go a long way in improving the teaching standards and research capabilities of the University. Similarly, I hope such linkages with the industry and public sector will also help in pursuing better collaborative programmes for the benefit of farming community.

I congratulate the Vice-Chancellor and his team of staff and students for successfully hosting the mega science event of 93rd Indian Science Congress, which was attended by a large number of national and international scientists, including Nobel Laureates.

I also appreciate and compliment the efforts put in by the Vice-Chancellor and his team in presenting the panorama of rural India, with special emphasis on agriculture and allied sectors, in connection with the maiden visit of His Excellency, President of USA Mr. George W. Bush, First-Lady Mrs. Laura Bush and the Foreign Secretary, USA, Dr .Condoleezza Rice, US Ambassador to India Dr. David Mulford. I am happy to inform that the visiting dignitaries were highly appreciative of the technologies developed and disseminated by the University.

Finally, I advise the young graduates to strive hard for the overall development of agriculture in the State and help in socio economic transformation of rural India.

Before I conclude, I once again congratulate and offer my best wishes to all the outgoing graduates. I am sure that the young graduates of this University will contribute their might and join us in transforming the State of Andhra Pradesh into ***Harithandhra Pradesh.***

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
39th ANNUAL CONVOCATION

24th March 2007

Address by

Shri S. Jaipal Reddy
Union Minister of Urban Development
Government of India

Rajendranagar, Hyderabad – 500 030

His Excellency, Chancellor, Shri Rameshwar Thakur ji, Vice -Chancellor Dr. S. Raghu Vardhan Reddy, Members of the Board of Management, Members of the Academic Council, Members of Research and Extension Advisory Council, Distinguished Guests, Faculty, Staff and Students of the University, Alumni of the University, Graduates of the Year, Representatives of Media, Ladies and Gentlemen!

It gives me great pleasure to be here with you today on the occasion of the 39th Annual Convocation of this University, named after Prof. N.G. Ranga, who was not only a celebrated Parliamentarian, illustrious leader of freedom struggle, but also one of the pioneers of peasant movement in India.

At the very outset, I would like to congratulate all the students who are graduating today and, my special compliments to those who will be receiving awards and medals. It makes me proud to learn of the rapid strides made by Acharya N.G. Ranga Agricultural University during the last 43 years of its dedicated service in the welfare of the farming community. I am informed that the University bagged the ICAR Best Institution Award in the year 1999 and the Best Performance Award during the year 2000, besides securing the second highest number of Junior Research Fellowships for the year 2004. I am further delighted to know that because of its high standards of teaching, the University is accredited by the University Grants Commission (UGC), Indian Council of Agricultural Research (I CAR) and Veterinary Council of India (VCI) and degrees conferred by it are globally recognized. The performance of the University in fulfilling its mandate of imparting education, conducting research and extending transfer of technology in agriculture and allied fields is commendable. I wish to congratulate the faculty, staff and students of this University for these unique achievements.

In this context, I congratulate the Vice-Chancellor, Dr. S. Raghu Vardhan Reddy, who was recently conferred with the Jawaharlal Nehru Birth Centenary Award during 94th Indian Science Congress, held at Chidambaram, Tamil Nadu, in recognition of the significant and lifetime contribution to the development of science and technology in the country, specifically in Agricultural Sciences. I am informed that the University has the credit of organizing the mega science event by hosting the 93rd Indian Science Congress during 2006, for which more than 5500 delegates attended from across the globe.

I wish to take this opportunity to share my thoughts on certain aspects of the multi-dimensional agrarian crisis which has been brewing for quite a while in the country. Let me begin with references to the some important features of the phenomenon:

India is today one of the fastest growing countries in the world. The country's gross domestic product (GDP) has grown by more than nine per cent a year two years in a row for the first time in the history of independent India. Also, for the first time since our independence, India's economy has grown by an average of more than eight per cent a year four years in succession. This is certainly no mean achievement, certainly not for a developing country such as ours. But, this is only one side of the story.

Over the last twenty years or thereabouts, whereas the industrial and the services sectors have both been growing at a rate varying between 8 per cent and 12 per cent each year, agricultural production has increased by barely 2 per cent. Whereas the share of the farm sector in the country's GDP has come down from roughly 35 per cent to less than 20 per cent over the last 20 years, the share of the population that is directly dependent on agriculture for their livelihood has decreased at a relatively slow pace in this period, which is from roughly 70 per cent to nearly 60 per cent. This proportion excludes the section of the population that is indirectly dependent on agriculture.

