SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH

By

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B. Sc. (Ag.)

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2000

CERTIFICATE

Mr. M. VENKATA KONDA REDDY has satisfactorily prosecuted the course of research and that the thesis entitled **"SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH"** 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 thereof has not been previously submitted by him for a degree of any University.

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This is to certify that the thesis entitled **"SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted in partial fulfillment of the requirements for the award of the degree of Master of Science in Agriculture of Acharya N. G. Ranga Agricultural University, Hyderabad is a record of the bonafide research work carried out by **Mr. M. VENKATA KONDA REDDY** under my guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee.

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

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LIST OF ABBREVIATIONS

ADR	:	Associate Director of Research
AICCIP	:	All India Coordinated Cotton Improvement Scheme
ANGRAU	:	Acharya N. G. Ranga Agricultural University
APAU	:	Andhra Pradesh Agricultural University
APSCA	:	Andhra Pradesh Seed Certification Agency
APSSDC	:	Andhra Pradesh State Seed Development Corporation
Bt	:	Bacillus thurigiencis
CCI	:	Cotton Corporation of India
CIMPC	:	Central Integrated Pest Management Centre
CIRCOT	:	Central Institute for Research on Cotton Technology
CPO	:	Chief Planning Officer
ETL	:	Economic Threshold Level
ETV	:	Eenadu Television Programme
FCR	:	Feed Conservation Ratio
FTC	:	Farmers Training Centre
FYM	:	Farm Yard Manure
H_2SO_4	:	Sulphuric Acid
HYV	:	High Yielding Varieties
ICAR	:	Indian Council of Agricultural Research
ICDP	:	Integrated Cotton Development Project
IPM	:	Integrated Pest Management
IRDP	:	Integrated Rural Development Project
ISI	:	Indian Standard Institute
KVK	:	Krishi Vigyan Kendra
MAO	:	Mandal Agricultural Office
MARKFED	:	Marketing Federation
mm	:	millimetre
NAA	:	Naphtalene Acitic Acid

NARP	:	National Agricultural Research Project
NGOs	:	Non Governmental Organizations
NPV	:	Nuclear Polyhedrosis Virus
P_2O_5	:	Phosphorus
ppm	:	Parts per million
RARS	:	Regional Agricultural Research Station
RBQ	:	Rank Based Quotient
R & D	:	Research and Development
SDOA	:	State Department of Agriculture
SLOT	:	Strengths, Limitations, Opportunities and Threats
SNAC	:	Stakeholders, Needs, Alterables and Constraints
SWOT	:	Strengths, Weaknesses, Opportunities and Threats
TNAU	:	Tamil Nadu Agricultural University
ZREAC	:	Zonal Research Extension Advisory Council

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M. Venkata Reddy

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DECLARATION

I, **MR. M. VENKATA KONDA REDDY** hereby declare that the thesis entitled **"SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted to the Acharya N. G. Ranga Agricultural University for the degree of Master of Science in Agriculture in the major field of Agricultural Extension is the result of original research work done by me. I also declare that any material contained in the thesis has not published earlier.

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ABSTRACT

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The contribution of cotton to total exports was reduced in previous years due to reduction in cotton cultivation. The low productivity in the state is mainly due to coverage of major area under rainfed conditions with traditional varieties whereas, the scheme under implementation, i.e., Integrated Cotton Development Project does not focus on specific gaps in cotton cultivation. Hence, there is need for application of SNAC and SWOT analysis for improvement in cotton cultivation. Therefore, the present study was undertaken with the specific objectives of analyzing stakeholders, needs, alterables, constraints (SNAC) and to unearth the strengths, weaknesses, opportunities

and threats (SWOT) in cotton cultivation over a figurative strategy for cotton improvement.

Exploratory research design was followed. Two mandals in Guntur district of Andhra Pradesh were selected purposively for drawing the 110 sample of the study. From each mandal 3 villages were selected randomly. The data were collected by personal interview with the help of structured interview schedule. Appropriate statistical procedures were employed and the data was analyzed and interpreted.

Majority of the respondent cotton farmers had medium level of adoption followed by high and low.

The major SWOT (strengths, weaknesses, opportunities and threats) parameters of cotton cultivation were: growing MCU5 for high market value, expensiveness of plant protection measures, growing MCU5 for high export potential, adulteration of seeds respectively and other SWOT parameters of cotton cultivation were also included in the study.

The major SNAC (stakeholders, needs, alterables and constraints) parameters of cotton cultivation were: State Agricultural University (ANGRAU) as stakeholder, seed rate and sowing as need, growing of hybrid seeds as alterable and expensiveness of plant protection measures as constraint and the rest of the SNAC parameters were discussed in detail over a figurative strategy for cotton improvement in the study. Implications were also drawn categorically for extension personnel, policy makers, administrators, input agencies and for cotton farmers considering the identified

problems like, expensiveness of plant protection measures, low price to cotton at proper time, high cost of hybrid seed, costliness of fertilizers, non-availability of labour at proper time, insufficient supply of water, health hazards due to application of insecticides/pesticides, more labour requirement for spraying, high cost of implements, non-availability of insecticides at proper time and solutions given below were suggested: Government should fix minimum support price by taking into account the realistic cost of cotton cultivation, the State Department of Agriculture and private agencies should be altered in supplying good quality of hybrid cotton seed, the agriculture department should provide subsidy on fertilizers, pesticides, plant protection equipment, etc., Financial institutions must come forward to provide timely, adequate credit at a cheaper rate of interest to encourage this enterprise, Government should develop adequate transport facilities fitted with storage for quick easy transportation of this commodity, Efforts must be made to provide the required knowledge and skill through training programmes. The training should focus on improved recommended technologies appropriate to all cotton farmers, Extension workers can help the cotton farmers by motivation and guiding them to approach the researchers and input agencies for required help and information on cotton.

The findings of the study were expected to help the planners, extension administrators, scientists and cotton farmers to take strategic decisions to overcome the constraints in cotton cultivation. It was also expressed to add to the existing body of scientific knowledge, in the dimension of constraint analysis for cotton improvement.

INTRODUCTION

CHAPTER I

INTRODUCTION

Cotton is cultivated in 33 million hectares in eighty countries and the average annual production is 19 million tonnes in accordance with 1993 census. The share of cotton in world textile production is 45 per cent and its production, processing and marketing sustains more than 250 million persons. The current status of cotton production and consumption pattern shows that India has major strides since independence from net importer to self-sufficiency and a marginal exporter of raw cotton. In India, cotton is cultivated in 9 million hectares in varied agro-climatic conditions across the nine major states and with a production of 12.20 million bales (each bale 170 kg) in 1998-99, it employs directly and indirectly more than 60 million persons in its production, processing and marketing. About 60 million people thrive on cotton cultivation trade and processing. India today has 1569 textile mills comprising 1295 spinning and 274 composite mills. The industry provides employment for 10.40 lakh people and around 10 lakh people are absorbed in the power-loom and handloom sector. Cotton cultivation offers 200 man-days/ha of employment.

India had ceded away most of the promising irrigated cotton area to Pakistan at the time of independence and was left with 60 per cent of the cotton area while almost 100 per cent of the industry remained with India.

To tide over the imbalance in supply and demand, campaigns like 'Grow More Cotton' and 'Cotton Extension Schemes' focussing on area expansion were launched in

the early 50s. Emphasis to raise productivity was made by formulating 'Package Programmes'. The Intensive Cotton Development Programme was launched in 1971-72, initially in seven irrigated and seven assured rainfall districts. Now this is operational in nine major and two minor cotton growing states. The main objective was to improve production and productivity of cotton to meet the rising raw cotton demand of the textile industry. The All India Coordinated Cotton Improvement Scheme (AICCIP) launched by the Indian Council of Agricultural Research (ICAR) in 1967, knitting together the cotton research centres of the state agricultural universities, the establishment of Central Institute for Cotton Research in 1976 it's close interaction with the Central Institute for Research on Cotton Technology (CIRCOT), Mumbai, are providing the Research and Development (R & D) back up for the cotton programme. The efforts of these agencies were instrumental in changing the profile of the cotton scenario of the country.

Cotton is the major commercial crop in the state with an area of about 12.71 lakh hectares with a production of 15.33 lakh tonnes. The state ranks 3rd in area and production while in productivity it stands 5th in the country. The productivity of cotton in Andhra Pradesh is 246 kg/ha and different states as Gujarat 356 kg/ha, Karnataka 323 kg/ha, Haryana 301 kg/ha, Tamil Nadu 278 kg/ha. The cotton is cultivated in 1.38 lakh hectares in Guntur district. The low productivity in the state is mainly due to coverage of major area under rainfed conditions with traditional varieties and neglected by management. The scheme under implementation, i.e., Integrated Cotton Development Project (ICDP) does not focus on specific gaps in cotton cultivation.

Hence, the SNAC analysis on cotton cultivation to acquire proper insights into the identification of stakeholders, needs, alterables and constraints.

1.1 CONCEPT OF SNAC ANALYSIS

SNAC analysis (Stakeholders, needs, alterables and constraints) is a revised version of SWOT analysis (Strengths, weakness, opportunities and threats) or SLOT analysis (Strengths, limitations, opportunities and threats).

SNAC as an acronym stands for stakeholders, needs, alterables and constraints of an organization, programme and project. These four attributes are also called SNAC parameters. Stakeholders are those groups or individuals who were directly or indirectly affected by an organization's pursuit of its goals or affected due to cotton cultivation. Needs implies a gap between 'what is' the existing situation and 'what ought to be' the desirable situation and also a gap between situation and objective. Alterables are traits that are shared by some persons or cotton farmers but not shared by all members of society. Constraint referred to the item of difficulty faced by cotton farmer in adoption of recommended technology.

The basic assumption of SNAC analysis acknowledges that the developments or Research and Development (R & D) programmes do not have opportunities and threats. It assumes that there are stakeholders who have different and varying needs and constraints and therefore the organization has to alter it's strategies for planning and implementation from time to time. So SNAC analysis is an improved version over SWOT analysis.

In brief, SNAC analysis is a modern management tool to analyze stakeholders, needs, alterables and constraints and is an improved version over SWOT analysis.

1.2 CONCEPT OF SWOT ANALYSIS

SWOT refers to strength, weakness, opportunity and threat of an organization, programme and project. These four attributes are also called SWOT parameters.

Strength is the basic asset of an organization, programme and project that would provide a competitive advantage for its growth and development. Weakness is the liability of an organization, programme and project that can create a state of time and situation specific disadvantage for its growth and development. Opportunity is the ability of an organization, programme and project to grow and achieve its specific objectives in a given situation. Threat is a situation that block the abilities of an organization, programme and project to grow and develop for meeting its ultimate goal. SWOT parameters may differ from organization to organization, programme to programme and project to project. Thus, these parameters defy straight-jacket and exact definition.

Kotler (1984) referred the SWOT parameters as 'potential internal' and 'potential external' and called potential internal strengths, potential internal weaknesses, potential external opportunities and potential external threats, and also he defines the opportunities and threats as environmental opportunity and environmental threat.

In the management sciences, SWOT analysis play a paramount role in understanding the management problems at all stages irrespective of the type of

organization, programme and project. The concept is meant to help in taking appropriate decisions for the development of an organization, programme and project in a particular operational environment. It has also an application for strategic decision in personal lives, politics, organizational environments and even in crop management.

1.3 NEED AND IMPORTANCE OF THE STUDY

The contribution of cotton to total exports is firmly established as on the top portion up to 1997, but exports during 1997-98 and 1998-99 to other states is reduced considerably, the reason may be reduction in cotton cultivation. It's production fell to 11.15 and 12.20 million bales respectively in the years of 1997-98 and 1998-99 from the highest 14.25 million bales recorded in the year of 1996-97. At this high time there is need for the application of SNAC and SWOT analysis for impeovement in cotton cultivation by analyzing stakeholders, needs, alterables, constraints and to unearth the strengths, weaknesses, opportunities and threats which in turn help the top administrators, planners of state government, scientists of cotton cultivation and cotton farmers to take strategic decision to overcome the weaknesses, threats and constraints in cotton cultivation.

Hence, to acquire proper insights into the identification of stakeholders, needs, alterables and constraints followed by strengths, weaknesses, opportunities and threats of cotton cultivation, an attempt has been made in this investigation with the following objectives.

1.4 OBJECTIVES OF THE STUDY

1. To unearth the strengths, weaknesses, opportunities and threats in adoption of cotton cultivation.
2. To analyze the stakeholders, needs, alterables and constraints (SNAC analysis) in cotton cultivation.
3. To develop a strategy and to illustrate figuratively the various analytical components of SNAC analysis in cotton cultivation as a mechanism for the transfer of agricultural technology.

1.5 SCOPE OF THE STUDY

The cotton crop is extensively cultivated in black cotton soils of the district. An earnest attempt has been made in this study to explore the adoption level of farmers regarding various improved cotton cultivation practices. Also a maiden attempt was made to analyze the stakeholders, needs, alterables, constraints and to unearth the strengths, weaknesses, opportunities and threats in cotton cultivation.

The findings of the study could be gainfully utilized by the administrators, scientists and extension personnel to know the present status of cotton cultivation in Andhra Pradesh in particular and help them to develop an appropriate extension strategy to overcome the problems in cotton cultivation and a methodological contribution as 'SNAC' analysis to the discipline of Agricultural Extension Education.

The results of the study could also be effectively used in other areas of the country where similar conditions exist with necessary structural changes.

1.6 LIMITATIONS OF THE STUDY

1. The study had the usual limitations of single student research project, although every attempt has been made to have a thorough investigation into several aspects of the problem.

2. The study had the paucity of time and finance since it was part of M.Sc. (Ag.) programme. Being a post graduate research, this investigation has limitation of time and resources.

3. The study was carried out only on cotton cultivation (MCU5) and limited to only one district. The findings will be applicable wherever similar conditions prevail, though the generalizations over a wider geographical area calls for the application of similar type of studies by minimizing the mental bias from the farmer respondents.

4. The findings of the study were based on the expressed opinions or 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.

5. The study was limited to a sample of 110 cotton farmers drawn randomly, hence the findings should be interpreted with caution.

1.7 PRESENTATION OF THE THESIS

The report of the study has been presented in six chapters. The first chapter deals with a brief introduction including objectives, scope, need and importance as well as limitations of the study. The second chapter deals with the review of related

literature. The third chapter was devoted to the materials and methods followed in the present study together with statistical procedures used. Results were presented in respect to the objectives of the study in the chapter four. The fifth chapter dealt with the discussion based on the results of the study. Finally, the sixth chapter dealt with the summary, implications of the findings and suggestions for further research. The bibliography and appendices were given at the end.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

A thorough review of literature is necessary to acquaint the researcher with the research area and was felt essential in developing sound research methodology and operationalizing the needed concept. This also helps to find out the available information related to objectives of the proposed research and provides a basis for interpretation of findings. Every effort has been put forth to review the literature available. However, literature dealing with application of SWOT analysis (strengths, weaknesses, opportunities and threats) and SNAC analysis (stakeholders, needs, alterables and constraints) on agricultural technology to unearth strengths, weaknesses, opportunities, threats and to analyze stakeholders, needs, alterables and constraints in the recommended technology and in the situation where the cotton cultivation is growing in an integrated manner is scarce. From the perusal of literature, it has been observed that few research studies for SWOT analysis were undertaken in the past, limited to rural development programmes and NARP (National Agricultural Research Project), horticultural crops like grapes and on prawn culture. A thorough search on literature review on SNAC revealed the meagre availability of research studies. However, an endeavour is made to reveal the available literature have direct or indirect bearing on this study and taking into consideration to cotton cultivation also. The review has been organized under the following sub-heads. .

2.1 SWOT analysis related to agricultural and rural development.

2.2 SNAC analysis related to agricultural development.

2.1 SWOT ANALYSIS RELATED TO AGRICULTURE AND RURAL DEVELOPMENT

2.1.1 Strengths

Shankara Murthy *et al* (1989) indicated that the strengths of MARKFED as competent teams of officials, strong and sound communication and coordination systems, good infrastructure, good market share, pesticide formulation of plant federation and financial support given to other organizations.

Govindarajulu (1990) revealed that the strengths in India's science and technology capability as more productive science and technology, infrastrucure and continuous growth in science and technology investment.

Kothai (1993) found out the strengths in rural development projects like farm clinic, presence of field functionaries, supervision and follow-up by field assistants, no bureaucratic shackles, people participation and developmental activities. Strengths in Srikshetra Dharmastala Rural Development project as presence of Sevanirath as field functionaries and supervision by Sevanirath and Superiors, developed communication system, respect to temple chief and no dearth of funds. Further, the strengths in Integrated Rural Development Project as sufficient manpower and no dearth of funds.

Jayaraman (1995) analyzed the strengths of Indian agriculture as diverse agro-climatic conditions, second largest country in production of fruits and vegetables followed by hi-tech floriculture industry for export and the net work of rural credit institutions.

Venkateswarlu and Jagadeesh (1996) identified the strengths of National Agricultural Research Project (NARP) as adequate infrastructural facilities, large manpower, new mandate of urban to rural, provision of training, status report preparation, farmers' participation in ZREAC (Zonal Research Extension Advisory Council) meetings, multi-disciplinary approach, the need of lead time for technologies to be developed and need based location specific technologies.

Rao (1997) revealed that the strengths perceived by growers of grape cultivation were: favourable climatic condition, market value for Thompson seedless variety, suitable chalka soils, potential market for table purpose grapes, recommended harvest indices for quality grapes and easy availability of plant protection chemicals.

Rao (1999) listed the strengths in prawn culture as: tiger prawn variety for high market value, lime application increases the water quality, trench method for low cost digging, recommended pond size, easy for water exchange in extensive system, artificial feed well nutritious and have good FCR, acclimatization practice to avoid damaged and diseased prawns, stored in ice to avoid the damage and rotting, paddle wheel aerators in semi-intensive and intensive system of culture, fertilizer application help to phyto-planktons growth and loamy soil with pH 7.5 – 8.5.

Weaknesses

Murty *et al* (1989) in their study on functioning of MARKFED examined the federation weakness as business transaction of the federation, heavy loss in manufacturing units, imbalance between supply and demand, loss of specific and

deliberate purchase policy, lack of proper interaction of purchases, purchase of raw materials without any quality considerations, isolation of the principle at cooperation among the co-operatives, unequitable distribution and compositions of staff, failure to build up cadre-wise specialization, initiated the realization of organizational goals, adoption of improper budgeting and appraisal techniques and increase in the volume of bad and doubtful debts.

Govindarajulu (1990) revealed the weakness in Indian science and technology as least resistance on technology import, decline in the share of research and development expenditure, irrelevant research by the scholars, area-wise allocation of funds, absence of strong engineering base, under utilization of research facilities, allocation of research and development funds below the critical level, bureaucracy alignment, lack of self-confidence and self-initiative by scientists for democratic participation.

Kothai (1993) analyzed the weakness in rural development projects like farm clinic as too many works to field assistants, insufficient salary for field functionaries, lack of need based programmes, weaknesses in Srikshetra Dharmastala Rural Development Project as too many works of Sevanirath, insufficient salary under financially and no need based programmes, weakness in Integrated Rural Development Project as failure of delivering goods, failure of creating linkages, lack of beneficiary training programmes, lack of proper planning, execution and monitoring and political interventions.

Jayaraman (1995) found that the weakness of Indian agriculture viz., lack of comprehensive agricultural policy, low level of productivity and low exports in milk and milk products.

Venkateswarlu and Jagadeesh (1996) revealed the weakness of National Agricultural Research Project (NARP) viz., wide mandate, location specific research, limited manpower, delay in creation of physical facilities, location of the farm structure, irregular status reports, meagre farmers participation in ZREAC meeting, lacking of organizational communication between NARP personnel and NGOs and tribal development agencies. Basic research component has been overlooked. Concept of farming situation in technology development was not followed, concept of value added crops and mandate of post harvest technology were not included, reporting the information is not up to the desired satisfaction, low return investment ratio, lack of proper techniques and mechanisms for monitoring, evaluation and controlling of NARP centres, lack of standardize procedure, methodology design and statistical methods for measuring the NARP impact.

Rao (1997) indicated the weakness in grape cultivation were unstability of climate to harvest two crops, shortage of labour, lack of disease resistant varieties, lack of leaf petiole analysis in lab in the region, no cold storage unit, ground water deficit, unregulated market structure and expensive system of training.

Rao (1999) observed that weakness in prawn culture were high feed cost, very high installation cost of paddle wheel aerators, lack of knowledge on disease diagnosis,

cost of pond preparation in saucer method is very high, feed wastage is more in saucer method of pond digging, severe winter and cloudy climate, lack of extensive service for technical know-how, lack of cold storage equipment, prawns are greatly influenced by chemical properties of water than that of soil.

Opportunities

Murty *et al* (1989) in their study of functioning of MARKFED examined the federation opportunities as experience gained by the federation in running some of the units, raw material purchasing policy, vast scope in avoiding the ill-effects of imminent gluts in agricultural marketing, tremendous scope in increasing in market shares, vast scope in enlarging its network of activities.

Kothai (1993) observed the opportunities in rural development projects like Farm Clinic as strengthening manpower, opportunities in Srikshetra Dharmastala rural development project as strengthening manpower gave help to mandal, coordinated efforts between the project and mandal, rural poverty alleviation programmes and communication techniques, opportunities in IRDP as gold laison and coordination with panchayat bodies.

Venkateswarlu and Jagadeesh (1996) reported the opportunities of NARP as physical facilities, indigenous technical knowledge, promotion, administrative experience of ADR's, team work of scientists belonging to different disciplines, knowledge updating for the trainees and diversification of research stations.

Rao (1997) concluded that opportunities in grape cultivation which includes consumer preference for Thompson seedless variety, cheaply availability of grant posts for erecting pandals, subsidies provided in drip irrigation, contribution of funds by the grape growers to establish leaf analysis in lab, assurance given by the government to establish cold storage and ease or procuring plant protection chemicals, availability of child labour, ease of handling refractometer, growing awareness about export potential followed by supervision and guidance available from the grape consultants.

Rao (1999) found that opportunities in prawn culture were export potential of tiger prawn, availability of lime at chapter rate, more availability of water for good extensive system of culture, feed wastage can easily assess in the trench method of pond, sea coast is nearer to study area for salinity maintenance, more availability of feed in the market, entrepreneurial nature of prawn growers, soils which are not suitable for paddy cultivation i.e., saline soils for prawn culture, tiger prawn could survive in both marine and fresh water sources.

Threats

Murty *et al* (1989) examined the threats in MARKFED as mounting overdues with the member societies, overstocking of raw materials, failure in adopting vigorous sales, promotional policies, huge losses due to costing and pricing policies, weak supervisory aspect and advance payments made by the federation.

Govindarajulu (1990) revealed the threats in India's science and technology capability as technological dependence for long time.

Kothai (1993) inferred the threats in rural development projects like Farm Clinic as idea of token honorarium, threats in Srikshetra Dharmastala rural development project as religion sentiments, threats in IRDP as lack of coordination between sectorial departments and lack of proper understanding of the scheme by the staff.

Jayaraman (1995) observed that the threats of Indian agriculture as drought conditions which can upset the exports, distortion in the cropping pattern and socio-economic tensions.

Venkateswarlu and Jagadeesh (1996) identified the threats of NARP as research by the private organizations, withdrawing support to NARP by some states, high cost viable technologies and artificial food produced by the biological scientists.

Rao (1997) concluded that the threats in grape cultivation were lightening strikes by the transporters, unseasonal and sudden rains at full bloom stage, indiscriminate usage of pesticides leading to pest resurgence, malpractices by middlemen, soil and ground water pollution due to industrial waters, growers are much bothered about the quantity rather than the quality.

Rao (1999) found that threats in prawn culture were white spot syndrome disease, no continuous power supply for prawn farming, frequently occurring cyclones and floods, acquatic pollution, exploitation of middlemen in the market and their collation to fix the price, change in water quality due to excess feed wastage, cow dung and chicken manure causes deterioration of water quality by release of Ammonia

compounds, long stored feed increases the mortality of the prawn, continuous prawn culture and the land is not suitable for field crops cultivation.

Stakeholders

Sharda and Aditya (1999) indicated the stakeholders as State Agricultural Universities, State Department of Agriculture, NGOs, KVKs, Farmers Training Centres, Farmers Communities and Research Stations.

Venkata Ramaiah (2000) identified the stakeholders for transfer of technology in T & V system as State Agricultural University (ANGRAU), clientele in T & V system were State Department of Agriculture (SDOA), Private Seed Companies, Farmers Training Centre, KVKs and NGOs.

Needs

Barooah (1965) expressed that farmers accorded importance to the handling of agricultural implements, plant protection materials and equipments and judicious use of fertilizers.

Sidhu and Patil (1968) found that the priority given in order of importance was plant protection, fertilizers, improved seeds, irrigation, improved implements, intercultural operations, land preparation, soil conservation and harvesting.

Satyanarayana (1969) in his study on the training needs of farmers in Hyderabad district of Andhra Pradesh observed that farmers required training in all package of

practices of high yielding varieties of crops except in land preparation, drainage and harvesting operations.

Sastry (1970) reported that plant protection, manures and fertilizers, improved seeds, agronomic practices of high yielding varieties of crops were the training needs of farmers.

Sharma (1970) stated that farmers needed training in plant protection, manures and fertilizers and improved seeds. He further reported that training in improved dairy, improved poultry and farm mechanism were preferred by all the groups of farmers.

Sohal and Yanaki (1970) felt that top priority should be given to agronomy, farm machinery and plant protection in farmers training programme.

Patil and Kale (1972) stated that farmers needed training in the following order of preferences, viz., use of fertilizers, pests and diseases and their control measures, soil analysis, preparatory cultivation, nutrient components of fertilizers, horticulture and irrigation methods.

John Knight (1973) found that among the various subject matter areas preferred to be in the curriculum of the farmers training, plant protection had been placed first in almost all the studies followed by fertilizers.

Gopal (1974) found that among agriculture and its allied fields, farmers primarily evinced interest in getting more training in agriculture, more specifically in plant protection, manures and use of chemical fertilizers.

Jha (1974) reported that training needs of small farmers in order of importance were plant protection, high yielding varieties, fertilizer application, seed treatment, storage, credit, nursery raising, transplanting, irrigation, water management and marketing.

Singh and Sharma (1976) found that higher percentage of small and marginal farmers demanded intensive training in plant protection, manures, management during adverse climatic conditions and fertilizer application techniques, while they demanded moderate training on care and management of agricultural implements and in methods of sowing.

Anantharaman (1977) concluded that out of 12 major subject areas, small farmers cited five areas as important ones, namely, plant protection, manures and manuring, soil conservation and reclamation, seeds and sowing and cropping pattern for inclusion in the training programme. Marginal farmers indicated all the above said areas and also credit, except cropping pattern as important ones in their training programmes.

Ganeshan *et al* (1980) stated that training needs of gramasevaks are in the order of plant protection, manures and manuring and soil management.

Satyasaibaba (1986) found that all the three categories, i.e., marginal, small and big farmers considered the major items such as plant protection, manures and manuring, improved varieties of crops and horticulture as more important and the rest of the items were considered as less important. Besides big farmers also gave more importance to the item soil conservation and reclamation.

Bhaskara Rao (1991) identified that training needs of hybrid cotton growing farmers were: land preparation, improved varieties of crop, seeds and sowing, manures and manuring, plant protection, agricultural implements, irrigation, after cultivation, soil conservation and reclamation followed by harvesting and marketing.

Ganeshan *et al* (1992) reported that small farmers need training in the major areas of plant protection, manures and manuring, seeds and sowing, time of application of green leaf manure, seed treatment, identification of pests and diseases, level of water to be maintained.

Agrawal *et al* (1994) reported that training needs of trainers engaged in watershed activities were bunding, cropping system, watershed development, contour trenching and drainage, marking contour.

Garav and Kamble (1995) observed that training needs of rural women were improved varieties of crops, seed treatment, storage of food grains, processing of agricultural produce, nutrition and diet.

Ohja and Singh (1996) revealed that farmers needed training in the areas of high yielding varieties, seed treatment, method and time of transplanting followed by plant protection measures.

Bhairamkar (1997) stated that master trainers needed training in the areas of crop production technology, pests and disease control, plant protection equipment and weed control.

Hanumanlal *et al* (1997) observed that the tribal farmers had the highest information need about soil reclamation whereas non-tribal farmers had the highest information need about fertilizer application and it also results that tribal farmers had poor information need about use of bio-gas while non-tribal farmers had poor information need about preservation of fruits and vegetables.

Sharma *et al* (1998) mentioned the training needs as manures and fertilizers, pest and disease control, improved varieties, credit facilities, crop rotation and inter-cropping.

Anandan and Vasantha Kumar (1999) found that the farmers of irrigated areas need training in the major subject areas of fertilizer management, plant protection, seeds and sowing, seed management. More specifically they need training in application of nitrogenous, phosphatic and potassic fertilizers, time and method of application of gypsum, time and method of application of micro-nutrient, time and method of application of nutrient solution, identification of pests and diseases, preparation of spray fluid and spraying techniques.

