# ECONOMICS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH

THESIS SUBMITTED TO THE
ANDHRA PRADESH AGRICULTURAL UNIVERSITY
IN PART FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF
**Master of Science in Agriculture**

BY
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**1989**

## CERTIFICATE

**Mr. K. Krishna Kishore** has satisfactorily prosecuted the course of research and that the thesis entitled **ECONOMICS 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 there of has not been previously submitted by him for a degree of any University.

Date: 28.4.89

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## CERTIFICATE

This is to certify that the thesis entitled **ECONOMICS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH** submitted in partial fulfilment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURE** of the Andhra Pradesh Agricultural University, Hyderabad is a record of the bonafide research work carried out by **Mr. K. Krishna Kishore** 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 other degree or diploma or has been published. Published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been duly acknowledged by him.

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I, K. Krishna Kishore, hereby declare that the thesis entitled 'ECONOMICS OF COTTON CULTIVATION IN GUNTUR DISTRICT OF ANDHRA PRADESH' is a result of original research work done by me. It is further declared that the thesis or any part thereof has not been published earlier in any manner.

Date: 28.4.89

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## ABSTRACT


Cotton is one of the important commercial crops playing a key role in the economy of the world and it occupies a significant position in agricultural and industrial economy of India as well as Andhra Pradesh.

The specific objectives of the study are

1. To study the costs and returns, profitability In cotton cultivation according to farm size.
2. To examine the resource returns, returns to scale and resource use efficiency according to farm size.
3. To estimate the remunerative prices for cotton under the present condition of farming.
4. To identify the production problems among the cotton cultivators in Guntur district.

**Methodology**

Guntur district was purposively selected for the study. Two mandals, Tadikonda and Chilakaluripet, out of 57 mandals of Guntur district were selected based on the probability proportion to the area under cotton. All the villages in each mandal were arranged in an ascending order based on its area and the top four villages were selected. The farmers were stratified into 3 size groups viz., small farms (less than 2 hectares), medium farms (2- 4 hectares) and large farms (4 hectares and above) and 9 cotton growers were selected randomly from each of 8 villages representing 3 size groups. The required data were collected from the informants by personal investigation with the help of a specially designed set of questionnaires. Conventional and functional analysis were used to arrive at valid conclusions for the study. Profitability in cotton farming has been assessed with the help of management tool ie. 'Break-Even Analysis'. Bulk line cost of production concept has been used to find out the remunerative price for cotton. The reference period of the study was 1987-88 agricultural year.

**Main findings**

The following are the main findings emerged from the study:

The total cost of production indicated a direct relationship with the farm size. The labour utilization showed an inverse relationship with the farm size. Plant protection, interculture and preparatory cultivation were the important operations which accounted for the major share of the total human labour utilized. Interculture and preparatory cultivation accounted for a major share

of cattle labour utilisation on the farms. The proportion of paid out costs also indicated a direct relationship with farm size.

The study further revealed that there was a direct relationship between farm size and productivity.

The gross returns also indicated a direct rela-tionship with the farm size. However, net returns (net loss) showed an inverse relationship with the farm size.

The Break-Even Analysis revealed unprofitable nature of cotton cultivation since the breakeven output was in the 3rd quandrant of the graph. Cost benefit ratio had also confirmed the unprofitable nature of cotton cultivation at present.

It is observed from the study that large farms had a definite advantage over small and medium farms though all the size groups realized maximum negative returns from cotton cultivation.

The production function analysis had indicated the operation of diminishing factor returns as well as decreasing returns to scale, except in case of large farms. Further, the ratios of marginal value product to opportunity cost showed an excessive use of resources and to a certain extent high degree of inefficiency indicating the scope for resource adjustments.

The bulkline cost of production showed a huge gap between bulkline cost and the actual price received by the farmer in the market. Thls analysis further confirmed the unprofitable nature of cotton cultivation.

The study exposed a wide gap between potential yields obtained at the research station and the actual ylelds in the farmer's fields.

The opinion survey revealed the following production problems associated with cotton production such as severe pest attack, vagaries of weather,adulteration of inputs like pesticides and seeds, high cost of fertilizers, labour and pesticides, lack of latest technical know-how and non-availability of timely credit.

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# INTRODUCTION

# INTRODUCTION

## 1.1 ECONOMIC IMPORTANCE OF THE CROP

Cotton is the oldest of all fibres used by human beings and it forms one of the most important commercial crops playing a key role in the economy of the world. It is the leading textile fibre in the world accounting for approximately 50% of the global textile market. Cotton is produced in about 75 countries around the world and the important cotton producing countries are USSR, China, USA, India, Brazil, Pakistan, Egypt, Mexico, Sudan, Peru and Turkey. These countries account for nearly 85% of the total cotton production in the world. For many countries raw cotton is an important foreign exchange earner. Infact, the developing countries account for 50% of the exports of raw cotton. Besides raw cotton a considerable portion of the cotton textiles produced in the developing countries are being exported mainly to industrialised nations like countries of Western Europe, Japan and USA. Cotton is also an employment-oriented industry. It is estimated that all over the world nearly 170 million people, representing 8.2% of the population are dependent on growing and processing cotton. Further, cotton seed is also a rich source of food since edible oil and cotton seed meal

are the products of the cotton seed. In several cotton producing countries particularly the developed nations like USA and USSR, cotton seed products make a considerable contribution to the supply of human and live stock food resources. For instance, in USSR, cotton seed oil is the second largest source of vegetable oil. Eventhough, it is advocated that synthetic fibres gradually replace cotton, it is not in the interest of the developing countries for the following reasons:

(i) Except in USA, the synthetic fibres are more expensive than raw cotton including Western Europe and Japan.

(ii) A worker in an average sized synthetic fibre (polyster) producing plant displaces 33 people engaged in growing cotton.

(iii) Since few developing countries have their own crude resources, it is not possible for them to import chemical feed stocks required for synthetic fibre production at a high cost and limited foreign currency resources.

(iv) Establishment of synthetic fibre plants in developing countries requires huge investment.

Thus, cotton continued to occupy a pivotal position in the world economy especially in developing countries for some more time to come.

## 1.2 IMPORTANCE OF COTTON IN INDIAN ECONOMY

Cotton industry has had a tremondous impact on the economy of the country since early times. In fact, the earliest civilisation to weave cotton is believed to have been the Indus valley civilisation and for centuries the cotton plant was unknown out of India. The earliest record of a mechanical device for separating lint from seed was also from India being the primitive 'Charkha' gin.

Cotton is one of the principal crops in India and enjoys a pride of place and unique position in our economy. India occupies the first position in the world in terms of area under cotton with 7.76 million hectares in 1983-84. It however ranks 4th in production as the production of lint for the year 1983-84 was 6.58 million bales of 170 kg each. India is regarded as a cradle of the cotton industry and ancient people who visited India had christened the cotton as 'vegetable lamp'.

It is largely cultivated under rainfed conditions and nearly 70% of the area is entirely depen-

dent on rainfall, while supplementary irrigation existed for about 30%.

