A STUDY ON IMPACT OF ANGRAU PRODUCTION TECHNOLOGIES FOR SELECTED CROPS

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M. Sc. (Ag.)

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CERTIFICATE

Mr. G.VENKATA MURALI has satisfactorily prosecuted the course of research and that the thesis entitled **"A STUDY ON IMPACT OF ANGRAU PRODUCTION TECHNOLOGIES FOR SELECTED CROPS"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part there of has not been previously submitted by him for a degree of any university.

Date: 13-02-2008

Place: Hyderabad

(P.RAMESHKUMAR REDDY)
Major Advisor

CERTIFICATE

This is to certify that the thesis entitled "**A STUDY ON IMPACT OF ANGRAU PRODUCTION TECHNOLOGIES FOR SELECTED CROPS**" submitted in partial fulfillment of the requirements for the degree of **DOCTOR OF PHILOSOPHY IN AGRICULTURE** of the **Acharya N.G. Ranga Agricultural University, Hyderabad** is a record of the bonafide research work carried out by **Mr. G.VENKATA MURALI** under our guidance and supervision. The Student's Advisory Committee.

No part of the thesis has been submitted for any other degree or diploma. The published part has been fully acknowledged. All assistance and help received during the course of the investigation have been duly acknowledged by the author of the thesis.

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I, **Mr. G.VENKATA MURALI,** hereby declare that the thesis entitled **"A STUDY ON IMPACT OF ANGRAU PRODUCTION TECHNOLOGIES FOR SELECTED CROPS"** submitted to Acharya N.G.Ranga Agricultural University, for the degree of **"DOCTOR OF PHILOSOPHY IN AGRICULTURE"** is a result of original work done by me. It is further declare that the thesis or any part there of has not been published earlier elsewhere in any manner.

Date: 13-02-2008

Place: Hyderabad

G.VENKATA MURALI

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LIST OF ABBREVIATIONS

ACRIP	:	All India Coordinate Research Project
AI&CC	:	Agricultural Information & Communication Centre
ANGRAU	:	Acharya N.G. Ranga Agricultural University
A.P	:	Andhra Pradesh
ARS	:	Agricultural Research Station
ATIC	:	Agricultural Technology Information Centre
DAATTC	:	District Agricultural Advisory and Transfer of Technology Centre
EEI	:	Extension Education Institute
et al.,	:	and others
FAO	:	Food and Agricultural Organisation
Fig.	:	Figure
ha	:	hectares
HYV		High Yielding Variety
IPM	:	Integrated Pest Management
kg	:	kilogram
KVK	:	Krishi Vigyan Kendra
RARS	:	Regional Agricultural Research Station
Rs	:	Rupees
SD	:	Standard Deviation
t/ha	:	Tonnes/ hectares
t-test	:	Student 't' Test
Viz.,	:	Namely
%	:	Per cent

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ABSTRACT

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In Andhra Pradesh, Acharya N. G. Ranga Agricultural University formerly known as Andhra Pradesh Agricultural University (APAU) plays a major role in agricultural research activities. These research activities are need based and location specific, which are carried out at RARS as well as at other Research Stations. The Scientists of the university have developed 258 crop varieties and other improved technologies of crop production and crop protection *etc.,* The number of emerging technologies is not important, but what is important is that, to what extent these new technologies are responsible for increasing agricultural production, productivity and farmers' income. Hence, there is a need for an analytical and diagnostic evaluation of these technologies, to determine their impact. This is possible by obtaining a clear and comprehensive picture of the present situation. This will facilitate researcher to generate more useful research.

A few studies on adoption and performance of agricultural technologies have been conducted in different parts of the country. Keeping in view of this, the present study entitled "A study on impact of ANGRAU production technologies for selected

crops" is modulated with the following objectives (1) To screen the technologies developed by ANGRAU for selected crops, (2) To measure the attitude of farmers towards ANGRAU technologies, (3) To study the impact of ANGRAU technologies in terms of adoption quotient, productivity, profitability and improvement in livelihood of the farmers, (4) To study the problems faced by research and extension scientists in generation and dissemination of these technologies, (5) To study the production constraints faced by the farmers in adoption of recommended technologies and their suggestions to overcome them and (6) To develop a strategy for effective technology generation, assessment, refinement and their dissemination.

The impact of ANGRAU production technologies for selected crops was studied using explorative research design. Three districts *viz.,* Krishna, Anantapur and Warangal districts, representing Coastal, Telangana and Rayalasema were selected as sample area. Two mandals were selected from each of the district. Three villages were selected from each of the mandal. A total of 12 farmers from each selected village were selected i.e., for each crop four farmers were selected. Thus, a total sample is 216 farmers and research scientists from concerned crops and all the extension scientists of DAATTCs and KVKs working in sample districts were selected. The data were collected by personal interview method through pre-tested interview schedule. Adoption, attitude, productivity, profitability and livelihood improvement of the selected respondents were included in the study. Statistical procedures like frequency, percentage, standard deviation and paired 't' test were adopted to analyse and interpret the data.

Salient findings of the study were a majority (50%) of rice farmers of Krishna district possessed favourable attitude and medium (41.67%) level of adoption of recommended ANGRAU technologies. The 't' calculated values revealed that the impact indicators such as productivity, profitability, physical capital, natural capital, financial capital, social capital and human capital were found to be significant after adoption of recommended technologies.

Majority of the respondents (41.67%) had favourable attitude towards recommended technologies, whereas, majority of the respondents occupied medium category (37.50%) of adoption and same number of the respondents (37.50%) were fall under low level of adoption of recommended technologies. Calculated values of the t-test were found to be significant for all the impact indicators except profitability and financial capital, after adoption of recommended technologies by groundnut farmers of Krishna district.

Majority of the respondents (45.84%) had favourable attitude and equal number of respondents (41.67%) had medium and low level of adoption of recommended technologies. The 't' calculated values revealed that the impact indicators such as financial capital and social capital were found to be significant after adoption of recommended technologies by chilli farmers of Krishna district.

Majority of the farmers (41.67%) expressed favourable attitude and medium level (50%) of adoption towards recommended ANGRAU technologies. Calculated values of the t-test were found to be significant for all the impact indicators except financial and social capital, after adoption of recommended technologies by rice farmers of Warangal district.

Majority of the respondents (45.83%) recorded favourable attitude and low level of adoption (62.50%) of recommended technologies. Calculated values of the t-test concluded that the 't' values were found to be non-significant for all the impact indicators except physical and natural capital, after adoption of recommended technologies by groundnut farmers of Warangal district.

Majority of the respondents (45.84%) recorded favourable attitude and low (54.17%) level of adoption of recommended technologies. Calculated values of the t-test were found to be non-significant for all the impact indicators except physical, natural and social capital, after adoption of recommended technologies by chilli farmers of Warangal district.

Majority of the farmers (45.84%) had less favourable attitude and medium (58.34%) level of adoption of recommended technologies. The 't' calculated values revealed that the impact indicators such as physical capital and natural capital were found to be significant after adoption of recommended technologies of rice farmers of Anantapur district.

Majority of the farmers (62.50%) possessed favourable attitude and half of the respondents exhibited medium level of adoption towards recommended technologies. Calculated values of the t-test were found to be significant for all the impact indicators except social capital, after adoption of recommended technologies by groundnut farmers of Anantapur district.

Equal number (37.50%) of respondents possessed favourable attitude and less favourable attitude, whereas, majority of the respondents (45.84%) fall under low level of adoption of recommended technologies. Calculated values of the t-test were found to be significant for all the impact indicators except profitability, financial capital and human capital, after adoption of recommended technologies of chilli farmers of Anantapur district.

Major problems expressed by the research scientists in technology generation of rice, groundnut and chilli crops were biotype variation in gall midge, lack of effective intercropping system in groundnut and low participation of extension scientists and farmers at the time of research project proposal. Suggestions given by the research scientists to overcome these problems were more research is needed on different biotypes, research on specific intercropping system should be needed and encourage the participation of researchers, extension scientists and farmers during the project proposal.

Major problems expressed by the extension scientists in tèchnology dissemination of rice, groundnut and chilli crop were lack of high yielding and early maturing varieties, ferti-cum seed drillers are unsuitable to rainfed conditions and no hybrids from the university. Suggestions given by the extension scientists to overcome these problems were research scientists should work on plant genetic characters, suitable ferti-cum seed drillers should be designed and university should concentrate on developing the hybrids.

Lack of knowledge on seedling root dip technique, unavailability of required quantity of seed and problem of more pests and diseases are the major production constraints expressed by the farmers in adoption of recommended rice, groundnut and chilli technologies. Suggestions given by the farmers to overcome these production constraints are skill demonstration on seedling root dip technique should be conducted, required quantity of seed should be provided and pests and disease resistant varieties should be developed.

CHAPTER I

INTRODUCTION

INTRODUCTION

Every thing else can wait but not agriculture

- Jawaharlal Nehru

If ploughman hands are folded even saints cannot find salvation

-Thirukural

India is predominantly an agricultural based country. Agriculture is "wheel of the Indian economy" and contributes about 21 per cent of the Gross Domestic Product (GDP), provides employment to two-third of the work force in the country. Out of 328 million hectares of the geographical area in India, 143 million hectares is cultivated. Out of this, only 40 per cent of the land (57 million hectares) has fully or partially assured irrigation facilities. The remaining 60 per cent is totally dependent on monsoon. India produces 10 per cent of the total world's food in just 2.4 per cent of geographical area of the world. The food grain production of India at present is 210.1 million tones, which was merely 54.9 million tones in 1949-50. Food grain production in India increased by 2.51 per cent at annual compound rate from 1949-50 to 2005-06.

Increase in crop production in earlier years was due to increase in area under cultivation. In recent years, however, increased productivity has been a more significant factor in growth of output. In future the challenge for Indian agriculture lies in achieving higher productivity to meet increasing demands of growing population. In spite of the increase in yields registered in the last two decades, productivity of land measured in terms of yield per hectare continues to be low compared to levels achieved in several other parts of developed as well as the developing countries of the world. Despite the fact that India stands 1st in the production of pulses, 2nd in wheat, rice and sugarcane and 3rd in cotton, the productivity per hectare is abysmally low in the world, which is 608 kg for pulses, 2493 kg for wheat, 2811 kg for rice, 65,892 kg for sugarcane and 922 kg for seed cotton, exhibiting India's rank in the world at 138th, 38th, 52nd, 31st and 77th respectively.

"The great stride that India made in agricultural production in last two decades has moved the country from a state of begging bowl to breadbasket. At the same time the population pressure on arable land is built up. As agricultural development relies more and more on advancements in scientific technologies, this necessitated the development of strong dynamic agricultural research in the country. For this purpose as on today, 39 agricultural universities and other institutes are functioning in India, which have contributed a great extent to agricultural research in the country. The major achievements in this direction were green revolution, yellow revolution, blue revolution *etc.*, which have enhanced the country from insufficient to self sufficient in food production. With the advent of new technologies, the farmers should come forward, empower themselves with the latest tools and techniques, effective use of inputs, safer and precise methods of input application, effective weed and insect control, safer harvesting. The coordination of all the stakeholders is the need of time, and not only the technology need to be developed at faster pace, but it should also be transferred without losing much time. The significance of quick information access, exposure to latest technologies is of prime importance".

In India, Andhra Pradesh (A.P) is the fifth largest state covering a land area of 2,74,400 sq.km, with a population of 66.51 million, accounting for 9 per cent of country's population. The state, in a sense, is regarded as microcosm of the nation comprising agriculturally advanced and prosperous area in nine Coastal districts, an economically and socially backward area in ten Telangana districts, a drought prone area in four Rayalaseema districts and a fairly extended tribal belt, along the northern and northeastern regions. Approximately, 70% of the state's population is dependent on agriculture and allied sectors activities, which contributes about 30% of the state's income. Andhra Pradesh is principally agrarian in character, consistently maintaining high levels of crop production in crops like rice, groundnut and chillies compared to several other Indian states.

Rice, which covers approximately 42 million ha. in India and 40 lakh acres in Andhra Pradesh, is the staple food for over 55 per cent of India's population and grown under diverse agro-climatic conditions. There is a phenomenal increase in production of rice compared to 1950s, as the production of rice in 1950-61 was only 20.5 million tone with a national average yield of 668 kg/ha. Rice, the most important staple food crop of the state, is cultivated under canals, tanks and wells in about 4.24 million hectares (9.2% of gross cropped area) in all the districts of Andhra Pradesh and ranked third in terms of productivity in the country. Andhra Pradesh is considered as rice bowl and is ranked along with those prime states that have surplus food grain production. Acharya N.G. Ranga Agricultural University (ANGRAU) is the first institution in India and second in the world, next to china and first among sub-tropical countries to develop and release the rice hybrids APHR 1 and APHR 2 in 1993 for general cultivation. It is also the first in the country to develop rice varieties resistant to gall midge (Kakatiya) and Brown Plant Hopper (Vajram). In Andhra Pradesh, research work on rice is being carried out at Maruteru, Rajendranagar, Warangal, Bapatla, Nellore, Ragolu, Pulla, and Michilipatnam.

Groundnut is the premier oilseed crop of India, which ranks first in area (8.2 m ha) and second in production (6.2mt) after china with an area of 4.63 m ha and production of 14.5 million tons (FAO, 2001). In Andhra Pradesh, it is being grown in an area of 18.6 lakh hectares with an annual production of 22.2 lakh tones. Though A.P. ranks second in groundnut area in the country, its productivity is very low (555-1100 kg/ha). Due to continuous drought during 1997, 1999, and 2002 the groundnut area had decreased from 22.2 lakh hectares (1995) to 18.6 hectares (2002-03). The production had also declined from 26.2 lakh tones (1995) to 20.3 lakh tones (2002-03), (Reddy S J, 2002). Further, more than 80 per cent of groundnut area in A.P is under rainfed. In Andhra Pradesh, research work on groundnut is being carried out at Kadiri, Tirupati, Jagtial, Palem and Yellamenchalli.

Chilli is an indispensable condiment of every Indian home. It is used in the daily diet in one form or other, not much is known about this important condiment in India prior to 17^{th} century. Chilli was first introduced in India by Portuguese in 17^{th} century in and around Goa from where it spread to the entire Indian sub-continent. Prior to its introduction, black pepper was most commonly used. India contributes about one fourth of world's production of chillies with annual production of 0.59 million tones. Andhra Pradesh ranked first in area and production followed by Maharastra, Orissa, Tamil Nadu and Karnataka. Productivity levels were high in Andhra Pradesh followed by Gujarat, Punjab and Haryana. In Andhra Pradesh, research work on species is being carried out at Regional Agricultural Research Station (RARS), Lam. This research station released several varieties, which are suitable to different chilli growing regions. The varieties evolved at Lam have occupied almost the entire area under chillies in the state and are also popular in Maharastra, Karnataka, Orissa, Tamilnadu, West Bengal, Assam and Punjab.

In Andhra Pradesh, ANGRAU formerly known as Andhra Pradesh Agricultural University (APAU) plays a major role in the development of agriculture. It was established in 1964 under the APAU Act 1963 and it was renamed as Acharya N. G. Ranga Agricultural University with effect from November 7, 1996. The growth and development of the university over the years has been phenomenal. The multi-faculty and multi-campus university has 9 colleges (6 in Agriculture, 1 in Agricultural Engineering, 1 in Home Science and 1 in Food Science and Technology), 8 Polytechnics Colleges, 66 Research Stations including 9 Regional Agricultural Research Stations, 22 District Agricultural and Transfer of Technology Centers (DAATTCs), 12 Krishi Vignan Kendras (KVKs), Extension Education Institute (EEI), Agricultural Information & Communication Centre (AI&CC), Agricultural Technology Information Centre (ATIC), Electronic Wing and a host of other centers across the state with around 5,800 scientific, supporting and administrative staff, apart from a good contingent labour force.

Mandate of the University

1. To train human resource needed for agriculture, home science and allied sectors for the development of the state of Andhra Pradesh (Education).
2. Assist in the process of transfer of technology through the dissemination of knowledge in collaboration with the Development Departments of the government (Extension).
3. Constantly strive to generate technologies for improving production of crops, home science and allied sectors (Research).

The research activities are need based and location specific, which are carried out at RARSs as well as at other research stations. The scientists of the university have developed 258 crop varieties and other improved technologies of crop production and crop protection *etc.*, The number of emerging technologies is not important. What is important is that, to what extent these new technologies are responsible for increasing agricultural production, productivity and farmers' income. Hence, there is a need for an analytical and diagnostic evaluation of these technologies, to determine their impact. This is possible by obtaining a clear and comprehensive picture of the present situation. This will facilitate researcher to generate more useful technologies.

So far no research work has been done on the impact of ANGRAU production technologies in general either in the state or in the selected districts *i.e.*, Krishna, Warangal and Anantapur. Keeping in view of this the present study entitled "A study on impact of ANGRAU production technologies for selected crops" is modulated with the following objectives.

Objectives of the study

1. To screen the technologies developed by ANGRAU for selected crops
2. To measure the attitude of farmers towards ANGRAU technologies
3. To study the impact of ANGRAU technologies in terms of adoption quotient, productivity, profitability and improvement in livelihood of the farmers
4. To study the problems faced by research and extension scientists in generation and dissemination of these technologies
5. To study the production constraints faced by the farmers in adoption of recommended technologies and their suggestions to overcome them
6. To develop a strategy for effective technology generation, assessment, refinement and their dissemination

Scope of the study

The present investigation was undertaken to know the impact of ANGRAU production technologies for selected crops. The findings of the study would help to reveal the facts about attitude and impact of recommended ANGRAU technologies by the farmers. The findings would give information to agricultural university, government agencies and extension workers to implement plans, policies and programmes for the benefit of the peasant.

The instrument developed for measuring the attitude of farmers towards the recommended ANGRAU technologies in rice, groundnut, chillies could be used among farmers where recommended ANGRAU technologies are going to be popularised for studying the phenomena, so that better strategy can be formulated by knowing their attitude with reference to rice, groundnut, chillies in particular and other crops in general.

The study also gives information about the problems faced by the researchers and extension scientists in technology generation and dissemination and measures to overcome the problems. The study also provides information about the research gaps and measures to be taken to bridge the same

The elucidation of problems in continuous adoption of the recommended ANGRAU production technologies in rice, groundnut, chillies and suggestions of the farmers in overcoming them will give deeper insight for the policy makers for developing better strategy for coming future.

Limitation of the study

1. The study has the usual limitation of single student research project although several attempts have been made to have a thorough investigation into several aspects of the study. This, being a student project, it is not possible to take a large sample.
2. Although the investigator has taken all the precautions to achieve objectivity in the study, the chance of bias cannot be completely eliminated.
3. The study used exploratory research design. So all the limitations associated with it themselves set a limitation for the study.
4. The results of the study are applicable only to the farmers of the region of this study and similar situation prevailing elsewhere.
5. The findings of the study were based on the expressed opinion on responses and recall mechanism of the respondents where the subjectivity might not have been completely overcome in spite of the best efforts of the investigator.

In spite of these limitations, several efforts were made by the researcher to keep this study as objectives as possible by deliberately following all the norms of scientific research. Hence, findings of the study can be generalized in all such regions where similar conditions exist.

Presentation of the study

The report of the study was presented in six chapters. The first chapter deals with brief introduction. A review of literature related to problem was presented in the second chapter. The third chapter deals with "material and methods" followed in the present study. Results were presented with respect to the objectives of the study in the chapter four. The fifth chapter discusses the results of the study. The sixth chapter deals with summary and implication of the study. The literature cited is presented following the ANGRAU thesis presentation guidelines.

CHAPTER II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

A thorough review of literature is of paramount important to a research endeavour. This helps to find out the available information related to objectives of proposed research and assist not only in delineation of problem areas but also provides a basis for theoretical framework and for interpretation of findings. The literature available on the topic is rather scarce as the present study is a novel idea. However, earnest efforts were made to review the available literature having direct or indirect bearing on the present study.

The available literature was reviewed under the following broad headings, in line with the objectives framed for the study.

2.1 Attitudes of farmers towards agricultural technologies,

2.2 Adoption of agricultural technologies by the farmers.

2.3 Productivity, profitability and improvement in livelihoods of the farmers.

2.4 Problems and suggestions by research and extension scientists in generation and dissemination of agricultural technologies.

2.5 Production constraints faced by the farmers and their suggestion for adoption of recommended technologies.

2.6 Conceptual model for the study.

2.7 Derivation of hypothesis.

2.1 Attitudes of farmers towards agricultural technologies.

Biswas (1990) found that majority (71.67%) of the farmers in Andaman district possessed favourable attitude followed by highly favourable (20%), unfavourable (5%) and neutral (3.33%) attitude towards rice production technologies.

Meti and Sundaraswamy (1998) stated that there was significant association between material possession and attitude of farmers.

Nagdeve (1999) inferred that majority of the respondents (68.67%) had moderately favourable attitude, while (16.66%) had more favourable attitude and (14.67%) respondents had less favourable attitude towards IPM practices in paddy cultivation.

Singh *et al.,* (1999) stated that there was positively significant relationship between material possession and attitude towards dry farming technologies.

Rai *et al.,* (2000) examined that a majority of the farmers belong to the low socioeconomic class, partial level of awareness and favourable attitude towards watershed development programmes. Highly demanded areas for training are crop planning, water conservation and irrigation techniques; and a significant association exists between socioeconomic status and training needs.

Reddy *et al.*, (2001) noted that most of the farmers (37.50%) had negative attitude followed by positive (31.63%) and neutral (30.83%) attitudes towards dryland agricultural technologies. Risk perception and adoption of components of dryland agricultural technologies were significantly and positively correlated while knowledge and skill training needs were significantly and negatively correlated with the attitude of the farmers towards dryland agricultural technologies.

Sanjay and Lall (2001) stated that Majority of the respondents had neutral attitude towards rice-wheat cropping system. Farmers under rice crop reported maximum gap (54%) against herbicide application methods through broadcasting by mixing with urea/sand and minimum gap (3%) against stage of herbicides application while adopting integrated weed management. In wheat crop, none of the farmers used the manual weeding alone for controlling weeds, the respondents adopted chemical or integrated weed management. Overall average gap in weed management practices in rice crop was 25 per cent. Maximum average technological gap 31.4 per cent in wheat crop was found in case of chemical weeding followed by integrated weed management 20.3 per cent. Overall average gap in weed management practices in wheat crop was 25.8 per cent.

Raju and Reddy (2004) stated that a majority of the farmers preferred Samba Masuri and Swarna despite their higher susceptibility to pests and diseases. Based on the attitude towards weed management practices in rice, a majority of the respondents had more than 60 per cent knowledge about summer ploughing, sub optimal plant population and unskilled labour leading to ineffective weed control. None of the farmers used manual weeding or herbicide alone. Many adopted integrated weed management practices. Farmers reported the highest gap with respect to dose and time of herbicide application. There was zero adoption of barnyard grass control in the rice nursery, although farmers knew about it. The herbicide sales representative had maximum contact with farmers, while the agricultural department officers were the least consulted on herbicidal technology. Friends and mass media (radio and television) were the most often used sources of information on weed management. Farmers preferred broad-spectrum-based chemicals with no toxic effects on fish. Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. Infrastructure consists of changes to physical environment that helps people to meet their basics needs and to be more productive. Producer goods are the tools and equipment that people use to function more productively.

2.2 Adoption of agricultural technologies by the farmers

Somasundaram (1976) reported that, the adopter and non-adopter small farmers differed significantly with regard to their perception of suitability of package of practices of IR-20 based on some of the attributes of technology. Among the nine practices he studied, the adopter small farmers perceived the recommended practices like the area of nursery, variety, seed rate, application of NPK and plant protection as less risky as compared to non-adopters of IR-20 paddy.

Ramachandran (1988) reported that all the farmers adopted summer ploughing and intercropping, while adoption levels of other technologies varied due to various reasons.

Reddy *et al.,* (1989) found significant departure in the adoption of all improved dryland technologies by groundnut growing participants in relation to benchmark survey reporting yerracheruvu model watershed of Andhra Pradesh.

Chandra and Singh (1992) examined that among the various determinants of adoption, income from crops, credit orientation of farmers, attitude towards HYVs, risk orientation, age of farmers and land owning ratio contributed significantly to adoption of new technology. The level of adoption was positively associated with size of farm, cropping intensity and per hectare crop income tended to increase with farm size. Human labour absorption was relatively higher on farms with low adoption than those with a high adoption level.

Dube and Sawarkar (1992) reported that there was a positive and significant relationship between training received and adoption of rice production technologies.

Rao and Reddy (1992) conducted a study in Anantapur district of Andhra Pradesh and the results revealed that there was a significant difference between small-large and medium-large farmers in adoption of dryland technologies in groundnut cultivation. The majority of small, medium and large farmers had not adopted seed treatment, gypsum application and soil and moisture conservation practices such as deep ploughing, formation of dead furrow at 3-6 meter interval and bunding.

Katyal *et al.*, (1993) observed that the increase in input use, improved seed and fertilizer was found to be conspicuous in irrigated paddy crop and rainfed castor crop. The increase of inputs for sorghum based cropping system was marginal and inconsistent. The plant protection continues to suffer poor adoption.

Satya (1993) revealed that adoption of the recommended technologies in case of both paddy and chilli was medium among majority of the respondents. Similar was the observation that a majority of respondents had a medium level of knowledge and medium attitude towards the recommended technologies of the A.P.A.U for both paddy and chilli cultivation.

Adesina and Seidis (1995) in their studies on swamp rice varieties briefed that, diffusion of the rice varieties, which started in 1983 with 13 per cent adoption, had reached 70 per cent by 1993. Contact with extension or rice development projects had positively influenced farmers' adoption; it is assessment of the superiority of these varieties to local varieties that principally motivated farmers to adopt.

Hossain *et al.,* (1995) stated that the increase in adoption between 1987 and 1992 was found to be HYV rice cultivation (55%), use of plant protection chemicals (53%), fruit and vegetable preservation (42%), use of rice thresher (73%) and use of gobar gas plant (54%). The socio-economic level of the sample was found to have improved. Profitability per ha was about four times as high with the improved methods as compared to the traditional methods. However, non-availability and untimely supply of inputs, the traditional attitude of farmers and the sharp rise in farm input prices obstructed technical progress.

Rao and Rao (1996) revealed that majority of the respondents had adopted the rice production technology to the medium extent. Relational analysis had shown that the extent of adoption was found to be positively and significantly associated with age, farming experience, training received, socio-economic status, cropping intensity, aspiration, economic motivation, innovativeness, information source utilization and its credibility.

Farooq *et al.,* (1997) reported that majority of farmers adopted dry farming practices like farmyard manure application (99.33%), deep ploughing (94.67%) and contour cultivation (91.33%) in Aurangabad district of Maharastra.

Sumathi and Alagesan (1998) conclude that there was a positively significant relationship between extension contact and adoption behaviour of IPM in groundnut.

Khan (1999) stated that majority (70.00%) of the respondents belonged to the medium category of adoption followed by low (15.56%) and high (14.44%) category with respect to the adoption of eco-friendly technologies in rice cultivation.

Patil *et al.,* (2000) stated the reasons of growing local varieties. Farmers opinioned that the local varieties are fine grained yield more straw, resistant to pest and diseases and they were habituated for its consumption.

Thyagarajan and Vasanthakumar (2000) reported that the majority of the rice farmers of all five selected villages (Adoor, Mugaiyur, Nandimangalam, Pinnalur and Nanjalur) were in low category of adoption of recommended rice technologies.

Atchutaraju (2002) revealed that majority of the respondents (57.50%) had medium level of adoption of eco-friendly farming practices followed by 22.50 per cent with low levels of adoption and remaining 20 per cent with high level of adoption.

Kshirsagar *et al.,* (2002) study revealed the importance farmers attach to quality characteristics in their choice of rice varieties. Improved rice varieties currently available in Garh Madhupur were judged by farmers to be mostly inferior to traditional varieties with respect to quality attributes. The low level of adoption of improved varieties also indicates that such varieties currently available to farmers are probably not well adapted to the heterogeneous environmental conditions of the study village.

2.3 Productivity, profitability and improvement in livelihoods of the farmers.

2.3.1 Productivity

Reddy and Rastogi (1985) reported that with the adoption of improved dryland technology, the yields of dryland crops could be enhanced by 50 to 150 per cent with moderate levels of management. In some situation, particularly in the region where technology testing-cum-demonstration and training to farmers were combined, the increase in yields varied between 200 to 400 per cent.

Bhat (1994) reported that majority (56.7%) of irrigated respondents had medium yield gap followed by high (25%) and low (18.30%) yield gap. However, majority of rainfed respondents (48.30 %) had medium yield gap followed by high (31.70%) and low (20.00%) yield gap.

Yadav *et al.*, (1996) found that the harmony between increased production through advanced agro-technology for the present and preservation of environmental quality and resource base for the future led to concept of sustainable agriculture. It aims at stability of production overtime through the location and situation specific production principle.

Patil and Kunal (1998) revealed that potential yield of groundnut was found to be 3500 kg per hectare in Karnataka. The potential farm yield of groundnut was found to be 1742 kg per hectare. The overall average productivity of groundnut realised by sample farmers was found to be 1289 kg per hectare. The productivity of groundnut on small farmers was 1287 kg per hectare and slightly less than that on the large farmers (1323 kg/ha).

Fan (2000) estimated a poverty equation in the cited system, showed that with every one percent increase in agricultural production or productivity growth, the total number of rural poor in India is reduced by 0.241 per cent as a result of direct and indirect effects. Using this elasticity, we can calculate the marginal impact of an additional unit in agricultural production value on poverty reduction. Multiplying this marginal poverty impact by the estimated productivity benefits from rice research gives a total number of poor reductions due to rice variety improvement research.

Velavan and Balakrishna (2000) in their study on resource use efficiency in groundnut cultivation in Salem district of Tamil Nadu revealed that there was a possibility of increasing the irrigated groundnut production by increased use of human labour and by increased application of nutrients.

Hossain *et al.*, (2001) reported that there is a substantial increase in average as well as marginal productivity of both land and labour during (1987-1995) period. The increase in land productivity is due to technological change in agricultural through different of modern seed and fertilizer.

Bouman (2003) said that more than 75 per cent of the rice produced comes from irrigated land. However, the water crisis threatens the sustainability of the irrigated system. The supply of water for irrigation is endangered by declining water quality, declining resource availability, increased competition from other users and increasing costs. Rice is especially sensitive to declining water availability since it requires more water than any other food crop and it has relatively low water-use efficiency. At the farm level, decreasing the relatively large and unproductive losses from seepage, percolation, and evaporation can reduce water inputs. Water-saving irrigation technologies such as saturated soil culture and alternate wetting and drying can drastically diminish these losses. Under these technologies, yields also decline, though to a lesser extent than the water inputs; hence, water productivities increase.

Israel (2003) reported that the implementation of the watershed development project could able to raise the average yield levels of the respondents from 1209.53 kg/ha to 1636.03 kg/ha. The increase in yield level of the respondents rose by 73.93 per cent.

Kanthimathinathan (2006) revealed that the average yield 2848 kg per hector in India was only 46 per cent of average Chinese yield. Indian's yield rate was lower than that the rates of Vitenam and Indonesia. Indian's yield rate is just 1/3rd of the highest average yield obtained in Egypt. Its share in world production was 22.5 per cent. Indian's average yield is 71 tonnes per hector.

Rajendran *et al.*, (2006) stated that the farmers observed higher number of panicles per hill (20 to 38) and higher number of panicle per square meter (322 to 645) in experimental fields, as compared to 5 to 7 panicles per hills and 250 to 429 panicle per square meter in fields with conventional cultivation.

Subbaiah (2006) reported that ACRIP has led to the release of 733 rice varieties of which 86 are central released and 647 are state released in the last four decades. Some of the varieties have resistance or tolerance to major pest and disease of rice and a few of these have multiple resistant to more than one pest or disease. These varieties have greatly accelerated the production and productivity of rice in the country. Spread of high yielding varieties (HYV's) has doubled from 37.9 per cent in 1966-67 to nearly 79 per cent by early 2000.

Singh and Behera (2006) stated that productivity growth in agricultural has been roughly halved during 1990s. If it is not improved, there may be danger of its falling well below the rate of growth of population. In order to make agriculture competitive and cost effective and to sustain in the livelihood of about 60 per cent of the work force, productivity will have to be augmented not only in the irrigated region but also in the rainfed region.

2.3.2 Profitability

Ernest (1973) reported a significant difference between big and small farmers in their perception of profitability of paddy (Ponni) high yielding varieties.

Rao (1986) observed from break-even analysis the profitable nature of groundnut cultivation since break-even out put was much less than the average yields in Anantapur district of Andhra Pradesh.

Ramagowda (1991) reported the perception of appropriateness of dryland technologies recommended to red soil by farmers showed that contour bunding was opined moderate on profitability, physical compatibility and trialability and high on complexity, shallow ploughing was rated moderately profitable, compatible, triable and low complexity. The application of balanced fertilizer and intercropping of groundnut were rated as moderate on profitability, physical compatibility, trilability and complexity dimensions. There were perceptual gaps between farmers and extension workers, farmers and scientists, scientists and scientists and also interestingly between extension worker and scientists.

Sadangi (1997) found that farmers agreed that adoption of proven alternative system would result in even greater economic benefits to farmers and environmental gains for the state and the country.

Manjunatha *et al.*, (1998) said that greater communication of experiences is required if farmers' aspirations are to be raised regarding the outcomes of adopting new post harvest technologies. Factors positively influencing aspirations were found to be higher annual farm income and education levels.

Rahman and Mikuni (1999) in their study on the impact of transfer of technology through lab to land on the income and employment status of small, marginal and landless labours in Karnal district of Haryana reported that the employment of family members increased slightly by around 30 per cent in 1982-83 and by about 7 per cent in 1983-84 over the base year. On the other hand, family income registered an increase of about 25 per cent in 1982-83 and about 51-52 per cent in 1983-84. The share of income from livestock went up from 41 to 55 per cent in the case of landless households.

Jawahar *et al.,* (2001) found that agricultural rice scheme was more equally distributed than non-agricultural income. The diffusion of modern agricultural technology did not affect the distribution of agricultural income but rather reduced inequality of overall income distribution, further, rural poverty was lower in technologically developed villages than in less developed villages.

Tranthi *et al.*, (2001) stated that the adoption of modern varieties, compared with traditional varieties contributed 130 per cent increase in rice income when grown under irrigated conditions and this variable found to be highly significant in the total household income. This clearly suggests that technology progress and impact of agricultural research does not contribute to increase in household income unless it is associated with development of infrastructure facilities.

Lancon *et al.,* (2002) revealed that with competition increasing in the West African rice sector, the economic viability of technical innovations is becoming a crucial issue. The economic setting in which farmers are making decisions is a major determinant of the adoption or non-adoption of new technology. Thus, economic research has an increasing role in the implementation of the research agenda of the West Africa Rice Development Association (WARDA). Economists started to look at farmers' characteristics and plant attributes that determine the adoption or non-adoption of improved technologies. Microeconomic analysis was further extended to assess farmers' efficiency in resource allocation, to derive recommendation for an optimal use of production factors. Structural reforms of the West African economies conferred an increasing role of the macroeconomic, institutional and market environments in farmers' decision-making.

Israel (2003) reported that introduction of a watershed development project helped to the average income of the respondents from Rs 18,450 to Rs 27,250 per year. The additional income generation was Rs 8,800 per year due to the implementation of the watershed programme by the respondents. The average annual income of the respondents rose by 67.61 per cent.

2.3.3 Improvement in livelihoods

Jatileksono (1993) noted that rice is the most important agricultural product in Indonesia, comprising around 47 per cent of the food crops value-added, or about 27 per cent of the total agricultural value-added in recent years. Rice is also the major staple food in the country, contributing around 53 per cent and 45 per cent of the total calorie and protein intakes respectively. In 1990, rice accounted for 17 per cent of total household expenditure and 28 per cent of total household food expenditure. Rice production continues to be one of the most important sources of livelihood in rural areas.

Indersain (1995) found that there was sharp reduction in the number of draft cattle in Punjab. This was due to the replacement of farm machines.

Patel (1995) opined that annual compound growth rate of cattle population declined from 0.31 per cent to 0.02 per cent during the period 1961-1990. Buffaloes also showed a decreasing trend from 0.51 per cent to 0.03 per cent in Karnataka. Reason for decrease in bovine population was due to change over to mechanization farming and high cost of cattle feed.

Prasad *et al.*, (1995) conformed that the bovine population recorded a growth rate of - 8.96 to -1.24 per annum during 1978-87. Decrease in draft animal was due to replacement of animal power by tractors and other mechanical power.

Rao and Raju (1995) noticed that the pattern of changes in composition and distribution of livestock in Andhra Pradesh. It was noticed that the total cattle declined during 1950 to 1993.

Thripati (1995) conformed that the total number of milch animals were reduced drastically. This was due the conversion of pasture and grass land into crop lands and large scale deforestation. A declining trend was noticed in the milch productivity of cow with the increase in alteration where buffaloes showed no definite trend in Utter Pradesh.

Rajanikumar (1998) revealed that cattle population was on a declining trend from 1956 to 1993 for the entire state. Population of adult female cattle had registered drastic decrease in all the regions *i.e.,* Andhra, Telangana and Rayalaseema. He also stated that the percentage contribution of livestock to agricultural income and the state income was declining. The percentage contribution of livestock to agricultural income in 1956 was 13.10 per cent, which had decreased to 19.92 per cent in 1993. Similarly percentage contribution of livestock to the state income was decreasing from 17.70 per cent in 1956 to 6.72 per cent in 1993.

Winkleman (1998) showed an optimistic view of technological change leading to poverty alleviation through positive effects of consumer's food prices, producer's income and labour's wage income.

Kerr and Shashi (1999) stated that there are four interrelated mechanisms through which new agricultural technology can affect poverty, those are technology adoption & farmer, agricultural wages & employment income, food price & availability and linkages among agricultural technology, economic growth & poverty alleviation. These four relationships and other associated conditioning factors differ in their magnitude and direct and indirect affects. There are two frameworks that characterize opposing views of the broad links between agricultural research and raising poor people's income and nutritional intake.

Sixteenth Quinquenial Livestock Census (1999) reported that animal operated items like wooden plough, triphase cultivars and animal carts have registered a decrease in 1999 census when compared to 1993 census. Similarly there is a considerable decrease in the number of wooden ploughs, which declined from 26.00 lakh in 1993 to 25.36 in 1999 census recording a decrease of 2.52 per cent. This may be due to increase in use of tractors and their implements.

Fan *et al.,* (2000) distinguished between direct and indirect effects of agricultural growth due to agricultural research. The direct effect arises in the form of benefits the poor perceive from higher income through growth in agricultural production. The indirect effects come from increased rural wages, employment and decreased food prices.

Rajaratnam (2000) observed that majority (73.68 %) of the respondents fell under medium category of material possession followed by high (15.79 %) and low (10.53 %) material possession.

Temudo (2000) reported that groundnut has been an important cash crop of Guinea-Bissau since the nineteenth century. In the Cubucare peninsula this crop actually plays a relevant role in women's livelihood strategies and as a key component of the diet during high labour demand and food shortage periods. In reviewing the scientific literature on groundnut post-harvest losses published to date it is concluded that research efforts were mainly focused on those that occurred in central storage facilities and colonial and post-independence governments largely ignored those problems at the household level. Field research revealed important post-harvest losses in groundnut, calling attention to an urgent need for an Integrated Pest Management (IPM) intervention to adapt, modify and complement the traditional methods of post-harvest management.

Adato *et al.*, (2002) revealed that additional explicit attention must be given to the implications of gender, ethnicity, class, or other types of social differentiation (multi-layered approach). Although this approach is more difficult for research than conventional single-disciplinary analyses, it leads to a more complete understanding that can help develop technologies that better fit in with complex livelihood strategies, especially of the poor.

APDPIP (2002) stated that advancement of science and technology in the laboratories is not reaching the poor in the field. Pro poor science and technologies can help the poor in each state of value chain of the livelihoods. Science can help in pre-production, production, harvesting, post harvesting, local value addition and producing new products. This will certainly increase income of the producers.

Fan and Hazell (2002) assessed the impact of public investment in technology and infrastructure by agro-ecological zones to examine whether marginal returns to public policies are higher in rainfall native to irrigated regions. The study used a district level data on agricultural and infrastructure variables and regional level estimates of poverty to show that return to public investment in terms of agricultural growth on poverty in some of these rainfed regions in greater than in irrigated regions.

Bird *et al.,* (2003) find that higher income households receive a higher share of income from remittances in rural Zimbabwe, whereas the severely poor, who shifted away from reliance on remittances as the main source of income during 1990s receives the lowest share.

Fan *et al.*, (2003) estimated the reduction poverty through rice varietal improvement research. The results clearly shows that the number of poor reduced has increased from 4.95 millions in 1991 to 4.81 millions in 1997 and further declined to 3.06 millions in 1999.

Hossain *et al.*, (2003) stated that modern rice varieties (MVs) adoption has no significant direct impact on the poor except for a small fraction who have been able to access land from the expanding tenancy market. But indirect impacts in the form of employment and price changes were found to have been largely positive for the poor in reducing vulnerability. The qualitative research component generally confirms these general findings, highlighting other factors such as the improved status associated with fixed-rent tenancy and "contract" labour arrangements. The qualitative research also shows negative adoption impacts such as shrinking common property resources and declining soil fertility, both of which may increase the long-term vulnerability of the poor. It also throws light on the process of technology dissemination. After initial release and dissemination of MVs, adoption has taken place primarily through informal farmer-to-farmer learning.

Lee (2003) revealed that mechanized rice direct sowing technology and efficient use of the high-performance harvester, labour inputs should decrease from 297 h ha^{-1} in

2001 to 180 h ha^{-1} in 2010. Rice production policy has been directed to produce high-quality rice at a low cost. It is suggested that the production of high-quality rice be increased from 50 per cent in 2002 to 80 per cent in 2005. The application of artificial fertilizer and chemical pesticides will decrease by 30 per cent in 2004. Pilotless helicopter for pest control, were developed to prevent weed growth and environmental contamination with herbicides. To overcome competition with other countries, highly labour-intensive farm operations will be changed to automatic operations and will use robots in the future.

Economic Survey (2004) reported that power availability for carrying out various agricultural operations has been increased to reach a level of 1.231 kilo watt/ha in 2001-02 from only 0.295 kilo watt/ha in 1971-72. This increase was the result of increasing use of tractor, power tiller, combine harvesters, irrigation pimps and other power operated machines. The share of mechanical power has increased from 39.63 per cent in 1971-72 to 83.62 per cent in 2001-2002. Efforts are on to encourage the farmers to adopt technically advanced agricultural equipments in order to carry farm operationally timely and precisely and to economise the agricultural production process.

Sarma (2004) advocated that the theory of under development views poverty as product of the vicious circle of low per capita income, low savings, and consequently low capital formation and productivity and so on. In rural areas, it arises mainly from unsustainable livelihoods and ultimately results in to low earnings.

Swarna (2004) stated that ecological friendly crop diversification and use of organic manures are much more labour intensive than the technologies of first green revolution. The labour absorption in agriculture has declined in the past two decades. No doubt the real wages of labour had increased but not commensurate with their share in agricultural population.

Harris *et al.*, (2005) reported that large areas of rice fallows (land left fallow after the harvest of rainfed rice) were identified in Bangladesh (2.1 million hectares), Nepal (0.4 million hectares) and India (11.6 million hectares). This under scores the need to facilitate double cropping and replace rice fallows with productive crops in these areas.

Prakash (2006) stated that with growing degradation of natural resources country's food security could only be achieved by resource conserving technologies. Agriculture is thus need of infusion of newer technologies that saves our natural resources. The countrywide adoption of resources conserving technologies could go a long way in ensuring sustainable food production and livelihood security.

2.4 Problems and suggestions by research and extension scientists in generation and dissemination of agricultural technologies.

GOI (1976) through the national commission on agriculture, in its report considered it necessary for agricultural universities and concerned state department to co-ordinate their efforts in order to develop useful technology and effectively serve the farming community.

Crawford and Barclay (1982) suggested that developing and evaluating technology must be done within the context of the farmer's own decision making environment and under the same conditions they face.

Rani (1985) observed that the major constraints in research are lack of budget resulting in the extra work and multifarious duties than research work on the part of research and also poor laboratory facilities.

Singh and Laharia (1992) stated that vacant posts, poor financial position of institution and lack of collaboration research projects and lack of inputs for conducting demonstration are the major constraints for transfer of technology in sugarcane.

Saran *et al.*, (1993) reported fluctuations in the onset of monsoon, flash-flooding, water stagnation due to impediments in natural drainage, and irregular water-receding patterns were some of the reasons for the failure of promising technologies. It is recommended that, in a complex, dynamic and risk-prone ecosystem, Farming System Research (FSR) scientists investigate ecological-based land-use systems of the farming community rather than being circumscribed by entry-point strategy. Adopting an integrated land and water resource management perspective has opened up new and interesting lines of inquiry. It also encourages a search for organic linkages among crop-livestock-fisheries-horticultural enterprises in a flood-prone region.

Sawant *et al.*, (1993) expressed the constraints reported by majority of scientists were non-availability of sufficient funds (42.33%), lack of computer facility (67.57%), lack of trained supporting and research staff (55.55%) and lack of incentives for good work (45.54 %).

Reddy (1996) reported constraints expressed by majority of the respondents in order of their importance as library facilities, scientific equipment, laboratory facilities and inadequate advanced training in new technologies to equip themselves with latest knowledge in subject concerned.

Khan (1999) in his study on eco-friendly technologies in rice reported that 48.88 per cent of the respondents felt that loan building is a lengthy procedure where as 63.63 per cent of scientists and extension workers respondents perceived that lack of technical knowledge by farmers as a major constrain.

Rao (2000) reported that provision of staff in full strength, spacious buildings, vehicle for transport, funds for organizing kisan melas and ZREAC meetings, laboratory facilities and work distribution among scientists are the major suggestions given by the DAATT centre scientists for effective technology dissemination.

Bhairamkar *et al.,* (2003) stated that the interpersonal communication channels are still important among paddy growers in India. Thus while introducing advanced information communication technologies, balanced interpersonal communication channels may be considered by the extension personal for its proper impact.

Verma (2006) stated that agriculture in India has witnessed many revolutions, green, white, blue, yellow, and ultimately the rainbow revolution since India attained freedom. Much credit for this success goes to several millions of farm families, providing strong back up to Indian agriculture. Their hard work, in association with agricultural scientists and policy planners, realised the dream of feeding one billion bellies, policy support, population strategies, public investment on infrastructure and research and extension helped significant increase in agricultural production.

2.5 Production constraints faced by the farmers and their suggestion for adoption of recommended technologies

Rastogi (1982) in his study of yield gap ratio showed wide variations between different crops. Even for same crops, it varied from region to region and from year to year even in the same region. The variations in yield ratio's during different years were attributed to seasonal conditions. The study documented higher yields under demonstration in all the years and for all the crops thereby establishing the build in mechanism of the recommended technology to withstand weather risks.

Srivastava and Singh (1990) stated that non-availability of seeds, high cost of fertilizers, lack of irrigation facilities, erratic distribution of rainfall and lack of technical knowledge were the constraints faced by majority of paddy growing farmers in paddy production.

Jeenab (1991) reported that intensification of adult education programmes, evolving pests and diseases resistant varieties, creation of credit facilities to the needy farmers, provision of subsidy on different agricultural inputs, strengthening of training programmes, intensification of extension efforts by extension staff, provision of good market facilities and price support were the suggestions given by the farmers for adoption of chilli technology.

Satya (1993) clearly revealed that lack of knowledge and lack of technological guidance were the major constraints limiting the adoption in case of both paddy and chilli cultivation. The other constraints were negligence, followed by traditional practices, inadequate and untimely availability of inputs and lack of cooperation among the farmers. Suggestions to overcome the constraints in the adoption of recommended A.P.A.U technologies indicated that provision of more financial help before cropping season followed by better irrigation facilities were having priority among both paddy and chilli cultivations.

Venkateswarlu (1993) stated the several constraints like not aware of practices, lack of knowledge, lack of technical guidance, non availability of inputs, lack of facilities, belief in traditional methods, non-availability of labour, high cost of labour, lack of market facilities, lack of suitable equipment and financial problems were the main reasons for non-adoption of recommended practices.

Kumar (1995) reported that non-availability of quality high yielding varieties followed by poor awareness for alternative use, uncertainty of market and price fluctuations were the major constraints perceived by the respondents in adoption of recommended technologies.

Vijayalakshmi (1995) found that provision of timely supply of needed information and women extension worker, providing subsidy for fertilizer and plant protection chemicals, supply of disease free seeds and high yielding varieties, providing credit facilities, conducting trainings programme and supply of fumigants on free of cost were the suggestions given by the respondents for improving vegetable production.

Dupare and Sinha (1999) reported that 60.00 percent of farmers say that university scientists recommendations are good and profitable if followed instructions, 26.00 per cent say that the recommended inputs are not available in markets.

Gangully and Singh (1999) revealed that small farmers perceived half of the recommendations in rice cultivation technologies given by scientists as not appropriate, whereas these were perceived as somewhat appropriate or appropriate by medium and large farmers.

Adewale (2000) his study examined the number of information sources, frequency of contact with extension agents, attitude to innovations, formal educational level, knowledge of innovation and age were the significant predictors of farmers' level of technology change in rice cultivation. In order to improve technology change among rice farmers and thus ensure a rapid growth of the domestic supply of rice in Nigeria, it is recommended that more relevant and appropriate information channels should be used to disseminate innovations to rice producers.

Patil *et al.*, (2000) stated that a large majority of beneficiaries (67.15 %) were not following line sowing due to the reason that timely sowing was not feasible.

Baswarajaiah (2001) concluded that the problems expressed by the farmers were lack of resources, follow up action by implementing officials, technological guidance by scientists, efforts on the part of implementing agency to educate and convince the farmers about the programme, illiteracy and the farmers were habituated to subsidies, low level of motivation and less availability of suitable technology for resource poor situation, credit facility and timely supply of inputs.

Atchutaraju (2002) stated that the most important constraints encountered by the respondents in adoption of sustainable farming were appearance of periodic drought spell during cultivation (bio-physical), poor economic status of farmers (micro level) lack of pest and diseases resistant varieties (technical), inadequate and untimely supply of agricultural inputs (administration) and lack of proper training facilities (extension).

Vasantha (2002) in her study on IPM technologies in cotton revealed that lack of organizational or cooperative efforts by farmers as the major problem for which it was suggested that formation of farmers clubs and cooperative societies for effective group action as the need of the hour.

Ghosh and Pandey (2003) revealed that the training programmes of KVK had desirable impact on the farmer's knowledge about improved rice cultivation technologies. The trainee-farmers of KVK had higher knowledge about improved rice cultivation technologies than non-trainees.