I can do no better than to quote from the Economic Survey 2006-07 that was presented in the Lok Sabha on 23rd February of this year and I quote:

"After an annual average of 3.0 per cent in the first five years of the new millennium starting 2001-02, growth of agriculture at only 2.7 per cent in 2006-07, on a base of 6.0 per cent growth in the previous year, is a cause of concern. Low investment, imbalance in fertilizer use, low seeds replacement rate, a distorted incentive system and low post-harvest value-addition continued to be a drag on the sector's performance."

Given it low share, a mechanical calculation of the adverse impact of low growth in agriculture on overall GDP can be misleading. With more than half the population directly depending on this sector, low agricultural growth has serious implications for the 'inclusiveness' of growth. Furthermore, poor agricultural performance, as the current year has demonstrated, can complicate maintenance of price stability with supply-side problems in essential commodities of day-to-day consumption. The recent spurt of activity in food processing and integration of the supply chain from the farm gate to the consumer's plate has the potential of redressing some of the root causes such as low investment, poor quality seeds, and little post-harvest processing.

With a shortfall in domestic production vis-a-vis domestic demand and hardening of international prices, prices of primary commodities, mainly food, have been on the rise in 2006-07 so far wheat, pulses, edible oils, fruits and vegetables and condiments and. spices have been the major contributors to the higher inflation rate of primary articles. As much as 39.4 per cent of the overall inflation in Wholesale Price Index (WPI) on February 3, 2007 came from the primary group of commodities. Within the primary group, the mineral subgroup recorded the highest year-on-year inflation at 18.2 per cent, followed" by food articles at 12.2 per cent and non-food articles at 12.0 per cent. Food articles have a high weight of 15.4 per cent in the WPI basket including manufactured products such as sugar and edible oils, food articles which contributed as much as 27.2 per cent to overall inflation of 6.7 per cent on February 3,2007".

The annual rate of growth of production of all kinds of food grain -wheat, rice, coarse cereals and pulses-stood at 1.67 per cent in the 1990s, a rate that was considerably lower than the rate of growth of population of 1.9 per cent during the decade. Food stocks mounted because the rate of growth of production of wheat and

rice far outstripped the rate of population growth right through the 1980s. Production of pulses had been stagnant for over three decades resulting in a drop in per capita availability. Also, coarse grains are being increasingly used to feed cattle and poultry.

A striking feature has been a distinct shift in consumer preferences towards non-cereal foods. One estimate is that all-India per head consumption of cereals came down from 15.3 kg per month in 1972-73 to 13.4 kg twenty years later in 1993-94. This trend towards a more diversified diet is not confined to the relatively well-off sections of the Indian population as may be commonly believed, but is discernible even among the poorest one-fourth of the population. While cereals continue to dominate total expenditure on food, their importance has declined -and continues to decline - over time. Simultaneously, cereals have become less expensive in comparison to other food products.

The UPA government, right since its inception has been acutely alive to the saturation point that the Green Revolution has reached and the imperative need for a paradigm shift to deal with the fundamentally new problem in the farm sector. As stated by our first Prime Minister Pandit Jawaharlal Nehru that "everything else can wait, but not agriculture", one of the first things that the UPA government did was to set up a National Commission on Farmers headed by none other than Dr. M.S. Swaminathan. The recommendations made by the Commission are under active consideration of the UPA government.

While preparing to meet the new challenges, we need to recount the success story of our Green Revolution. Through the decades of the 1960s, the 1970s and the 1980s, there was no dearth of doomsayers who predicted that India would not be able to feed her teeming millions. There were many who argued that what the British political economist Thomas Robert Malthus had claimed in 1798 in his "Essay on the Principle of Population" would turn out to be correct as far as India was concerned. Malthus, who was well known for his pessimistic predictions on the future of humanity, had contended that while population would grow in geometric progression, food output wou'ld increase in arithmetic progression. He believed that this imbalance would be rectified only by divine intervention in the form of famine and disasters. But India proved Malthus wrong. In fact, the manner in which stocks of wheat and rice with the public sector Food Corporation of India rose in the early years of this millennium not merely disproved Malthus' worst apprehensions, but the mountains of food grain made the "ship-to-mouth" days of the 1960s seem like a distant nightmare. It was said that if each and every bag of grain were placed lengthwise, it would have traversed a distance all the way to the moon and back. Yet the situation changed dramatically and in 2006, India imported 5.5 million tones of wheat from Australia. Moreover, the mere presence of stocks of wheat and rice is no guarantor of the absence of malnutrition from many parts of the country.