The average annual cotton trade in India was over Rs.1500 crores. The key role that cotton played in our economy can be gauged from the fact that nearly 13 million farmers spread out in more than 10 States are dependent on cotton cultivation. The Indian textile industry which constituted the largest single segment of the organised industrial sector provided employment to nearly 0.8 million persons (1986). Cotton industry is one of the largest employer in the country and nearly 15% of the total labour force of 190 million is employed in cotton textile manufacturing and associated industries. There are about 55 million owner cultivators in India out of which about 15 million produce cotton. The processing and manufacturing of cotton from 'Kapas' to textile provides employment for more than 15 million people. Of this, 9 lakhs are employed in spinning and composite mills, 7 lakhs in the power loom industry and an undetermined number in ginning and processing, seed crushing and marketing.

## 1.3 COTTON PRODUCTION IN INDIA

Cotton in India is largely grown during the tropical monsoon season. The major cotton growing States are Maharastra, Gujarat, Karnataka, Madhya

Pradesh, Punjab, Rajasthan, Andhra Pradesh, Haryana and Tamilnadu. The area, production and yields of cotton in India for the period 1950-51 to 1983-84 are incorporated in Table 1.1.

Table 1.1: Area, production and yield of cotton in India

| Year | Area in lakh ha | Production in lakh bales | Lint yield kgs/ha |
|---|---|---|---|
| 1950-51 | 58.82 | 30.44 | 88 |
| 1960-61 | 76.10 | 56.04 | 125 |
| 1970-71 | 76.05 | 47.63 | 106 |
| 1980-81 | 78.23 | 70.10 | 152 |
| 1982-83 | 78.71 | 75.34 | 163 |
| 1983-84 | 77.65 | 65.82 | 144 |

Source: "India - 1985"

It can be seen that the cotton increased from 58.82 lakh hectares in 1950-51 to 78.71 lakh hectares in 1982-83. But the area declined to 77.65 lakh hectares in 1983-84. Both production and yield showed an increasing trend from 1970-71 to 1982-83 but during 1983-84 both have showed a declining trend.

The importance of cotton in India's economy can be gauged from the foreign exchange earnings contributed by the textile industry. Further, India is one of the

leading exporters of cotton textiles. Foreign exchange earnings through the trade in textiles increased gradually from Rs.130.18 crores in 1970 to 263.57 crores in 1975. The increase in foreign exchange earnings through export of cotton textile industry indicated the importance of cotton as an important foreign exchange earner.

## 1.4 COTTON PRODUCTION IN ANDHRA PRADESH

Andhra Pradesh has no doubt made a remarkable progress in recent years in the production of long and extra staple varieties of cotton which is commendable. Cotton crop occupies second place among the commercial crops in the State with an area of 554 thousand hectares (1984-85). In fact, the cotton production which stood at a mere 109 thousand bales in 1970-71 in the State had recorded nearly nine fold increase which has about 984 thousand bales by 1984-85. In A.P. the crop is predominantly grown in Kurnool, Adilabad, Ananthpur, Cuddapah, Guntur, Prakasam, Krishna and Mahaboobnagar. Almost the entire area in the State is rainfed traditionally. The cultivation of long staple varieties of cotton in Guntur and Prakasam districts is however of recent origin.

The district wise acreage, out-put and yield of cotton in major cotton growing districts of Andhra

Pradesh from 1970-71 to 1984-85 are presented in Table 1.2

It is seen from the Table that the area had steeply increased in the State from 316 thousand hectares in 1970-71 to 554 thousand hectares by 1984-85. Further, upto 1980-81 Kurnool district stands first in terms of area under cotton but Guntur district came forward during the year 1984-85 with 172 thousand hectares. Any how the area under cotton had not shown any marked change in the district of Kurnool, Ananthapur and Adilabad. In the district of Guntur, the area under cotton had very steeply increased from 9 thousand hectares in 1970-71 to 172 thousand hectares in 1984-85. A similar increasing trend prevailed in Prakasam district also with an area of 8 thousand hectares in 1970-71 to 95 thousand hectares in 1984-85.

The details pertaining to the output of cotton indicated that a very steep increase was observed in the State from 83 thousand tonnes (1970-71) to 984 thousand tonnes (1984-85). Among these districts, Kurnool stands first with respect to output of cotton during the year 1970-71. But in latter years, the first position was occupied by Guntur district with an output of 189 thousand tonnes in 1974-75, 246 thousand tonnes in 1980-81 and 496 thousand tonnes by 1984-85. Prakasam

Table 1.2: District wise acreage, production and yield of cotton in A.P.

| State/District | 1970 - 71 | | | 1974 - 75 | | | 1980 - 81 | | | 1984 - 85 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | P | Y | A | P | Y | A | P | Y | A | P | Y |
| A.P. | 316 | 83 | 45 | 414 | 489 | 198 | 419 | 504 | 198 | 554 | 984 | 302 |
| Guntur | 9 | 7 | 118 | 76 | 189 | 426 | 90 | 246 | 467 | 172 | 496 | 489 |
| Prakasham | 8 | 1 | 25 | 40 | 108 | 456 | 45 | 143 | 537 | 95 | 175 | 313 |
| Ananthapur | 31 | 6 | 35 | 21 | 18 | 145 | 18 | 4 | 32 | 17 | 27 | 270 |
| Kurnool | 149 | 36 | 41 | 146 | 67 | 78 | 103 | 42 | 69 | 71 | 102 | 245 |
| Adilabad | 83 | 18 | 37 | 95 | 66 | 118 | 14 | 33 | 42 | 135 | 70 | 88 |

Note : A = Area (in '000 hectares)

P = Production (in '000 tonnes)

Y = Yield (kgs/hectaes)

Source : Statistical abstract of A.P.

district occupied second position in the years 1974-75, 1980-81 and 1984-85 with an output of 108 thousand tonnes, 143 thousand tonnes and 173 thousand tonnes respectively. Inspite of relatively low acreage under cotton in Guntur and Prakasam districts compared to Kurnool and Adilabad, the output was much higher in Guntur and Prakasam districts during the years 1974-75 and 1980-81.

The data relating to per hectare yield of cotton in the State indicate that the State average yield increased from 45 kgs/ha (1970-71) to 302 kgs/ha (1984-85). With regard to major cotton growing districts of A.P. the yield/ha was the highest in Guntur district for the years 1970-71 and 1984-85. During the years 1974-75 and 1980-81, the yield per hectare was the highest in Prakasam district with 456 kg and 537 kg respectively. The yield per hectare in Guntur district increased from 118 kg in 1970-71 to 489 kg in 1984-85. In Prakasam district, the yield per hectare was very low in 1970-71 (25 kg) but in later years it had sharply increased to 537 kg in 1980-81 but dropped to 313 kg by 1984-85.

## 1.5 PROBLEM SETTING

Though Guntur district is the most reputed regions for cotton growing, the scenario has been

utterly changed during the recent years. Consequently, the cotton growers were put to severe and unbearable hardships. Further, the increased number of suicides by cotton growers in the district due to heavy loss in cotton cultivation in the recent periods, because of high pest menace, severe drought condition, non-coverage of even prime costs and consequent indebtedness to the money lenders and commercial banks are the main reasons for the selection of this problem on cotton production in Guntur district. Apart from that the cotton production is facing challenges from many directions. The increased cost of inputs particularly the fertilizers, insecticides and labour has resulted in doubling or trebling its cost of production. Another important challenge is the severe pest and disease infestation recently and consequent costly control measures boosted up the total cost of production. Despite high cost of certain inputs, some of the cultivators in their anxiety to control pests and diseases had indiscriminately used scarce resources just like adding fuel to the fire. Inspite of all these efforts, the end result was not encouraging. This resulted in heavy loss and indebtedness among many farmers. Because of unbearable strain and stress on the resources, small farmers have to resort unconditionally in disposing their immovables for

clearing the debts incurred mainly in cotton cultivation.