Rai (2006) stated that new agro-techniques are not reaching the farmers with the speed, which is desirable for the faster agri-growth rate to come to the expectations of 4 per cent growth rate status.

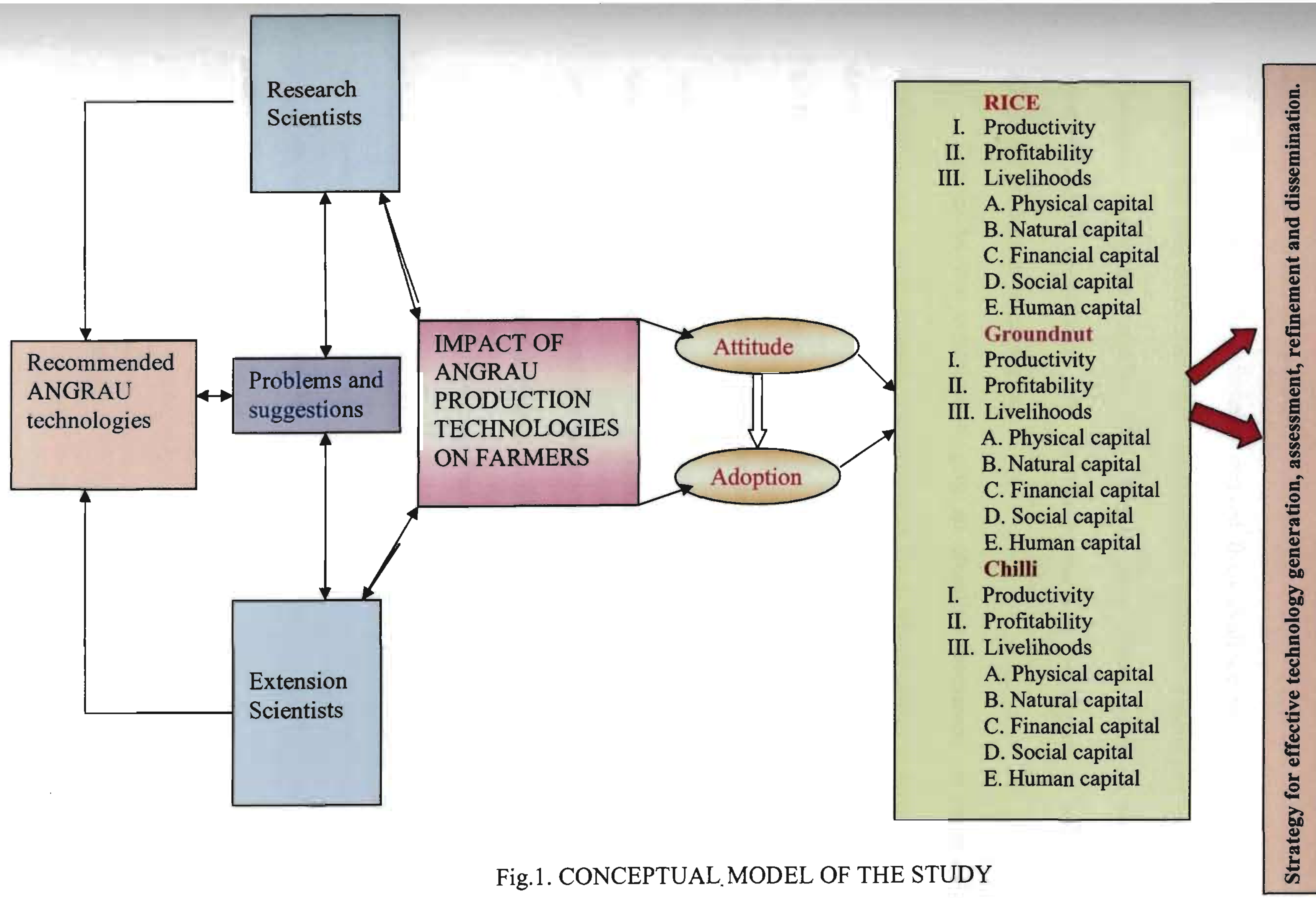


Fig.1. CONCEPTUAL MODEL OF THE STUDY

2.6 Conceptual model for the study

In the light of the inferences derived from evidence in literature, conceptual framework has then established which represents the important dimensions and postulated relationship among the variables. Five variables were chosen based on the review of literature and in consultation with experts to examine the impact of recommended ANGRAU production technologies.

This model was conceived to give an objective assessment of variables. The relationship was diagrammatically represented in Fig.1, which helped to derive hypothesis for empirical testing.

2.7 Derivation of hypothesis

Based on the review of literature and conceptual framework for the study, the following hypothesis was found to examine the variables and its selected dimensions.

General hypothesis: There will be relationship between selected characteristics of the participating farmers before and after adoption of recommended technologies.

The null and empirical hypothesis deduced from general hypothesis with respect to each variable under the study and reported in the result chapter.

CHAPTER III

MATERIAL AND METHODS

MATERIAL AND METHODS

The procedure followed in sampling, empirical measurement of variables, devices used in data collection and the statistical tests applied for the analysis of the data were presented in this chapter in a systematic manner, under the following heads.

3.1 Research design

3.2 Sampling procedure

- 3.2.1 Locale of the study
- 3.2.2 Selection of the districts
- 3.2.3 Selection of the mandals
- 3.2.4 Selection of the villages
- 3.2.5 Selection of the respondents
- 3.2.6 Screening of ANGRAU technologies

3.3 Variables used and their measurements

3.4 Devices and methods used for collection of data and

3.5 Statistical tools used for analysis of the data

3.1 Research design: An explorative research design was adopted for the conduct of the study.

3.2 Sampling procedure

3.2.1 Locale of the study: The state of Andhra Pradesh was chosen for the study because of the following reasons.

a) The investigator is familiar with the local language, which would help to build quick rapport and also facilitate indepth study coupled with personal observation.

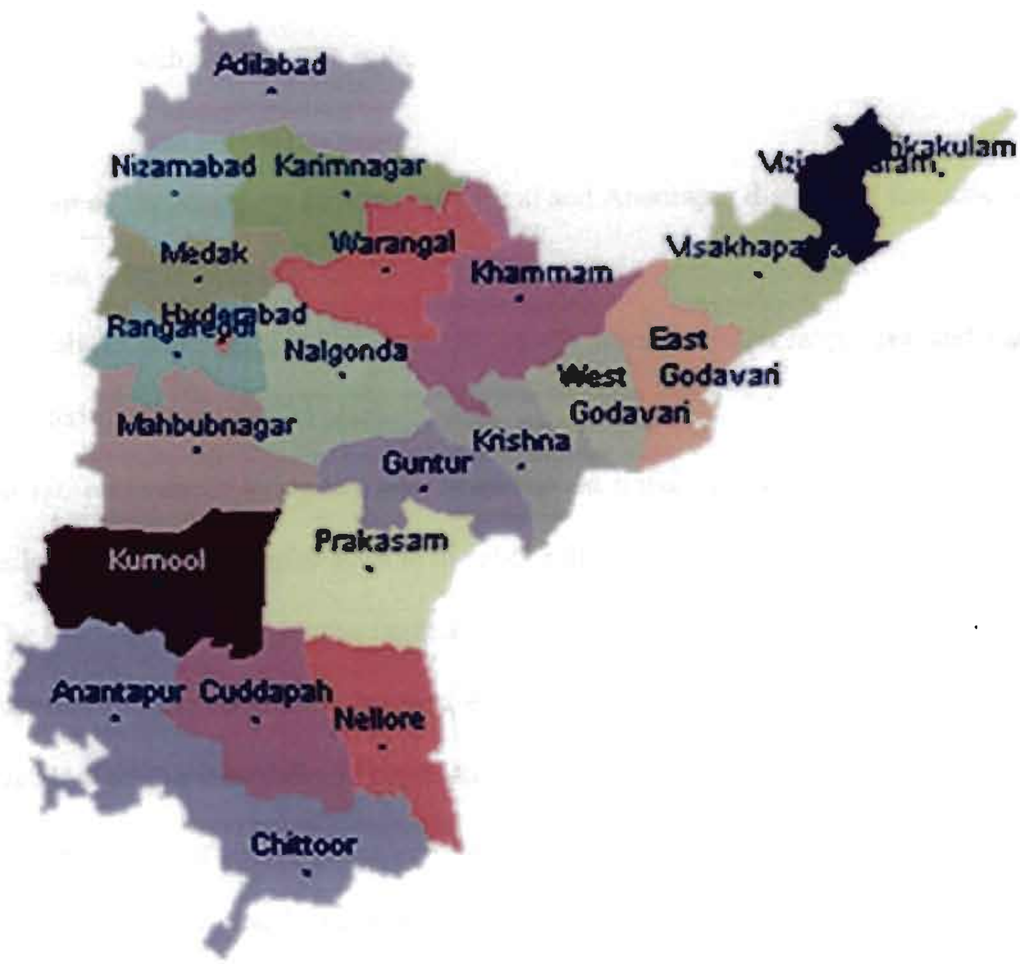


Fig .2. Map showing selected districts of Andhra Pradesh

S.No.	Selected district
1.	Krishna district
2.	Warangal district
3.	Anantapur district

b) Andhra Pradesh is one of the largest producers of rice, groundnut and chillies in India.

c) The Acharya N. G. Ranga Agricultural University provided stipend to the research scholar for doing Ph. D course, hence, it was obligatory on the part of the investigator to carryout research work in the state, so that findings of this study would benefit the state.

3.2.2 Selection of the districts: Krishna, Warangal and Anantapur districts of the state of Andhra Pradesh were selected for the following reasons.

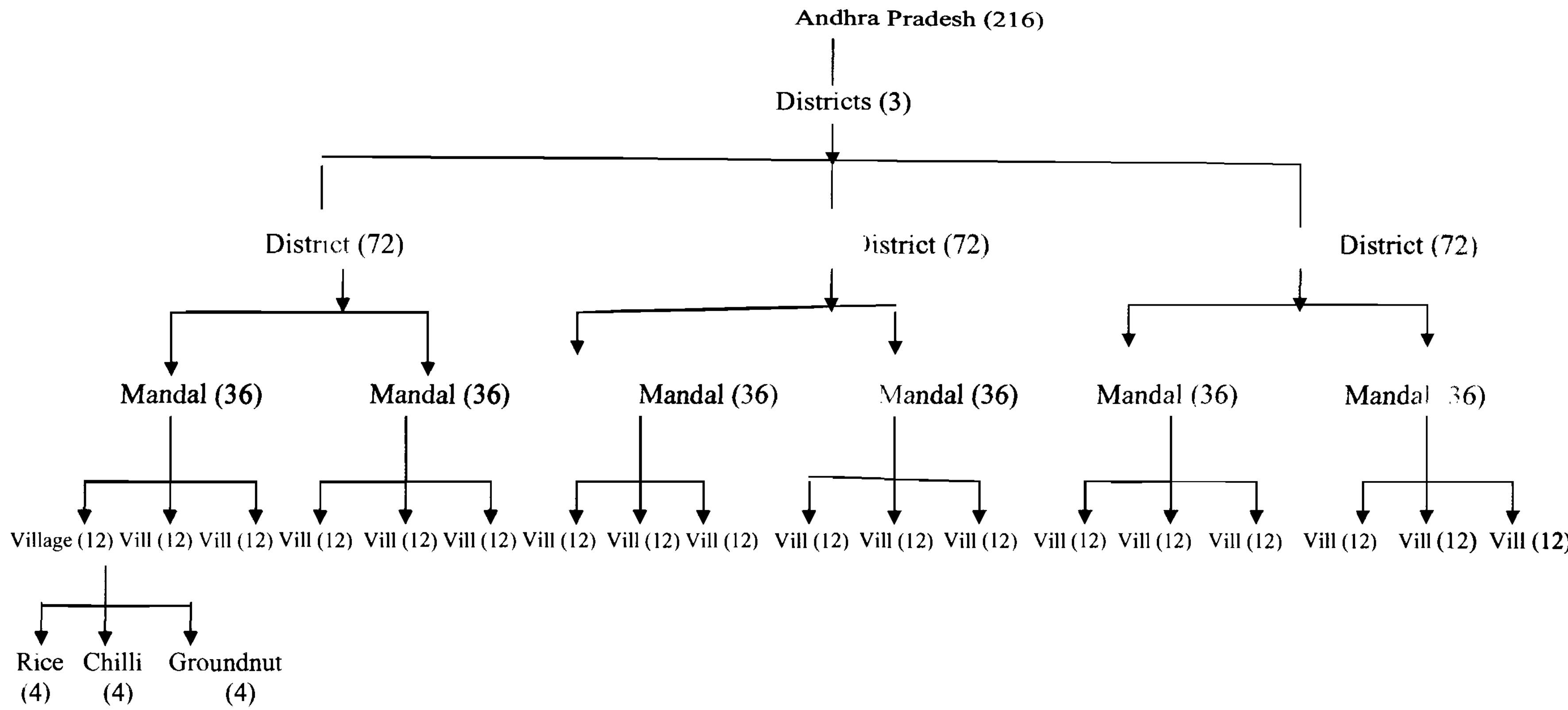
a) The above three districts are growing all the three crops in large area and one selected crop being grown predominantly.

b) So far, no research study has been taken up on impact of ANGRAU production technologies on the similar lines in the above districts.

c) The investigator is also quite familiar with the crops, which helped a lot to build rapport to collect factual information about the various components of the study.

3.2.3 Selection of the mandals: A complete list of mandals that were growing all the three selected crops *viz.*, rice, groundnut and chillies was obtained from the selected districts, from which, six mandals at a rate of two per district were randomly selected. The mandals selected were Nandigama & Kanchikacherla from Krishna district, Bukkarayasamudram & Pamidi from Anantapur district and Hanumakonda & Marripeda from Warangal district.

3.2.4 Selection of the villages: A complete list of villages that were growing rice, groundnut, chilli crops was obtained from these six mandals from which 18 villages at a rate of three villages from each mandal were selected randomly.



*** (Number of Respondents)**

Fig. 6 Sampling frame of the study

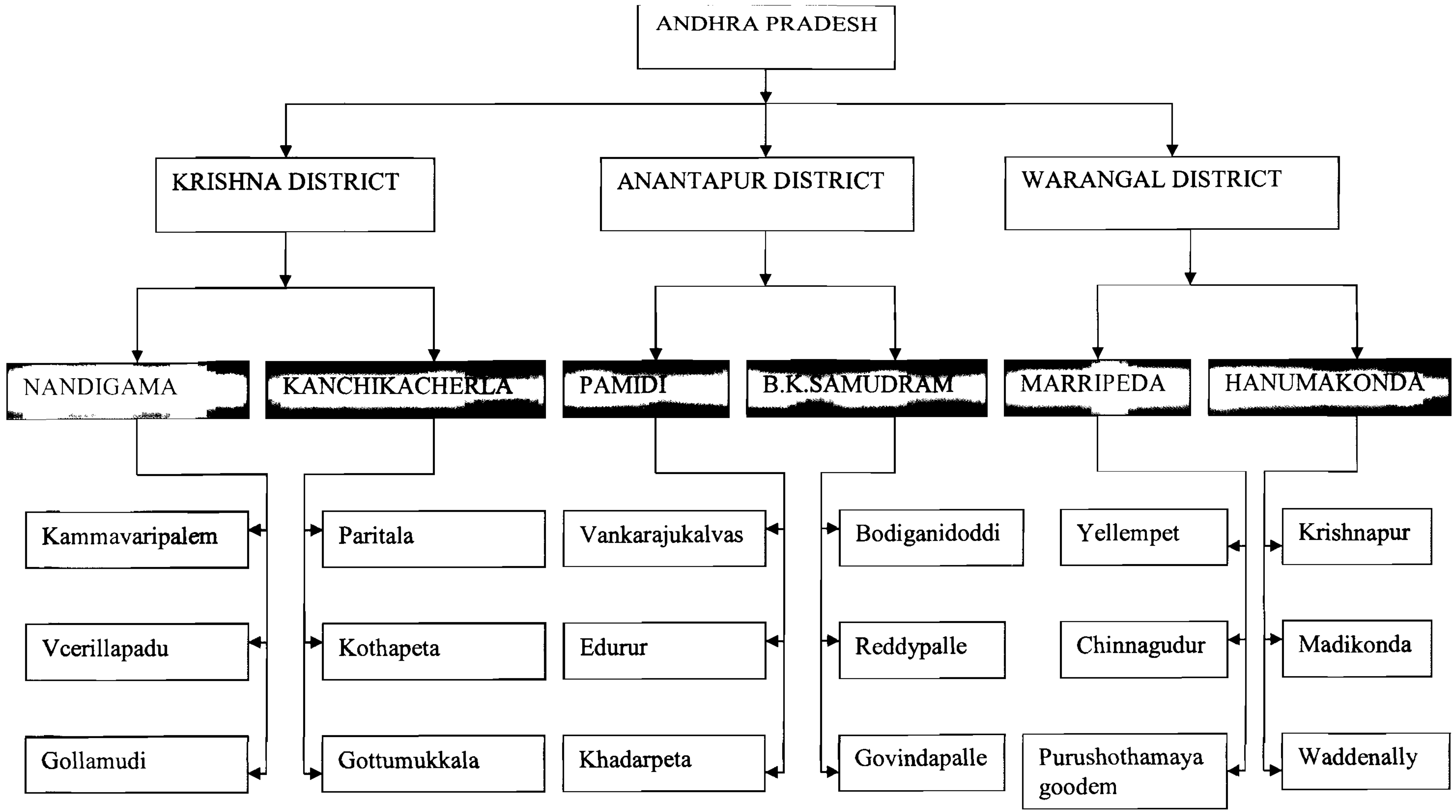


Fig.7 Districts, mandals and villages selected for the study

Table 1. Districts, mandals and villages selected for the study.

S.No.	District	Mandal	Village	Respondents
1.	Krishna district	Nandigama	Kammavaripalem	12
			Vcerillapadu	12
			Gollamudi	12
		Kanchikacherla	Paritala	12
			Kothapeta	12
			Gottumukkala	12
2.	Anatapur district	Bukkarayasamudram	Bodiganidoddi	12
			Reddypalle	12
			Govindapalle	12
		Pamidi	Vankarajukalva	12
			Edurur	12
			Khadarpeta	12
3.	Warangal district	Hanumakonda	Krishnapur	12
			Madikonda	12
			Waddenally	12
		Marripeda	Yellampet	12
			Chinnagudur	12
			Purushothamaya goodem	12
Total	3	6	18	216

Fig. 3. Location Map of Krishna district with the sampled mandals

S.No.	Selected mandal
4.	Nandigama
6.	Kanchikacherla

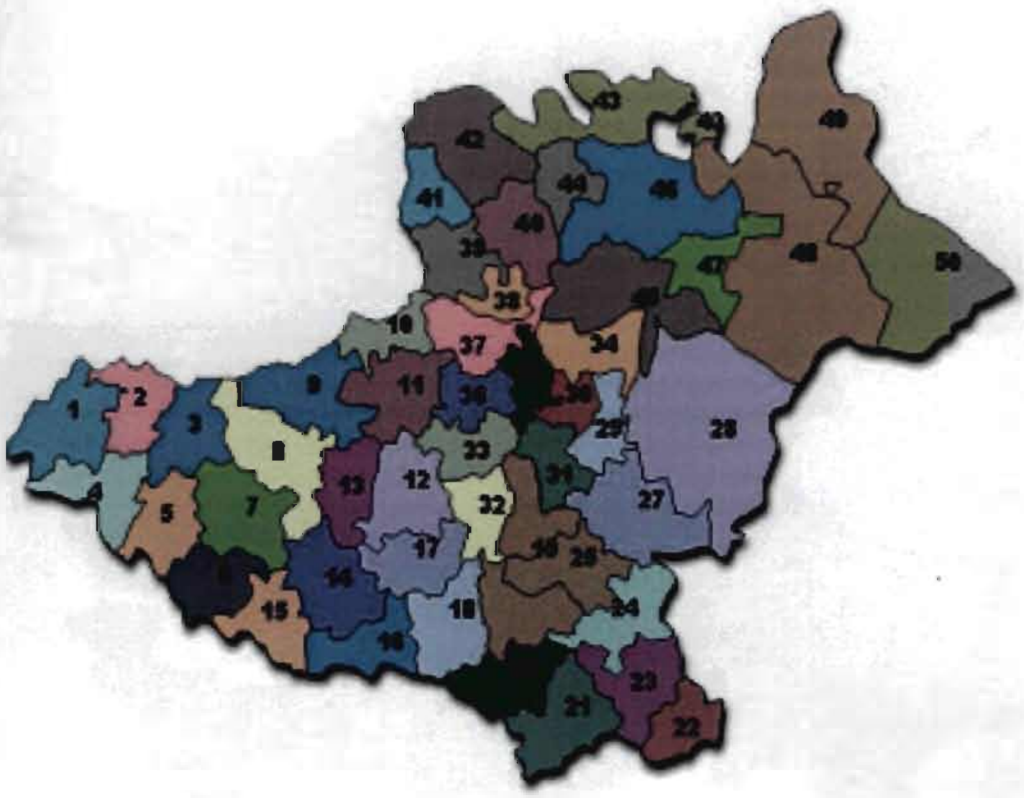


Fig .4. Location Map of Warangal district with the sampled mandals

S.No.	Selected mandal
11.	Hanumakonda
21.	Marripeda

Fig.5. Location Map of Anantapur district with the sampled mandals

S.No.	Selected mandal
26.	Bukkarayasamudram
12.	Pamidi

3.2.5 Selection of the respondents: A total of 12 farmers from each selected village were chosen randomly *i.e.,* four farmers for each selected crop. Thus a total sample is 216.

3.2.6. Screening of ANGRAU technologies

Recommended technologies for the study have been selected on the basis of secondary documents of ANGRAU, consultation with research scientists, extension personnel for concerned crops in selected districts and Directorate of Research section. Those technologies developed between 1990-2000 by ANGRAU were selected. The selected technologies are appended in Appendix-I

3.3 Variables used and their measurements: Consulting the advisory committee members, extension scientists of ANGRAU and review of literature, five variables *i.e.,* attitude, adoption quotient, productivity, profitability and improvement in livelihoods were selected for the study. The methodology followed for measuring the variables are discussed below.

3.3.1 Attitude of farmers towards ANGRAU production technologies

Attitude is an organized predisposition to think, feel, perceive and behave towards a cognitive object. Thurstone (1946) defined attitude as the degree of positive or negative affect associated with some psychological object. According to Thurstone, "psychological object" means any symbol, phrase, slogan, idea, person and institution towards which people can differ with respect to positive or negative affect.

Attitude in this study was operationalised as the degree of positive or negative feeling of farmers towards the recommended ANGRAU production technologies.

3.3.1.1 Construction and standardization of attitude scale

For measuring the attitude, different types of scales developed by Thurstone, Likert and several others differ markedly in type and method of construction, but the objectives in every case was to assign an individual a position along a quantitative scales.

In this study, a measurement of attitude of farmers towards ANGRAU technologies was studied. Attitude scale was developed using the Likert method of summated rating because of the following reasons.

a) Hall (1934) had indicated that the Likert type scales with even fewer statements will give high reliability coefficients.
b) In this scale each item was judged on a five point continuum rather more rejection of the item as in Thurstone scale. By this method, we get more information about the item than Thurstone scale.
c) No judges are required to rank the item as in case of Thurstone's scale as this is a response based method. This saves time, labour and money and also simplifies the procedure.
d) It is relatively simpler and easier than equal appearing interval scale which have been claimed by Likert (1932) and supported by Hall (1934)
e) The item on a Likert scale provide data on the individual about the specific issues covered by the single item as well as total scores on the attitude dimension being studied.

3.3.1.2 Collection of statements

Seventy five statements, expressing the attitude of farmers towards ANGRAU production technologies for rice, groundnut, and chillies have been collected from available literature, in consultation with the specialist in the field of extension and they were edited on the basis of criteria suggested by Thurstone (1946), Likert (1932) and Edward (1957).

Out of 75 statements, 60 statements (Appendix-III) were retained after editing. These statements were translated into Telugu and administered to 60 respondents who were selected from outside the sample area.

The respondents were asked to indicate their degree of agreement or disagreement with each statement on the five-point continuum ranging from "strongly agree" to "strongly disagree". The scoring pattern adopted was 5 to 1, in which, 5 weighs to strongly agree response, 4 to agree response, 3 to undecided response, 2 to disagree response and 1 to strongly disagree response for positive statement and for negative statement, the scoring pattern was reversed *viz.,* 1 weighs to strongly agree response, 2 to agree response, 3 to undecided response, 4 to disagree response and 5 to strongly disagree response. Their responses were recorded and summated score for the statement was obtained.

3.3.1.3 Calculation of 't' value

Based upon the total scores, the respondents were arranged in descending order. The top 25 per cent of the respondents with their total scores were considered as the high group and the bottom 25 per cent as the low group, so as these two groups provide criterion groups in terms of evaluating the individual statements as suggested by Edwards

(1957). Thus out of 60 farmers to whom the items were administered for the item analysis, 15 farmers with lowest score were used as criterion groups to evaluate individual items.

The critical ratio, that is the 't' value which is a measure of the extent to which a given statements differentiates between the high and low groups of the respondents for each statements was calculated by using the formula suggested by Edward (1957).

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\dfrac{\Sigma(X_H-\bar{X}_H)^2 + \Sigma(X_L-\bar{X}_L)^2}{n(n-1)}}}$$

Where,

$$\Sigma(X_H-\bar{X}_H)^2 = \Sigma X_H^2 - (\Sigma X_H)^2$$

$$\Sigma(X_L-\bar{X}_L)^2 = \Sigma X_L^2 - (\Sigma X_L)^2$$

$\bar{X}_H$ = The mean score on given statement of the high group

$\bar{X}_L$ = The mean score on given statement of the low group

ΣX_H^2 = Sum of squares of the individual score on a given statement for high group

ΣX_L^2 = Sum of squares of the individual score on a given statement for low group

ΣX_H = Summation of scores on given statement for high group

ΣX_L = Summation of scores on given statement for low group

n = Number of respondents in each group

Σ = Summation

3.3.1.3 Selection of attitude statements for final scale

After computing the 't' value for all the items, 27 statements(Appendix-IV) with highest 't' value equal to or greater than 1.75 were finally selected and included in the attitude scale.

3.3.1.4 Reliability

3.3.1.4.1 Test-retest method

The final set of the 27 statements, which represent the attitude of farmers towards ANGRAU production technologies, was administered on five-point continuum to a fresh group of 60 farmers, which were not included in the actual sample. After a period of 15 days the scale was again administered to the same respondents and thus two sets of scores were obtained. The correlation coefficient for the both the sets were worked out. The 'r' value (0.7965) was significant at 0.01 level of probability indicating the attitude scale was highly suitable for administration to the farmers as the scale was stable and dependable in its measurement.

3.3.1.5 Validity of the scale

3.3.1.5.1 Content validation

The content validity of the scale was tested. The content validity is the representative or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument (Kerlinger 1983). This method was used in the present scale to determine the content validity of the scale. As the content of the attitude was thoroughly covered the entire universe of selected ANGRAU technologies through literature and expert opinion, it was assumed that present scale satisfied the content validity. As the scale value difference for almost all the statements included had a very high discriminating value, it seemed reasonable to accept the scale as a valid measure of the attitude.

3.3.1.6 Administration of the scale

Selected statements were categorized crop wise *i.e.,* 23 statements (12 positive and 11 negative) for rice crop, 23 (13 positive and 10 negative) statements for groundnut and 21 (13 positive and 8 negative) statements for chillies. The final attitude scale constructed by following all required norms and administered to the respondents to study their attitude towards ANGRAU production technologies.

These selected statements were translated into Telugu and administered to the selected farmers for studying the attitude. Each statement was read out to the respondents by the investigator and the response to each statement in terms of their own degree of agreement or disagreement was noted down in the proper column with a (v) mark.

3.3.1.7 Scoring technique

Each item of scale was provided with five point continuum *i.e.,* strongly agree, agree, undecided, disagree, strongly disagree with scores of 5,4,3,2 and 1 respectively for positive statements and 1,2,3,4 and 5 respectively for negative statements. The total score of the respondents on the scale was obtained by adding the score of all the items in the scale.

3.3.7.1 Categorisation of the respondents based on their attitude scores

The respondents were grouped into the following three categories based on the scores obtained by each of them duly following the usual procedure of mean and standard deviation.

Score	**Category**
Less favourable attitude	Below (Mean - SD)
Favourable attitude	Between (Mean + SD)
More favourable attitude	Above (Mean + SD)

3.3.2 Adoption quotient

Adoption is the acceptance and application by a respondent of some or all the recommended practices of rice, groundnut and chillies. All the practices included in a package were considered important. A range of adoption was provided for these practices facilitating adjustment based on local conditions.

Adoption quotient of recommended ANGRAU technologies by the respondent was measured by using a structured schedule developed separately for rice, groundnut and chilli farmers, after thorough consultation with scientists of rice, groundnut and chillies, Director of Research and Extension Personnel.

$$\text{Adoption quotient} = \frac{\text{Number of practices adopted}}{\text{Total number of practices recommended}} \times 100$$

3.3.3 Productivity

In the present study, the changes in yield levels (kg/ha) as a result of adoption of the recommend ANGRAU technologies is measured taking in to consideration, the difference of yield levels before and after adoption of the recommend ANGRAU technologies. A score of one is assigned to each kilogram of the yield.

3.3.4 Profitability

Profitability was operationally defined as net profit obtained by the respondent from a unit area of rice or groundnut or chilli crop.

In the present study, the changes in the profit (Rs/ha), as a result of adoption of recommended ANGRAU technologies, is measured taking into consideration the difference in profit before and after adoption of recommended technologies.

3.3.5 Improvement in livelihoods

Livelihood is operationally defined as the means and ways of living to meet the basic minimum necessaries of the individual farmers as well as the family.

3.3.5.1 Human capital

Human capital is operationally defined as the good health facilities, nutritional status and access to education, which are important for the successful pursuit of different livelihood options.

Five point continuum was used to measure the extent of improvement of the human capital after adoption of the recommended technologies. The scoring pattern is as follows.

S.No.	Category	Score
1.	LEE (Least Extent)	1
2.	LE (Less Extent)	2
3.	SE (Some Extent)	3
4.	GE (Great Extent)	4
5.	VGE (Very Great Extent)	5

3.3.5.2 Physical capital

Physical capital is operationally defined as the 'infrastructure facilities' like affordable transport facilities, type of house where respondent is living, adequate water supply and sanitation, affordable source of energy for domestic purposes and agricultural implements possessed by the respondent.

Taking into consideration, the difference of physical capital possessed by the respondent before and after adoption of recommended technologies, the scoring pattern followed was as follows.

3.3.5.2.1 Type of house

S.No.	Category	Score
1.	Katcha	1
2.	Pucca	2

3.3.5.2.2 Source of drinking water

S.No.	Category	Score
1.	Tank	1
2.	Dug well	2
3.	Tap water	3

3.3.5.2.3 Source of energy for domestic purpose

S.No.	Category	Score
1.	Fire wood	1
2.	Kerosene	2
3.	LP gas	3

3.3.5.2.4. Transport facility

S.No.	Category	Score
1.	Bullock cart	1
2.	Public transport	2
3.	Own vehicle	3

3.3.5.2.5 Agricultural implements and machinery

Score one is allotted for each agricultural implement and two for machinery.

3.3.5.3 Natural capital

Natural capital is operationalised as the natural resource base available such as type of land, type of cultivation, cropping system and livestock composition for income generation, profit maximization and enhancing the livelihood capabilities.

In the present study the change in natural capital as a result of adoption of recommended technologies was assessed by taking into consideration, the difference before and after the adoption of the recommended ANGRAU technologies. The score was assigned as follows:

3.3.5.3.1 Land

S.No.	Category	Score
1.	Dry land	1
2.	Wet land	2

3.3.5.3.2 Type of cultivation

S.No.	Category	Score
1.	Rainfed	1
2.	Irrigated	2

3.3.5.3.3 Cropping system

S.No.	Category	Score
1.	Mono cropping	1
2.	Double cropping	2
3.	Multiple cropping	3

3.3.5.3.4 Livestock

S.No.	Category	Score
1.	Poultry	1
2.	Draught animal	2
3.	Milch animal	3

3.3.5.4 Social capital

Social capital is defined as the respondent's socio-political participation for improving their livelihood.

In the present study the change in social capital as a result of adoption of recommended technologies was assessed by taking into consideration the difference of social capital possessed by the respondent before and after adoption of recommended technologies, the scoring pattern followed was as follows.

S.No.	Category	Score
1.	Without any position in socio political organization	0
2.	Official position in one or more formal organizationss	1
3.	Official position in SHGs or poverty alleviation programmes	2
4.	Active office bearer	3
5.	Financial contribution or raising funds for community work	4

3.3.5.5. Financial capital

Financial capital is operationalised as the capital base cash, credit/debit, savings and other economic assets, which are essential for the pursuit of any livelihood strategy.

In the present study the changes in savings (Rs/ha) as a result of adoption of recommended ANGRAU technologies was assessed, taking into consideration the difference in savings before and after adoption of recommended ANGRAU technologies.

3.4 Devices and methods used for collection of data

3.4.1 Interview schedule

With reference to the objectives formulated for the study, a comprehensive interview schedule covering all the aspects of the farming and the farmhouse holds was prepared. Before finalizing the items that go into the schedule for collecting relevant data on selected variables, extensive review of work in the related fields was carried out along with discussion with experts and advisory committee keeping in view the various aspects of the problems under study. Draft schedule is prepared and given to the judges comprising extension scientists, with a request to suggest the ways of further improving it. Only the most relevant, unambiguous and practical questions were included in the schedule duly avoiding irrelevant items. The improved schedule was divided into two parts. Part A contained variables related to the farmers. Part B includes production constraints faced by the farmers in adoption of recommended ANGRAU technologies. The investigator had to translate the content of the schedule into the local language (Telugu) so as to make the respondents understand the questions properly and furnish reliable responses. Mechanics of the interview schedule construction were studied before the actual preparation of the schedule.

3.4.2 Pre-testing of schedule

Pre-testing was carried out with 8 per cent of the total sample, who were outside the main sample. In light of the experience gained in the pre-testing, suitable modifications were carried out before finalising the instrument. The finalised interview schedule is appended in Appendix-II.

3.4.3 Establishing the rapport

Prior to data collection, sufficient rapport with respondents was the pivotal step in research study. First few days were devoted to get acquainted with farmers. The respondents were convinced about the purpose of the study, later the investigator made informal and friendly visit to them. All these methods were extremely useful and hopeful in getting the desired cooperation in addition to valid and authentic information.

3.4.5 Farmer's constraints and suggestions

This was measured by asking the farmers to list out the important constraints they face in adoption of recommended technologies and their suggestion to overcome them. For each problem indicated by the respondent one score was given. Respondents were tabulated based on frequency and per centage.

3.4.6 Problems faced by the researchers in technology generation and their suggestions

This was measured by asking the research scientists, the problems they faced in the generation of the selected technologies and suggestions to overcome the above problems. For each problem indicated by the respondent one score was given. Respondents were tabulated based on frequency and percentage.

3.4.7 Problems faced by the extension persons in technology dissemination and their suggestions

Problems faced by the extension persons in technology dissemination and their suggestions to overcome the problems, were collected from the DAATTC scientists of Krishna, Anatapur and Warangal districts and tabulated based on frequency and percentage.

3.4.8 Preparation of the report

After analysis of the data, secondary tables were prepared. The findings emerged out of the analysis as well as testing of hypothesis were suitably interpreted and necessary conclusions and interpretations were drawn accordingly.

3.5 Statistical tools used for analysis of the data

For the purpose of statistical analysis to fulfill the set of objectives, the following statistical tools were used.

3.5.1 Frequency and per centage

Frequency was used to know the distribution pattern of the respondents according to the objectives under study.

Per centage was used for standardisation of sample size by calculating the number of individuals that would be under the given category.

3.5.2 Arithmetic mean $(\overline{X})$

It is defined as, the sum of the value of the observations divided by the total number of observations (Rao, 1983).

It was used for categorisation on all components of study; symbolically it is represented as $(\overline{X})$

$$\text{Arithmetic mean } (\overline{X}) = \frac{\Sigma x_i}{n} = \frac{x_1 + x_2 + x_3 + \ldots\ldots x_n}{n}$$

Where, $\overline{X}$ = Arithmetic mean

x_i = Value of i^{th} item of x

$i = 1, 2, 3, \ldots\ldots n$

n = Total number of items

3.5.3 Standard Deviation (σ)

It is the positive square root of the arithmetic mean of the squared observations taken from arithmetic mean (Rao, 1983).

Symbolically it is represented as "σ"

$$\text{Standard Deviation } (\sigma) = \frac{1}{n}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]$$

Where Σx^2 = Sum of squares of observations

$(\Sigma x)^2$ = Square of sum of x values

n = Number of observations

CHAPTER IV

RESULTS

RESULTS

This chapter highlights the results of the analysis, which have been clearly discussed in the methodology chapter. The data collected during the investigation was scored, analyzed by using relevant statistical methods and interpreted.

The results of investigation were discussed under the following heads.

4.1 Impact of ANGRAU technologies on farmers of Krishna district

4.2 Impact of ANGRAU technologies on farmers of Warangal district

4.3 Impact of ANGRAU technologies on farmers of Anantapur district

4.4 Comparison of recommended technologies on farmers of Krishna, Warangal and Anantapur districts

4.5 Problems faced by the research scientists in technology generation and their suggestions to overcome them

4.6 Problems faced by the extension scientists in technology dissemination and their suggestions to overcome them

4.7 Production constraints faced by the farmers and their suggestions for adoption of recommended technologies

4.8 Strategy for effective technology generation, assessment, refinement and their dissemination

4.1 Impact of ANGRAU technologies on farmers of Krishna district

4.1.1 Rice farmers of Krishna district

4.1.1.1 Attitude

Table 2 indicates that majority of the respondents possessed (50.00%) favourable attitude and (41.67%) fell under less favourable attitude followed by more favourable attitude (8.33%) towards recommended technologies.

Table 2: Distribution of rice farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	10	41.67
2.	Favourable	12	50.00
3.	More favourable	2	8.33

4.1.1.2 Adoption

Results furnished in the Table 3 shows that majority of the farmers expressed (41.67%), medium level of adoption towards recommended technologies followed by high level of adoption (37.33%) and low level of adoption (25.00%).

Table 3: Distribution of rice farmers of Krishna district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	8	37.33
2.	Medium	10	41.67
3.	High	6	25.00

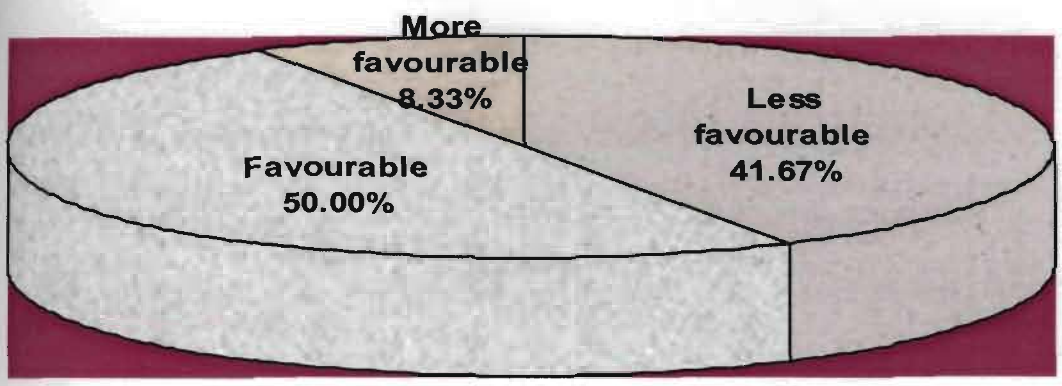


Fig.8. Distribution of rice farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

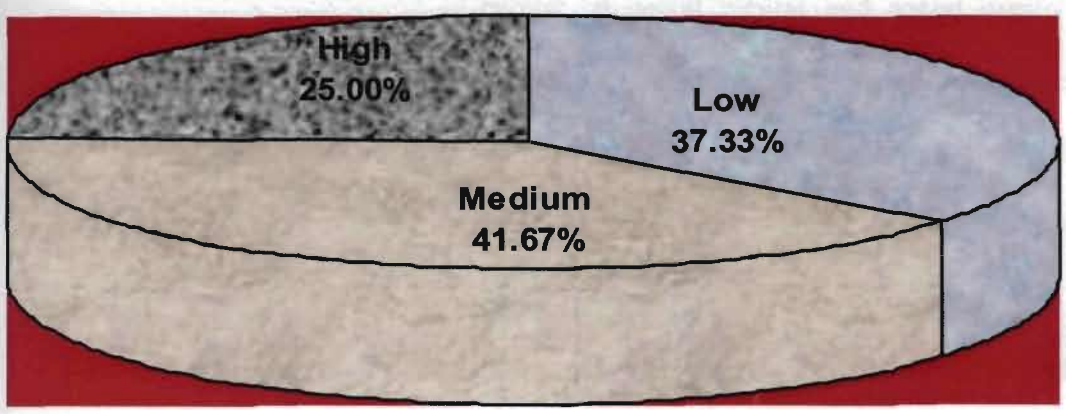


Fig.9. Distribution of rice farmers of Krishna district according to their level of adoption of recommended ANGRAU technologies

4.1.1.3 Testing of hypothesis

4.1.1.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Krishna district before and after the adoption and sample & population mean of human capital after the adoption of recommended technologies.

4.1.1.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Krishna district before and after the adoption and sample & population mean of human capital after the adoption of recommended technologies.

4.1.1.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.1.1.4.1 Productivity

A glance at Table 4a indicates the productivity of the respondents before and after adoption of recommended technologies. To find out the significant difference in the productivity, paired 't' test was conducted and the 't' calculated value was found to be 2.80842, which was significant at 0.01 level of probability.

4.1.1.4.2 Profitability

From the Table 4a, it is clearly evident that the adoption of recommended technologies resulted into increase in mean profitability among the respondents from

Table 4a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Krishna district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	2259.96	2578.47	318.51	14.09	2.80842**
II.	Profitability	13287.49	15906.25	2618.76	19.70	1.68712*
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.66	3.27	0.61	22.93	3.41090**
b.	Natural capital	3.82	2.68	-1.14	-29.84	3.44702**
c.	Financial capital	2379.17	3766.68	1387.51	58.31	2.71852**
d.	Social capital	0.75	1.54166	0.79	105.55	2.86415**

Table 4b: Difference in the sample mean and population mean of human capital of rice farmers of Krishna district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	17.125	14	3.125	22.32	2.71732**

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS-- Non-significant

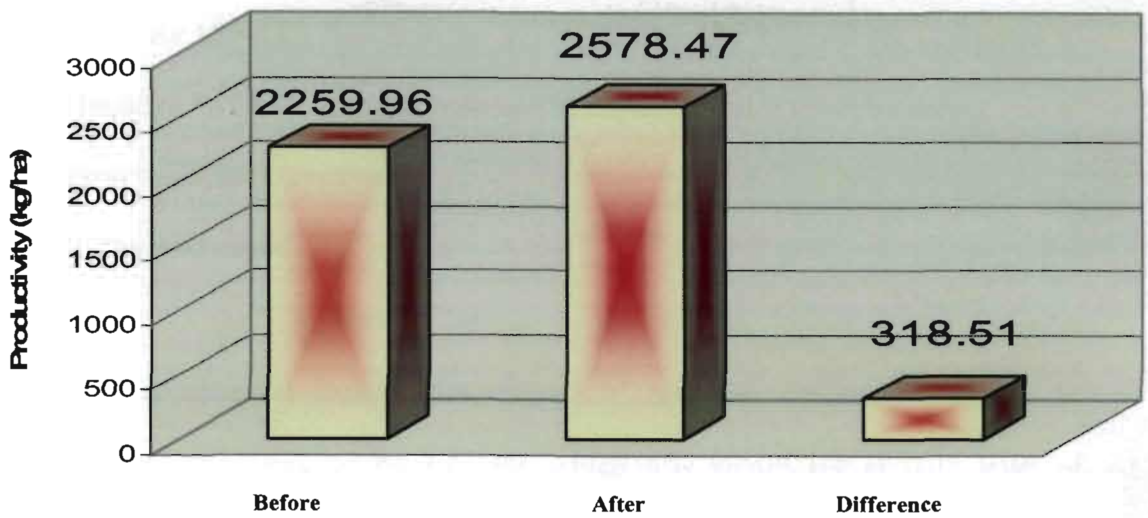


Fig.10. Differences in the mean productivity of rice farmers of Krishna district before and after the adoption of recommended technologies

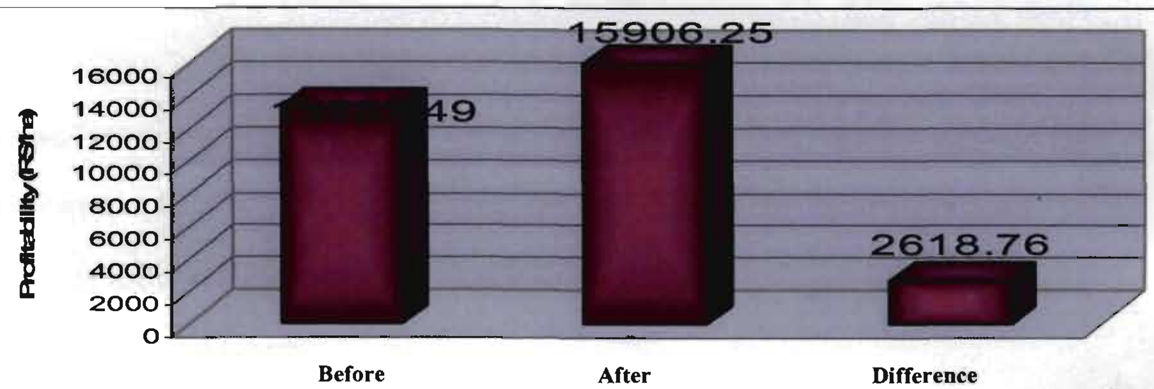


Fig.11. Differences in the mean profitability of rice farmers of Krishna district before and after the adoption of recommended technologies

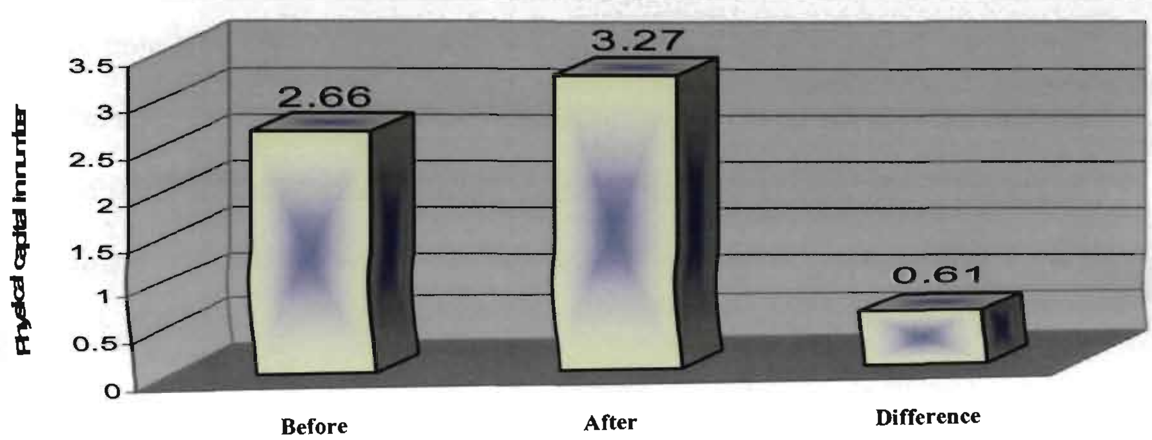


Fig.12. Difference in the mean physical capital of rice farmers of Krishna district before and after the adoption of recommended technologies

Rs 13287.49 to Rs 15906.25. The increase in profitability was Rs 2618.76. Computed 't' value was found to be 1.68712, which was significant at 0.05 level of probability.

4.1.1.4.3 Improvement in livelihoods

4.1.1.4.3.1 Physical capital

To find out the significant difference in the physical capital before and after adoption of recommended technologies, paired 't' test was conducted and the 't' calculated value was found to be 3.41090, which was significant at 0.01 level of probability.

4.1.1.4.3.2 Natural capital

A glance at Table 4a indicates the natural capital of the respondents before and after adoption of recommended technologies. To find out the significant difference in the natural capital, paired 't' test was conducted and the 't' calculated value was found to be 3.447027, which was significant at 0.01 level of probability.

4.1.1.4.3.3 Financial capital

From the above Table 4a, it was evident that the adoption of recommended ANGRAU technologies could also help to raise the average financial capital among respondents from Rs 2379.17 to Rs 3766.68 with the "t" calculated value of 2.718528. Hence, the average financial capital of the respondents rose by 58.31 per cent. To find out significant difference in the financial capital, paired 't' test was adopted and 't' calculated value was found to be 2.71852, which was significant at 0.01 level of probability.