Having outlined the nature of the problem in agriculture and its consequences on the Indian economy, especially on inflation, let me briefly mention some of the important initiatives that the government is taking to deal with the problem as has been mentioned in the speech of Honourable Finance Minister Palaniappan

Chidambaram on the floor of the Lok Sabha on the 28th of, February while presenting the Union Budget for 2007-08.

The Finance Minister pointed that the country's agriculture sector has witnessed sharp ups and downs. He pointed out that average growth during the Tenth Plan period is estimated at 2.3 per cent, which is below the desired level of 4 per cent a year. Shri Chidambaram added: "About 115 million families are classified as farming families. Furthermore, a country with a large population has to be nearly self- sufficient in essential food items; otherwise supply constraints could upset macro economic stability and growth prospects. Hence, agriculture must top the agenda of the policy makers and must hold the first charge on our resources."

As Finance Minister pointed out, Bharat Nirman remains the cornerstone of the Government's policy. During 2006-07 alone, the government created:

* Additional irrigation potential of 2.4 million hectares.
* Drinking water had been provided to 55,512 habitations until December 2006 against a target of 73,120 habitations.
* Until December 2006, nearly 12,200 kilometers of rural roads had been completed.
* 783,000 rural houses had been constructed up to December 2006 and 914,000 houses are under construction and the target of 1,500,000 houses for *2006-07* will be exceeded.
* 19,758 villages have peen covered so far under the Rajiv Gandhi Grameen Vidyudikaran Yojana.
* 15,054 villages had been provided with a telephone against the target of 20,000 villages and the balance will be covered by the end of March.

We are all aware of the way in which usurious moneylenders in villages exploit farmers. The UPA government has gone out of its way to ensure that banks and financial institutions step up the flow of credit to the agricultural sector. The government's target of doubling farm credit in three years has been achieved in two years. The target of Rs.175, 000 crores for 2006-07 will be exceeded comfortably and is likely to reach Rs.190, 000 crores. Until December 2006, 53.37 lakh new farmers were brought into the institutional credit system and during the coming financial year, an additional 50 lakh new farmers is expected to be brought into the banking system.

A special plan has been implemented over the last three years in 31 distressed districts in four states involving an amount of nearly Rs.17, 000 crores. The bulk of this amount has been spent on water- related schemes. In addition, there are schemes to induct high-yielding milch cattle under this programme. The government has appointed a committee under Dr. R. Radhakrishna to examine all aspects of agricultural indebtedness. This committee is currently completing consultations and will be finalizing its report soon.

Of particular concern to the government is the stagnation in the production and productivity of pulses. A critical deficiency is the availability and quality of

certified seeds. The government is increasing expenditure on research in this area and offering generous capital grants and concessional funds with the intention of doubling the production of certified seeds within a period of three years. A Special Purpose Tea Fund has been launched for re-plantation and rejuvenation of tea and similar funds will be put in place soon for increasing the output of coffee, rubber, spices, cashew and coconut.

The Accelerated Irrigation Benefit Programme has been revamped to complete more irrigation projects in the quickest possible time. In 2006-07,35 new projects with an additional irrigation potential of 900,000 hectares will be created. The financial outlay on this programme has been increased significantly from Rs.7, 121 crore in 2006-07 to Rs.11,000 crore in 2007-08. Of this amount, the grant component to state governments will be increased to Rs.3, 580 crore from Rs.2, 350 crore. Last year, the government established the National Rainfed Area Authority to coordinate all schemes relating to watershed development and various land use.

The Green Revolution that took place in parts of the Punjab, Haryana and Andhra Pradesh was brought about by many agricultural extension workers who worked side by side with the farmers. Unfortunately, this programme fell into disuse. The Ministry of Agriculture, in consultation with state governments, is now reviving the programme of agricultural extension to herald a new Green Revolution, a revolution that would not only be more inclusive but also one that would not be confined to a few parts of the country.