Secondly, eventhough the area under cotton crop has increased in the recent years, (the farmer is not able to cope up with the increased expenses per unit of production.) Hence, it is felt desirable to probe into the economic aspects of cotton production in Guntur district which has a large potential hitherto. Thus, an attempt has been made to probe into the economic aspects of cotton production, productivity and profitability.

## 1.6 SCOPE

Although some studies were conducted in costs and returns, there is a big gap in the research aspect of resource efficiency on cotton in certain parts of the country. In recent years, there is no systematic study on resource use efficiency of cotton in Guntur district. Thus, no scientific data are available in respect of costs and returns, resource use efficiency and profitability in cotton production in Guntur district which may be helpful for cotton growers as well as policy makers.

An attempt has been made in this study to go in depth into the cost of cultivation, returns, profitabi-

lity, resource productivity, remunerative prices and production problems associated with cotton cultivation in Guntur district under current conditions of farming. The present study is confined only to Tadikonda and Chilakaluripet mandals of the Guntur district.

Further, the study may be useful to the farmers as well as policy makers to know the exact reason and associated factors which led the farmers to frustration and ultimate suicides.

## 1.7 OBJECTIVES

Keeping in view the problems discussed earlier the present study has been undertaken with the following specific objectives:

(1) To study the costs and returns, profitability in cotton cultivation according to farm size.

(2) To examine the resource returns, returns to scale and resource use efficiency according to farm size.

(3) To estimate the remunerative prices for cotton under the present conditions of farming.

(4) To identify the production problems among the cotton cultivators in Guntur district.

## 1.8 PLAN OF THE THESIS

The thesis is presented in six chapters.

The first chapter presents the importance of cotton industry and scope of the study besides specific objectives.

The second chapter attempts a critical review of the past work done on the economic aspects of crop production with particular reference to cotton.

The materials and methods adopted for the study including sample procedure and the techniques adopted in the analysis are incorporated in third chapter.

The Agro-economic features of the study area are discussed in the fourth chapter.

The fifth chapter encompasses a critical analysis of the results and discussion there for.

The last chapter throws light on the summary and conclusions emerged from the study with the policy implications.

## 1.9 LIMITATIONS OF THE STUDY

This study has the constraints of time, limited size of the sample and inadequate resources at the disposal of the investigator.

The conclusions drawn are based on the data collected for the agricultural year 1987, which is a very short period for extending concrete recommendations. Further, the information obtained and presented in the study is based on the recall memory of the sampled cultivators which have certain inherent limitations.

Since the present study has been undertaken in only 2 Mandals out of 57 mandals in Guntur districts, the conclusions drawn are specifically applicable to the area of the similar agro climatic conditions. Hence, no generalisation can be made possible either for the region or for the entire State.

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# REVIEW OF LITERATURE

An attempt has been made in this chapter to review the available literature which provides an opportunity to acquire fairly comprehensive knowledge in this field of work.

For clarity and convenience sake the review is presented under the following sub heads:

1. Labour utilisation
2. Costs and Returns
3. Profitability
4. Resource Productivity and Returns to scale

## 2.1 LABOUR UTILIZATION

Labour is one of the most important inputs in crop production. The labour utilisation per unit area depends upon the crop and the nature of intercultural operations to be taken up besides the farm size.

Dantwala (1958) found that the percentage of family labour to the total labour input was the largest (91.18%) in the smallest size group (<2.5 acres) and gradually decreased as the size of the farm increased. But even on the largest groups (25 acres and above) it's share was as large as 43.75%. The use of hired labour ranged from 8.82% on the smallest size group to 22.92% on the largest.

Tonbary (1960) found that the efficiency in case of human labour tended to increase as the farm gets larger and bullock labour performance also rose as the size of the farm increased.

In a study Hanumantha Rao (1965) observed that the proportion of family labour input to total labour input per acre declined consistently as the farm size increased.

Abraham and Boil (1966) observed that the total labour days utilized per acre decreased with the increase in farm size and also added that the smaller the size of the farm, greater was the bullock labour utilized.

The human labour input per acre decreased with the increase in farm size according to Bhagath Singh (1966). He also observed that bullock labour input per acre decreased with the increase in farm size.

Karla (1966) expressed an inverse relationship between the operational holding and farm labour input per acre.

In a particular study, Rama Murthy (1967) concluded that the opportunities for the employment of family labour were the highest in small size group,

while permanent and casual labour were relatively higher as the farm size increased.

Adinarayana (1968) found that cotton cultivation in rice follows on an average involved 125 mandays per acre. He also observed that utilization of family labour units per acre decreased as the operated area under cotton increased.

In a study Parthasarathy (1974) opined that the labour utilization per acre in sugarcane was inversely related with the farm size in North circars and South circars, where as it was directly related to the farm size in Telangana region.

Pandy et al (1977) found that the share of the purchased inputs like fertilizer, water and human labour increased with the size of the farm.

Nagabhushanam and Prakasha Rao (1978) opined that the labour requirement per acre on an average was 95.62, 86.30 and 80 mandays for Suvin, Varalakshmi and MCU-5 cotton varieties respectively. They further observed that the farm size has indicated an inverse relationship with labour utilisation in all the above 3 varieties of cotton.

In a special study Palanisamy and Rajagopalan (1978) pointed out that chillies and cotton crops required more labour than other crops since the harvesting of these crops extended to 2 - 3 months and relatively with crop consumed more labour than cotton.

Singh and Verma (1978) stated that in groundnut, human labour accounted for 41.09% followed by bullock labour which formed 19.21% to the total cost.

Rastogi et al. (1980) noticed that under the traditional system, the cost of labour, both human and bullock were the main components which varied between 60% and 90% of the total working cost for different crops where as under the recommended practices, the major components were the materials such as seed, fertilizers and plant protection chemicals which accounted for 45.70% of the total working cost.

Rambabu (1980) observed direct relationship between human labour utilization and farm size in sugarcane. He estimated that the human labour requirements were 117.50, 120.5 and 127.5 mandays per acre on small, medium and large farms respectively. The bullock labour requirements were estimated to be 7.29, 6.84 and 6.56 for small, medium and large farms respectively.

While studying the economic aspects of food grains in Andhra Pradesh, Suryanarayana (1980) stated that the human labour utilization per hectare varied from 184 mandays for HYV to 219 mandays for local varieties of paddy for kharif season.

Ghodake et al. (1981) reported an inverse relationship between the farm size and the total labour use per hectare in general.

Ananthaverma (1981) concluded that the percentage utilization of family labour days decreased with the increase in the size of the farm while that of hired labour increased with the increase in farm size.

Mahesh Kuman Singh (1982) concluded that there was an inverse relationship between the size of the farm and total human labour requirement per hectare. The total labour requirement of chillies varied from 195.07 mandays on large farms to 186.79 mandays on small farms with an overall average of 169.64 mandays for the whole sample.