Sailaja and Narasimha Reddy (1999) found that training needs of farm women in sericulture were varieties, soil & moisture conservation, land preparation, manuring, planting, fertilizer management, pruning, inter-cultivation, irrigation, plant protection, harvesting, post harvest activities, particulars of rearing house, eggs and hatching, methods of late age worm rearing, mounting, pest and disease control.

Ravichandran *et al* (2000) expressed more training needs on practices like plant protection, marketing and post harvesting followed by information on symptoms of blast disease, training in plant protection and techniques in application of poison bait for rat control.

Alterables

Sharda and Aditya (1999) indicated the alterables identified in Krishi Vigyan Kendra (KVK) – a farm science centre as growing nurseries, sustainability through conservation of natural enemies/biological control, growing of resistant varieties against pests and diseases, use of indigenous technological knowledge, saving labour on weed management, loan and insurance facilities to farmers.

Venkata Ramaiah (2000) expressed that certain impact points like conservation of natural resources, natural enemies, crop rotation, hybrid and production, etc., were the alterables for the clientele in T & V system.

Constraints

Ramachandran and Sripal (1990) stated that constraints in adoption of dry land technology for rainfed cotton were insufficient rainfall, susceptibility to pests and diseases, non-availability of gorru, high cost of weedicides.

Lakhera and Panjabi (1991) found that constraints in fertilizer utilization were high cost of fertilizer, unavailability of guidance, lack of credit facilities, lack of assured irrigation and non-availability of fertilizers in time.

Gumaste *et al* (1993) found that constraints faced by the beneficiary farmers in utilization of water under minor irrigation projects were insufficient supply of irrigation water, high irrigation charges and uncertainty in release of water.

Adam (1994) revealed that constraints faced by cotton growing lambadi tribal farmers in adoption of recommended practices were: high cost of inputs, non-availability of irrigation facilities, lack of knowledge, lack of timely guidance, ineffective control of pests by pesticides and not willing to take risk to unfavourable weather conditions.

Kulkarni *et al* (1994) revealed that constraints encountered by PKV HY-2 cotton growers were non-availability of seed at proper time, costliness of seed, high cost of fertilizers, expensive crop production schedule and higher seed rate.

Shehrawat *et al* (1994) stated that constraints as perceived by cotton farmers were high cost of farm inputs, spurious agro-chemicals and lack of good prices of the farm produce.

Anand Singh (1995) found that constraints in cotton production were lack of knowledge regarding optimum utilization of pesticides/fertilizer, lack of realizations about dangers of mono-cropping, lack of finance and non-availability of inputs in time.

Meti and Hanchinal (1995) found that constraints in the adoption of dry land recommended crop production technologies in cotton cultivation were good variety seeds were not available in market in time, highly expensive crop and financial problem.

Verma *et al* (1995) found that lack of funds, irrigation problem, low prices of farm produce, small size of holding, high rates of fertilizers, plant protection measures, high yielding variety seeds and lack of improved crop production technology were the major constraints in getting potential yield of farm produce.

Iqbal *et al* (1996) found that constraints perceived by the farmers concerning the adoption of IPM practices in cotton were: lack of adequate knowledge on the predators and parasites, lack of adequate knowledge on Economic threshold level (ETL) of the different pests, inability of apply pesticides in time, poor quality of some of the insecticides used, laboriousness in preparing the poison bait and high cost of pesticides.

Jayasubramanian *et al* (1997) observed that constraints faced by participants in the correspondence course were no complete information for cultivation, lack of details about the availability of seeds, seedlings, saplings, lack of guidance for marketing the produce, lessons were difficult to understand and absence of personal contacts to teach the cultivation aspects.

Kale *et al* (1998) expressed the majority of small and big cotton growers had low level of input credit information and transport infrastructural facilities available to them for their farming enterprise.

Kalsariya *et al* (1998) indicated that 76.67 per cent of cotton growers had medium technological gap followed by high (16%) and low (9.33%) in hybrid - 6 cotton cultivation technology.

Katole *et al* (1998) identified the constraints faced by the cotton growers in adoption of plant protection measures of AHH - 468 cotton hybrid were: high cost of insecticides, non-availability of plant protection appliances, financial difficulties, non-availability of sufficient water for spraying, non-availability of skilled labour for spraying, non-availability of insecticides in time, high wage rates of labour, lack of timely advise from extension agencies about plant protection measures, lack of knowledge about biological control and lack of knowledge about plant protection measures.

Mankar *et al* (1998) expressed that the majority of the growers adopted the cotton variety AKH 84635 and the rate of adoption was high with regard to seed by 79 per cent and low adoption was 23 per cent for plant protection. He also mentioned the constraints like, non compatibility of the previous varieties and high price when compared to PKV - HY_2.

More *et al* (1998) revealed that majority of the respondents expressed the expensiveness of plant protection measures as the most important constraint in adoption of plant protection practices in cotton and other constraints were low price to cotton at proper time, high cost of hybrid seed, costliness of fertilizers, non-availability of labour at proper time, insufficient supply of water, health hazards due to application of insecticides and pesticides, more labour requirement for spraying, high cost of improved implements and non-availability of fertilizers/pesticides at proper time.

Sujatha and Annamalai (1998) reported that lack of awareness, high cost of inputs, non-availability of inputs in time and inadequate quantity of inputs were the major constraints as expressed by majority of the marginal, small and big farmers for better utilization of inputs.

Charles Jeeva and Ravichandran (1999) found that constraints in the utilization of plant protection chemicals were high cost, lack of adequate information, inadequate capital, adulteration and poor quality followed by non-availability of plant protection equipments in time.

Venkata Ramaiah (2000) while expressing the impact points in T & V workshop mention the constraints in cotton cultivation as more pests and diseases, high cost of fertilizers & plant protection chemicals and lack of technical guidance.

MATERIALS AND METHODS

CHAPTER III

MATERIALS AND METHODS

In this chapter, the procedures followed in sampling, development of empirical measures, collection of data and procedures used in the analysis of the data were explained.

The chapter is divided into five parts and presented under the following heads.

3.1 Research design

3.2 Sampling procedure

a) Locale of the study

b) Selection of the district

c) Selection of mandals

d) Selection of villages

e) Selection of the respondents

3.3 Operationalization of variables and their empirical measurements

3.4 Devices used for data collection

3.5 Statistical tools used

3.1 RESEARCH DESIGN

Exploratory research design is used for the purpose of formulating a problem for more precise investigation or of developing hypotheses. An exploratory study may, however, have other functions, e.g., increasing the investigator's familiarity with the

phenomena he wishes to study in a subsequent, more structured investigation or with the setting in which he plans to carryout such an investigation. An exploratory study may also serve as a basis for clarifying concepts, establishing priorities for further research, gathering information about practical possibilities for carrying out research in real-life settings, etc. "Exploratory studies", says Katz (1953), "represent the earlier stage of a science." From its findings may come the knowledge that helps the researcher in formulating a problem for research or in developing hypotheses to be tested subsequently. For a general area of problems about which little knowledge is available, an exploratory study is most appropriate. It was also suggested that the methods like a) A review of related social science and other pertinent literature, b) A survey of people who have had practical experience of the problem to be studied, c) An analysis of 'insight stimulating' cases are likely to be very fruitful in exploratory research directed towards the search for meaningful hypothesis.

In brief, the exploratory research design was adopted in the present investigation to achieve new insights into the problem where there is no variable used for the study.

3.2 SAMPLING PROCEDURE

3.2.1 Locale of the Study

For any research in social science, it is needed that the knowledge on the situations in which investigations are carried out will give basic idea (broad idea) to relate the findings to similar situations.

The state of Andhra Pradesh was purposively selected for the following reasons:

The state of Andhra Pradesh was purposively selected due to larger area under cotton cultivation and also the researcher hails from the same state and as Telugu language proficiency too for better rapport with respondent farmers.

3.2.2 Selection of District

Guntur district of Andhra Pradesh was selected purposively because it is one of the districts of Andhra Pradesh where in cotton cultivation is being in practice on a large scale for years together. The other strong reason for the selection of this district was wider coverage of newspapers and other mass media about the suicidal deaths of a few cotton farmers.

3.2.3 Selection of Mandals

The existed mandals in Guntur district and area under cotton cultivation in each mandal were given in Table 1.

Table 1: Mandals of Guntur district

S.No	Name of the Mandal	Area (acres)
1	Chilakaluripet	6,314
2	Narasaraopet	7,479
3	Rompicherla	2,040
4	Ipur	3,549
5	Savalyapuram	509
6	Nuzendla	5,345
7	Vinukonda	3,955
8	Bollapalli	13,940

Contd.....

S.No	Name of the Mandal	Area (acres)
9	Karempudi	13,385
10	Durgi	13,731
11	Veldhurthi	18,030
12	Macherla	12,567
13	Rentachintala	14,704
14	Gurajala	26,545
15	Dachepalli	13,710
16	Machavaram	10,373
17	Piduguralla	8,362
18	Edlapadu	8,640
19	Nadendla	14,695
20	Nekarikallu	2,488
21	Bellamkonda	7,480
22	Atchanpet	10,410
23	Amaravathi	13,629
24	Thulluru	4,564
25	Mangalagiri	1,806
26	Tadepalli	–
27	Pedanandipadu	6,891
28	Rajupalem	5,405
29	Krosuru	5,924
30	Pedakurapadu	8,595
31	Tadikonda	12,079
32	Pedakakani	1,738
33	Vatticherukuru	5,354
34	Prathipadu	11,522

Contd.....

S.No	Name of the Mandal	Area (acres)
35	Muppalla	3,188
36	Sattenapalli	12,223
37	Phirangipuram	10,906
38	Medikonduru	8,405
39	Guntur	10,353
40	Duggirala	–
41	Kollipara	–
42	Kolluru	–
43	Bhattiprolu	–
44	Repalle	–
45	Nagaram	–
46	Nizampatnam	–
47	Karlapalem	–
48	Bapatla	–
49	Kakumanu	1,748
50	Tenali	–
51	Vemuru	–
52	Cherukupalli	–
53	Pittalavanipalem	–
54	Ponnuru	25
55	Chebrolu	1,985
56	Tsunduru	–
57	Amarthalur	–

Source: CPO Office, Guntur

Out of 57 mandals in the district, two mandals namely Prathipadu and Pedanandipadu selected purposively because no similar type of research work was

conducted in these mandals regarding SWOT and SNAC analysis of cotton cultivation. The other strong reason being the wider coverage of newspapers and other mass media about the suicidal deaths of few cotton farmers.

3.2.4 Selection of Villages

Three villages from each mandal were selected randomly, thus making a total of six villages.

Table 2: Village-wise area particulars of selected mandals

S.No	Name of the Mandal	Name of the Village	Area under cotton (acres)
I	Prattipadu	1 Prattipadu	1,685
		2 Mallaiahpalem	1,606
		3 Enamadala	3,500
		4 Edulapalem	40
		5 Nedimpalem	1,500
		6 Konda Jagarlamudi	105
		7 Gottipadu	810
		8 Ganigapudi	450
		9 Vangipuram	1,150
		10 Kondepadu	676
		Total	11,522
II	Pedanandipadu	1 Pedanandipadu	324
		2 Annaparru	226
		3 Gigipalem	757
		4 Ravipadu	758
		5 Pusuluru	913

Contd.....

S.No	Name of the Mandal	Name of the Village	Area under cotton (acres)
		6 Katrapadu	698
		7 Varagani	1,623
		8 Rajupalem	196
		9 Annavaram	147
		10 Kopparru	342
		11 Uppalapadu	458
		12 Palaparru	449
		Total	6,891

Source: Mandal Agricultural Office, Prattipadu, Pedanandipadu

3.2.5 Selection of Respondents

Cotton farmers from each village were selected randomly. Thus a total of 110 farmers were selected from six cotton cultivating villages.

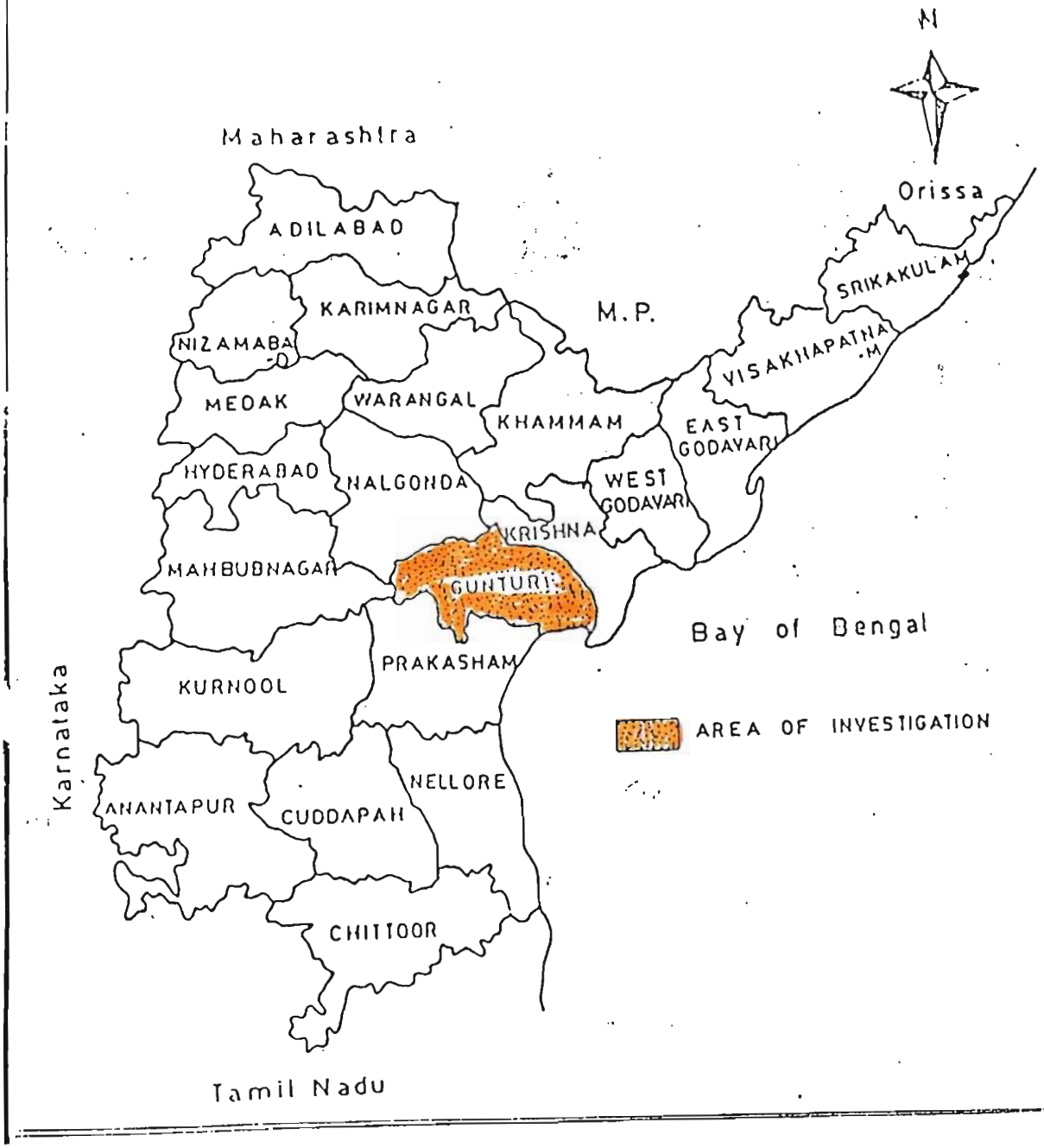
Table 3: Number of respondents selected from two mandals

S.No	Mandal	Village Selected	Total no. of farmers	No. of farmers selected
1	Prattipadu	1. Prattipadu	1,803	26
		2. Mallaiahpalem	1,382	23
		3. Gottipadu	1,356	21
2	Pedanandipadu	1. Pedanandipadu	568	11
		2. Varagani	1,325	20
		3. Annaparru	536	9

* Figures are in accordance with 1999 census

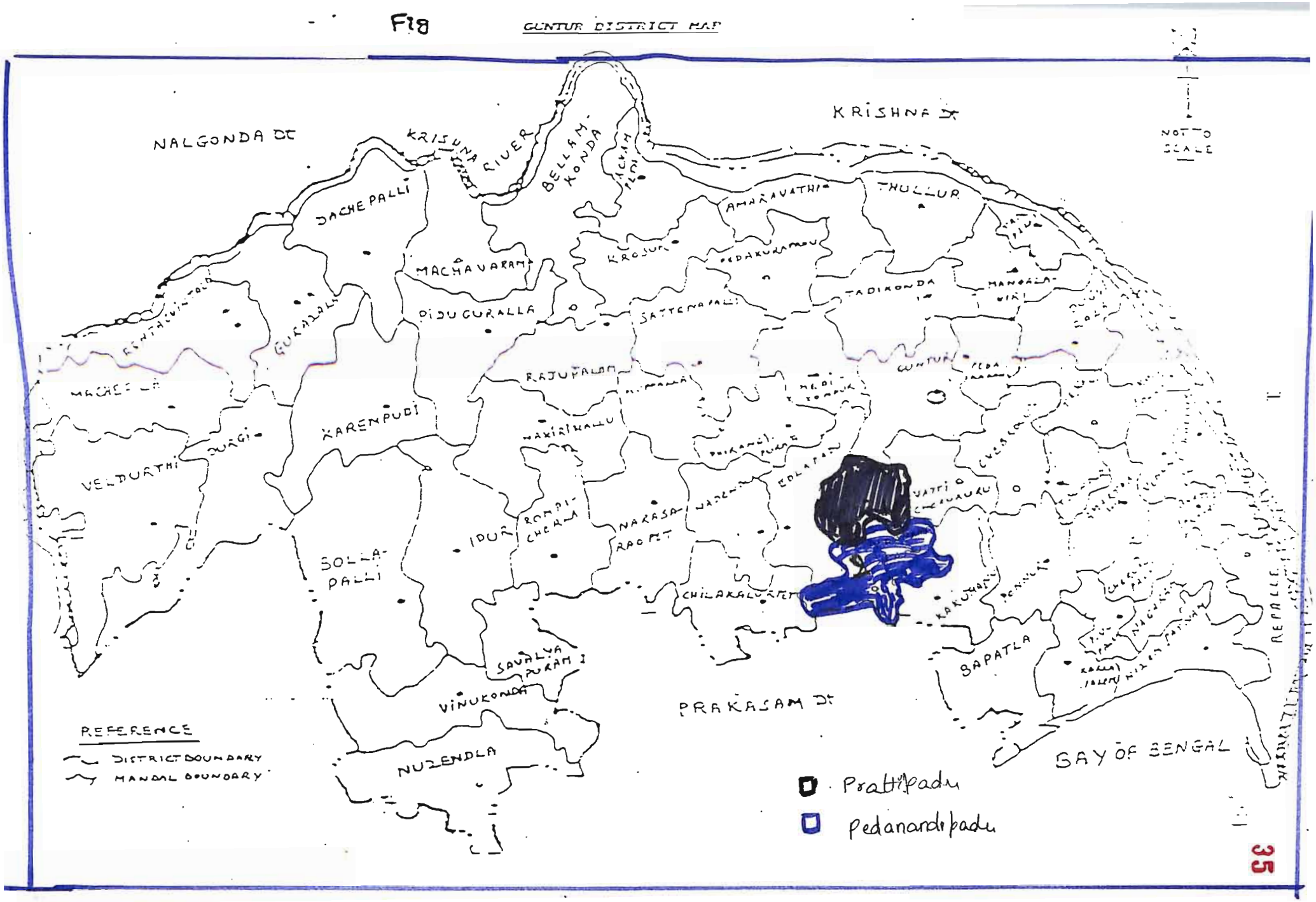
Source: Mandal Agricultural Office, Prattipadu, Pedanandipadu

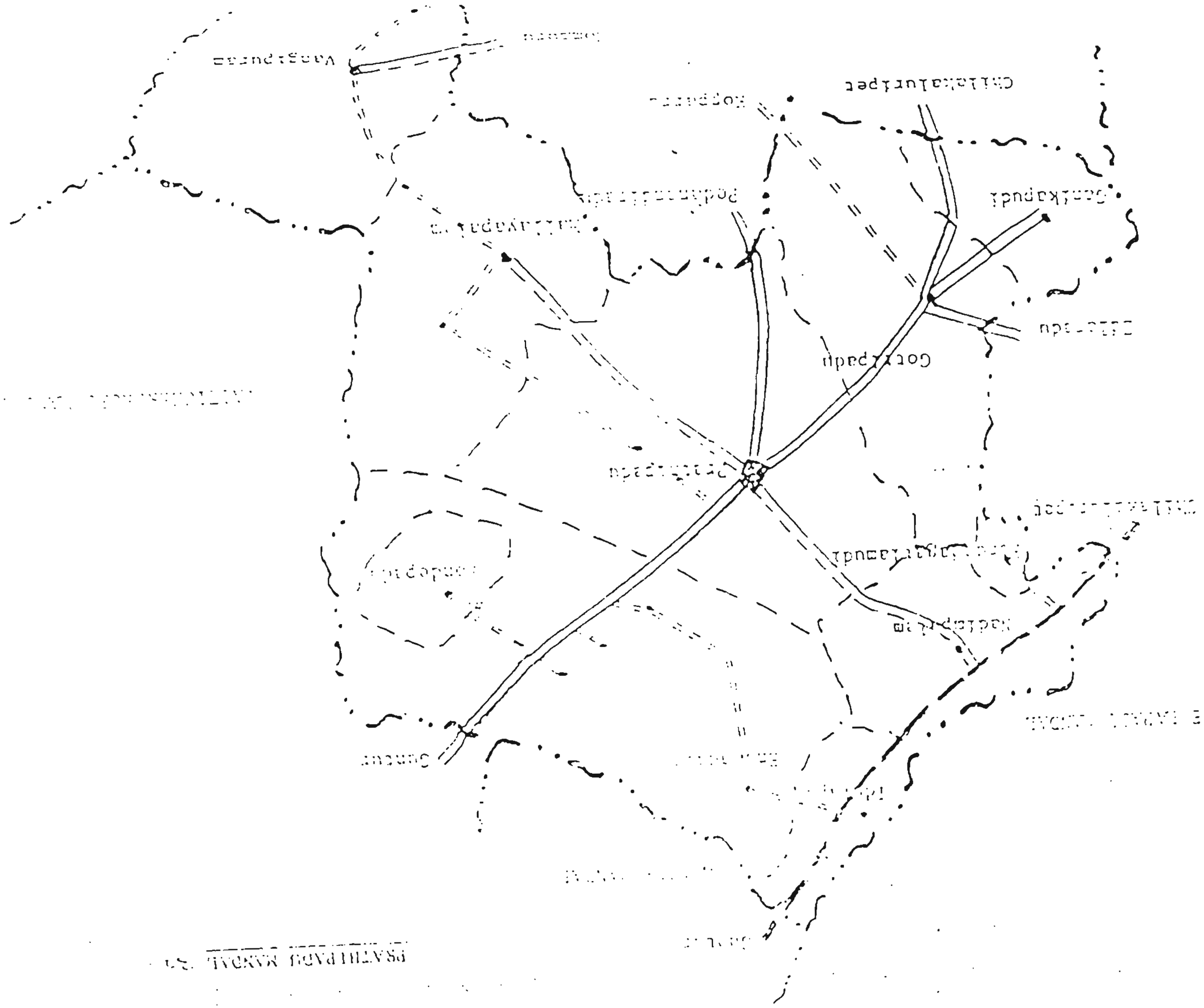
Fig : 2 Map of Andhra Pradesh showing the selected Guntur district



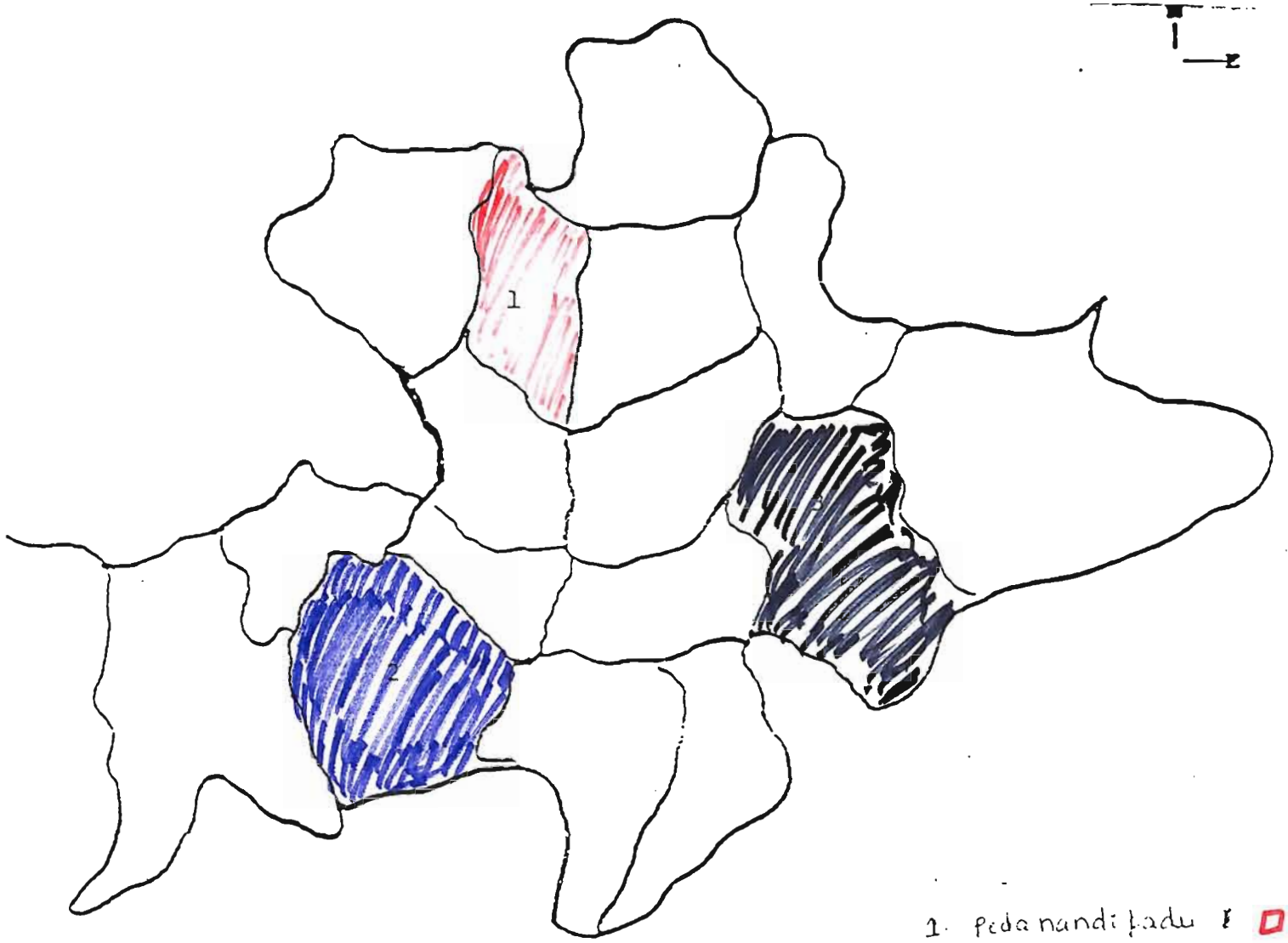
Fig

GUNTUR DISTRICT MAP





Prattipadu Mandal


1
2
3
1. Pedanandipadu
2. Annapamu
3. Varagani

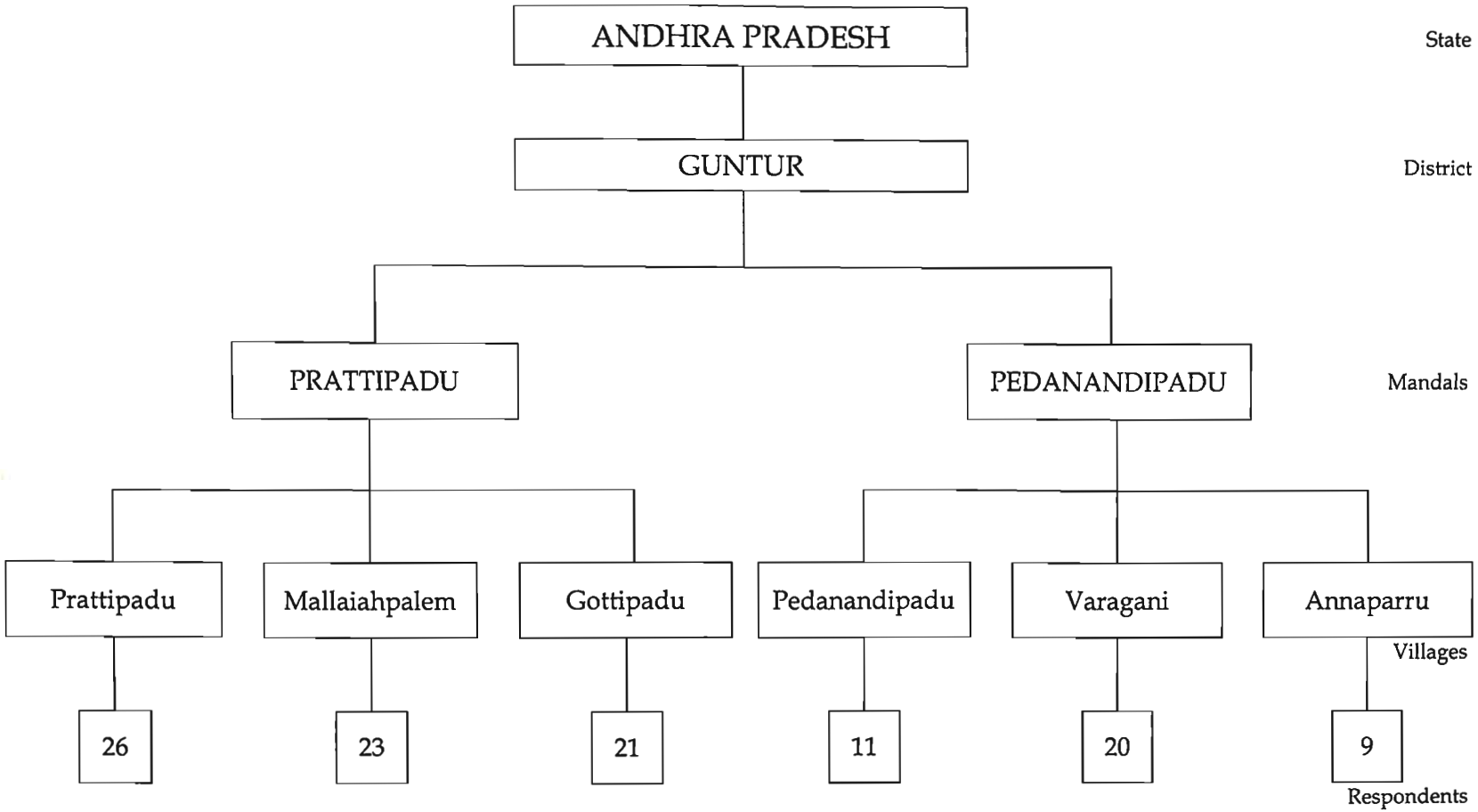


Fig. 5: Figure showing Sampling Procedure of the Study

3.3 OPERATIONALIZATION OF VARIABLES AND EMPIRICAL MEASUREMENTS

3.3.1 Adoption

Adoption was operationally defined as the acceptance and application by a respondent farmer either some or all the practices recommended for cotton cultivation. All the practices included in a package were considered important.