A major problem of the Indian agriculture is that product prices are very high by the world standards. While costs of cultivation per hectare are among the lowest in the world, so are yields thereby increasing product prices. Indian farmers find it profitable to export only during years when there has been a widespread crop failure resulting in prices going up. Compared to wheat, rice and pulses, whose output has grown marginally, stagnated or declined, the production of exportable items - including fruits, flowers, and soybean -has grown relatively faster during the 1990s. Till 1990-91, the bulk of agricultural imports by India comprised two items: oilseeds and coffee. At present, however, on account of the rules laid down by the World Trade Organization (WTO) , India is importing a wide range of fruits besides rubber and cotton. Such imports have resulted in Indian farmers cultivating similar products facing stiff competition. India currently. produces 145 million tonnes of fruits and vegetables but less than 2 per cent of this quantum is processed, thereby depriving farmers many benefits that could accrue from value-addition in both domestic as well as foreign markets. The decline in the share of investment in agriculture as a percent of GDP from 1.6 per cent in 1993-94 to 1.3 per cent in subsequent years has been an area of continued concern for the government, in particular, the fact that the decline is mainly attributable to the near-stagnation or fall of public investment in agriculture since the early 1990s.

The National Common Minimum Programme (NCMP) of the UPA government has talked about nursing the rural cooperative credit system back to health. As stated, the government has been able to more than meet the commitments made in the NCMP on doubling rural credit in three years, expanding institutional lending to

small farmers, easing the debt burden, reducing interest rates on farm loans and making crop and livestock insurance schemes more effective. As the NCMP has stated, the UPA government is committed to ensure the "fullest implementation" of minimum wage laws for agricultural labour, thoroughly modernize revenue administration and establish clear land titles. The government will also ensure that the functioning of cooperatives is made more "democratic, autonomous and professional". As the NCMP has stated, there will be "systematic removal" of controls that depress the incomes of farmers. The government is committed to ensuring that "adequate protection is provided to all farmers from imports, particularly when international prices fall sharply".

Given the huge number of people engaged in farm activities, it has to do with what the National Commission on Farmers recommends: we need a new deal that rebuilds hope about farming. A deal that takes into confidence the needs of rural poor who mayor may not be involved in working on land, and who are consumers of products, who need livelihood to spur the demand for food grains.

We need to step up agriculture growth by emphasis on irrigation, technological breakthrough to improve dry-land farming, and expansion of institutional credit to tackle farmers' indebtedness. Unless the public investment in farm sector gets translated in food security and remunerative prices and profitability of farmers, the rest of the economy cannot clock impressive 8 per cent growth in GDP on a sustainable basis.

The approach paper on 11th Plan speaks of the supply side productivity improvements and corresponding increase in demand for agricultural output. I am struck by the twin trends of stagnating per capita domestic food consumption and weak world prices for many crops. Why would a farmer cultivate if he or she cannot get remunerative prices for the farm produce? Our Government recently announced a bonus of Rs.1 00 per quintal for wheat over and above the MSP because it appears what we would soon need to import wheat to feed our people after a gap of many years of self-sufficiency in cereal production and we need to incentivise wheat production. I may recall that the Government had earlier announced a remarkable increase of Rs.40 over that of last year in the MSP of paddy. These were not easy decisions to take as they could have negative consequences on the inflationary situation, which is already causing concern. But, support to the cause of farmers has been extended consciously and courageously as part of solution to the larger problem.

The heart-rending cases of suicides of farmers in Andhra Pradesh and other states make me wholeheartedly endorse the Farmer Commission's assertion that farm sector would not get revived unless we have a policy that results in assessing agricultural progress in term of the net income of farm families rather than statistics of million tons of farm commodities produced. It means placing faces before figures; the human dimensions to determine the efficacy of agricultural policies than just production in physical terms.

However, sustained long-term growth would depend on technological breakthrough and that can come by strengthening research in agriculture by

universities. Developing appropriate strategies for different agro-climatic zones, improvement in land and water management, much enhanced extension support, quality seeds and better animal breeds are required to overcome the yield gaps.

And it brings me to the role the Agricultural Universities have to play in order to revive and improve the whole range of system support that a small farm economy requires.

As noted by Farmer Commission, the key goal is to improve the economic viability of farming by ensuring that the farmers earn a minimum net income. In this direction, we need to introduce measures which can help to attract and retain youth in farming by making it intellectually stimulating and economically rewarding, by conferring the power and economy of scale to small and marginal farmers both in the production and post-harvest phases of farming. To a great extent that would depend on the services being provided by the state agriculture departments and the University.