Shoba Rani (1984) found that the total human labour requirement per hectare of hybrid cotton varied from 62.82 mandays on small farms to 60.05 mandays on large farms with an overall average of 62.82 mandays for

the whole sample. With respect to total cattle labour requirement for hybrid cotton an inverse relationship was observed with the farm size. The total cattle requirement of hybrid cotton was 20.96 CPD.

In a study, Vevek Babu (1988) found that the labour utilization had a direct relationship with the farm size in the dry crops. viz., jowar and castor and irrigated paddy. The cattle labour utilization also indicated a direct relationship.

## 2.2 COSTS AND RETURNS STUDIES

Production costs plays an important role in the decision making process of the farmers. In general at a given level of prices, a farmer can increase his farm income in two ways - Either by increasing the production or by reducing the cost of production. The former practice would have less influence in a competitive market. The second alternative which has great applicability is to reduce the cost of production through realisation of resource use with low cost of production factors. Knowledge of cost of different inputs and practices would enable the farmer to have a least cost combination of inputs and practices to maximise the farm profits as a whole.

Denning (1967) who made a comparison of the variable costs for growing maize, cotton and groundnut in Zambia, concluded that at the existing wage rates farmers might achieve higher gross margins by growing groundnut or cotton than maize. If wage rates were doubled, cotton showed a better gross margin than maize with good yield.

In a particular study, Adinarayana (1968) observed that cultivation of P-216 F cotton involved a gross cost of Rs.695 per acre and further stated that on an average an acre of cotton yielded 498 kg which resulted in a gross return of Rs.832.

Later, Viswanath (1969) in his comparitive study of irrigated and unirrigated crops in Dhoharighat Block in U.P. observed that the per acre cost structure indicated that seed cost remained constant in respect of all size groups whereas expenditure on manures and fertilizers did not exhibit any relationship with farm size over all net profit revealed direct relation with size of the farm for all the crops.

Dhaliwal and Chawla (1974) in their study on comparative economics of American cotton 320-F and Desi cotton on different sizes of farm observed that the per acre gross returns, variable costs and net returns of

American cotton related positively with the farm size. On small, medium and large farms (bullock operated) the per acre variable costs were of the order of Rs. 525.72, Rs. 560.04 and Rs. 614.64 resulting in gross returns of Rs.1833, Rs.2065 and Rs.2240. These yielded a net return of Rs.1307, Rs.1505, and Rs.1625 in the same order. The net returns per rupee investment were Rs.2.48, Rs.2.68 and Rs.2.64 respectively on small, medium and large farms. For Desi cotton the per acre variable costs on small, medium and large farms were Rs.405, Rs.427 and Rs.429 and gross returns were Rs.1305, Rs.1308 and Rs.1425 in the same order. The net returns per acre accounted to Rs.899.42, Rs.899.28 and Rs.996 respectively. The net returns per rupee investment were Rs.2.22, Rs.2.08 and Rs.2.32 on small, medium and large farms respectively. The higher net return per acre and per rupee investment from American cotton confirmed the superiority and more profitability of the high yielding varieties. They also found that the tractor operated farms were yielding higher net returns/acre and per rupee invested over all other bullock operated farms.

While comparing the cost structure of cotton with its competitive crops such as maize and bajra. Ganga and Omprakash (1974) indicated no significant

difference in the cost of cultivation of cotton, maize and bajra. It was Rs.1141.66 in case of cotton and Rs.1368.25 in case of maize. But the difference in gross income between the above crops was quite substantial and it was Rs.2000.80, Rs.1812.40 and Rs.1368.25 for maize, bajra and cotton respectively. Further, they observed higher net return and input-output ratio for maize and baj ra than that of cotton, and concluded that maize and bajra were more remunerative than cotton.

Nirmal Singh and Bal (1974) compared the costs and returns of important commercial crops such as American cotton, sugarcane and groundnut. They estimated the operational costs per hectare as Rs.868.13 for cotton as against the returns of Rs.1611.13.

Shingarey and Bhole (1974) compared the economics of high yielding varieties and local varieties of cotton and observed that returns from HYVS were nine times greater than local variety. They also noted that cost per quintal of produce was Rs.121 for HYV and Rs.132 for local varieties. The corresponding figures from the cultivators angle (cost $A_1$ only) were Rs.96 and Rs.90 respectively.

Singh et al. (1974) studied economics of commercial crops viz., cotton and tobacco in Khaira

district of Gujarat. The study revealed a higher net income per hectare in cotton than tobacco on medium and large farms, while the small farms got lesser income from cotton than tobacco. He attributed that small farms were not efficient in the use of pesticides in cotton. Further, it was noticed that the income per hectare increased with the increase in the size of the farm in cotton, while the reverse trend was true in case of tobacco.

Rawalgi (1974) in his study on economics of hybrid cotton (A case study in Anand Taluk) revealed that the overall cost of cultivation per hectare of cotton was Rs.2303 and Rs.2324 on tractor and non-tractor farms respectively. The cost of cultivation was highest on large farms and the least in case of medium farms. The share of fertilizers, labour and pesticides together formed about 68% of the total cost in tractor farms and nearly 60% on the non tractor farms.

In their study on economics of HYV of cotton ($H_4$) in Parbhani district, Satpute and Bhole (1974) concluded that on an average the cultivators obtained an yield of 1468 kgs of seed cotton per hectare of H4 cotton. The total cost of production was worked out to Rs.2501.70 per hectare, in which share of out of pocket

expenditure was Rs.2141.22 per hectare. The share of human and bullock labour cost together was maximum in total cost viz., 26% followed by cost of manures and fertilizers (22%) and plant protection chemicals (15%). They further observed that the per hectare gross returns was Rs.8438.53. The net returns worked out to Rs.2696.31 and Rs.2336.83 per hectare over cost 'A' and cost 'C' respectively.

Marathia (1974) made an attempt to compare costs and returns of cotton with that of groundnut, maize and jowar. The study revealed that the per hectare cost of cotton was relatively more in both local and high yielding varieties. The total cost per hectare for local cotton, groundnut, maize and jowar worked out to Rs.650, Rs.569, Rs.334 and Rs.226 respectively. The costs for HYV of these crops were Rs.963, Rs.842, Rs.579 and Rs.356 respectively. From the gross and net returns point of view cotton was considered to be the most profitable crop. The net return per hectare for local cotton, groundnut, maize and jowar was Rs.1558, Rs.1291, Rs.781 and Rs.467 respectively. For high yielding varieties of crops the net returns were Rs.2887, Rs.2228, Rs.1223 and Rs.852 in that order. Every rupee invested gave a net return of Rs.3.39, Rs.3.26, Rs.3.33 and Rs.3.06 for local varieties of the above crops while there were Rs.3.90,

Rs.3.55. Rs.3.10 and 3.39 for high yielding varieties of the same crops in the above order. It was found that the use of farm resources was efficient in cotton compared to others.

Madalia (1974) found that the average cost of Production of irrigated cotton was Rs. 2667.02 per hectare while for rainfed crop it was Rs. 1605.29 per hectare. In both the cases insecticides/fungicides, fertilizers and labour charges were the major items of cost. Irrigated cotton provided a net return of Rs.3674.71 per hectare as against Rs.2088.00 per hectare in case of rainfed cotton.