For this purpose, a schedule consisted of 53 items which represents the entire package of practices of cotton cultivation were collected from different sources like vyavasaya panchangam, printed literature including pamphlets, folders and leaflets published by the state department of agriculture and ANGRAU communication centre and distributed by agricultural scientists, extension specialists of ANGRAU, teaching staff of Agricultural College, Bapatla and scientists of Regional Agricultural Research Station, Lam farm, Guntur were also consulted for relevant information relating to the knowledge about cotton cultivation. Each practice adopted within the range by a farmer was given a score of one. The scores summated for all the adopted practices formed the total score of the individuals.

The respondents were grouped into the categories based on equal class interval of the total scores of the respondent as follows:

S.No	Category	Class Interval
1	Low	0 - 17
2	Medium	18 - 35
3	High	36 - 53

Further the item response analysis of adoption of recommended package of practices of cotton cultivation was done with the help of percentages.

3.3.2 SWOT and SNAC Parameters

The four SWOT parameters were operationally defined as follows:

Strength: Strength is the basic asset and advantage of cotton cultivation in Andhra Pradesh with respect to recommended technology that would provide competitive advantage for its growth and development.

Weakness: Weakness is the liability of cotton cultivation with respect to recommended technology that can be at a state of time and situation specific disadvantage for cotton farming.

Opportunity: Opportunity is the ability of recommended cotton production technology to achieve specific objectives of cotton farming in Andhra Pradesh.

Threat: Threat is a situation that may block the recommended cotton production technology to adopt for meeting its ultimate goal.

The four SNAC parameters were operationally defined as follows:

Stakeholders: Those groups or individuals who were directly or indirectly affected by cotton cultivation's pursuit of its goals.

Needs: Cotton farmers needs implies a gap between what is the existing situation of cotton cultivation and what ought to be the desirable situation of cotton cultivation.

Alterables: Alterables are traits that are shared by some persons but not shared by all members of society. Hoe culture, plough culture and mechanization are alternative ways of farming.

Constraints: Constraint referred to the item of difficulty faced by a farmer in adoption of recommended technology in cotton cultivation.

Considering the above parameters, a the schedule was prepared to unearth the SWOT and to analyze the SNAC parameters in each package of practices of cotton cultivation. Further the respondents were asked to rank the strengths and weaknesses according to their importance of strengths and weaknesses, opportunities according to attractiveness of the perceived opportunity, threats according to seriousness of the perceived threats. Stake holders and needs according to their importance of stake holders and needs, alterables according to their attractiveness of the perceived alterable and constraints according to seriousness of the perceived constraint. Thus ten important strengths, weaknesses, opportunities, threats and stakeholders, needs, alterables and constraints were identified by applying rank based quotients (Sabarathnam, 1988).

3.4 DEVICES USED FOR DATA COLLECTION

3.4.1 Interview Schedule

The schedule was used for collection of data which was prepared by consulting the experts. Before the collection of data interview schedule was undergone pretesting as follows:

Keeping in view the specific objectives, a structured schedule was prepared in a simple and intelligible language to avoid ambiguity to collect data from the respondents. The interview schedule was pre-tested with 15 per cent of the sample size in a non-sampled area under similar conditions. Necessary modifications were carried out in the light of difficulties encountered during pre-testing. The final interview schedule was prepared for the study was presented in Appendix - I.

3.4.2 Establishing Rapport

Prior to data collection, sufficient rapport was built up with the respondents during the first few days of field investigation. The respondents were convinced about the purpose of the study as purely academic in nature. This helped the investigator to establish friendly relations with the respondents and gain their confidence and willingness to respond properly.

3.4.3 Method of Data Collection

The data was collected by administering the pre-tested interview schedule to the respondents. The farmers were personally interviewed by the investigator which enabled him to get first hand information and gave an opportunity to observe the respondents personally. It was made sure that the questions were correctly understood by the respondents by repeating questions whenever necessary. Friendly atmosphere was maintained during the interview to see that the respondents were at ease and expressed their opinion fairly and frankly.

3.4.4 Preparation of the Report

The data collected were coded, analyzed and tabulated in order to make the findings meaningful. The findings of the data were suitably interpreted and necessary conclusions and inferences were drawn.

2.5 STATISTICAL TOOLS USED

The following statistical tools were used for the analysis and interpretation of the data of the investigation for accomplishment of set objectives. The data for statistical procedures were processed and subjected for computer analysis.

3.5.1 Frequency and percentages

3.5.2 Equal class interval

3.5.3 Rank based quotient (RBQ)

3.5.1 Frequency and Percentages

Some of the data were also subjected to and interpreted in terms of their frequencies and percentages.

Frequency and percentages were used to know the distribution pattern of respondents with respect to selected variables.

Percentages were used for standardization of size by calculating the number of individuals that would be a given category if the total number of cases were 100.

3.5.2 Equal Class Interval

The variables selected for the study were grouped into different categories based on the equal class intervals of the total score, i.e., the difference between minimum and maximum possible score divided by number of categories required with respect to the selected variables.

3.5.3 Rank Based Quotient (RBQ)

The data obtained from the cotton farmers regarding SWOT and SNAC parameters in cotton cultivation were quantified, i.e., the number of farmers who gave the particular rank of strengths, weaknesses, opportunities, threats, stake holders, needs, alterables and constraints. The ranks attributed for different SWOT and SNAC parameters and the frequency of farmers who gave ranks could be used for calculation of Rank Based Quotient (RBQ) (Sabarathnam, 1988). The formula for RBQ calculation is as follows:

$$RBQ = \frac{\sum_{i=1}^{n} (F_i)(n + 1 - i)}{Nn} \times 100$$

where, F_i = frequency of farmers for ith rank and SWOT parameters

N = number of farmers

n = number of ranks

$\sum_{i=1}^{n}$ = directs to sum the multiplicate factors

$$\sum_{i=1}^{n} (F_i)(n + 1 - i) = F_1 X_n + F_2 X_{n-1} + F_3 X_{n-2} + \ldots\ldots\ldots + F_n X_1$$

RESULTS

CHAPTER IV

RESULTS

In this chapter an attempt was made to examine the results based on empirical data of the present study. The findings of the investigations were presented keeping in view of the objectives of the study under the following headings.

4.1 To unearth the strengths, weaknesses, opportunities and threats in adoption of cotton cultivation.

4.2 To analyse the stake holders, needs, alterables and constraints (SNAC anlysis) in cotton cultivation.

4.3 To develop a strategy and to illustrate figuratively the various analytical components of SNAC analysis in cotton cultivation as a mechanism for the transfer of agricultural technology.

4.1 SWOT ANALYSIS IN ADOPTION OF COTTON CULTIVATION

4.1.1 Extent of Adoption of Recommended Production Practices of Cotton Cultivation by the Respondent Farmers

An attempt has been made to find out the extent of adoption level of the respondents regarding the recommended practices of cotton cultivation and presented in Table 4.

Table 4: Distribution of respondents regarding extent of adoption of recommended practices of cotton cultivation based on equal class interval

(n=110)

Category	Frequency	Percentage
Low (0-17)	12	10.90
Medium (18-25)	53	48.18
High (36-53)	45	40.92
Total	110	100.00

Cotton farmers were categorized in accordance with the extent of adoption of recommended package of practices and presented in the table by following the equal class interval method.

The data incorporated in Table 4 depicted that sizable number (48.18%) of the respondents had medium level of adoption. Whereas, 40.92 and 10.90 per cent of the respondents had high and low level of adoption respectively.

4.1.2 Item Response Analysis of Recommended Production Practices of Cotton Cultivation by the Respondent Farmers

To probe deeper in to the extent of adoption of different recommended practices by the respondents, item response analysis had been carried out and the results were depicted in the Table 5.

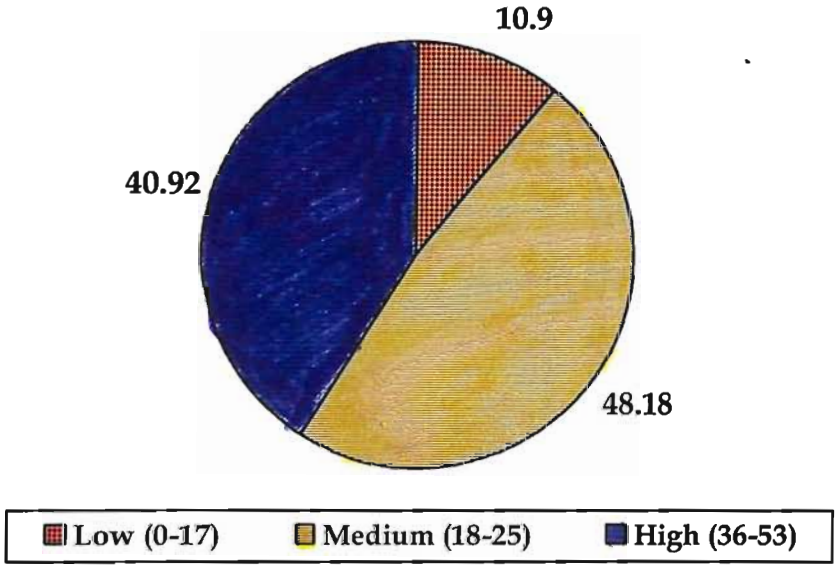


Fig. 6: Figure showing the distribution of respondents regarding to extension of adoption of recommended practices of cotton cultivation

Table 5: Item response analysis of extent of adoption of recommended practices of cotton cultivation.

n=110

S.No	Item	Confirmed to adopt		Not confirmed to adopt	
		F	%	F	%
I. Soils					
a)	Black cotton soils	110	100.00	0	0
b)	Red soils	0	0	110	100.00
c)	Alluvium soils	0	0	110	100.00
II. Land preparation					
a)	Ploughing with country plough	75	68.18	35	31.82
b)	Bullock drawn mould board plough	88	80	22	20.00
c)	Tractor drawn mould board plough	36	32.72	74	67.28
d)	Deep summer ploughing	32	29.09	78	70.91
e)	Levelling	15	13.63	95	86.37
III. Seeds and sowing					
a)	Variety selection	90	81.81	20	18.19
b)	Season	82	74.54	28	25.46
c)	Seed rate	59	53.63	51	46.37
d)	Optimum spacing for sowing	48	43.63	62	56.37
e)	Seed treatment with concentrated H_2SO_4	66	60.00	44	40.00
f)	Delinting of seed	0	0	110	100.00
IV. Manures and fertilisers					
a)	Application of chemical fertilisers	85	77.27	25	22.13
b)	Application of manures (FYM/Cakes)	64	58.18	46	41.82
V. Irrigation					
a)	Irrigation sources				
	1. Canals	110	100.00	0	0
	2. Tanks	0	0	110	100.00
	3. Tube wells	0	0	110	100.00
	4. Wells	0	0	110	100.00

S.No	Item	Confirmed to adopt		Not confirmed to adopt	
		F	%	F	%
b)	Alternate furrow irrigation	34	30.90	76	69.10
c)	Number of times irrigated	45	40.90	65	59.10
VI.	Inter cultural operations				
a)	Thinning and gap filling	86	78.18	24	21.82
b)	Synchronised planting	0	0	110	100.00
c)	Hand/mechanical weeding	110	100.00	0	0
d)	Herbicide usage	33	30.00	77	70.00
VII.	Insect pest management				
a)	Jassid control	87	79.09	23	20.91
b)	Whitefly - control	95	86.36	15	13.64
c)	Boll-worm complex control	80	72.72	30	27.28
VIII.	Integrated pest management (IPM)				
a)	Trap cropping with castor / okra	89	80.90	21	19.10
b)	Guard cropping with maize / jowar	79	71.81	31	28.19
c)	Mechanical control of pests (Hand picking)	79	71.81	31	28.19
d)	Pheramone trap	38	34.54	72	65.46
e)	Yellow sticky trap	0	0	110	100.00
f)	Introduction of bio-control agents	0	0	110	100.00
g)	Botanical pesticides (neem oil, sesamum oil)	91	82.72	19	17.28
h)	Ash (or) cowdung application	60	54.54	50	45.46
i)	Crop rotation with chillies/ jowar/maize/soybean/pulses/ sesamum/redgram	43	39.09	67	60.91
j)	Inter cropping with cow pea/ groundnut/greengram/ soybean/clusterbean	40	36.36	70	63.64
IX.	Disease management				
a)	Red leaf control	98	89.09	12	10.91
b)	Bud and boll shedding control	83	75.45	27	24.55
c)	Bacterial blight control	88	80.00	22	20.00
d)	Control of leaf spots like Alternaria/cercospra/ Helminthosporium	23	20.90	87	79.10

S.No	Item	Confirmed to adopt		Not confirmed to adopt	
		F	%	F	%
X. General management practices					
a)	Removal of top leaves	85	77.27	25	22.73
b)	Application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernal extract	0	0	110	100.00
c)	Conservation of natural enemies	10	9.09	100	90.91
d)	Collection and destruction of affected plant parts	63	57.27	47	42.73
XI. Harvesting and yield					
a)	Recommended crop period for harvesting	76	69.09	34	30.91
b)	Picking	110	100.00	0	0
XII. Post harvest management					
a)	Grading	99	90.00	11	10.00
b)	Storage	102	92.72	8	7.28
c)	Marketing	105	95.45	5	4.55
d)	Value addition	23	20.90	87	79.1

F = Frequency ; % = Percentage

Note: Response from cotton farmers were elicited on innovation-decision process (ID Process) continuum consisting of different stages like knowledge, persuasion, decision and confirmation either to adopt or not to adopt. Hence it is indicated in table 5 "Confirmed to adopt" as adopted or "Not confirmed to adopt" as non-adoption.

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On the perusal of the Table 5 it was evident that cent per cent of the respondents have adopted the recommended practices of cotton cultivated in black cotton soils, practicing canal irrigation and hand / mechanical weeding.

Majority of the respondents (75-90%) adopted the recommended practices of ploughing with Bullock drawn mould board plough, variety selection, application of chemical fertilisers, thinning and gap filling, jassid control, whitefly control, trap cropping with castor / okra, mechanical control of pests (hand pickings), botanical pesticides (neem oil, sesamum oil), red leaf control, bud and boll shedding control, bacterial blight control, removal of top leaves by topping in cotton plants, grading, storage and marketing of cotton.

The respondents (50-74%) adopted the following recommended practices in the order of ploughing with country plough, season, seed rate, seed treatment with concentrated H_2SO_4. Applciation of manure (FYM/cakes). Bollworm complex control, guard cropping with maize / jowar, ash (or) cowdung application, collection and destruction of affected plant parts, recommended crop period for harvesting.

The respondent (25-49%) farmers adopted the following recommended practices like ploughing with tractor drawn mould board plough, deep summer ploughing, optimum spacing for sowing, alternate

furrow irrigation, number of times irrigated, herbicide usage, pheramone trap, crop rotation with chillies/jowar/maize/soybean/pulses/ sesamum/redgram and inter cropping with cowpea/groundnut/ greengram/soybean/clusterbean.

Less than 25 per cent of the cotton farmers adopted levelling, control of leaf spots like Alternaria/cercospora/Helminthosporium, conservation of natural enemies and value added products.

None of the respondent farmers adopted the practices of cotton cultivated in red soils / alluvium soils, delenting of seeds, tanks, well irrigation and tube wells, synchronized planting, yellow sticky trap, introduction of biocontrol agents and application of Helio NPV @ 500 lt/ha or Bt formulation or neem seed kernel extract.

4.1.3 SWOT Analysis of Various Recommended Practices of Cotton Cultivation

This section dealing with the strengths, weaknesses, opportunities and threats as perceived by the respondents in adoption of cotton cultivation in Guntur district of Andhra Pradesh and the results were presented in Table 6.

The results revealed that 80 per cent of the respondents have perceived "Bright sunshine" hot climate as strengths, weaknesses as perceived by the respondents were "Severe winter and cloudy climate

Table 6: SWOT Analysis of cotton cultivation.

(n = 110)

Item	Strengths	Weaknesses	Opporutnities	Threats
1. Climate	a. Bright sunshine, hot climate (88) (80%)	a. Severe winter and cloudy climate (80) (72.73%) b. Low temperature at higher elevation (66) (60%)	a. Summer season for higher yields (73) (66.36%) b. A well distributed precipitation of 900 to 1000mm during vegetative phase helps in better growth and yield of cotton (44) (40%)	a. Frost is harmful (110) (100%) b. Frequently occurred cyclones, floods and droughts (59) (53.63%)
2. Soils	a. Well drained loams retentive at soil moisture with a lot of humus (44) (40%)	a. Black cotton soils with hard pans root proliferation is restricted (30) (27.27%)	a. Saline soils which are suitable for cotton cultivation because cotton is saline tolerant (102) (92.72%)	a. Acid soils (22) (20%)
3. Land preparation	a. Ploughing with bullock drwn mould board plough and 2-3 harrowings (60) (54.54%) b. Ridges and furrows for easy application of irrigation water (62) (56.36%)	a. Non availability of improved implements (30) (70.90%) b. High cost of implements (110) (100%)	a. Ploughing with tractor drawn mould board plough (66) (60.00) b. 3-4 deep summer ploughings are done with subsequent harrowings and levelling (44) (40.00)	a. Crust formation (105) (95.45)

( ) Figures in first parenthesis under each column indicates the frequency of cotton farmers response.

( ) Figures in second parenthesis under each column indicates the percentage of cotton farmers response

Item	Strengths	Weaknesses	Opporutnities	Threats
4. Seeds and sowing	a. Growing MCU5 for high market value (110) (100%) b. Higher growth rate (110) (100%)	a. Easy susceptible to pests and diseases (51) (46.36%) b. High cost of hybrid seed (110) (100%) c. Lack of knowledge about seasons, seed rate, seed treatment and spacings (79) (71.81%)	a. High export potential (110) (100%) b. High fibre percentage, length of lint and ginning out turn (49) (44.54%)	a. Adultration of seeds (110) (100%) b. Delayed sowing reduces yield (68) (61.81%) c. More seed rate causes more pest problem (64) (58.18%)
5. Manures and fertiliser	a. FYM application (98) (70.9%) b. Lime application (68) (61.81%)	a. Non availability of fertilisers at proper time (106) (96.36%) b. Costliness of fertilisers (110) (100%) c. Lack of money at proper time (97) (88.18%)	a. Application of complete P_2O_5 as a basal dose at last ploughing and duly incorporate in to the soil (39) (35.45%) b. While top dressing fertiliser should be applied in pockets 7-10 cm away from the plant and at the same depth (59) (53.63%) c. Providing irrigation for irrigated crop soon after application of fertilisers (67) (60.90%)	a. Lack of adequate moisture when there is application of fertilisers (73) (66.36%)

Item	Strengths	Weaknesses	Opporutnities	Threats
6. Irrigation	a. Canal type of irrigation (110) (100%) b. Irrigation applied after fertiliser application, during flowering time and at boll formation (105) (95.45%)	a. Insufficient supply of water (110) (100%)	a. Irrigate the crop 2-3 times in kharif and 6 times in rabi (29) (26.36%) b. Sowing of cotton crop on ridges when sown under irrigation (102) (92.72%)	a. Moisture stress during flowering and boll formation to boll development stages reduces yield (110) (100%) b. Cotton can not tolerate excess moisture/water logging conditions (110) (100%)
7. Inter cultural operations	a. Thinning and gap filling increases the yield and maintenance of optimum plant population (110) (100%) b. Hand/mechanical weeding can be done twice or thrice with in 30 to 60 days can reduce the weed population (36) (32.72%) c. Frequent inter cultivation to keep the crop weed free to conserve soil moisture (95) (86.36%)	a. Non availability of labour at proper time (110) (100%) b. High labour charges (88) (80%) c. Lack of knowledge about herbicides (51) (46.36%)	a. Earthing up for irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation (100) (90.90%)	a. Rains occurs at the time of weeding operations (50) (45.45%)

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Item	Strengths	Weaknesses	Opporutnities	Threats
8. Insect Pest Manageemnt	a. Application of phorate granules/monocrotophos for jassid control (60) (54.54%) b. Application of monocrotophos and Triozophos for white fly control (97) (88.18%) c. Application of endosulfan, monocrotophos, quinolphos for control of boll worm complex (53) (48.18%)	a. Non availability of insecticides / pesticides at proper time (72) (65.45%) b. Expensiveness of plant protection measures (110) (100%) c. Insufficient knowledge about plant protection measures (80) (72.72%) d. Judicious use of pesticides (74) (67.27%)	a. Growingof resistant varieties like L604, NA 1325, phosphomidon / methyl demeton for jassid control (78) (70.90%) b. Growing of resistant varieties like LPS 141, Lk 861, endosulfan / profenophos / neem oil / ethion for whitefly control (106) 96.36%) c. Collection of dried shoots with larvae, collection of grown up larvae, collection of rosette flowers for boll worm complex control (67) (60.90%)	a. Environmental pollution (105) (95.45%)
9. Integrated Pest Management (IPM)	a. Mechanical control of pests (hand picking) (90) (81.81%) b. Guard cropping with maize/jowar (65) (59.09%) c. Trap cropping with castor/okra (95) (86.36%)	–	a. Pheramone traps for control of Helicoverpa (99) (90%) b. Yellow sticky trap for control of white fly (110) (100%)	–

Item	Strengths	Weaknesses	Opporutnities	Threats
10. Disease management	–	a. Lack of knowledge about disease diagnosis (20) (18.18%)	–	a. Red leaf (59) (53.63%) b. Bud and boll shedding (89) (80.90%) c. Bacterial blights (63) (57.27%) d. Alternaria / cercosporal / Helminthosporium leaf spots (110) (100%)
11. General management practices	a. Removal of top leaves by topping in cotton plants (110) (100%)	a. Not attending to collection and destruction of affected plant parts (82) (74.54%)	a. Application of Helio NPV @ 500 lt/ha or Bt formulation or neem seed kernel extract of control of Helicoverpa (110) (100%) b. Conservation of natural enemies (110) (100%)	–
12. Harvesting and yield	a. Good count (60 counts) of cotton can be obtained in 180 days yield is 28 quintals/ha (110) (100%)	a. Picking of cotton irrespective of boll maturity at the time of climatic hazards (73) (66.36%) b. Non availability of sufficient quantity of female labour for cotton picking (99) (90%)	a. Picking of kapas free from debris, dried leaves, bracts during cooler times of the day (110) (100%)	a. Boll opening and boll shedding (102) (92.72%) b. Occurrence of rainfall delays harvesting (59) (53.63%)

Item	Strengths	Weaknesses	Opporutnities	Threats
13. Post harvesting and marketing	a. Storing of kapas in gunnies or boras in well ventilated sheds (94) (85.45%) b. Local traders are more (81) (73.63%)	a. Low price to cotton at proper time (110) (100%)	a. Grading of kapas and shade dry (96) (87.27%) b. During transportation kapas should be protected from vagaries of weather, dust and dirt (87) (79.09%)	a. Exploitation of cotton traders (88) (80%) b. Collation of middlemen to fix the price of cotton (100) (90.90%)

(72.73%), low temperature at higher elevations (60%). Opportunities as perceived by the respondents were summer season for higher yields (66.36%). A well distributed precipitation of 900 to 1000 mm during vegetative phase helps in better growth and yield of cotton (40%). Threats as perceived by the respondents were Frost is harmful (100%), frequently occurred cyclones/floods/droughts (53.63%).

Soils

The results of Table 6 revealed that 40 per cent of the respondents perceived well drained loams, retentive of soil moisture with a lot of humus as strength. Black cotton soils with hard pan, root proliferation is restricted as weakness by 27.27 per cent of the respondents. Saline soils which are suitable for cotton cultivation as opportunity by 92.72 per cent of the respondents. Whereas 20 per cent of the respondent farmers perceived the Acid soils as threat.

Land preparation

About land preparation, strengths as perceived by the respondents were, ploughing with bullock drawn mould board plough and 2-3 harrowings (54.54%), ridges and furrows for easy application of irrigation water (56.36%). Weaknesses as perceived by the respondents were, non availability of improved implements (70.90%), high cost of implements (100%), opportunities as perceived by respondents were ploughing with tractor drawn mould board plough (60%), 3-4 deep

summer ploughing are done with subsequent harrowings and levelling (40%). Crust formation perceived as threat by 95.45 per cent of the respondents.

Seed and Sowing

About seeds and sowing strengths as perceived by the respondents were growing MCU5 for high market value (100%) higher growth rate (100%). Weaknesses as perceived by the respondents were, easy susceptible to pests (46.36%), high cost of hybrid seed (100%) lack of knowledge about seasons, seed rate, seed treatment and spacings (71.81%), opportunities as perceived by the respondents were high export potential (100%), high fibre percentage, length of lint and gunning out turn (44.54%). Adultration of seed (100%). Delayed sowing reduces yield (61.80%), more seed rate causes more pest problem (58.18%) were perceived as threats by the respondent cotton farmers.

Manures and fertilisers

From the Table 6 it was evident that strengths as perceived by the respondents were, FYM application (70.90%), Lime application (61.81%). Non availability of fertilisers at proper time (96.36%), costliness of fertiliser (100%), lack of money at proper time (88.18%) were the weaknesses as perceived by the respondents. Opportunities as perceived by the respondents were, application of complete P_2O_5 as a basal dose at last ploughing and duly incorporating in to the soil (35.45%), while top

dressing fertiliser should be applied in pockets 7-10 cm away from the plant and at the same depth (53.63%), providing irrigation for irrigated crop soon after application of fertilisers (60.90%). Lack of adequate moisture when there is application of fertilisers (66.36%) was perceived as threat by the respondents.

Irrigation

About irrigation strengths as perceived by the respondents were, canal type of irrigation (100%), irrigation applied after fertiliser application, during flowering time and at boll formation (95.45%). Insufficient supply of water (100%) was a weakness as perceived by the respondents. Opportunities as perceived by the cotton farmers included 2-3 times irrigation in *kharif* and 6 times in *rabi* (26.36%), sowing of cotton crop on ridges under irrigation (92.72%). Moisture stress during flowering and boll formation to boll development stages reduces yield (100%), cotton can not tolerate excess moisture/water logging conditions (100%) were perceived as threats by the respondent farmers.

Intercultural operations

Strengths as perceived by the respondents were, thinning and gap filling increases the yield and maintenance of optimum plant population (100%), hand / mechanical weeding can be done twice or thrice within 30 to 60 days can reduce the weed population (32.72%), frequent inter cultivations to keep the crop weed free to conserve soil moisture

(86.36%). Weaknesses as perceived by the respondents were, non availability of labour at proper time (100%), high labour charges (80%), lack of knowledge about herbicides (46.35%). Earthing up for irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation (90.90%) as an opportunity by the respondents. Rains occur at the time of weeding operations as threat by 45.45 per cent of the respondents.