Here, I would like to underline a few approaches that may define the activities of Agriculture University: Firstly, the University should attempt to fill up the gap between scientific know-how and field-level do-how. How the knowledge deficit should be overcome, by designing courses and collaborating with state agencies, NGOs, PRIs towards lab-to-land demonstration would be one guiding principle. Secondly, as argued by Farmer Commission, the goal of the university should be 'every scholar an entrepreneur'. This will call for integrating business management principles with major applied courses. Another related activity could be a system to accord recognition to farm graduates to provide extension and other services and to ensure quality and credibility of such services provided by farm practitioners. Taking into account new opportunities opened by ICT, biotechnology, genomes, etc, the University should promote new pedagogic methods to promote learning revolution among the students. The University may also establish employment and business advisory services and special one-stop window for generating awareness on self-employment opportunities, which are also gender-sensitive.

In the end, I call upon the agricultural students to be the effective instruments in bringing about socio-economic transformation in rural India. I am grateful to all of you for providing me this opportunity to share my thoughts with you today. I once again congratulate all the new graduates and offer my heartfelt best wishes to everyone in the Acharya N.G. Ranga Agricultural University.

Thank you.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
40th ANNUAL CONVOCATION

5th June 2008

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Governor, Reserve Bank of India

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His Excellency, the Governor of Andhra Pradesh and the Chancellor of Acharya N.G. Ranga Agricultural University (ANGRAU), Shri Narayan Datt Tiwari garu; Vice Chancellor, ANGRAU, Dr. P. Raghava Reddy garu; Members of the Board of Management of ANGRAU; Registrar of ANGRAU; Horticultural University Vice Chancellor, Dr. S.D. Sikhamani garu; Members of the Academic Council of Agriculture and Home Science Faculties; dear students and staff of this university, respected parents, distinguished guests, media personnel, ladies and gentlemen.

It is an honour and privilege for me to be with you on this memorable occasion. This is a convocation address, no doubt, but it is also an occasion to dedicate my address to the memory of Acharya N.G. Ranga garu. His views on political economy and agriculture have acquired great relevance and special significance in today's turbulent world of high food prices and focus on farmers' well-being. You, my young friends, will have a critical role in resolving the emerging issues relating to agriculture, both in India and globally.

Acharya N.G. Ranga, who was educated in prestigious institutions in the United Kingdom and was a Professor of Economics at Pachaiyappa's College in Madras University, entered the Guinness Book of World Records as a Parliamentarian with fifty years of service in legislative bodies. He was a leading freedom fighter of national stature and a great propounder, of international stature, of the importance of peasantry and agricultural labour. His beliefs led him to find the Bharat Krishikar Lok Party and the Swatantra Party along with Rajaji, which frowned upon the permit-licence Raj. The economic reforms in India since 1991 have served us well and these have, in many ways, followed one of Professor Ranga's suggestions namely 'liberalisation'. However, only recently we have commenced realising the significance of peasantry and rural labour that he had recognised decades ago. We now realise how critical the situation in regard to agriculture, in particular food prices, is to all sections of the people, all over the world. In fact, it is uppermost in the current agenda of central banks around the world in the context of price stability and inflation expectations. I believe that the distinguished faculty and the knowledgeable students of this university would appreciate the contemporary relevance of Professor Ranga's ideas and they will commit to play a historic role in resolving the issues that confront us today.

At the outset, my hearty congratulations are due to the Graduating Class of 2008, who would be receiving their hard earned degrees and awards. I also compliment the staff members who have received awards and the entire faculty for their efforts in imparting high quality education and inculcating good values to shape the personalities of our young generation. It is the endeavour of the students and the staff, I understand, that helped this agricultural university in winning the ICAR's Best Agricultural Institute Award two times in quick succession and also the ICAR Best Performance Award of Students in the ICAR All India Competitive Examinations twice in the last few years.

Dear new graduates, the Reserve Bank of India (RBI) has an important stake in the subjects that you have been trained in. Our main objectives relate to maintaining price stability and aid the process of generating output and employment.

Agricultural prices are really critical for the household budgets of about a billion people in our country. About sixty per cent of our work force in India is dependent upon agriculture and related activities. Though most policy issues in this regard fall within the domain of governments and universities like yours, the RBI has to monitor the developments and aid public policy through the financial system – especially in terms of price stability, financial stability, financial inclusion and credit delivery. In this background, while there are many issues in agriculture, I will confine to a few. I will briefly explore the serious problem of food that is confronting the world today. This is followed by a narration of the Indian situation. In particular RBI's approach to agriculture is described.