Further, Desai (1976) attempted to study the impact of the cost of input factors on farm income by making a sample study from West Godavari district through a technique of impact cost elasticity of the aggregate cost and also by co-relating the farm income with total cost as well as the total revenue. The study revealed that a) Farm income of small farmers was more susceptible to changes in input prices b) Farm income was largely dependent upon the indirect price rather than the cost and c) Farm was highly influenced by the cost of input factors.

Prakash Rao and Nagabhushanam (1978) in their study on resource productivity and returns to scale of three cotton varieties in Guntur and Prakasam districts revealed that Varalakshmi variety warranted an investment of Rs.3201.67 per acre accompanied by Rs.2939.54 per acre for Suvin and Rs.2704.09 per acre for MCU-5. The pattern of net returns per unit measure also showed that Varalakshmi variety recorded maximum returns in all the units of measurement with Rs.943.87/acre, Rs.124.23/quintal, Rs.10.92/man day work and Rs.0.30 per rupee invested uniformly, compared to other varieties except a small deviation on large farms.

**2.3 PROFITABILITY**

Parthasarathy and Suryanarayana (1976) measured the Break even output at two points of time in sugarcane cultivation. They felt that majority of sugarcane growers were incurring losses in 1964-65 in Andhra Pradesh. Though the minimum prices of sugarcane was increased in the year 1970-71 the growers did not get reasonable profits, so as to induce them to continue the production of sugarcane.

In another study he further stated that in maize production (1982) the break even out put was 10.51 and 16.85 quintals per hectare for local and HYV

respectively during kharif as against 13 and 16 qtls/ha of average production. While estimating BEO for bajra it was revealed 10.77 qtls/ha. This was less than the average yield indicating that the farmers were in profit zone.

Mahesh Kumar Singh (1982) from his study concluded that the breakeven outputs on an average in case of tomato, brinjal, chillies, ridge gourd and cluster beans were 7.06 tonnes, 4.83 tonnes, 6.31 tonnes 2.47 tonnes and 1.14 tonnes respectively as against the average production of 15.41 tonnes, 9.56 tonnes, 11.77 tonnes, 5.30 tonnes and 1.97 tonnes of the same crops.

Mohamad (1984) observed from the break even analysis that the average yields obtained on different size groups were less than that of break even output indicating loss in tobacco cultivation. The lower percentage of breakeven output in case of larger farms indicated that the larger size groups were incurring relatively lower loss per hectare compared to small and medium farms.

Sivaswamy (1985) observed from the break even analysis that the average yields obtained on different size groups were more than that of breakeven output indicating profits in groundnut cultivation.

## 2.4 RESOURCE PRODUCTIVITY AND SCALE RETURNS

Cobb and Douglas (1923) developed in the field of industries an experimental type of production function for American manufacturing industry in the form of $Y = ax^b$. This equation can be changed into linear form by using logarithms and represented as

$$\log Y = b \log x$$

Now this type of production function is widely used in the field of agriculture because of its greater flexibility and applicability. The studies of Tintner (1944), Heady (1945), Harris 1947, Heady and Swanson (1952), Clarke (1954), Bhattacharjee (1955), Rabinson (1955) and Kelly et al (1959) were a selected few in this field.

Heady (1954) fitted two production functions one for crop enterprise and another for livestock to measure the marginal value productivity of the resources used in production process. Suryanarayana (1958) has pointed out that diminishing factor returns were prevailing with respect to land, labour and capital resources on the Telangana farms.

Venkatreddy (1967) used Cobb-Doughlas production function to measure production efficiency in farms of South India.

Using Cobb-Doughlas type of production function, Nagabhushanam (1970) worked out resource efficiency in respect of paddy, sugarcane, chillies, tobacco and for the whole farm of the above crops under different size groups in Andhra Pradesh. Further, marginal productivities were estimated and compared with acquisition costs of each input. He also made comparision of optimum and existing level of input for different independent variables and appropriate adjustments were suggested.

Shankaran and Sirohi (1971) used Cobb-Doughlas model and found out that constant return to scale were in operation in case of seed potato farms.

Singh et al. (1974) have fitted Cobb-Doughlas production function for cotton, sugarcane and rape and mustard based upon samples drawn from Hissar, Ambala and Mohindergarh districts in Haryana for the year 1973-74. The selected variables i.e., expenses on fertilizers, irrigation, insecticides and human labour explained only 59 per cent of variation in the value of gross out put in rape and mustard on sample farms, the co-efficient of determination being 0.72 for cotton. The authors provided the information regarding the comparative economics of sugarcane, cotton, rape and mustard and

showed that cotton was more profitable than rape, mustard and sugarcane.

. Satpute and Bhole (1974) used Cobb-Douglas production function for the cotton found increasing return to scale. Marginal returns to labour was much greater than the marginal cost which indicated the scope for rising output profitably by increasing the use of labour. The marginal return to manures and fertilizers was also greater than marginal cost.

. Dhaliwal and Chawla (1974) in their study entitled 'comparative economics of American (320 F) and Desi cotton on different size farms' observed that the marginal value productivity of different inputs used in respect of American cotton was higher than Desi cotton.

, Singh et al. (1974) in their study 'production for commercial crops in Haryana' concluded that the marginal value products of fertilizer and irrigation for sugarcane, irrigation and human labour for cotton were less than zero indicating exessive use of these inputs. Further, they suggested that cotton was more profitable than sugarcane in Haryana.

Parthasarathy et al. (1974) used Cobb-Douglas production function and observed significant diminishing returns to land in all the agro-climatic

regions of Andhra Pradesh. With respect to sugarcane cultivation they also noted that only human labour in Northern circars, cattle labour in Southern circars and cattle labour and seed in Telangana showed significant diminishing returns. Further, they concluded that in all the regions, the contribution of fertilizers in sugarcane production was practically nil and constant returns to scale were prevailing in sugarcane production.

Singh (1975) fitted Cobb-Doughlas production function in backward agriculture to work out the elasticities of inputs which inturn were used to calculate their marginal value products for average farms. The result of the study supported the hypothesis of constant returns to scale for both small and large farms in the selected regions.

Mahesh Kumar Singh (1982) fitted Cobb-Doughlas production function in case of tomato, brinjal, chillies, ridge-gourd and clusterbeans and revealed the operation of diminishing factor returns in general for all the crops studied. In case of tomato, MVP for manures and fertilizers exhibited a direct relationship with farm size. Human labour on all size groups was over utilized and profits would be maximised by

curtailing the use of human labour in all farm size groups.

Alshi et al.(1983) in their study on technological change and factor shares in cotton production: A case study of Akola Cotton farms fitted Cobb-Doughlas production function and indicated constant returns to scale in case of Hybrid, American and Desi cottons. The variables, human labour, fertilizers, farm yard manures and capital indicated 72 per cent variation in case of desi cotton, 80 per cent variation and 94 per cent variation in case of American cotton and hybrid cotton respectively.

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# MATERIALS & METHODS

# MATERIALS AND METHODS

The present study was carried out in Guntur district of Andhra Pradesh. The chapter deals mainly about sampling design, nature and mode of collection of data and analytical tools employed in achieving the objectives of the study. Further, different concepts and methods followed in the study are also outlined.