Insect pest management

About insect pest management the strengths as perceived by respondents were, application of phorate granules/monocrotophos for jassid control (54.54%), application of monocrotophos or triozophos for whitefly control (88.18%), application of monocrotophos, quinolphos for control of boll worm complex (48.18%). Weaknesses as perceived by the respondents were, non availability of insecticides/pesticides at proper time (65.45%), expensiveness of plant protection measures (100%), insufficient knowledge about plant protection measures (72.72%), judicious use of pesticides (67.27%). Opportunities as perceived by the respondents were, growing of resistant varieties like L604, NA 1325, phosphomidon / Methyl demeton for jassid control (70.90%), growing of resistant varieties like LPS 141, Lk861, Endosulfan / profenophos / neem oil / ethion for whitefly control (96.36%), collection of dried shoots with larvae, collection of grown up larvae, collection of Rosette flowers for

boll worm complex control (60.90%). Environmental pollution occuring because of the application of insecticides/pesticides was perceived as threat by 95.45 per cent of respondents.

Integrated Pest Management (IPM)

Strengths as perceived by the respondents were mechanical control of pests (hand picking) (81.81%), guard cropping with maize/jowar (59.09%), trap cropping with castor/okra (86.36%). Opportunities as perceived by respondents were, pheromone traps for control of *Helico verpa* (90.00%), yellow sticky trap for control of white fly (100%). None of the respondents perceived weaknesses and threats regarding integrated pest management.

Disease Management

Lack of knowledge about disease diagnosis was expressed as the weakness by 18.18 per cent of the respondents. Threats perceived by the respondents were Red leaf (53.63%), bud and boll shedding (80.90%), Bacterial blight (57.27%), Alternaria/cercospora/Helminthosporium leaf spots (100%). None of the respondents perceived the strengths and opportunities regarding disease management.

General management practices

Removal of top leaves by topping in cotton plants was a strength as perceived by cent per cent of the respondents. Not attending to collection and destruction of affected plant parts were the weaknesses as perceived

by 74.54 per cent of the respondents. Opportunities as perceived by the respondents were, application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract for control of Helicoverpa (100%), conservation of natural enemies (100%). None of the respondents perceived threat regarding general management practices.

Harvesting and yield

Good count (60 counts) of MCU5 cotton can be obtained in 180 days and yield is 28 q/ha (100%) which was perceived as the strength by the respondents. Weaknesses as perceived by the respondents were: picking of cotton irrespective of boll maturity at the time of climatic hazards (66.36%), non availability of sufficient quantity of female labour for cotton picking (90%). Picking of kapas free from debris / dried leaves / bracts during cooler times of the day (100%) was perceived as the opportunity by the respondents. Threats as perceived by the respondents were, boll opening and boll shedding (92.72%) and occurrence of rainfall delays harvesting (53.63%).

Post Harvesting and Marketing

Strengths perceived by the respondent farmers were: storing of kapas in gunnies or boras in well ventilated sheds (85.45%), local traders are more (73.63%). Low price to cotton at proper time (100%) was the weakness perceived by the respondents. Opportunities perceived by the respondents were: grading of kapas and shade dry (87.27%). During

transportation kapas should be protected from vagaries of weather, dust and dirt (79.09%). Threats perceived by the respondents were exploitation of cotton traders (80%), collation of middle men to fix the price of cotton (90.00%).

4.1.4 Estimation of Rank Based Quotients (RBQ for SWOT Analysis in Cotton Cultivation

The respondents were asked to rank ten strengths, weaknesses and opportunities and threats each in cotton cultivation based on the importance of strengths and weaknesses, the attractiveness of opportunities and seriousness of threats. Accordingly, the rank based quotients (RBQ) were calculated and presented in table 7.

Strengths: RBQ estimations

From the table 7, it was clear that the important ten strengths in cotton cultivation which were ranked top by the cotton farmers were identified based on rank based quotient and placed in order which includes, growing MCU5 for high market value (95.18), thinning and gap filling can increases the yield and maintainance of optimum plant population (89.81), removal of top leaves by topping in cotton plants (78.72), good count (60 counts) of MCU5 cotton can be obtained in 180 days, yield is 28 q/ha (71.00), storing of kapas in gunnies or boras in well ventilated sheds (58.18), spraying of monocrotophos/Ethion for control of whitefly (49.54), Trap cropping with castor/okra (40.63), Ridges and

Table 7: Estimation of rank based quotients (RBQs) for SWOT analysis in cotton cultivation

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
Strengths											
1. Growing MCU5 for high market value	62	43	5	--	--	--	--	--	--	--	95.18
2. Thinning and gap filling can increase the yield and maintainance of optimum plant population	43	28	33	6	--	--	--	--	--	--	89.81
3. Removal of top leaves by topping in cotton plants	3	24	39	44	--	--	--	--	--	--	78.72
4. Good count (60 counts) of cotton can be obtained in 180 days yield is 28 q/ha	2	15	18	32	43	--	--	--	--	--	71.00
5. Storing of kapas in gunnies or boras in well ventilated sheds	--	--	11	15	49	24	11	--	--	--	59.18
6. Spraying of monocrotophos/ethion for control of white fly	--	--	4	13	14	28	45	6	--	--	49.54
7. Trap cropping with castor/okra	--	--	--	--	4	42	30	25	9	--	40.63
8. Ridges and furrows for easy application of irrigation water	--	--	--	--	--	16	24	23	22	25	28.54
9. Frequent inter cultivations to keep the crop weed free to conserve soil moisture	--	--	--	--	--	--	--	28	45	37	19.18
10. Bright sunshine, hot climate	--	--	--	--	--	--	--	28	34	48	18.18

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
Weaknesses											
1. Expensiveness of plant protection measures	69	24	10	7	-	--	--	--	--	--	94.09
2. Low price to cotton at proper time	37	49	22	2	--	--	--	--	--	--	91.00
3. High cost of hybrid seed	4	37	32	37	--	--	--	--	--	--	84.09
4. Costliness of fertilisers	--	--	34	15	39	18	4	--	--	--	65.18
5. Non availability of labour at proper time	--	--	12	49	20	14	15	--	--	--	62.63
6. Insufficient supply of water	--	--	--	--	36	45	18	6	5	--	49.18
7. Non availability of fertilisers at proper time	--	--	--	--	12	23	42	16	17	--	39.72
8. Lack of knowledge about disease diagnosis	--	--	--	--	3	10	31	28	38	--	32.00
9. Non availability of sufficient quantity of female labour for cotton picking	--	--	--	--	--	--	--	39	24	47	19.27
10. Lack of money at proper time	--	--	--	--	--	--	--	21	26	63	16.18

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
Opportunities											
1. Growing MCU5 for high export potential	58	30	22	--	--	--	--	--	--	--	93.27
2. Pick kapas free from debris, dried leaves, bracts during cooler times of the day	30	48	24	8	--	--	--	--	--	--	89.09
3. Conservation of natural enemies	16	23	44	18	9	--	--	--	--	--	81.72
4. Yellow sticky trap for control of white fly	6	9	20	43	17	15	--	--	--	--	70.81
5. Earthing up in irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation	--	--	--	23	45	27	12	3	--	--	56.63
6. Application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract for control of Helicoverpa	--	--	--	18	26	46	13	7	--	--	53.18
7. Grading of kapas and shade dry for high market value	--	--	--	--	13	22	58	10	7	--	42.18
8. Sow the crop on ridges when sown under irrigation	--	--	--	--	--	--	16	62	22	10	27.63
9. Protection of kapas during transport from vagaries of weather, dust and dirt	--	--	--	--	--	--	11	14	43	42	19.45
10. Pheramone traps for control of Helicoverpa	--	--	--	--	--	--	--	14	38	58	16.00

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
Threats											
1. Adulteration of seeds	49	28	33	--	--	--	--	--	--	--	91.45
2. Cotton can not tolerate excess moisture/water logging conditions	35	22	30	16	7	--	--	--	--	--	85.63
3. Alternaria/cercospora/ Helninthosporium leaf spots	21	28	22	28	11	--	--	--	--	--	81.81
4. Moisture stress during flowering and boll formation to boll development stage reduces yield	5	32	25	29	19	--	--	--	--	--	77.72
5. Boll opening and boll sheddings	--	--	--	32	38	22	13	5	--	--	57.18
6. Environmental pollution	--	--	--	5	35	42	21	7	--	--	50.90
7. Rains occurs at the time of weeding and harvesting operations	--	--	--	--	--	40	31	20	13	6	37.81
8. Crust formation	--	--	--	--	--	6	37	42	20	5	31.72
9. Frost is harmful	--	--	--	--	--	--	8	22	42	38	20.00
10. Collation of middlemen to fix the price of cotton	--	--	--	--	--	--	--	14	35	61	15.72

furrows for easly application of irrigation water (28.54), frequent inter-cultivations to keep the crop weed free and to conserve soil moisture (19.18), bright sunshine and hot climate (18.18).

Weaknesses: RBQ estimation

From the table 7 it could be observed that the important ten weaknesses in cotton cultivation, which were ranked in serial by cotton farmers were; Expensiveness of plant protection measures (94.09), low price to cotton at proper time (91.00), high cost of hybrid seed (84.09), costliness of fertilisers (65.18), non availability of labour at proper time (62.53), in sufficient supply of water (49.18), non availability of fertilisers at proper time (39.72), lack of knowledge about disease diagnosis (32.00), non availability of sufficient quantity of female labour for cotton picking (19.27) and lack of money at proper time (16.18).

Opportunities: RBQ Estimation

From the table 7 it could be clear that, growing MCU5 for high export potential (93.27), picking of kapas free from debris, dried leaves, bracts during cooler times of the day (89.09), conservation of natural enemies (81.72), yellow sticky trap for control of whitefly (70.81), earthing up for irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation (56.63), application of Helio NPV @ 500 lt/ha or Bt formulation or neem seed kernal extract for control of Helicoverpa (53.18), grading of the kapas

and shade dry for high market value (42.18), sowing of cotton crop on ridges under irrigation (27.63), protection of kapas during transport from vagaries of weather, dust and dirt (19.45) and pheramone traps for control of Helicoverpa (16.00) were the ten important opportunities as perceived by the respondents.

Threats: RBQ Estimation

Table 7 depicts the ten important serious threats which were ranked by the respondents. They were: adulteration of seeds (91.45), cotton can not tolerate excess moisture/water logging conditions (85.63), Alternaria/cercospora/helminthosporium leaf spots (81.81), moisture stress during flowering and boll formation to boll development stages reduces yield (77.72), boll opening and boll sheddings (57.18), environmental pollution (50.90), rains occurs at the time of weeding and harvesting operations (37.81), crust formation (31.72), frost is harmful (20.00), collation of middle men to fix the price of cotton (15.72).

4.2 SNAC ANALYSIS OF COTTON CULTIVATION

SNAC refers to the analysis of stake holders, needs, alterables and constraints as perceived by the respondents in cotton cultivation in Guntur district of Andhra Pradesh and the results were presented in table 8.

4.2.1 SNAC Analysis of Various Recommended Practices of Cotton Cultivation

The results of table 8 revealed that cent per cent of the respondents have perceived that Agricultural College, Bapatla as stake holder. Needs as perceived by respondents were, identification and reclamation of problem soils (86.36%), knowledge about soil conservation practices (66.36%), soil sampling (100%). Acidity of the soils perceived as constraint by 58.18 per cent of the respondents. None of the respondents reported the alterables regarding soils.

Land Preparation

About land preparation, the stake holders as perceived by the respondents were: state department of Agriculture (89.09%), non governmental organisations (72.72%), farming community (92.72%). Needs as perceived by the respondents were, formation of irrigation and drainage channels (32.72%), choosing right implements (70.90%), using different newly introduced agricultural implements (39.09%), repairs and maintainance of implements (27.27%). Alterables as perceived by the respondents were, ploughing with tractor drawn mould board plough (60%), 3-4 deep summer ploughing are done with subsequent harrowings and levelling (40%), non availability of improved implements (70.90%), insufficient time for preparatory tillage and inter cultivation (31.81%),

Table 8: SNAC analysis of cotton cultivation

(n = 110)

Item	Stake holders	Needs	Alterables	Constraints
1. Soils	a. Agricultural College, Bapatla (110) (100%)	a. Identification and reclamation of problem soils (95) (86.36%) b. Knowledge about soil conservation practices (73) (66.36%) c. Soil sampling (110) (100%)	–	a. Acidity of the soils (75) (68.18%)
2. Land preparation	a. State department of Agriculture (98) (89.09%) b. NGO's (80) (72.72%) c. Farming community (102) (92.72%)	a. Formation of irrigation and drainage channels (36) (32.72%) b. Choosing right implements (78) (70.90%) c. Using different newly introduced agricultural implements (32) (39.09%) d. Repairs and maintenance of implements (30) (27.27%)	a. Ploughing with tractor drawn mould board plough (66) (60%) b. 3-4 deep summer ploughings are done with subsequent harrowings and levelling (44) (40%)	a. Non availability of improved implements (78) (70.90%) b. Insufficient time for preparatory tillage and inter cultivation (35) (31.81%) c. High cost of implements (110) (100%) d. Non availability of bullocks (46) (41.81%)

( ) Figures in first parenthesis under each column indicates the frequency of cotton farmers response.

( ) Figures in second parenthesis under each column indicates the percentage of cotton farmers response

Item	Stake holders	Needs	Alterables	Constraints
3. Seeds and sowing	a. Mahyco hybrid seeds and other seed companies (88) (80%) b. Private companies for seed treatment (70) (63.63%) c. RARS, Lam, Guntur (110) (100%)	a. Sources of availability of seed (72) (65.45%) b. Growth stages and characteristics of varieties (34) (30.9%) c. Special qualities possessed by the varieties (77) (70%) d. Season of the crop (81) (73.63%) e. Seed rate and sowing (110) (100%) f. Pre treatment of seed (76) (69.09%) g. Delinting of seed with concentrated sulphuric acid (31) (28.18%) h. Delinting of seed with cow dung (13) (11.81%) i. Method of sowing (60) (54.54%) j. Method of seed treatment with fungicides (72) (65.45%)	a. Growing of hybrid seeds for high export potential, high staple length, high fibre strength, high fibre maturity (110) (100%) b. Treating the seed with concentrated sulphuric acid @ 100 ml /kg of seed for not more than 2 minutes and wash with water 2-3 times and with lime water once (87) (79.09%) c. Treating of cotton seed with 0.01% streptomycin, oxytetracyclin (Pushamycin) and with 0.1% systematic fungicide like carbaxin (vitavax) solution for 6-8 hours (89) (80.90%)	a. High cost of hybrid seeds (110) (100%) b. Non availability of good quality seed at proper time (72) (65.45%) c. Adulteration in seed (110) (100%)

Item	Stake holders	Needs	Alterables	Constraints
4. Manures and fertilisers	a. Private fertiliser shops (73) (66.36%) b. State department of Agriculture (98) (80.09%) c. NGO's (80) (72.72%)	a. Application of fertilisers as per soil and variety (110) (100%) b. Optimum doses and time of application (79) (71.81%) c. Identification of nutrient deficiency symptoms (36) (32.72%) d. Importance of major and minor nutrients (38) (34.54%) e. Identification of important fertilisers (17) (15.45%) f. Method of fertiliser application (19) (17.27%) g. Calculation of nutrient content in fertilisers (30) (27.27%)	a. Application of complete P_2O_5 as a basal dose at last ploughing and duly incorporating into the soil (39) (35.45%) b. While top dressing, fertiliser should be applied in pockets 7-10 cm away from the plants and at the same depth (59) (53.63%) c. Fertiliser application for a rainfed crop should be done when there is adequate moisture (72) (65.45%) d. Providing irrigation for irrigated crop soon after application of fertilisers (67) (60.90%)	a. Non availability of fertilisers at proper time (106) (96.36%) b. Costliness of fertilisers (110) (100%) c. Lack of money at proper time (97) (88.18%)
5. Irrigation	–	a. Critical stages of water requirement (110) (100%) b. Modern methods like sprinkler irrigation (73) (66.36%) c. Time and amount of irrigation (80) (72.72%) d. Interval and depth of irrigation (38) (34.54%) e. Assessment of soil moisture condition for irrigation by using simple methods (68) (61.81%)	a. Formation of irrigation and drainage channels for proper maintenance of irrigation water (75) (68.18%) b. Sowing of cotton crops on ridges under irrigation (102) (92.72%) c. Irrigated the crop 2-3 times in kharif and 6 times in rabi (29) (26.36%)	a. Insufficient supply of water (110) (100%) b. Moisture stress during flowering and boll formation to boll development stage reduces yield (110) (100%) c. Cotton can not tolerate excess moisture/water logging conditions (110) (100%)

Item	Stake holders	Needs	Alterables	Constraints
6. Inter cultural operations	a. State Department of Agriculture (98) (89.09%)	a. Synchronised planting (77) (70%) b. Critical stages of crop weed competition (110) (100%) c. Herbicide usage (35) (31.81%) d. Knowledge about different weeds (73) (66.36%)	a. Contract system to minimise labour charges (69) (62.72%) b. Earthing up in irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation (100) (90.09%) c. By dibbling the cotton seed in the intersecting points made by the marker reduces the weed growth as it facilitates inter cultivation by working gorru and guntaka on all direction thereby saving labour on weed management (110) (100%)	a. Non availability of labour at proper time (110) (100%) b. High labour charges (88) (80%) c. Lack of knowledge about herbicides (51) (46.36%) d. Lack of knowledge about different weeds (71) (64.54%)

Item	Stake holders	Needs	Alterables	Constraints
7. Insect pest management	a. RARS, Lam, Guntur (110) (100%) b. State agricultural university (110) (100%) c. State Department of Agriculture (98) (89.09%) d. ETV-Annadata (66) (60%) e. Radio news (68) (61.81%) f. FTC (76) (69.09%)	a. Identification of sensitive stages of pests for easy control (110) (100%) b. Preparation of spray fluid (79) (71.81%) c. Identification of predators and parasites and taking care for their multiplication (40) (36.36%) d. Identification of ISI brand plant protection chemicals (78) (70.90%) e. Detecting the threshold level of various pests (15) (13.63%) f. Selection of suitable plant protection chemicals for effective control of pests (59) (53.63%) g. Spray schedule of different plant protection chemicals (53) (48.18%)	a. Growing of resistant varieties like L604, NA 1325 Monocrotophos / phosphomidon / Methyl demeton for jassid control (78) (70.90%) b. Growing of resistant varieties like LPS 141, LK 861. Triazophos / endosulfan / profenophos Neem oil / ethion for white fly control (106) (96.36%) c. Collection of dried shoots with larvae, collection of grown up larvae, collection of rosette flowers, endosulfon / chloripyriphos / qunolphos / acephate / monocrotophos for boll worms control (67) (60.90%) d. Application of water soluble sulphur or dicofol for control of red spider mite (70) (63.63%) e. Application of Methyl parathion or qunolphos mixed with sandovit or teepol for mealy bugs control (79) (71.81%)	a. Non availability of insecticides / pesticides at proper time (72) 65.45%) b. Expensiveness of plant protection measures (110) (100%) c. Insufficient knowledge about plant protection measures (80) (72.72%) d. Costliness of sprayers (37) (33.63%) e. Lack of faith in spraying (30) (27.27%) f. Health hazards due to application of insecticides / pesticides (103) (93.63%) g. More labour requirement for spraying (108) (98.18%) h. Non availability of timely information about pest control (18) (16.36%)

Item	Stake holders	Needs	Alterables	Constraints
8. Integrated Pest Management (IPM	a. RARS, Lam, Guntur (110) (100%) b. State agricultural university (110) (100%) c. State Department of Agriculture (98) (89.09%) d. ETV-Annadata (66) (60%) e. Radio news (68) (61.81%) f. FTC (76) (69.09%)	a. Knowledge about physical, mechanical, Biological control methods for control of pests (52) (47.27%)	a. Pheramone traps for control of Helicoverpa (99) (90%) b. Yellow sticky trap for control of white fly (110) (100%) c. Crop rotation with chillies/jowar/maize/ soybean/pulses/ sesamum/redgram (110) (100%) d. Inter cropping with cowpea/groundnut/ greengram/soybean/ cluster bean (103) (93.63%) e. Introduction of biocontrol agents Trichogramma, Chrysopha, NPV solution, aphids, coccinellides, spiders (74) 67.27%) f. Botanical pesticides, neem oil, sesamum oil (36) (32.72%) g. Uproot the cotton stubbles with stalk puller to discourage pest population (30) (27.27%)	a. More cost of cultivation (15) (13.63%) b. Lack of knowledge about IPM practices (22) (20.00%)

Item	Stake holders	Needs	Alterables	Constraints
9. Disease management	–	a. Identification of diseases and causal organisms (104) (94.54%) b. Knowledge about control of diseases (75) (68.18%)	a. Spraying of NAA 10 ppm for control of bud and boll shedding (110) (100%) b. Foliar spraying of 1g pushamycin and copper oxychloride 30g/Lt of water for control of bacterial blight (38) (34.54%) c. Spray dithane M-45 or Blitox for control of leaf spots (14) (12.72%)	a. Lack of knowledge about disease diagnosis (20) (18.18%)
10.General management practices	a. FTC (77) (70%) b. KVK (65) (59.09%)	a. Knowledge about general management practices (35) (31.81%)	a. Removal of cotton stubbles after last picking without opting for ratoon crop (108) (98.18%) b. Application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract for control of Helicoverpa (110) (100%) c. Conservation of natural enemies (110) (100%)	a. More cost of cultivation (59)(53.63%)

Item	Stake holders	Needs	Alterables	Constraints
11. Harvesting and yield	–	a. Time of picking (110) (100%) b. Recommended crop period for picking of cotton (78) (70.90%)	a. Picking of kapas free from debris, dried leaves, bracts during cooler times of the day (110) (100%) b. Insect damaged kapas should not be picked along with good kapas (75) (68.18%) c. First and last picked kapas should not be mixed with middle kapas as it fetches better price (51) (46.36%)	a. Non availability of sufficient quantity of female labour for cotton picking (95) (86.36%) b. High labour charges (13) (66.36%)
12. Post harvest maangement	a. CCI – Cotton corporation of India (98) (89.09%)	a. Storage of cotton (76) (69.09%) b. Grading of cotton (88) (80%) c. Marketing of produce through formal institutions (85) (77.25%) d. Value added products (102) (92.72%)	a. Grading of kapas and shade dry (96) (87.27%) b. Protection of kapas during transport from vagaries of weather, dust and dirt (87) (79.09%) c. The regulated market should provide requisite facilities to farmers for storage, loans, insurance against fire, and theft etc for selling their produce at competitive prices (105) (95.45%) d. Good quality of market information regarding prices etc should be made available to the farmers through mass media, news papers (101) (91.81%)	a. Low price to cotton at proper time (110) (100%)

high cost of implements (100%), non availability of bullocks (41.81%) were constraints as perceived by the respondents.

Seeds and Sowing

Stake holders as perceived by the respondents were Mahyco hybrid seeds and other seed companies (80%), private companies for seed treatment (63.63%), RARS, Lam, Guntur (100%). Needs as perceived by the respondents were, sources of availability of seed (65.45%), growth stages and characteristics of varieties (30.90%), special qualities possessed by the varieties (70%), season of the crop (73.63%), seed rate and sowing (100%), pre-treatment of seed (69.09%), delinting of seed with conc. Sulphuric acid (28.18%), delinting of seed with cowdung (11.81%), method of sowing (54.54%), method of seed treatment with fungicides (65.45%). Growing of hybrid seeds for high export potential, high staple length, high fibre strength, high fibre maturity (100%), Treating the seed with concentrated sulphuric acid @ 100 ml/kg of seed for not more than 2 minutes washing with water 2-3 times and with lime water once (79.09%), treating of seed with 0.01% streptomycen / oxytetracyclin (Pushamycin) and with 0.1% systematic fungicide like carboxin (vitavax) solution for 6-8 hours were the alterables as perceived by the respondents. Constraints as perceived by the respondents were, high cost of hybrid seed (100%), non availability of good quality seed at proper time (65.45%) and adulteration of seed (100%).

Manures and Fertilisers

From the table 8 it was evident that stake holders as perceived by the respondents were: private fertiliser shops (16.36%), state department of Agriculture (89.09%), NGO's (72.72%). Needs as perceived by the respondents were, application of fertilisers as per soil and variety (100%), optimum doses and time of application (71.81%), identification of nutrient deficiency symptoms (32.72%), importance of major and minor nutrients (34.54%), identification of important fertilisers (15.45%), method of fertiliser application (17.27%), calculation of nutrient content in fertilisers (27.27%). Alterables as perceived by the respondents were, application of complete P_2O_5 as a basal dose at last ploughing and duly incorporating in to the soil (35.45%), while top dressing fertiliser should be applied in pockets 7-10 cm away from the plant and at the same depth (53.63%). Fertiliser application for a rainfed crop should be done when there is adequate moisture (65.45), providing irrigation for irrigated crop soon after application of fertilisers (60.90%). Constraints as perceived by the respondents were, non availability of fertilisers at proper time (96.36%), costliness of fertiliser (100%) and lack of money at proper time (88.18%).

Irrigation

Needs as perceived by the respondents were, critical stages of water requirement (100%), modern methods like sprinkler irrigation

(66.36%), time and amount of irrigation (72.72%), interval and depth of irrigation (34.54%), assessment of soil moisture condition for irrigation by using simple methods (61.81%). Alterables as perceived by the respondents were, formation of irrigation and drainage channels for proper maintainance of irrigation water (68.18%), sowing of cotton crop on ridges under irrigation (92.72%), irrigation of cotton crop 2-3 times in *kharif* and 6 times in *rabi* (26.36%). Insufficient supply of water (100%), moisture stress during flowering and boll formation to boll development stage reduces yield (100%), cotton can not tolerate excess moisture water logging conditions (100%) were perceived as constraints by the respondent cotton farmers. None of the respondents indicated the stakeholders regarding irrigation practices.

Inter cultural Operations

From the table 8 it was evident that 89.09 per cent of cotton farmers have perceived "State Department of Agriculture" as a stake holder. Needs as perceived by the respondents were, synchronised planting (70%), critical stages of crop weed competition (100%), herbicide usage (31.81%) knowledge about different weeds (66.36%). Alterables as perceived by the respondents were "Contract system for minimise labour charges (62.72%), earthing up in irrigated cotton crop should be done with the help of a plough or blade harrow after fertiliser application and irrigation (0.90%), by dibbling the cotton seed in the intersecting points

made by the marker reduces the weed growth as it facilitates inter cultivation by gorru and guntaka on all directions by saving labour on weed management (100%). Constraints as perceived by the respondents were, non availability of labour at proper time (100%), high labour charges (80%), lack of knowledge about herbicides (46.36%) and lack of knowledge about different weeds (64.54%).

Insect Pest Management

Stakeholders as perceived by the respondents were, RARS, Lam, Guntur (100%), State Agricultural University (ANGRAU) (100%), State Department of Agriculture (89.09%), ETV Annadata (60%), Radio news (61.81%), FTC (69.09%), needs as perceived by the respondents were, identification of sensitive stages of pests for easy control (100%), preparation of spray fluid (71.81%), identification of predators and parasites and taking care for their multiplication (36.36%), identification of ISI brand plant protection chemicals (70.90%), detecting the threshold level of various pests (13.63%), selection of suitable plant protection chemicals for effective control of pests and diseases (53.63%), spray schedule of different plant protection chemicals (48.18%), alterables as perceived by the respondents were growing of resistant varieties like L604, NA 1325 Monocrotophos / phosphomidon / methyl demeton for jassid control (70.90%), growing of resistant varieties like LPS 141, L861, Triazophos / endosulpsulfan / profenophos / neem oil / ethion for

whitefly control (96.36%), collection of dried shoots with larvae, collection of grown up larvae, collection of Rosette flowers, endosulfan / chloripyriphos / quinolphos / acephate / moncrotophos for boll worm control (60.90%). Application of water soluble sulphur or dicofol for control of red spider mite (63.63%), application of Methyl parathion or quinolphos mixed with Sandovit or Teepol for mealy bugs control (71.81%). Constraints as perceived by the respondents were non availability of insecticides / pesticides at proper time (65.45%), expensiveness of plant protection measures (100%), insufficient knowledge about plant protection measures (72.72%), costliness of sprayers (33.63%), lack of faith in spraying (27.27%). Health hazards due to application of insecticides/pesticides (93.63%), more labour requirement for spraying (98.18%) and non availability of timely information about pest control (16.36%).

Integrated Pest Management (IPM)

From the table 8 it was evident that stake holders as perceived by respondents were, RARS, Lam, Guntur (100%), State agricultural University (100%), State Department of Agriculture (89.09%), ETV - Annadata (60%), Radio news (61.81%), FTC (69.09%). Knowledge about physical, mechanical, biological control methods for control of pests perceived as need by 47.27 per cent of the respondents. Alterables as perceived by the respondents were pheramone traps for control of

Helicoverpa (90%), yellow sticky trap for control of whitefly (100%), crop rotation with chillies / jowar / maize / soybean / pulses / sesamum / redgram (100%), inter cropping with cowpea / groundnut / greengram / soybean / cluster bean (93.63%), introduction of bio control agents Trichogramma, chrysopha, NPV solution, aphids, coccinellids, spiders (67.27%) and uprooting the cotton stubbles with stalk puller to discourage pest population (27.27%). More cost of cultivation (13.63%) and lack of knowledge about IPM practices (20%) were constraints as perceived by the respondents.