Food Prices as a global issue

In recent months, there has been a phenomenal increase in food prices globally. To illustrate, while the global food price index rose on average by 10.5 per cent in calendar year 2006 and by 15.2 per cent in 2007, it has increased by a substantial 40.8 per cent in the first four months of 2008 compared to the corresponding period of the previous year. According to the Food and Agriculture Organisation (FAO), 37 countries in the world are presently facing food crisis, 31 of which are in Africa and Asia. Last week (end of May) the World Bank unveiled a US$ 1.2 billion fast track funding facility to help combat the impact of rising food prices on the poor. World leaders are currently (June 3-5 in Rome) meeting for a High-Level Conference on World Food Security hosted by FAO. The summit comes at a time when food prices have registered an increase of 55 per cent, in the last twelve months. The agenda for the summit includes measures relating to augmenting crop production, trade, aid, diversion to bio fuels and increasing investment in agriculture science and technology. The overall purpose of the High-Level Conference is to address food security issues in the face of soaring food prices and the new challenges of climate change and energy security. The objective of the Conference is to assist countries and the international community in devising sustainable solutions to the food crisis by identifying the policies, strategies and programmes required to safeguard world food security in the immediate, short and longer term.

Undoubtedly, the current global food situation is very serious and hence, we need to understand the reasons for such dramatic increase in food prices in a short period.

First, it is said that rapid growth of China and India is lifting standards of living of millions of people every year thus putting enormous pressure on global demand. It is also argued that the food basket has changed and is contributing to higher demand. However, a closer scrutiny would reveal that enhanced demand cannot explain a sudden spurt in prices in one year since these two economies have been growing at elevated and accelerating levels for over a decade, if not over two decades. Further, China has been a net wheat exporter and its per capita meat consumption had reached western standards by 2005. India is an exporter or an importer at the margin, except in regard to vegetable edible oils where it has been a consistent net importer in recent years, and also to a small extent in regard to pulses.

Second, the drought conditions, possibly induced by climate change, in some countries like Australia and Ukraine, may provide some explanation for price increases. It is also likely that dwindling stock levels observed in several countries could have exacerbated the scarcity conditions. Further, administrative measures in some countries to restrict or discourage exports of food products might have stabilised prices in those countries but could have enhanced the prices in some other countries. However, these reasons do not fully explain the widespread global increases in prices of all the commodities at the same time.

Third, it is argued that increases in energy costs are resulting in cost push inflation but contribution of energy costs to overall costs in agriculture may not explain the huge increase in food-prices.

Fourth, related to the current elevated energy prices, there has been diversion of corn and edible oils to bio-fuels, which are significantly influenced by policy mandates. Very clearly this diversion to bio-fuel is a policy induced new reality which coincided with price escalation in precisely those products and hence, is noteworthy.

Fifth, the financialisation of commodity trade and current extraordinary conditions in global financial markets could have influenced the spurt in prices. The recent reductions in interest rates in the U.S. and the injection of liquidity have resulted in investors seeking new avenues such as commodity markets, in view of the turbulence in financial markets and the low returns in treasuries. The relatively easy liquidity and low interest rates, by themselves, make holding of inventories attractive and thus induce greater volatility to commodity markets. The weakening of the U.S. dollar is also advanced as a reason for the recent volatility in commodity markets, including food items. It is evident that this phenomenon is also now coinciding with the across-the- board rise in food prices.

In brief, while there are demand and supply side pressures on food items, there is considerable merit in the arguments that recent extraordinary increases in food prices are closely linked to the public policy responses to high energy costs in advanced economies, and the turbulence in financial markets and financial institutions. It is said that the impact of such policy induced diversion of food to bio-fuels is significant at this juncture and reflects a preference to fill the fuel tanks of automobiles rather than fill the empty stomachs of people. Similarly, it is sometimes held that the weight accorded to financial stability in public policy may now be at the expense of stability in real sector – especially of sensitive commodities like food. At the same time, there is a general consensus that public policies in regard to food in many economies around the world have not provided adequate incentives to farmers to increase the supply of food and other agricultural products to comfortably match the growing demand over the medium term.