## 3.1 SAMPLING DESIGN

### 3.1.1 Selection of the district

Guntur district was purposively selected for the study as it ranked first both in area as well as production in cotton cultivation in Andhra Pradesh.

### 3.1.2 Selection of the mandals

Among the mandals of the district, two mandals Tadikonda and Chilakaluripet were selected for the study based on the probability proportion to the area in the district.

### 3.1.3 Selection of the villages

All the villages in each mandal were arranged in an ascending order based on its area and the top four villages were selected so as to make 8 villages for the detailed study.

The final selected villages are given below:

**I. Tadikonda mandal**

1. Tadikonda
2. Bandarupally
3. Pamula Padu
4. Ponnekallu

**II. Chilakaluripet mandal**

1. Pasumarru
2. Murikipudi
3. Kavuru
4. Rajapet

### 3.1.4 Selection of cotton farmers

The list of all the cotton farmers in each selected village was obtained from the revenue records of the respective villages. The farmers were selected according to the 'stratified random sampling' taking operational holding as the basis.

All the cotton farmers in each selected village were grouped into 3 size groups viz. small farms (less than 2 hectares), medium farms (2-4 hectares) and large farms (more than 4 hectares) on the basis of operational area under cotton. 9 growers from each village were

selected at random taking 3 farms from each size group under each selected village. Thus, one district, 2 mandals, 8 villages and 72 cotton farmers formed the material for the study.

## 3.2 DATA COLLECTION

The reference period for the data collection was 1987 Agricultural year.

Data for this study were collected by personal interview with the help of a specially devised set of schedules. 3 schedules were developed - one pertaining to village information, second for holding particulars and the third for the production problems of cotton farmers.

Under the village schedule, information regardng cropping pattern, irrigation sources, transport and communication facilities, credit and marketing institutions were collected. Information pertaining to farm holdings i.e., resource endowments, costs and returns were collected with the help of holding schedule. The third schedule for evaluating the production problems covers the difficulties in procuring inputs including credit and suggestions to improve cotton production.

## 3.3 TOOLS OF ANALYSIS

Conventional as well as functional analysis have been used to analyse the data and to arrive at valid conclusions. Conventional analysis (Tabulations) have been used to arrive at capital investment, labour requirement, costs and returns which were estimated according to farm size irrespective of the variety.

Functional analysis has been used to estimate resource productivity, returns to scale, resource use efficiency and to study the cost output relationships.

Break-Even Analysis has been used to find out the profitability in cotton production.

Bulk line cost of production analysis has been used to find out the remunerative price for cotton.

### 3.3.1 Resource productivity and returns to scale

The existing literature has clearly revealed that among the various functional forms to estimate resource productivity and returns to scale, the Cobb - Douglas production function is the best suited model. So in the study, the production function model of Cobb-Douglas type has been used to estimate productivity and returns to scale in cotton cultivation.

The first derivative of the production function gives the marginal physical product. When the marginal physical product is multiplied with the unit price of the output it gives marginal value product. The ratio of MVP to opportunity cost is considered as the measure of resource use efficiency.

The general form of the model is

$$Y = a\, x_1^{b1}\, x_2^{b2}\, x_3^{b3} \ldots\ldots\ldots\ldots x_n^{bn}$$

Where,

$Y$ = Out put of the crop

$a$ = Constant

$x_1 - x_n$ : Independent variables considered in the function

$b_1 - b_n$ : The respective production elasticities

From this function, the marginal physical product (MPP) is derived by differentiation.

$$MPP = \frac{dy}{dx_i} = a\, b_1 x_1^{b1-1}\; b_2 x_2^{b2-1},\; b_3 x_3^{b3-1} \ldots\ldots\ldots\; b_n x_n^{bn-1}$$

$$\frac{dy}{dx_i} = bi \frac{\bar{y}}{\bar{x}_I}$$

Where,

$\bar{y}$ = Output at the level when all the inputs are kept at geometric mean levels.

xi = Respective independent variables at the geometric mean level.

bi = Partial regression coefficients of the respective inputs.

The MVP for each factor is obtained by multiplying the MPP of each factor with the unit price of the output.

MVP = MPP x PY

PY = Price/Unit of output

For judging the efficiency of the resource use, the MVP of an input is compared with its marginal cost. In the present study the marginal cost/opportunity cost has been referred to as per unit aquisition cost of resource. The significant differences between MVP of a resource and its aquisition cost is tested by computing 't' values. The formula for the 't' test is as follows:

$$t = \frac{MVP_i - P_{xi}}{\text{SE of } MVP_i}$$

Where,

$MVP_i$ = Marginal value product of $i^{th}$ resource

$P_{xi}$ = Aquisition cost of the $i^{th}$ input

If $MVP_i - P_{xi}$ is greater than zero, it indicates that the output can be maximized by increasing the use of the $i^{th}$ resource. Thus, it would be profitable to reduce the use of $i^{th}$ resource if $MVP_i - P_{xi}$ is less than zero.

### 3.3.2 Break-Even Analysis

Profitability was studied with the help of the management tool viz., 'Break-Even Analysis'. The breakeven charts were drawn where in breakeven output located by using the formula:

$$B.E.O = \frac{\text{Total fixed costs per farm}}{\text{Price per quintal - variable costs per quintal}}$$

### 3.3.3 Bulk line cost of production analysis

Bulk line cost of production analysis has been used to find out whether the existing price is remunerative or not for cotton production.

## 3.4 CONCEPTS

### 3.4.1 Operational holding

It is that part of the holding which is actually under operation.

### 3.4.2 Size of holding

In the present study, the total cotton farmers in the sample were classified into 3 size groups based on their operational holding viz.,

| | | |
|---|---|---|
| Small farms | : | Less than 2 hectares |
| Medium farms | : | 2-4 hectares |
| Large farms | : | more than 4 hectares |

### 3.4.3 Farm assets

Under farm assets such as land, farm buildings, wells, implements, machinery and livestock were included.

### 3.4.4 Mandays

It is the work turned out by a male adult within a duration of 8 hours. For the standardisation of mandays, female days were converted to mandays on the basis of existing wage rates.

### 3.4.5 Cattle pair days

It is the work turned out by a pair of cattle in a duration of 8 hours.

### 3.4.6 Cost of cultivation

All costs incurred in the cultivation of cotton i.e., variable and fixed costs were considered to arrive at the total cost.

### 3.4.7 Fixed costs

Under fixed costs, rental value of the owned land, depreciation, land revenue and interest on the fixed capital were considered.

### 3.4.8 Variable costs

The components of the variable costs include costs incurred on human labour, bullock labour, seeds, manures and fertilizers and plant protection chemicals. Interest on working expenses are also included under these costs.

### 3.4.9 Total costs

Fixed costs and variable costs together constitute the total costs.

### 3.4.10 Classification of costs

**1. Cost $A_1$**

This include the costs and kind expenses actually incurred by the owner (cultivator). These include costs of manure and fertilizers, cost of seed, cost of plant protection chemicals, charges for hired human labour, charges for both hired and owned bullock labour, land revenue, depreciation charges on farm assets and interest on working capital.