Disease Management

Needs as perceived by the respondents were, identification of diseases and casual organisms (94.54%), knowledge about control of diseases (68.18%). Alterables as perceived by the respondents were, spraying of NAA 10 ppm for control of bud and boll shedding (100%). Foliar spraying of 1g pushamycin + copper oxychloride 30g/lt of water for control of bacterial blight (34.54%), spray dithane M-45, or Blitox for control of leaf spots (12.72%). Lack of knowledge about disease diagnosis was perceived as constraint by 18.18 per cent of the respondents. None of the respondents reported the stake holders regarding disease management.

General Management Practices

About general management practices stake holders as perceived by respondents were FTC (70%) & KVK (59.09%). Knowledge about general

management practices (31.81%) was perceived as the need by the respondents. Alterables as perceived by the respondents were, removal of cotton stubbles after last picking with out opting for ratoon crop (98.18%), application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract for control of Helicoverpa (100%)and conservation of natural enemies(100%). More cost of cultivation was perceived as the constraint by 53.63 per cent of respondents.

Harvesting and Yield

Needs as perceived by the respondents were, time of picking (100.00%), recommended crop period for picking of cotton (70.90%). Alterables as perceived by the respondents were, picking of kapas free from debris, dried leaves, bracts during cooler times of the day (100.00%), insect damaged kapas should not be picked with good kapas (68.18%), first and last picked kapas should not be mixed with middle kapas as it fetches better price (46.36%). Constraints as perceived by the respondents were. non availability of sufficient quantity of female labour for cotton picking (86.36%) and high labour charges (66.36%). None of the respondents indicated the stakeholders regarding harvesting and yield.

Post Harvest Management

The results of table 8 revealed that majority (89.09%) of the respondents have perceived the stake holder of post harvest management in terms of CCI, cotton corporation of India.

Needs as perceived by the respondents were, storage of cotton (69.09%), grading of cotton (80%), marketing of produce through formal institutions (77.27%), value added products (92.72%). Alterables as perceived by the respondents were, grading of kapas and shade dry (87.27%). Protection of kapas during transport from vagaries of weather dust and dirt (79.09%), the regulated market should provide requisite facilities to farmers for storage, loans, insurance against fire and theft etc. For selling their produce at competitive price (95.45%), good quality of market information regarding prices etc., should be made available to the farmers through mass media, news papers (91.81%). Low price to cotton at proper time perceived as constraint by cent per cent of the respondents.

4.2.2 Estimation of Rank Based Quotients (RBQ) for SNAC Analysis in Cotton Cultivations

The respondents were asked to rank ten stakeholders, needs, alterables and constraints each in cotton cultivation based on importance of stakeholders and needs the attractiveness of alterables and seriousness of constraints. Accordingly, the rank based quotients were calculated and presented in table 9.

Stakeholders: RBQ Estimation

From table 9 it was clear that the important ten stake holders in cotton cultivation which were ranked top by the cotton farmers were

Table 9: Estimation of rank based quotients (RBQs) for SNAC ar

n = 110

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
STAKEHOLDERS											
1. State agricultural university (ANGRAU)	54	32	24	--	--	--	--	--	--	--	92.72
2. RARS, Lam,Guntur	37	33	26	14	--	--	--	--	--	--	88.45
3. Farming community	11	30	42	27	--	--	--	--	--	--	82.27
4.State Department of Agriculture (SDOA)	8	15	8	49	30	--	--	--	--	--	72.90
5. Mahyco hybrid seeds and other seed companies	--	--	6	12	49	32	11	--	--	--	57.27
6. CCI – Cotton corporation of India	--	--	4	8	20	27	46	5	--	--	49.27
7. NGOs (non governmental organisations)	--	--	--	--	11	38	32	22	7	--	42.18
8. FTC (Farmers training centre)	--	--	--	--	--	13	21	29	30	17	28.45
9. ETV – Annadata	--	--	--	--	--	--	--	32	47	31	20.09
10.Radio news	--	--	--	--	--	--	--	22	26	62	16.36

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
NEEDS											
1. Seed rate and sowing	52	27	31	--	-	--	--	--	--	--	91.90
2. Application of fertilisers as per soil and variety	33	27	29	15	6	--	--	--	--	--	86.00
3. Critical stages of water requirement	20	31	25	27	7	--	--	--	--	--	82.72
4. Critical stages of crop weed competition	5	25	25	38	17	--	--	--	--	--	76.63
5. Identification of sensitive stages of pests for easy control	--	--	--	26	43	25	12	4	--	--	56.81
6. Identification and reclamation of problem soils	--	--	--	4	37	42	21	6	--	--	51.09
7. Time of picking	--	--	--	--	--	36	32	25	12	5	37.45
8. Value added products	--	--	--	--	--	7	38	44	15	6	32.27
9. Identification of diseases	--	--	--	--	--	--	7	22	42	39	19.72
10. Taking soil samples for analysis	--	--	--	--	--	--	--	9	41	60	15.36

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
ALTERABLES											
1. Growing of hybrid seeds for high export potential, high staple length, high fibre strength and high fibre maturity.	60	34	16	--	--	--	--	--	--	--	94.00
2. Picking of kapas free from debris, dried leaves bracts during cooler times of the day	30	48	24	8	--	--	--	--	--	--	89.09
3. Conservation of natural enemies	16	23	44	18	9	--	--	--	--	--	81.72
4. Crop rotation with chillies/jowar/maize/soybean/ pulses/sesamum/redgram	4	5	26	47	19	9	--	--	--	--	71.00
5. Growing of resistant varieties like LPS 141, Lk 861, Triazophos / endosulfan / profenophos / neem oil / ethion for control of white fly	--	--	--	26	47	24	10	3	--	--	57.54
6. By dibbling the cotton seed in the intersecting points made by the maker reduces the week growth as it facilitates inter cultivation by working gorru and guntaka on all directions there by saving labour on weed management	--	--	--	11	29	52	12	6	--	--	52.45
7. The regulated markets should provide requisite facilities to farmers for storage, loans, insurance against fire and theft etc for selling their produce at competitive prices	--	--	--	--	6	25	62	10	7	--	41.18
8. Good quality of market information regarding prices etc. should be made available to farmers through mass media, news papers, etc.	--	--	--	--	--	--	16	63	18	13	27.45
9. Removal of cotton stubbles after last picking with out opting for ratoon crop	--	--	--	--	--	--	10	16	47	37	19.90
10. Spraying of NAA 10 ppm for control of bud and boll shedding	--	--	--	--	--	--	--	12	38	60	15.63

Item	RANKS										RBQ
	1	2	3	4	5	6	7	8	9	10	
CONSTRAINTS											
1. Expensiveness of plant protection measures	69	24	10	7	--	--	--	--	--	--	94.09
2. Low price to cotton at proper time	37	49	22	2	--	--	--	--	--	--	91.00
3. High cost of hybrid seed	4	37	32	37	--	--	--	--	--	--	84.09
4. Costliness of fertilisers	--	--	34	15	39	18	4	--	--	--	65.18
5. Non availability of labour at proper time	--	--	12	49	20	14	15	--	--	--	62.63
6. Insufficient supply of water	--	--	--	--	36	45	18	6	5	--	49.18
7. Health hazards due to application of insecticides / pesticides	--	--	--	--	10	29	46	19	6	--	41.63
8. More labour requirement for spraying	--	--	--	--	5	4	27	58	16	--	33.09
9. High cost of implements	--	--	--	--	--	--	--	16	48	46	17.27
10. Non availability of insecticides pesticides at proper time	--	--	--	--	--	--	--	11	35	64	15.18

identified based on rank based quotient and placed in the order which includes, state agricultural university (ANGRAU) (92.72), RARS, Lam, Guntur (88.45), farming community (82.27), state department of agriculture (SDOA) (72.90), Mahyco hybrid seeds and other seed companies (57.27), CCI Cotton Corporation of India (49.27), NGO's (non governmental organisations) (42.18), FTC (Farmers training centre) (28.45), ETV - Annadata (20.09), Radio news (16.36).

Needs: RBQ Estimation

From table 9 it could be observed that the important ten needs in cotton cultivation which were ranked in serial by the cotton farmers were; seed rate and sowing (91.90), application of fertilisers as per soil and variety (86.00), critical stages of water requirement (82.72), critical stages of crop-weed competition (76.63), identification of sensitive stages of pests for easy control (56.81), identification and reclamation of problem soils (51.09), time of picking (37.45), value added products (32.27), identification of disease and their casual organism (19.72) followed by taking soil samples for analysis (15.36).

Alterables: RBQ Estimation

From table 9 it could be clear that, growing of hybrid seeds for high export potential, high staple length, high fibre strength, high fibre maturity (94.00), picking of kapas free from debris, dried leaves, bracts during cooler times of the day (89.00), conservation of natural enemies

(81.72), crop rotation with chillies / jowar / maize / soybean / pulses / sesamum / redgram (71.00), growing of resistant varieties like LPS 141, LK 861, Triazophos / Endosulfan / Profenophos / Neem oil / Ethion for control of white fly (57.54). By dibbling the cotton seed in the intersecting points made by the marker reduces the weed growth as it facilitates intercultivation by working gorru and guntaka on all directions there by saving labour on weed management (52.45). The regulated markets should provide requisite facilities to farmers for storage, loans, insurance against fire,theft etc., for selling their produce at competitive prices (41.18), good quality of market information regarding prices etc., should be made available to the farmers through mass media, news papers (27.45), removal of cotton stubbles after last picking without opting for ratoon crop for breaking the cycles of problem pests (19.90) and spraying of NAA 10 ppm for control of bud and boll shedding (15.63) were the alterables as perceived by the respondents.

Constraints: RBQ Estimation

Table 9 shows that the ten important constraints which were ranked by the respondents. They were: expensiveness of plant protection measures (94.09), low price to cotton at proper time (91.00), high cost of hybrid seed (84.09), costliness of fertiliser (65.18), non availability of labour at proper time (62.63), insufficient supply of water (49.18), health hazards due to application of insecticides/pesticides (41.63), more labour

requirement for spraying (33.09), high cost of implements (17.27) and non availability of insecticides/pesticides at proper time (15.18).

DISCUSSION

CHAPTER V

DISCUSSION

In this chapter, the results were discussed for which the contents of chapter IV was used as raw material. Discussion on the results of the study were presented under the following heads.

5.1 Extent of adoption of recommended production practices of cotton by the respondent farmers.

5.2 SWOT analysis of various recommended practices of cotton cultivation.

5.3 Estimation of rank based quotients (RBQ) for SWOT analysis in cotton cultivation.

5.4 SNAC analysis of various recommended practices of cotton cultivation.

5.5 Estimation of rank based quotients (RBQ) for SNAC analysis in cotton cultivation.

5.6 SNAC strategy for cotton improvement.

5.1 EXTENT OF ADOPTION OF RECOMMENDED PRODUCTION PRACTICES OF COTTON BY THE RESPONDENT FARMERS

From the total picture of the results incorporated in table 4, it could be inferred that 48.18 per cent of the respondent farmers had medium level of adoption of

recommended package of practices in cotton cultivation followed by high (40.92%) and low (10.90%) levels of adoption. This implies that the extent of adoption varied from farmer to farmer. This draws the attention of medium adopter category and make them to adopt the recommended practices of cotton cultivation. The finding was in line with the findings of Rogers (1995).

The reason for varied extent of adoption could also be attributed to the individual differences in their sense perceptions. Since the adoption is a mental process through which an individual farmer passes from first stage of hearing about cotton cultivation to the adoption of cotton practices.

From the table 5, it could be observed that the practices like cotton cultivation in black cotton soils, canal type of irrigation, hand/mechanical weeding, picking of cotton were adopted by all the respondent cotton farmers. These methods involve lesser skill, low cost with overwhelming profits.

SWOT analysis of cotton production technology was also attempted to get more insight towards overall problem in adoption of technology. The following would point out the possible reasons for non-adoption of different practices of cotton cultivation.

None of the respondents cultivated in red soils and alluvium soils, because the farmers under study were having only black cotton soils. Delinting of seed can not be adopted by the respondents due to lack of knowledge, even though they have knowledge, they back foot that practice due to financial difficulty.

Farmers do not go for tanks, tube wells, well type of irrigation since the study area Prattipadu and Pedanandipadu practice canal type of irrigation leaving tank, tubewell and well type irrigation.

None of the farmers adopted synchronized planting due to their beliefs and traditional is on. In fact, the farmers were not having the time to sow the crop on the same day. Further no respondent cotton farmer adopted yellow sticky trap due to lack of awareness and knowledge about the cultural methods. They opted chemical control of pests. Of course, none were introduced the bio-control agents due to lack of confidence about biological control as it takes time for control of pests.

The practice of application of Helio NPV 500 Lt/ha or Bt formulation or neem seed kernel for control of helicoverpa was not adopted by cotton farmers due to lack of awareness and knowledge on this specific practice. Similar results were also recorded by Bhaskara Rao (1991) in hybrid cotton cultivation. Further, the findings were in conformity with the reasons attributed by him. However, the findings are not in conformity with the research findings of Adam (1994).

Seeds and Sowing

Timely supply of quality seed can be achieved by closely monitoring the demand and availability of the seed. This should be done by 15th May for kharif cotton and by 1st week of October for rabi.

Table 5 represents that the majority of cotton farmers were adopting variety selection, season, seed rate, seed treatment but not adopting the optimum spacing for

sowing and delinting of seed. Similar trend was observed by Vankata Ramaiah (2000). This needs to be looked in from close angle to draw a strategy of educating the non-adopters by conducting demonstrations on optimum spacing and delinting of cotton seed followed by educational tours and field visits to other successful and progressive farmers fields.

Seeds are of two types as notified hybrids/varieties and private research produced varieties/hybrids. As per law, notified varieties and hybrids can be subjected to certification or need not be. It is purely voluntary. In case of private varieties/hybrids no certification is done, no company would like to reveal the parents used in producing these varieties/hybrids. Surprisingly even in case of certified seed, neither the certification agency nor the company guarantees any compensation. The farmers necessarily have to file cases, under 'consumers law' in case of seed failure/performance failure. Compounded to this is the problem of trade. Significant quality of trade takes place outside the domainion of law, in the name of farmer to farmer transaction. Producers of hybrid cotton who are from Guntur district organize seed production elsewhere, hands-in-glove with APSCA (Andhra Pradesh Seed Certification Agency) officers indulging various kinds of malpractices besides selling directly to farmers.

Neither certification agency nor APSSDC (Andhra Pradesh State Seed Development Corporation) has adequate staff to closely monitor seed production. Farmers are no longer moralistic and stick to the seed production practices like roguing. One solution appears to be making the private sector more accountable by appropriate

memorandum of understanding (MOU) and reducing the burden of APSCA and APSSDC. Otherwise, government continuous to be answerable without any control and take all the blame for no fault of it.

One more issue is marketing agreement between companies which are being allowed under the present law. Due to this a company evolves a variety and in turn sells to various companies who market the variety by separate names giving an impression to the gullible farmer that each one is a new variety, not only the farmer is cheated but also too many products are dumped in the market creating marketing problems.

The findings also drive at an implication that in the long run, 'seed village programme' only can ensure availability of quality seed at reasonable prices to the cotton farmers and solve many of the problems in case of varieties.

Manures and Fertilizers

Application of correct doses of manures and fertilizers enhances the soil fertility and in turn results in the higher yields. Soil testing is the precursor for applying the recommended fertilizer for achieving better results. This could be attended by collecting soil samples and interpreting. Soil test results should be given in analysis report so that the nutrients required could be used in the form of NPK. It is evident that the majority of the cotton farmers adopted both the application of chemical fertilizers (77.27%) and manures like FYM/cakes (58.18%). This is in conformity with the findings of Bhaskara Rao (1991).

The plausible reasons for the trend of non-adoption of chemical fertilizers and manures may be due to the fact that fertilizers should be manufactured by public sector, joint sector and large private sector companies. Quality problems are very few among the products of these companies. Zinc and micro nutrient manufacturers are, however, small and too many number. Maximum number of complaints and sample failures are noticed in these products. However, application of recommended doses of manures and fertilizers, i.e., N:P:K is 90:45:45 and use of K fertilizer and N application during 30th, 60th and 90th day after sowing. Split application of N in three doses as 30, 30, 30. The findings drive at providing adequate subsidy for muriate of potash and supply of Zinc.

Plant Protection Measures

Regular pest surveillance should be undertaken with the assistance of ANGRAU, CIPMC and other research centres to monitor the pest incidence from the beginning of the season in order to minimize losses due to pest incidence, need based plant protection measures should also be taken up. Protecting the plant by an integrated approach has been gaining momentum in the recent past. This is otherwise called as IPM. Other methods like releasing predators, mechanical methods were also common in practical scenario. It could be seen that the majority adopted Jassid (79.09%), white fly (86.36%), boll worm complex (72.72%) control measures followed by IPM practices like trap cropping with castor/okra (80.90%), guard cropping with maize/jowar (71.81%), botanical pesticides (82.72%). With non-adoption regarding pheromone traps (65.46%), yellow sticky trap (100%), bio control agents (100%) and crop rotation with chillies/jowar/ maize/soybean/pulses (60.91%). Added to this a majority of cotton

farmers adopted disease management practices like red leaf control (89.01%), bud and boll shedding (75.45%), bacterial blight (80%) but surprisingly the larger number of farmers (79.90%) have not adopted the control of leaf spots like Alternaria/Cercospora/ Helminthosporium. This calls for close observation into the problem(s). The problem in pesticides mainly related to proliferation in terms of numbers and regulatory body becoming non-trustworthy. The plant protection measures in cotton include adequate supply of subsidized phorate granules, effective weed control, use of neem based and eco friendly pesticides, etc.

The findings also drives at suggestion that IPM has to be universalized for crops like cotton, it will spread and gains acceptable. Only if we are able to supply adequate quantity of biological agents, it is not possible to government to set up so many laboratories all over. It is better to encourage agricultural colleges, NGOs, KVKs to produce these agents by giving them one time grant for equipment with adequate training backup. Further it is also required that the extension machinery needs to be strengthened besides adequate training and demonstration experiences. Three things are crucial at this juncture. They are 1) reach, 2) focus, 3) image. Reach means extension worker reaching the target farmer. Focus means understanding the practices of IPM and Image depicts positive or negative effect on cotton farmers.

In summary, the close association with farmers and extension functionaries for positive impact about inputs was given a go by. Moreover, significant number of farmers learnt latest technology faster than those not so qualified workers because of the improved educational levels and better developed communication infrastructure.

Meanwhile, fairly strong dealer network developed in the private sector close to the doors of the farmers for delivery of inputs like pesticides, seeds and fertilizers. This network started transfering technology of their interest and gained influence over the farmers gradually as the basic agricultural extension worker was beyond his reach especially in times of emergency. Crisis in cotton improvement is mostly weather dependent and whenever a pest problem arises, its spreads so fast that all the farmers, need extension services at the same time. With such a large jurisdiction and without mobility support, it is just not possible for the MAOs to cover all the farmers or the villages in such a short period. Therefore, the farmer naturally seeks advice from the fertilizers/Seeds/Pesticide dealer available next door. The result in poor quality advice and at times suicidal deaths of cotton farmers due to wrong advices.

What is the alternative? If we look at the rest of the world, what we rate is that in majority of the countries, plant protection services in the form of agricultural extension services are offered mostly by private sector and the role of government is minimal. Private companies carryout the plant protection services through qualified extension personnel unlike India.

The state does not have resources to employ any more plant protection workers than what we have. Infact 85 per cent of the budget overall is already being used for financing, non-plan expenditure. With the change in educational qualifications of the farmer and better communication infrastructure, it is better to use their services for transfer of technology by providing refresher training on plant protection measures like IPM. It is being observed that the CIPMC officials are covering only selected plots/

villages during their visit. In order to minimize pest density in time, they should cover more areas in addition to the selected areas for cotton improvement.

5.2 SWOT ANALYSIS OF VARIOUS COTTON PACKAGE OF PRACTICES

Climate

The results presented in table 6 were used as foundation material on SWOT analysis of various cotton package practices under different sub heads as given below:

Majority of the cotton farmers perceived bright sunshine as strength due to larger number of sunny days in the area of study which facilitate favourably for cotton cultivation. Therefore, it is an indicative of the fact that the findings of the present study were in conformity with the findings are of Venkat Rao (1999).

Further severe winter and cloudy climate, low temperature at higher elevations were regarded as weaknesses and summer season for higher yields as an opportunity. The plausible reasons attributed for this type of trend was the nature's gift to Indian continent more so with the study area in Andhra Pradesh where summer gives higher cotton yields with a congenial climate for cotton cultivation. Frost though harmful in accordance with the majority of the respondents (100%), frequently occurred cyclones, floods and droughts (53.63%) caused massive damage to the crop. It is quite natural under the above said reasons, the cotton farmers perceived both the above components as threat. This finding was fallen in line with the findings of Venkat Rao (1999) but not in conformity with the findings of Rao (1997).

The cyclones were worst hit and they were real threat to Guntur district where in larger cotton acerage quiet often get submerged thereby change in colour of the boll, lint causing unfavourable market leading to price structure on loss line occures. Though this trend was observed in relation to other crops, the severity is high with cotton crop. Hence it is a threat. There lies the responsibility of extension functionaries to counter and combat the threats by practicing coping mechanisms like the construction of circular type of cyclonic shelters, wind breaks seeking the support and cooperation of voluntary organizations, humanitizations and students community involvement.

The view points were also in conformity with the officials and administrators of Cotton Corporation of India whose ideas were collected by the researcher while conducting the study.

Soils

Following is the discussion drawn for table 6 about soils 40 percent of the respondents perceived the sufficient moisture for all stages of cotton crop growth as a strength. This is in conformity with the findings of Adam (1994) and the reasons could be attributed to well drained loams, retentive of soil moisture with a lot of humus as a strength in view of presence of humus and moisture which is congenial, specially for cotton crop which requires limited moisture at all stages of crop growth. Further the black cotton soils with hard pans root proliferation has been cannoted as weakness due to the shrinkage and swelling property of black cotton soils. It not only affects the aeration of the roots but also the crop growth. It is observed that cotton requires at least

10 per cent of aeration for aerobic respiration of roots. This finding is in line with the findings of Gururaj Hunsigi and Krishna (1998). Saline soils which are suitable for cotton cultivation was an opportunity. Cotton grows under a wide range of salinity. This crop is considered saline tolerant and can withstand ECe of 7.7 ds/m (Fageria *et al*, 1991). 20 per cent of the respondent farmers perceived acid soils as a threat. Cotton crop cannot tolerate acidity. The critical pH range is 5.5 to 6.0 and the upper limit is 8.5. In acidic soils cotton can be grown only with the application of lime at suitable doses. But it is not economical to each and every farmer because their small land holdings are economically not viable. So, it is becoming burden to the farmers. Similar findings were in conformity with the research findings of Munro (1987).

Land Preparation

About land preparation, strengths as perceived by the respondents were ploughing with bullock drawn mould board plough and 2-3 harrowings (54.54%), ridges and furrows for easy application of irrigation water (56.36%). Ploughing with bullock drawn mould board plough, causes the soil to become good tilth and the furrows made by the ploughing appear good for sowing the cotton seeds and it requires only lesser skill, less expense and normal practice followed by the farmers. Mould board plough inverse the soil and it kills the larvae of the pests. It facilitates the irrigation to the cotton crop. Ridges and furrows facilitate easy application of irrigation. Seeds are sown at the height of ¾ of the ridge. At the early stage of seed growth, it requires limited moisture in soil, it is possible only with the irrigation applied in furrows. If we apply irrigation in a flooded way it affects the seedling growth. So furrow irrigation is suitable to seed

germination and crop growth. Weaknesses as perceived by the respondents were non-availability of improved implements (70.9%), high cost of implements (100.00%). Mostly Indian farmers were illiterate and stick on to the indigenous technology coming from generation to generation. They most dependent upon traditional practices. Moreover the sophisticated implements not within the reach of the cotton farmers both financially and technically. So the farmers even though curious enough to adopt new technology, they were not in a position to achieve it due to financial and traditional conditions. Similar findings were recorded by Adam (1994), Katole *et al* (1998) and More *et al* (1998). Ploughing with tractor drawn mould board plough (60.00%), 3-4 deep summer ploughings are done with subsequent harrowings and levelling (40.00%) were the opportunities as perceived by cotton farmers. Nowadays cattle population is decreasing day by day and the cattle available for the ploughing in the villages were unable to pull the sophisticated implements like mould board plough. In such conditions the farmer has to go for the machines like tractors, to handle the mould board ploughs. Cotton crop is grown by the majority of the farmers in the villages under study (table 2). It is better to have combinely a tractor drawn mould board plough. Due to summer ploughings the larvae of pests come over to the top layer of the soil and expose to sunlight thereby they die. Like that they could be controlled. This finding was in conformity with the findings of Sriram and Palaniswamy (1999). Crust formation perceived as threat by 95.45 per cent of the respondents. Crust formation in some of the typical soils affects the seed germination and thereby reduces the crop growth. Farmers provide light irrigation to the crust formed soils at the time of seed germination which reduce the effect of soil

crust and enhance the seed germination. This finding was in conformity with that of Venkat Rao (1999).

Seeds and Sowing

Following is the discussion pertinent to table 6 about seeds and sowing. All the respondents under study were growing MCV5. The reasons attributed for this trend was multifold like higher market value and higher growth rates. Similar findings were also indicated by Govindarajulu (1990)

The other characteristics of MCU5 as perceived by respondent cotton farmers were as follows: Duration of MCU5 is 180 days, length of lint 30 mm, fibre per cent 34 and ginning out turn is 60 counts and yield/hectare in 28 q/hectare. So it has good market value due to its quality and quantity. Similar view points were also recorded in Telugu literature in vyavasaya panchangam (2000).

As far as weaknesses were concerned the MCU5 was easily susceptible to pests. This is inherent weakness of American variety which calls for latest breeding strategies on the part of the breeders to combat susceptibility for white fly by injecting resistance, to pests and diseases. The other reason was the high cost of hybrids. It is quite natural that the hybrid cost was high than the varieties since it involves lot of labour which in turn add to their wages for having been attended the pollination work. This brings up the cost of cultivation high far beyond the level of common farmer. This finding was in conformity with those of Adam (1994, More *et al* (1998) and not in conformity with that of Katole *et al* (1998).

The good characteristics of MCU5 has kept the variety as top in performance and yield potential. This evidence the vistas of global marketability and high trade and export potentiality. This line of thinking was also endorsed by Chinnam Naidu (1988). It is surprising to note that coincidence of these two results were in conformity with the observations made by Venkat Rao (1999). However, the finding is an eye opener to administrators and policy makers and extension functionaries to encourage in accordance with global priorities leading to higher exports. The other opportunities include high fibre percentage, length of lint and ginning out turn (100%).

The threats were quiet common which include the following. Adulteration of seeds, delayed sowing reduces yield, more seed rate causes more pest problem. Most preferably farmers consume seed from private companies and they do not go for research stations. Adulteration of seeds is more in private companies. They sell these adulterated seeds to farmers for their own benefit. This finding was in conformity with that of More *et al* (1998 but not in conformity with that of Katole *et al* (1998).

Delayed sowing is other attribute perceived by respondents. Generally the sowing time for kharif cotton is June - July. Delayed sowings can be done within 15th August to 31st August. For delayed sowing the moisture within the soil can be decreased. Crops suffers with moisture stress as a result of delayed sowing. This calls for attention on the part of cotton farmers to reduce the moisture stress and avoidance of delayed sowings.

The other plausible reason for this type of trend was due to more seed rate which causes more pest problem. Generally the seed rate for traditional varieties was 8 - 10 kg/ha, and for hybrid varieties 2 - 3 kg/ha. More seed rate increases the density of plants thereby pest population increases.

The findings were in line with the findings of Hunsigi and Katarki (1974).

Manures and Fertilizers

Strengths as perceived by respondents were FYM application (70.9%), lime application (61.81%). FYM application is most useful for cotton crop as it increases the nutrient status and gives good physical properties to the soil. Four cart loads of FYM/acre can be applied every year. Lime application decreases the soil acidity especially in cotton cultivation. 3 tonnes of lime can be applied for a hectare to decrease the soil acidity. This was also recorded by Bhaskara Rao (1991). Non-availability of fertilizer at proper time (96.36%), costliness of fertilizer (100.00%), lack of money at proper time (88.18%) were weaknesses as perceived by the respondents. In villages, some of the shops do not maintain fertilizers, they maintain only pesticides because they were getting more profit from pesticides rather than fertilizers. Whereas, the majority of the farmers apply fertilizers for cotton fields at the same time causing more consumption of fertilizers at low/non availability of the same, thereby glut in the cotton market which results the higher prices of fertilizer. Added to this, lack of timely finance is also a weakness in cotton cultivation. These findings were in conformity with that of Kulkarni *et al* (1994), More *et al* (1998), Kotele *et al* (1998) and not in conformity with that of Ramachandran and Sripal (1990).