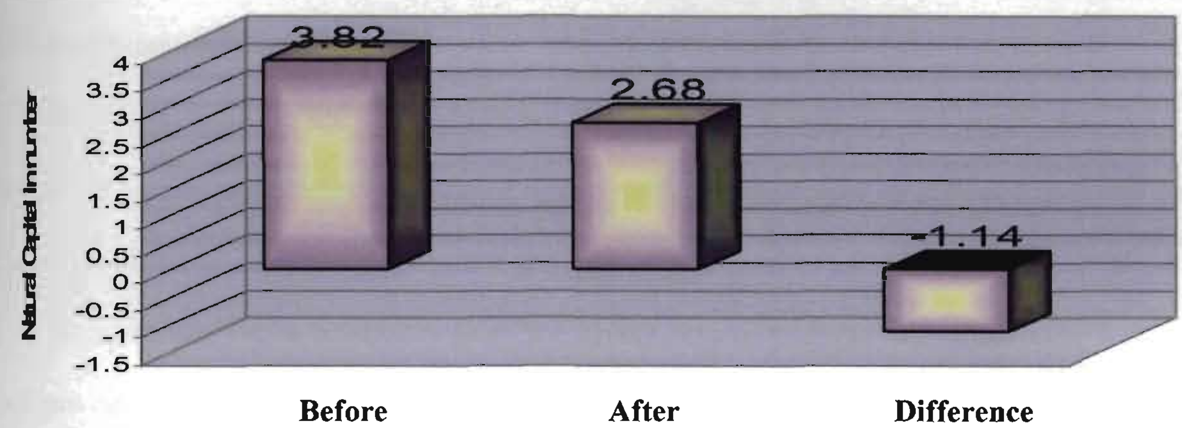


Fig.13. Difference in the mean natural capital of rice farmers of Krishna district before and after the adoption of recommended technologies

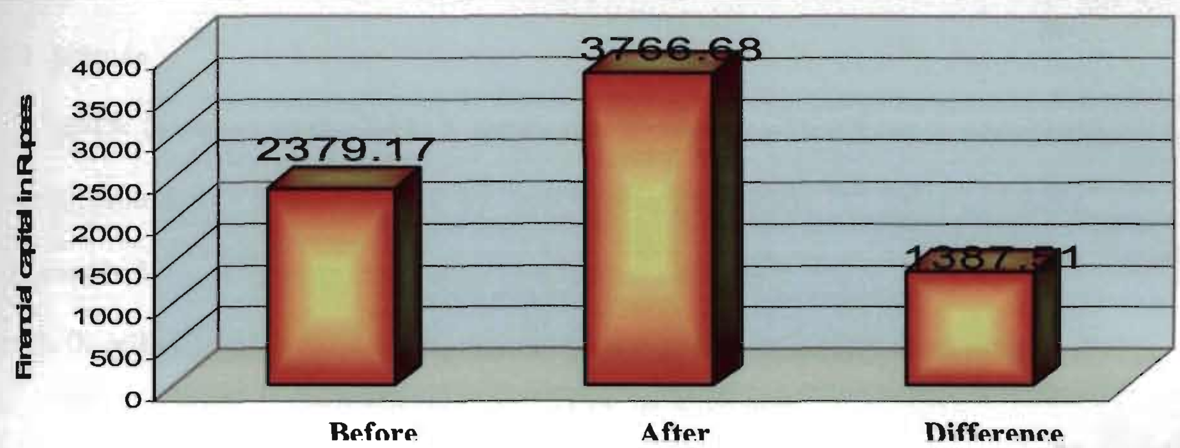


Fig.14. Difference in the mean financial capital of rice farmers of Krishna district before and after the adoption of recommended technologies

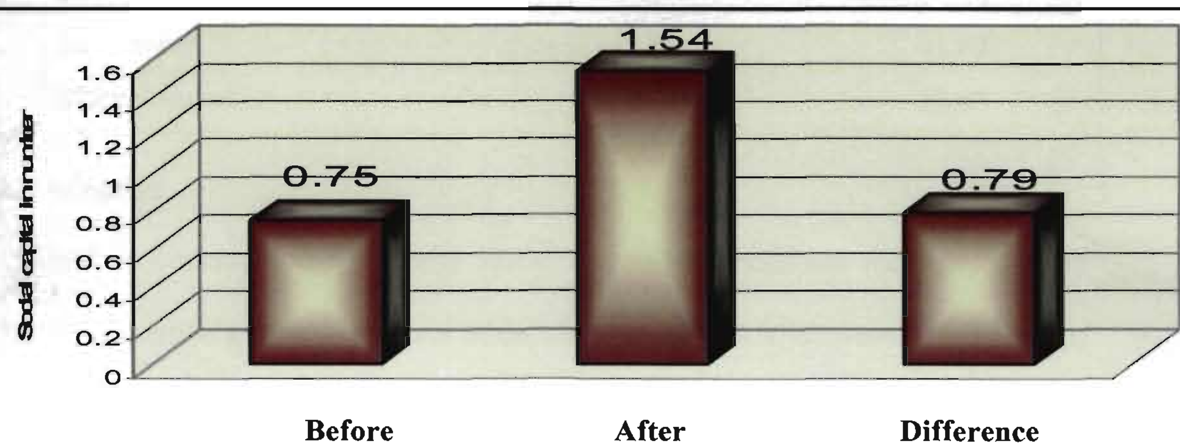


Fig.15. Difference in the mean social capital of rice farmers of Krishna district before and after the adoption of recommended technologies

4.1.1.4.3.5 Human capital

Results furnished in the Table 4b shows that there was a positive and significant difference in human capital after adoption of recommended technologies, as "t" calculated value was found to be 2.71732, which was significant at 0.01 level of probability.

An inference could be drawn from the above results that the 't' values were significant on all the impact indicators. Hence, null hypothesis was rejected and empirical hypothesis was accepted on all the impact indicators.

4.1.2 Groundnut farmers of Krishna district

4.1.2.1 Attitude

Results furnished in the Table 5 shows that a majority of the farmers possessed favourable attitude (41.67%) followed by less favourable attitude (37.50%) and more favourable (20.83%) attitude towards recommended technologies.

Table 5: Distribution of groundnut farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	9	37.50
2.	Favourable	10	41.67
3.	More favourable	5	20.83

4.1.2.2 Adoption

Table 6 concludes that majority of the respondents occupied medium category (37.50%) of adoption and same per cent of the respondents (37.50%) were of low level of

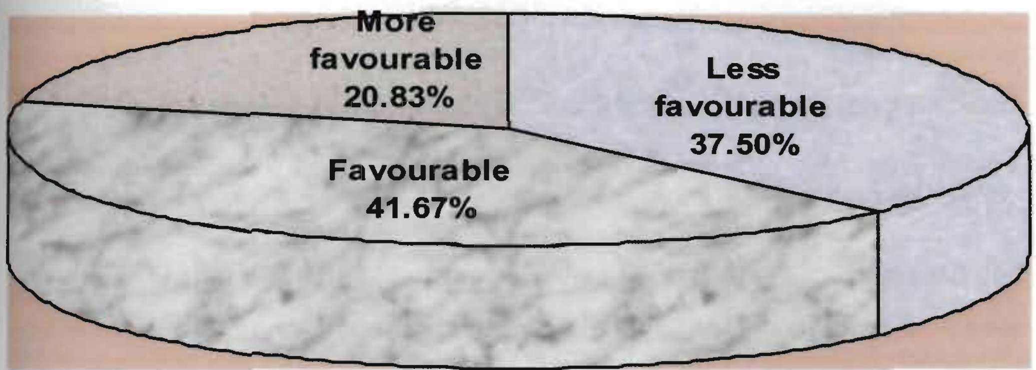


Fig.17. Distribution of groundnut farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

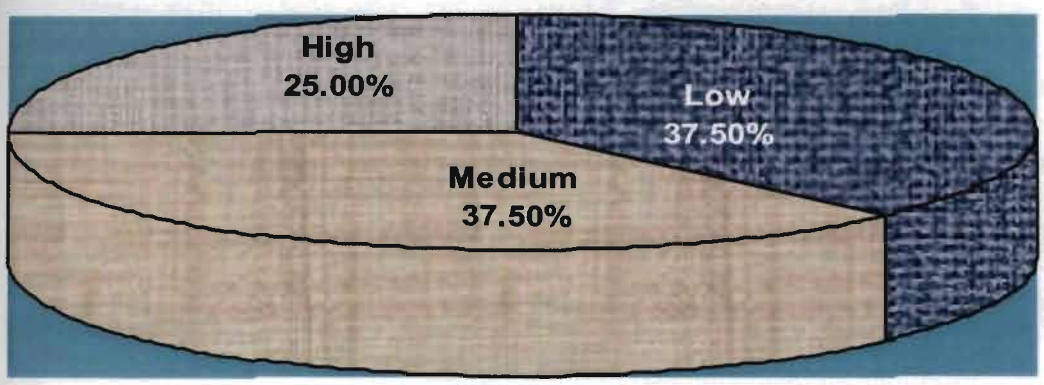


Fig.18. Distribution of groundnut farmers of Krishna district according to their level of adoption of recommended ANGRAU technologies

Table 7a: **Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Krishna district before and after the adoption of recommended technologies**

n=24

S. No.	**Impact indicators**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
I.	Productivity	1176.06	1234.44	58.38	4.96	2.134024*
II.	Profitability	10066.66	11175	1108.34	11.11	0.73259NS
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.48	2.78	0.3	12.09	1.853138*
b.	Natural capital	3.45	2.35	-1.1	-31.88	2.62975**
c.	Financial capital	1116.67	1579.17	462.5	41.42	1.01963NS
d.	Social capital	0.17	0.67	0.5	60.01	1.99518*

Table 7b: **Difference in the sample mean and population mean of human capital of groundnut farmers of Krishna district after the adoption of recommended technologies**

III. B.	**Improvement in livelihoods**	**Sample mean**	**Population mean**	**Mean difference**	**Per cent increase**	**'t' value**
e.	Human capital	16.58	14	2.58	18.45	3.98855**

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

Fig.18. Difference in the mean productivity of groundnut farmers of Krishna district before and after the adoption of recommended technologies

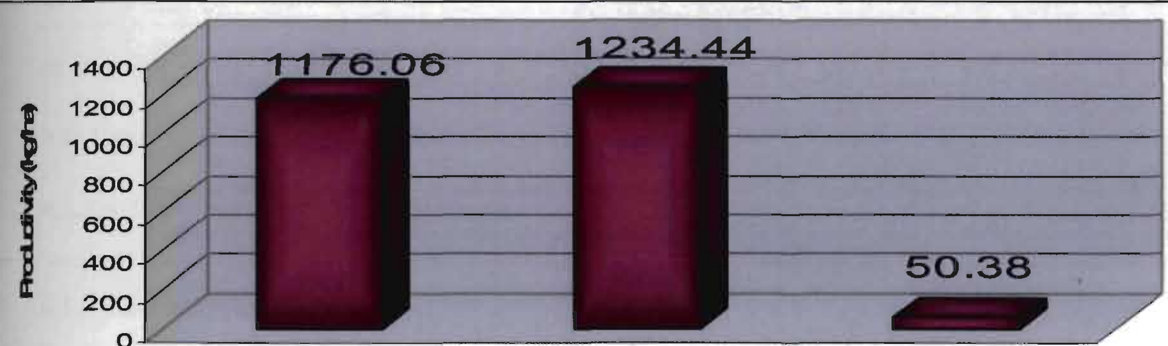


Fig.19. Difference in the mean profitability of groundnut farmers of Krishna district before and after the adoption of recommended technologies

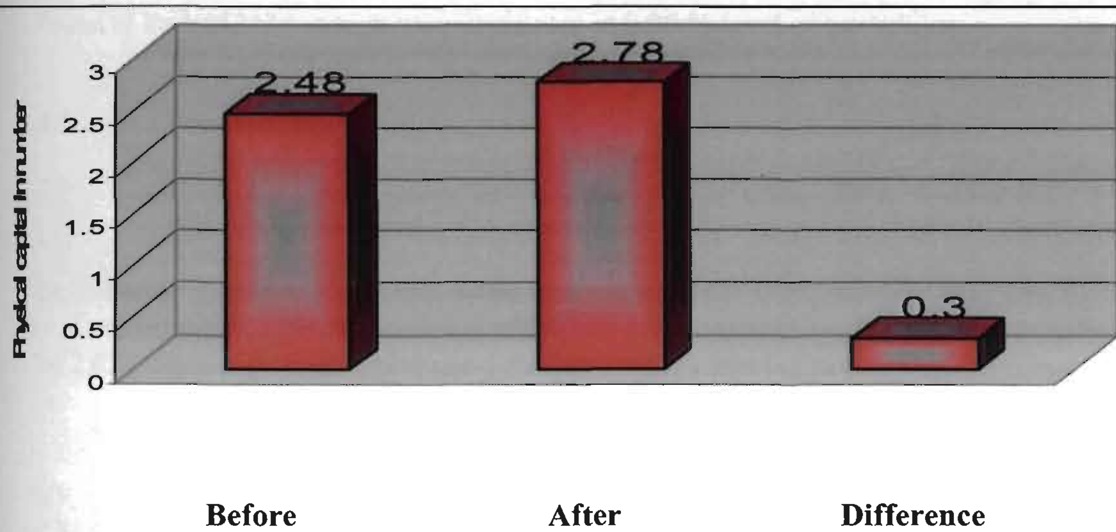


Fig.20. Difference in the mean physical capital of groundnut farmers of Krishna district before and after the adoption of recommended technologies

4.1.2.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.1.2.4.1 Productivity

Results furnished in the Table 7a shows that the significant increase in the productivity after adoption of recommended technologies, as "t" calculated value was found to be 2.134024, which was negatively significant at 0.01 level of probability.

4.1.2.4.2 Profitability

Table 7a depicts that there was a significant difference in the mean profitability before and after the adoption of recommended technologies. To find out the significance of increase in the profitability, paired "t" test was conducted and the 't" calculated value was found to be 0.73259, which was non significant.

4.1.2.4.3 Improvement in livelihoods

4.1.2.4.3.1 Physical capital

A close look at the Table 7a indicated that there was a significant difference in the physical capital of the respondents after adoption of recommended technologies. To find out the significant difference, paired "t" test was conducted and "t" calculated value was found to be 1.853138, which was significant at 0.05 % level of probability.

4.1.2.4.3.2 Natural capital

Results furnished in the Table 7a shows that the significant decrease in the natural capital after adoption of recommended technologies, as "t" calculated value was found to be 2.629756, which was negatively significant at 0.01 level of probability.

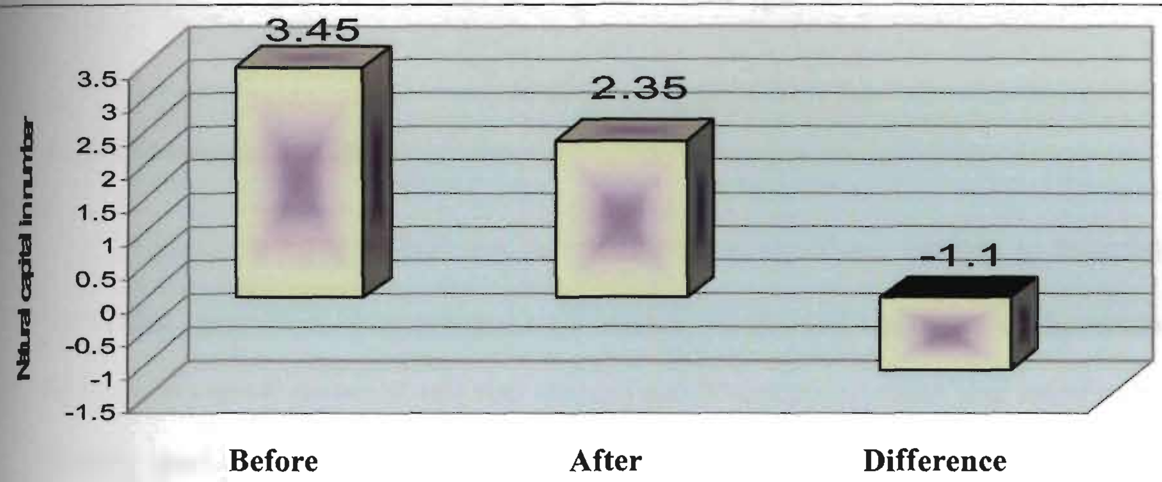


Fig.21. Difference in the mean natural capital of groundnut farmers of Krishna district before and after the adoption of recommended technologies

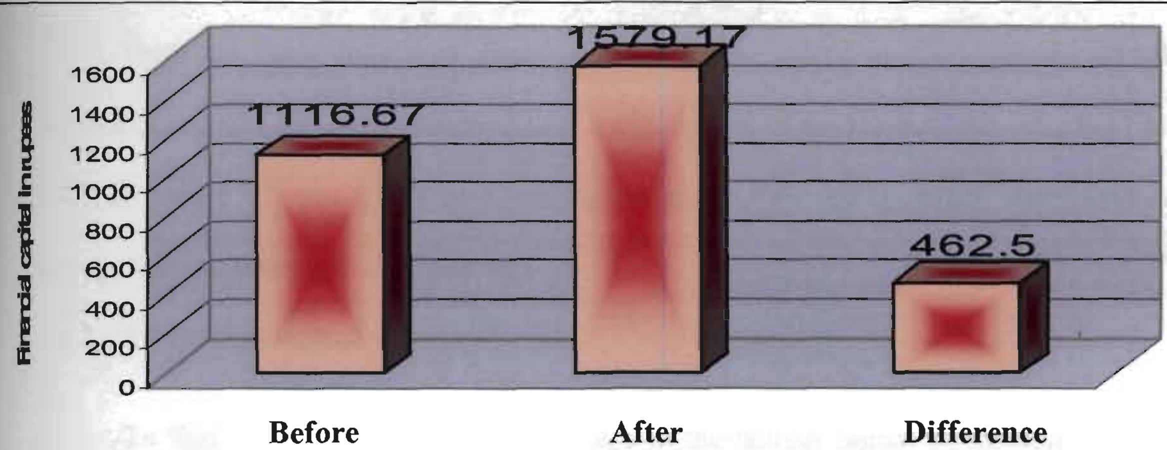


Fig.22. Difference in the mean financial capital of groundnut farmers of Krishna district before and after the adoption of recommended technologies

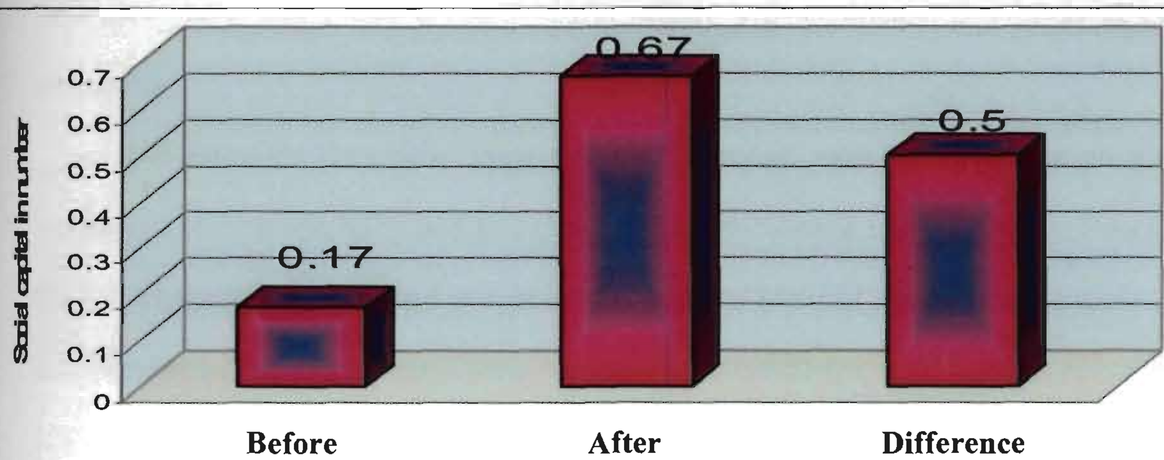


Fig.23. Difference in the mean social capital of groundnut farmers of Krishna district before and after the adoption of recommended technologies

4.1.2.4.3.3 Financial capital

A glance at Table 7a indicates that there was no significant increase in financial capital after adoption of recommended technologies. To find out significant difference in the financial capital, paired 't' test was adopted and 't' calculated value was found to be 1.01963, which was non-significant.

4.1.2.4.3.4 Social capital

From the Table 7a, it was clearly evident that the adoption of the recommended technologies could also help to increase the social capital of the respondents from 0.17 to 0.27. Computed 't' value of social capital was found to be 1.99518, which was found to be significant at 0.05 level of probability.

4.1.2.4.3.5 Human capital

To find out the significance of increase in the human capital of the respondents after adoption of the recommended technologies, "t" test was conducted and the "t" calculated value was found to be 3.98855, which was significant at 0.01 level of probability.

The above results clearly show that the "t" values were significant on all the indicators except profitability and financial capital, which were non-significant. Hence, the null hypothesis was rejected in case of productivity, physical capital, natural capital, social capital and human capital.

4.1.3 Chilli farmers of Krishna district

4.1.3.1 Attitude

Table 8 indicates that majority of respondents (45.84%) had favourable attitude towards recommended ANGRAU technologies. About (37.50%) of the respondents had less favourable attitude and (16.66%) of the respondents had more favourable attitude.

Table 8: Distribution of chilli farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	9	37.50
2.	Favourable	11	45.84
3.	More favourable	4	16.66

4.1.3.2 Adoption

It could be concluded from Table 9 that a majority of farmers fall under medium (41.67 %) level of adoption and same per cent of the respondents were low (41.67 %) level of adoption and 16.66 per cent of the farmers fall under high level of adoption of recommended chilli technologies.

Table 9: Distribution of chilli farmers of Krishna district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	10	41.67
2.	Medium	10	41.67
3.	High	4	16.66

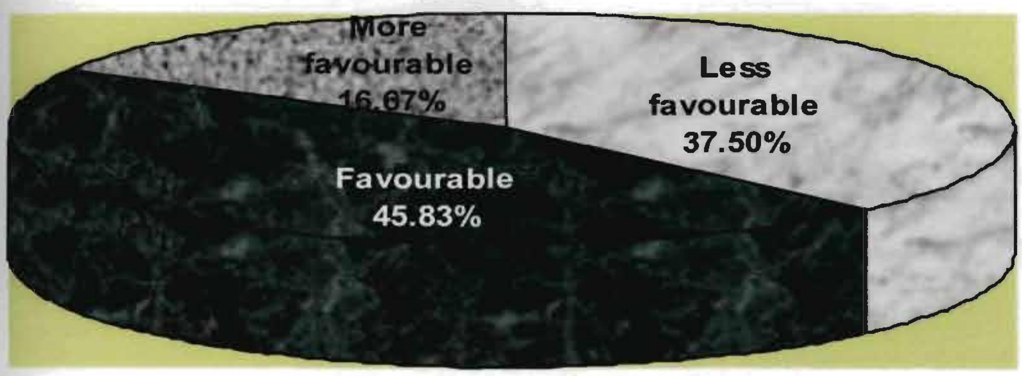


Fig.24. Distribution of chilli farmers of Krishna district according to their attitude towards recommended ANGRAU technologies

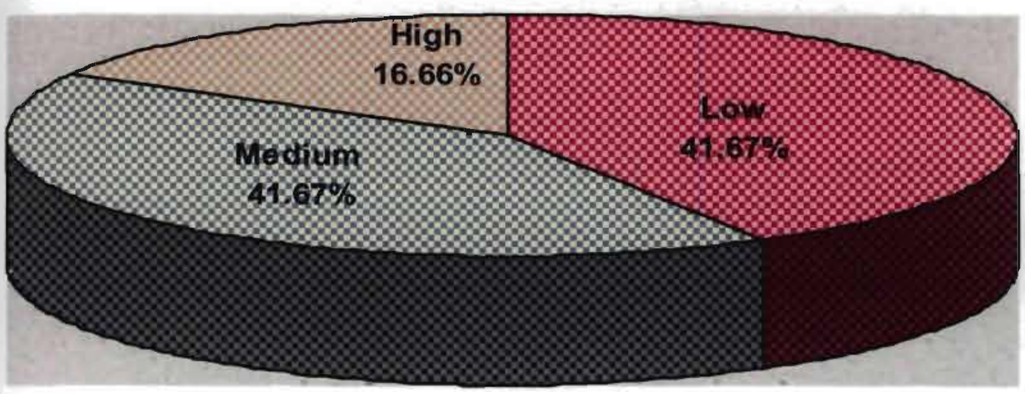


Fig.25. Distribution of chilli farmers of Krishna district according to their level of adoption of recommended ANGRAU technologies

4.1.3.3 Testing of hypothesis

4.1.3.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Krishna district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.1.3.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital in chilli farmers of Krishna district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.1.3.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.1.3.4.1 Productivity

Table 10a indicates the productivity of the chilli crop before and after adoption of recommended technologies. To find out the significant difference in the productivity, paired ‘t’ test was used and the ‘t’ calculated value was found to be 2.042819, which was significant at 0.05 level of probability.

4.1.3.4.2 Profitability

Table 10a reveals that there was a significant difference in the profitability of the respondents before and after adoption of recommended technologies. To find out the significant difference in the profitability of the respondents, paired ‘t’ test was conducted

Table 10a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Krishna district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	2132.5	2391.46	258.96	12.14	2.042819*
II.	Profitability	56250	67566.68	11316.68	20.12	2.12145**
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.74	3.27	0.53	19.34	2.73017**
b.	Natural capital	3.42	2.17	-1.25	-36.55	3.98577**
c.	Financial capital	6750	8500	1750	25.92	0.88631NS
d.	Social capital	0.79	1.29	0.5	63.29	1.33945NS

Table 10b: Difference in the sample mean and population mean of human capital of chilli farmers of Krishna district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	16.41	14	2.41	17.26	2.716662**

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

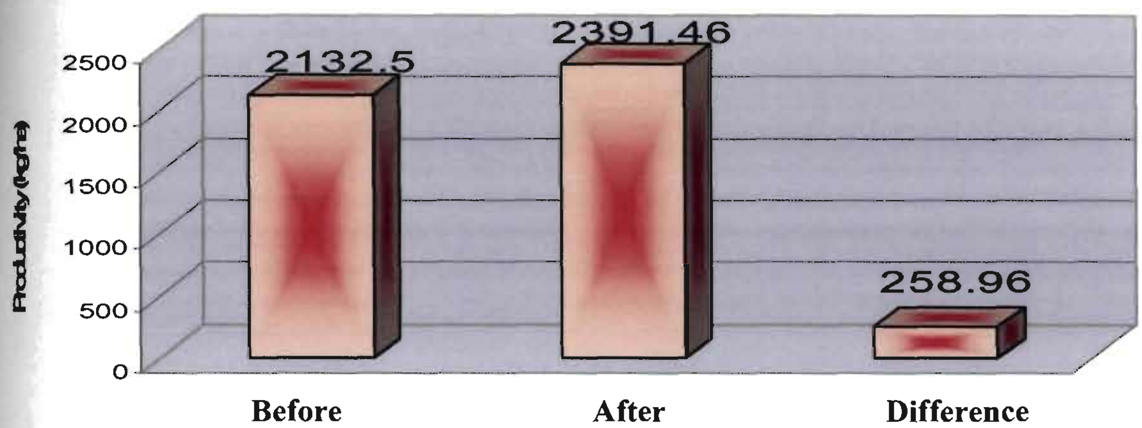


Fig.26. Difference in the mean productivity of chilli farmers of Krishna district before and after the adoption of recommended technologies

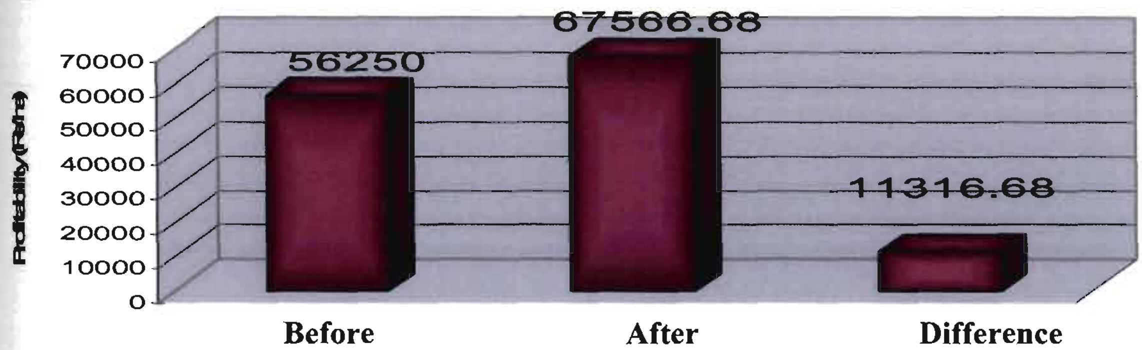


Fig.27. Difference in the mean profitability of chilli farmers of Krishna district before and after the adoption of recommended technologies

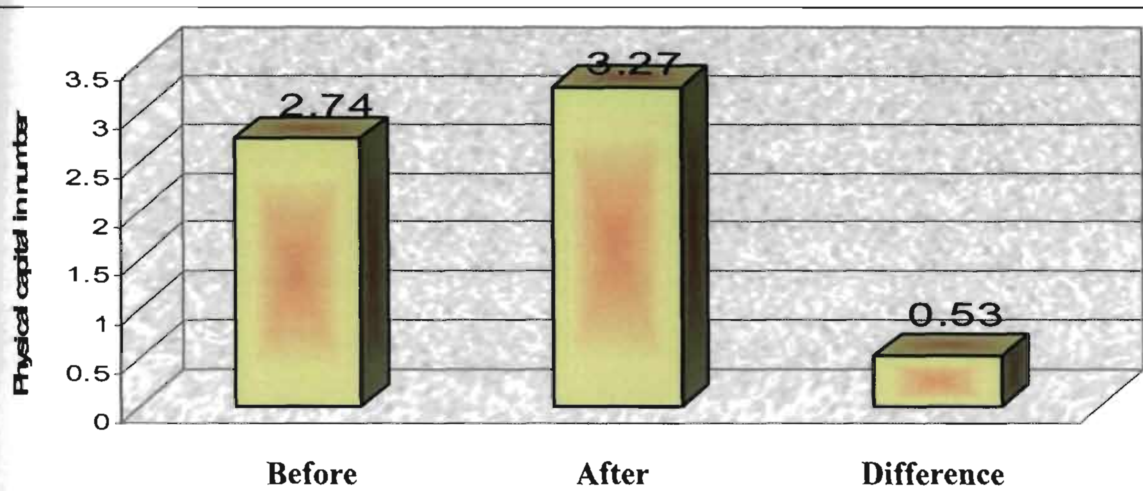


Fig.28. Difference in the mean physical capital of chilli farmers of Krishna district before and after the adoption of recommended technologies

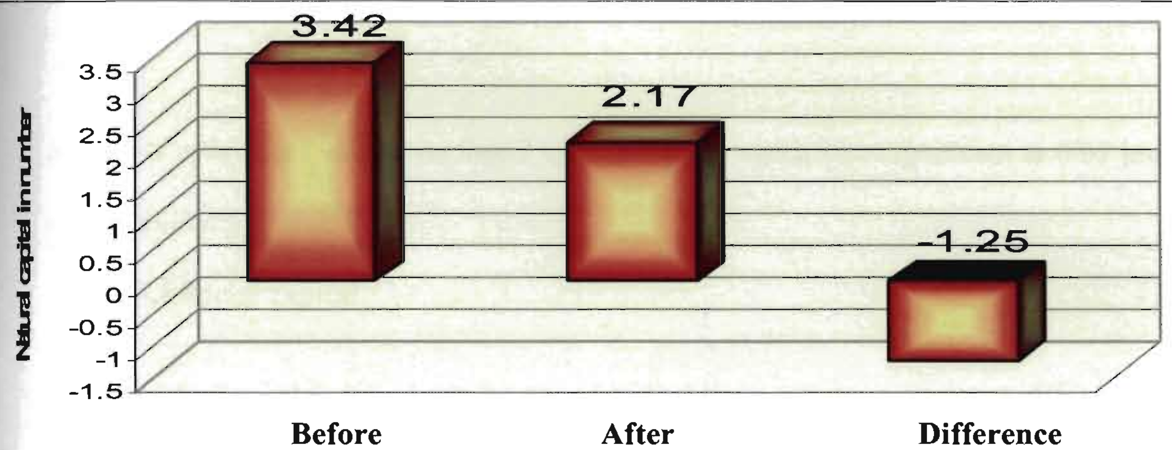


Fig.29. Difference in the mean natural capital of chilli farmers of Krishna district before and after the adoption of recommended technologies

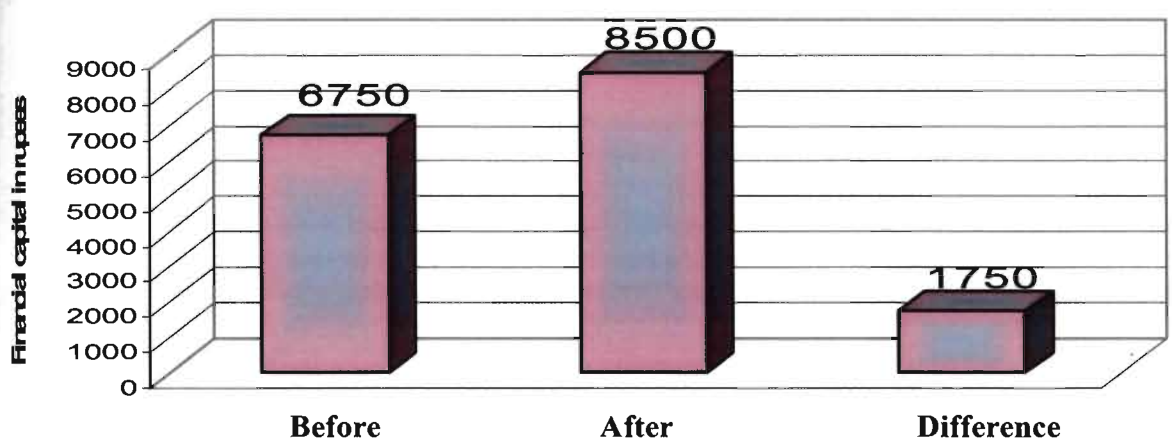


Fig.30. Difference in the mean financial capital of chilli farmers of Krishna district before and after the adoption of recommended technologies

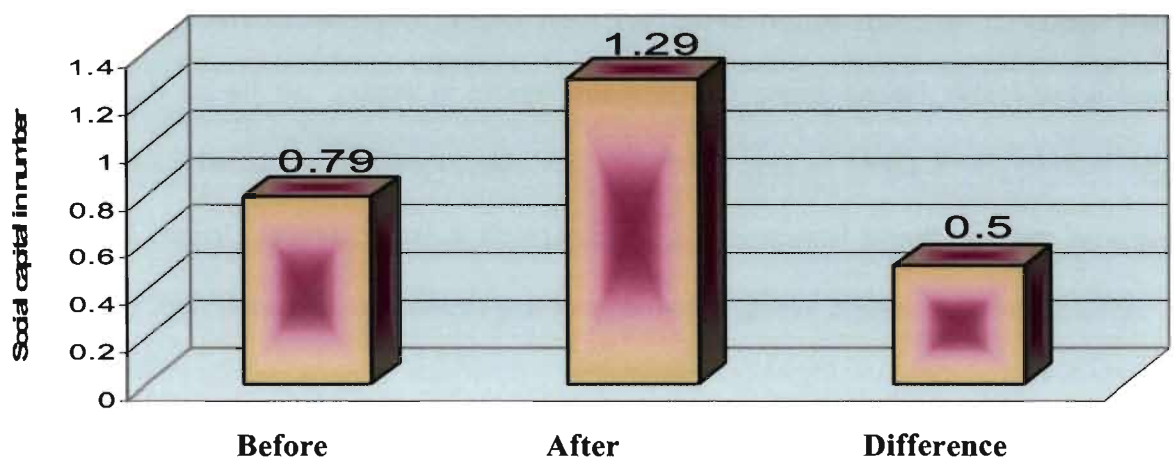


Fig.31. Difference in the mean social capital of chilli farmers of Krishna district before and after the adoption of recommended technologies

and the 't' calculated value was found to be 2.12145, which was significant at 0.05 level of probability.

4.1.3.4.3.4 Social capital

From the Table 10a, it can be observed that there was no significant difference in the social capital of the respondents before and after adoption of recommended technologies. To find out the significant difference in the productivity, 't' test was conducted and 't' calculated value was found to be 1.3394, which was non-significant.

4.1.3.4.3.5 Human capital

From the Table 10b, it was observed that there was significant difference in the human capital of the chilli growers before and after adoption of recommended technologies. To find out the significant difference in the productivity, 't' test was conducted and 't' calculated value was found to be 2.716662, which was significant at 0.01 level of probability.

An inference could be drawn from the above results that the 't' values were significant on all the indicators except financial and social capital, which were non-significant. Hence, the null hypothesis was rejected in case of productivity, profitability, physical capital, natural capital & human capital and empirical hypothesis was accepted for these indicators. Null hypothesis was accepted on financial capital and social capital.

4.2 Impact of ANGRAU technologies on farmers of Warangal district

4.2.1 Rice farmers of Warangal district

4.2.1.1 Attitude

The Table 11 clearly exemplifies that a majority of the respondents possessed favourable attitude (41.67%), followed by less favourable (37.50%) and more (20.83%) favourable attitude towards recommended ANGRAU technologies.

Table 11: Distribution of rice farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	9	37.50
2.	Favourable	10	41.67
3.	More favourable	5	20.83

4.2.1.2 Adoption

The results from the Table 12 reveals that a majority of the respondents fell under medium (50.00%) followed by low (41.67%) level of adoption of recommended technologies, whereas, 8.33 per cent of the respondents possessed high level of adoption of recommended ANGRAU technologies.

Table 12: *Distribution of rice farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies*

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	10	41.67
2.	Medium	12	50.00
3.	High	2	8.33

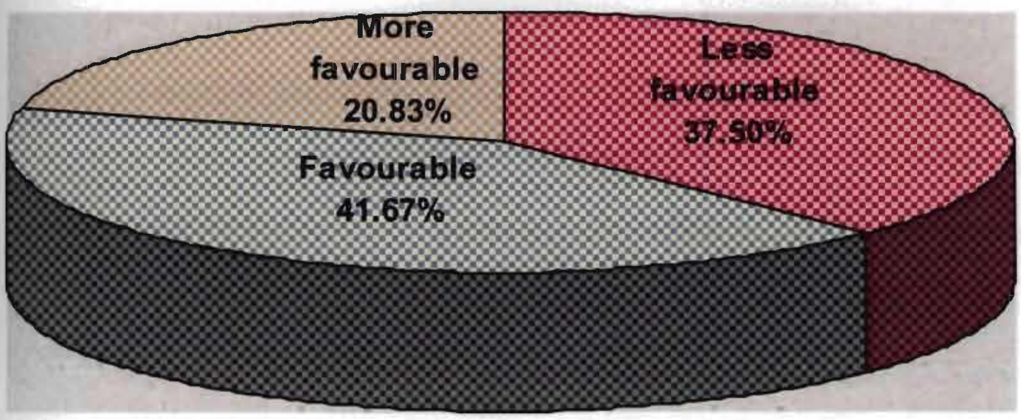


Fig.32. Distribution of rice farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

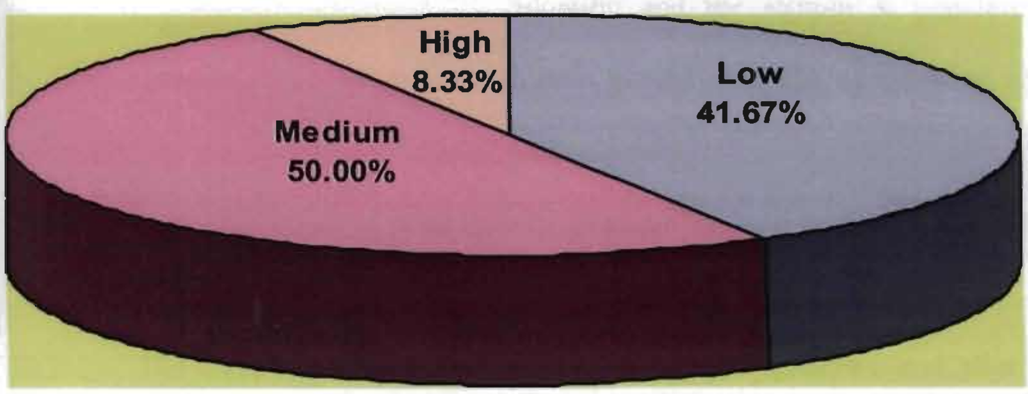


Fig.33. Distribution of rice farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies

4.2.1.3 Testing of hypothesis

4.2.1.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Warangal district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.2.1.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Warangal district before and after the adoption and the sample & population mean of human capital after the adoption of recommended technologies.

4.2.1.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.2.1.4.1 Productivity

The comparison of productivity of the rice crop before and after adoption of recommended technologies from the Table 13a shows that the adoption of recommended technologies led to 10.58 per cent increase in productivity of the rice crop. To find out the significant increase in the productivity, a paired 't' test was applied and the 't' calculated value was found to be 2.147834, which was significant at five per cent level of probability.

Table 13a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Warangal district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	2283.33	2525	241.67	10.58	2.147834*
II.	Profitability	8418.75	10587.5	2168.75	25.76	2.00109*
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.48	2.91	0.43	17.34	3.15893**
b.	Natural capital	3.63	2.18	-1.45	-39.94	5.13295**
c.	Financial capital	1966.67	2404.18	437.51	22.25	1.14819NS
d.	Social capital	1.41	1.411	0.01	0.07	0.001NS

Table 13b: Difference in the sample mean and population mean of human capital of rice farmers of Warangal district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	15.41	13	2.41	18.589	3.456**

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

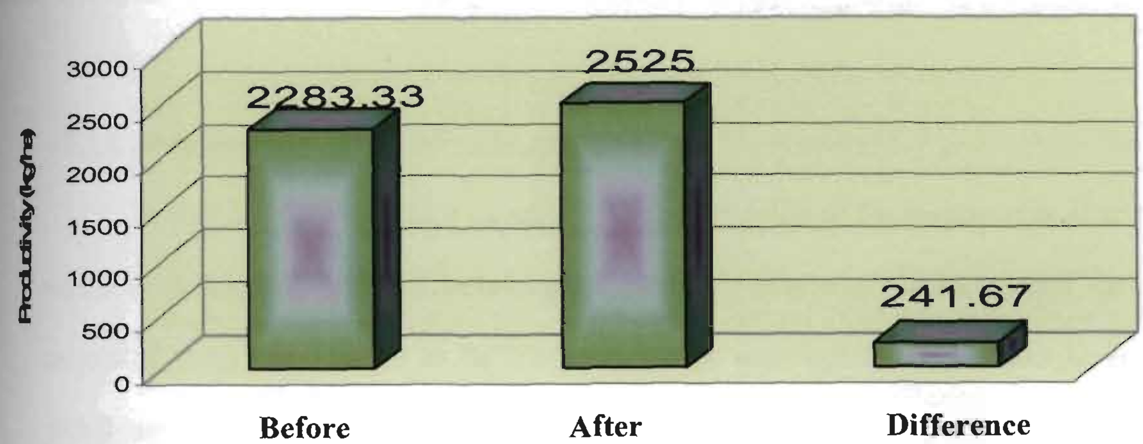


Fig.34. Difference in the mean productivity of rice farmers of Warangal district before and after the adoption of recommended technologies

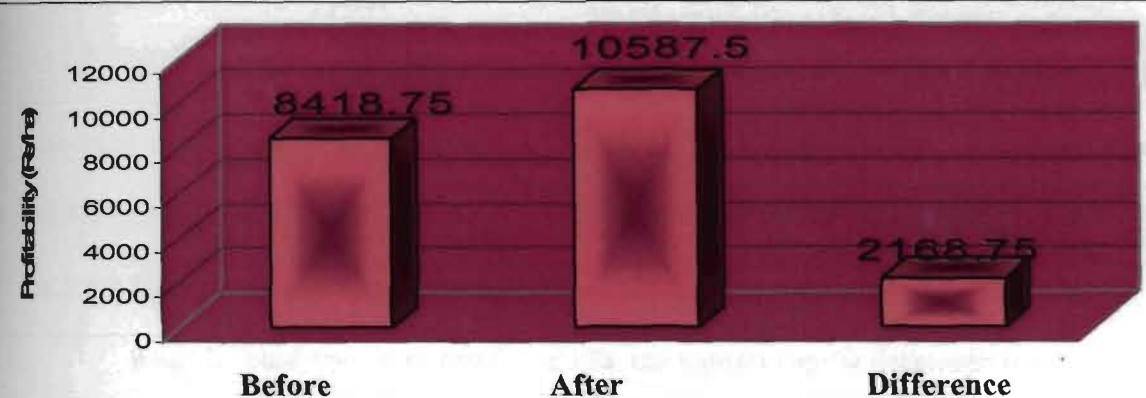


Fig.35. Difference in the mean profitability of rice farmers of Warangal district before and after the adoption of recommended technologies

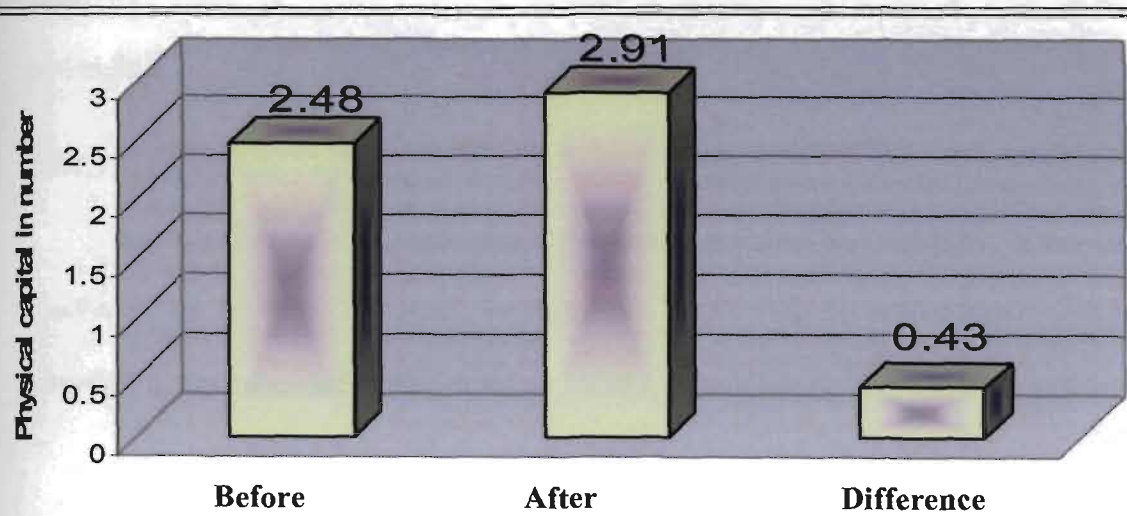


Fig.36. Difference in the mean physical capital of rice farmers of Warangal district before and after the adoption of recommended technologies

4.2.1.4.2 Profitability

To find out the significant increase in the profitability of the respondents after the adoption of the recommended technologies, paired 't' test was conducted and the 't' calculated value was found to be 2.00109, which was significant at 0.05 level of probability.

4.2.1.4.3 Improvement in livelihoods

4.2.1.4.3.1 Physical capital

It is seen from the Table 13a that the 't' calculated (3.158932) value of the physical capital was significant at 0.01 level of probability, thus showing significant difference in physical capital before and after adoption of recommended technologies.

4.2.1.4.3.2 Natural capital

It can be observed from the Table 13a, the natural capital decreased tremendously among the respondents after adoption of recommended technologies. The 't' calculated value was found to be 5.13295, which was negatively significant at 0.01 level of probability.

4.2.1.3.3.3 Financial capital

As indicated in the Table 13a, 't' calculated value was 1.14819. It could be concluded that there was no significant difference in the financial capital before and after adoption of recommended technologies.

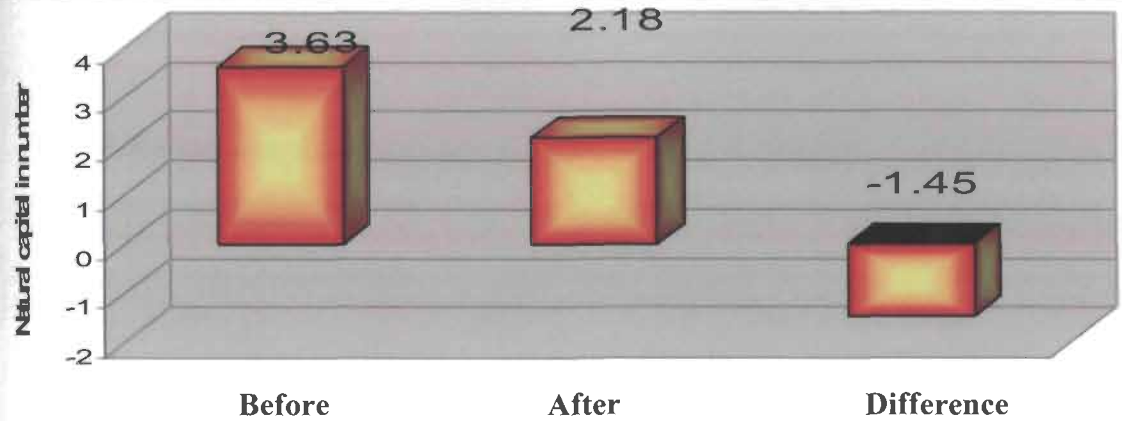


Fig.37. Difference in the mean natural capital of rice farmers of Warangal district before and after the adoption of recommended technologies

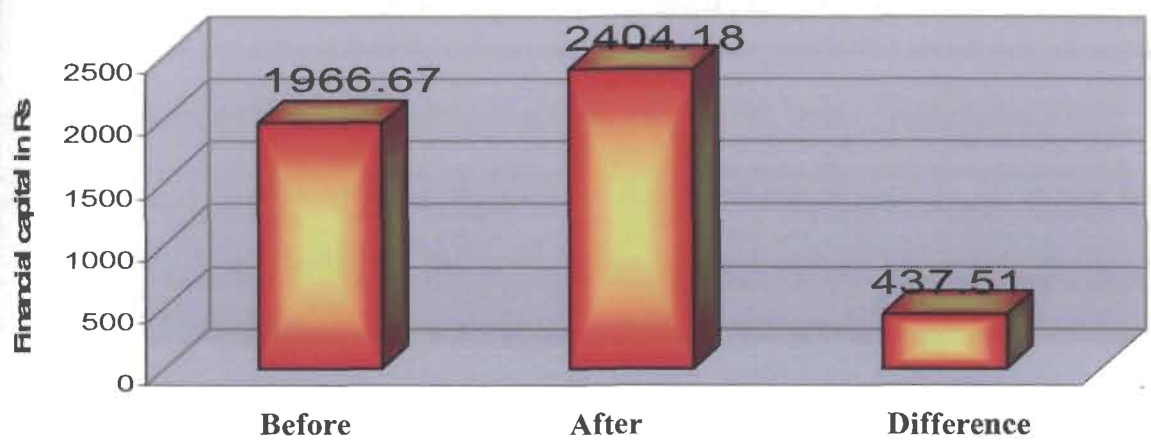


Fig.38. Difference in the mean financial capital of rice farmers of Warangal district before and after the adoption of recommended technologies

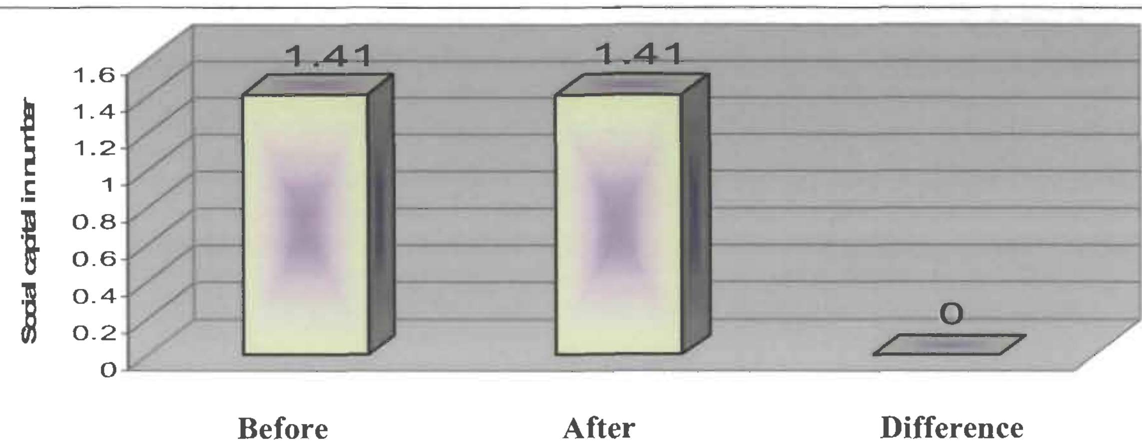


Fig.39. Difference in the mean social capital of rice farmers of Warangal district before and after the adoption of recommended technologies

4.2.1.4.3.4 Social capital

Results furnished in the Table 13a shows that there was no significance difference in social capital before and after adoption of recommended technologies, as 't' calculated value was found to be 0.001, which was non-significant.