**2. Cost $A_2$**

Cost $A_1$ + rent paid for leased in land.

**3. Cost B**

This is obtained by adding rental value of owned land and interest on fixed capital to cost $A_1$.

**4. Cost C**

This is estimated by adding the imputed value of family labour to cost B. This gives the commercial cost of production.

**5. Paid-out costs**

These are the values of purchased inputs and all cultivation expenses incurred and paid for in cash.

**6. Unpaid costs**

They are costs which are not actually paid by farmer but the payments made in kind like grain and perquisites.

**7. Prime costs**

Cost $A_1$ minus land revenue plus imputed value of family labour constitute the prime cost.

**3.4.11 Farm returns**

Under farm returns, gross and net returns are included.

**1. Gross returns**

This pertaining to the total value of cotton (main and by-product) produced on the farm during the year valued at the market price.

**2. Net returns**

These are worked out on the basis of cost C and prime costs.

### 3.4.12 Measures of farm income

Besides gross and net returns in the study, certain other income measures are also used. They are:

**(i) Farm business income**

This is the return to the cotton cultivator for himself and his family labour and investment on owned land and owned fixed capital. It is obtained by deducting cost $A_1$ from gross returns.

**(ii) Farm family labour income**

It is a measure of return from cotton cultivation to family labour. This is obtained by deducting cost B from gross income.

**(iii) Farm investment income**

It is a measure of return from cotton cultivation to the fixed capital investment of the farm.

This is obtained by adding the imputed rental value of owned land and interest on fixed capital to net income. (Gross income - cost C + Cost B - Cost $A_1$).

### 3.4.13 Break-Even Output

This is the output at which there is neither profits nor losses in production of particular enterprise. Break even output is estimated by taking total fixed costs per farm, price per unit and variable cost per unit.

### 3.4.14 Bulk line cost

This is the cost at which 85% of the total product is said to be produced.

### 3.4.15 Remunerative price

It is the price which covers the bulk line cost of production.

## 3.5 PROCEDURE ADOPTED IN COMPUTING COSTS

### 3.5.1 Human labour

Family labour is imputed at the general wage rate prevailing for the permanent labourers in the villages. In the case of permanent labour, payments made in kind like grain and other perquisites were evaluated at the prevailing market rates. Payments made in cash were added. In case of casual labour the actual wages paid had been taken into consideration. In all

the cases a manday of 8 hours has been taken as the basis to arrive at total labour days.

### 3.5.2 Bullock labour

To evaluate the owned cattle labour, the cost of maintainance per work day is adopted. The prevailing hire rates were taken as the basis for the hired cattle labour.

### 3.5.3 Seed

The farm produced seed is charged at the prevailing local rates. Purchased seed is charged at the rates actually paid.

### 3.5.4 Manures and fertilizers

Farm produced manures are charged at the prevailing local rates. Chemical fertilizers and other manures purchased are charged at the rates actually paid.

### 3.5.5 Plant protection chemicals

The actual prices paid for the plant protection chemicals by the cultivator are considered.

### 3.5.6 Interest on working capital

The interest on working capital is charged at the rate of 12.5% for half of the crop period.

### 3.5.7 Rental value of owned land

One fourth of the gross value of produce is taken to impute the rental value of the owned land.

### 3.5.8 Land revenue

The actual amount paid is charged with respect to land revenue.

### 3.5.9 Depreciation

Depreciation on the farm structures like cattle shed, stores and implements shed is worked out at 2% for pucca and 5% for katcha structures. Depreciation on implements and machinery is computed using the straight line method (10% of the acquired value per year).

### 3.5.10 Interest on fixed capital

Interest on fixed capital excluding land is charged at the rate of 4%.

### 3.5.11 Gross returns

These are the total receipts obtained by selling the main and by-products.

### 3.5.12 Net returns

These are the profits left with after deducting the total cost of production from gross income.

### 3.5.13 Input-output ratio

This is the ratio of gross returns and total cost. It is estimated by the formula:

$$\text{Input - Output} = \frac{\text{Gross returns}}{\text{total cost}}$$

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# AGRO-ECONOMIC FEATURES

# AGRO ECONOMIC FEATURES

The economic appraisal of any region requires knowledge of physical, environmental and agro-climatic feature of the area like location, rainfall, soil type, climate, irrigation facilities, extent of mechanisation etc. Since the present study is confined to Tadikonda and Chilakaluripet mandals of Guntur district, a general view of agro-climatic features of the region will be very useful to have a comprehensive idea of the tract.

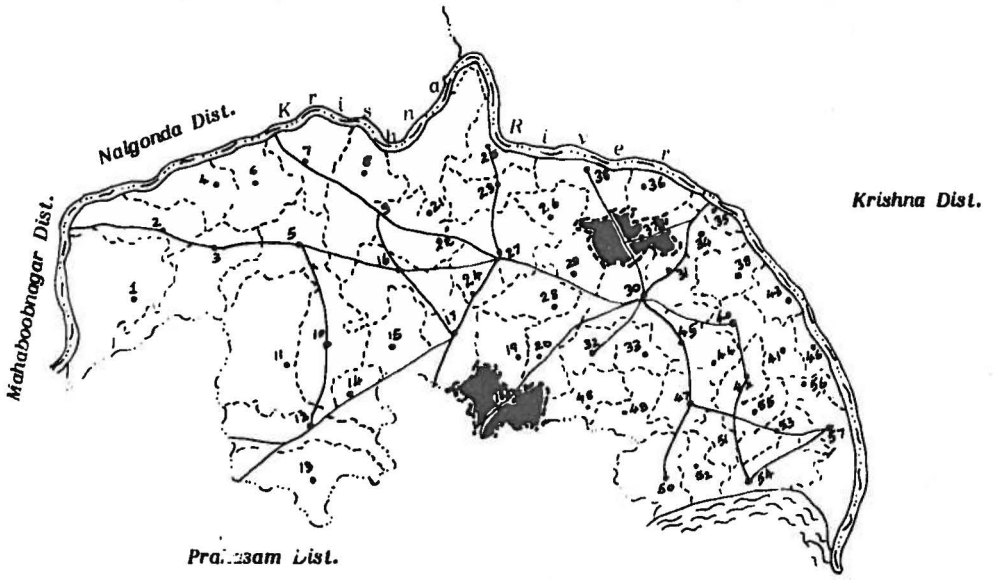
## 4.1 THE DISTRICT IN BRIEF

### 4.1.1 Location

Guntur district with headquarters at Guntur is one of the coastal districts in Andhra Pradesh extending over an area of 10,268 sq.kms and is situated between $15^{o}$-18' and $16^{o}$-15' of Northern latitude and $70^{o}$-10' and $80^{o}$-55' of the Eastern longitude. The district is bounded on the North by Krishna and Nalgonda districts, on the west by Mahaboobnagar district while on the South by Prakasam district and on the East by Krishna district and Bay of Bengal. It consists of 3 Revenue Divisions, 57 mandals and 732 villages. The district was first formed in 1904 bifurcating the then Krishna and Nellore districts. In

## GUNTUR DISTRICT MANDAL MAP

Scale : 1" = 16 Miles




• Mandal HQrs.