Opportunities as perceived by the respondents were, application of complete P_2O_5 as a basal dose at last ploughing and duly incorporating into the soil (35.45%) while top dressing fertilizer should be applied in pockets 7-10 cm away from the plant and at the same depth (53.63%), and providing irrigation for the irrigated cotton crop soon after the application of fertilizers (60.90%). For traditional varieties the N:P:K ratio is 90:45:45. Nitrogen can be applied in three doses as 30, 30, 30 at 30th day, 60th day, 90th day after sowing. All P_2O_5 (45kgs) should be applied at a basal dose after last ploughing. Potash can be applied in three split doses such as 15, 15, 15 at 30th day, 60th day, 90th day after owing. For hybrids the N:P:K ratio is 120:60:60. In cotton the P_2O_5 should be applied in a basal dose and nitrogen and potash can be applied as top dressing. For irrigated cotton crop the irrigation should be applied after application of fertilizers since the fertilizers dissolve in water and the soil become easily accessible to absorb fertilizers. This helps to increase the nutrient status of the soil. In similar way lack of adequate moisture when there is application of fertilizers (66.36%) perceived as threat by the respondents. This finding was in conformity with that of Adam (1994).

Irrigation

Following is the discussion pertinent to table 6 about irrigation. All the respondents under study had canal type of irrigation. They perceived that this is a strength due to some of the areas in Andhra Pradesh were rainfed. In those areas the farmers dig bores, wells for irrigation by spending lot of money and time. Whereas the farmers won't incur expenditure on logging of bores and well, since they have canal irrigation facility. This finding was not in conformity with that of Adam (1994).

Irrigation applied after fertilizer application at flowering time and at boll formation (95.45%) perceived as a strength since these stages are critical for water requirement. For easy dissolving of fertilizer into the soil, for good flowering and for good quality boll the irrigation is compulsory at these stages. This finding was in conformity with that of Adam (1994) but not in conformity with that of Bhaskara Rao (1991). Insufficient supply of water as a weakness perceived by respondents. Government is not releasing the water thereby causing shortage of water in reservoirs. This finding was in conformity with that of More *et al* (1998) but not in conformity with that of Takole (1998).

Opportunities as perceived by cotton farmers includes mainly the irrigation of crop. This varies from season to season. Due to frequent rains in kharif the irrigation required is only 2-3 times. Whereas in rabi, the crop has to be irrigated 6 times.

The seed can be sown on ridges. This practice saves moisture as compared to the practice of sowing seed under normal conditions which consumes excess moisture thereby seed damage.

The threats were moisture stress during flowering and the reduction of yield due to boll formation to boll development stages (100%) cotton cannot tolerate excessive moisture/water logging conditions (100%).

Cotton requires sufficient moisture for its growth. It cannot tolerate both excess moisture and moisture stress. They can reduce the quality and quantity of the boll thereby reducing yield as well. Optimum irrigation schedule tend to produce longer

unable to go for herbicides due to lack of knowledge and the high cost of herbicides. This finding was in conformity with that of More (1998), Katole (1998) and not in conformity with that of Shehrawat *et al* (1994).

Earthing up should be done in irrigated cotton crop because of the cotton crop can be sown on ridge for limited moisture, as the time goes the ridge gradually decreases. The field can be modified into flat shape. So the cotton crop can directly be exposed to irrigation. It is also suffering from water logging conditions. For this purpose earthing up should be done. This was an opportunity perceived by the respondents. Rains delay the weeding operations thereby increasing weed growth. This was perceived as a threat by 45.45 per cent of respondents.

Insect Pest Management

With regard to the insect pest management strengths as perceived by respondents it was appropriate to apply phorate granules/monocrotophos for jassid control (54.54%). Due to jassid, the leaves turn yellowish and eventually to brick red followed by hopper burn appears in the fields. For this the farmers applied phorate granules/monocrotophos. 10g of phorate granules should be applied in 1.15 ai/ha (12.5 kg/ha) by pocketing method. Monocrotophos should be applied at the rate of 1.5 ml/lt of water.

Application of monocrotophos/triazophos for control of white fly (88.18%) was found quite effective. Monocrotophos should be applied at the rate of 2.8 ml/lt of water. Triazophos should be applied at the rate of 2.5 ml/lt of water.

fibers. Excessive irrigation however leads to rank growth, reduction in fruiting coefficient and formation of fibres with low pressly index values.

Inter-cultural Operation

Strengths as perceived by respondents were: thinning and gap filling which increases the yield, maintenance of optimum plant population (100%). Hand/ mechanical weeding if done twice or thrice within 30 to 60 days will reduce the weed population (32.72%). Frequent inter-cultivation can be done keeping the crop weed free to conserve soil moisture (86.36%).

Studies by Hunsigi and Katarki (1974) have shown that cotton is highly flexible in respect of plant densities. There were no yield differences when the plant densities varied from 50,000 to 1,00,000 plants per ha. Yield sharply declines at the plant population below 30,000 per ha. Similarly higher density above 3,00,000 plants per ha reduces the yield. Therefore thinning and gap filling can be compulsory. Hand weeding is cheap and requires less skill and common practice to be followed by the respondents. The weeds can be competitive with plants especially for moisture. Weeds can be completely removed only by frequent inter-cultivations thereby conserving soil moisture. This finding was in conformity with that of Sriram and Palani swamy (1999).

Weakness as perceived by respondents were non-availability of labour at proper time (100%), high labour charges (80%), lack of knowledge about herbicides. In cotton cultivation, the need of labour for weeding is more. Labour scarcity is more and so are labour charges. Farmers are illiterates. They only depend on hand weeding. They were

unable to go for herbicides due to lack of knowledge and the high cost of herbicides. This finding was in conformity with that of More (1998), Katole (1998) and not in conformity with that of Shehrawat *et al* (1994).

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Insect Pest Management

With regard to the insect pest management strengths as perceived by respondents it was appropriate to apply phorate granules/monocrotophos for jassid control (54.54%). Due to jassid, the leaves turn yellowish and eventually to brick red followed by hopper burn appears in the fields. For this the farmers applied phorate granules/monocrotophos. 10g of phorate granules should be applied in 1.15 ai/ha (12.5 kg/ha) by pocketing method. Monocrotophos should be applied at the rate of 1.5 ml/lt of water.

Application of monocrotophos/triazophos for control of white fly (88.18%) was found quite effective. Monocrotophos should be applied at the rate of 2.8 ml/lt of water. Triazophos should be applied at the rate of 2.5 ml/lt of water.

Monocrotophos and quinolphos should be applied for the control of boll worm complex. Monocrotophos should be applied at the rate of 2 ml/lt of water. Quinolphos should be applied at the rate of 2 ml/lt of water.

Weaknesses as perceived by the respondents were non availability of insecticides/pesticides at proper time (65.45%), expensiveness of plant protection measures (100%), insufficient knowledge about plant protection measures (72.72%) and judicious use of pesticides (67.27%). All farmers felt that major weakness was expensiveness of plant protection measures due to financial weakness and also judicious use of pesticides which causes environmental pollution and resurgence of pests. This finding was in conformity with those of Anand Singh (1995), More *et al* (1998), Katole *et al* (1998) and not in conformity with those of Kulkarni *et al* (1994).

Opportunities as perceived by respondents were growing resistant varieties like L604, NA1325, phosphomidon/methyl demeton for jassid control (70.9%). Resistant varieties are most beneficial for controlling the insects. Phosphomidon should be applied at the rate of 0.5 ml/lt of water. Methyl demeton should also be applied at the rate of 2 ml/lt of water.

Grow resistant varieties like LPS 141, LK 861, endosulfan/profenophos/neem oil/ethion are quite useful for white fly control (96.36%). White fly causes sooty mould and the leaves turn to small yellow chlorotic patches. The farmer can go for this practice and reduce the white fly menace.

Collection of dried shoots with larvae, collection of grown-up larvae and collection of Rosette flowers for boll worm complex control (60.9%) are the other practices which should be followed by the farmers to control boll worms.

Farmers were applying pesticides excessively, which in turn causes environmental pollution and pest resurgence. In Guntur district pesticide consumption was more thus leading to a lot of environmental pollution. This is a threat as perceived by the respondents.

The above mentioned research findings drew support from the findings of Vasantha (1996).

Integrated Pest Management (IPM)

Strengths as perceived by the respondents were mechanical control of pests (hand picking) due to complete removal of pests and low cost. It includes collection of larvae by hand and killing them. School children during weekends and holidays go to the farmers field and engage themselves in collection of larvae of the pests especially in the last instar stage. They were paid 10 paise per larva. These larvae were collected and handed over to a private bio-control agency (Green Tech Agro Private Ltd.) for preparing NPV. A sum of Rs.300/- per 1000 larvae was given as an incentive to the farmers. This finding derived support from the findings of Rathinasabapathi (1987), Saxena et al (1989), Sriram and Palaniswamy (1999) who expressed that the children were facilitating the removal and sale of larvae.

Guard cropping with maize, jowar (59.09%). Maize/jowar can be sown as guard crops so that the attack of pests on cotton crop is reduced.

Trap cropping with castor/okra (86.36%). Okra was 3 - 10 times more preferred by cotton jassid and it diverted 5 per cent population of this pest from cotton. Spotted boll worms, *Erias vitella* and American boll worm laid more number of eggs on okra fruits. Suchinfested fruits should be removed periodically and destroyed. Planting of castor as trap crop diverted population of spodoptera litura. These findings were in conformity with that of Sriram and Palani swamy (1999).

Opportunities as perceived by respondents were pheromone traps for control of helicoverpa (90.00%), yellow sticky trap for control of white fly (100.00%), gossyplure is commercially available sex pheromone for control of boll worms. These findings were in conformity with that of Sriram and Palani swamy (1999).

None of the respondents perceived the weaknesses and threats regarding integrated pest management.

Disease Management

Also none of the cotton farmers have perceived the strengths and opportunities in control of diseases in cotton cultivation. But they perceived weakness as lack of knowledge about disease diagnosis. Most of the farmers were illiterate and they are unable to diagnose the diseases. Red leaf (53.63%), bud and boll shedding (80.9%), bacterial blight (57.27%), alternaria/cercospora/helminthosporium leaf spots (100.00%) were a threat as perceived by the respondents. For correcting red leaf, water logging

should be avoided by proper draining and by the use of foliar spray of 2% urea (20 g/lt of water). For correcting bud and boll shedding, spraying of NAA 10 ppm would be the right step. Bud and boll shedding is also associated with boran, zinc deficiency. For this, spraying of Borax 0.1%, $ZnSO_4$ 2% was recommended. For correcting bacterial blight, acid delinting and seed treatment with antibiotics like plantomycin (100 mg/lt) + 0.1% vitavax or foliar spray of 1g paushamycin + copper oxy chloride 30 g/lt of water at fortnightly intervals was recommended. For controlling leaf spots, spraying of dithane M-45 2.5 g/lt of water or blitax 3 g/lt of water could be quite useful. This could not draw any support from the findings out of the research study conducted elsewhere.

General Management Practices

Removal of top leaves by topping in cotton plants is considered as a strength because it is best control mechanism for *Helicoverpa armigera*. Helicoverpa lays eggs on top leaves. So the top leaves in cotton plants can be used for control of this pest. Collection and destruction of plant parts cannot be done as a weakness. Farmers felt that this practice is time consuming. Due to negligence of the practice the pests can survive and cause damage to the next crop. This finding was in line with the findings of Sriram and Palani swamy (1999).

Opportunities as perceived by the respondents were: application of Helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract to control Helicoverpa (100%). Conservation of natural enemies (100%), conservation of natural enemies by replacement of sprayable insecticides in the initial stages of crop growth with application of granular insecticides when sufficient moisture is available in the soil are

the other suitable measures to curb this disaster. Conservation of natural enemies can be done by growing inter crops/strip crops. This finding was in line with the findings of Sriram and Palani swamy (1999). None of the respondents perceived as threat regarding general management practices.

Harvesting and Yield

Harvesting is an important aspect in cotton cultivation. MCU5 can be harvested within 180 days and its yield is 28 quintals/hectare and its ginning out turn is 60 counts. Among the good qualities of MCU5, the respondents perceived as strength as the most important one. Most of the farmers however could not achieve the optimum yield, this might be due to occurrence of cyclones, floods, droughts, pests and diseases which was perceived as weakness by 66.36 per cent of the respondents. This limitation can be overcomed by adjusting the crop season based on the previous experiences of the occurrence of cyclones and floods. This finding derived support from the findings of Venkat Rao (1999).

More labour is required for cotton picking. Non-availability of labour for cotton picking was considered as weakness by 90.00 per cent of the respondents.

An opportunity as perceived by the respondents was picking of kapas free from debris, dried leaves, bracts during cooler times of the day (100.00%) because it protects the kapas from higher temperature and it gives good quality kapas.

Threats as perceived by the respondents were boll opening and boll shedding (92.72%), occurrence of rainfall delays harvesting (53.63%). Similar results were drawn by Adam (1994).

Post Harvest and Marketing

It was evident from the table 6 that 85.45 per cent of the respondents perceived that is advisable to see that storing of kapas is done either in gunnies or boras in well ventilated sheds because it avoids the damage to the kapas. The availability of local traders was considered as strength (76.63%) keeping in view the fact of the immediate selling of produce to them to avoid the damaging of kapas. Similar results were drawn by Venkat Rao (1999).

Low price to cotton at proper time was considered as weakness by cent per cent of the respondents. To overcome these, the government fixes minimum support price to cotton. This finding was in conformity with that of More *et al* (1998). 87.27 per cent of the respondents perceived the grading of kapas and shade dry as an opportunity because it gives good quality and leads to good marketing. Kapas should be protected from vagaries of weather, dust and dirt during transportation as opportunity by 79.09 per cent of respondents. Kapas are especially damaged to the maximum during transportation. So it could be carefully protected from weather, dust and dirt.

The threats as perceived by the respondents were exploitation of cotton traders (80%) and collation of middlemen to fix the price of cotton (90%).

Synergic efforts were also recorded by Venkat Rao (1999).

5.3 ESTIMATION OF RANK BASED QUOTIENTS (RBQ) FOR SWOT'S IN COTTON CULTIVATION

In this section the important ten strengths, weaknesses, opportunities and threats ranked by respondents were discussed.

Strengths

From the table 7, it was clear that the important ten strengths in cotton cultivation which are ranked top by the cotton farmers were identified based on rank and placed in the order which includes, growing of MCU5 for high market value (95.18), thinning and gap filling which increases the yield and maintenance of optimum plant population (89.81), removal of top leaves by topping in cotton plants (78.72), good count (60 counts) of MCU5 cotton can be obtained in 180 days, yield in 28 quintals/hectare (71), storing of kapas in gunnies or boras in well ventilated sheds (59.18), spraying of monocrotophos/tiazophos for control of white fly (49.54), trap cropping with castor/okra (40.63), ridges and furrows for easy application of irrigation water (28.54), frequent inter-cultivations to keep the crop weed free to conserve soil moisture (19.18), bright sunshine and hot climate (18.18).

Farmers gave first rank to MCU5 due to higher yields and good market value. The least rank was given to bright sunshine and hot climate.

Weaknesses

From table 7 it could be observed that the important ten weaknesses in cotton cultivation which were ranked in serial by cotton farmers were expensiveness of plant

protection measures (94.09), low price to cotton at proper time (91.00), high cost of hybrid seed (84.09), costliness of fertilizer (65.18), non-availability of labour at proper time (62.63), insufficient supply of water (49.18), non-availability of fertilizers at proper time (39.72), lack of knowledge about disease diagnosis (32.00), non-availability of sufficient quantity of female labour for cotton picking (19.27) and lack of money at proper time (16.18).

The farmers expressed expensiveness of plant protection measures, which was an important weakness. They gave least rank to lack of money at proper time.

Opportunities

From the table 7, it could be clear that growing MCU5 for high export potential (93.27), picking of kapas free from debris, dried leaves, bracts during cooler times of the day (89.09), conservation of natural enemies (81.72), use of yellow sticky trap for control of white fly (70.81), earthing up of irrigated cotton crop with the help of a plough or blade harrow after fertilizer application and irrigation (56.63), application of helio NPV @ 500 Lt/ha or Bt formulation or neem seed kernel extract can be used for control of helicoverpa and white fly (53.18), grading of kapas and shade dry for high market value (42.18), sowing the crop on ridges when sown under irrigation (27.63), during transport, kapas should be protected from vagaries of weather, dust and dirt (19.45), use of pheromone traps for control of helicoverpa (16.00) were the ten important opportunities as perceived by the respondents.

Farmers had given first rank to MCU5 for high export potential due to its good qualities, least rank to pheromone traps for control of helicoverpa due to lack of knowledge.

Threats

Table 7 shows ten important serious threats which were ranked by the respondents. They were adulteration of seeds (91.45), cotton cannot tolerate excess moisture/water logging conditions (85.63), alternaria/cercospora/helminthosporium leaf spots (81.81), moisture stress during flowering and boll formation to boll development stages, which reduces yield (77.72), boll opening and boll sheddings (57.18), environmental pollution (50.90), occurrence of rains at the time of weeding and harvesting operations (37.81), crust formation (31.72), harmful frosts (20) and collation of middlemen to fix the price of cotton (15.72).

Farmers gave first rank to adulteration of seeds and least rank to collation of middlemen to fix the price of cotton.

5.4 SNAC ANALYSIS OF VARIOUS RECOMMENDED PRACTICES OF COTTON CULTIVATION

The results presented in table 8 were used as foundation material for discussing on SNAC analysis of various cotton package practices under different sub heads as given below:

Soils

Following is the discussion pertinent to table 8 about soils. All the respondents under study have perceived Agricultural College, Bapatla as staker holer because of the

presence of a soil testing laboratory in Bapatla campus. All the farmers came to Bapatla along with their soil for testing. The Department of Soil Science and Agricultural Chemistry also gives valuable suggestions to farmers.

Most of the farmers cultivated crops on soils quite unaware the effect of soil properties. Due to realization of importance of soils the needs of farmers were as follows: identification and reclamation of problematic soils (86.36%), knowledge about soil conservation practices (66.36%), soil sampling (100.00%). This finding was in line with that of Bhaskara Rao (1991). Cotton crop can not tolerate acidity. The critical pH range is 5.5 to 6.0 and the upper limit is 8.5. In acidic soils cotton can be grown only with the application of lime at suitable doses. The finding was in conformity with that of Munro (1987).

Land Preparation

Stakeholders as perceived by respondents were state department of agriculture (89.09%), non-governmental organizations (72.72%) and farming community (92.72%). These organizations were providing valuable suggestions about land preparation and implements. It is quite interesting to note that farming community was also giving valuable suggestions and in fact it is quite nearer and credible to the farmers.

Formation of irrigation and drainage channels, choosing right implements, using different newly introduced agricultural implements, repairs and maintenance of implements were the needs as perceived by respondents. This finding was in

conformity with that of Saibaba (1986), Sohal and Yanaki (1970), Shankara Rao (1986) and not in conformity with that of Satyanarayana (1969).

Due to realization of importance of water management and the possibility of dissemination of pests, diseases and weeds through irrigation and drainage water, the farmer felt a need for the formation of irrigation and drainage channels. This finding was in conformity with that of Saibaba (1986).

The cotton growers possessed implements which could be purchased and repaired locally. Great care must be taken for the proper function of these implements. Therefore, to save money and time, the farmers wanted to repair the implements by themselves. Probably for these reasons farmer needs were choosing right implements, using different newly introduced agricultural implements, repairs and maintenance of implements. This finding was in line with those of Sohal and Yanaki (1970), Saibaba (1986) and Sankara Rao (1986).

Alterables as perceived by the respondents were ploughing with tractor drawn mould board plough, 3-4 deep summer ploughings were done with subsequent horrowings and levelling. Due to the decrease of cattle population, unable to draw sophisticated implements like mould board plough. The farmer has to go for tractors to handle the mould board plough. The animal drawn mould board plough is small, ploughs to a depth of 15 cm, while two mould board ploughs which are bigger in size are attached to the tractor and ploughed to a depth of 25 to 30 cm. Mould board ploughs are used where soil inversion is necessary. Summer ploughing leads to the

destruction of eggs and larvae of the pests, apart from making the soil to a fine tilth for increasing the soil fertility and good germination. This finding was inline with that of Sriram and Palani swamy (1999).

The farmers faced many constraints about land preparation like non-availability of improved implements, insufficient time for preparatory tillage and inter cultivation, high cost of implements, non-availability of bullocks. Improved implements do not reach farmers both technically and financially, timing for preparatory tillage are also minimum due to decrease in cattle population. These findings were in conformity with those of Ramachandran and Sripal (1990), Adam (1994), More *et al* (1998) and Katole *et al* (1999).

Seeds and Sowing

The farmers prefer Mahyco hybrid seeds as well as RARS, Lam, Guntur for good quality seed. Excellent research is being done on cotton by the scientists of Lam and it is so nearer to farmers and surprisingly the farmers were preferring private companies as far as seed treatment is concerned since it is so popular in the name of seed treatment laboratories and were increasingly perceived as stakeholders by the respondent cotton farmers.

Cotton seed should be treated with concentrated sulphuric acid for getting high germination percentage. Otherwise farmers cannot afford to adopt higher seed rate as hybrid cotton seed has costly inputs. The farmers might have realized the importance of maintaining optimum seed rate and sowing in protecting the crop from pests and

disease attack. The farmer needs are as follows: Sources of availability of seed (65.45%), growth stages and characteristics of varieties (30.9%), special qualities possessed by the varieties (70.00%), season of the crop (76.63%), seed rate and sowing (100.00%), pre-treatment of seed (69.09%), delinting of seed with conccentrated sulphuric acid (28.18%), delinting of seed with cow dung (11.81%), method of sowing (54.54%) and method of seed treatment with fungicides (65.45%).

This finding is in accordance with that of Saibaba (1986) and Shankara Rao (1991).

Alterables as perceived by the respondents were: treating the seed with concentrated sulphuric acid @ 100 ml/kg of seed for not more than 2 minutes, wash it with water 2-3 times and with lime water once (79.09%), treating of cotton seed with 0.01% streptomycin oxy tetracycline (pushamycin) and with 0.1% systematic fungicides like carboxin (vitavax) solution for 6-8 hours. Many of the seed borne diseases appear after the crop is sown. These can be controlled if the procured seed is treated with these chemicals before sowing. If a few rupees are spent for seed treatment, much money that has to be spent on seed borne diseases can be saved. This finding was in conformity with that of Sriram and Palani swamy (1999). Growing of hybrid seeds for high export potential, high staple length, high fibre strength, high fibre maturity (100%) is alterable due to its higher yield, good quality and less seed rate.

As far as constraints were concerned regarding seeds and sowing, high cost of hybrid seed (100%) is most important. This brings cost of cultivation beyond the level of

common farmer. Non-availability of good quality seed at proper time (65.45%), adulteration in seed (100%). The private companies sell adulterated seeds to the farmers for their own benefit. The farmers are not patient enough to go to research stations. They go for private companies. So good quality seed is not available and adulterated seeds are more common in private companies. This finding was in conformity with that of More *et al* (1998) but not in conformity with that of Katole *et al* (1998).

Manures and Fertilizers

Farmers consume fertilizers mostly in private fertilizer shops. The state department of agriculture also gives fertilizers to the farmers on subsidy basis. NGOs suggest about the use of manures and fertilizers.

Fertilizer is not only an important input but also a costlier one. Care must be taken to avoid its indiscriminate use which is based on soil analysis results. Most probably for these reasons, the farmers needs were: application of fertilizers as per soil and variety (100.00%), optimum doses and time of application (71.81%), identification of nutrient deficiency symptoms (32.72%), importance of major and minor nutrients (34.54%), identification of important fertilizers (15.45%), method of fertilizer application (17.27%) and calculation of nutrient content in fertilizers (17.27%). This finding was in conformity with those of Sastry (1970), Sharma (1970), Saibaba (1986) and Shankara Rao (1991).

Alterables as perceived by respondents were application of complete P_2O_5 as a basal dose at last ploughing and should be duly incorporated into the soil (35.45%),

while top dressing fertilizer should be applied in pockets 7-10 cm away from the plant and at the same depth (53.63%). For a rainfed crop, fertilizer application should be done where there is adequate moisture (65.45%). For irrigated crops, provide irrigation soon after the application of fertilizers (60.9%). For traditional varieties, the N:P:K ratio is 90:45:45. Nitrogen can be applied inthree split doses as 30, 30, 30 at 30th, 60th, 90th day after sowing. All P_2O_5 such as 45 should be applied at base dose after last ploughing. Potash can be applied in three split doses such as 15, 15, 15 at 30th, 60th, 90th day after sowing. The N:P:K ratio is 120:60:90 for hybrid. Incotton the P_2O_5 should be applied at a basal dose and nitrogen and potash can be applied as top dressing. It must be remembered that fertilizer application, moisture is compulsory for dissolving of fertilizer in the soil. In rainfed soils, fertilizer application should be done where adequate moisture is present in the soil. In irrigated conditions, irrigation should be provided for this purpose. This finding was in conformity with that of Adam (1994).

Irrigation

None of the cotton farmers perceived the stakeholders under irrigation practices. Required irrigation is compulsory for cotton because cotton cannot tolerate water logging conditions. For efficient use of irrigation water, the farmer needs were critical stages of water requirement (100.00%), modern methods like sprinkler irrigation (66.36%), interval and depth of irrigation (34.54%), assessment of soil moisture condition for irrigation by using simple methods (61.81%). This finding was in conformity with those of Sidhu and Patel (1968), Bhaskara Rao (1991) and not in conformity with that of Saibaba (1986).

Alterables as perceived by respondents were formation of irrigation and drainage channels for proper maintenance of irrigation water (68.18%), sowing the crop on ridges under irrigation (92.72%), irrigation in kharif 2-3 times and in rabi 6 times (26.36%). For efficient use of irrigation water the formation of irrigation and drainage channels were compulsory. Irrigation should be applied through irrigation channel and excess water should be drained through drainage channel. So the optimum moisture can be absorbed by the plants as it gives good aeration to the roots. Ultimately it adds to good yields. Due to frequent rains in kharif the irrigation required is only 2-3 times whereas in rabi, the crop has to be irrigated 6 times.

The seed can be sown on ridges. This practice saves moisture as compared to the practice of sowing seed under normal conditions which consumes excess moisture thereby seed damage.

Constraints perceived by the respondents were insufficient supply of water (100%), willingness on part of the government not to release the canal water if water present in reservoir decreases. This finding was in conformity with that of More *et al* (1998). Moisture stress during flowering and boll formation to boll development stage reduces yield (100%) and cotton cannot tolerate excess moisture/water logging conditions (100.00%). Both moisture stress and water logged conditions adversely affect the cotton growth. This finding was in line with that of Adam (1994).

Inter Cultural Operations

From the table 8 it was evident that 89.09 per cent of cotton farmers have perceived state department of agriculture as stake holder. This is because of the fact that

they give valuable suggestions to the farmers about the weeds and their controls on few inter cultivation practices.

Weeds are the unwanted plants and they compete with crop plants mainly for moisture and nutrients. Cotton requires 9 weeks weed-free environment after emergence. Mostly farmers go for hand weeding. For this, farmers needs were synchronized planting (70.00%), critical stages of crop-weed competition (100.00%), herbicide usage (31.81%), knowledge about different weeds (66.36%). This finding was in line with those of Sidhu and Patel (1968), Satyanarayana (1969) and Bhaskara Rao (1991). Alterables as perceived by the respondents were contract system to minimize labour charges. For daily wages, the labour cannot work sufficiently and not completely within time. Due to contract system, weeding can be completed within time and charges also decreased. For irrigated cotton crop earthing up should be done with the help of a plough or blade harrow after fertilizer application and irrigation (90.9%). Earthing up should be done for building up of ridges thereby maintaining ridges and furrows for easy application of irrigation water. By dibbling the cotton seed on the intersecting points made by the marker, the weed growth can be reduced as it facilitates inter cultivation by working gorru and guntaka in all directions. This also saves labour on weed management (100%) as alterables perceived by respondents.

Due to labour scarcity and wages the constraints of the farmers growing cotton were non-availability of labour at proper time (100%), high labour charges (80%), illiteracy and non-awareness of farmes about the weeds and herbicides were thought of

as constraints by the respondents. This finding was in conformity with that of More *et al* (1998), Katole *et al* (1998).

Insect Pest Management

Stakeholders as perceived by the respondents were RARS, Lam, Guntur (100%), state agricultural university (100%), state department of agriculture (89.09%), FTC (69.09%). These gave valuable suggestions to farmers about insect pest management. Farmers were cosmopolite and were exposed to ETV Annadata and Radio news (61.81%) for gaining knowledge on these aspects.