4.2.1.4.3.5 Human capital

To find out the significant increase in the human capital of the respondents after adoption of the recommended technologies, 't' test was conducted and the 't' calculated value was found to be 3.456, which was significant at 0.01 level of probability.

An inference could be drawn from the above results that the 't' values were significant on all the impact indicators except financial and social capital, which were non-significant. Hence, the null hypothesis was rejected in case of productivity, profitability, physical capital, natural capital and human capital and empirical hypothesis was accepted for these indicators. Whereas, null hypothesis was accepted in case of financial capital and social capital.

2.2 Groundnut farmers of Warangal district

4.2.2.1 Attitude

Table 14 depicts that a majority of the respondents (45.83%) recorded favourable, followed by less favourable (41.67%) and more favourable (12.50%) attitude towards recommended ANGRAU technologies.

Table 14: Distribution of groundnut farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	10	41.67
2.	Favourable	11	45.83
3.	More favourable	3	12.50

4.2.2.2 Adoption

The perusal of the Table 15 depicts that a majority of the respondents exhibited low (62.50), followed by medium (25.00%) and high (12.50%) level of adoption of recommended technologies.

Table 15: Distribution of groundnut farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	15	62.50
2.	Medium	6	25.00
3.	High	3	12.50

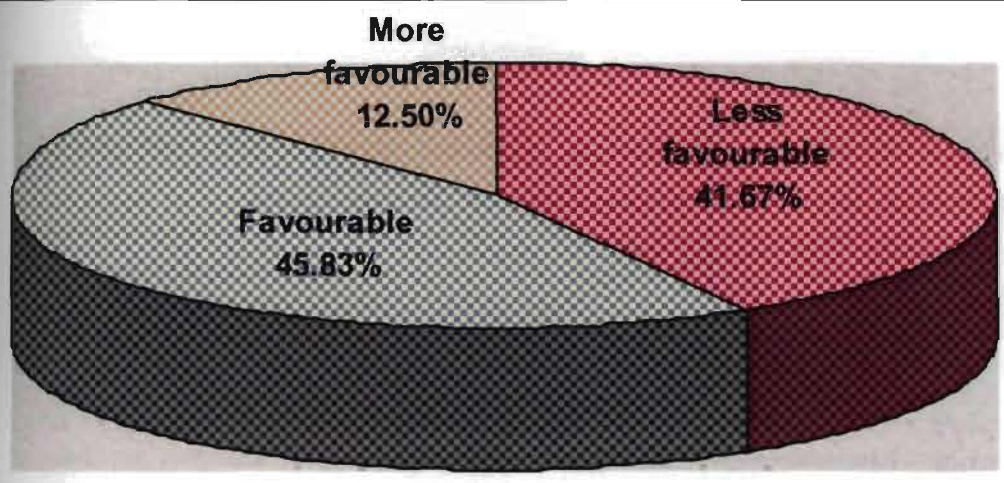


Fig.40. Distribution of groundnut farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

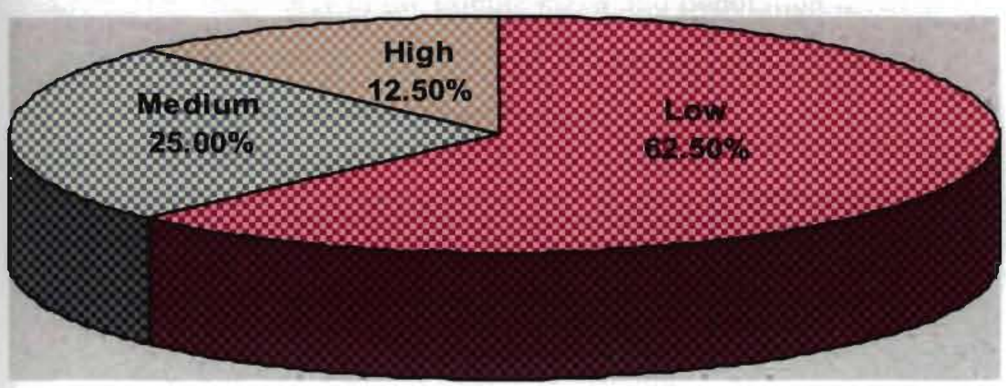


Fig.41. Distribution of groundnut farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies

Table 16a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Warangal district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	930.417	1001.68	71.263	7.66	0.17876NS
II.	Profitability	12955.38	13790.16	834.78	6.4265	0.56392NS
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.2	2.64	0.44	20	3.243.27**
b.	Natural capital	2.29	1.51	-0.78	-34.06	3.10734**
c.	Financial capital	125	199.17	74.17	39.33	0.78928NS
d.	Social capital	0.58	0.5	-0.08	-13.79	0.28919NS

Table 16b: Difference in the sample mean and population mean of human capital of groundnut farmers of Warangal district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	13.66	13	0.66	5.12	0.08303NS

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

4.2.2.3 Testing of hypothesis

4.2.2.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Warangal district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.2.2.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Warangal district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.2.2.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.2.2.4.1 Productivity

From Table 16a, it can be observed that there was no significant increase in the productivity of groundnut crop after adoption of recommended technologies, as 't' calculated was found to be 0.17876, which was non-significant.

4.2.2.4.2 Profitability

To find out significant increase in the profitability after adoption of recommended technologies, a paired 't' test was adopted and 't' calculated value was found to be 0.569223, which was non-significant.

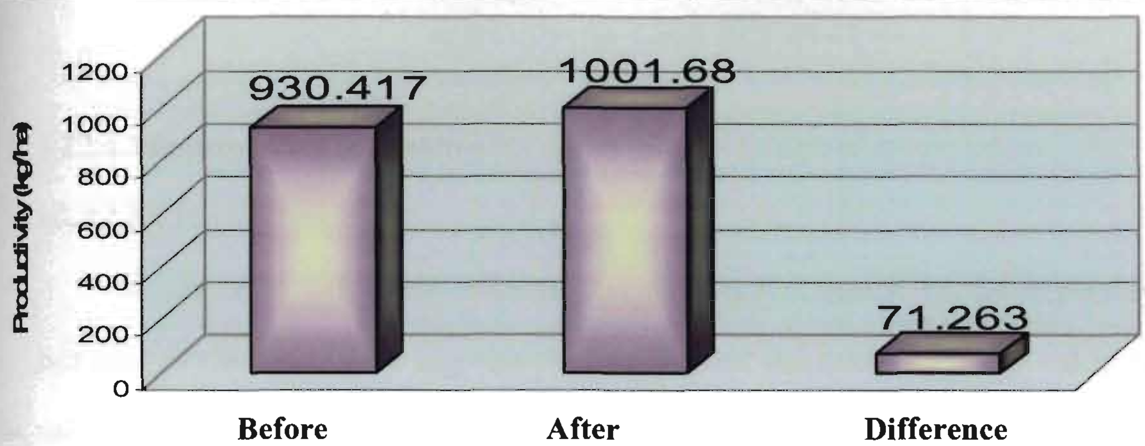


Fig.42. Difference in the mean productivity of groundnut farmers of Warangal district before and after the adoption of recommended technologies

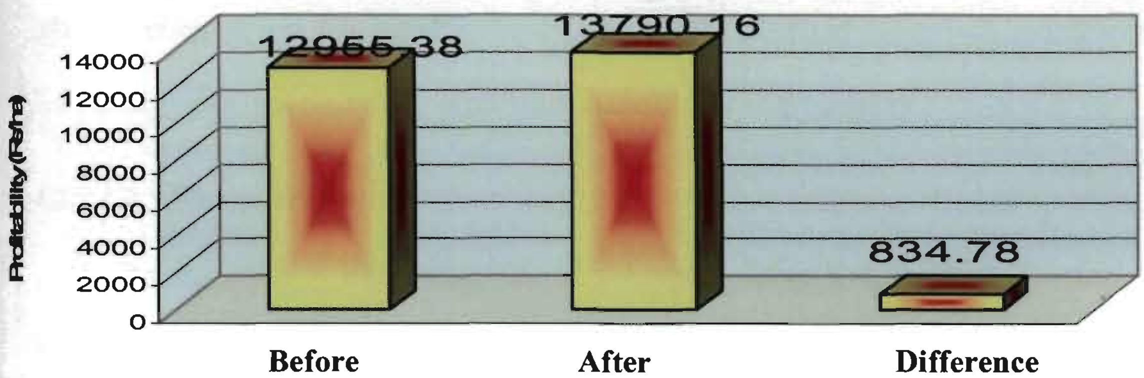


Fig.43. Difference in the mean profitability of groundnut farmers of Warangal district before and after the adoption of recommended technologies

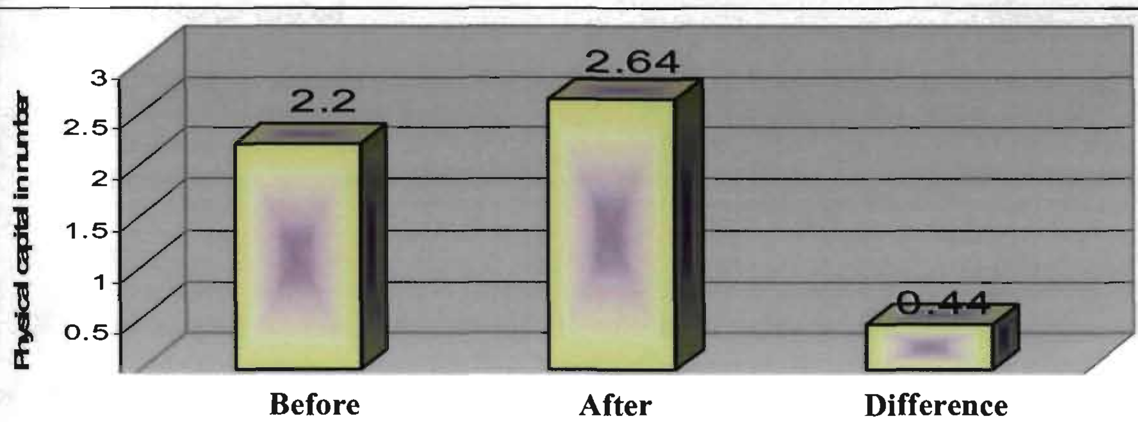


Fig.44. Difference in the mean physical capital of groundnut farmers of Warangal district before and after the adoption of recommended technologies

4.2.2.4.3 Improvement in livelihoods

4.2.2.4.3.1 Physical capital

A glance at Table 16a indicates that the physical capital of the respondents increased tremendously after adoption of recommended technologies. The 't' calculated value was found to be 3.243.27, which was significant at 0.01 level of probability.

4.2.2.4.3.2 Natural capital

From the Table 16a, it was observed that the significant decrease in natural capital after adoption of recommended technologies, as 't' calculated value was found to be 3.107342, which was negatively significant at 0.01 level of probability.

4.2.2.4.3.3 Financial capital

As indicated in the Table 16a, 't' calculated value was 0.78928. It could be concluded that there was no significance difference in the financial capital before and after adoption of recommended technologies.

4.2.2.4.3.4 Social capital

Table 16a shows that there was a significant difference in the social capital of the respondents after adoption of the recommended technologies, paired 't' test was conducted to find out the significant difference in social capital before and after adoption of recommended technologies and the 't' calculated value was found to be 0.28919, which was non-significant.

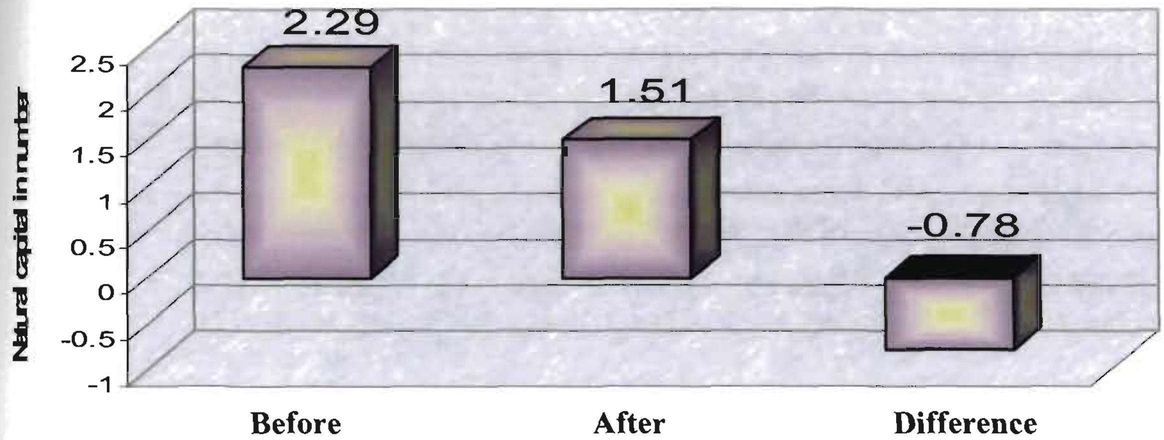


Fig.45. Difference in the mean natural capital of groundnut farmers of Warangal district before and after the adoption of recommended technologies

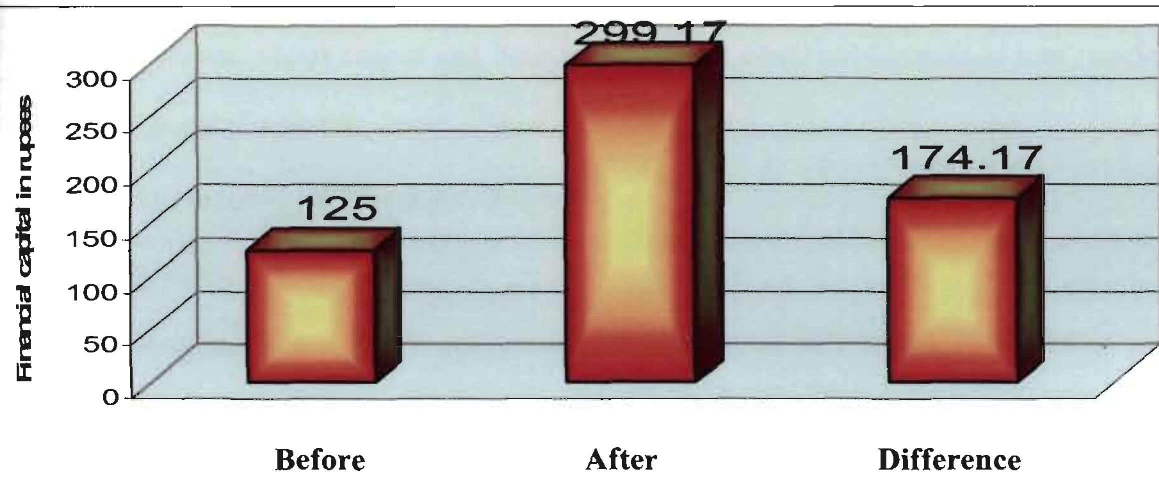


Fig.46. Difference in the mean financial capital of groundnut farmers of Warangal district before and after the adoption of recommended technologies

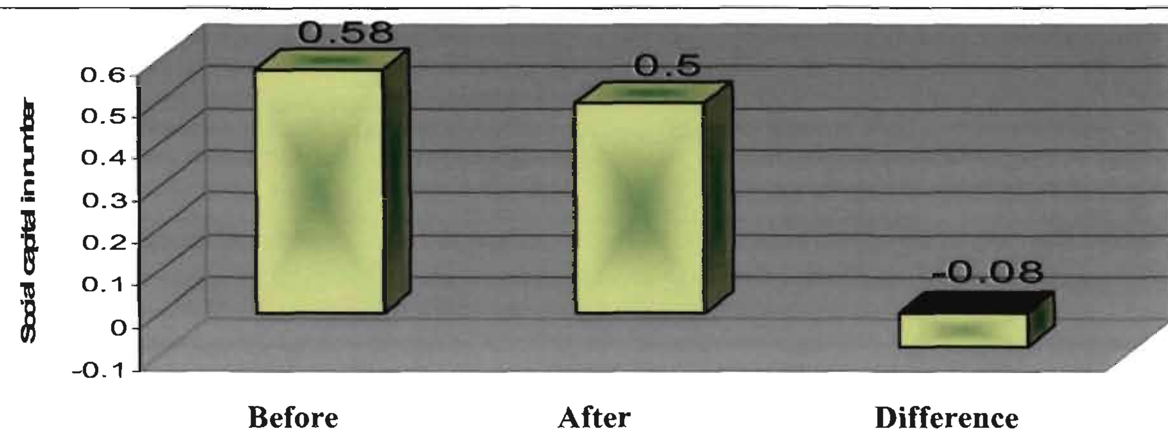


Fig.47. Difference in the mean social capital of groundnut farmers of Warangal district before and after the adoption of recommended technologies

4.2.2.4.3.5 Human capital

To find out the significant difference in the human capital after adoption of recommended technologies, 't' test was applied and the 't' calculated value was found to be 0.08303, which was non-significant.

An inference could be drawn from the above results that the 't' values were non-significant on all the impact indicators except physical and natural capital, which were significant. Hence, the null hypothesis was accepted in case of productivity, profitability, financial capital, social capital and human capital and empirical hypothesis was rejected for these impact indicators.

4.2.3 Chilli farmers of Warangal district

4.2.3.1 Attitude

A close look at Table 17 reveals that the majority of the respondents (45.84%) possessed less favourable, followed by favourable (37.50%) and more favourable (16.66%) attitude towards recommended ANGRAU technologies.

Table 17: Distribution of chilli farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	11	45.84
2.	Favourable	9	37.50
3.	More favourable	4	16.66

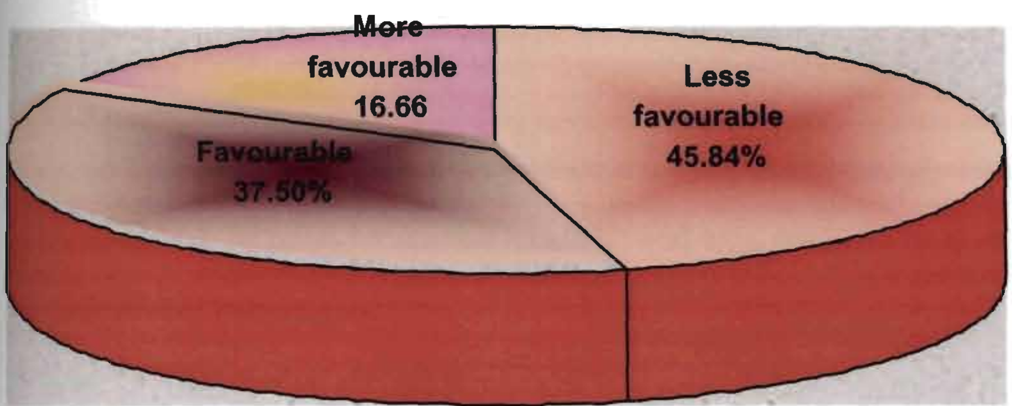


Fig.48. Distribution of chilli farmers of Warangal district according to their attitude towards recommended ANGRAU technologies

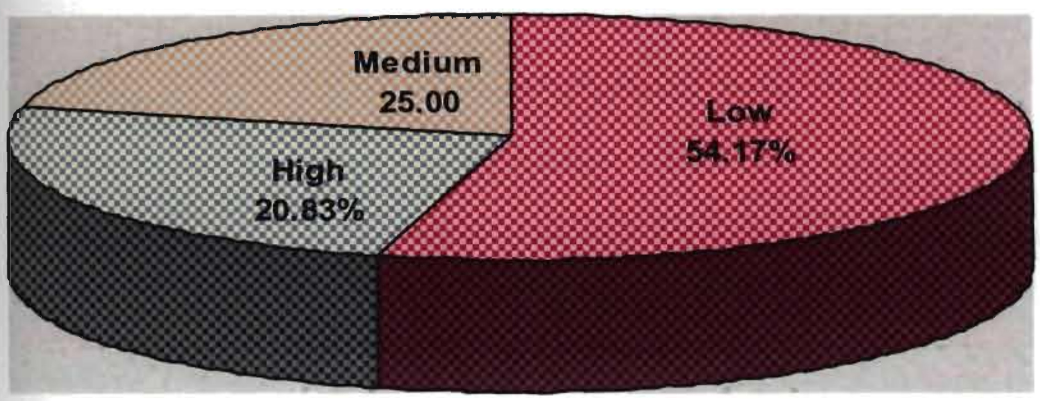


Fig.49. Distribution of chilli farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies

4.2.3.2 Adoption

The perusal of the Table 18 reveals that the majority of the respondents exhibited low (54.17%), followed by medium (25.00%) and high (20.83%) level of adoption of recommended technologies.

Table 18: Distribution of chilli farmers of Warangal district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	13	54.17
2.	Medium	6	25.00
3.	High	5	20.83

4.2.3.3 Testing of hypothesis

4.2.3.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Warangal district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.2.3.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Warangal district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

Table 19a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Warangal district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	1565.5	1654.79	89.29	5.70	0.742NS
II.	Profitability	34466.66	39266.58	4799.92	13.93	1.10584NS
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.95	12.50	9.55	76.40	6.59398**
b.	Natural capital	3.08	1.86	-1.22	-39.61	4.53706**
c.	Financial capital	9791.66	10500	708.34	7.23	0.422NS
d.	Social capital	1.62	2.29	0.67	41.36	1.979926*

Table 22b: Difference in the sample mean and population mean of human capital of chilli farmers of Warangal district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	17.125	17	0.125	0.73	0.2173NS

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

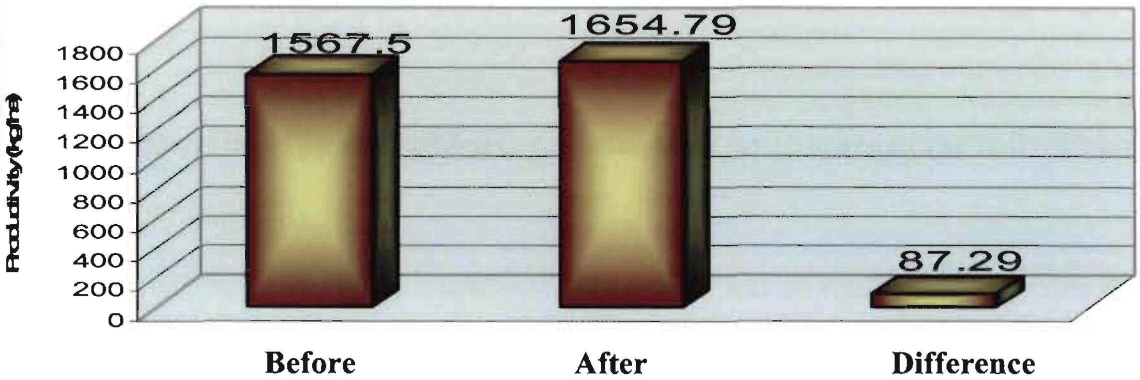


Fig.50. Difference in the mean productivity of chilli farmers of Warangal district before and after the adoption of recommended technologies

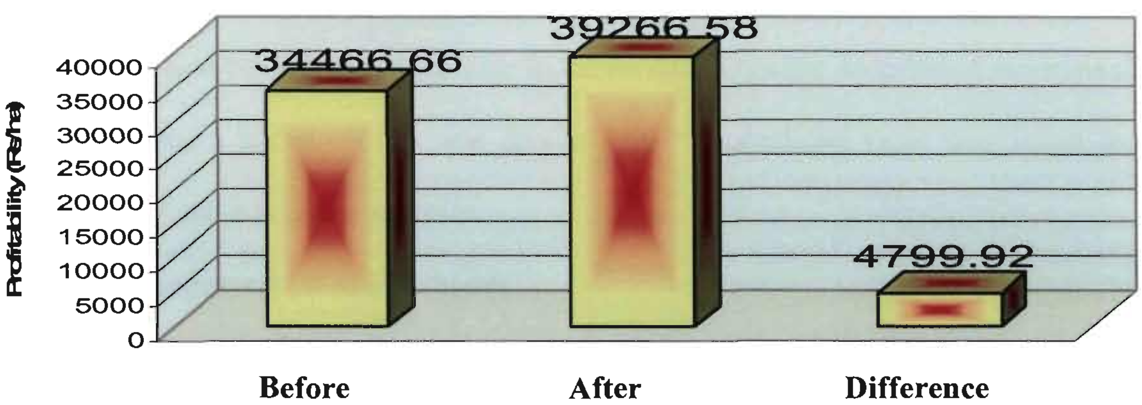


Fig.51. Difference in the mean profitability of chilli farmers of Warangal district before and after the adoption of recommended technologies

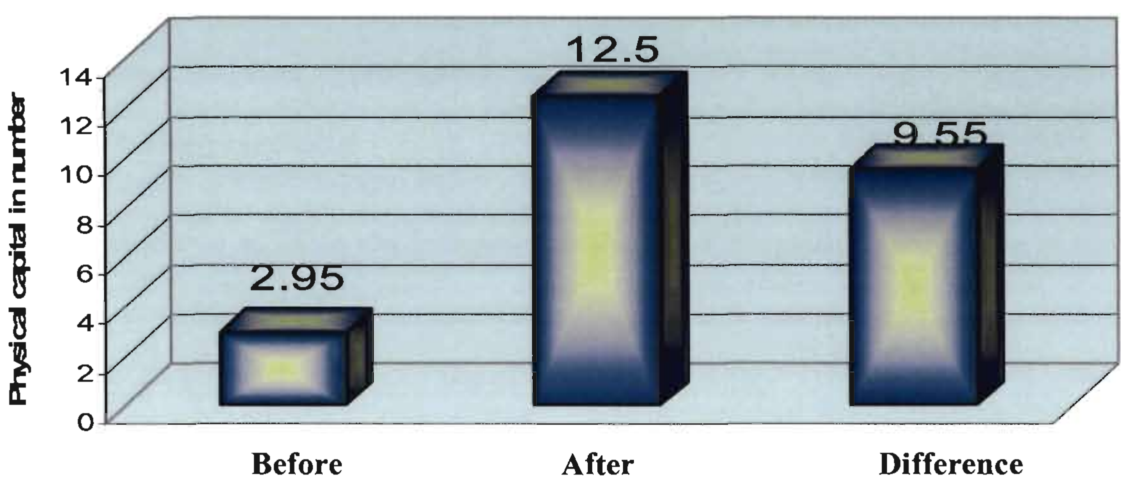


Fig.52. Difference in the mean physical capital of chilli farmers of Warangal district before and after the adoption of recommended technologies

4.2.3.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.2.3.4.1 Productivity

From the Table 19a, it was observed that there was no significant difference in the productivity after adoption of recommended technologies, as 't' calculated value is 0.742 was found to be non-significant.

4.2.3.4.2 Profitability

To find out significant increase in the profitability after adoption of recommended technologies, a paired 't' test was applied and 't' calculated value was found to be 1.10584, which was non-significant.

4.2.3.4.3 Improvement in livelihoods

4.2.3.4.3.1 Physical capital

To find out the significant difference in the physical capital of the respondents, paired 't' test was conducted and 't' calculated value was found to be 6.59398, which was significant at 0.01 level of probability.

4.2.3.4.3.2 Natural capital

A glance at Table 19a indicates that there was a significant difference in natural capital after adoption of recommended technologies, as 't' calculated value was 4.537065, which was negatively significant at 0.01 level of probability.

4.2.3.4.3.3 Financial capital

A close look at the Table 19a indicates that there was a significant difference in the financial capital of the respondents before and after adoption of recommended

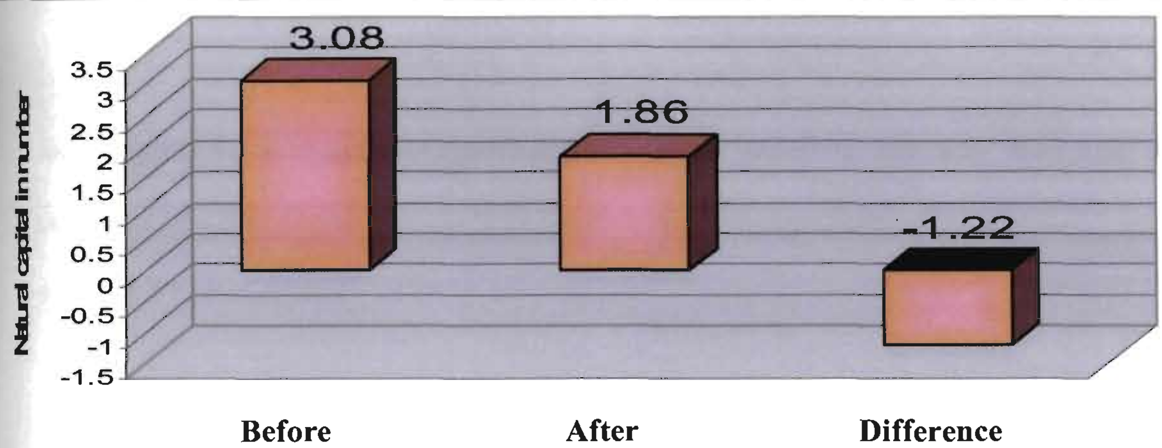


Fig.53. Difference in the mean natural capital of chilli farmers of Warangal district before and after the adoption of recommended technologies

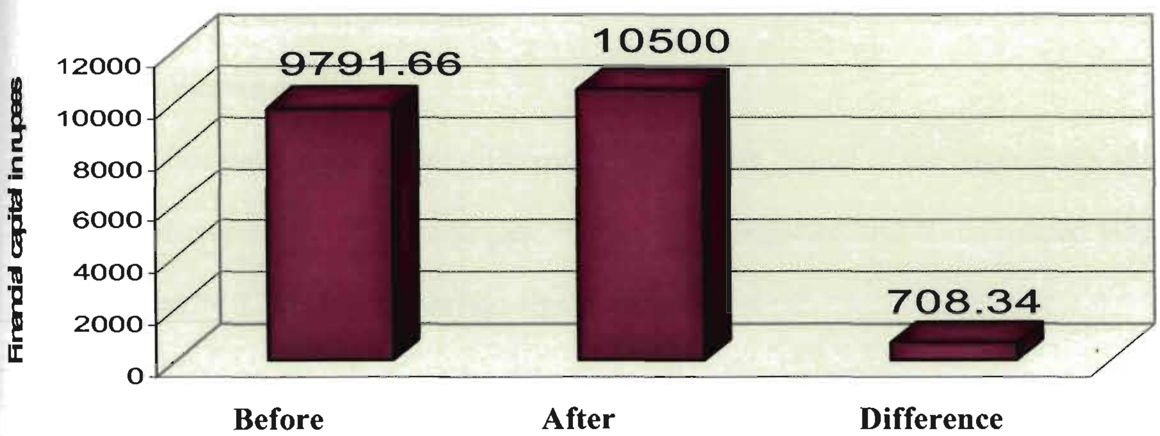


Fig.54. Difference in the mean financial capital of chilli farmers of Warangal district before and after the adoption of recommended technologies

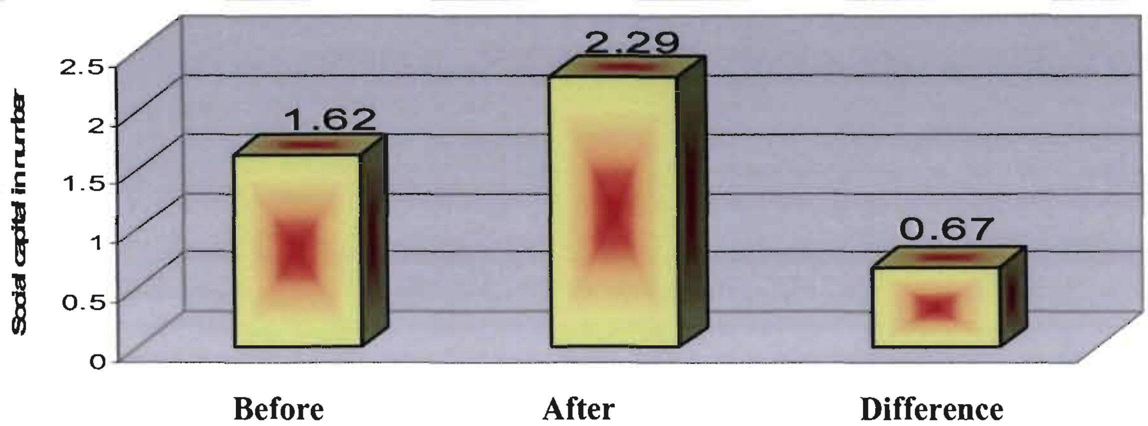


Fig.55. Difference in the mean social capital of chilli farmers of Warangal district before and after the adoption of recommended technologies

technologies. To find out the significant difference, paired 't' test was used and 't' calculated was found to be value 0.42223, which was non-significant.

4.2.3.4.3.4 Social capital

From the above Table 19a, it was clearly evident that the adoption of recommended technologies could also help to raise the average social capital of the respondents from 1.62 to 2.29 with 't' calculated value of 1.979926, which was significant at 0.05 level of probability.

4.2.3.4.3.5 Human capital

To find out the significant difference in the human capital of the respondents after adoption of recommended technologies, 't' test was conducted and 't' calculated value was found to be 0.217, which was non-significant.

An inference could be drawn from the above results that the 't' values were significant on physical, natural and social capital. Hence, the null hypothesis was rejected in case of these impact indicators and empirical hypothesis was accepted.

4.3 Impact of ANGRAU technologies on farmers of Anantapur district

4.3.1 Rice farmers of Anantapur district

4.3.1.1 Attitude

Results furnished in Table 20 shows that majority of the farmers possessed favourable attitude (45.84%) followed by less favourable attitude (33.33%) and more favourable (20.83%) attitude towards recommended ANGRAU technologies.

Table 20: Distribution of rice farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	8	33.33
2.	Favourable	11	45.84
3.	More favourable	5	20.83

4.3.1.2 Adoption

Table 21 concludes that majority of the respondents fell under medium category (58.34%) of adoption, followed by 29.16 per cent of the respondents with low level of adoption and (12.50%) with high level of adoption of recommended ANGRAU technologies.

Table 21: Distribution of rice farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	7	29.16
2.	Medium	14	58.34
3.	High	3	12.50

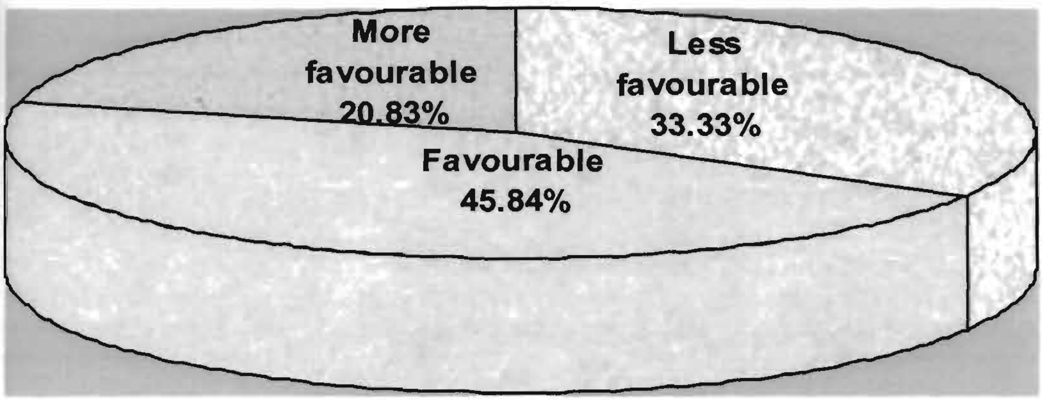


Fig.56. Distribution of rice farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

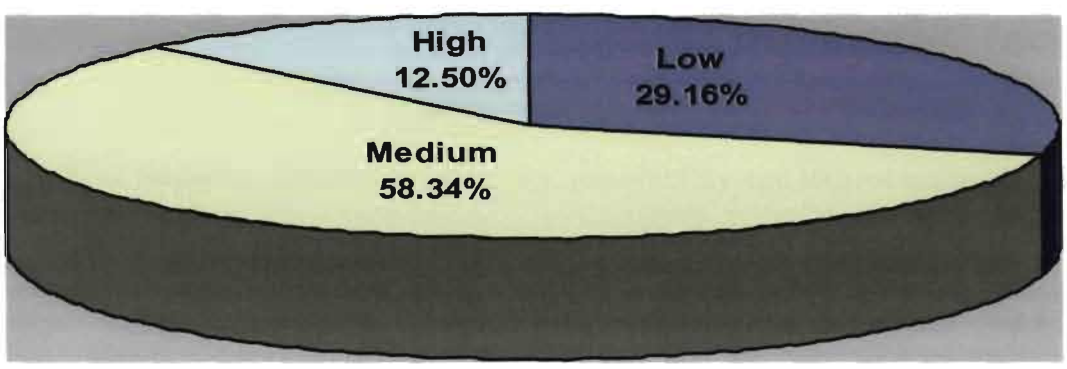


Fig.57. Distribution of rice farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

Table 22a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of rice farmers of Anantapur district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	2172.5	2378.12	205.62	9.6	1.02954NS
II.	Profitability	7925	10091.66	2166.66	27.34	1.38346NS
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.429167	3.08	0.65	26.7924	3.45227**
b.	Natural capital	4.37	1.98	-2.39	-54.69	5.246395*
c.	Financial capital	1116.67	1579.17	462.5	41.42	1.01963NS
d.	Social capital	1.29	1.58	0.29	22.48	1.07292NS

Table 22b: Difference in the sample mean and population mean of human capital of rice farmers of Anantapur district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	16. 54	16	0.54	3.38	0.77453NS

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

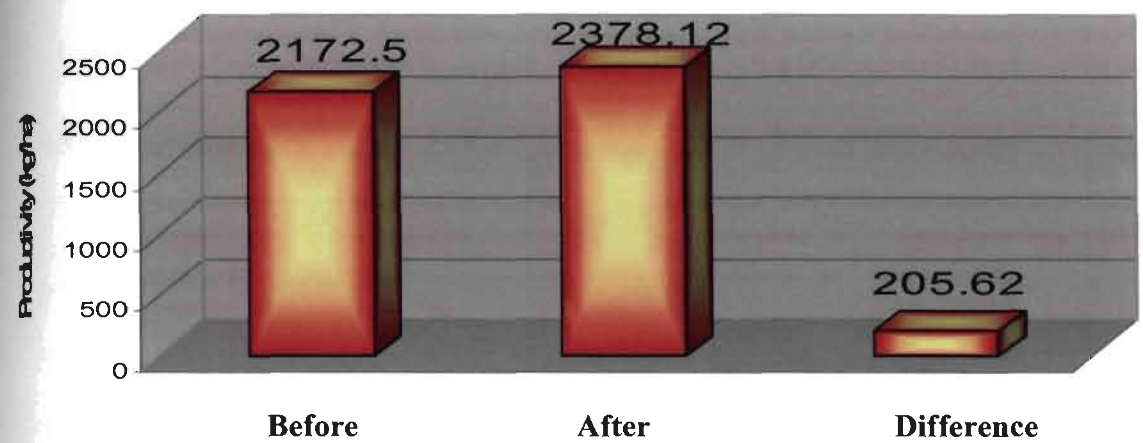


Fig.58. Difference in the mean productivity of rice farmers of Anantapur district before and after the adoption of recommended technologies

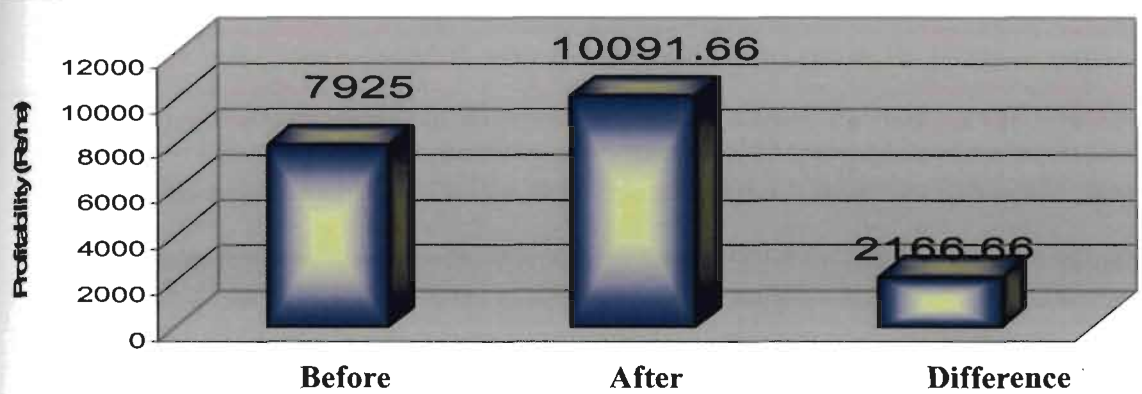


Fig.59. Difference in the mean profitability of rice farmers of Anantapur district before and after the adoption of recommended technologies

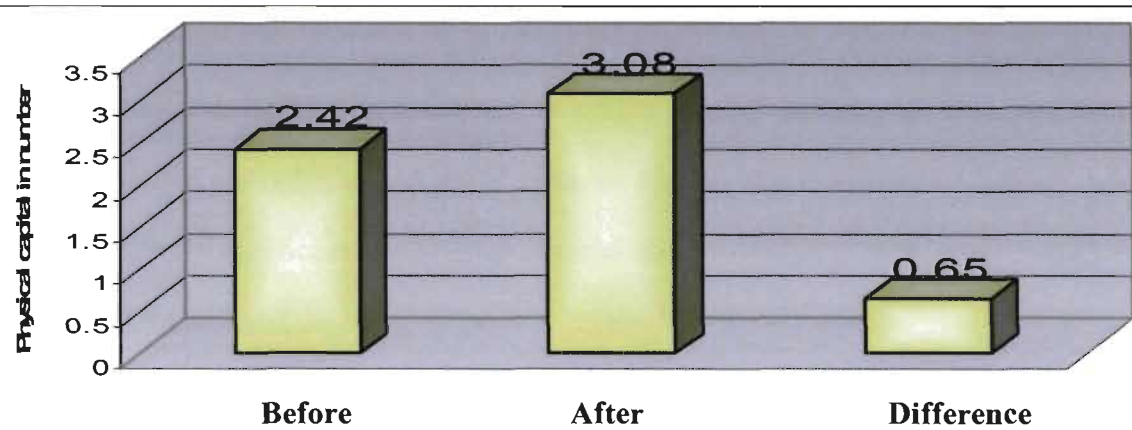


Fig.60. Difference in the mean physical capital of rice farmers of Anantapur district before and after the adoption of recommended technologies

4.3.1.4.2 Profitability

From Table 22a, it was observed that there was no significant difference in the productivity of the rice crop before and after adoption of recommended technologies, as 't' calculated value was found to be 1.383464, which was non-significant.

4.3.1.4.3 Improvement in livelihoods

4.3.1.4.3.1 Physical capital

Table 22a reveals that there was a significant difference in the physical capital of the respondents after adoption of recommended technologies. To find out the significant difference in the physical capital of the respondents, paired 't' test was conducted and the 't' calculated value was found to be 3.45227 that was significant at 0.01 level of probability.

4.3.1.4.3.2 Natural capital

Table 22a reveals that a negative and significant difference in the natural capital of the respondents after adoption of recommended technologies. Paired 't'test was adopted to find out the significant difference in natural capital before and after adoption of recommended technologies and the 't' calculated value was found to be 5.246395, which was negatively significant at 0.01 level of probability.

4.3.1.4.3.3 Financial capital

A glance at Table 22a indicates there was a significant difference in financial capital after adoption of recommended technologies, as 't' calculated value was found to be 5.24639, which was significant at 0.01 level of probability.

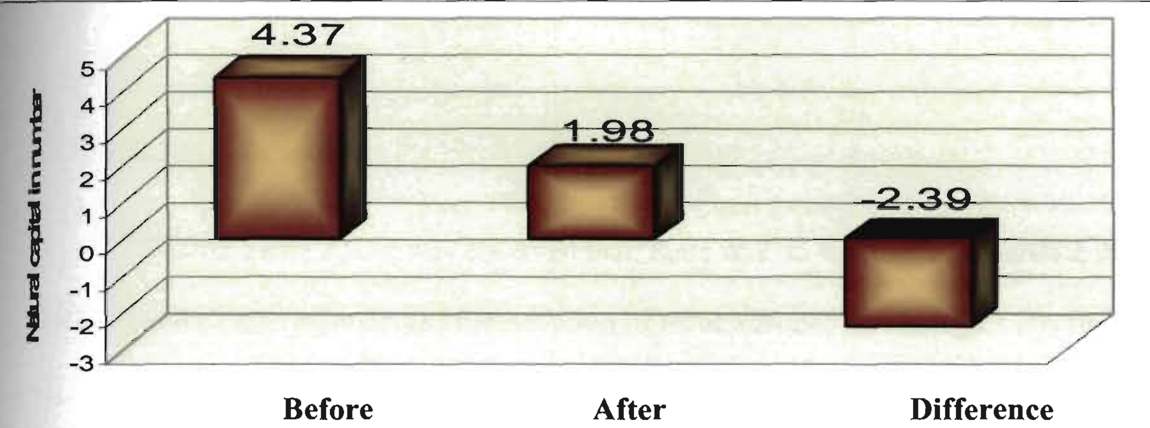


Fig.61. Difference in the mean natural capital of rice farmers of Anantapur district before and after the adoption of recommended technologies

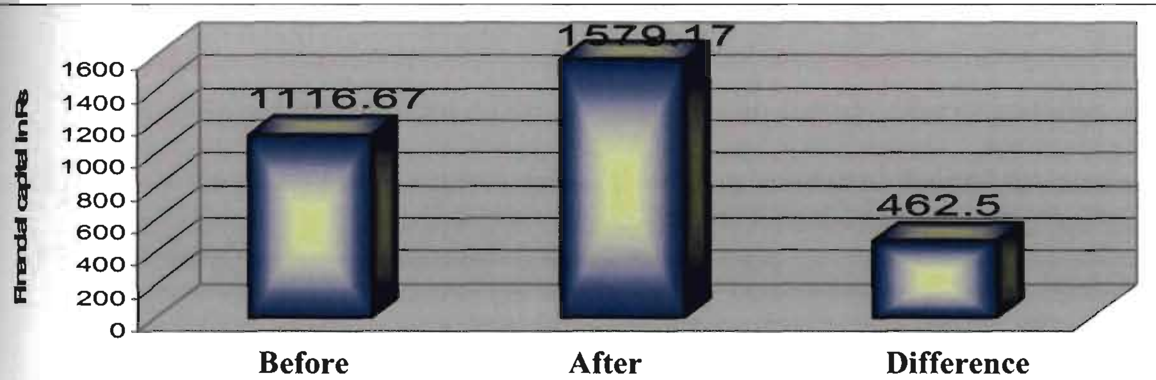


Fig.62. Difference in the mean financial capital of rice farmers of Anantapur district before and after the adoption of recommended technologies

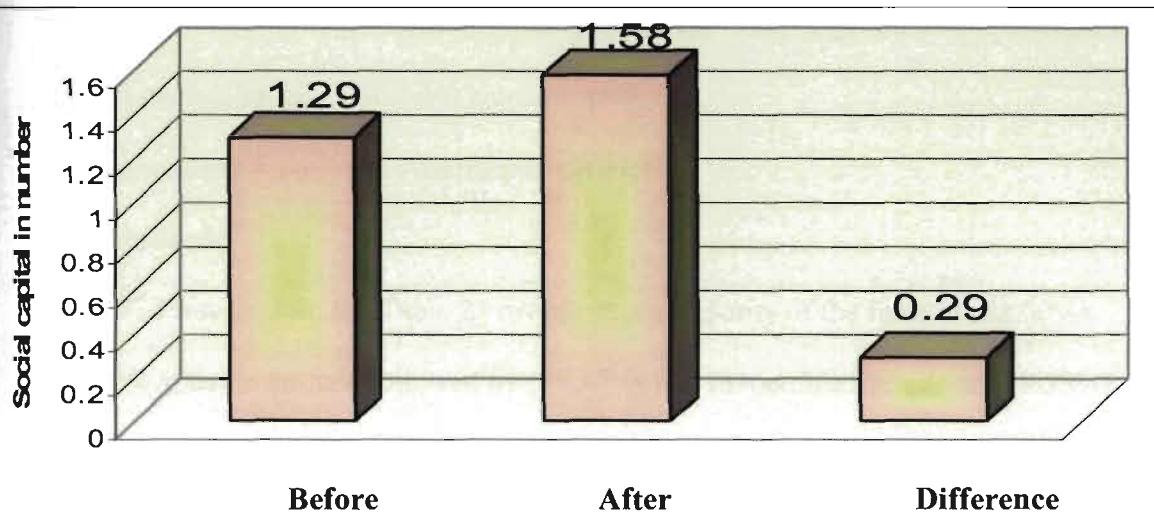


Fig.63. Difference in the mean social capital of rice farmers of Anantapur district before and after the adoption of recommended technologies

4.3.1.4.3.4 Social capital

From the Table 22a, it was observed that, there was no significant difference in the social capital of the respondents after adoption of recommended technologies. To find out the significant difference, paired 't' test was conducted and 't' calculated value was found to be 1.07292, which was non-significant.

4.3.1.4.3.5 Human capital

To find out the significant difference in the human capital of the respondents after adoption of the recommended technologies, 't' test was conducted and the 't' calculated value was found to be 0.77453, which was non-significant.