As regards prospects for the near future, there are severe imponderables, especially relating to the path of future prices of oil; progress in restoration of normalcy in financial markets, especially currency markets; and the extent of slow down in the U.S. economy and its consequential impact on the world economy as a whole. Further, public policies in regard to food, especially diversion to bio-fuel; cross border trading; subsidies; and replenishment or use of buffer stocks; would impact the evolution of prices globally. However, the redeeming feature is that supply

response in regard to food grains is possible in a year or two. As per FAO estimates, wheat output is set to achieve a new record in 2008, though against the backdrop of deeply depleted stocks. Global production of rice in 2008 is expected to be marginally better than the previous year and hence, some depletion of stocks held may be expected. Global output of edible oil is anticipated to fall by about three per cent in the current year, and according to FAO, oil seeds and edible oil prices are expected to remain firm.

What is the medium term to long term outlook for food prices at the global level? According to the Agricultural Outlook from OECD and FAO, while agricultural commodity prices should ease from their recent record peaks, they are expected to average well above their mean level of the past decade. Two days ago (June 3rd) U.N. Secretary-General said, in a speech at the High-Level Conference on World Food Security hosted by FAO that world food output needs to rise by 50 per cent by 2030 to meet rising demand.

The implications of such a scenario in global farm outputs and prices for us should be very clear. With rapid economic growth in our country, the food-consumption will rise in an unprecedented fashion since we are over a billion people. The food basket will also change. We have to augment food supplies within the country since marginal requirements or even a perception of shortfalls in domestic supply in our economy can have significant influence on world prices. As we have over half of the work force depending on agriculture, and as we have scope for increasing productivity in agriculture, there is no reason why we cannot ensure food security for our country, at a minimum. Indeed, India can become the ‘Annapoorna’ for the world and I feel that Andhra Pradesh can become the ‘Annapoorna’ for India.

In this regard, I can do no better than quote Dr. M.S. Swaminathan, one of our esteemed agricultural scientists, “India has the technological and economic capability to demonstrate how farming system can be adjusted to different weather patterns. It is hoped that at the Rome Conference, Indian representatives will serve as a bright affirming flame in the midst of the sea of despair we see around us”.

Indian situation

Let us now focus on the Indian situation. At the outset, it must be recognised that increase in food prices in India in recent months has been only a fraction of that observed in many other countries. In particular, the global prices of wheat and rice had almost doubled between January and April 2008, while in India the increase has been far less than one tenth of that. In a sense, this vindicates the long-standing public policy of emphasis on a degree of food security in our country, especially due to the vulnerability of large segments of the population. Yet, the prices of food articles spurted in India also in 2006 and 2007. The average annual increase in the Wholesale Price Index (WPI) of food articles was around 7.0 per cent during that period. While increase in the food prices was led by wheat (13.0 per cent) during 2006, rice (6.0 per cent) and edible oil (13.1 per cent) also joined in the price rise in 2007. However, food prices have exhibited some moderation during 2008. The Wholesale Price Index of food articles during 2008-09 (up to May 17, 2008) has

increased by around 2.5 per cent as compared with the corresponding period (3.1 percent) in the previous year.

Of greater interest may be the current outlook for individual commodities, which appears positive for wheat, with significant improvement in procurement. In regard to rice production which stagnated since mid-90s, some turnaround is observed since 2005-06. The prices of edible oil increased sharply in 2006-07 and spiked during 2007-08. However, some moderation has been observed during the current financial year so far. Due to stagnant levels of production in pulses the demand-supply gap is met through imports, but domestic prices saw a spurt before seeing a decline during the last one year. Prospects for sugar, of which India is amongst the largest producers, appear bright for the current year, since production has risen substantially since 2005-06.

Overall, some abatement of global prices, indication of better domestic supplies and addition to our buffer stocks, along with the series of measures already taken by the government, on the supply side, are expected to yield results in the months to come. Over the medium term, however, the National Food Security Mission launched about two years ago should yield positive results.

RBI's approach to Agriculture

RBI's major objectives are to maintain price stability and maintain growth momentum, especially employment generation. In this endeavour, agriculture plays a critical role since agricultural commodities have a relatively significant weight in price indices in our country and also in anchoring inflation expectations. In terms of employment also agriculture dominates, accounting for about sixty per cent of the total, while in terms of GDP its share is less than a third of that. However, the policy space available to RBI is basically confined to managing aggregate demand through appropriate stance in regard to growth in money supply, interest and exchange rates and, to some extent, flow of credit through banks. Yet, in view of the criticality of agriculture, RBI articulates its approaches to agriculture through the Annual Reports. Let me summarise briefly, the analysis and the views as expressed by the Directors of the RBI in their Annual Reports during the recent past – say last five years.