Pests cause 30 per cent of yield losses to cotton. Due to pests the quality and quantity of cotton crop decreases. Farmers might be innovative and interested to improve their farm and home conditions by way of achieving maximum output per unit area and time. For this purpose the farmer needs were: identification of sensitive stages of pests for easy control (100.00%), preparation of spray fluid (71.81%), identification of predators and parasites and taking care for their multiplication (36.36%), identification of ISI brand plant protection chemicals (70.9%), detecting the threshold level of various pests (13.63%), selection of suitable plant protection chemicals for effective control of pests and diseases (53.63%) and the spraying schedule of different plant protection chemicals (48.18%). This finding was in agreement with that of Saibaba (1986), Bhaskara Rao (1991).

Alterables as perceived by respondents were: growing resistant varieties like L604, NA1325, monocrotophos/phosphomidon/methyl demeton for jassid control

(70.9%), growing resistant varieties like LPS141, LK861, triazophos/endosulfan/ profenophos/neem oil/ethion for white fly control (96.36%), collection of dried leaves with larvae, collection of grown up larvae, collection of Rosette flowers, endosufan/ chloripyriphos/quinolphos/acephate/monocrotophos for boll worm control (60.9%), application of water soluble sulphur or dicofol for control of red spidermite (63.63%), application of methyl parathion or quinolphos mixed with sandovit or teepol for control of mealy bugs (71.81%). Farmers followed these alternative ways of pest control for better crop growth.

Farmers face many constraints in insect pest management both financially and technically. The constraints were: non-availability of insecticides/pesticides at proper time (65.45%), expensiveness of plant protection measures (100.00%), insufficient knowledge about plant protection measures (72.72%), costliness of sprayers (33.63%), lack of faith inspraying (27.27%), health hazards due to application of insecticides/pesticides, more labour requirement for spraying (98.18%) and non-availability of timely information about pest control (16.36%). This finding was in line with those of Anand Singh (1985), Iqbal *et al* (1996), More *et al* (1998), Katole *et al* (1998) and not in conformity with those of Ramachandran and Sripal (1990), Kulkarni (1994) and Shehrawat (1994).

Integrated Pest Management (IPM)

Table 8 depicts that similar findings were recorded as that of Insect Pest Management. In other words, the findings of IPM were akin to that of insect pest management with an emphasizing the perception of cotton farmers about RARS, Lam,

Guntur (100%), State Agricultural University (100%), State Department of Agriculture (89.09%), FTC (69.09%), ETV – Annadata (60%) and radio news (61.81).

Farmers were not having knowledge about biologically control methods. For that their need was knowledge about physical, mechanical, biological control methods for control of pests as perceived by 47.27 per cent of the respondents.

Alterables as perceived by the respondents were pheromone traps for control of helicoverpa (90%), gossyplure is commercially available sex pheromone for control of boll worms. These pests were attracted to sex pheromones and trapped.

Yellow sticky trap for control of white fly (100%). This is launched in the field so that white flies are attracted to yellow colour thereby they can be trapped.

Crop rotation with chillies/jowar/maize/soybean/pulses/sesamum/redgram (100%). Normally cotton crop is grown continuously. This provides a continuous supply of food for the development and multiplication of pests. It should be rotated preferably with non-preferred host plants.

Inter cropping of cotton with cowpea/groundnut/greengram/soybean/cluster bean (93.63%). It helps to get higher annual monetary returns/unit area. These inter crops have also been reported to divert the population of sucking pests and American boll worm from cotton. The inclusion of cow peas in cotton helped in the colonization of coccinellids (Natarajan and Seshadri, 1989) followed by the introduction of bio control agents, trichogramma, chrysopha, NPV solution, aphids, coceinellids, spiders (67.27%)

and botanical pesticides, like neem oil, sesamum oil (32.72%). These are the biological control methods for permanent control of pests.

Up root the cotton stubbles with stalk puller to discourage pest population (27.27%). The pests attached to the stubbles are exposed to sunlight resulting in gradual death. These findings were in conformity with that of Sriram and Palani swamy (1999).

Constraints as perceived by respondents were more cost of cultivation (13.63%) and lack of knowledge about IPM practices (20.00%). The other two findings are in conformation with the findings of Iqbal *et al* (1996) and the reasons attributed were in accordance with Nagdev (2000) who has developed an IPM model for the dry land farmers of Konkan tract of Maharashtra.

Disease Management

None of the respondents reported the stake holders regarding disease management. Diseases cause 26% of the yield losses to cotton farmers who were unable to diagnose the diseases and their control. They simply use chemicals without any knowledge. For that farmer needs like identification of diseases, causal organisms (94.54%) and knowledge about control of diseases (68.18%) were necessary. This was in conformity with that of Venkat Rao (1999).

Alterables as perceived by respondents were spraying of NAA 10 ppm for control of land and boll shedding (100.00%), foliar spray of 1g pushamycin + copper oxychloride 30 g/lt of water for control of bacterial blight (34.54%), spraying of dithane M-45 or blitox for control of leaf spots (12.72%). The diseases were controlled through

the said methods. Farmers should follow the preventive measures to overcome these diseases. Lack of knowledge about disease diagnosis was perceived as a constraint by 18.18 per cent of the respondents. This could not draw any support from the findings of the research study conducted elsewhere.

General Management Practices

About general management practices, stakeholders as perceived by respondents were FTC (70.00%), KVK (59.09%). These institutions were providing good suggestions about general management practices. Farmers training centres impart training to farmers about general management practices.

General management practices were most important as they give better yield of cotton. Knowledge about general management practices was needed as perceived by 31.81 per cent of the respondents.

Alterables as perceived by respondents were: removal of cotton stubbles after last picking without opting for ratoon crop (98.18%) which is caused due to breaking the cycles of problem pests, application of helio NPV @ 500 Lt/ha or Bt formulation or neem need kernel extract for control of helicoverpa was perceived by cent per cent of the respondents.,conservation of natural enemies was also perceived by cent per cent respondents. It is done by replacement of sprayable insecticides in the initial stages of crop growth with application of granular insecticides when sufficient moisture is available in the soil. Farmers are to adopt biological control methods for permanent pest control. This finding was in line with the findings of Sriram and Palani swamy (1999).

For the implementation of general management practices, farmers felt that cost of cultivation increased as constraint by 53.63 per cent of respondents. All farmers were not following the general management practices due to increased cost of cultivation.

Harvesting and Yield

None of the respondents reported the stakeholders regarding harvesting and yield. In developing countries like India manual harvesting is done which is costly and labour intensive. The appropriate time of harvesting is when most of the leaves are dried or in shedding stage. First picking can be taken up when 10 per cent of the bolls have burst open. Care should be taken not to allow more open bolls in the fields. Depending on the skill a person can harvest less than 10 kg to more than 60 kg seed cotton per day. For this the farmers needs were: time of picking (100%), recommended crop period for picking of cotton (70.9%). This finding was in conformity with that of Bhaskara Rao (1991).

Alterables as perceived by respondents were: picking of kapas free from debris, dried leaves, bracts during cooler times of the day (100.00%) because it protects the kapas from higher temperature. Insect damaged kapas should not be picked with good kapas (68.18%) as good quality kapas. First and last picked kapas should not be mixed with middle kapas as it fetches better price (46.36%). First and last picked kapas may be of lower quality. Middle kapas should be of good quality. For this purpose, the first and last picked kapas should not be mixed with the middle kapas.

Due to labour scarcity and high labour charges, the farmers constraints were non-availability of sufficient quantity of female labour for cotton picking (86.36%), high labour charges (66.36%). Harvesting of cotton fields should be done at the same time since female labour scarcity was more. These findings were in conformity with those of More *et al* (1998), Katole *et al* (1998).

Post Harvest Management

Majority (89.09%) of the respondents have perceived the stakeholder of post harvest management in terms of CCI - Cotton Corporation of India. The farmers prefer to consume the produce in CCI than local traders because they get good price. Farmers have confidence about CCI for surety of money. CCI can give money to the farmers within one week in the form of cheques after purchasing the produce.

At the time of marketing the kapas should be damaged even though farmer can get good yields due to lack of knowledge about post harvest management. For this reason the farmers needs were: storage of cotton (69.09%), grading of cotton (80.00%), marketing of produce through formal institution (77.27%), value added products (72.72%). This finding was in conformity with that of Bhaskara Rao (1991).

Alterables as perceived by respondents were: grading of kapas and shade dry (87.27%). Grading should be done for getting good price. Kapas should be protected from vagaries of weather, dust and dirt during transportation (79.09%). The fear, kapas getting damaged during transportation is more. So it can be carefully protected from vagaries of weather, dust and dirt for getting good price. The regulated market should

provide requisite facilities to farmers for storage, loans, insurance against fire and theft etc. for selling their produce at competitive prices (95.45%). In these market yards, open auction system is presented. In that, farmers have a choice to sell their produce if he gets good price. Otherwise he need not accept the offer. Good quality of market information regarding prices, etc., should be made available to the farmers through mass media, newspapers, etc. (91.81%). Farmers should be cosmopolite for gaining information on prices.

Low price to cotton at proper time was perceived as constraint by cent per cent of the respondents. To overcome these, the government has fixed minimum support price to the cotton. This finding was in conformity with that of Shehrawat *et al* (1994), More *et al* (1998).

5.5 ESTIMATION OF RANK BASED QUOTIENTS (RBQ) FOR SNAC ANALYSIS IN COTTON CULTIVATION

In this section the important ten stakeholders, needs, alterables and constraints which were ranked by respondents were:

Stakeholders

From the table 9, it was clear that the important ten stakeholders in cotton cultivation which were ranked top by the cotton farmers were identified based on rank based quotient and placed in order which includes state agricultural university (ANGRAU) (92.72), RARS, Lam, Guntur (88.45), Farming Community (82.27), State Department of Agriculture (SDA) (72.90), Mahyco hybrid seeds, etc. (57.27), CCI -

Cotton Corporation of India (49.27), NGOs (Non Governmental Organizations) (42.18), FTC (Farmers Training Centres) (28.45), ETV Annadata (20.00) and radio news (16.36%).

Farmers gave first rank to state agricultural university and the least rank to radio news.

Needs

From the table 9, it could be observed that the important ten needs in cotton cultivation which were ranked in serial by the cotton farmers were seed rate and sowing (91.90), application of fertilizers as per soil and variety (86.00), critical stages of water requirement (82.72), critical stages of crop-weed competition (76.63), identification of sensitive stages of pests for easy control (56.81), identification and reclamation of problem soils (51.09), time of picking (37.45), value added products (32.27), identification of diseases and their casual organisms (19.72) and taking soil samples for analysis (15.36).

Farmers gave first rank to seed rate and sowing followed by least rank to soil sampling.

Alterables

From the table 9 it could be clear that, growing of hybrid seeds for high export potential, high staple length, high fibre strength, high fibre maturity (94.00), pick kapas free from debris, dried leaves, bracts during cooler times of the day (89.09), conservationof natural enemies (81.72), crop rotation with chillies/jowar/maize/ soybean/pulses/sesamum/redgram (71.00), growing of resistant varieties like LPS 141,

LK 861, Triazophos/endosulfan/profiniphos/neem oil/ethion for control of white fly (57.54). By dibbling the cotton seed in the intersecting points made by the market reduces the weed growth as it facilitates inter cultivation by working gorru and guntaka on all directions thereby saving labour on weed management (52.45), the regulated markets should provide requisite facilities to farmers for storage, loans, insurance against fire and theft, etc., for selling their produce at competitive prices (41.18), good quality of market information regarding prices, etc., should be made available to the farmers through mass media, newspapers (27.45), removal of cotton stubbles after last picking without opting for ratoon crop for breaking the cycles of problematic pests (19.90), spraying of NAA 10 ppm for control of bud and boll shedding (15.63).

Farmers gave first rank to growing of hybrid seeds, least rank to spraying of NAA 10 ppm for control of bud and boll shedding.

Constraints

Table 9 shows that the ten important constraints which were ranked by the respondents. They were, expensiveness of plant protection measures (94.09), low price to cotton at proper time (91.00), high cost of hybrid seed (84.09), costliness of fertilizer (65.18), non-availability of labour at proper time (62.63), insufficient supply of water (49.18), health hazards due to application of insecticides/pesticides (41.63), more labour requirement for spraying (33.09), high cost of implements (17.27) and non-availability of insecticides/pesticides at proper time (15.18).

The farmers gave first rank to expensiveness of plant protection measures, least rank to non-availability of insecticides/pesticides at proper time.

Above said reasons hold good for this type of locale specific situation.

5.6 STRATEGY FOR COTTON IMPROVEMENT

SNAC is a revised version of SWOT or SLOT with an assumption that the developments on R & D (Research & Development) programmes do not have opportunities and threats and the stakeholders who have different and varying needs and constraints. Therefore, it calls for a strategy for planning cotton improvement and implementation from time to time.

The strategy includes four areas as given below:

I. Problem Identification

The first and foremost task could be to analyze how accurate and appropriate the problem identification is in cultivation of cotton crop. This would include looking at the aspect such as who identified the problem(s)? Who prioritized these problems? On what criteria the problems have been prioritized? Was the prioritization shared with the client group?

While answering for the above said questions the cotton farmers have enlisted the problems. Of course the problems were identified by farmer himself. Some of the selected problems identified in cultivation of cotton crop were prioritized in consultation with the farmers as follows:

Problems Identified in Cotton Cultivation

1. Expensiveness of plant protection measures.
2. Low price to cotton at proper time.
3. High cost of hybrid seed.
4. Costliness of fertilizers.
5. Non-availability of labour at proper time.
6. Insufficient supply of water.
7. Health hazards due to application of insecticides/pesticides.
8. More labour requirement for spraying.
9. High cost of implements.
10. Non-availability of insecticides at proper time.

II. Solutions Suggested (Technical Competency)

Solutions were sought for the ten problems identified and enlisted above. In case of multiple problems/solutions it was proposed to have casual links due to establish between specific problems and proposed solutions. The social, managerial and economic appropriateness of the solutions also have been evaluated. Certain solutions are new and were tested. The criteria used to rank possible solutions to the selected problems were also fixed. Such of those solutions were listed below in accordance with the problem serial number mentioned under the area – problem identification.

Solutions Suggested

1. Government should fix minimum support price by taking into account the realistic cost of cotton cultivation.

2. The state department of agriculture, private agencies should be altered in supplying good quality of hybrid cotton seed.

3. The agriculture department should provide subsidy on fertilizers, pesticides, plant protection equipment, etc.

4. Financial institutions must come forward to provide timely, adequate credit at a cheaper rate of interest to encourage this enterprise.

5. Government should develop adequate transport facilities fitted with storage for quick easy transportation of the commodity.

6. Efforts must be made to provide the required knowledge and skill through training programmes. The training should focus on improved recommended technologies appropriate to all cotton farmers.

7. Extension workers can help the cotton farmers by motivation and guiding them to approach the researchers and input agencies for required help and information on cotton.

III. Implementation of Proposed Solutions

It refers to management competence. This area of review would focus on efficiency of implementation of the solutions that were proposed. Aspects like activity completion, timeliness, resource allocation, follow-up were considered with a prime thinking that efficiency would become a prime target. The implementation of proposed solutions with all managerial competency were listed below.

List of Proposed Solutions

1. Evolving of resistant varieties to pests, diseases, cyclones and droughts because the farmers were getting heavy losses due to the vagaries of monsoon and pests & diseases.

2. The government can extend more technical as well as financial support to cotton cultivation, since it has vast potentiality to earn foreign exchange.

3. Both state as well as central government should take appropriate policies for the development of regulated market structure to get remunerative price for the produce.

4. Development of low cost agricultural implement.

5. The government organizations like CCI have to come forward in purchasing of decolourized cotton.

6. The farmers need to discard the habit of indiscriminate use of pesticides.

IV. Impact Analysis

The impact analysis was done in terms of desired aspect as for the initial stated objectives obtained at village level from cotton farmers with all validation of an assumption made while suggesting solutions. Additional benefits/negative impacts were also pruned from the constraints or problems identified for attending to each activity were also included. Of course the biggest stumblic block faced by the researcher was certain problems expressed and solutions suggested were unclear, vague and non-

inconsurable. The impact analysis revealed that the cotton farmers are required to manipulate the non-cash inputs like correct sowing, season, optimum plant population, choosing of quality inputs like seeds, fertilizers and pesticides.

Further, they need to draw attention on slow moving technologies like plant protection measures than fast moving technologies like seed/variety adoption, etc.

The SNAC analysis applied in toto certainty showed the great impact on cotton cultivation in terms of higher yields leading to higher income, increase in standard of living thereby cotton farmers satisfaction after passing through the stages of learning process like Attention, Interest, Conviction, Action and finally Satisfaction.

Thus, the cotton cultivation strategy need to be redesigned in accordance with SNAC analysis to meet the changes or the aspects due to change in the field situation or needs of stakeholders, farmers, state agricultural university (ANGRAU), RARS, Lam, Guntur, Farming Community, State Department of Agriculture, Mahyco hybrid seeds, CCI - Cotton Corporation of India, NGOs, FTC, ETV - Annadata and radio news.

Strategic management tools like SWOT or SLOT and finally SNAC were applied to arrive at a new strategy. Cotton development programmes however have multiple clients, multiple needs and multiple constraints. These were considered along with various analytical components and their relationship of SNAC, while illustration of the figurative diagram of SNAC under Fig. 6, 7 as follows:

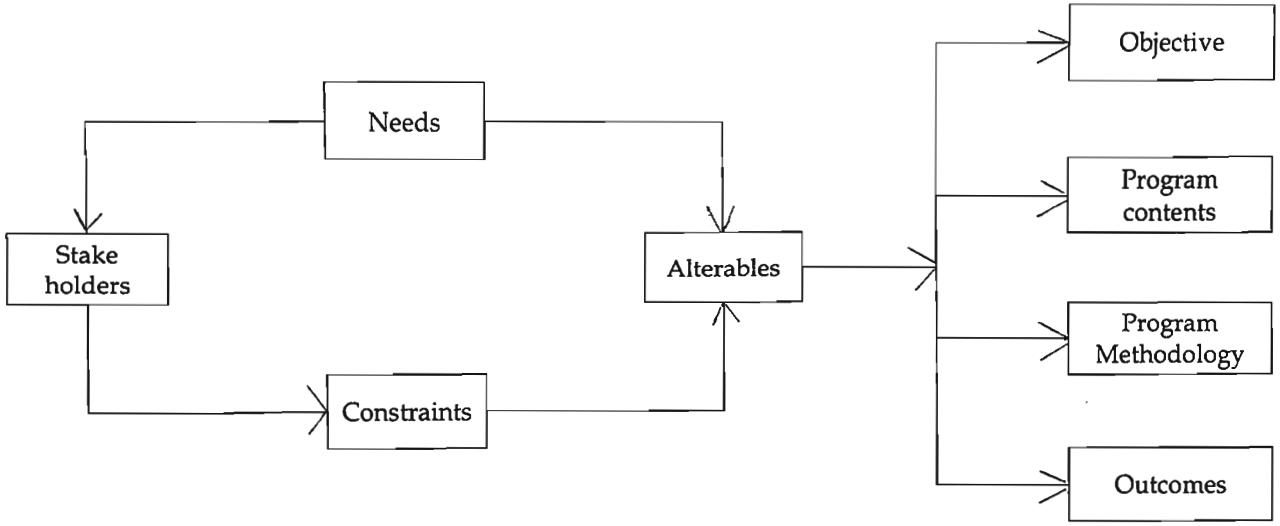
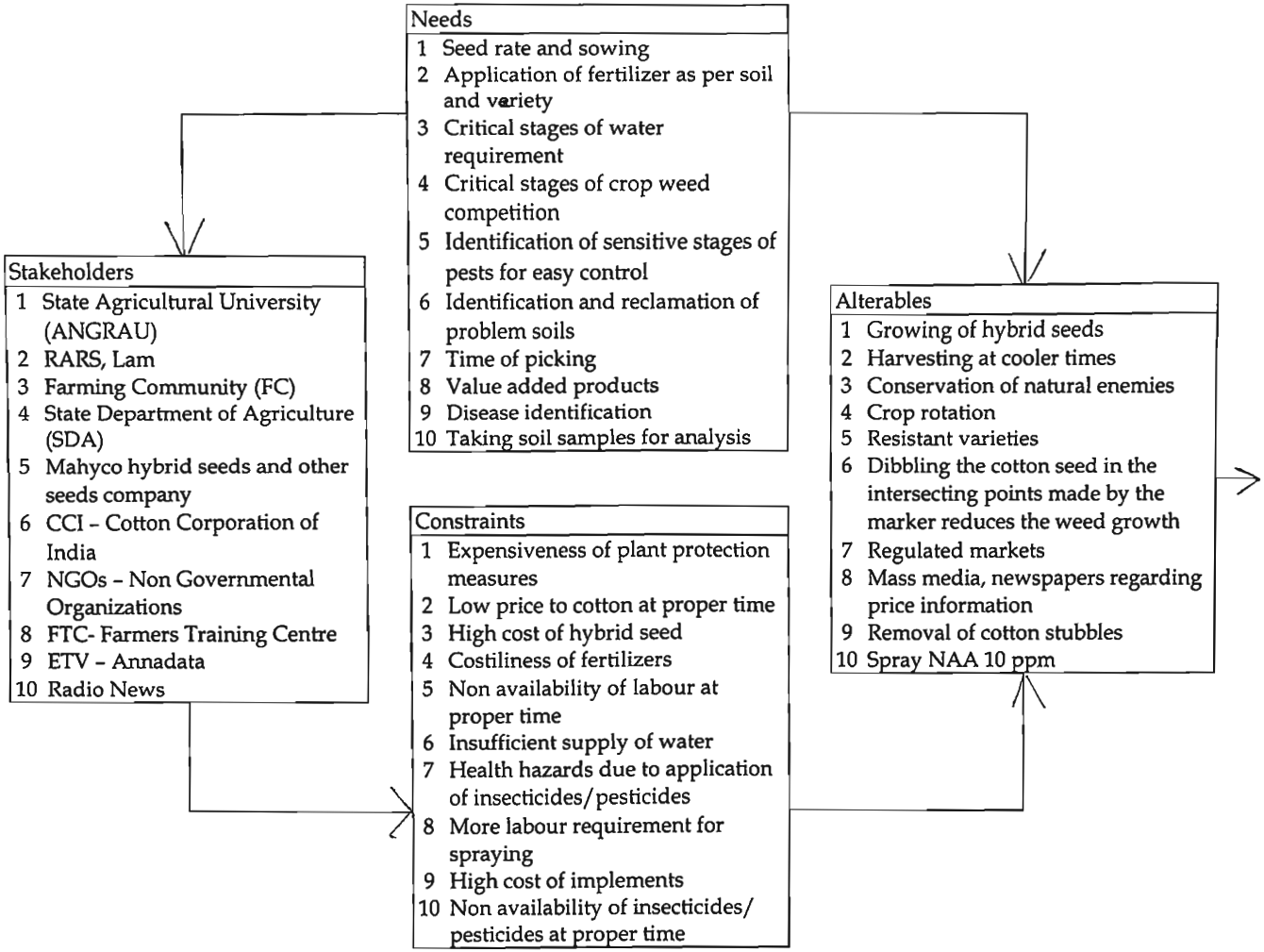
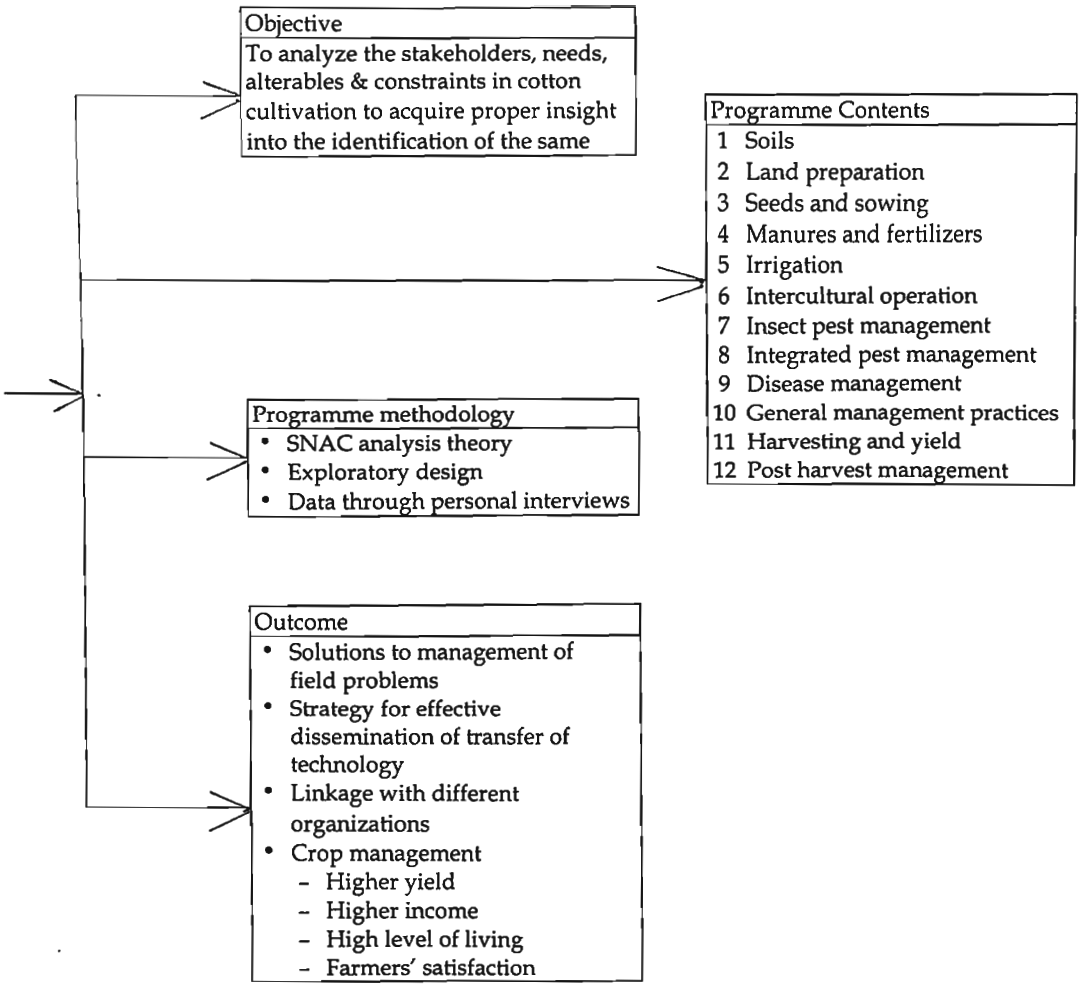


Fig. 6: Paradigm depicting SNAC analysis



Continued...

Fig. 8: Figurative diagram of SNAC analysis in detail


Objective
To analyze the stakeholders, needs, alterables & constraints in cotton cultivation to acquire proper insight into the identification of the same
Programme Contents
1 Soils
2 Land preparation
3 Seeds and sowing
4 Manures and fertilizers
5 Irrigation
6 Intercultural operation
7 Insect pest management
8 Integrated pest management
9 Disease management
10 General management practices
11 Harvesting and yield
12 Post harvest management
Programme methodology
• SNAC analysis theory
• Exploratory design
• Data through personal interviews
Outcome
• Solutions to management of field problems
• Strategy for effective dissemination of transfer of technology
• Linkage with different organizations
• Crop management
- Higher yield
- Higher income
- High level of living
- Farmers' satisfaction

Stake Holders Analysis

The cotton cultivation has multiple stakeholders. These include

1. State Agricultural University (ANGRAU)
2. Regional Agricultural Research Station, Lam, Guntur
3. Farming Community
4. State Department of Agriculture (SDA)
5. Mahyco Hybrid Seeds and Other Seed Companies
6. CCI - Cotton Corporation of India
7. NGOs - Non Governmental Organizations
8. FTC - Farmers Training Centre
9. ETV - Annadata
10. Radio News

Needs

The needs of cotton farmers were

1. Seed rate and sowing
2. Application of fertilizers as per soil and variety
3. Critical stages of water requirement
4. Critical stages of crop weed competition
5. Identification of sensitive stages of pests for easy control
6. Identification and reclamation of problem soils
7. Time of picking

8. Value added products
9. Identification of diseases
10. Taking soil samples for analysis

Constraint Analysis

Constraints faced by farmers in cotton cultivation were

1. Expensiveness of plant protection measures
2. Low price to cotton at proper time
3. High cost of hybrid seed
4. Costliness of fertilizers
5. Non-availability of labour at proper time
6. Insufficient supply of water
7. Health hazards due to application of insecticides/pesticides
8. More labour requirement for spraying
9. High cost of implements
10. Non-availability of insecticides/pesticides at proper time

Alterables Analysis

1. Growing of hybrid seeds for high export potential, high staple length, high fibre strength and high fibre maturity.
2. Picking of kapas free from debris, dried leaves, bracts during cooler times of the day.
3. Conservation of natural enemies.

4. Crop rotation with chillies, jowar, maize, soybean, pulses, sesamum, redgram.

5. Growing of resistant varieties like LPS 161, LS 861, triazophos/endosulfan/ profenophos/ neem oil/ethion for control of white fly.

6. By dibbling the cotton seed in the intersecting points made by the marker reduces the weed growth as it facilitates inter cultivation by working gorru and guntaka on all directions thereby saving labour on weed management.