An inference could be drawn from the above results that the 't' values were significant on physical capital and natural capital. Hence, the null hypothesis was rejected in case of physical capital and natural capital and empirical hypothesis was accepted on these indicators. Null hypothesis was accepted in the case of productivity, profitability, financial capital, social capital and human capital.

4.3.2 Groundnut farmers of Anantapur district

4.3.2.1 Attitude

The results from the Table 23 reveals that a majority of the farmers (62.50%) possess favourable attitude followed by (29.17%) less favourable attitude and (8.33%) more favourable attitude towards recommended technologies.

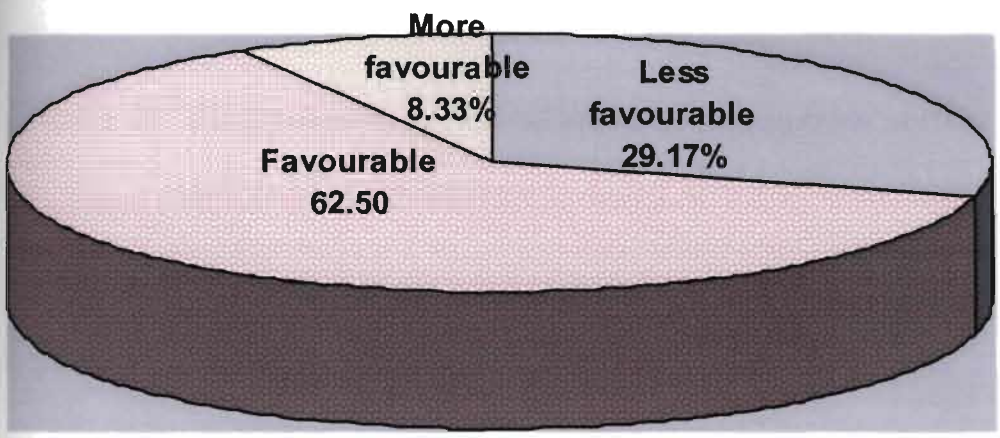


Fig.64. Distribution of groundnut farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

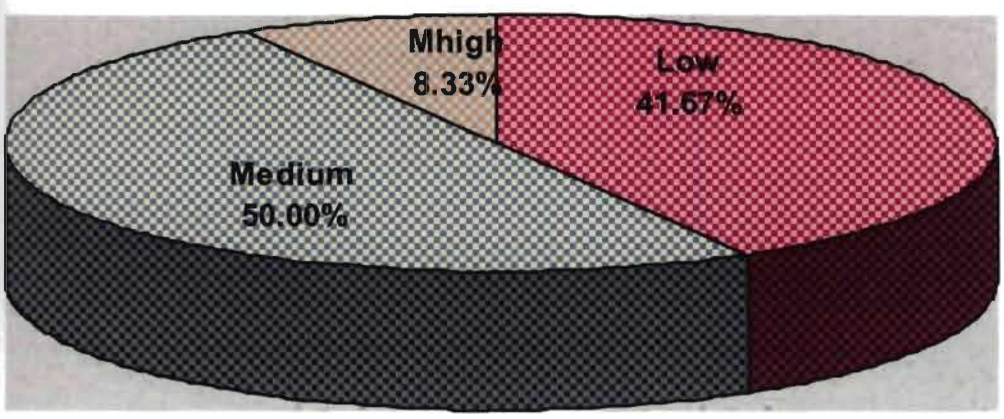


Fig.65. Distribution of groundnut farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

Table 23: Distribution of groundnut farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	7	29.17
2.	Favourable	15	62.50
3.	More favourable	2	8.33

4.3.2.2 Adoption

Table 24 connotes that half of the respondents exhibited medium level of adoption followed by low (41.66%) and high (8.33%) level of adoption of recommended technologies by the groundnut farmers of Aanatapur district.

Table 24: Distribution of groundnut farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	10	41.67
2.	Medium	12	50.00
3.	High	2	8.33

4.3.2.3 Testing of hypothesis

4.3.2.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Anantapur district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

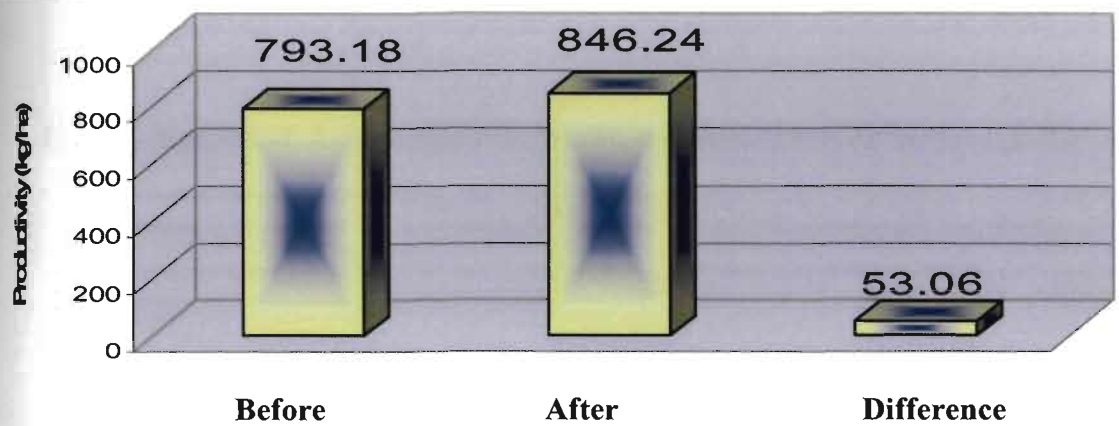


Fig.66. Difference in the mean productivity of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

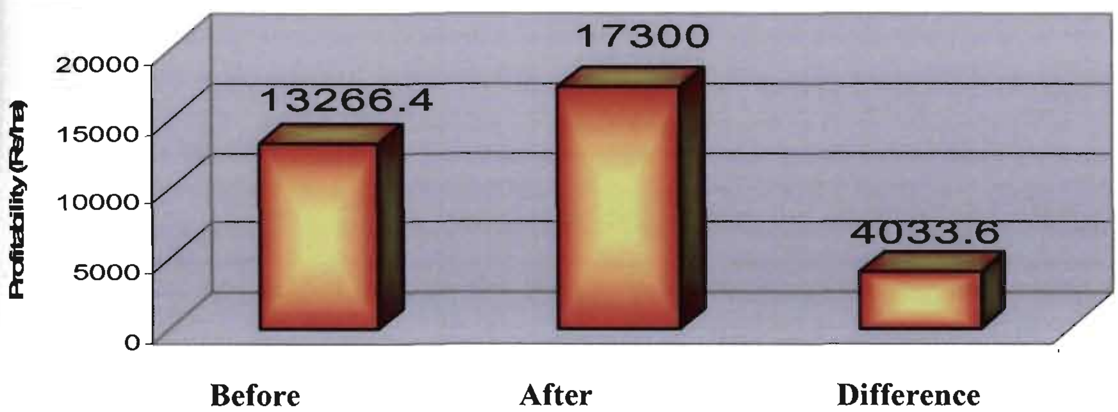


Fig.67. Difference in the mean profitability of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

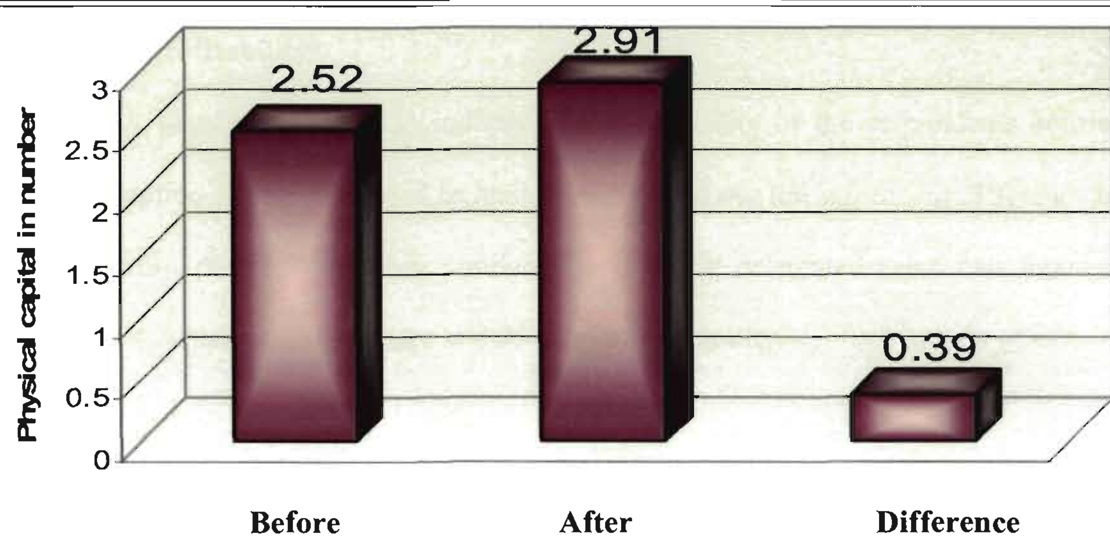


Fig.68. Difference in the mean physical capital of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

4.3.2.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Anantapur district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.3.2.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.3.2.4.1 Productivity

From the Table 25a, it was clearly evident that the adoption of recommended technologies also helped to raise the average productivity of the groundnut crop from 793.18kg/ha to 846.24 kg/ha, To find out significant difference in the productivity, paired 't' test was adopted and 't' calculated value was found to be 1.771175, which was significant at 0.05 level of probability.

4.3.2.4.2 Profitability

A glance at Table 25a indicates the profitability of the respondents before and after adoption of recommended technologies. To find out the significant difference in the profitability, paired 't' test was conducted and the 't' calculated value was found to be 1.977654, which was significant at 0.05 level of probability.

Table 25a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	793.18	846.24	53.06	6.68	1.771175*
II.	Profitability	13266.4	17300	4033.36	30.40	1.977654*
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.52	2.91	0.39	15.48	2.323612*
b.	Natural capital	2.29	1.51	-0.78	-38.06	3.10734**
c.	Financial capital	866.66	1500	633.34	73.08	1.868285*
d.	Social capital	0.83	1.67	0.84	101.20	1.0224NS

Table 25b: Difference in the sample mean and population mean of human capital of groundnut farmers of Anantapur district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	16.91	14	2.91	20.83	3.48864**

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

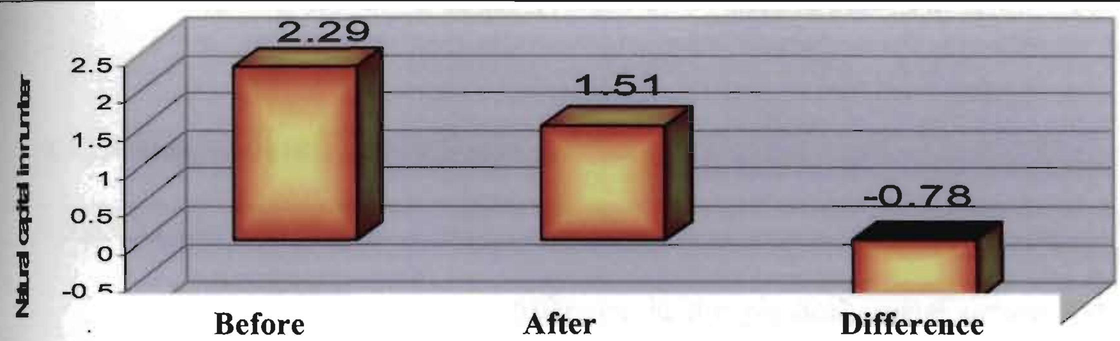


Fig.69. Difference in the mean natural capital of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

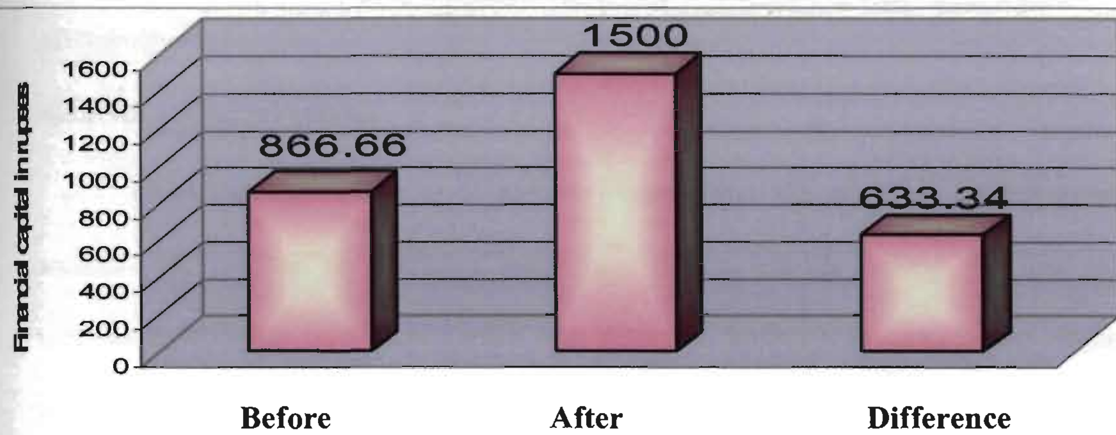


Fig.70. Difference in the mean financial capital of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

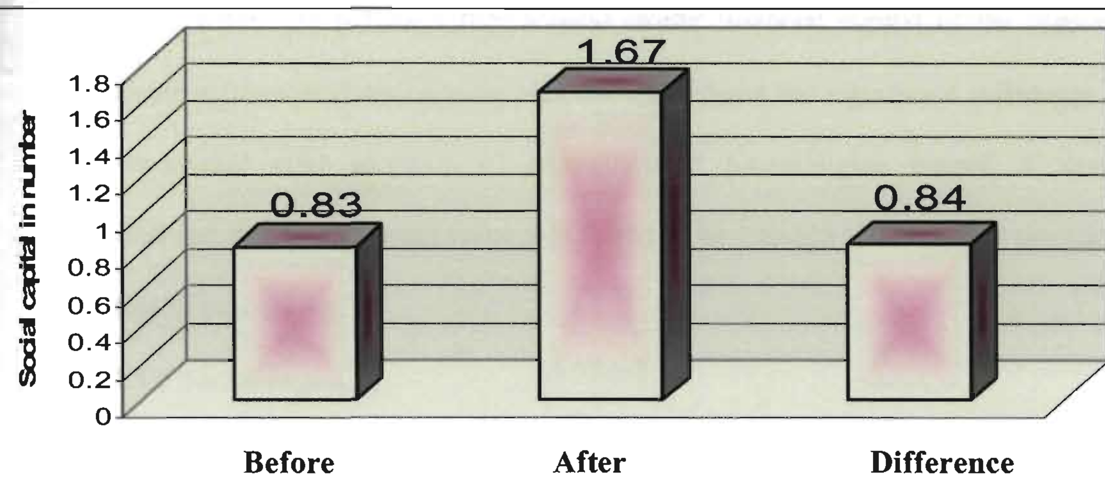


Fig.71. Difference in the mean social capital of groundnut farmers of Anantapur district before and after the adoption of recommended technologies

4.3.2.4.3 Improvement in livelihoods

4.3.2.3.3.1 Physical capital

To find out the significant difference in the physical capital before and after adoption of recommended technologies, paired 't' test was conducted and the 't' calculated value was found to be 2.323612, which was significant at 0.01 level of probability.

4.3.2.4.3.2 Natural capital

From the Table 25a, it is clearly evident that the adoption of recommended technologies resulted in decrease in average natural capital among the respondents. Computed 't' value of natural capital was found to be 3.10734, which was negatively significant at 0.01 level of probability.

4.3.2.4.3.3 Financial capital

The Table 25a indicates the increase in the financial capital of the respondents after adoption of recommended technologies. To find out the significant difference in the financial capital after adoption of recommended technologies, paired 't' test was conducted and the 't' calculated value was found to be 1.868285, which was significant at 0.05 level of probability.

4.3.2.4.3.4 Social capital

As indicated in the Table 25a,'t' calculated value was found to be 1.02247, which was non-significant. It could be concluded that there was no significant difference in the social capital before and after adoption of recommended technologies.

4.3.2.4.3.5 Human capital

To find out the significant mean difference in the human capital after adoption of recommended technologies,'t' test was applied and the 't' calculated value was found to be 3.48864, which was significant at 0.01 per cent level of probability.

An inference could be drawn from the above results that the 't' values were significant on all the impact indicators except social capital. Hence, the null hypothesis was rejected in case of all these impact indicators except social capital.

4.3.3 Chilli farmers of Anantapur district

4.3.3.1 Attitude

Table 26 indicates that majority of the farmers (37.50%) expressed favourable attitude and the same percentage (37.50%) of the respondents possessed less favourable attitude. Whereas 25.00 per cent of the farmers expressed more favourable attitude towards recommended technologies.

Table 26: Distribution of chilli farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Less favourable	9	37.50
2.	Favourable	9	37.50
3.	More favourable	6	25.00

4.3.3.2 Adoption

A close look at Table 27 reveals that majority of the respondents (45.83%) expressed low level of adoption followed by medium level of adoption (41.67%) and (12.50%) high level of adoption of recommended technologies.

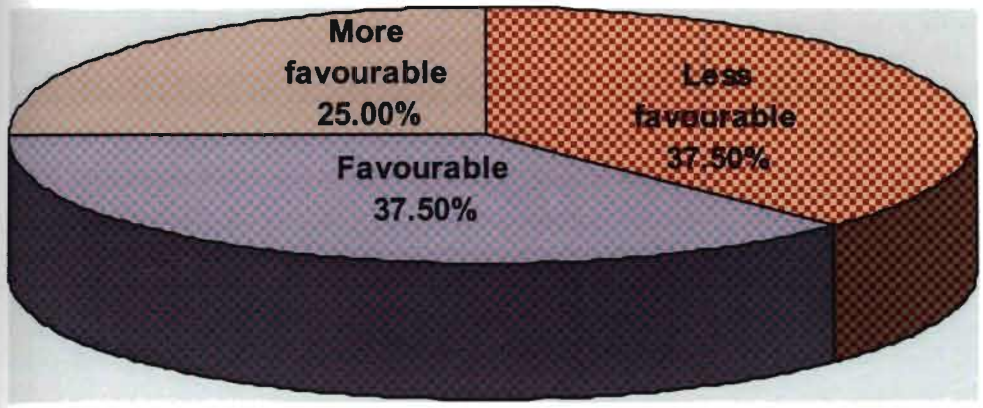


Fig.72. Distribution of chilli farmers of Anantapur district according to their attitude towards recommended ANGRAU technologies

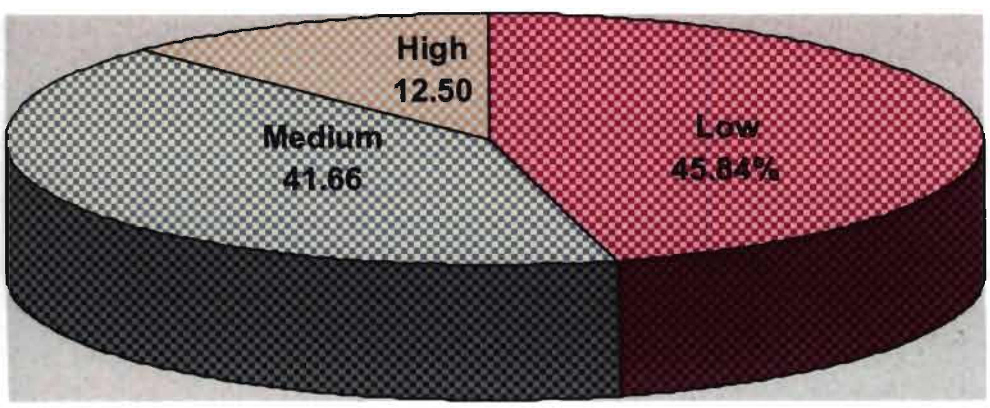


Fig.73. Distribution of chilli farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

Table 27: Distribution of chilli farmers of Anantapur district according to their level of adoption of recommended ANGRAU technologies

n=24

S.No.	Category	Respondents	
		Frequency	Percentage
1.	Low	11	45.84
2.	Medium	10	41.66
3.	High	3	12.50

4.3.3.3 Testing of hypothesis

4.3.3.3.1 Null hypothesis: There will be no significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Anantapur district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

4.3.3.3.2 Empirical hypothesis: There will be significant difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Anantapur district before and after the adoption and the sample mean & population mean of human capital after the adoption of recommended technologies.

Table 28a: Difference in the mean productivity, profitability, physical capital, natural capital, financial capital and social capital of chilli farmers of Anantapur district before and after the adoption of recommended technologies

n=24

S. No.	Impact indicators	Before adoption	After adoption	Additional improvement	Per cent increase	't' value
I.	Productivity	1010.21	1160.83	150.62	14.91	2.24*
II.	Profitability	21662.49	26175	4512.51	20.83	0.92520NS
III. A.	**Improvement in livelihoods**	**Before adoption**	**After adoption**	**Additional improvement**	**Per cent increase**	**'t' value**
a.	Physical capital	2.09	2.79	0.7	33.49	5.23314**
b.	Natural capital	3.45	2.18	-1.27	-36.81	4.32166**
c.	Financial capital	8650.23	9520.41	870.18	10.05	1.01NS
d.	Social capital	0.75	1.42	0.67	89.33	2.08*

Table 31b: Difference in the sample mean and population mean of human capital of chilli farmers of Anantapur district after the adoption of recommended technologies

III. B.	Improvement in livelihoods	Sample mean	Population mean	Mean difference	Per cent increase	't' value
e.	Human capital	17.75	17	0.75	4.41	0.998NS

**-- Significant at 0.01 level of probability

* -- Significant at 0.05 level of probability

NS—Non-significant

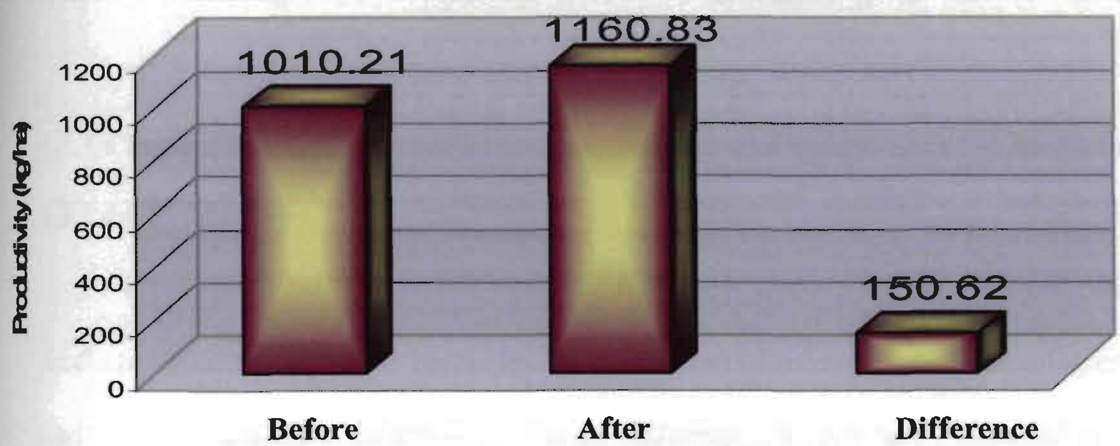


Fig.74. Difference in the mean productivity of chilli farmers of Anantapur district before and after the adoption of recommended technologies

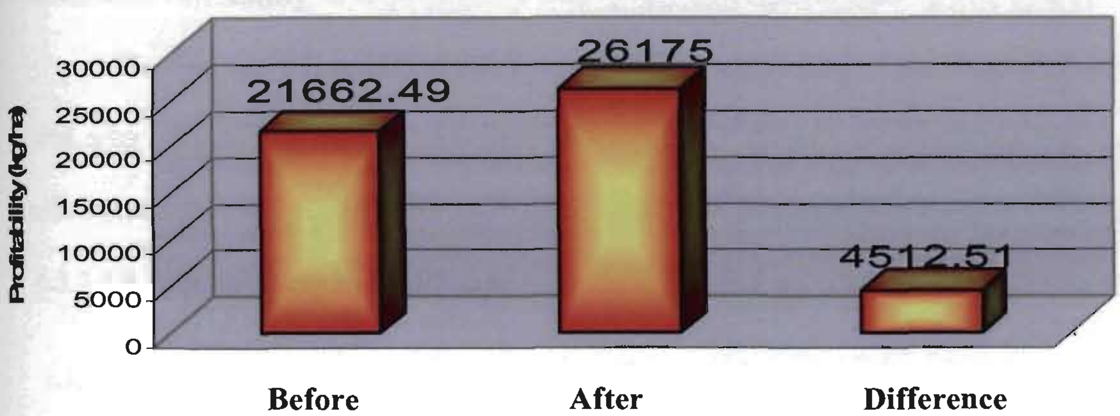


Fig.75. Difference in the mean profitability of chilli farmers of Anantapur district before and after the adoption of recommended technologies

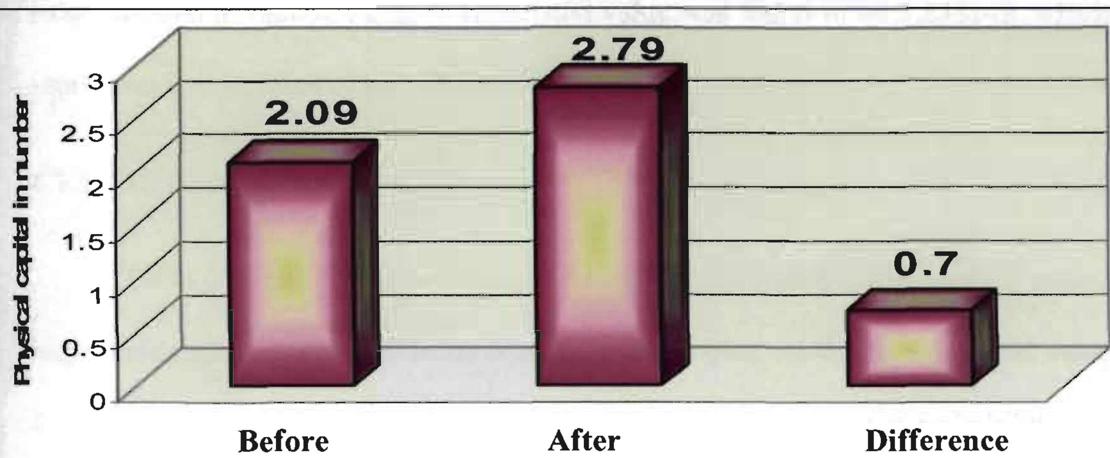


Fig.76. Difference in the mean physical capital of chilli farmers of Anantapur district before and after the adoption of recommended technologies

4.3.3.4 Impact in terms of productivity, profitability and improvement in livelihoods

4.3.3.4.1 Productivity

From the Table 28a, it was observed that there was significant difference in the productivity of the chilli crop before and after adoption of recommended technologies. To find out the significant difference in the productivity, 't' test was conducted and 't' calculated value was found to be 2.24, which was significant at 0.05 level of probability.

4.3.3.4.2 Profitability

To find out the significant difference in the profitability of the chilli crop before and after adoption of the recommended technologies, 't' test was conducted and the 't' calculated value was found to be 0.9252095, which was non-significant.

4.3.3.4.3 Improvement in livelihoods

4.3.3.4.3.1 Physical capital

Table 28a, witnesses the significant increase in physical capital after adoption of recommended technologies, as 't' calculated value was found to be 5.233142, which was significant at 0.01 level of probability.

4.3.3.4.3.2 Natural capital

Table 28a indicates that the natural capital decreased tremendously among the respondents after adoption of recommended technologies. As the 't' calculated value was found to be 4.32166, which was negatively significant at 0.01 level of probability.

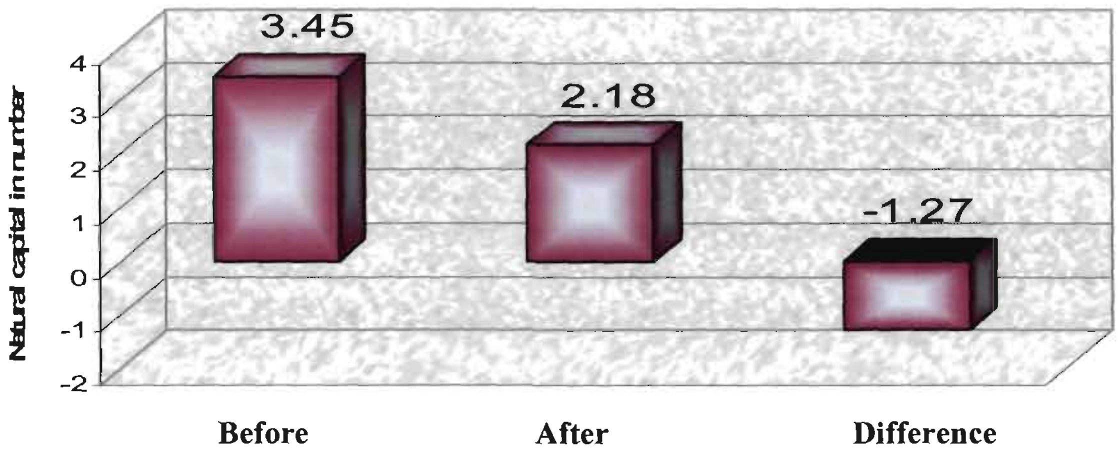


Fig.77. Difference in the mean natural capital of chilli farmers of Anantapur district before and after the adoption of recommended technologies

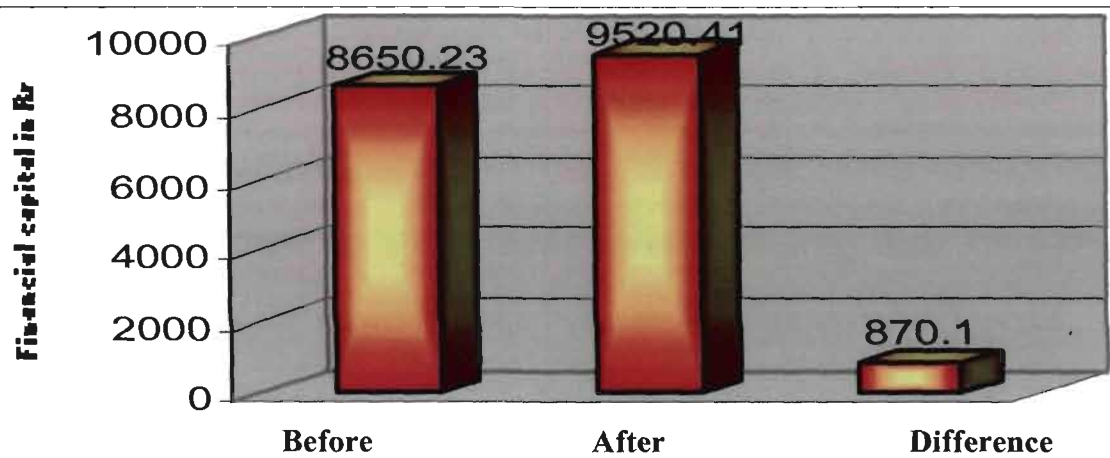


Fig.78. Difference in the mean financial capital of chilli farmers of Anantapur district before and after the adoption of recommended technologies

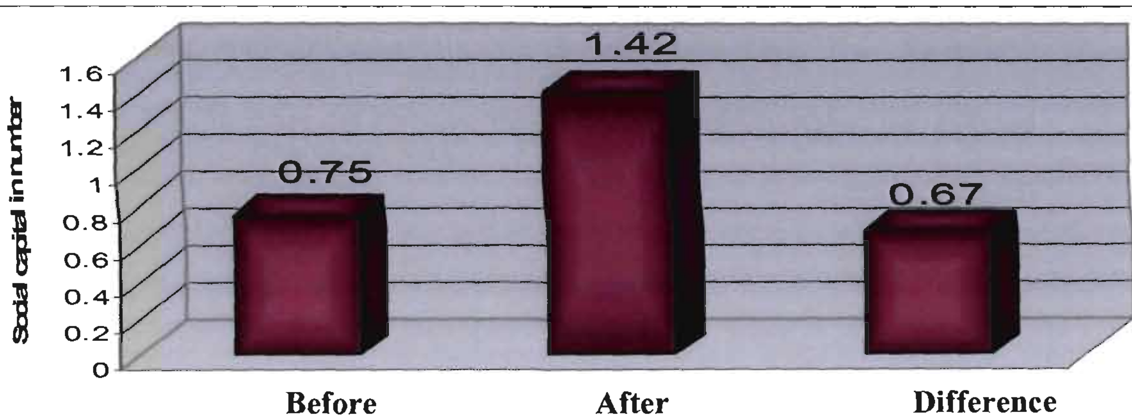


Fig.79. Difference in the mean social capital of chilli farmers of Anantapur district before and after the adoption of recommended technologies

4.3.3.4.3.3 Financial capital

As indicated in the Table 28a,'t' calculated value was found to be 1.01, which was non-significant. It could be concluded that there was no significant difference in the financial capital before and after adoption of recommended technologies.

4.3.3.4.3.4 Social capital

A significant increase in social capital after adoption of recommended technologies could be witnessed from the above Table 31a. The 't' calculated value was found to be 2.08, which was significant at 0.05 level of probability.

4.3.3.4.3.5 Human capital

From the Table 28b, it was observed that there was no significant difference in the human capital of the respondents after adoption of recommended technologies, as 't' calculated value was found to be 0.998, which was non-significant.

An inference could be drawn from the above results that the 't' values were significant on all the impact indicators except profitability, financial and human capital, which were non-significant. Hence, the null hypothesis was accepted in case of profitability, financial and human capital and empirical hypothesis was rejected.

Table 29: Comparison of recommended rice technologies on farmers of Krishna, Warangal and Anantapur districts

Krishna district

	Category		Respondents F	%
1.	Attitude	Less favourbale	10	41.67
		Favourbale	12	50.00
		More favourbale	2	8.33
2.	Adoption	Low	8	37.33
		Medium	10	41.67
		High	6	25.00
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	2259.96	2578.47	14.09	2.80**
4.	Profitability	13287.49	15906.25	19.70	1.68*
5.	Livelihoods				
a.	Physical capital	2.66	3.27	22.93	3.410**
b.	Natural capital	3.82	2.68	-29.84	3.447**
c.	Financial capital	2379.17	3766.68	58.31	2.71**
d	Social capital	0.75	1.54	105.55	2.86**
	Livelihoods	SM	PM	PI	't' value
e.	Human capital	17.12	14	22.32	2.71**

Warangal district

	Category		Respondents F	%
1.	Attitude	Less favourbale	9	37.50
		Favourbale	10	41.67
		More favourbale	5	20.83
2.	Adoption	Low	10	41.67
		Medium	12	50.00
		High	2	8.33
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	2283.33	2525	10.58	2.1478*
4.	Profitability	8418.75	10587.5	25.76	2.00*
5.	Livelihoods				
a.	Physical capital	2.48	2.91	17.34	3.1589**
b.	Natural capital	3.63	2.18	-39.94	5.1329**
c.	Financial capital	1966.67	2404.18	22.25	1.148NS
d	Social capital	1.41	1.411	0.07	0.001NS
	Livelihoods	SM	PM	PI	't' value
e.	Human capital	15.41	13	18.589	3.456**

Anantapur district

	Category		Respondents F	%
1.	Attitude	Less favourbale	8	33.33
		Favourbale	11	45.84
		More favourbale	5	20.83
2.	Adoption	Low	7	29.16
		Medium	14	58.34
		High	3	12.50
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	2172.5	2378.12	9.46	1.029NS
4.	Profitability	7925	10091.66	27.34	1.383NS
5.	Livelihoods				
a.	Physical capital	2.429167	3.08	26.7924	3.4522**
b.	Natural capital	4.37	1.98	-54.69	5.246**
c.	Financial capital	1116.67	1579.17	41.42	1.019NS
d	Social capital	1.29	1.58	22.48	1.072NS
	Livelihoods	PM	SM	PI	't' value
e.	Human capital	16.54	16	3.38	0.7745NS

**-- Significant at 0.01 level of probability * -- Significant at 0.05 level of probability NS-- Non-significant

4.4 Comparison of recommended technologies on farmers of Krishna, Warangal and Anantapur districts

4.4.1 Comparison of recommended rice technologies on rice farmers of Krishna, Warangal and Anantapur districts

The results from the Table 29 confirm that majority of the farmers in all the three selected districts (Krishna, Warangal and Anantapur district) possessed favourable attitude and medium level of adoption of recommended rice technologies.

Productivity and profitability of rice crop before and after adoption of recommended technologies shows significant relationship in Krishna and Warangal district rice farmers, but, in case of rice farmers of Anantapur district these showed non-significant relationship.

From the Table 29, it was observed that there was significant difference in the financial and social capital of the Krishna district rice farmers before and after adoption of recommended technologies.

4.4.2 Comparison of recommended groundnut technologies on groundnut farmers of Krishna, Warangal and Anantapur districts

A close look at the Table 30 revealed that, a majority of the groundnut farmers were grouped under favourable attitude towards recommended technologies.

It was depicted from the Table 30 that, a majority of the groundnut farmers had low to medium level of adoption of recommended technologies in Krishna and Anantapur districts.

Table 30. Comparison of recommended groundnut technologies on farmers of Krishna, Warangal and Anantapur districts

Krishna district

	Category			Respondents Frequency	%
1.	Attitude	Less favourbale		9	37.50
		Favourbale		10	41.67
		More favourbale		5	20.83
2.	Adoption	Low		9	37.50
		Medium		9	37.50
		High		6	25.00
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	1176.06	1234.44	4.96	2.134*
4.	Profitability	10066.66	11175	11.11	0.73NS
5.	Livelihoods				
a.	Physical capital	2.48	2.78	12.09	1.85313*
b.	Natural capital	3.45	2.35	-31.88	2.6297**
c.	Financial capital	1116.67	1579.17	41.42	1.019NS
d.	Social capital	0.17	0.27	60.01	1.99518*
	Livelihoods	PM	SM	PI	't' value
e.	Human capital	16.58	14	18.45	3.9885**

Warangal district

	Category			Respondents Frequency	%
1.	Attitude	Less favourbale		10	41.67
		Favourbale		11	45.83
		More favourbale		3	12.50
2.	Adoption	Low		15	62.50
		Medium		6	25.00
		High		3	12.50
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	930.417	1001.68	7.66	0.17NS
4.	Profitability	12955.38	13790.16	6.42	0.56NS
5.	Livelihoods				
a.	Physical capital	2.2	2.64	20	3.243 **
b.	Natural capital	2.29	1.51	-34.06	3.1073**
c.	Financial capital	125	199.17	39.33	0.789NS
d.	Social capital	0.58	0.5	-13.79	0.289NS
	Livelihoods	PM	SM	PI	't' value
e.	Human capital	13.66	13	5.12	0.083NS

Anantapur district

	Category			Respondents Frequency	%
1.	Attitude	Less favourbale		7	29.17
		Favourbale		15	62.50
		More favourbale		2	8.33
2.	Adoption	Low		10	41.67
		Medium		12	50.00
		High		2	8.33
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	793.18	846.24	6.68	1.771*
4.	Profitability	13266.4	17300	30.40	1.977*
5.	Livelihoods				
a.	Physical capital	2.52	2.91	15.48	2.32361*
b.	Natural capital	2.29	1.51	-38.06	3.1073**
c.	Financial capital	866.66	1500	73.08	1.86828*
d.	Social capital	0.83	1.67	101.20	1.022NS
	Livelihoods	PM	SM	PI	't' value
e.	Human capital	16.91	14	20.83	3.4886**

**-- Significant at 0.01 level of probability   * -- Significant at 0.05 level of probability   NS-- Non-significant

Table 30 reveals that there was a significant difference in the natural capital of the respondents of all the three selected districts before and after adoption of recommended technologies

From the Table 30 it was observed that the productivity of Krishna and Anantapur groundnut farmers was found to be significant after adoption of recommended technologies, whereas, productivity of Warangal district groundnut farmers showed non-significance after adoption of recommended technologies.

From the Table 30, it was observed that there was a significant difference in the profitability of Anantapur district groundnut farmers before and after adoption of recommended technologies, whereas for Krishna and Warangal district groundnut farmers it showed non-significant relationship.

The Table 30 clearly reveals that financial capital of the groundnut farmers in Krishna and Warangal districts showed non-significant relationship after adoption of recommended groundnut technologies.

4.4.3 Comparison of recommended chilli technologies on chilli farmers of Krishna, Warangal and Anantapur districts

Table 31 indicates that majority of the farmers in Warangal and Anantapur districts had less favourable to favourable attitude towards recommended technologies.

A Close look at the Table 31 revealed that a majority of the chilli farmers in Warangal and Anantapur districts possessed low level of adoption of recommended technologies.

Table 31: Comparison of recommended chilli technologies on farmers of Krishna, Warangal and Anantapur districts

Krishna district

	Category			Respondents Frequency	%
1.	Attitude	Less favourbale		9	37.50
		Favourbale		11	45.84
		More favourbale		4	16.66
2.	Adoption	Low		10	41.67
		Medium		10	41.67
		High		4	16.66
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	2132.5	2391. 46	12.14	2.042*
4.	Profitability	56250	6756 6.68	20.12	2.12*
5.	Livelihoods				
a.	Physical capital	2.74	3.27	19.34	2.73**
b.	Natural capital	3.42	2.17	-36.5	3.98**
c.	Financial capital	6750	8500	25.92	0.88NS
d.	Social capital	0.79	1.29	63.29	1.33NS
	Livelihoods	PM	SM	PI	't' value
e.	Human capita	16.41	14	17.26	2.71**

Warangal district

	Category			Respondents F	%
1.	Attitude	Less favourbale		11	45.84
		Favourbale		9	37.50
		More favourbale		4	16.66
2.	Adoption	Low		13	54.17
		Medium		6	25.00
		High		5	20.83
	Impact indicators	BA	AA	PI	't' value
3.	Productivity	1565. 5	1654. 79	5.70	0.742NS
4.	Profitability	3446 6.66	3926 6.58	13.93	1.105NS
5.	Livelihoods				
a.	Physical capital	2.95	12.5	76.40	6.5939**
b.	Natural capital	3.08	1.86	-39.61	4.5370**
c.	Financial capital	9791. 66	1050 0	7.23	0.422NS
d.	Social capital	1.62	2.29	41.36	1.97996*
	Livelihoods	PM	SM	PI	't' value
e.	Human capita	17.1 25	17	0.73	0.217NS

Anantapur district

	Category			Respondents F	%
1.	Attitude	Less favourbale		9	37.50
		Favourbale		9	37.50
		More favourbale		6	25.00
2.	Adoption	Low		11	45.84
		Medium		10	41.66
		High		3	12.50
	Impact indicators	BA	AA	PI	't'.value
3.	Productivity	1010.2 1	1160. 83	14.91	2.24*
4.	Profitability	21662. 49	2617 5	20.83	0.92NS
5.	Livelihoods				
a.	Physical capital	2.09	2.79	33.49	5.23**
b.	Natural capital	3.45	2.18	- 36.81	4.32**
c.	Financial capital	8650.2 3	9520. 41	10.05	1.01NS
d.	Social capital	0.75	1.42	89.33	2.08*
	Livelihoods	PM	SM	PI	't' value
e.	Human capita	17.75	17	4.41	0.99NS

**-- Significant at 0.01 level of probability   * -- Significant at 0.05 level of probability   NS-- Non-significant

From the Table 31, it was observed that there was significant difference in the productivity of the chilli crop of Krishna, Warangal and Anantapur district farmers before and after adoption of recommended technologies.

Table 31 reveals that the profitability of chilli crop of Warangal and Anantapur district farmers before and after adoption of recommended technologies showed non-significant relationship.

From the Table 31 it was observed that the financial capital of the chilli farmers showed non-significant relation after adoption of recommended technologies in all the three selected districts.

Table 32: Problems faced by research scientists in generation of rice technologies and their suggestions to overcome them

n=22

S. No.	Problems	F	%	Suggestions	F	%
I.	**Technological**					
1.	Inconsistent performance due to lower magnitude of heterosis	2	9.09	Studies on characterization and functional validation of genes responsible for yield	3	13.63
2.	Effect of herbicidal application on soil and plant environment	1	4.54	Skilled labour is required to carryout these experiments	1	4.54
3.	Wide variation in weed species	1	4.54	Safe herbicidal application	1	4.54
4.	Out crossing rates is very low	3	13.63	Due care is required at the time of cross pollination	1	4.54
5.	Less number of experiments on characterization and improved grain quality	4	18.18	More number of experiments should be conducted on characterization and improved grain quality	4	18.18
6.	The cultivars with variation in phenology will react differently to drought	2	9.09	Need to develop drought resistant varieties	1	4.54
7.	Shallow rootedness of rice results in frequent water stress	3	13.63	Frequent irrigations should be provided to the experimental fields	2	9.09
8.	Cost of hybrid seeds are very high	2	9.09	Need to develop more number of CMS lines	2	9.09
9.	Biotype variation in gall midge	6	27.27	More research is needed on different biotypes	3	13.63
II.	**Economical problems**					
1.	Non availability of funds in time	4	18.18	Providing funds in time	3	13.63
2.	Lack of incentives and inadequate facilities at research station	5	22.72	Need to provide incentives for innovative research	6	27.27
III.	**Social problem**					
1.	Lack of coordination from different departments in multidisciplinary experiments	5	22.72	Co-operation and co-ordination among different departments are to be encouraged	2	9.09
2.	Lack of positive response from higher authorities for innovative research	4	18.18	Allocation of adequate funds for research activities	3	13.63
IV.	**Situational problems**					
1.	Salinity problems in rice	4	18.18	Experiments on varietal responses to salinity are needed.	3	13.63
2.	Recommendations of nitrogen fertilizer application vary with location	6	27.27	Research on location specific recommendations are needed	4	18.18
3.	High water table in Coastal region	2	9.09	Adequate drainage facilities should be provided	1	4.54
V.	**Organisational**					
1.	Coincidence of critical stage of experiment with university works	4	18.18	Consider researcher schedule before allotting any work	4	18.18
2.	More miscellaneous work	5	22.72	Avoid allotment of miscellaneous work	5	22.72

F- Frequency %- Percentage

4.5 Problems faced by the research scientists in technology generation and their suggestions to overcome them

4.5.1 Problems faced by the research scientists in generation of rice technologies and their suggestions to overcome them

An attempt was made to identify the critical problems faced by the research scientists in technology generation for rice crop and their suggestion to over come them. Their responses were presented in Table 32. The problems and suggestions were grouped in to five categories *i.e.,* technological, economical, social, situational and organizational.

Technological problems elicited by the research scientists are biotype variation in gall midge, less number of experiments on characterization and improved grain quality, shallow rootedness of rice results in frequent water stress, out crossing rates is very low, the cultivars with variation in phenology will react differently to drought, inconsistent performance due to lower magnitude of heterosis, cost of hybrid seeds are very high, wide variation in weed species and effect of herbicidal application on soil and plant environment.

Economical problems are lack of incentives and inadequate facilities at research station and non-availability of funds in time.

Social problems are lack of coordination from different departments in multidisciplinary experiments and lack of positive response from higher authorities for innovative research.

Situational problems are recommendations of nitrogen fertilizer application vary with location, salinity problems in rice and high water Table in coastal region.

Organisational problems are more miscellaneous work and Coincidence of critical stage of experiment with university works.

Technological suggestions elicited by the research scientists to overcome the technological problems are more research is needed on different biotypes, more number of experiments should be conducted on characterization and improved grain quality, frequent irrigations should be provided to the experimental fields, due care is required at the time of cross pollination, need to develop drought resistant varieties, studies on characterization and functional validation of genes responsible for yield, need to develop more number of CMS lines, safe herbicidal application and skilled labour is required to carryout these experiments.

Suggestions to overcome the economical problems are need to provide incentives for innovative research and providing funds in time.

Suggestions to overcome the social problems are co-operation and co-ordination among different departments are to be encouraged and allocation of adequate funds for research activities.

Suggestions to overcome the situational problems are research on location specific recommendations are needed, experiments on varietal responses to salinity are needed and adequate drainage facilities should be provided.

Suggestions to overcome the organizational problems are avoid allotment of miscellaneous work and consider researcher schedule before allotting any work.

Table 33: Problems faced by research scientists in generation of groundnut technologies and their suggestions to overcome them

n=16

S.No	Problems	F	%	Suggestions	F	%
I.	**Technological problems**					
1.	Resistance developed in fungal pathogens against site specific fungicides	5	31.25	Avoid repeated spraying of same fungicide	4	25.00
2.	Decrease in soil organic matter content due to soil erosion	1	6.25	Growing pasture crops during non crop period	1	6.25
3.	Lack of effective intercropping system in groundnut	6	37.50	Research on specific intercropping system should be needed	5	31.25
4.	Erratic rains resulting in uneconomical yields	4	25.00	Provision of assured irrigation facility to the research station	3	18.75
5.	Influence of Soil moisture regimes on the microclimate	3	18.75	Research is needed on different soil moisture levels with microbial population	2	12.50
6.	Impact of different IPM practices are unknown	4	25.00	To evaluate the effect of IPM practices on groundnut and their impact takes a long time	4	25.00
7.	Affect of epistatic variance in groundnut	4	25.00	Double cross analysis provides additional information on different order of gene interaction	4	25.00
8.	Improper selection of parents for hybridisation	2	12.50	Proper care should be needed at the time of selection of parents	2	12.50
II.	**Economical problems**					
1.	Lack of adequate funds to conduct research	3	18.75	To provide adequate and timely funding to research	1	6.25
III.	**Social problems**					
1.	Lack of proper planning and coordination for IPM project	4	25.00	Effective planning and coordination should be needed for IPM project	3	18.75
2.	IPM experiments are cumbersome	3	18.75	Division of work among different disciplines are needed	2	12.50
IV.	**Situational problems**					
1.	Lack of skilled labour	3	18.75	Farm labour should be trained enough	3	18.75
2.	Lack of working staff	5	31.25	Fill the vacancies according to the requirement	5	31.25
3.	Inadequate animal power	4	25.00	Mechanization of the farm as per demand	4	25.00
4.	Lack of modern radio tracer laboratories	2	12.50	Provide modern sophisticated laboratories fitted with radio tracers	3	18.75
V.	**Organizational problems**					
1.	Weak infrastructure facilities	2	12.50	Provide sufficient infrastructure facilities	2	12.50
2.	Lack of transport facilities for field visits	2	12.00	Provide sufficient transport facilities for field visits	1	6.25
3.	Excessive work load	3	18.75	Reduce the work load to conduct smooth research	3	18.75

F- Frequency %- Percentage

4.5.2 Problems faced by the research scientists in generation of groundnut technologies and their suggestions to overcome them

Cursory examination of the Table 33 reveals that several problems faced by the groundnut scientists in technology generation and their suggestion to overcome the said problems. The problems and suggestions were grouped in to five categories *i.e.,* technological, economical, social, situational and organizational.