(a) Since the mid-1990s, the growth of the agricultural sector has not only been low, but also volatile. The crop yields have shown an unstable trend in recent years. An area of growing concern has been the continued incidence of localised droughts even in good monsoon years. In recent years, the food consumption basket is getting diversified towards value added food products such as meat, poultry, fish, vegetables and fruits. It is important for production to respond to these shifts in consumption.

(b) The share of agriculture in the total gross capital formation (GCF) in real terms has been declining in recent years mainly on account of steady erosion in the share of public investment. The inadequacy of private investment in fulfilling the capital requirements of agriculture has raised concerns about the state of the rural infrastructure, which could turn into a binding constraint on growth.

(c) Several initiatives have been taken in recent years to improve the agricultural credit delivery mechanism. However, some bottlenecks continue to affect the flow of credit to agriculture. To attain a higher growth in agriculture, the major areas requiring attention in the financial sector are, *inter alia*, spread of insurance against crop losses and facilities for meeting the needs of the rural economy. Newer forms of credit assessment and risk management systems may also have to be put in place, besides upgrading skills, and ushering in changes in attitudes and mind-sets. Information technology has to be used to facilitate transformation in various processes of rural credit.

(d) Efficient and well developed agricultural markets are necessary to enable farmers to deal with inherent risks associated with the perishability of their produce, to get remunerative prices, and to secure smooth access to input supplies. Towards these objectives, the agricultural marketing system in the country needs to be integrated and strengthened. Given the several risks that farmers face, such as future price and monsoon conditions, there is a need to put in place appropiate risk mitigation policies. Accordingly, a comprehensive public policy on risk management in agriculture could promote a more efficient and commercialised agriculture that could also provide relief to the distressed farmers. Rural infrastructure, which includes agriculture research and extension, transport, electricity, and storage structures, not only enhances the productivity of physical resources, but also helps in supply chain management and value addition in agriculture.

(e) Greater focus needs to be placed on agricultural research in the coming years as the success so far has been restricted to select crops. Efforts to modernise and strengthen the agricultural research system, including the agricultural universities, need to be intensified. The Green Revolution has been the cornerstone of India's agricultural development, transforming the country from one of food deficiency to self-sufficiency. The time is now ripe for a second Green Revolution which will lay emphasis on diversifying the agricultural sector further in order to capture new market opportunities.

As regards flow of credit, in which RBI has a role primarily as the regulator of banking system, it has been the RBI's endeavour to enhance credit flow to agriculture by removing the bottlenecks in credit delivery. The RBI, on its part, is intensifying efforts in revitalising the rural cooperative credit system, strengthening regional rural banks, providing incentives to commercial banks for investments in rural economy and ensuring an adequate and timely delivery of credit at a reasonable price. The programme for financial inclusion initiated by the RBI in collaboration with banks and several State Governments, by adopting modern technology, is being intensified and expanded.

Andhra Pradesh

Before concluding this section on India and RBI, let me hasten to add that Andhra Pradesh has shown a visionary leadership by putting irrigation and agriculture at the top of agenda for public policy. Andhra Pradesh has anticipated the

emerging criticality of agriculture and designed a policy that is now being followed by many other states in India. RBI has been having the privilege of very close cooperation and coordination with the Government of Andhra Pradesh.

Conclusion

Let me conclude by reiterating that globally demand for agricultural products will be very high for the next two to three decades. India will play a dominant role in contributing to both global demand and global supply. Agriculture will be increasingly more diversified and not confined to food crops. Scientific agriculture is and will be the key for the future. The path ahead is far from smooth, and traversing this path requires constant efforts, vigilance and dedication. I am sure that the knowledge gained from your education will help you in moving forward in your endeavours in life, with determination and confidence.

My dear young graduates in agriculture and horticulture, you have a bright – a very bright – future since India, indeed, the world beckons you. Make the best of it by working hard and purposefully and at the same time being happy. Remember, the ultimate goal is your happiness and the final judge of how you achieve it is your own conscience.

I pray that your continuing commitment to the cause of agriculture will be an inspiration and a matter of pride to the future generations.

Thank you.

CONVOCATION ADDRESSES OF ANGRAU (1966-2008)

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