7. The regulated markets should provide requisite facilities to farmers for storage, loans, insurance against fire and theft etc., for selling their produce at competitive prices.

8. Good quality of market information regarding prices, etc., should be made available to farmers through mass media, newspapers.

9. Removal of cotton stubbles after last picking without opting for ratoon crop.

10. Spraying of NAA 10 ppm for control of bud and boll shedding.

The overall strategy in planning and implementing the package practices of cotton cultivation depends on the analysis of stakeholders, their needs and constraints. It is inferred that the cotton cultivation should strive constantly to be flexible and alterable in shaping the overall strategic management by tackling the field problems for effective and efficient dissemination of transfer of agricultural technology.

SUMMARY AND CONCLUSIONS

CHAPTER VI

SUMMARY AND CONCLUSIONS

SNAC analysis (stake holders, needs, alterables and constraints) is a revised version of SWOT analysis (strengths, weaknesses, opportunities and threats) or SLOT analysis (strengths, limitations, opportunities and threats). The basic assumption of SNAC analysis acknowledges that the developments of research and development (R & D) programmes do not have the opportunities and threats. It assumes that there are stakeholders who have different and varying needs and constraints and therefore the organization has to alter its strategies for planning and implementation from time to time.

SWOT as an acronym stands for strength, weakness, opportunity and threat of an organization, programme and project. In the management sciences SWOT analysis play a paramount role in understanding the management problems at all stages irrespective of the type of organization, programme and project. The concept is meant to help in taking appropriate decisions for the development of an organization, programme and project in a particular operational environment. It has also an application for strategic decision in personal lives, politics, organizational environment and even in cotton crop management.

In India, cotton is cultivated in 9 million hectares in varied agro-climaic conditions across the nine major states and with a production of 12.20 million bales (each bale 170 kg) in 1998-99. Cotton is the major commercial crop in the state with an

area of about 12.71 lakh hectares with a production of 15.33 lakh tonnes. The state ranks 3rd in area and production while in productivity it stands 5th in the country. The contribution of cotton to total exports is firmly established an on the top portion up to 1997 but exports during 1997-98 and 1998-99 to other states is reduced considerably. The reason may be reduction in cotton cultivation. The low productivity in the state is mainly due to coverage of major area under rainfed conditions with traditional varieties whereas, the scheme under implementation, i.e., Integrated Cotton Development Project does not focus on specific gaps in cotton cultivation. At this high time there is need for the application of SNAC and SWOT analysis for improvement in cotton cultivation by analyzing stakeholders, needs, alterables, constraints and to unearth the strengths, weaknesses, opportunities and threats which in turn help the planners, extension administrators, extension functionaries, scientists and cotton farmers to take strategic decision to overcome the weaknesses, threats and constraints in cotton cultivation.

Duly keeping in mind the above parameters in cotton cultivation, SNAC analysis has been applied in cotton production technology and the study entitled as SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH was designed with the following objectives.

6.1 OBJECTIVES OF THE STUDY

1. To unearth the strengths, weaknesses, opportunities and threats in adoption of cotton cultivation.
2. To analyze the stake holders, needs, alterables and constraints (SNAC analysis) in cotton cultivation.

3. To develop a strategy and to illustrate figuratively the various analytical components of SNAC analysis in cotton cultivation as a mechanism for transfer of agricultural technology.

6.2 SAMPLING PROCEDURE

An exploratory research design was followed in the study. The Guntur district in Andhra Pradesh was purposively selected for the study. Out of 57 mandals, two mandals were purposively selected and from each mandal, 3 villages were selected. A total of 110 respondents were drawn on random sampling from the selected six villages. The data was collected through personal interview with the help of structured interview schedule. Appropriate statistical procedures were employed and the findings emerged out of the study were presented below:

6.3 RESULTS

6.3.1 Extent of Adoption of Recommended Production Practices of Cotton Cultivation by the Respondent Cotton Farmers

Sizable number of the respondents had medium level of adoption followed by high and low.

Cent per cent of the respondents have adopted the recommended practices of cotton cultivation such as cultivation in black cotton soils, use of canal type of irrigation, hand/mechanical weeding and picking of cotton.

The respondent cotton farmers (75 - 99%) adopted the recommended practices like ploughing with bullock drawn mould board plough, variety selection, application of

chemical fertilizers, thinning and gap filling, jassid control, white fly control, trap cropping with castor, okra, mechanical control of pests (hand picking), botanical pesticides (neem oil, sesamum oil), red leaf control, bud and boll shedding control, bacterial blight control, removal of top leaves by topping in cotton plants, grading of cotton, storage of cotton and marketing of cotton.

The respondents (50 – 74%) adopted the following recommended practices like ploughing with country plough, season, seed rate, seed treatment with concentrated H_2SO_4, application of manures (FYM/Cakes), boll worm complex control, guard cropping with maize/jowar, ash or cow dung application, collection and destruction of affected plant parts and recommended crop period for harvesting.

The respondent farmers (24 – 49%) adopted the following recommended practices like ploughing with tractor drawn mould board plough, deep summer ploughing, optimum spacing for sowing, alternate furrow irrigation, number of times irrigated, herbicide usage, pheromone trap, crop rotation with chillies/jowar/maize/ soybean/pulses/sesamum/redgram and intercropping with cowpea/groundnut/ greengram/soybean/cluster bean.

Less than 25 per cent of the respondent cotton farmers adopted leveling followed by control of leaf spots like alternaria/cercospora/helminthosporium, conservation of natural enemies and value addition to the products.

None of the respondent farmers adopted the practices of cotton cultivated in red soils, alluvium soils, delinting of seed, tanks, tube wells, wells type of irrigation,

synchronized planting, yellow sticky trap, introduction of bio-control agents and application of helio NPV and 500 Lt/ha or Bt formulation or neem seed kernel extract.

6.3.2 SWOT Analysis of Cotton Cultivation

The important strengths as perceived by the cotton farmers in cotton cultivation were: growing MCU5 for high market value, thinning and gap filling can increases the yield and maintenance of optimum plant population, removal of top leaves by topping in cotton plants, good count (60 counts) of MCU5 cotton can be obtained in 180 days. Yield is 28 quintals/hectare, kapas may be stored in gunnies or boras in well ventilated sheds, spraying of monochrotophos/ethion for control of white fly, trap cropping with castor/okra, ridges and furrows for easy application of irrigation water, frequent inter-cultivations to keep the crop weed free to conserve soil moisture, bright sunshine and hot climate.

The important weaknesses as perceived by the cotton farmers in cotton cultivation were: expensiveness of plant protection measures, high cost of hybrid seed, costliness of fertilizers, non-availability of labour at proper time, insufficient supply of water, non-availability of fertilizers at proper time, lack of knowledge about disease diagnosis, non-availability of sufficient quantity of female labour for cotton picking and lack of money at proper time.

The important opportunities as perceived by the cotton farmers in cotton cultivation were: growing MCU5 for high export potential, pick kapas free from debris, dried leaves, bracts during cooler times of the day, conservation of natural enemies,

yellow sticky trap for control of white fly, earthing up should be done for irrigated cotton crop with the help of a plough or blade harrow after fertilizer application and irrigation, application of Helio NPV and 500 Lt/ha or Bt formulation or neem seed kernal extract for control of Helicoverpa, grading of kapas and shade dry for high market value, sowing of cotton crop on ridges under irrigation, protection of kapas during transport from vagaries of weather, dust and dirt followed by pheromone traps for control of helicoverpa.

The important threats as perceived by the cotton farmers in cotton cultivation were: adulteration of seeds, cotton cannot tolerate excess moisture/water logging conditions, alternaria/cercospora/helminthosporium leaf spots, moisture stress during flowering and boll formation to boll development stages reduces yield, boll opening and boll shedding, environmental pollution, occurring of rains at the time of weeding and harvesting operations, crust formation, frost formation and harmfulness followed by collation of middle men to fix the price of cotton.

6.3.3 SNAC Analysis of Cotton Cultivation

The important state holders as perceived by the cotton farmers in cotton cultivation were: state agricultural university (ANGRAU), RARS, Lam, Guntur, farming community, state department of agriculture, Mahyco hybrid seeds and other companies, CCI-cotton corporation of India, NGOs (Non-Governmental Organizations), FTC (Farmers Training Centre), ETV-Annadata and radio news.

The important needs as perceived by the cotton farmers in cotton cultivation were: seed rate and sowing, application of fertilizers as per soil and variety, critical

stages of water requirement, critical stages of crop-weed competition, identification of sensitive stages of pests for easy control, identification and reclamation of problem soils, time of picking, value added products, identification of diseases and their casual organisms, taking soil samples for analysis.

The important alterables as perceived by the cotton farmers in cotton cultivation were: growing of hybrid seed for high export potential, high stable length, high fibre strength, high fibre maturity, picking of kapas free from debris, dried leaves, bracts during cooler times of the day, conservation of natural enemies, crop rotation with chillies/ jowar/maize/soybean/pulses/sesamum/redgram, growing resistant varieties like LPS 141, LK 861, Triazophos/Endosulfan/Profenophos/Neem Oil/Ethion for control of white fly, by dibbling the cotton seed in the intersecting points made by the marker reduces the weed growth as it facilitates inter-cultivation by working gorru and guntaka on all directions thereby saving labour on weed management, the regulated markets should provide requisite facilities to farmers for storage, loans, insurance against fire and theft etc., for selling their produce at competitive prices, good quality of market information regarding prices, etc., should be made available to the farmers through mass media, newspapers, removal of cotton stubbles after last picking without opting for ratoon crop for breaking the cycles of problem pests, spraying of NAA 10 ppm for control of bud and boll shedding.

The important constraints as perceived by the cotton farmers in cotton cultivation were expensiveness of plant protection measures, low price to cotton at proper time, high cost of hybrid seed, costliness of fertilizers, non-availability of labour

at proper time, insufficient supply of water, health hazards due to application of insecticides/pesticides, more labour requirement for spraying, high cost of implements and non-availability of insecticides/pesticides at proper time.

6.4 IMPLICATIONS OF THE STUDY

From the results of the present investigation the following implications were drawn which needs attention of cotton scientists, officials of the state department of agriculture and government of Andhra Pradesh to overcome the constraints in cotton cultivation.

6.4.1 Implications for Extension Personnel

There is a need for increasing alterables to the cotton farmers to seek more information through several sources like mass media and interpersonal media through available institutions so that every cotton farmer should have an access to information. The extension personnel should provide need based, problem solving, relevant information, help and build up needed avenues for cotton farmers to exchange and discuss latest relevant information with each other and to promote the information seeking habit of the cotton farmers.

Majority of the cotton farmers were in need of help from both the extension personnel and research agencies. Extension workers can help the cotton farmers by motivating and guiding them to approach the researchers and input agencies for getting required help and information on cotton cultivation.

Efforts must be made to provide the required knowledge and skill through training programmes. The training should focus on improved recommended technologies appropriate to all cotton farmers.

6.4.2 Implications for Policy Makers, Administrators and Input Agencies

1. The government can extend more technical as well as financial support to this enterprise since it has vast potentiality to earn foreign exchange.
2. Government should develop adequate transport facilities fitted with storage for quick easy transportation of this commodity.
3. Both state as well as central governments should take appropriate policies for the development of regulated market structure to get remunerative price for the produce and betterment of the cotton farmers.
4. Financial institutions must come forward to provide timely, adequate credit at a cheaper rate of interest to encourage this enterprise.
5. The state department of agriculture, private agencies should be altered in supplying good quality of hybrid cotton seed well before commencing of the season. The agriculture department should provide subsidy on fertilizers, pesticides and plant protection equipment, etc.
6. The marketing officials should keep the strict vigil on the traders and middlemen who have the tendency to exploit the farmers by sudden reduction of market price.
7. Government should fix minimum support price by taking into account the realistic cost of cotton cultivation.

6.4.3 Implications for Cotton Farmers

1. Cotton farmers should test their soil before starting of cotton cultivation to know the pH, salinity and nutrient status of the soil.
2. Cotton farmers should follow the crop rotation and intercroppings for breaking the cycles of problem pests and getting high monetary returns.
3. The cotton farmers should immediately discard the habit of indiscriminate use of pesticides as it causes pest resurgence.
4. Cotton farmers should do the collection and destruction of affected plant parts.
5. Cotton farmers should adopt the synchronized planting. Farmers sow minimum number of varieties with same maturity period in a whole village or block within 10 - 15 days at normal time.

6.5 SUGGESTIONS FOR FUTURE RESEARCH

1. The present investigation was conducted in Guntur district only. Similar studies may be undertaken in other districts.
2. Present investigation was confined to only 6 villages in two mandals. Similar studies may be undertaken with more number of mandals involving more respondents.
3. The present study was confined to only one major crop, namely cotton. SNAC and SWOT can be applied to various commercial crops to get transparent picture about the stake holders, needs, alterables, constraints and strengths, weaknesses, opportunities and threats in cultivation.

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APPENDICES

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
AGRICULTURAL COLLEGE, BAPATLA
DEPARTMENT OF AGRICULTURAL EXTENSION

TITLE: "SNAC ANALYSIS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH"

INTERVIEW SCHEDULE

1. Respondent's Name : _____
2. Village: _____ Mandal: _____ District: _____
3. Age: _____ Education: _____ Family Size: _____
4. Land Holding in Ha. _____ Irrigated: _____ Dry: _____
5. Cotton Area in Ha. _____ Soil Type: _____
6. Source of Irrigation : _____

PART – A

Sl. No.	Cotton Recommended Practices	Adoption	
		Adopted	Not adopted
I.	Soils: Going for cotton cultivation in		
	a) Black cotton soils		
	b) Red soils		
	c) Alluvium soils		
II.	Land Preparation		
	a) Ploughing with country plough		
	b) Bullock drawn mould board plough		
	c) Tractor drawn mould board plough		
	d) Deep summer ploughing		
	e) Leveling		
III.	Seeds and Sowing		
	a) Variety selection		
	b) Season		
	c) Seed rate		
	d) Optimum spacing for sowing		
	e) Seed treatment with Conc. H_2SO_4		
	f) Delinting of seed		
IV.	Manures and Fertilizers		
	a) Application of chemical fertilizers		
	b) Application of manures (FYM/Cakes)		
V.	Irrigation		
	a) Irrigation source		
	i) Canals		
	ii) Tanks		

Sl. No.	Cotton Recommended Practices	Adoption	
		Adopted	Not adopted
	iii) Tube wells iv) Wells v) Others (please specify) a) b) b) Alternate furrow irrigation c) Number of times irrigated		
VI.	Inter Cultural Operations a) Thinning and gap filling b) Synchronized planting c) Hand/Mechanical weeding d) Herbicide usage		
VII.	Insect Pest Management a) Jassid – Control b) White fly – Control c) Boll worm complex – Control		
VIII.	Integrated Pest Management (IPM) a) Trap cropping with castor/okra b) Guard cropping with maize/jowar c) Mechanical control of pests (hand picking) d) Pheromone trap e) Yellow sticky trap f) Introduction of bio-control agents g) Botanical pesticides (neem oil,sesamum oil) h) Ash or cow dung application i) Crop rotation with chillies/jowar/mauze/ soybean/pulses/sesamum/redgram j) Intercropping with cow pea/groundnut/ greengram/soybean/cluster bean		
IX.	Disease Management a) Red leaf control b) Bud and boll shedding control c) Bacterial blight – control d) Control of leaf spots like Alternaria/ Cercospora/Helminthosporium		
X.	General Management Practices a) Removal of top leaves by topping in cotton plants b) Application of Helio NPV @ 500 lt/ha or Bt formulation or neem seed kernel extract		

Sl. No.	Cotton Recommended Practices	Adoption	
		Adopted	Not adopted
	c) Conservation of natural enemies d) Collection and destruction of affected plant parts		
XI.	Harvesting and Yield a) Recommended crop period for harvesting b) Picking of cotton		
XII.	Post Harvest Management: a) Grading of cotton b) Storage of cotton c) Marketing of cotton d) Value added products		

PART – B

SWOT ANALYSIS OF COTTON CULTIVATION

Sl. No.	Cotton Recommended Practices	SWOT ANALYSIS			
		S (Strengths)	W (Weaknesses)	O (Opportunities)	T (Threats)
(1)	(2)	(3)	(4)	(5)	(6)
1	Climate	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
2	Soils	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
3	Land preparation	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
4	Seeds and sowing	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
5	Manures and fertilizers	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
6	Irrigation	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
7	Inter cultural operations	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)

Sl. No.	Cotton Recommended Practices	SWOT ANALYSIS			
		S (Strengths)	W (Weaknesses)	O (Opportunities)	T (Threats)
(1)	(2)	(3)	(4)	(5)	(6)
8	Insect Pest Management (IPM)	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
9	Integrated pest management	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
10	Disease management	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
11	General management practices	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
12	Harvesting and yield	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
13	Post harvesting and marketing	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)

PART – C

RANK ASSIGNMENTS:

Please rank 10 important strengths, weaknesses, opportunities and threats in cotton cultivation

STRENGTHS	OPPORTUNITIES
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
WEAKNESSES	**THREATS**
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

PART – D

SNAC ANALYSIS OF COTTON CULTIVATION

Sl. No.	Cotton Recommended Practices	SNAC ANALYSIS			
		S (Stakeholders)	N (Needs)	A (Alterables)	C (Constraints)
(1)	(2)	(3)	(4)	(5)	(6)
1	Soils	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
2	Land preparation	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
3	Seeds and sowing	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
4	Manures and fertilizers	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
5	Irrigation	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
6	Intercultural operations	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
7	Insect pest management	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)

Sl. No.	Cotton Recommended Practices	SNAC ANALYSIS			
		S (Stakeholders)	N (Needs)	A (Alterables)	C (Constraints)
(1)	(2)	(3)	(4)	(5)	(6)
8	Integrated Pest Management (IPM)	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
9	Disease management	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
10	General management practices	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
11	Harvesting and yield	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)
12	Post harvesting and marketing	a)	a)	a)	a)
		b)	b)	b)	b)
		c)	c)	c)	c)

PART – E

RANK ASSIGNMENTS:

Please rank 10 important stakeholders, needs, alterables and constraints in cotton cultivation

STAKEHOLDERS	ALTERABLES
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
NEEDS	**CONSTRAINTS**
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

ఆచార్య ఎన్. జి. రంగా విశ్వవిద్యాలయము
వ్యవసాయ విస్తరణ విభాగము
వ్యవసాయ కళాశాల, బాపట్ల – 522101

(మౌఖిక ప్రశ్నావళి)

1. రైతు పేరు:_____
2. గ్రామము:_____ మండలము:_____ జిల్లా:_____
3. వయస్సు:_____ విద్య:_____ కుటుంబ సంఖ్య:_____
4. భూకమతాలు: _____ హెక్టార్లలో నీటిపారుదల సౌకర్యం:_____ హెక్టార్లలో మెట్ట:_____ హెక్టార్లలో
5. ప్రత్తి విస్తీర్ణం:_____ హెక్టార్లలో నేలల రకం:_____
6. నీటిపారుదల పనరులు:_____

భాగము – అ

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	అమలు	
		అమలు చేయుట	అమలు చేయుటలేదు
1.	నేలలు: ఈ క్రిందివాటిలో ప్రత్తి సాగు చేయబడును		
	అ) నల్లరేగడి నేలలు		
	ఆ) ఎర్ర నేలలు		
	ఇ) ఒండ్రు నేలలు		
2.	నేలను తయారు చేయడం		
	అ) నాగలితో దున్నడం		
	ఆ) ఎద్దులతో మౌల్డ్‌బోర్డ్ నాగలిని దున్నడం		
	ఇ) ట్రాక్టరుతో మౌల్డ్‌బోర్డ్ నాగలిని దున్నడం		
	ఈ) వేసవిలో నేలను లోతుగా దున్నడం		
	ఉ) చదును చేయడం		
3.	విత్తనము మరియు విత్తేపద్ధతి		
	అ) రకాల ఎంపిక		
	ఆ) విత్తే సమయం		
	ఇ) విత్తనము – కేజిలు/హెక్టారుకు		
	ఈ) విత్తే దూరం – సెం. మీ.		
	ఉ) గాఢ సల్ఫ్యూరిక్ ఆమ్లముతో విత్తనశుద్ధి		
	ఊ) విత్తనము నుండి పీచు వేరుచేయు పద్ధతి		
4.	రసాయన ఎరువులు మరియు సేంద్రీయ ఎరువులు		
	అ) రసాయన ఎరువులు వేయుట		
	ఆ) సేంద్రీయ ఎరువులు వేయుట		

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	అమలు	
		అమలు చేయుట	అమలు చేయుటలేదు
5.	నీటి యాజమాన్యం		
	అ) నీటిపారుదల వనరులు		
	ఎ) కాలువలు		
	బి) ట్యాంకులు		
	సి) బోరులు		
	డి) బావులు		
	ఇ) ఇంకా ఏమైనా (దయచేసి తెలుపండి)		
	i)		
	ii)		
	ఆ) పరుస తరువాత పరుస నీరు పెట్టుట		
	ఇ) నీటి తడుల సంఖ్య		
6.	అంతర కృషి		
	అ) మొక్కలను తీసివేయుట మరియు ఖాళీలను పూడ్చుట		
	ఆ) అందరూ ఒకేసారి పంటను వేయుట		
	ఇ) చేతితో/ యాంత్రికంగా కలుపు తీయుట		
	ఈ) కలుపు మందులను ఉపయోగించుట		
7.	పురుగులు – వాటి నివారణా పద్ధతులు		
	అ) జాసిడ్స్ – నివారణ		
	ఆ) తెల్లదోమ – నివారణ		
	ఇ) కాయ తొలుచు పురుగు – నివారణ		
8.	సమగ్ర సస్య రక్షణ		
	అ) ఎర మొక్కలుగా ఆముదము లేదా బెండ మొక్కలను వేయుట		
	ఆ) రక్షిత పైర్లుగా జొన్న, మొక్కజొన్నలను వేయుట		
	ఇ) యాంత్రిక పద్ధతుల ద్వారా పురుగుల నివారణ		
	ఈ) లింగాకర్షక బుట్టలను ఉపయోగించుట		
	ఉ) పసుపు పచ్చ ఎరలను ఉపయోగించుట		
	ఊ) బదనికలు, పరాన్నభుక్కులైన ట్రైకోగ్రామా, క్రైసుఫా, యన్.పి.వి. వైరస్ ద్రావణము, తేనెటీగలు, అక్షింతల పురుగులు, సాలీళ్లు, బాసిల్లమ్ తురెంజిన్సిస్ వాడుట		
	ఎ) వృక్ష సంబంధమైన క్రిమిసంహారక మందులు (నువ్వులనూనె, వేపనూనె)		
	ఐ) బూడిద మరియు పేడలను వాడుట		

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	అమలు	
		అమలు చేయుట	అమలు చేయుటలేదు
	ఒ) పంటమార్పిడి పద్ధతిగా మిరప, జొన్న, మొక్కజొన్న, నువ్వులు, కంది వేయుట ఔ) అంతర పంటలుగా అలసంద, వేరుశనగ, పెసలు, సోయాచిక్కుడు వేయుట		
9.	తెగుళ్ళు – యాజమాన్య పద్ధతులు అ) పండాకు తెగులు – నివారణ ఆ) పూత, పిందె మరియు కాయ రాలుట – నివారణ ఇ) బ్యాక్టీరియల్ బ్లైట్ తెగుళ్ళు – నివారణ ఈ) ఆకుమచ్చ తెగుళ్ళు లాంటి ఆల్టెర్నేరియం/సెర్కోస్పోరా/ హెల్మింథోస్పోరియం తెగుళ్ళు – నివారణ		
10.	సహజ యాజమాన్య పద్ధతులు అ) ప్రత్తిలోని పైన ఆకులను త్రుంచివేయుట ఆ) హీలియో యన్.పి.వి. ద్రావణాన్ని ఒక హెక్టారుకు 500 లీటర్లు లేక బి.టి. ద్రావణం లేక వేపవిత్తనం నుండి తీసిన ద్రావణాన్ని వాడుట ఇ) పరాన్నభుక్కులను రక్షించుట ఈ) దెబ్బతిన్న మొక్క భాగాలను ఏరివేసి నిర్మూలించుట		
11.	కోత మరియు దిగుబడి అ) కోత కోయుటకు కావలసిన పంటకాలము ఆ) ప్రత్తి కోత		
12.	కోత తరువాత యాజమాన్య పద్ధతులు అ) ప్రత్తిని గ్రేడింగ్ చేయుట ఆ) ప్రత్తిని నిల్వ చేయుట ఇ) ప్రత్తి మార్కెటింగ్ ఈ) విలువనిచ్చే ఉత్పత్తులు		

భాగము - ఆ

ప్రత్తిలోని బలములు, బలహీనతలు, అవకాశములు, నష్టములను అంచనా వేయుట

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	బలములు, బలహీనతలు, అవకాశములు, నష్టముల అంచనా			
		బలములు	బలహీనతలు	అవకాశములు	నష్టములు
(1)	(2)	(3)	(4)	(5)	(6)
1	వాతావరణం	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
2	నేలలు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
3	నేలను తయారుచేయుట	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
4	విత్తనము మరియు విత్తే పద్ధతి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
5	నేంద్రీయ ఎరువులు మరియు రసాయన ఎరువులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
6	నీటి యాజమాన్యం	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	బలములు, బలహీనతలు, అవకాశములు, నష్టముల అంచనా			
		బలములు	బలహీనతలు	అవకాశములు	నష్టములు
(1)	(2)	(3)	(4)	(5)	(6)
7	అంతర కృషి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
8	పురుగులు - వాటి నివారణా పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
9	సమగ్ర సస్యరక్షణ	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
10	తెగుళ్లు - యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
11	సహజ యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
12	కోత మరియు దిగుబడి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
13	కోత తరువాత యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)

భాగము – ఇ

ర్యాంకులను గుర్తించుట:

పది బలములు, బలహీనతలు, అవకాశములు మరియు నష్టములను దయచేసి గుర్తించి, వాటికి ర్యాంకులను ఇవ్వండి

బలములు	అవకాశములు
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

బలహీనతలు	నష్టములు
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

భాగము - ఈ

ప్రత్తియొక్క ఉపయోగదారులు, అవసరములు, పర్యాయములు, ఇబ్బందులను అంచనా వేయుట

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	ఉపయోగదారులు, అవసరములు, పర్యాయములు, ఇబ్బందుల అంచనా			
		ఉపయోగదారులు	అవసరములు	పర్యాయములు	ఇబ్బందులు
(1)	(2)	(3)	(4)	(5)	(6)
1	నేలలు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
2	నేలను తయారుచేయుట	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
3	విత్తనము మరియు విత్తే పద్ధతి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
4	సేంద్రీయ ఎరువులు మరియు రసాయన ఎరువులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
5	నీటి యాజమాన్యం	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
6	అంతర కృషి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)

వరుస సంఖ్య	ప్రత్తి పంటకు సిఫారసు చేయబడిన పద్ధతులు	ఉపయోగదారులు, అవసరములు, పర్యాయములు, ఇబ్బందుల అంచనా			
		ఉపయోగదారులు	అవసరములు	పర్యాయములు	ఇబ్బందులు
(1)	(2)	(3)	(4)	(5)	(6)
7	పురుగులు - వాటి నివారణా పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
8	సమగ్ర సస్యరక్షణ	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
9	తెగుళ్లు - యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
10	సహజ యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
11	కోత మరియు దిగుబడి	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)
12	కోత తరువాత యాజమాన్య పద్ధతులు	అ)	అ)	అ)	అ)
		ఆ)	ఆ)	ఆ)	ఆ)
		ఇ)	ఇ)	ఇ)	ఇ)

భాగము – ఊ

ర్యాంకులను గుర్తించుట:

పది ఉపయోగదారులు, అవసరములు, పర్యాయములు మరియు ఇబ్బందులను దయచేసి గుర్తించి, వాటికి ర్యాంకులను ఇవ్వండి

ఉపయోగదారులు	పర్యాయములు
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
అవసరములు	**ఇబ్బందులు**
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

BIO-VITA

I, M. Venkata Konda Reddy, was born on 05-6-1976 to Sri M. Bala Rosi Reddy and Smt. M. Bala Venkatamma in Giddalur village of Prakasam district in Andhra Pradesh.

I completed my S. S. C. from S. V. Jr. College, Giddalur in 1991 and Intermediate from S. T. R. College, Guntur in the year 1993. I obtained my B. Sc. (Ag.) degree from ANGRAU, Agricultural College, Bapatla in 1998. I was joined in M. Sc. (Ag.) course in 1998 in Agricultural College, Bapatla. In my post graduation I worked under humble guidance of Dr. P. Venkata Ramaiah, Professor and University Head, Department of Agricultural Extension, Dr. Y. Eswara Prasad, Professor and Head, Department of Agricultural Economics, Dr. T. Lakshmi, Assistant Professor, Department of Agricultural Extension and Sri K. Jayaramaiah, Assistant Professor, Department of Statistics and Mathematics as Advisory Committee, Agricultural College, Bapatla for completion of my post-graduate programme.

M.V. konda Reddy

(M. VENKATA KONDA REDDY)

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