Technological problems elicited by the research scientists are lack of effective intercropping system in groundnut, affect of epistatic variance in groundnut, impact of different IPM practices are unknown, resistance developed in fungal pathogens against site specific fungicides, erratic rains resulting in uneconomical yields, influence of soil moisture regimes on the microclimate, improper selection of parents for hybridization and decrease in soil organic matter content due to soil erosion.

Economical problem is lack of adequate funds to conduct research.

Social problems are lack of proper planning and coordination for IPM project and IPM experiments are cumbersome.

Situational problems are lack of working staff, lack of skilled labour, inadequate animal power and lack of modern radiotracer laboratories.

Organisational problems are excessive workload, lack of transport facilities for field visits and weak infrastructure facilities.

Technological suggestions elicited by the research scientists to overcome the technological problems are research on specific intercropping system should be needed, avoid repeated spraying of same fungicide, double cross analysis provides additional information on different order of gene interaction, to evaluate the effect of IPM practices on groundnut and their impact takes a long time, provision of assured irrigation facility to the research station, research is needed on different soil moisture levels with microbial population, proper care should be needed at the time of selection of parents and growing pasture crops during non crop period.

Suggestion to overcome the economical problem is to provide adequate and timely funding to research.

Suggestions to overcome the social problems are effective planning and coordination should be needed for IPM project and division of work among different disciplines.

Suggestions to overcome the situational problems are fill the vacancies according to the requirement, mechanization of the farm as per demand, provide modern sophisticated laboratories fitted with radiotracers and farm labour should be trained enough.

Suggestions to overcome the organisational problems are reduce the workload to conduct smooth research, provide sufficient infrastructure facilities and provide sufficient transport facilities for field visits.

Table 34: Problems faced by research scientists in generation of chilli technologies and their suggestions to overcome them

n=8

S.No.	Problems	F	%	Suggestions	F	%
I.	**Technological problems**					
1.	Higher concentration (more than 10 ppm) of growth hormones cause epinasty	2	25.00	Only scientist or skilled labour should prepare the required chemical based on the dosage	2	25.00
2.	Higher moisture and improper drying causes thermal injury to the seed	3	37.50	Recommended moisture content levels should be maintained at the time of drying	3	37.50
3.	Poor germination in shade drying fruits	2	25.00	Pods with optimum moisture content should be dried with thermal driers	3	37.50
4.	Affect of excess application of GA_3 on the seed quality characters.	1	12.50	Need to develop effective and economical dosage to minimize the loss	1	12.50
5.	High sensitivity to soil moisture	2	25.00	Irrigation should be provided based on water requirement of the crop	2	25.00
6.	Susceptibility to several viral diseases	5	62.50	Need to develop virus resistant varieties	4	50.00
7.	Sun drying is time consuming for drying chilli	1	12.50	Appropriate drying methods should be developed	1	12.50
8.	Information on seasonal occurrence and source of resistance to virus diseases are not available	4	50.00	Need to conduct more experiments on seasonal occurrence and source of resistance to virul diseases	2	25.00
II.	**Economical problems**					
1.	Lack of incentives to innovative research	3	37.50	Provide incentives for innovative research	1	12.50
2.	Untimely supply of funds for conducting research	4	50.00	Supply of funds should be in time	2	25.00
III.	**Social problems**					
1.	Misconception with regard to some practices	4	50.00	Educate the farmers about recommended technologies	3	37.50
2.	Low participation of extension scientists and farmers at the time of research project proposal	5	62.50	Encourage the participation of researchers, extension scientists and farmers during the project proposal	5	62.50
IV.	**Situational problems**					
1.	Labour problem during peak season	2	25.00	Farm mechanisation should be introduced	2	25.00
2.	Occurrence of floods during the period of conducting experiments	3	37.50	Green house or poly houses should be established for some experiments	2	25.00
V.	**Organizational problems**					
1.	Inadequate infrastructure at research station	4	50.00	Provide required infrastructure at research station	3	37.50
2.	Low financial resources to buy growth regulators	3	37.50	Growth regulators should be provided on subsidized basis	2	25.00

F- Frequency %- Percentage

4.5.3 Problems faced by the research scientists in generation of chilli technologies and their suggestions to overcome them

An attempt was made to identify the critical problems faced by the research scientist in technology generation of chilli crop and their suggestions to overcome them and the responses were presented in Table 34. The problems and suggestions were grouped in to five categories *i.e.,* technological, economical, social, situational and organizational.

Technological problems elicited by the research scientists in technology generation of chilli crop are susceptibility to several viral diseases, information on seasonal occurrence and source of resistance to virus diseases are not available, higher moisture and improper drying causes thermal injury to the seed, poor germination in shade drying fruits, high sensitivity to soil moisture, higher concentration (more than 10 ppm) of growth hormones cause epinasty, sun drying is time consuming for drying chilli and affect of excess application of GA_3 on the seed quality characters.

Economical problems are untimely supply of funds for conducting research and lack of incentives to innovative research.

Social problems are low participation of extension scientists and farmers at the time of research project proposal and misconception with regard to some practices.

Situational problems are occurrence of floods during the period of conducting experiments and labour problem during peak season.

Organisational problems are low financial resources to buy growth regulators and inadequate infrastructure at research station.

Technological suggestions elicited by the research scientists to overcome the technological problems are need to develop virus resistant varieties, need to conduct more experiments on seasonal occurrence and source of resistance to viral diseases, recommended moisture content levels should be maintained at the time of drying, pods with optimum moisture content should be dried with thermal driers, irrigation should be provided based on water requirement of the crop, only scientist or skilled labour should prepare the required chemical based on the dosage, appropriate drying methods should be developed and need to develop effective and economical dosage to minimize the loss.

Suggestions to overcome the economical problems are supply of funds should be in time and provide incentives for innovative research.

Suggestions to overcome the social problems are encourage the participation of researchers, extension scientists and farmers during the project proposal and educate the farmers about recommended technologies

Suggestions to overcome the situational problems are green house or poly houses should be established for some experiments and farm mechanisation should be introduced.

Suggestions to overcome the organisitional problems are growth regulators should be provided on subsidized basis and provide required infrastructure at research station.

Table 35: Problems faced by extension scientists in dissemination of recommended rice technologies and their suggestions to overcome them

n=12

S.No.	Problems	F	%	Suggestions	F	%
I.	**Technological problems**					
1.	Adoption of dwarf varieties may leads to a misidentification of the yield constraints	6	50.00	More research is needed on qualitative traits of dwarf varieties	6	50.00
2.	Herbicidal weed control requires investment and not feasible for subsistence farmers	10	83.33	Need to develop low cost technologies.	8	66.66
3.	Farmers are not convinced with herbicidal application	10	83.33	Create awareness about use of herbicidal application	9	75.00
4.	Lack of literature on proven IPM technologies	9	75.00	University should provide sufficient literature to the extension scientists on IPM technologies.	7	58.33
5.	Untimely feedback from the farmers	4	33.33	Telinetwork should be improved	3	25.00
6.	Difficulty in disseminating skill oriented technologies	9	75.00	Practical skills should be imparted to extension scientist by conducting trainings by the researchers	6	50.00
7.	Lack of high yielding and early maturing varieties	11	91.66	Research scientists should work on plant genetic characters	10	83.33
II.	**Economical problems**					
1.	Untimely supply of funds to conduct demonstrations	8	66.66	Timely supply of funds to the extension scientists for conducting demonstrations	6	50.00
III.	**Social problems**					
1.	Cultural diversity	8	66.66	Educate the farmers on certain misconceptions	6	50.00
2.	Lack of people participation in DAATTC trainings	10	83.33	Arrange training schedules based on farmers convenience	8	66.66
IV.	**Situational problems**					
1.	Inadequate transport facilities to visit farmers' fields	5	41.66	Adequate transport facility should be provided	2	16.66
2.	Problematic soils	9	75.00	Location specific recommendation should be needed	6	50.00
3.	Existence of socio-economic diversity	6	50.00	Need to develop suitable technologies for different categories of farmers	4	33.33
V.	**Organisational problems**					
1.	Lack of mobile training units	5	41.66	Provision of mobile training units to DAATTC	4	33.33
2.	Mismatch between supply and demand of skilled labour	3	25.00	Recruit sufficient number of skilled labour	2	16.66

F- Frequency %- Percentage

4.6 Problems faced by the extension scientists in technology dissemination and their suggestions to overcome them

4.6.1 Problems faced by the extension scientists in dissemination of recommended rice technologies and their suggestions to overcome them

In present investigation, an attempt was made to elicit the critical problems faced by the extension scientists in technology dissemination and their suggestions to over come them .A list of problems and suggestions given by the extension scientists was furnished in the Table 35.

Technological problems elicited by the extension scientists in disseminating rice technologies are lack of high yielding and early maturing varieties, farmers are not convinced with herbicidal application, herbicidal weed control requires investment and not feasible for subsistence farmers, lack of literature on proven IPM technologies, difficulty in disseminating skill oriented technologies, adoption of dwarf varieties may leads to a misidentification of the yield constraints and untimely feedback from the farmers.

Economical problem is untimely supply of funds to conduct demonstrations

Social problems are lack of people participation in DAATTC trainings and cultural diversity.

Situational problems are problematic soils, existence of socio-economic diversity and inadequate transport facilities to visit farmers' fields.

Organisational problems are lack of mobile training units and mismatch between supply and demand of skilled labour

Technological suggestions elicited by the extension scientists to overcome the technological problems are research scientists should work on plant genetic characters, create awareness about use of herbicidal application, need to develop low cost technologies, university should provide sufficient literature to the extension scientists on IPM technologies, practical skills should be imparted to extension scientist by conducting trainings by the researchers, more research is needed on qualitative traits of dwarf varieties and teli network should be improved.

Suggestion to overcome the economical problem is timely supply of funds to the extension scientists for conducting demonstrations.

Suggestions to overcome the social problems are arrange training schedules based on farmers convenience and educate the farmers on certain misconceptions.

Suggestions to overcome the situational problems are location specific recommendation should be needed, need to develop suitable technologies for different categories of farmers and adequate transport facility should be provided.

Suggestions to overcome organizational problems are provision of mobile training units to DAATTC and recruit sufficient number of skilled labour

4.6.2 Problems faced by the extension scientists in dissemination of recommended groundnut technologies and their suggestions to overcome them

The data pertaining to the problems faced by the extension scientists in technology dissemination of groundnut crop and their suggestions to overcome the problems has been furnished in the Table 36.

Technological problems elicited by the extension scientists in dissemination of groundnut technologies are ferti-cum seed drillers are unsuitable to rain fed conditions,

Table 36: Problems faced by extension scientists in dissemination of recommended groundnut technologies and their suggestions to overcome them

n=12

S.No.	Problems	F	%	Suggestions	F	%
I.	**Technological problems**					
1.	Ferti-cum seed drillers are unsuitable to rain fed conditions	10	83.33	Suitable ferti-cum seed drillers should be designed	9	75.00
2.	Availability of technical information on groundnut crop is meager	7	58.33	Sufficient information materials on groundnut crop should be provided	4	33.33
3.	Lack of manpower to carryout extension activities in Anantapur	8	66.66	Provide sufficient staff to conduct all the extension activities	6	50.00
4.	Non adoption of recommended spacing	9	75.00	Awareness should be created on importance of spacing	9	75.00
5.	It is difficult to co-ordinate existing input supply procedure	5	41.66	Seek government intervention on present input supply procedure	4	33.33
6.	Inadequate materials and equipments to conduct kisan melas and exhibition on groundnut crop	9	75.00	University should provide sufficient funds for preparation of exhibits	8	66.66
7.	Time of sowing depends on climatic conditions	3	25.00	Varieties with wide adaptability should be developed	2	16.66
II.	**Economical problems**					
1.	Inadequate funds to conduct trainings	6	50.00	University should provide required funds to conduct trainings	5	41.66
III.	**Social problems**					
1.	Illiteracy of farmers	3	25.00	Provide sufficient functional literacy to the farmers	1	8.33
2.	Adoption of IPM technologies demands for community approach	4	33.33	Educate the farmers on advantages of community approach	2	16.66
IV.	**Situational problems**					
1.	Water logging adversely affects the germination of groundnut seeds	2	16.66	Develop varieties that are suitable for water logging situation	2	16.66
2.	Non coperational attitude of farmers to conduct demonstrations	4	33.33	Motivate the farmers on advantages of adoption of recommended technologies	3	25.00
V.	**Organisational problems**					
1.	Inadequate staff in Anantapur district	2	16.66	Adequate staff should be provided	2	16.66
2.	No technical personnel to guide the farmers after conducting demonstrations	3	25.00	Technical persons are needed to carry out demonstrations	2	16.66

F- Frequency %- Percentage

non adoption of recommended spacing, inadequate materials and equipments to conduct kisan melas and exhibition on groundnut crop, lack of manpower to carryout extension activities in Anantapur, availability of technical information on groundnut crop is meager, it is difficult to co-ordinate existing input supply procedure and time of sowing depends on climatic conditions

Economical problem is inadequate funds to conduct trainings

Social problems are adoption of IPM technologies demands for community approach and illiteracy of farmers.

Situational problems are water logging adversely affects the germination of groundnut seeds and non-coperational attitude of farmers to conduct demonstrations.

Organisational problems are no technical personnel to guide the farmers after conducting demonstrations and inadequate staff in Anantapur district

Technological suggestions elicited by the extension scientists to overcome the technological problems are suitable ferti-cum seed drill should be designed, awareness should be created on importance of spacing, university should provide sufficient funds for preparation of exhibits, provide sufficient staff to conduct all the extension activities, sufficient information materials on groundnut crop should be provided, seek government intervention on present input supply procedure and varieties with wide adaptability should be developed.

Suggestion to overcome the economical problem is university should provide required funds to conduct trainings

Table 37: Problems faced by extension scientists in dissemination of recommended chilli technologies and their suggestions to overcome them.

n=12

S.No.	Problems	F	%	Suggestions	F	%
I.	**Technological problems**					
1.	No hybrids from university	9	75.00	University should concentrate on developing the hybrids	8	66.66
2.	Farmers not convinced with the soil application of carbofuran to control pest population.	1	8.33	Need to conduct demonstration on farmers fields with the help of research scientists	2	16.66
3.	Lack of sufficient knowledge on preparation of growth hormone solutions	7	58.33	Demonstration should be provided on growth hormone preparation	6	50.00
4.	Lack of co-ordination between researchers and extension persons	1	8.33	Coordination between researchers and extension scientists should be encouraged	1	8.33
5.	Wide host range of pod borers	6	50.00	Broad spectrum chemicals should be recommended	6	50.00
6.	Unavailability of location specific varieties	2	16.66	Location specific varieties should be developed	3	25.00
7.	Wilting problem in uprooted seedlings	8	66.66	Uprooted seedling should be maintained under wet conditions	8	66.66
8.	Farmers are unaware of quality parameters	5	41.66	Educate the farmers on quality characters of chillis	4	33.33
II.	**Economical problems**					
1.	Inadequate and untimely release of funds	3	25.00	Provide sufficient and timely funds	1	8.33
2.	High cost of growth regulators	1	8.33	Reduce the cost of growth regulators	2	25.00
III.	**Social problems**					
1.	Farmers are not satisfied with the results of the recommended technologies	6	50.00	Impact studies are needed to identify the gross root level problems	2	16.66
2.	Difficult to diagnose all the crop related problems	3	25.00	Diagnostic center should be established at each DAATTC	2	16.66
3.	Cultural diversity of the farmers	4	33.33	Widely acceptable technologies should be developed	5	41.66
IV.	**Situational problems**					
1.	Present extension system is not suitable for effective technology dissemination	4	33.33	Bottom-up approach should be followed	2	16.66
2.	Inadequate information on micronutrient deficiency	5	41.66	Research scientists should concentrate on micronutrient research	4	33.33
V.	**Organisational problems**					
1.	It is difficult for extension scientist to visit the whole district	5	41.66	Need to provide transport facility and financial assistance for covering the whole district	3	25.00
2.	Lack of scientists for all the subjects	4	33.33	Recruit the needed staff	1	8.33

F- Frequency %- Percentage

Suggestions to overcome the social problems are educate the farmers on advantages of community approach and provide sufficient functional literacy to the farmers.

Suggestions to overcome the situational problems are develop varieties that are suitable for water logging situation and motivate the farmers on advantages of adoption of recommended technologies.

Suggestions to overcome the organisitional problems are technical persons are needed to carry out demonstrations and adequate staff should be provided.

4.6.3 Problems faced by the extension scientists in dissemination of recommended chilli technologies and their suggestions to overcome them

An attempt was made to identify the critical problems faced by the extension scientists in technology dissemination of chilli crop and their suggestions to over come the said problems. A list problems and suggestions gathered from the respondents after posing relevant questions and data were furnished in the Table 37. The problems and suggestions were grouped in to five categories *i.e.,* technological, situational, economical, social and organizational.

Technological problems elicited by the extension scientists in disseminating the chilli technologies are no hybrids from university, wilting problem in uprooted seedlings, lack of sufficient knowledge on preparation of growth hormone solutions, wide host range of pod borers, farmers are unaware of quality parameters, unavailability of location specific varieties, farmers not convinced with the soil application of carbofuran to control pest population and lack of co-ordination between researcher scientists and extension persons.

Economical problems are inadequate and untimely release of funds and high cost of growth regulators.

Social problems are farmers are not satisfied with the results of the recommended technologies, cultural diversity of the farmers and difficult to diagnose all the crop related problems.

Situational problems are inadequate information on micronutrient deficiency and present extension system is not suitable for effective technology dissemination.

Organisational problems are it is difficult for extension scientist to visit the whole district and lack of scientists for all the subjects.

Technological suggestions elicited by the extension scientists to overcome the technological problems in disseminating the chilli technologies are university should concentrate on developing the hybrids, uprooted seedling should be maintained under wet conditions, demonstration should be provided on growth hormone preparation, broad spectrum chemicals should be recommended, educate the farmers on quality characters of chillies, location specific varieties should be developed, need to conduct demonstration on farmers fields with the help of research scientists and coordination between researchers and extension scientists should be encouraged

Suggestions to overcome the economical problems are provide sufficient and timely funds and reduce the cost of growth regulators.

Suggestions to overcome the social problems are widely acceptable technologies should be developed, impact studies are needed to identify the gross root level problems and diagnostic center should be established at each DAATTC.

Table 38: Production constraints faced by the rice farmers in adoption of recommended rice technologies and their suggestion to overcome them

n=72

S.No.	Problems	F	%	Suggestions	F	%
1.	High cost of hybrid seed	43	59.72	Hybrid seed should be supplied on subsidized rates	39	54.16
2.	Poor taste of hybrid rice.	16	22.23	Taste of the hybrid rice should be improved	14	19.44
3.	Cooking quality of Vijetha variety is low	18	25.00	Need to improve the cooking quality characters of Vijetha variety	9	12.50
4.	Lack of good price support	32	44.44	Higher price support should be provided for produce	26	36.11
5.	High cost of critical inputs	45	63.88	Timely and adequate supply of inputs at reasonable cost	42	58.33
6.	Lack of awareness on use of pheromone traps	28	38.88	Technical guidance should be provided through demonstrations	15	20.83
7.	Expensive nature of recommended herbicides as well as equipments	39	54.16	Cost of herbicides and equipments should be reduced	23	31.94
8.	Poor contact of extension worker with farmers	26	36.11	Gap between extension worker and farmer should be reduced	19	26.38
9.	Lack of knowledge on seedling root dip technique	56	77.77	Skill demonstration on seedling root dip technique should be conducted	43	59.72
10.	Low yields of early maturity varieties	12	16.66	Varieties with high yield potential and early maturity should be developed	8	11.11
11.	Unavailability of quality and quantity of recommended rice varieties	46	63.88	Improved seed of rice be made available in sufficient quantity	43	59.72
12.	Lack of credit facility to follow recommended operations	42	58.33	Sought Government intervention for providing timely credit facilities	34	47.22
13.	Exorbitant price of pesticide and its ineffectiveness against pests	37	51.38	Continuous monitoring is needed on cost and quality of pesticides	16	22.22

F- Frequency %- Percentage

Suggestions to overcome the situational problems are research scientists should concentrate on micronutrient research and bottom-up approach should be followed

Suggestions to overcome the organisational problems are need to provide transport facility and financial assistance for covering the whole district and recruit the needed staff.

4.7 Production constraints faced by the farmers in adoption of recommended technologies and their suggestions to overcome them

An attempt was made to identify the critical production constraints faced by the farmers in adoption of recommended technologies in rice, groundnut and chilli crops. A list of production constraints and suggestions to overcome these constraints were gathered from the respondents after posing the relevant questions, frequency and percentages were worked out in order to understand the more urgent needs of the respondents to workout suitable measures by the university.

4.7.1 Production constraints faced by the rice farmers in adoption of recommended rice technologies and their suggestion to overcome them

A cursory look at the Table 38 reveals that lack of knowledge on seedling root dip technique, unavailability of quality and quantity of recommended rice varieties, high cost of critical inputs, high cost of hybrid seed, lack of credit facility to follow recommended operations, expensive nature of recommended herbicides as well as equipments, exorbitant price of pesticide and its ineffectiveness against pests, lack of good price support, lack of awareness on use of pheromone traps, poor contact of extension worker with farmers, cooking quality of Vijetha variety is low, poor taste of hybrid rice and low

Table 39: Production constraints faced by the groundnut farmers in adoption of recommended groundnut technologies and their suggestion to overcome them

n=72

S.No.	Problems	F	%	Suggestions	F	%
1.	Lack of cooperation from fellow farmers on IPM practices	29	40.27	Educate the farmers about the advantages of community approach	23	31.94
2.	Crop failure due to adverse climatic conditions	8	11.11	Drought resistant varieties should be developed	7	9.72
3.	Non availability of required quantity of FYM	18	25	Educate farmers about preparation of vermicompost	15	20.83
4.	Unavailability of required quantity of seed	53	73.61	Required quantity of seed should be provided	42	58.33
5.	Small land holdings to adopt recommended technologies	36	50.00	Develop technologies which are suitable for small land holdings	18	25.00
6.	Lack of knowledge on seed treatment	34	47.22	Demonstration on seed treatment should be conducted	25	34.72
7.	Difficult to follow spacing as it requires more time	39	54.16	Develop equipment for maintaining recommended spacing	43	59.72
8.	Time of sowing influenced by the seasonal conditions	29	40.27	Develop different varieties which are suitable for different dates of sowings	19	26.38
9.	Lack of literature on IPM practices	25	34.72	Sufficient literature on IPM practices should be provided	12	16.66
10.	Lack of knowledge on inter cropping practices	37	51.38	Educate the farmers on intercropping practices	27	37.50
11.	Non availability of loans to adopt recommended technologies	52	72.22	Provide credit facility to adopt recommended technologies	19	26.38
12.	Poor contact of extension agency with farmer	36	50.00	Coordination between Extension agency and farmers should be developed	30	41.66

F- Frequency %- Percentage

yields of early maturity varieties were considered to be the production constraints that are faced by the rice farmers in adoption of recommended rice technologies.

Table 38, reveals that the suggestions given by the respondents to overcome the production constraints. They are skill demonstration on seedling root dip technique should be conducted, improved seed of rice be made available in sufficient quantity, timely and adequate supply of inputs at reasonable cost, hybrid seed should be supplied on subsidized rates, sought Government intervention for providing timely credit facilities, cost of herbicides and equipments should be reduced, continuous monitoring is needed on cost and quality of pesticides, higher price support should be provided for produce, technical guidance should be provided through demonstrations, gap between extension worker and farmer should be reduced, need to improve the cooking quality characters of Vijetha variety, taste of the hybrid rice should be improved and varieties with high yield potential and early maturity should be developed.

4.7.2 Production constraints faced by the groundnut farmers in adoption of recommended groundnut technologies and their suggestions to overcome them

A list of production constraints faced by the groundnut farmers was furnished in the Table 39. They are unavailability of required quantity of seed, non availability of loans to adopt recommended technologies, difficult to follow spacing as it requires more time, lack of knowledge on inter cropping practices, poor contact of extension agency with farmer, small land holdings to adopt recommended technologies, lack of knowledge on seed treatment, lack of cooperation from fellow farmers on IPM practices, time of sowing influenced by the seasonal conditions, lack of literature on IPM practices, non

Table 40: Production constraints faced by the chilli farmers in adoption of recommended chilli technologies and their suggestions to overcome them

n=72

S.No.	Problems	F	%	Suggestions	F	%
1.	University recommended varieties are giving low yields	16	22.22	Hybrids should be developed	12	16.66
2.	Problem of more pests and diseases	56	77.77	Pests and disease resistant varieties should be developed	46	63.88
3.	Lack of knowledge on seed treatment	45	62.50	Demonstrations on seed treatment should be conducted	38	52.77
4.	Small land holdings	13	18.05	Develop technologies which are suitable for small land holdings	7	9.72
5.	Pest management practices require high initial investments	19	26.38	Low cost pest management practices should be advised	13	18.05
6.	Fear of defoliation due to spraying of growth hormones	32	44.44	Conduct demonstrations on preparation of growth hormone solution	19	26.38
7.	Lack of technical guidance on post harvest techniques	7	9.72	Educate the farmers on post harvest techniques	4	5.55
8.	Lack of knowledge on pod quality characters	5	6.94	Need to educate the farmers on different quality characters of chilli pods	3	4.16
9.	Timely pickings are not done due to non-availability of labour	19	26.38	Pod picker equipment should be developed	12	16.66
10.	Degradation in quality due to high moisture content at the time of storage	42	58.33	Effective pod drying mechanism should be developed	16	22.22
11.	High cost of seed	43	59.72	Seed should be provided with reasonable price	34	47.22
12.	Non availability of adequate quantity of seed	16	22.22	Improved seed to be provided in time	11	15.27

F- Frequency %- Percentage

availability of required quantity of FYM and crop failure due to adverse climatic conditions

A list of suggestion to overcome the production constraints faced by the groundnut farmers was furnished in the Table 39. They are required quantity of seed should be provided, provide credit facility to adopt recommended technologies, develop equipment for maintaining recommended spacing, educate the farmers on intercropping practices, coordination between extension agency and farmers should be developed, develop technologies which are suitable for small land holdings, demonstration on seed treatment should be conducted, educate the farmers about the advantages of community approach, develop different varieties which are suitable for different dates of sowings, sufficient literature on IPM practices should be provided, educate farmers about preparation of vermicompost and drought resistant varieties should be developed were considered to be the suggestion given by the groundnut farmers to overcome production constraints in adoption of recommended chilli technologies.

4.7.3 Production constraints faced by the chilli farmers in adoption of recommended chilli technologies and their suggestions to overcome them

A critical observation of the Table 40, reveals that problem of more pests and diseases, lack of knowledge on seed treatment, high cost of seed, degradation in quality due to high moisture content at the time of storage, fear of defoliation due to spraying of growth hormones, timely pickings are not done due to non-availability of labour, pest management practices require high initial investments, non availability of adequate quantity of seed, university recommended varieties are giving low yields, small land holdings, lack of technical guidance on post harvest techniques and lack of knowledge on pod quality characters are production constraints faced by the chilli farmers in adoption of recommended chilli technologies were the production constraints faced by the chilli farmers in adoption of recommended chilli technologies.

A list of suggestions given by the chilli farmers to overcome production constraints was furnished in the Table 40. They are pests and disease resistant varieties should be developed, demonstrations on seed treatment should be conducted, seed should be provided with reasonable price, effective pod drying mechanism should be developed, conduct demonstrations on preparation of growth hormone solution, improved seed to be provided in time, pod picker equipment should be developed, low cost pest management practices should be advised, hybrids should be developed, develop technologies which are suitable for small land holdings, educate the farmers on post harvest techniques and need to educate the farmers on different quality characters of chilli pods.

4.8 Strategy for effective technology generation, assessment, refinement and their dissemination

Sixth objective of the study was to develop a strategy for effective technology generation, assessment, refinement and their dissemination. Strategy was given based on the findings of the study and with the vision of the researcher. Detailed strategy over a paradigm was discussed under discussion chapter.

CHAPTER V

DISCUSSION

DISCUSSION

In this Chapter results are discussed and meaningful conclusions were drawn. These findings were examined in relation to the reported findings of other investigations wherever possible.

The results of investigation were discussed under the following heads.

5.1 Impact of ANGRAU technologies on farmers of Krishna district.

5.2 Impact of ANGRAU technologies on farmers of Warangal district.

5.3 Impact of ANGRAU technologies on farmers of Anantapur district.

5.4 Comparison of recommended technologies on farmers of Krishan, Warangal and Anantapur districts

5.5 Problems faced by the researchers in technology generation and their suggestions to overcome them.

5.6 Problems faced by the extension scientists in technology dissemination and their suggestion to overcome them.

5.7 Production constraints faced by the farmers and their suggestions for adoption of recommended technologies.

5.8 Empirical model of the study

5.9 Strategy for effective technology generation, assessment, refinement and dissemination.

5.1 Impact of ANGRAU technologies on farmers of Krishna district

5.1.1 Rice farmers of Krishna district

5.1.1.1 Attitude

It is evident from the Table 2, the majority of the farmers expressed favourable (50.00%) attitude towards recommended ANGRAU technologies. The reason for such favourable attitude might be due to the fact that the farmers might have got higher yields by recommended technologies when compared to traditional practices. The finding was in concurrence with the findings of Biswas (1990) and Satya (1993).

5.1.1.2 Adoption

A perusal of the Table 3 vividly depicts that the majority of the respondents (41.67%) possessed medium level of adoption towards recommended technologies. The trend was due to the fact that Krishna district farmers were ready to take risk because of availability of irrigation water and more potential to yield high compared to rainfed areas, where the farmers plan their production practices as per the rainfall pattern only. This finding was in line with the findings of Khan (1999) and Satya (1993).

5.1.1.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.1.1.3.1 Productivity

Results furnished in Table 4a indicates the calculated 't' value for productivity found to be significant at 0.01 level of probability. This trend might have emerged because of the fact that those farmers who had favourable attitude towards recommended technologies would learn new farming ideas that may result more production and productivity. This might be due to knowledge gained by the farmers about recommended technologies by attending the various field visits and demonstrations organized by the extension scientists of ANGRAU. The findings were in tune with the results of Rajendran *et al.,* (2006).

5.1.1.3.2 Profitability

It could be seen from the Table 4a, with respect to profitability, positive and significant relationship was observed before and after adoption of recommended technologies. This may be due to the fact that most of the farmers agreed to work for higher yields and economic gains and also to try new ideas, which will help them to earn more profits. The finding was in agreement with findings of Tranthi *et al.,* (2001)

5.1.1.3.3 Improvement in livelihoods

5.1.1.3.3.1 Physical capital

It is evident from the Table 4a that the calculated 't' value of physical capital was found to be significant at 0.01 level of probability. The reason for such significant relationship might be due to the fact that the farmers purchased assets like tractor drawn implements, sprayers and drillers, which considerably increased their asset position. The finding was in concurrence with the findings of Lee (2003).

5.1.1.3.3.2 Natural capital

It was evident from the Table 4a that the Natural capital of the respondents showed negative and significant relationship before and after adoption of recommended ANGRAU technologies, the reason might be due to the fact that the farmers might have preferred to practice farming with new agricultural machinery and implements instead of cattle. And other reasons for decreasing cattle population was decrease in grazing lands and large scale out break of epidemic diseases during floods.

5.1.1.3.3.3 Financial capital

It could be seen from the Table 4a that there was a significant difference in the financial capital of the rice farmers before and after adoption of recommended technologies. The reason could be that most of the farmers agreed to work for higher yields and economic gains and also to try new ideas, which will help them to earn more income. The finding was in conformity with that of Fan *et al.,* (2000).

5.1.1.3.3.4 Social capital

Results indicate from the Table 4a that the adoption of recommended technologies showed positive and significant relationship in social capital. It is evident from the above discussion that majority of the farmers had favourable attitude towards ANGRAU technologies. It is quite natural that these farmers had regular information seeking habit through farm literature and from different social organizations. Farmers having membership in one or more orgenisations, have a better opportunity to discuss with the extension scientists, progressive farmers and other higher officials of the concerned organisitations, which created better knowledge about recommended technologies in turn helped in adoption of those technologies.

5.1.1.3.3.5 Human capital

It was evident from the Table 4b that the human capital of the respondents showed negative and significant relationship after adoption of recommended technologies. The fact that the adoption of recommended technologies generally empowers the respondents not only to understand the situation but get aware of problems and solutions to face situation because of their improvement in literacy level.

5.1.2 Krishna district groundnut farmers

5.1.2.1 Attitude

Results from the Table 5 indicates that majority (41.67%) of the respondents had favourable attitude whereas, (37.50%) had less favourable attitude followed by (20.83%) with more favourable attitude towards recommended ANGRAU technologies. It is fact that farmers of Krishna district have a better ability to understand new ideas and practices. These farmers have rational thinking, evaluation and understanding. This might be the possible reason for above trend. This result was in accordance with earlier study of Meti and Sundaraswamy (1998).

5.1.2.2 Adoption

It could be seen from the Table 6, that majority of the respondents occupied medium category (37.50%) of adoption and same per cent of the respondents (37.50%) were having low level of adoption followed by high level (25.00%) of adoption of recommended technologies. It was observed during field investigations, that the farmers were unable to cope up with high cost technologies involving additional inputs, thus it is beyond their reach to bring their entire land under recommended technologies. This result was in conformity with the similar findings of Farooq *et al.,* (1997) and Khan (1999).

5.1.2.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.1.2.3.1 Productivity

From the Table 7a, it was evident that the adoption of recommended technologies influenced the increase in average productivity of the respondents from 1176.06 kg/ha to 1234.44 kg/ha. The average productivity level of respondent rose by 4.96 per cent. This may due to the fact that the farmers are not in a position to adopt all the recommended practices. This result was in agreement with the findings of Velavan and Balakrishna (2000).

5.1.2.3.2 Profitability

It was evident from the Table 7a that the non-significant relationship was found in profitability between before and after adoption of recommended technologies. The possible reason for this might be that the groundnut farmers in this district still consider agriculture as a subsistence occupation and not as commercial one. These results were in accordance with the findings of Rao (1986).

5.1.2.3.3 Improvement in livelihoods

5.1.2.3.3.1 Physical capital

A perusal of the Table 7a vividly depicted that the significant relationship was found in physical capital before and after adoption of recommended technologies. The probable reason for this relationship might be due to the fact that the structure of farm implements and machinery owned by farmers show much higher asset base, since the recommended technologies has greatly advocated and recommended the use of improved implements in the place of traditional implements. The finding was in conformity with that of Rajaratnam (2000).

5.1.2.3.3.2 Natural capital

Table 7a indicated that the adoption of recommended technologies led to negative and significant relation in natural capital. This might be due to the fact that the use of animals for draught purpose was showing no significant growth hence, the farmer should revert to modern machinery drawn implements rather than animal drawn implements for carrying out all agricultural operations for cultivation. This result was in conformity with the earlier findings of Praksh (2006).

5.1.2.3.3.3 Financial capital

On cursory look at the data presented in Table 7a, it could be inferred that the calculated "t" value proved no significant difference in financial capital after adoption of recommended technologies. Financial capital of the farmer could be interpreted as a desire for more profits, which could be attained by means of more adoption and in turn would be determined by other factors like security of good yields from the land holding and availability of inputs.

Whereas, in this case, it requires no further explanation, as there was no much gain in the profitability after adoption of recommended technologies led to above said non-significant relationship. This result was in line with the findings of Sarma (2004).

5.1.2.3.3.4 Social capital

From the Table 7a, it was observed that there was significant difference in the social capital after adoption of recommended ANGRAU technologies. The trend might be due to the fact that, social capital generally would give prestige, recognition and status to any individual, the farmers are not beyond this truth. This result was in conformity with the similar findings of Adato *et al.*, (2002).

5.1.2.3.3.5 Human capital

It was evident from the Table 7b that the significant difference was found in human capital after adoption of recommended technologies. It clearly explains that the improvement in health conditions and transport facilities prevailing in the sample area.

5.1.3 Chilli farmers of Krishna district

5.1.3.1 Attitude

Table 8 depicts, that a majority of respondents (45.84%) had favourable attitude towards recommended ANGRAU technologies. About (37.50%) of the respondents had less favourable attitude and 16.66 percent of the respondents had more favourable attitude. The reason for such favourable attitude might be due to the fact that, those farmers who adopted recommended technologies might have got benefited in terms of production and profitability, which motivated the other farmer to establish favourable attitude towards recommended technologies. This result was in conformation with the findings of Rahman *et al.,* (1999).

5.1.3.2 Adoption

A perusal of the results depicts in the Table 9 was used as base material for discussion. Quite interestingly the same percentage (41.67%) of the respondents possessed medium and low level of adoption of recommended practices. It indicates extension functionaries need to work hard to adopt recommended technologies by the farmers. This result was in conformity with the similar findings of Satya (1993).

5.1.3.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.1.3.3.1 Productivity

It was evident from the Table 10a that the 't' test indicates significant difference in productivity before and after adoption of recommended technologies. This clearly points out that, due to the adoption of the recommended technologies the existing situation was better than the non-adopted period i.e., before adoption. The finding of Yadav *et al.,* (1996) was in line with the findings reported.

5.1.3.3.2 Profitability

A perusal of the Table 10a vividly depicts that significant relationship was observed in the profitability of chilli farmers after adoption of recommended technologies. Thus, it can be stated that the higher additional income to the farmers can attributed to their better perception and adoption of recommended technologies which in turns results in improvement in the yield levels. This result is not in conformation with the results of Sadangi (1997).

5.1.3.3.3 Improvement in livelihoods

5.1.3.3.3.1 Physical capital

Results furnished in Table 10a indicated that the Physical capital of the respondents had shown positive and significant relationship after adoption of recommended technologies. The reason could be that the farmers with more profitability will have more financial resources at their disposal, which lead the farmers to purchase more physical assets. Since the recommended technologies has greatly advocated and recommended the use of improved agricultural implements. This finding was in line with the findings of Singh *et al.*, (1999).

5.1.3.3.3.2 Natural capital

A close observation of Table 10a revealed the negatively significant relationship in natural capital after adoption of recommended technologies. This might be due to the fact that mechanization in agriculture replaces the live stock population with machinery. The finding was in concurrence with the findings of Rajanikumar (1998).

5.1.3.3.3.3 Financial capital

The result indicated from Table 10a, that there was no significant difference in financial capital before and after adoption of recommended technologies. The trend might be due to the fact that majority of the respondents gave preference to buy agricultural implements rather than saving money in the financial institutions. This result was in conformity with the similar findings of Rahman and Mikuni (1999)

5.1.3.3.3.4 Social capital

Table 10a revealed that the association of social capital before and after adoption of recommended technologies was non-significant. The reason might be that the formal organizations in the village were few in number, another possible reason might be that the farmers need time to participate in social organization, but the farmers in this district are busy in different activities like transplanting, spraying, picking, etc., in crop period, which in turn resulted non-significant relationship.

5.1.3.3.3.5 Human capital

A perusal of the Table 10b vividly depicts that the significant relationship was found in physical capital after adoption of recommended technologies. This reflects the improvement in the health, sanitation and hygienic condition in the selected area.

5.2 Impact of ANGRAU technologies on farmers of Warangal district

5.2.1 Rice farmers of Warangal district

5.2.1.1 Attitude

It could be vividly observed from the Table 11 that majority of the respondents possessed favourable attitude (41.67%), followed by less favourable (37.50%) and more (20.83%) favourable attitude towards recommended technologies. The reason for such favourble attitude might be due to the fact that the farmers might have got higher yields by adopting recommended technologies when compared to traditional practices. The findings were in partial concurrence with the findings of Singh *et al* ., (1999).

In this context there is every need to strengthens and intensifies extension activities like training programmes and demonstrations on recommended technologies to develop more feavourable attitude among the farmers.

5.2.1.2 Adoption

A close observation of Table 12 reveals that majority (50.00%) of the respondents had medium level of adoption followed by high (41.67%) and low (8.33%) level of adoption of recommended technologies. The plausible reason for this trend may be because of readiness of the rice farmers of Warangal district to harvest the windfall profit of the recommended technologies. This result was in accordance with the findings of Hossain *et al.,* (1995).

5.2.1.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.2.1.3.1 Productivity

Table 13a, depicts that the comparison of productivity of the rice crop before and after adoption of recommended technologies show 10.58 per cent increase in productivity of the rice crop after adoption of recommended technologies. This trend clearly signifies that the farmers noted that the recommended technologies had more in-put use efficiency and high yielding capacity. The results were in accordance with the findings of Patil and Kunnal (1998).

5.2.1.3.2 Profitability

On cursory look of the data presented in Table 13a in the results chapter reveals that there was significant difference in the profitability before and after adoption of recommended technologies. It may be due to the fact that the farmers might have got benefited through the adoption of recommended technologies in terms of profitability because of these technologies utilize the available resources very effectively. This view is in support of the earlier findings of Rajendran *et al.*, (2006)

5.2.1.3.3 Improvement in livelihoods

5.2.1.3.3.1 Physical capital

A perusal of the results depicts in the Table 13a was used as base material for discussion. Difference in the physical capital of the respondents before and after adoption of recommended technologies showed positive and significant relationship. It is worth noting that physical or 'man made' capital can substitute for natural capital in many circumstances.

5.2.1.3.3.2 Natural capital

Table 13a, denotes that the natural capital showed negative and significant relationship after adoption of recommended technologies. It is evident from the above discussion that the majority of the farmers in this district have replaced their livestock population with modern agricultural machinery, implements and another reason that the land, which is used as a source of fodder for cattle, has declined. This finding was in conformity with that of Sixteenth Quinquenial Livestock Census (1999).

5.2.1.3.3.3 Financial capital

From the Table 13a, it was observed that there was no significant difference in the financial capital after adoption of recommended ANGRAU technologies. This trend might be due to the fact that the farmers utilize their profits for purchasing agricultural implements and necessary inputs rather than saving it in financial institution. This findings was in concurrence with the findings of Fan *et al.,* (2000)

5.2.1.3.3.4 Social capital

On cursory look of the data presented in Table 13a in the result chapter reveals that there was no significant difference in the social capital after adoption of recommended technologies. The plausible reason for this trend may be because rigid rules, laid by the members in the social organizations for attending meetings hinders the participation of respondents in the social organisations.

5.2.1.3.3.5 Human capital

A cursory look at the Table 13b indicated that the 't' test of compare means of sample and population showed significant difference. Thus, it proves the impact of recommended technologies at higher levels. This clearly explains that the improved health conditions and facilities are prevailing in the sampled area. This view was in accordance with the earlier findings of Temudo (2002).

5.2.2 Groundnut farmers of Warangal district

5.2.2.1 Attitude

A close observation of Table 14 reveals that majority of the respondents (45.83%) possessed favourable, followed by less favourable (41.67%) and more favourable (12.50%) attitude towards recommended ANGRAU technologies. The reason for such favourable attitude might be due to the fact that the farmers were fully aware of the benefits of the recommended technologies in the selected area. This might be attributed to the efforts made by the extension personnel and research scientists in improving the scientific knowledge among the farmers about recommended technologies. This result was in conformity with that of Biswas (1990).

5.2.2.2 Adoption

A perusal of the Table 15 vividly depicts that majority of the respondents possessed low level of adoption of recommended technologies. This might be mainly attributed due to fact that most of the farmers had low land holding, high cost of inputs and unfeavourable seasonal conditions.

The results revealed that there is a need to provide required finance, risk free, low cost and location specific technologies. Moreover, the extension contact must be on regular basis. Sincere and dedicated approach to work is required on the part of extension worker. Hence, the administration should look in to the matter and take up suitable measures to attain high level of adoption. This finding was in accordance with earlier study of Khan (1999).

5.2.2.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.2.2.3.1 Productivity

A cursory look at the Table 16a indicates that, the computed 't' value of the productivity after adoption of recommended technologies was found to be non-significant. This shows that there is more yield gap in case of groundnut in Warangal district. The possible reason for this could be low-level of adoption of recommended technologies by the respondents led to low yields. This result was disagreement with the findings of Velavan and Balakrishna (2000)

5.2.2.3.2 Profitability

It is seen from the Table 16a, that the profitability of the respondents before and after adoption of recommended technologies was found to be non-significant. There are several reasons *viz.,* lack of resources, non-availability of inputs and high cost of the practices led to low profitability. This finding was in line with the findings of Rao (1986).

5.2.2.3.3 Improvement in livelihoods

5.2.2.3.3.1 Physical capital

It was evident from the Table 16a that the difference in the physical capital of the respondents before and after adoption of recommended technologies showed positive and significant relationship. This might be due to the fact that majority of the agricultural operations carried with improved implements rather than traditional practices without considering their present economic conditions. The finding was in concurrence with the findings of Lee (2003).

5.2.2.3.3.2 Natural capital

From the Table 16a, it was observed that there was negative and significant difference in the natural capital before and after adoption of recommended ANGRAU technologies. The probable reason for this might be due to the fact that expansion of dry land area and decreasing the farm related live stock population in all the three regions (Andhra, Telengana and Rayalaseema) in the Andhra Pradesh from 1993 onwards (Sixteenth Quinquenial Livestock Census 1999).

5.2.2.3.3.3 Financial capital

It was clear from the Table 16a that the association of financial capital before and after adoption of recommended technologies was found to be non-significant. It was evident that the selected farmers in this district were not adopting majority of recommended practices, thus, they are not in a position to gain the benefits from recommended technologies.

5.2.2.3.3.4 Social capital

A perusal of Table 16a indicated that the adoption of recommended technologies showed non-significant relationship in social capital. The possible reasons for the above trend might be lack of more number of social organizations in the study area and lack of knowledge about benefits of social participation.

5.2.2.3.3.5 Human capital

From the Table 16b, it was observed that there was no significant difference in the sample and population mean of human capital after adoption of recommended technologies. In nutshell, the poor health facilities, low literacy and less availability of nutritional food were contributing for the above said non-significant relationship.

5.2.3 Chilli farmers of Warangal district

5.2.3.1 Attitude

Results indicated from the Table 17 that the majority (45.84%) of the respondents had less favourable attitude followed by favourable attitude (37.50%) and 16.66 per cent of the respondents possessed more favourable attitude towards recommended technologies. This trend might be due to the fact that the chilli farmer perceived that the recommended technologies need more fertilizer, assured irrigation, plant protection measures and skilled labour. Hence, majority of the respondents possessed less favourable attitude towards recommended technologies.

5.2.3.2 Adoption

A perusal of the Table 18 vividly depicts that majority of the respondents exhibited low (54.17%), followed by medium (25.00%) and high (20.83%) level of adoption of recommended technologies. This might be due to the fact that the chilli farmers of the Warangal district perceived that the recommended practices are time consuming than the traditional methods and also need skilled and efficient labour. The finding was disagreement with the earlier findings of Satya (1993).

5.2.3.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.2.3.3.1 Productivity

A cursory look at the Table 19a indicates that, the computed 't' value of the productivity of the chilli crop after adoption of recommended technologies was found to be non-significant. This might be due to the fact that the chilli farmers of Warangal district were not willing to take risk because of their poor economic conditions.

Hence, the extension agency has to recommend the government on policy decisions like supply of necessary inputs such as plant protection chemicals, fertilizers on subsidy basis and short term credit facility to the farmers. This finding was in accordance with earlier study of Singh and Behera (2006).

5.2.3.3.2 Profitability

It could be seen from the Table 19a that the profitability of the chilli crop found to be non-significant after adoption of recommended technologies. The trend might be due to the fact that, the chilli is a commercial crop, where plant production and plant protection measures need much time, greater care and caution, so that the farmers were spending more money on the purchasing seed and plant protection chemicals, these factors in variably ending up with low profits.

5.2.3.3.3 Improvement in livelihoods

5.2.3.3.3.1 Physical capital

On cursory look of the Table 19a reveals that there was significant difference in physical capital after adoption of recommended technologies. The trend might be due to the fact that the improved agricultural implements helped the farmers to carry out agricultural operations with ease, this may be the reason for above said relationship. This finding was in accordance with earlier study of Rajaratnam (2000).

5.2.3.3.3.2 Natural capital

The Table 19a explores that the adoption of recommended technologies showed negative and significant relationship in natural capital. The reason for such relationship might be due to the fact, that there is perceptible shift in type of cultivation from wetland farming to rainfed farming. This finding was in accordance with earlier study of Prasad *et al.,* (1995) and Rao and Raju (1995).

5.2.3.3.3.3 Financial capital

Table 19a reveals that the association of the financial capital before and after adoption of recommended technologies was found to be non-significant. This may be due the low income from chilli crop, more money spent on plant protection chemicals and non-institutional credit system's predominance (i.e., through money lenders), which inturn increase the debts of the farmers and reduce the savings. This result was in line with the findings of Sarma (2004).

5.2.3.3.3.4 Social capital

Table 19a connotes that the social capital of the respondents before and after adoption of recommended technologies had shown positive and significant relationship. The reason could be that the chilli farmers in the Warangal district perceived that the social participation would give prestige, recognition and status to them.

5.2.3.3.3.5 Human capital

Table 19b, depicts that the 't' test of comparison between sample and population mean of human capital after adoption of recommended technologies proved non-significant. The reason for such relationship might be due to, poor health facilities, illiteracy and poor availability of transport facilities in selected area.

5.3 Impact of ANGRAU technologies on farmers of Anantapur district

5.3.1 Rice farmers of Anantapur district

5.3.1.1 Attitude

A close observation of Table 20 reveals that majority (45.84%) of the respondents posses favourable attitude followed by less favourable (33.33%) and more favourable attitude (20.83%) towards the recommended technologies. It may be due to the fact, that inspite of efforts made by extension personnel to disseminate the ANGRAU technologies, majority of the farmers in the selected district were not much interested about these technologies. This is due to the unfavourable conditions prevailing in the selected area and lack of pro-farmer initiatives. This view is in support of the earlier findings of Biswas (1990).

5.3.1.2 Adoption

Results indicated from the Table 21 that majority of the respondents had medium category of adoption. This is mainly due to the consecutive droughts in the district and very poor returns from their investment in rice crop. The cultivation of rice in these dry lands is more risky and uncertain than cultivation of rice by farmers having surface irrigation facilities. The finding was in accordance with the earlier study of Rao and Rao (1996).

5.3.1.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.3.1.3.1 Productivity

It was evident from Table 22a, the productivity of rice crop after adoption of recommended technologies was found to be non-significant. The reason for such non-significant relationship, this might be due to the fact that the majority of the farmers were small and marginal with less resources and low productivity over the years due to consecutive droughts in Anantapur district. The prevailing adverse conditions in the district have shown the impact not only on livestock production but also affected the productivity of rice crop. This result was inline with the findings of Singh and Behera (2006).

5.3.1.3.2 Profitability

It could be seen from the Table 22a, that there was no significant difference in profitability after adoption of recommended technologies. Inspite of the efforts made by the extension agencies for rapid dissemination of recommended technologies, majority of the farmers in the selected area were rainfed farmers and also resource poor for adopting recommended technologies. This might the reason for above said relationship.

5.3.1.3.3 Improvement in livelihoods

5.3.1.3.3.1 Physical capital

From the Table 22a, it was observed that there was significant increase in the physical capital after adoption of the recommended ANGRAU technologies. This result clearly shows the improvement in public transport facilities by different means to the villages and also governments perceived that provision of physical capital assets has multiple beneficial affects on livelihoods due to saving of time on accessing.

5.3.1.3.3.2 Natural capital

Table 22a indicates the association of natural capital of the respondents before and after adoption of recommended technologies. It showed negative and significant relationship. The acute drought conditions were forcing the farmers to sell off their cattle and further venturing into risk agriculture. This might be the possible reason for the above relationship. The finding was in accordance with earlier study of Prakasham (2006).

5.3.1.3.3.2.3 Financial capital

The results indicated in the Table 22a was used as base material for discussion. Difference in financial capital before and after adoption of recommended technologies showed non-significant relationship. The low financial capital might be due to the low profits from the rice crop, more money spent on digging bore wells and non-institutional credit system's predominance in this region.

5.3.1.3.3.2.4 Social capital

It could be noted from the Table 22a, that the adoption of recommended technologies led to non-significant relation in social capital. The possible reason for the above trend might be the farmers' hand to mouth situation would have a little time to actively participate in any organizations in their village even though they had interest to participate in social organizations.

5.3.1.3.3.2.5 Human capital

On cursory look at the Table 22b reveals that the 't' test with compared means of sample and population means of human capital after adoption of recommended technologies showed non-significant relationship. The probable reason for this might be the poor education of farmers, subsequently led to poor awareness of diseases and access to public health clinics and domination by the costly private health clinics where poor can access but cannot afford.

5.3.2 Groundnut farmers of Anantapur district

5.3.2.1 Attitude

A perusal of the Table 23 vividly depicts that majority of the farmers (62.50%) possess favourable attitude followed by (29.17%) less favourable attitude and (8.33%) more favourable attitude towards recommended technologies. Involvement of the farmers in various extension activities like kisan melas, trainings, group discussions, demonstrations, etc., would help the farmers to get favourable attitude towards recommended technologies. Hence, the above relationship was observed. The finding was in conformity with that of Reddy *et al.,* (2001).

5.3.2.2 Adoption

Results indicated in the Table 24 reveals that half of the respondents exhibited medium level of adoption followed by low (41.67%) and high level of adoption (8.33%) of recommended technologies. The plausible reason for this type of trend may be due to the fact that Anantapur district farmers were well convinced with the recommended groundnut technologies because of the higher productivity and profitability. This finding was in concurrence with the findings of Atchutaraju (2002).

5.3.2.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.3.2.3.1 Productivity

A critical analysis of the Table 25a shows significant increase in the productivity of the rice crop after adoption of recommended technologies. The farmers with favourable attitude towards recommended technologies obtained opportunities to get expose themselves to new technologies and also attaining better knowledge and adoption levels, which ultimately led to higher yields. This finding was in accordance with earlier study of Reddy and Restogi (1985).

5.3.2.3.2 Profitability

From the Table 25a, it was evident that the difference in the profitability before and after adoption of recommended technologies showed positive and significant relationship. It had been the general observation that the farmers with more productivity will have more financial resources at their disposal and make farming as more profitable.

5.3.2.3.3 Improvement in livelihoods

5.3.2.3.3.1 Physical capital

A cursory look at the Table 25a denoted that there was significant difference in the physical capital after adoption of recommended technologies. The reason for such relationship might be due to the fact that majority of the farmers were interested in possessing new agricultural implements for getting maximum benefits from the recommended technologies.

5.3.2.3.3.2 Natural capital

Table 25a reveals that the difference in the natural capital of the respondents after adoption of recommended technologies showed negative and significant relationship. It was found that several reasons *viz.,* introduction of improved agricultural implements replacing the cattle population, non-availability of fodder at lean period and high cost of maintaining livestock, led to obtain the above results. The finding was in conformity with that of Prakasham (2006).

5.3.2.3.3.3 Financial capital

On cursory look at the data presented in Table 25a in the result chapter reveals that there was significant difference in the financial capital after adoption of recommended technologies. This clearly points out that due to adoption of recommended technologies the financial situation had improved a lot because of improvement in the profitability by the adopted farmers.

5.3.2.3.3.4 Social capital

Table 25a indicated that the association of social capital before and after adoption of recommended technologies was non-significant. The possible reason for the above trend might be due to the lack of knowledge on benefits with social organizations in the village and some extent illiteracy.

Social participation of the farmers could improve by establishing social organizations like Self Help Groups (SHGs), Water User Associations (WUAs) and chercha mandals etc., in the selected area.

5.3.2.3.3.5 Human capital

It is seen from the Table 25b, that the human capital of the respondents after adoption of technologies was found to be significant. This type of trend might be due to the fact that the improvement in the family education levels of the farmers subsequently led to awareness of the diseases and access to health clinics. This view is in support of the earlier findings of Temudo (2002).

5.3.3 Chilli farmers of Anantapur district

5.3.3.1 Attitude

Table 26 in the results chapter was used as base material for discussion. Quite interestingly the same percentage (37.50%) of the respondents possessed medium and low level of adoption of recommended practices. The plausible reason for this trend might be due to the fact that farmers think twice about pros and cons before taking up any recommended technologies and they invariably evaluated the performance of the technologies in terms of profits.

This call for concerted efforts on the part of extension staff to create greater awareness on various aspects of recommended technologies, various extension methods like training programmes, field trips, exposure to mass media and group discussions could have been effectively utilized for brining greater awareness among the farmers about the recommended technologies, which helps to create favourable attitude towards ANGRAU technologies. This result was in accordance with the findings of Rai *et al.,* (2000).

5.3.3.2 Adoption

A close observation of Table 27 reveals that majority of the respondents (45.84%) expressed low level of adoption followed by medium level of adoption (41.66%) and (12.50%) high level of adoption of recommended technologies. it could be inferred from the results that low adoption was mainly due to the fact that farmers practicing dryland cultivation are generally poor in natural resources and also apprehensive in applying cost involving technologies. This finding was disagreement with the finding of Satya (1993).

5.3.3.3 Impact in terms of productivity, profitability and improvement in livelihoods

5.3.3.3.1 Productivity

A perusal of the table 28a vividly depicts that the significant relationship was observed in the productivity of chilli crop after adoption of recommended technologies. The possible reason for the above trend might be due to fact that the farmers noted that the recommended technologies had more suitable to their fields and use limited resources efficiently.

5.3.3.3.2 Profitability

Table 28a reveals that the difference in the profitability of chilli crop after adoption of recommended technologies showed non-significant relationship. This might be due to fact that the farmers who growed chilli as a monocropping in the dryland areas resulted in poor quality and lesser production, this led to low profitability. The result was in accordance with the findings of Rao (1986).

5.3.3.3.3 Improvement in livelihoods

5.3.3.3.3.1 Physical capital

It could be concluded from the Table 28a that the adoption of recommended technologies led to significant relationship in physical capital. Even though farmers are getting low profits from recommended technologies, they still considered physical capital to be a necessary in the development aspect. Since this factor enhance the skill competence, increases financial capital and increases the inclination of the farmers towards adoption of modern technologies under the risky environments.

5.3.3.3.3.2 Natural capital

It was evident from the Table 28a that the difference in the natural capital of the respondents after adoption of recommended technologies showed negative and significant relation. The reason might be due to the fact that the sampled area was dryland where crops are grown under rainfed conditions and resources are very low, which ultimately led to poor natural asset base.

5.3.3.3.3.3 Financial capital

Table 28a, connotes the non-significant relationship of the financial capital of chilli farmers before and after adoption of recommended technologies. The low financial capital of the farmers was mainly due to the low livelihood opportunities to augment the income from farm, lack of proper and timely institutional credit support and subsequent over exploitation of the money lenders with more rate of interest and buy back mechanism with money lenders. This finding was in concurrence with the report of APDPIP (2002)

5.3.3.3.3.4 Social capital

From the Table 28a it was observed that there was a significant difference in the social capital of the respondents after adoption of recommended ANGRAU technologies. This trend might have emerged because of the fact that chilli farmers of Anantapur district perceived, participation in any social organization helps them to acquire more information and knowledge and this naturally promoted improvement in social participation.

5.3.3.3.3.5 Human capital

A bird's eye view of the Table 28b confirms that there was no significant difference in human capital after adoption of recommended technologies. The above finding throws light on the need of creating awareness among farmers about health and nutritional aspects through group interactions and mass media. Farmers in the selected area should be motivated and encouraged to involve themselves in educational programmes and regular health check ups. This view was disagreement with the earlier findings of Temudo (2002).

5.4 Comparison of recommended technologies on farmers of Krishan, Warangal and Anantapur districts

5.4.1 Comparison of recommended rice technologies on rice farmers of Krishna, Warangal and Anantapur districts

The results from the Table 29 confirm that majority of the farmers in all the three selected districts (Krishna, Warangal and Anantapur district) possessed favourable attitude towards the recommended rice technologies. Hence, there is a need on the part of the extension agency to educate, motivate and develop more favourable attitude towards the recommended ANGRAU rice technologies through organizing training programmes, demonstrations, educational tours, exhibitions *etc.,*

The results from Table 29 confirm that majority of the farmers in all the three selected districts (Krishna, Warangal and Anantapur district) had medium level of adoption of the recommended rice technologies. Farmers with favourable attitude may adopt the recommended technologies without thinking of the cost or risk in general, but the unfavourable seasonal conditions might had acted as constraints in this situation.

Table 29 reveals that the productivity of rice crop before and after adoption of the recommended technologies showed significant difference in Krishna and warangal districts, whereas, in Anantapur district it shows non-significant relationship. Small and marginal land holdings and subsistence farming in rainfed conditions might be the reasons behind the above said relationship in Anantapur district.

Results furnished in Table 29 depicts that the profitability of rice crop after adoption of the recommended technologies shows significant relationship in Krishna and Warangal district, whereas, in Anantapur district it shows non-significant relationship. The possible reasons for this situation could be the lack of assured irrigation facilities in Anantapur district that led to low yields than the other two districts. This resulted in low profitability in Anantapur district.

The results from Table 29 confirm that the financial and social capital of the Krishna district farmers shows significant difference after adoption of the recommended technologies. Mass literacy, considerable amount of land holdings and predominance of irrigation facilities might have led to the above said significant relationship.

5.4.2 Comparison of recommended groundnut technologies on groundnut farmers of Krishna, Warangal and Anantapur districts

A close look at Table 30 reveals that, a majority of the groundnut farmers were grouped under favourable attitude towards the recommended technologies. This might be due to the fact that the farmers had got higher yields by adopting the recommended practices when compared to local practices.

A close look at Table 30 reveals that, a majority of the groundnut farmers had low to medium level of adoption of the recommended technologies in Krishna and Anantapur districts. The possible reason for this trend might be that majority of the farmers in these districts were concentrating on rice and chilli crops to obtain better profits, which could act as a barrier to make use of the recommended groundnut technologies.

From Table 30, it was observed that the groundnut farmers' profitability was found to be non-significant after adoption of the recommended technologies. The present trend of the respondents instantly calls for an encouragement by the extension agency to create enthusiasm in Warangal farmers to adopt the recommended groundnut technologies for enhancing productivity.

The table 30 clearly reveals that profitability of groundnut after adoption of the recommended technologies shows significance in Anantapur district and non-significance in Krishna and Warangal districts. The reason might be that, in Anantapur district groundnut cultivation is an age-old practice and the farmers in this district are ready to accept new technologies which inturn leads to better profits.

The table 30 clearly reveals that financial capital of the groundnut farmers in Krishna and Warangal districts shows non-significant relationship after adoption of the recommended groundnut technologies. Low profits were achieved through the recommended technologies in these areas which inturn might have helped to develop non-significant relationship in financial capital.

5.4.3 Comparison of recommended chilli technologies on chilli farmers of Krishna, Warangal and Anantapur districts

As indicated in Table 31, the attitude of farmers towards the recommended chilli technologies shows that a majority of the farmers in Warangal and Anantapur districts had less favourable to favourable attitude towards the recommended technologies. Hence, it is necessary on the part of extension personnel to develop favourable attitude towards the recommended chilli technologies by organizing demonstrations.

Table 31 shows that, the adoption of the recommended technologies by chilli farmers shows that majority of the farmers in Warangal and Anantapur districts had low level of adoption, whereas in Krishan districts farmers had medium level of adoption. This may be due to the fact that the farmers of Warangal and Anantapur districts are cultivating chilli as a rainfed crop and these farmers had poor natural resources and are also apprehensive in adopting the recommended technologies.

From Table 31, it was observed that there was significant difference in the productivity of chilli crop in Krishna, Warangal and Anantapur districts before and after adoption of the recommended technologies. The possible reason for this type of trend is that, the farmers accept varieties and follow all other recommendations to some extent.

Table 31 reveals that the profitability of chilli crop in Warangal and Anantapur districts before and after adoption of the recommended technologies shows non-significant relationship. Major reason for such non-significant relationship was the area under irrigation. Except in Krishna district, in the other two districts chilli is cultivated under dryland conditions or some times under less irrigated conditions.

From Table 31 it was observed that the financial capital of the respondents shows non-significant relation after adoption of the recommended technologies by the chilli farmers in all the three selected districts. The obvious reason for this might be that, the cost of cultivation of chilli crop in all the three selected districts is high and this has lead to low profits.

5.5 Problems faced by the researchers in technology generation and their suggestions to overcome them

5.5.1 Problems faced by research scientists in generation of rice technologies and their suggestions to overcome them

Cursory examination of the table 32 reveals that several problems were perceived by the researchers in generation of rice technologies and their suggestions to overcome them.

Biotype variation in gall midge was the major technological problem as mentioned by the rice researchers. The problem expressed by the research scientists appear to be logical because this pest exists in four different biotype forms and it is difficult to generate the variety which is resistant to gall midge. The suggestion given by the researchers to overcome the above problem is more research is needed on different biotypes.

Lack of incentives and inadequate facilities for research was the major economical problem as expressed by the researchers. The probable reason for this was that, the salary of the researchers remain the same to the all persons those who are having same position. Similarly, promotions are tied to the length of the service and responsibility, both of which have been deemed as disincentives by researchers and it calls for an appropriate mechanism to be put in place dealing with promotions and awards. The criteria could be based on innovativeness of the work. Hence, the suggestion given by the researcher *i.e.*, need to provide incentives for innovative research was noteworthy.

Lack of coordination from different departments in multidisciplinary experiments was the major social problem expressed by the researchers. The suggestion given by the research scientists to overcome the said problem was co-operation and co-ordination among different departments is to be encouraged. Interdisciplinary approach can be promoted through the activities like solving the technical problems with pooled ideas of related department scientists and more technical interaction sessions should be arranged in research stations between different departmental scientists to improve the coordination.

The major situational problem expressed by the researchers was, recommendations of nitrogen fertilizer application vary with location. To overcome this problem they suggested research on location specific recommendations are needed. Therefore, it is the responsibility of researchers to develop suitable crop and nutrient management strategies that not only exploit the full genetic potential of rice crop but, more importantly, to provide the base for sustainable rice production system.

More miscellaneous work was the major organizational problem expressed by the researchers. The above said problem is certainly an eye opener for superiors who would assign the miscellaneous works to the researchers. The suggestion given by the researchers for overcoming this problem is, avoid allotment of miscellaneous work. Hence, there should not be any kind of overlapping of work in terms of the duties and responsibilities that are performed by the scientist.

The other problems and suggestions expressed by the researchers should be taken into consideration and relative importance should be analysed for effective technology generation of rice crop. This result was in accordance with the earlier studies of Singh and Laharia (1992), Saran (1993) and Khan (1999).

5.5.2 Problems faced by research scientists in generation of groundnut technologies and their suggestions to overcome them

The data presented in Table 33 is used as a base material for discussion. The major technological problem expressed by the researchers was lack of effective intercropping system in groundnut. The reason might be due to the fact that the research efforts in Andhra Pradesh, so far are mainly confined to genotype evaluation in different seasons and agronomic practices. The possible solution might be that, the research on specific intercropping system should be needed. In order to develop varieties suitable for different season's *viz.,* kharif, rabi & summer and different situations such as sole cropping and intercropping systems, it is necessary to develop location specific varieties on the basis of genetic variability and combining ability. Researchers had also pointed, the problem of resistance developed in fungal pathogens against site-specific fungicides. To overcome this problem, scientist will incorporate resistance to major pests and diseases in newly released modern varieties. Large germplasm collections were to be screened and donors for resistance be identified and utilize these donors for improving varieties with resistance to major pests and insects. To overcome the above problem, researchers suggested to avoid repeated spraying of the same fungicide.

The major economical problem perceived by the researchers was lack of adequate funds to conduct research. The possible reason might be that, money is required for purchasing different inputs and carry out different agricultural practices; otherwise these inputs cause much hindrance in technology generation. Hence, provide adequate and timely funding to research as noteworthy suggestion.

Lack of proper planning and coordination for IPM project is one of the major social problems perceived by the researchers in technology generation. The problem expressed by the researchers appears to be logical because co-ordination and cooperation is prerequisite for IPM technology generation. Hence, the suggestion given by the researchers i.e., effective planning and coordination should be needed for IPM project is noteworthy.

Lack of working staff was the major situational problem expressed by the researchers. It appears to be logical because skilled labour is a prerequisite for conducting any research. The suggestion given by the researchers for overcoming this problem is, farm labour should be trained well. Hence, the university officials should put in greater efforts in imparting skills to the labour.

Excessive workload was the major organizational problem expressed by the researchers. The possible reason might be that, the large number of vacant posts leads to inadequate technical staff and this is a major hindrance for effective technology generation. Hence, it is time to listen to the suggestion given by the researcher *i.e.*, reduce the workload to conduct smooth research.

The other problems and suggestions given by the respondents should be given due consideration in effective technology generation in groundnut crop and also for overall agricultural development to meet the future demand for food grains. This result was in accordance with the similar studies of Sawant *et al.*, (1993), Venkateswara Reddy (1996) and Srinivasrao (2000).

5.5.3 Problems faced by research scientists in generation of chilli technologies and their suggestions to overcome them.

It could be seen from Table 34, that the research scientists expressed susceptibility to several diseases as a problem they perceived at the time of technology generation. In order to overcome this problem they suggested that resistance varieties should be developed against diseases. This could be effectively done through incorporating resistance to major pests and diseases in newly released modern varieties. For this, large germplasm collections were screened and donors for resistance are identified. Utilization of these donors for developing improved varieties with resistance to major pests and insects is the need of the hour.

The major economical problem perceived by the researchers was lack of incentives to innovative research. The possible reason might be that, researchers usually attain job satisfaction not by mere salaries but due to their commitment and zeal in extending need based activities. In the research, the job satisfaction of the researcher progressively increases when he gets applauds (in terms of incentives) from the concerned authorities. Hence, they suggested that, providing incentives for innovative research is an important suggestion to overcome the above problem.

Chilli scientists expressed that low participation of extension scientists and farmers at the time of research project proposal is a major social problem. From this problem, it is evident that agricultural university has to redefine and restructure their functioning in order to facilitate changing conditions. To overcome this problem research scientist advised to encourage the participation of research scientists, extension scientists and farmers during the project proposal.

The major situational problem perceived by the researchers was, occurrence of floods during the period of conducting experiments. It appears to be logical that researchers perceived this constraint as important, because cyclones are at the mercy of nature. To overcome this problem researchers suggested that green house or poly houses should be established for some experiments.

Researchers had also pointed out the problem of low financial resources to buy growth regulators as a major organizational problem. This may be due to the facts that, the application of growth regulators is very essential in chilli crop,the high cost of growth regulators and allotment of limited budget for research project. For which it was suggested that growth regulators should be provided on subsidized basis.

The problems and suggestions welcomed by the chilli researchers should be kept in view by the administrators, planners, *etc.,* while formulating the future programmes concerned with chilli technologies. This result was in concurrence with the earlier findings of Rani (1985) and Srinivasrao (2000).

5.6. Problems faced by the extension scientists in technology dissemination and their suggestion to overcome them

5.6.1 Problems faced by extension scientists in dissemination of recommended rice technologies and their suggestions to overcome them

Cursory look of the table 35 reveals that several problems were perceived by the extension scientists in dissemination of rice technologies and their suggestions to overcome them.

The major technological problem perceived by the extension scientists was lack of high yielding and early maturing varieties. Therefore it is the responsibility of researchers to develop and select high yielding, early maturing and drought tolerant varieties than improved varieties grown by farmers and traditional races in different production systems. Hence, the suggestion given by the extension scientists *i.e.,* research scientists should workout on these aspects as a noteworthy.

The major economical problem perceived by the extension scientists was untimely supply of funds for conducting demonstrations. Due to untimely supply of funds they were unable to perform their project effectively, which cause much hindrance in their job performance. In order to overcome this problem, they suggested that timely supply of funds to the extension scientists for conducting demonstrations.

Lack of people participation in DAATTC trainings is major social problem perceived by the extension scientists in technology dissemination of rice crop. In order to overcome the above problem, extension scientists advocated that arrangement of training schedules based on farmers convenience. Hence, it is required by the authorities to formulate a master plan for training programmes that was targeted to farmers without disturbing their critical activities. Participation in trainings helps the farmers to acquire latest developments in agriculture, thereby leading to better adoption of the recommended technologies.

Problematic soils were major situational problems given by the extension scientists. This may be due to the fact that several stresses such as nutrient deficiency, mineral deficiency and toxicity in soil affect rice productivity and profitability. Hence, there is a need to develop varieties that are suitable to different abiotic stress. Therefore, it is the responsibility of researchers to develop remedial measures to improve the soil physical and chemical characters. Hence, extension scientists suggested to develop location specific recommendations.

Lack of mobile training units is a major organizational problem perceived by the extension scientists in technology dissemination. Quick dissemination of information is a prerequisite for successful extension; delay in dissemination causes much hindrance in adopting recommendations. Hence, provision of mobile training units to DAATTC is an important suggestion to overcome the above problem.

It was clear from the problems expressed by the extension personnel that they were facing many problems in technology dissemination. Hence, it is required to consider their suggestions to overcome the problems for effective technology dissemination. This trend was in line with the findings of Bhairamkar (2003).

5.6.2 Problems faced by extension scientists in dissemination of recommended groundnut technologies and their suggestions to overcome them

Cursory examination of table 36 revealed that several problems were perceived by the extension scientists in dissemination of groundnut technologies and their suggestions to overcome them.

Extension scientists expressed that ferti-cum seed drillers are unsuitable to rainfed conditions and is a major technological problem in disseminating the recommended groundnut technologies. This may be due to the fact that some farmers even felt that the traditional implements used by them are easily made locally with low cost and the improved designs do not match them with reference to rainfed conditions. For this problem they suggested that suitable ferti-cum seed drillers should be designed.

The major economical problem perceived by the extension scientists was inadequate funds to conduct trainings. The reason for such expression might be due to the fact that the limited budget hinders the functioning of DAATTC scientists. For solving this problem extension scientist suggested that university should provide adequate funds to conduct trainings.

The major social problem expressed by the extension scientists was adoption of IPM technologies demands for community approach. Though IPM recommendations are must for augmenting yields in groundnut crop by getting rid of pests and diseases, lack of knowledge on the part of farmers on IPM approach is highly deplorable. For solving this problem they suggested conducting effective training programmes as a suggestion.

Water logging adversely affects the germination of groundnut seeds and this was a major situational problem expressed by the extension scientists. The probable reason for this may be frequent monsoons in the costal area leads to water stagnation, which might hinder the germination of groundnut seeds. The solution suggested by the extension scientist is developing varieties that are suitable for water logging situation. The possible reason for the above suggestion might be the cultivators with variation in phenology will react differently to drought and water logging depending on the stress development.

No technical personnel to guide the farmers after conducting demonstrations is one of the major organizational problem perceived by the extension scientists. The probable reason for this might be due to the fact that it is difficult to monitor on-farm trails, demonstrations and minikit trails throughout the district by the extension scientists without help of field staff. Hence, they suggested that vacant posts may be filled up immediately as noteworthy suggestion.

Similarly the remaining constraints need to be tackled by adopting suitable measures, which are expressed by the extension scientists for effective technology dissemination in groundnut crop. This result got substantiated with the findings of Bhairamkar (2003) and Verma (2006).

5.6.3 Problems faced by extension scientists in dissemination of recommended chilli technologies and their suggestions to overcome them

A cursory look at Table 37 revealed that the extension scientists perceived no hybrids from university as a major technological problem. This appears to be logical due to farmers' willingness to adopt high yielding hybrids in place of local and university recommended varieties. Hence, the researchers put on greater efforts in generating hybrid chillies. For this problem it was suggested that university should concentrate on developing the hybrids.

Extension scientist expressed that inadequate and untimely release of funds as a major economical problem in disseminating the recommended technologies. This type of result might be due to the fact that very limited budget was allotted to DAATTCs, which is a major hindrance for the functioning of DAATTC scientists. Hence, it should be corrected immediately. In order to overcome this problem, they suggested to provide sufficient and timely funds.

The major social problem perceived by the extension scientists was that farmers are not satisfied with the results of the recommended technologies. Hence, extension scientists thought that the dissemination of recommended technologies is very difficult. To overcome this problem extension scientists suggested that impact studies are needed to identify the grass root level problems.

Extension scientists expressed that inadequate information on micronutrient deficiency is a major situational problem in disseminating the recommended technologies. This may be due to the fact that the degradation of soil physical conditions and increase in the risk of erosion strongly led to gradual decrease in soil organic matter. This in turn causes deficiencies of Boron, Zinc, Magnesium *etc.,* and these deficiencies cause much harm to the standing crop. The solution they suggested to overcome the above problem was that research scientists should concentrate on micronutrient research.

The extension scientists perceived that it is difficult for them to visit the whole district and considered this as a major organizational problem. The reason appears to be logical and because of limited staff in DAATTCs, they were unable to cover the entire district at the time of crop period. In order to overcome this problem, they suggested to provide transport facilities and financial assistance for covering the whole district.

The other problems and suggestions expressed by the extension scientists should be taken into consideration and relative importance should be analysed for effective technology dissemination in chili crop. This result was in concurrence with the earlier findings of Bhairamkar (2003) and Verma (2006).

5.7 Production constraints faced by the farmers and their suggestions for adoption of recommended technologies

5.7.1 Production constraints faced by the rice farmers in adoption of recommended rice technologies and their suggestion to overcome them

Cursory examination of Table 38 revealed the several production constraints faced by the farmers in adoption of the recommended rice technologies and their suggestions to overcome them.

Lack of knowledge on seedling root dip technique was one of the major production constraints as mentioned by the rice farmers. It was a known fact that, unless the farmers are educated and convinced about the seedling root dip technique, they will not come forward to adopt the recommended technology.

Skill demonstration on seedling root dip technique should be conducted was a major suggestion given by the rice farmers. Extension machinery has to work very close with the farmers, advising them on the seedling root dip technique of rice crop and this can be done more effectively with the involvement of farmers.

Unavailability of quality and quantity of recommended rice varieties was another major production constraint as mentioned by the rice farmers. It was the fact that, unless sufficient quantity of good quality seed is available, farmers will not come forward to adopt the latest recommended rice technologies.

Rice farmers expressed improved seed of rice not made available in sufficient quantity is one of the major production constraints. Non supply of good quality seed material will better adapt for pest and diseases like stem borer, leaf folder, Brown Plant Hopper (BPH), blast and gall midge. Hence, adequate input supply, which is basic problem in the crop production, should be given utmost importance and the government and university should give strong emphasis on timely supply of adequate quantity of seed.

The above and many other problems and suggestions indicated by the respondents deserve adequate attention by the concerned research and extension agencies, if aim is to improve the adoption of the recommended rice technologies. These findings derive support from Srivastava and Singh (1990), Satyatej (1993), Kumar (1995), Adewale J G (2000), Vasantha (2002) and Rai (2006).

5.7.2. Production constraints faced by the groundnut farmers in adoption of recommended groundnut technologies and their suggestion to overcome them

A cursory look at Table 39 revealed that unavailability of required quantity of seed was a major production constraint as mentioned by the groundnut farmers. It implies that the groundnut farmers will be highly receptive to adopt recommended technologies. Therefore, the agricultural university and state government can capitalise on this situation by providing sufficient quantity of seed material. To overcome this production constraint they suggested to provide required quantity of seed. Hence, the administrative wing has to take policy decisions to supply the required quantity of seed material to the farmers.

Non availability of loans to adopt recommended technologies was another major problem mentioned by groundnut farmers. This may be due to the fact that most of the farmers were unable to meet their farm expenses without any external assistance. Crop failures for continuous years enable the farmers as ineligible for fresh loans of any kind in succeeding years due to non-repayment of earlier loans.

Hence, the Nationalized Banks should provide credit facilities, especially long term loans to reap the benefits of recommended technologies, particularly to purchase improved agricultural implements, to take up land development activities, purchase of required inputs, *etc.*,.

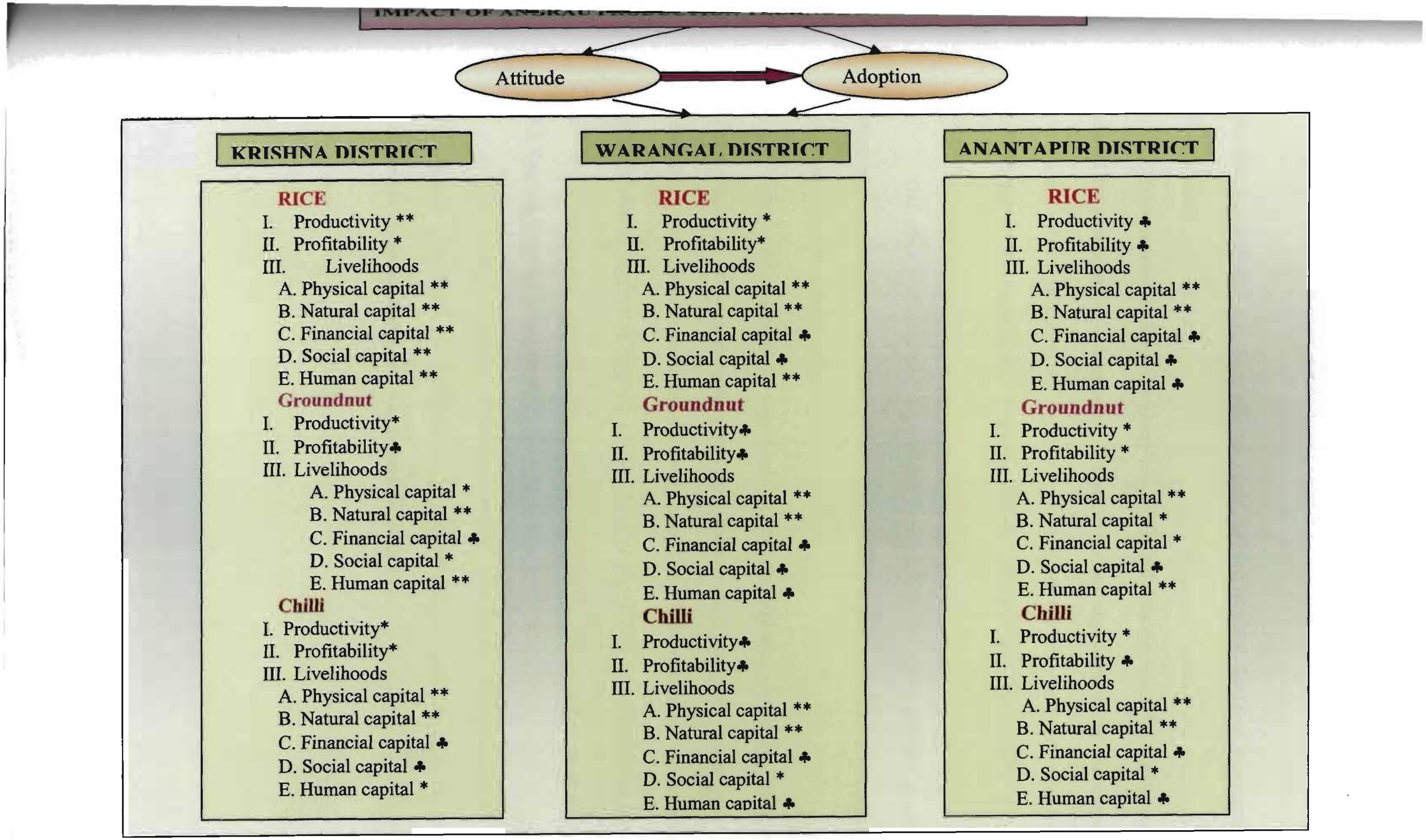
The other problems and suggestions expressed by the farmers should be taken into consideration and relative importance should be analysed for effective technology dissemination of groundnut technologies. These findings were in conformity with the findings of Jeenab (1991)., Venkateswarlu (1993), Dupare and Sinha (1999), Ganguly and Singh (1999) and Baswarajaiah (2001),.

5.7.3 Production constraints faced by the chilli farmers in adoption of recommended chilli technologies and their suggestions to overcome them

Table 40 revealed that the problem of more pests and diseases was one of the major production constraints as mentioned by chilli farmers. Recommended chilli varieties were susceptible to pests and diseases such as chilli pod borer, thrips,, damping off, *etc.,* So perception of this constraint appears to be logical because the out break of pest and diseases reduces the yields and there by increases the cost of cultivation.

Majority of the respondents offered the suggestion to develop varieties that are resistant to pests and diseases. Though the university chilli varieties have high yield potential they seem to be lacking in productivity. Hence, research has to be intensified to develop varieties that are resistant to pests and diseases keeping in view the needs of the chilli farmers.

Lack of knowledge on seed treatment was another major production constraint expressed by the chilli farmers. It was a fact that, unless the farmers are educated and convinced about the latest recommended technologies like seed treatment, growth



**-- Significant at 0.01 level of probability * -- Significant at 0.05 level of probability ♣ -Non-significant

Fig.83. Empirical model of the study

regulators preparation, *etc.*, they will not come forward to adopt the latest recommended technologies.

To overcome the above problem they advocated demonstrations on seed treatment should be conducted as a suggestion. Hence, it is the responsibility of the extension personnel to create awareness among the farmers towards the recommended technologies. In addition to this, agricultural scientists should maintain personal contacts with the farmers.

The other problems and suggestions expressed by the chilli farmers should be taken into consideration and relative importance should be analysed for effective adoption of the recommended chilli technologies.

Hence, the suggestions expressed by the respondents should be given due consideration in technology generation and dissemination of chilli technologies by researchers and extension scientist for better adoption. These results are in accordance with the earlier studies of Satyatej (1993), Patil *et al.*, (2000) and Ghosh and Pandey (2003).

5.8 Empirical model of the study

The conceptual model developed earlier (Fig.1) for the purpose of this investigation was tested. An empirical model was developed depending upon the results obtained in the selected area and was presented in Fig 83.

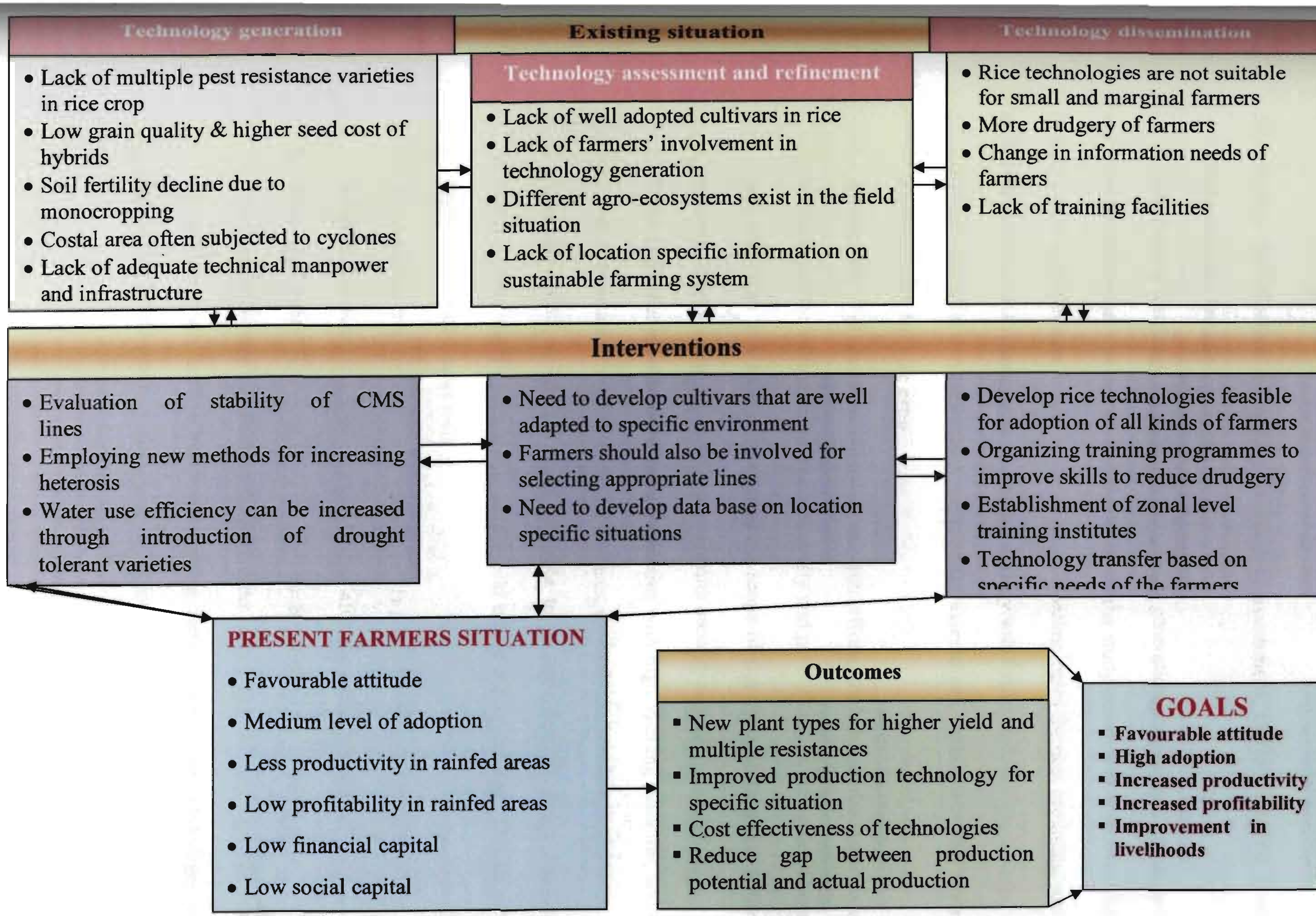


Fig. 80. Strategy for effective technology generation, assessment, refinement and their dissemination for rice crop

5.9 Strategy for effective technology generation, assessment, refinement and their dissemination for selected crops

Developing a strategy for effective technology generation, assessment, refinement and their dissemination was one of the objectives of the study among six objectives. So based on results obtained on impact of the ANGRAU technologies for rice, groundnut and chilli crops coupled with researchers vision, the strategy was formulated.

5.9.1 Strategy for effective technology generation, assessment, refinement and their dissemination for rice crop

1. Researchers will have to intensify research efforts to harness the new gene technologies for enhancement of productivity and profitability in rice crop. These new tools may also help us to expand the scope of rice research to shoulder the responsibility of ensuring nutritional and health security as well.
2. There is greater need to develop rice varieties with high yielding potential, short duration, resistance to major pests and diseases, drought, temperature *etc.,*
3. Research results should be made available to farmers through direct contact. Inturn farmers should decide how they would utilize the knowledge. This should apply to new varieties as well.
4. A concurrent crop management "revolution" is needed, especially in view of non-substantial increase in per hectare yields even after the green "revolution".
5. Transfer of hybrid rice technology from research station to the farmers' fields is as important as developing the hybrids. Extension agency have to play a greater role in creating much needed awareness among farmers about the advantages of cultivating hybrid rice by various innovative approaches.

6. As there is tremendous variability from one site to another and from one year to another, on farm research should be carried out at farmer's management level. Farmers should also involve for selecting better lines than own cultivars.
7. National and international programmes like All India Coordinated Research Project (AICRP), different State Agricultural Universities (SAUs) and Department of Agriculture should work together with farmers to select location specific, high yielding and stable genotypes for increased yields.
8. A paradigm shift is required in extension approaches from production oriented to quality and cost oriented for generating higher profits and higher returns to farmers. There is greater need to develop a two-pronged extension model for agricultural development wherein there is product oriented and market oriented departments at the district level.
9. Changing the mindset of people "seeing is believing" still holds good as was brought out in many studies. Hence, exposure visits and farmer to farmer interaction in the farmer demonstration plots will help in changing the mindset and help for quick adoption of different components of the farming system for efficient use of available land and water resources by the farmers.
10. Need for creation of media cell at district, zonal and state level for propagation of uniform message through radio, television *etc.*,
11. To achieve the yield potentials already created, farmers have to necessarily adopt the recommended rice technologies in totality. Farmers adopting the improved varieties and parts of the package are not giving adequate attention to the remaining components particularly the correction of soil problems and nutritional

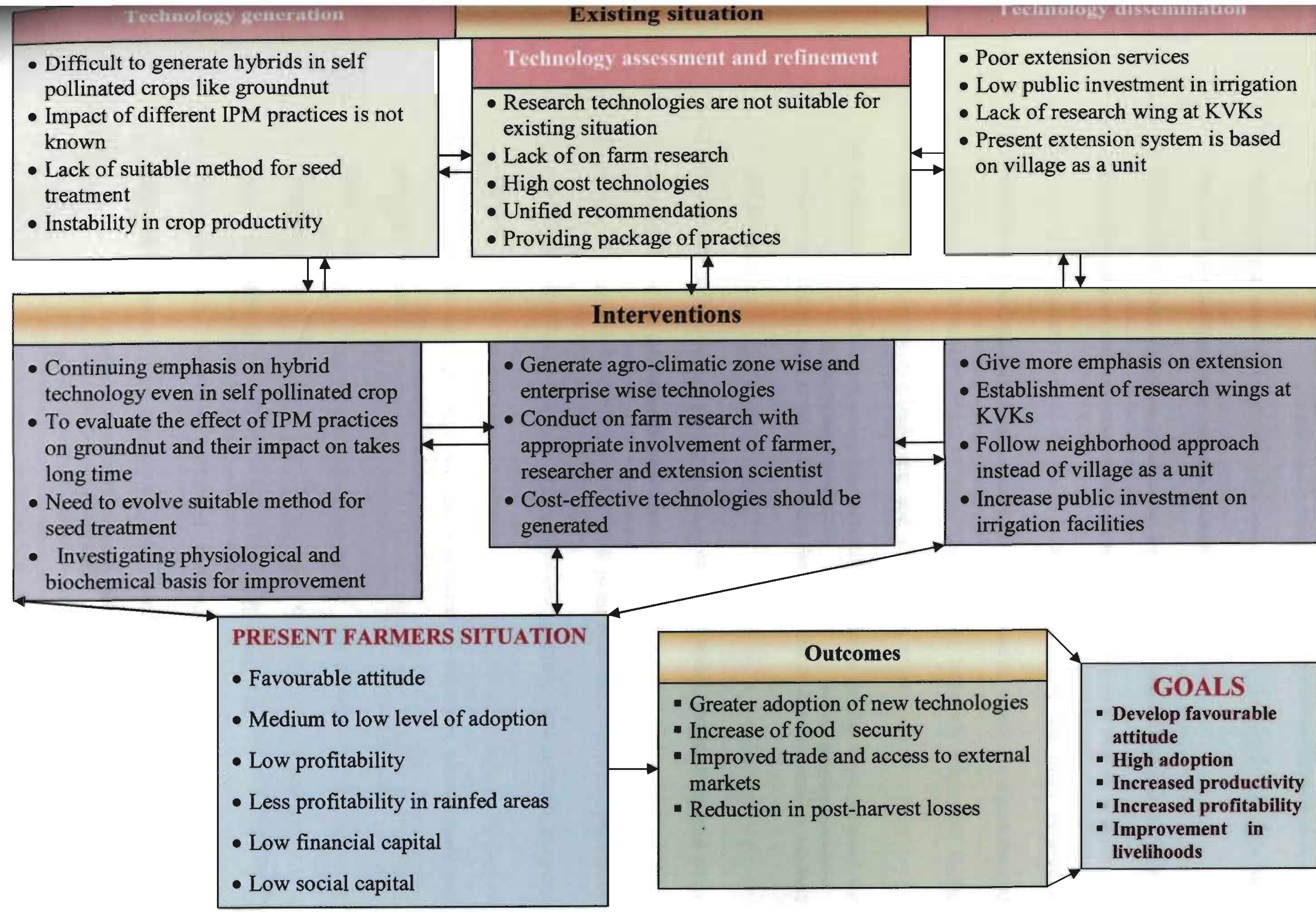


Fig. 81. Strategy for effective technology generation, assessment, refinement and their dissemination for groundnut crop

disorders and water management practices. This needs to be taken care of through more on-farm research and extension efforts.

12. Conducting kisan melas or exhibitions by university/ARS/ DAATC/ KVK's to share the research outcomes and familiarizing the farmers with technologies.
13. Training programmes need to be conducted to identify the plant protection chemicals, good quality seeds, financial management, weed management and irrigation management. Further, it is the time to inculcate extension skills, including development of leadership and information skills.
14. A major concern in promoting agricultural production is that there is need for institutionalization of a strong partnership between researchers, extension workers and farmers.

5.9.2 Strategy for effective technology generation, assessment, refinement and their dissemination for groundnut crop

1. Research is needed in development of new plant types and varieties specifically suited for monocropped rainfed areas, multiple cropping and summer irrigated cropping.
2. Respect traditional knowledge because it is based on countless observations and empirical research over millennia. Our future research should relate to traditional knowledge.
3. Integrated crop management modules for each of sub-ecologies and production system should be developed and validated in the farmers' field.
4. The farmers were using plant protection chemicals, which leads to environmental pollution and increase the residues of plant protection chemicals in farm produce

and eventually leads to ecological imbalance. It calls for a strategy to demonstrate different aspects of Integrated Pest Management (IPM) practices especially in groundnut which includes cultural, physical, legal, biological and chemical methods of pest control followed by more of field visits, group discussions to avoid indiscriminate use of pesticides.

5. Rainfed ecologies are not only challenges to resources but also to policy makers to develop appropriate strategies to improve food and nutritional security and better livelihoods to rural poor.
6. If the association of growers of different crops, various commodity boards, market committees, financing banks, processing units and voluntary organizations, work for ensuring coordination, there will be excellent results.
7. Cost-effective technologies should be generated for resource poor farmers.Low cost/ no cost technologies are required, as they cannot adopt high cost technologies due to limited resources. The technology generated should be appropriate with respect to farmers' needs, problems and background.
8. Non- availability of credit has been a major constraint for the farmers. The officials should make efforts for sustainable expansion of institutional credit to people who needed it the most at an affordable rate of interest. Besides, there should be improvement in the delivery channels so that funds can quickly reach the people who need them without any leakage at any stage.
9. Encouragement of Participatory Technology Development (PTD) rather than scientist centered technology, so that the technology will be made easy for propagation and multiplication.

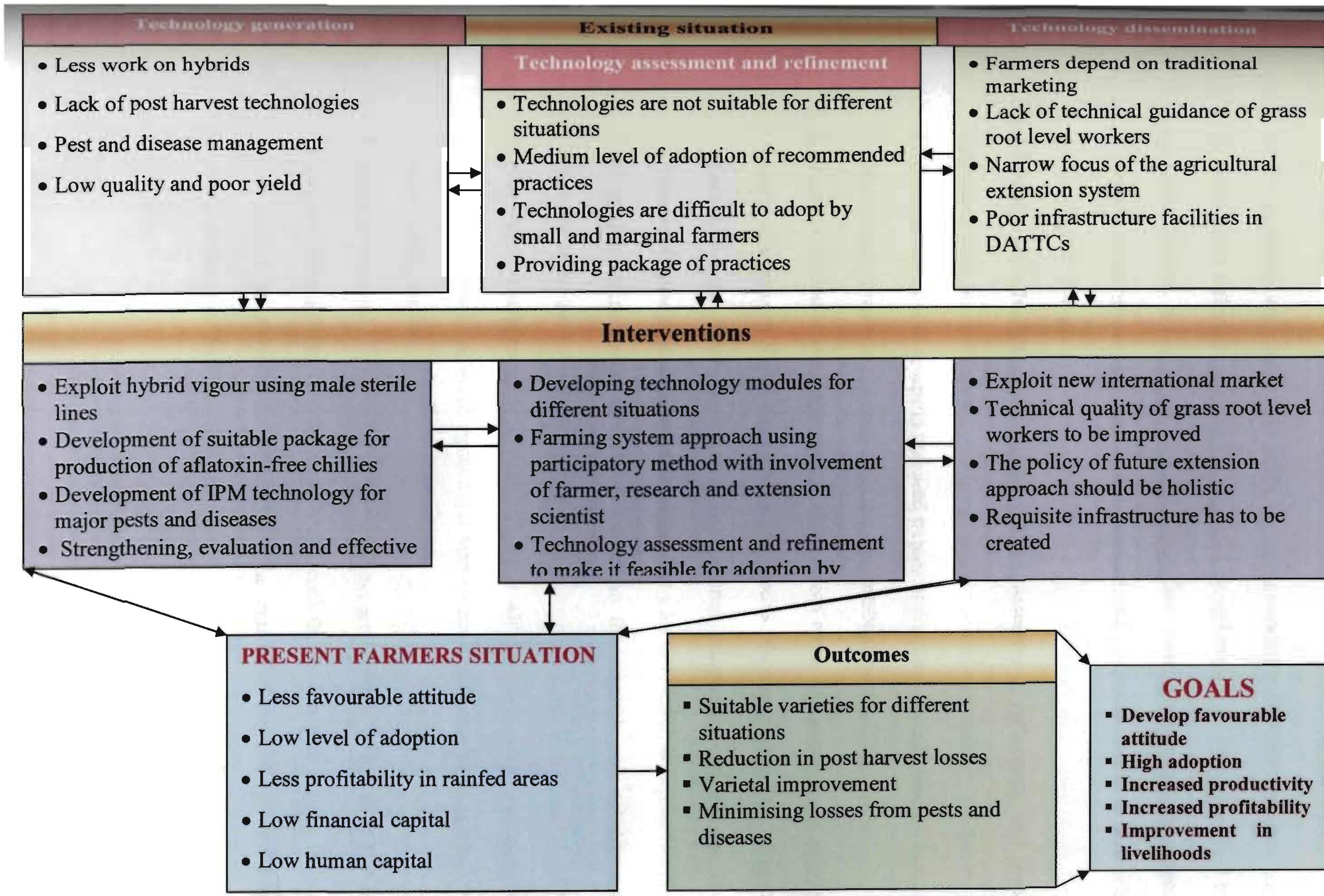


Fig. 82. Strategy for effective technology generation, assessment, refinement and their dissemination for chilli crop

10. By acquiring knowledge and skills on recommended groundnut practices and adoption of different technologies suggested by agricultural scientists may lead to visible results, better irrigation, high production, water conservation, increased income, high marketable agricultural produce and eventually leads to farmer's satisfaction through sustainable agriculture.

5.9.3 Strategy for effective technology generation, assessment, refinement and their dissemination for chilli crop

1. Introduction of seed selection and seed treatment practices of chilli seeds, which is an important prophylactic measure in the crop establishment stage.
2. Plant protection is one major area in chilli which needs due attention. At present farmers incur crop losses due to pests and insects. To prevent this loss, farmers should use the latest and most effective crop protection technologies. The biotechnological measures can do wonders, but a lot of research is required in this field. University should provide incentives to the research and development companies for the agricultural research.
3. Our system needs research in both high input and low input chilli culture. The emerging scenario in world agricultural markets must not force us to ignore low input chilli cultures.
4. More funds should be allocated to the extension programmes, so that as and when the new techniques are developed, it should reach the farmers with in time. Efforts are needed to increase the mobility of the extension workers by providing adequate transport facility.

5. On farm research on spacing, fertilizer management are to be conducted at farmer field for determination and conviction by scientists.
6. Extension machinery has to work very close with the farmers advising them on the marketing prospects of chilli crop and the probable climate that the crop would have to face in that season. This can be done more effectively with the involvement of farmers' organizations and NGOs.
7. Farmers in general and commodity groups in particular like "Chilli Growers Association" may be promoted among the farmers groups. Such groups/ associations can deal with different agencies, whoever does well to them on competitive manner. Further, both systems can co-exist and have complementary and supplementary roles.
8. University may encourage the efforts of NGO's in educating the farmers regarding ANGRAU technologies. So that there can be better awakening among the farming community.
9. Water harvesting by construction of on-farm water storage structures like farm ponds and reservoirs. This will help in collection of excess rainwater during kharif season and utilizing it during subsequent rabi and summer seasons.
10. There is a need to invest substantially in infrastructure development such as cold storage facilities, processing facilities, information networks *etc.*, which will have positive impact on export marketing.

CHAPTER VI

SUMMARY

SUMMARY

The great stride that India made in agricultural production in last two decades has moved the country from a state of begging bowl to breadbasket. At the same time the population pressure on arable land is built up during these years. As agricultural development relies more and more on advancements in scientific technologies, this necessitated the development of strong dynamic agricultural research. For this purpose as on today, 39 Agricultural Universities and other institutes are functioning in India, which have contributed a great extent to agricultural research in the country. The major achievements in this direction were green revolution, yellow revolution, blue revolution *etc.*, which have enhanced the country from insufficient to self sufficient in food production. With the advent of new technologies, the farmers should come 'forward, empower themselves with the latest tools and techniques, effective use of inputs, safer and precise methods on input application, effective weed and insect control, safer harvesting. The coming together of all the stakeholders is the need of time, and not only the technology need to be developed at fast pace, but also transferred without losing much time. The significance of quick information access, exposure to latest technologies is of prime importance.

Andhra Pradesh (A.P), covering a land area of 274,400 sq. km, is the fifth largest state in India, with a population of 66.51 million, accounting for 9 per cent of country's population. The state, in a sense, is regarded as microcosm of the nation comprising agriculturally advanced and prosperous area in the Costal (9 districts), an economically and socially backward area in Telangana (10 districts), a drought prone area in

Rayalaseema (4 districts) and a fairly extended tribal belt, along the northern and northeastern regions. Approximately, 70% of the state's population is dependent on agriculture and allied sectors activities, which contributes about 30% of the state's income. Andhra Pradesh is principally agrarian in character, consistently maintaining high levels of crop production in crops like rice, groundnut and chillies compared to several other Indian states.

In Andhra Pradesh Acharya N. G. Ranga Agricultural University plays a major role in research activities and holds 66 research stations, spread all over the state. These include nine Regional Agricultural Research Stations (RARS) located in each of the nine agro-climatic zones of the state. The research activities are need based and location specific, which are carried out at RARS as well as at other research stations. The scientists of this university have developed nearly 258 crop varieties and other improved technologies of crop production, crop protection *etc.*,

The number of emerging technologies is not important. What is important is to what extent, these new agricultural technologies are responsible for increasing agricultural production, productivity and farmers income. Hence there is a need for an analytical and diagnostic evaluation of technologies, to determine their impact. This is possible by obtaining a clear and comprehensive picture of present situation. This will facilitate researchers to generate more useful research.

A few studies on adoption and performance of agricultural technologies have been conducted in different parts of the country. Keeping in view of this the present study entitled "A study on impact of ANGRAU production technologies for selected crops" is modulated with the following objectives.

6.1 Objectives of the study

1. To screen the technologies developed by ANGRAU for selected crops.
2. To measure the attitude of farmers towards ANGRAU technologies.
3. To study the impact of ANGRAU technologies in terms of adoption quotient, productivity, profitability and improvement in livelihood of the farmers.
4. To study the problems faced by research and extension scientists in generation and dissemination of these technologies.
5. To study the production constraints faced by the farmers in adoption of recommended technologies and their suggestion to overcome them.
6. To develop a strategy for effective technology generation, assessment, refinement and their dissemination.

6.2 Methodology

6.2.1 Research Design

An explorative research design was followed to carry out the study.

6.2.2 Locale of the study

The study was conducted in Andhra Pradesh covering all the three regions *i.e.,* Coastal Andhra, Telangana, Rayalaseema in three districts *i.e.,* Krishan, Warangal, Anantapur respectively, six mandals and twelve villages.

6.2.3 Selection of Farmers

A total of 12 farmers from each selected village were selected *i.e.,* for each crop four farmers were selected. Thus a total sample was 216.

6.2.4 Selection of research scientists and extension scientists

Research scientists from concerned crops and all the extension scientists of DAATTCs and KVKs working in the selected districts were selected.

6.2.4 Devices used for data collection

Keeping in view of the objectives under the study, a comprehensive schedule was prepared covering all the objectives of the study.

6.3 Research findings

In consonance with the objectives of the study, the major findings are given below.

1. Majority of the rice farmers of Krishna district possessed (50.00%) favourable attitude and (41.67%) fell under less favourable attitude followed by more favourable attitude (8.33%) towards recommended technologies.
2. Majority of the rice farmers of Krishna district expressed (41.67%) medium level of adoption towards recommended technologies followed by high level of adoption (37.33%) and low level of adoption (25.00%).
3. Calculated values of the t-test were found to be significant for all the impact indicators, after adoption of recommended technologies by rice farmers of Krishna district.
4. Majority of the groundnut farmers of Krishna district possessed favourable attitude (41.67%) followed by less favourable attitude (37.50%) and more favourable (20.83%) attitude towards recommended technologies.
5. Majority of the groundnut farmers of Krishna district occupied medium category (37.50%) of adoption and same category of the respondents (37.50%) were

under low level of adoption followed by high (25.00%) level of adoption of recommended ANGRAU technologies.

6. Calculated values of the t-test were found to be significant for all the impact indicators except profitability and financial capital, after adoption of recommended technologies by groundnut farmers of Krishna district.
7. Majority of the chilli farmers of Krishna district possessed favourable attitude (45.84%) towards recommended ANGRAU technologies. About (37.50%) of the respondents had less favourable attitude and (16.66%) of the respondents had more favourable attitude.
8. Majority of the chilli farmers of Krishna district was on medium (41.67%) level of adoption and same per cent of the respondents were low (41.67 %) level of adoption and 16.66 per cent were high category of adoption of recommended chilli technologies.
9. Calculated values of the t-test were found to be significant for all the impact indicators except financial and social capital, after adoption of recommended technologies by chilli farmers of Krishna district.
10. Majority of the rice farmers of Warangal district possessed favourable attitude (41.67%), followed by less favourable (37.50%) and more (20.83%) favourable attitude towards recommended ANGRAU technologies
11. Majority of the rice farmers of Warangal district fell under medium (50.00%) followed by low (41.67%) level of adoption of recommended technologies, whereas, 8.33 per cent of the respondents possessed high level of adoption.

12. Calculated values of the t-test were found to be significant for all the impact indicators except financial and social capital, after adoption of recommended technologies by rice farmers of Warangal district.
13. Majority of the groundnut farmers of Warangal district recorded favourable (45.83%), followed by less favourable (41.67%) and more favourable (12.50%) attitude towards recommended ANGRAU technologies.
14. Majority of the groundnut farmers of Warangal district exhibited low (62.50%), followed by medium (25.00%) and high (12.50%) level of adoption of recommended technologies.
15. Calculated values of the t-test were found to be non-significant for all the impact indicators except physical and natural capital, after adoption of recommended technologies by groundnut farmers of Warangal district.
16. Majority of the chilli farmers of Warangal district possessed (45.84%) less favourable, followed by favourable (37.50%) and more favourable (16.66%) attitude towards recommended ANGRAU technologies.
17. Majority of the chilli farmers of Warangal district exhibited low (54.17%), followed by medium (25.00%) and high (20.83%) level of adoption of recommended technologies.
18. Calculated values of the t-test were found to be non-significant for all the impact indicators except physical, natural and social capital, after adoption of recommended technologies by chilli farmers of Warangal district.

19. Majority of the rice farmers of Anantapur district possessed favourable attitude (45.84%) followed by less favourable attitude (33.33%) and more favourable (20.83%) attitude towards recommended technologies.
20. Majority of the rice farmers of Anantapur district occupied medium category (58.34%) of adoption followed by 29.16 per cent of the respondents were low level of adoption and high level of adoption (25.00%) of recommended ANGRAU technologies.
21. Calculated values of the t-test were found to be non-significant for all the impact indicators except physical and natural, after adoption of recommended technologies by rice farmers of Anantapur district.
22. Majority of the groundnut farmers of Anantapur district possess (62.50%) favourable attitude followed by (29.17%) less favourable attitude and (8.33%) more favourable attitude towards recommended technologies.
23. Half of the groundnut farmers of Anantaput district exhibited medium level of adoption followed by low (41.67%) and high level of adoption (8.33%) towards recommended technologies.
24. Calculated values of the t-test were found to be significant for all the impact indicators except social capital, after adoption of recommended technologies by groundnut farmers of Anantapur district.
25. Majority of the chilli farmers of Anantapur district possessed (37.50%) favourable attitude and the same per centage (37.50%), less favourable attitude. Whereas and (25.00%) of the farmers possessed more favourable attitude towards recommended technologies.

26. Majority of the chilli farmers of Anantapur district occupied low (45.84%) level of adoption followed by 41.66 per cent of the respondents were medium level of adoption and high level (12.50%) of adoption of recommended ANGRAU technologies.
27. Calculated values of the t-test were found to be significant for all the impact indicators except profitability, financial capital and human capital, after adoption of recommended technologies of chilli farmers of Anantapur district.
28. Regarding problems and suggestions expressed by the research scientists generation of recommended rice technologies were classified into five categories *i.e.,* technological, economical, social, situational and organizational. Major problems include, more research is needed on different biotypes, lack of incentives and inadequate facilities at research station, lack of coordination from different departments in multidisciplinary experiments, recommendations of nitrogen fertilizer application vary with location and more miscellaneous work. Suggestions to overcome these problems are more research is needed on different biotypes, need to provide incentives for innovative research, co-operation and co-ordination among different departments is to be encouraged, research on location specific recommendations are needed and avoid allotment of miscellaneous work.
29. Problems and suggestions expressed by the research scientists in generation of recommended groundnut technologies were classified into five categories *i.e.,* technological, economical, social, situational and organizational. Major problems include, lack of effective intercropping system in groundnut, lack of

adequate funds to conduct research, lack of proper planning and coordination for IPM project, lack of working staff and excessive work load. Suggestions to overcome these problems are research on specific intercropping system should be needed, to provide adequate and timely funding to research, division of work among different disciplines is needed, fill the vacancies according to the requirement and reduce the work load to conduct smooth research.

30. Problems and suggestions expressed by the research scientists in generation of recommended chilli technologies were classified into five categories *i.e.,* technological, economical, social, situational and organizational. Major problems include, susceptibility to several viral diseases, untimely supply of funds for conducting research, low participation of extension scientists and farmers at the time of research project proposal, occurrence of floods during the period of conducting experiments and inadequate infrastructure at research station. Suggestions to overcome these problems are need to develop virus resistant varieties, supply of funds should be in time, encourage the participation of researchers, extension scientists and farmers during the project proposal, green houses or poly houses should be established for some experiments and growth regulators should be provided on subsidized basis.

31. Major technological, economical, social, situational and organizational problems faced by the extension scientists in dissemination of rice technologies include, lack of high yielding and early maturing varieties, untimely supply of funds to conduct demonstrations, lack of people participation in DAATTC trainings, problematic soils and lack of mobile training units. Suggestions to overcome

these problems are research scientists should work on plant genetic characters, timely supply of funds to the extension scientists for conducting demonstrations, arrange training schedules based on farmers convenience, location specific recommendation should be needed and provision of mobile training units to DAATTC.

32. Major technological, economical, social, situational and organizational problems faced by the extension scientists in dissemination of groundnut technologies includes ferti-cum seed drillers are unsuitable to rain fed conditions, inadequate funds to conduct trainings, adoption of IPM technologies demands for community approach, non coperational attitude of farmers to conduct demonstration and no technical personnel to guide the farmers after conducting demonstrations. Suggestions to overcome these problems are suitable ferti-cum seed drillers should be designed, university should provide required funds to conduct trainings, educate the farmers on advantages of community approach, motivate the farmers on advantages of adoption of recommended technologies and technical persons are needed to carry out demonstrations activities.

33. Major technological, economical, social, situational and organizational problems faced by the extension scientists in dissemination of chilli technologies include no hybrids from university, inadequate release of funds, farmers are not satisfied with the results of the recommended technologies, present extension system is not suitable for effective technology dissemination and it is difficult for extension scientists to visit the whole district. Suggestions to overcome these problems are university should concentrate on developing the hybrids, provide

sufficient funds for preparation of audio visual aids, impact studies are needed to identify the gross root level problems, research scientists should concentrate on micronutrient research and need to provide transport facility and financial assistance for covering the whole district.

34. Major production constraints faced by the rice farmers in adoption of recommended technologies is lack of knowledge on seedling root dip technique and to overcome this problem, a skill demonstration on seedling root dip technique should be conducted. Major production constraints faced by the groundnut farmers in adoption of recommended technologies is unavailability of required quantity of seed, to overcome this they suggested required quantity of seed should be provided. Major production constraint faced by the chilli farmers in adoption of recommended technologies is problem of more pests and diseases and to overcome this, pests and disease resistant varieties should be developed.

6.4 IMPLICATIONS OF THE STUDY

The implications of the study, documented based on the out comes of the probing, would serve as pace setter for future endeavors, researchers and extension workers. Hence, an attempt was made to document the implications of the present study, mostly in nature of suggesting some changes so as to improve the knowledge and adoption of recommended technologies by the respondents.

1. The findings revealed that the majority of the farmers had medium level of adoption on recommended rice, groundnut and chilli technologies. Hence, they must be educated and convinced to adopt all the recommended practices through conducting demonstrations, field trips, training programmes and exhibitions.

2. The availability of inputs and market facility having a major role in adoption, there is a need to revamp the whole system to facilitate an easy and timely availability of most important inputs like seed, credit and plant protection chemicals. There is an equal need to put an end to the exploitation of farmers by middleman by creating an effective network of marketing yards and by developing co-operation among the farmers.
3. The lack of technical guidance was an equally major constraint. This ask for gearing up of such technologies which impart skills to farmers like method demonstration, field visits, *etc.*,
4. The farmers should be educated about the advantages of recommended technologies to mitigate constraints like lack of awareness, negligence.
5. The discouraging trend among the farmers regarding the price situation needs a meticulous study in relation to the probable reasoning discussed and the authorities concerned have to formulate a production oriented price policy since a remunerative price for a product could be an incentive for higher production.
6. Most of the farmers had low level of social participation. This trend should be changed by helping the farmers to form more discussion groups, farmers clubs, welfare associations *etc.*, as social exposure will augur in adoption of recommended technologies.
7. The problems and suggestions given by the farmers of the study also looked in to by the officials in order to improve the adoption of recommended technologies of rice, groundnut and chillies.

6.5 SUGGESTIONS FOR FUTURE RESEARCH

The findings of the present study warranted the need for further investigations in several directions. The following suggestions are made for use of future research who undertaken study in this area.

1. Similar studies may be made to find the impact of adoption of recommended practices with some other impact indicators like sustainability, cost benefit ratio, *etc.*,

2. The adoption in relation to some other important crops like cotton, sugarcane, tobacco, *etc.*, may be made along with a study of constraints limiting the adoption.

3. Similar studies in other districts would help to generalise the findings and to identify the major findings.

4. A study totally committed to the identification of constraints limiting adoption of recommended technologies in different crops should be made.

5. Explorative research design has been adopted in the present study in order to understand the extent of adoption of recommended technologies. These approaches could be tested by experimental studies in order to know the exact impact of such studies.

6. The devices of measurement developed for the present study appear to be convenient and appropriate. However, they need to be tried on large samples and to be cross validated with other similar measurements.

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*Originals not seen

The pattern of 'Literature cited' presented above is in accordance with the 'Guidelines' for thesis presentation for Acharya N. G. Ranga Agricultural University, Rajendranagar, Hyderabad-500030.

APPENDICES

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

EXTENSION EDUCATION INSTITUTE

Rajendranagar, Hyderabad-500 030

Dr. P. Rameshkumar Reddy
Professor
Extension Education Institute
Rajendranagar
Hyderabad-500030

Dear Sir/Madam ---

This is to inform that one of my Ph. D students Mr. G. Venkata Murali (ID.No. RAD/04-06), Research Scholar, EEI, Hyderabad is working on Ph. D research entitled "**A STUDY ON IMPACT OF ANGRAU PRODUCTION TECHNOLOGIES FOR SELECTED CROPS**" under my guidance and supervision. Regarding the above research work he has to collect relevant data from your institute and scientists.

I, therefore request you to spare your valuable time from your busy schedule and co-operate in his research work by providing necessary information on his research work.

Hence, I look forward for your cooperation and help to complete his research work at your place as per convenience.

Thanking you

Yours sincerely

(P. Rameshkumar Reddy)

APPENDIX-I

SCREENING OF ANGRAU TECHNOLOGIES

1. Recommended rice technologies

S. No.	Recommended Technology
1.	APHR-1
2.	APHR-2
3.	Vijeta (MTU 1001)
4.	Nandi (MTU 5182)
5.	Kavya (WGL 48684)
6.	Deepti (MTU 4870)
7.	Bhadrakali (WGL 3962)
8.	Keshava (WGL 3825)
9.	Shiva (WGL 3943)
10.	Orugallu (WGL 47970)
11.	Maruteru sannalu (MTU 006)
12.	Surya (BPT 4358)
13.	Swathi (NLR 33057)
14.	Somasila (NLR 3358)
15.	Penna (NLR 33365)
16.	Sravani (NLR 33359)
17.	Erramallelu (WGL 20471)
18.	Cotton dora sannalu (MTU 1010)
19.	Seed rate for rainfed rice- 30-36 kg/acre, if irrigated - 20-25 kg/acre
20.	Seedling root dip technique (0.02% Chloropyriphos-20EC) or Pest management- application of Carbofuran 3g@1.5a.i./ha 5days before pulling
21.	Use of pheromone traps-8/acre
22.	Disease management –Sheath blight control-spraying of Propiconazole 25EC@1ml/lit or Hexaconazole 5EC@2ml/lit

2. Recommended groundnut technologies

S. No.	Recommended Technology
1.	Vemana(K 134)
2.	Jagtial 88
3.	Kadiri(K 150)
4.	Tirupati 2
5.	Vemana
6.	Kadiri 4 (K 150)
7.	IPM for red hairy catter pillar management a) Summer ploughing b) Avoid monocropping c) Crop rotation d) Dislodge the larvae by shaking the plants and destroy e) Adopt community approach f) Keep bird perchs@50/acre g) Aim the spraying at early instars i) Spray NPV or Bt j) Follow need based application of pesticides k) Avoid staggered sowing
8.	Fertilizer recommendation: N – P – K: 20—40—50 kg/ha (rainfed areas), if irrigated N – P – K: 30-40-50 kg/ha
9.	Deep ploughing increased pod yield
10.	NPK recommended doses +gypsum 2t/ha+FYM 5t/ha
11.	Inter cropping: Groundnut +Redgram (7:1)
12.	Optimum time of sowing: 2nd fortnight of july
13.	Seed treatment-Mancozeb+Chloropyriphos+Neem oil+*Trichoderma viridae*
14.	Land preparation equipment-Chekkala guntaka
15.	Spacing: 30cm ? 15 cm
16.	Fertilizer application equipment-Enati gorru
20.	Post harvest technique (Storing pods) -Neem oil or Pongamia oil spray at 10% concentration

3. Recommended chilli technologies

S. No.	Recommended Technology
1.	Prakash (LAC-206)
2.	LAM (LAC-305) vegetable
3.	LAM 334 (LAC-334)
4.	Seed rate-direct sowing-2.5kg/acre, if transplanting-650gram/acre
5.	Seed treatment with Mancozeb or Capton or Bavistin @3gram/kg seed
6.	Seedling root dip technique-Imidacloprid(0.02%)
7.	Pod borer management-Chloropyriphos(0.05%)
8.	Thrips management-Triazophos or Acephate-750 grams a.i/ha
9.	Pest management –Soil application of Carbofuran 3G@1 Kg ai/ha at 15 DAT
10.	Spraying NAA (15 ppm) thrice at fortnightly interval
11.	Heap the ripe pods over night to get uniform ripening

APPENDIX-II

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
EXTENSION EDUCATION INSTITUTE
Rajendranagar, Hyderabad-500 030

An Interview schedule on

A study on impact of ANGRAU production technologies for selected crops (Rice)

Part-A

Name: Respondent No:

Mandal: Date

Village:

District:

ADOPTION

The following are the recommended ANGRAU production technologies for rice. Please indicate the technologies, which you have adopted for the past 5 years by marking (v) under **"A(Adopted)"**, if not adopted by marking (v) under **"NA(Not Adopted)"**.

S.No	Technology			A	NA
	Krishna district	**Warangal district**	**Anantapur district**		
1.	APHR-1	Bhadrakali (WGL 3962)	Swathi (NLR 33057)		
2.	APHR-2	Keshava (WGL 3825)	Somasila (NLR 3358)		
3.	Vijetha (MTU 1001)	Shiva (WGL 3943)	Penna (NLR 33365)		
4.	Nandi (MTU 5182)	Orugallu (WGL 47970)	Sravani (NLR 33359)		
5.	Kavya (WGL 48684)				
6.	Erramallelu (WGL 20471)				

7.	Maruteru sannalu (MTU 006)			
8.	Deepti (MTU 4870)			
9.	Cotton dora sannalu (MTU 1010)			
10.	Surya (BPT 4358)			
11.	Seed rate for rainfed rice- 30-36 kg/acre, if irrigated - 20-25 kg/acre			
12.	Seedling root dip technique (0.02% Chloropyriphos-20EC) or Pest management- application of Carbofuran 3g@1.5a.i./ha 5days before pulling			
13.	Use of pheromone traps-8/acre			
14.	Disease management –Sheath blight control-spraying of Propiconazole 25EC@1ml/lit or Hexaconazole 5EC@2ml/lit			

PRODUCTIVITY

Please give the details of productivity levels of rice crop before and after adoption of recommended ANGRAU technologies.

S.No.	Season	Productivity levels (Kg/ha)	
		Before	**After**
1.	Kharif		
2.	Rabi		
3.	Summer		

PROFITABILITY

Specify the income obtained from agriculture before and after adoption of recommended ANGRAU technologies in rice.

S.No.	Income source	Before	After
1	Income from agriculture		
2	Income in the form of labour/wage work		
3	Any other source		

LIVELIHOODS

Physical Capital: Please give the details of physical capital before and after adoption of recommended ANGRAU technologies.

S.No.	Type of physical capital	Before	After
1.	House a) Katcha b) Pucca		
2.	Source of drinking water a) Tank b) Dug well c) Tap water		
3.	Source of energy for domestic purpose a) Fire wood b) Kerosene c) LP gas		
4.	Transport facility a) Bullock cart b) Public transport c) Own vehicle		
5.	Agricultural implements and machinery		
6.	Other physical assets, if any		

Natural Capital: Please give the details of natural capital before and after adoption of recommended ANGRAU technologies.

S.No.	Type of natural capital	Before	After
1.	Land a) Wet land b) Dry land		
2	Type of cultivation a) Rainfed b) Irrigated		
3	Cropping system a) Mono cropping b) Double cropping c) Multiple cropping		
4	Live stock a) Milch animal b) Draught animal c) Poultry		
5	If Any other, please specify		

Financial Capital: Please give the details of financial capital before and after adoption of recommended ANGRAU technologies.

S.No.	Savings	Before	After
1	Formal institutions		
2.	Informal institutions		

Social Capital: Please give the details of social capital before and after adoption of recommended ANGRAU technologies.

S.No.	Type of social capital	Before	After
1.	Without any position in socio political organization.		
2.	Official position in one or more formal organizationss.		
3.	Official position in SHGs or poverty alleviation programmes.		
4.	Active office bearer		
5.	Financial contribution or raising funds for community work		

Human Capital: Please indicate extent of improvement in health, nutritional and educational status of family members after adoption of ANGRAU technologies in terms of VGE (very great extent), GE (great extent), SE (some extent), LE (less extent) and LEE (least extent).

S.No.	Health, nutritional and educational status	VGE	GE	SE	LE	LEE
1.	Medical treatment availed					
2.	Means of transport in case of emergency					
3.	Taking timely treatment for curing illness					
4.	Access to balanced diet					
5.	Family education status					

Attitude of farmers towards recommended ANGRAU rice technologies

The following statements are concerned with the attitude of farmers towards recommended ANGRAU rice technologies. Please express your feeling about these statements by indicating degree of your agreement or disagreement on the five point continuum.

S.No.	Statement	SA	A	UD	DA	SDA
1.	ANGRAU technologies are the technologies available for improvement of the production in the state					
2.	ANGRAU technologies are drudgery prone					
3.	ANGRAU technologies involve efficient utilization of resources and farm wastes					
4.	ANGRAU technologies are complex in nature					
5.	ANGRAU technologies lead farmers towards scientific farming					
6.	ANGRAU technologies are not ecofriendly					
7.	ANGRAU technologies created awareness among farmers about scientific farming					
8.	The extension person's credibility is enhanced with the transfer of ANGRAU technologies					
9.	Money spent for adopting ANGRAU technologies ensure the farmer better economic returns					
10.	Continuous adoption of ANGRAU technologies impairs the ecological balance					
11.	Farmers adopting ANGRAU technologies improved the nutritional and health status of their family					

S.No.	Statement	SA	A	UD	DA	SDA
12.	ANGRAU technologies are generated considering traditional know how of farmers					
13.	Existing traditional methods of harvesting and drying are beneficial and economical than ANGRAU technologies					
14.	Use of pheromone traps helps the farmers to monitor and check pest population					
15.	ANGRAU technologies do not address the problems of different categories of farmers.					
16.	ANGRAU is doing laudable services to the farming community in the state					
17.	Seed selection and seed treatment are nothing but waste of time					
18.	It is better to resort to chemical control when pest crosses ET levels					
19.	ANGRAU technologies are need based and proved effective in farmers field					
20.	Agricultural labour can earn more money than a farmer adopting ANGRAU technologies					
21.	Local rice varieties are known for higher yields than recommended ANGRAU varieties					
22.	In rainfed rice cultivation ANGRAU recommended seed rate should necessarily be followed to assure adequate plant population					
23.	Use of ANGRAU rice varieties enhances the infestation of pests and diseases in rice crop					

SA-Strongly Agree, A- Agree, UD-Undecided, DA- Disagree & SDA- strongly Disagree

Part-B

Please indicate the constraints in adoption of above recommended rice technologies.

1.

2.

3.

4.

5.

6.

Please suggest the measures for adoption of above recommended rice technologies

1.

2.

3.

4

5.

6.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

EXTENSION EDUCATION INSTITUTE

Rajendranagar, Hyderabad-500 030

An Interview schedule on

A study on impact of ANGRAU production technologies for selected crops

(Groundnut)

Part-A

Name: Respondent No:

Mandal: Date

Village:

District:

ADOPTION

The following are the recommended ANGRAU production technologies for Groundnut. Please indicate the technologies, which you have adopted for the past 5 years by marking (v) under **"A(Adopted)"**, if not adopted by marking (v) under **"NA(Not Adopted)"**.

S.No	Technology			A	NA
	Krishna district	**Warangal district**	**Anantapur district**		
1.		Vemana (K 134)	Vemana (K 134)		
2.	Vemana (K 134)	Jagtial 88	Kadiri (K 150)		
3.	Kadiri 4 (K 150)	Tirupati 2	Tirupati 2		
4.	IPM for red hairy catter pillar management a) Summer ploughing b) Avoid monocropping c) Crop rotation d) Dislodge the larvae by shaking the plants and destroy e) Adopt community approach f) Keep bird perchs@50/acre				

	g) Aim the spraying at early instars i) Spray NPV or Bt j) Follow need based application of pesticides k) Avoid staggered sowing		
5.	Fertilizer recommendation: N – P – K: 20—40—50 kg/ha (rainfed areas), if irrigated N – P – K: 30-40-50 kg/ha		
6.	Deep ploughing increased pod yield		
7.	NPK recommended doses +gypsum 2t/ha+FYM 5t/ha		
8.	Inter cropping: Groundnut +Redgram (7:1)		
9.	Optimum time of sowing : 2nd fortnight of july		
10.	Seed treatment-Mancozeb+Chloropyriphos+Neem oil+*Trichoderma viridae*		
11.	Land preparation equipment-Chekkala guntaka		
12.	Spacing : 30cm ? 15 cm		
13.	Fertilizer application equipment-Enati gorru		
14.	Post harvest technique (Storing pods) -Neem oil or Pongamia oil spray at 10% concentration		

PRODUCTIVITY

Please give the details of productivity levels of Groundnut crop before and after adoption of recommended ANGRAU technologies

S.No.	Season	Productivity levels (Kg/ha)	
		Before	After
1.	Kharif		
2.	Rabi		
3.	Summer		

PROFITABILITY

Specify the income obtained from agriculture before and after adoption of recommended ANGRAU technologies in Groundnut.

S.No.	Income source	Before	After
1.	Income from agriculture		
2.	Income in the form of labour/wage work		
3.	Any other source		

LIVELIHOODS

Physical Capital: Please give the details of physical capital before and after adoption of recommended ANGRAU technologies

S.No.	Type of physical capital	Before	After
1.	House a) Katcha b) Pucca		
2.	Source of drinking water a) Tank b) Dug well c) Tap water.		
3.	Source of energy for domestic purpose a) Fire wood b) Kerosene c) LP gas		
4.	Transport facility a) Bullock cart b) Public transport c) Own vehicle		
5.	Agricultural implements and machinery		
6.	Other physical assets if any		

Natural Capital: Please give the details of natural capital before and after adoption of recommended ANGRAU technologies

S.No.	Type of natural capital	Before	After
1.	Land a) Wet land b) Dry land		
2	Type of cultivation a) Rainfed b) Irrigated		
3	Cropping system a) Mono cropping b) Double cropping c) Multiple cropping		
4	Live stock a) Milch animal b) Draught animal c) Poultry		
5	If Any other, please specify		

Financial Capital: Please give the details of financial capital before and after adoption of recommended ANGRAU technologies.

S.No.	Savings	Before	After
1	Formal institutions		
2.	Informal institutions		

Social Capital: Please give the details of social capital before and after adoption of recommended ANGRAU technologies.

S.No.	Type of social capital	Before	After
1.	Without any position in socio political organization.		
2.	Official position in one or more formal organizations.		
3.	Official position in SHGs or poverty alleviation programmes.		
4.	Active office bearer		
5.	Financial contribution or raising funds for community work		

Human Capital: Please indicate extent of improvement in health, nutritional and educational status of family members after adoption of ANGRAU technologies in terms of VGE (very great extent), GE (great extent), SE (some extent), LE (less extent) and LEE (least extent).

S.No.	Health, nutritional and educational status	VGE	GE	SE	LE	LEE
1.	Medical treatment availed					
2.	Means of transport in case of emergency					
3.	Taking timely treatment for curing illness					
4.	Access to balanced diet					
5.	Family education status					

Attitude of farmers towards recommended ANGRAU groundnut technologies

The following statements are concerned with the attitude of farmers towards recommended ANGRAU groundnut technologies. Please express your feeling about these statements by indicating degree of your agreement or disagreement on the five point continuum.

S.No.	Statement	SA	A	UD	DA	SDA
1.	ANGRAU technologies are the technologies available for improvement of the production in the state					
2.	ANGRAU technologies are drudgery prone					
3.	ANGRAU technologies involve efficient utilization of resources and farm wastes					
4.	ANGRAU technologies are complex in nature					
5.	ANGRAU technologies lead farmers towards scientific farming					
6.	ANGRAU technologies are not ecofriendly					
7.	ANGRAU technologies created awareness among farmers about scientific farming					
8.	The extension person's credibility is enhanced with the transfer of ANGRAU technologies					
9.	Money spent for adopting ANGRAU technologies ensure the farmer better economic returns					
10.	Continuous adoption of ANGRAU technologies impairs the ecological balance					
11.	Farmers adopting ANGRAU technologies improved the nutritional and health status of their family					

S.No.	Statements	SA	A	UD	DA	SDA
12.	ANGRAU technologies are generated considering traditional know how of farmers					
13.	Existing traditional methods of harvesting and drying are beneficial and economical than ANGRAU technologies					
14.	Use of pheromone traps helps the farmers to monitor and check pest population					
15.	ANGRAU technologies do not address the problems of different categories of farmers.					
16.	ANGRAU is doing laudable services to the farming community in the state					
17.	Seed selection and seed treatment are nothing but waste of time					
18.	It is better to resort to chemical control when pest crosses ET levels					
19.	ANGRAU technologies are need based and proved effective in farmers field					
20.	Agricultural labour can earn more money than a farmer adopting ANGRAU technologies					
21.	IPM approach in groundnut saves and maintains the natural enemies /beneficial insects in the crop					
22.	Chekkalaguntaka is not preferred over country plough for land preparation in groundnut					
23.	IPM in groundnut does not require any community cooperation for effective pest management					

SA-Strongly Agree, A- Agree, UD-Undecided, DA- Disagree & SDA- strongly Disagree

Part-B

Please indicate the constraints in adoption of above recommended groundnut technologies

1.

2.

3.

4.

5.

6.

Please suggest the measures for adoption of above recommended groundnut technologies

1.

2.

3.

4

5.

6.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

EXTENSION EDUCATION INSTITUTE

Rajendranagar, Hyderabad-500 030

An Interview schedule on

A study on impact of ANGRAU production technologies for selected crops (chillies)

Part-A

Name: Respondent No:

Mandal: Date

Village:

District:

ADOPTION

The following are the recommended ANGRAU production technologies for chilli. Please indicate the technologies, which you have adopted for the past 5 years by marking (v) under **"A(Adopted)"**, if not adopted by marking (v) under **"NA(Not Adopted)"**.

S.No	Technology			A	NA
	Krishna district	**Warangal district**	**Anantapur district**		
1.	Prakash (LAC-206)	Prakash(LAC-206)	LAM (LAC-305) vegetable		
2.	LAM (LAC-305) vegetable	LAM 334 (LAC-334)	LAM 334 (LAC-334)		
3.	LAM 334 (LAC-334)				
4.	Seed rate-direct sowing-2.5kg/acre, if transplanting-650gram/acre				
5.	Seed treatment with Mancozeb or Capton or Bavistin @3gram/kg seed				
6.	Seedling root dip technique-Imidacloprid (0.02%)				
7.	Pod borer management-Chloropyriphos (0.05%)				

8.	Thrips management-Triazophos or Acephate-750 grams a.i/ha		
9.	Pest management –Soil application of Carbofuran 3G@1 Kg ai/ha at 15 DAT		
10.	Spraying NAA (15 ppm) thrice at fortnightly interval		
11.	Heap the ripe pods over night to get uniform ripening		

PRODUCTIVITY

Please give the details of productivity levels of chilli crop before and after adoption of recommended ANGRAU technologies.

S.No.	Season	Productivity levels (Kg/ha)	
		Before	After
1.	Kharif		
2.	Rabi		
3.	Summer		

PROFITABILITY

Specify the income obtained from agriculture before and after adoption of recommended ANGRAU technologies in chillies.

S.No.	Income source	Before	After
1.	Income from agriculture		
2.	Income in the form of labour/wage work		
3.	Any other source		

LIVELIHOODS

Physical Capital: Please give the details of physical capital before and after adoption of recommended ANGRAU technologies

S.No.	Type of physical capital	Before	After
1.	House a) Katcha b) Pucca		
2.	Source of drinking water a) Tank b) Dug well c) Tap water		
3.	Source of energy for domestic purpose a) Fire wood b) Kerosene c) LP gas		
4.	Transport facility a) Bullock cart b) Public transport c) Own vehicle		
5.	Agricultural implements and machinery		
6.	Other physical assets if any		

Natural Capital: Please give the details of natural capital before and after adoption of recommended ANGRAU technologies

S.No.	Type of natural capital	Before	After
1.	Land a) Wet land b) Dry land		
2.	Type of cultivation a) Rainfed b) Irrigated		
3.	Cropping system a) Mono cropping b) Double cropping c) Multiple cropping		
4.	Live stock a) Milch animal b) Draught animal c) Poultry		
5.	If Any other, please specify		

Financial Capital: Please give the details of financial capital before and after adoption of recommended ANGRAU technologies

S.No.	Savings	Before	After
1.	Formal institutions		
2.	Informal institutions		

Social Capital: Please give the details of social capital before and after adoption of recommended ANGRAU technologies

S.No.	Type of social capital	Before	After
1.	With out any position in socio political organization.		
2.	Official position in one or more formal organizations.		
3.	Official position in SHGs or poverty alleviation programmes.		
4.	Active office bearer		
5.	Financial contribution or raising funds for community work		

Human Capital: Please indicate extent of improvement in health, nutritional and educational status of family members after adoption of ANGRAU technologies in terms of VGE (very great extent), GE (great extent), SE (some extent), LE (less extent) and LEE (least extent).

S.No.	Health, nutritional and educational status	VGE	GE	SE	LE	LEE
1.	Medical treatment availed					
2.	Means of transport in case of emergency					
3.	Taking timely treatment for curing illness					
4.	Access to balanced diet					
5.	Family education status					

Attitude of farmers towards recommended ANGRAU chilli technologies

The following statements are concerned with the attitude of farmers towards recommended ANGRAU chilli technologies. Please express your feeling about these statements by indicating degree of your agreement or disagreement on the five point continuum.

S.No.	Statement	SA	A	UD	DA	SDA
1.	ANGRAU technologies are the technologies available for improvement of the production in the state					
2.	ANGRAU technologies are drudgery prone					
3.	ANGRAU technologies involve efficient utilization of resources and farm wastes					
4.	ANGRAU technologies are complex in nature					
5.	ANGRAU technologies lead farmers towards scientific farming					
6.	ANGRAU technologies are not ecofriendly					
7.	ANGRAU technologies created awareness among farmers about scientific farming					
8.	The extension person's credibility is enhanced with the transfer of ANGRAU technologies					
9.	Money spent for adopting ANGRAU technologies ensure the farmer better economic returns					
10.	Continuous adoption of ANGRAU technologies impairs the ecological balance					
11.	Farmers adopting ANGRAU technologies improved the nutritional and health status of their family					

S.No.	Statements	SA	A	UD	DA	SDA
12.	ANGRAU technologies are generated considering traditional know how of farmers					
13.	Existing traditional methods of harvesting and drying are beneficial and economical than ANGRAU technologies					
14.	Use of pheromone traps helps the farmers to monitor and check pest population					
15.	ANGRAU technologies do not address the problems of different categories of farmers.					
16.	ANGRAU is doing laudable services to the farming community in the state					
17.	Seed selection and seed treatment are nothing but waste of time					
18.	It is better to resort to chemical control when pest crosses ET levels					
19.	ANGRAU technologies are need based and proved effective in farmers field					
20.	Agricultural labour can earn more money than a farmer adopting ANGRAU technologies					
21.	Recommended chilli technologies can save the farmers from indebtness					

SA-Strongly Agree, A- Agree, UD-Undecided, DA- Disagree & SDA- strongly Disagree

Part-B

Please indicate the constraints in adoption of above recommended chilli technologies

1.

2.

3.

4.

5.

6.

Please suggest the measures for adoption of above recommended chilli technologies

1.

2.

3.

4

5.

6.

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
EXTENSION EDUCATION INSTITUTE
Rajendranagar, Hyderabad-500 030

Questionnaire on

A study on impact of ANGRAU production technologies for selected crops

Research Scientist

Name:

Research station:

District:

The above list is the recommended ANGRAU production technologies for rice, groundnut and chilli crops. Please indicate the problems faced by the Research scientist in generation of these technologies.

A) Technological problems
   1.
   2.
   3.

B) Economical problems
   1.
   2.
   3.

C) Social problems
   1.
   2.
   3.

D) Situational problems
   1.
   2.

3.

E) Organisational problems

1.

2.

3.

Suggestion to overcome the above problems

A) Technological problems

1.

2.

3.

B) Economical problems

1.

2.

3.

C) Social problems

1.

2.

3.

D) Situational problems

1.

2.

3.

E) Organisational problems

1.

2.

3.

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Questionnaire on
A study on impact of ANGRAU production technologies for selected crops
Extension Scientist

Name:
DAATTC/KVK:
District:
The above list is the recommended ANGRAU production technologies for rice, groundnut and chilli crops. Please indicate the problems faced by the Extension scientist in dissemination of these technologies.

F) Technological problems
1.
2.
3.

G) Economical problems
1.
2.
3.

H) Social problems
1.
2.
3.

I) Situational problems
1.
2.

3.

J) Organisational problems

1.

2.

3.

Suggestion to overcome the above problems

F) Technological problems

1.

2.

3.

G) Economical problems

1.

2.

3.

H) Social problems

1.

2.

3.

I) Situational problems

1.

2.

3.

J) Organisational problems

1.

2.

3.

APPENDIX-III

STATEMENTS ON ATTITUDE OF FARMERS TOWARD RECOMMENDED ANGRAU TECHNOLOGIES FOR RICE, GROUNDNUT AND CHILLI CROP ALONG WITH THEIR 't' VALUES

S.No.	Statements	't' Value
1.	ANGRAU technologies are the technologies available for improvement of the production in the state	7.854*
2.	Refinement of ANGRAU technologies is the need of the hour for sustainable agriculture	1.100
3.	Due to quality of produce, ANGRAU technologies are not preferred by consumers	1.147
4.	University extension should reorient its efforts to promote the adoption of ANGRAU technologies	1.386
5.	ANGRAU technologies are drudgery prone	4.740*
6.	ANGRAU technologies involve efficient utilization of resources and farm wastes	6.632*
7.	Use of ANGRAU technologies gives social recognition to farmers	1.3467
8.	ANGRAU technologies are complex in nature	9.920*
9.	Money spent on the technology generation in the university is waste	1.634
10.	ANGRAU technologies must be adopted by farmers to reach optimum level of production	1.589
11.	ANGRAU technologies lead farmers towards scientific farming.	7.320*
12.	Location specific problems of farmers are not solved by ANGRAU technologies	1.399
13.	ANGRAU technologies are not ecofriendly.	5.200*
14.	ANGRAU technologies created awareness among farmers about scientific farming	6.935*

S.No.	Statements	't' Value
15.	Participation of farmers, scientists and extension personnel in technology generation, assessment and transfer is important to obtain good results	1.711
16.	The extension person's credibility is enhanced with the transfer of ANGRAU technologies	8.488*
17.	Money spent for adopting ANGRAU technologies ensure the farmer better economic returns	7.179*
18.	Refinement of ANGRAU technologies is necessary for sustainable development	1.417
19.	Success of ANGRAU technologies enhanced scientists credibility in the farming community	1.493
20.	Research efforts need reorientation in wake of WTO	1.217
21.	An ANGAU technology helps the farmers in managing risk and uncertainty	0.698
22.	Absolute economic gain from ANGRAU technologies is very low	0.794
23.	ANGRAU technologies are not suitable and inappropriate in wake of globalisation, liberalization and privatization	1.513
24.	Farmers in general are not inclined to follow ANGRAU technologies	0.915
25.	Continuous adoption of ANGRAU technologies impairs the ecological balance	2.209*
26.	ANGRAU technologies are need based and proved effective in farmers field	9.513*
27.	Chemical seed treatment before sowing is waste of money and time	1.686
28.	Farmers adopting ANGRAU technologies improved the nutritional and health status of their family	1.889*
29.	Adoption of ANGRAU technologies are not assuring expected yields	1.258
30.	Pests and diseases could not be brought completely under control by ANGRAU technologies	1.166

S.No.	Statements	't' Value
31.	Application of recommended doses of N, P, K will certainly increase production of rice/ chilli/ groundnut	0.801
32.	ANGRAU technologies are generated considering traditional know how of farmers	8.413*
33.	Shifting from the traditional practices to ANGRAU technologies, boost up farmers standard of living	0.783
34.	Killing of insect pest and rodents in the crop is a sin	0.591
35.	Existing traditional methods of harvesting and drying are beneficial and economical than ANGRAU technologies	4.070*
37.	ANGRAU is doing laudable services to the farming community in the state	7.058*
38.	Herbicidal application in both nursery and main field in rice is essential to control weeds	1.120
39.	Use of pheromone traps helps the farmers to monitor and check pest population	4.517*
40.	ANGRAU technologies do not address the problems of different categories of farmers	4.740*
41.	Seed selection and seed treatment are nothing but waste of time	1.857*
42.	Spraying of NAA is not helpful against flower drop in chillies	1.200
43.	Use of fungicides control fungal diseases in the crop effectively	1.116
44.	It is better to resort to chemical control when pest crosses ET levels	8.577*
45.	Growing tolerant varieties and seed treatment with sodium carbonate will counter the attack of soil borne diseases in chilli crop	1.284
46.	In rainfed rice cultivation ANGRAU recommended seed rate should necessarily be followed to assure adequate plant population	6.543*
47.	Paddy at nursery stage does not require any plant protection measures	0.105

S.No.	Statements	't' Value
48.	Local rice varieties are known for higher yields than recommended ANGRAU varieties	11.428*
49.	Carbofuron application before pulling is not advisable against rice pest	0.967
50.	Use of ANGRAU rice varieties enhances the infestation of pests and diseases in rice crop	8.379*
51.	Agricultural labour can earn more money than a farmer adopting ANGRAU technologies	5.787*
52.	IPM approach in groundnut saves and maintains the natural enemies /beneficial insects in the crop	3.937*
53.	Chekkalaguntaka is not preferred over country plough for land preparation in groundnut	4.798*
54.	Neem oil application to the groundnut pods increases the post harvest loses	0.633
55.	Application of FYM or compost during preparatory tillage will not affect soil fertility considerably	0.670
56.	IPM in groundnut does not require any community cooperation for effective pest management	2.946*
57.	Chilli pod borer can be controlled by spraying of chloropyriphos	1.719
58.	Carbofuron application helps in checking the soil born diseases in chillies	0.461
59.	Recommended chilli technologies can save the farmers from indebtness	7.801*
60.	Prosperity of chilli growers is not related to adoption of recommended chilli technologies	1.411

*- selected for final scale

APPENDIX-IV

SELECTED STATEMENTS FOR FINAL ATTITUDE SCALE ALONG WITH THEIR 't' VALUES

S.No.	Statement	't' Value
1.	ANGRAU technologies are the technologies available for improvement of the production in the state	7.854
2.	ANGRAU technologies are drudgery prone	4.740
3.	ANGRAU technologies involve efficient utilization of resources and farm wastes	6.632
4.	ANGRAU technologies are complex in nature	9.920
5.	ANGRAU technologies lead farmers towards scientific farming.	7.320
6.	ANGRAU technologies are not ecofriendly	5.200
7.	ANGRAU technologies created awareness among farmers about scientific farming	6.935
8.	The extension person's credibility is enhanced with the transfer of ANGRAU technologies	8.488
9.	Money spent for adopting ANGRAU technologies ensure the farmer better economic returns	7.179
10.	Continuous adoption of ANGRAU technologies impairs the ecological balance	2.209
11.	ANGRAU technologies are need based and proved effective in farmers field	9.513
12.	Farmers adopting ANGRAU technologies improved the nutritional and health status of their family	1.889
13.	ANGRAU technologies are generated considering traditional know how of farmers	8.413
14.	Existing traditional methods of harvesting and drying are beneficial and economical than ANGRAU technologies	4.070

S.No.	Statement	't' Value
15.	ANGRAU is doing laudable services to the farming community in the state	7.058
16.	Use of pheromone traps helps the farmers to monitor and check pest population	4.517
17.	ANGRAU technologies do not address the problems of different categories of farmers	4.740
18.	Seed selection and seed treatment are nothing but waste of time.	1.857
19.	It is better to resort to chemical control when pest crosses ET levels	8.577
20.	In rainfed rice cultivation ANGRAU recommended seed rate should necessarily be followed to assure adequate plant population	6.543
21.	Local rice varieties are known for higher yields than recommended ANGRAU varieties	11.428
22.	Use of ANGRAU rice varieties enhances the infestation of pests and diseases in rice crop	8.379
23.	Agricultural labour can earn more money than a farmer adopting ANGRAU technologies	5.787
24.	IPM approach in groundnut saves and maintains the natural enemies /beneficial insects in the crop	3.937
25.	Chekkalaguntaka is not preferred over country plough for land preparation in groundnut	4.798
26.	IPM in groundnut does not require any community cooperation for effective pest management	2.946
27.	Recommended chilli technologies can save the farmers from indebtness	7.801