— Important Roads

### MANDAL Nos. AND NAMES

1. VELDURTI
2. MACHERLA
3. DURGI
4. TENTACHINTALA
5. KARAMPUDI
6. GURAZALA
7. DACHEPALLI
8. MACHAVARAM
9. PIDUGURALLA
10. IPUR
11. BOLLAPALLE
12. VINUKONDA
13. NUZENDLA
14. SAVALYAPURAM
15. ROMPICHERLA
16. NEKARIKALLU
17. NARASARAOPET
18. CHILAKALURIPET
19. NADENDLA
20. EDLAPADU
21. BELLAMKONDA
22. RAJUPALEM
23. KROSURU
24. MUPPALLA
25. ATCHEMPETA
26. PEDAKURAPADU
27. SATTENAPALLI
28. PHIRANGIPURAM
29. MEDIKONDURU
30. GUNTUR
31. PEDAKAKANI
32. PRATHIPADU
33. VATTICHERUKURU
34. MANGALAGIRI
35. TADEPALLI
36. TULLURU
37. TADIKONDA
38. AMARAVATHI
39. DUGGIRALA
40. TENALI
41. VEMURU
42. AMPUTHALURU
43. KOLLIPARA
44. TSUNDURU
45. CHEBROLU
46. KOLLURU
47. PONNUR
48. PEDANANDIPADU
49. KAKUMANU
50. BAPATLA
51. PITTALAVANIPALEM
52. KARLAPALEM
54. NIZAMPATNAM
55. CHERUKUPALLI
56. BHATTIPROLU
57. REPALLE

Febraury 1970, Prakasam district was carved out from Guntur and Nellore districts.

### 4.1.2 Demographic status

Demographic features of the district are presented in the Table 4.1.

It is seen that the total population in the district is 34,34,724 (1981) comprising of 17,14,102 males and 16,93,622 females. It is observed that the rural population is 24,89,022. Nearly 73% of the total population lives in rural areas. There are 3,83,116 cultivators in the district. The density of population worked out to be 302 per sq.km. Sex ratio indicates that there are 973 females for every 1000 males and literacy rate in the district was only 36%.

### 4.1.3 Occupational pattern

The details regarding the occupational pattern of Guntur district are presented in Table 4.2.

It is observed from the Table that nearly 44% were the main workers in the district. Out of which 11% was cultivators, 20% was agricultural labourers and the rest 13% was engaged in other and allied activities other than agriculture.

Table 4.1: Demographic features of Guntur district (1981 census

| S.No. | Particulars | Population | % to total |
|---|---|---|---|
| 1 | Total population | 34,34,724 | --- |
| | Males | 17,41,102 | 50.69% |
| | Females | 16,93,622 | 49.30% |
| 2 | Rural population | 24,89,022 | 72.46% |
| 3 | Urban population | 9,45,702 | 27.53% |
| 4 | Literacy rate | -- | 36.06% |
| 5 | Density of population (per sq.km.) | 302 | -- |
| 6 | Sex ratio | 973 | -- |
| 7 | Population growth rate | -- | 20.75% |

Source: Census of India - 1981

District census Hand book, Andhra Pradesh

Table 4.2: Occupational pattern in Guntur district

| S.No. | Particulars | Population | % to total |
|---|---|---|---|
| 1. | Cultivators | 3,83,116 | 11.15% |
| 2. | Agril. labourers | 6,72,451 | 19.58% |
| 3. | Other workers | 4,32,029 | 12.58% |
| 4. | Total main workers | 14,97,753 | 43.61% |
| 5. | Total population | 34,34,724 | --- |

Source: Hand book of Mandal statistics - 1985
Guntur district.

### 4.1.4 Physiography

The interesting physiographical features of Guntur district are hills, rivers, sea coast and planes. The sea coast is fringed by planes and ridges of brown sand of 5-6 miles in length. Generally the topography of land scape is monotonous. The land is raising gently from sea level through undulating plains to an average altitude of 1500 feet in the hills. The monotony is broken only by the numerous, scattered, small crape hill systems that rise abruptly against the skyline. Barring these hills, the Guntur district is a flat open plain of black and red soils.

The Guntur district may be broadly divided into 4 distinct regions viz.,

(1) The delta
(2) The stony uplands of the west
(3) Black cotton plains
(4) Eastern sea board

### 4.1.5 Climate and rainfall

The district suffer from very hot climate, the summer being extremely dry and the year may be divided into 4 seasons. The summer season starts by about the middle of Febraury and continues till the first week of

June. The heat in April and May is oppressive. The North-East monsoon breaks the hot spell and makes the weather bearable. The South-West monsoon season follows thereafter and extends upto the end of September, While October and November constitute the post-monsoon or retreating monsoon season. The period from December to the middle of Febraury is generally marked by fine weather.

### 4.1.6 Rainfall

The rainfall in the district generally decreases from East to West. Both, the South West monsoon and the retreating monsoon bring rains to the district, while the rainfall in the monsoon accounts for 61% of the annual rainfall. But the rain in the retreating monsoon season amounts to a third of the annual total. It is found that October is the rainiest month of the year. The average rainfall in the district is 826.3 mms of which the normal rainfall for the S.W. monsoon period is 504.00 mm representing 61% of the total normal rainfall of the district.

### 4.1.7 Land utilization

Analysis of land utilisation in any area is very important as it gives a wide picture of land use pattern including the net area sown and the resultant

**Table 4.3: Average rainfall of Guntur district (1986-87)**

(in millimeters)

| Month | Normal Rainfall | Actual Rainfal |
|---|---|---|
| **1. South West monsoon** | | |
| June | 90 | 82 |
| July | 133 | 119 |
| August | 131 | 223 |
| September | 145 | 85 |
| Total | 499 | 509 |
| **2. North East Monsoon** | | |
| October | 137 | 63 |
| November | 79 | 80 |
| December | 12 | 2 |
| Total | 228 | 145 |
| **3. Winter period** | | |
| January | 5 | 4 |
| Febraury | 11 | -- |
| Total | 16 | 4 |
| **4. Summer period** | | |
| March | 10 | 26 |
| April | 18 | 7 |
| May | 43 | 13 |
| Total | 71 | 46 |
| Total for the year | 814 | 704 |

Source: An outline of Agricultural situation in A.P. 1986-87

Table 4.4: Land utilization in Guntur district (1986-87)

| Classification | area (in '000 hectares) | % to total geographical area |
|---|---|---|
| Forests | 156 | 13.77 |
| Barren and uncultivable land | 43 | 3.80 |
| Land put to non-agril. use | 146 | 12.89 |
| Permanent pastures and other grazing lands | 26 | 2.29 |
| Miscellaneous crops | 46 | 4.06 |
| Cultivable waste | 64 | 5.65 |
| Other fallow lands | 33 | 2.91 |
| Current fallows | 22 | 1.94 |
| Net Area sown | 597 | 52.69 |
| Area sown more than once | 203 | 17.92 |
| Total cropped area | 800 | 70.61 |
| Total geographical area | 1133 | 100.00 |

Source: An outline of Agrl. situation in A.P. 1986-87

economies contributing to the economic growth of the zone.

The land utilisation details of Guntur district (1986-87) are presented in Table 4.4.

Among the detailed components of land utilisation in the district, forests account for 13% of the total geographical area in the district, while 12% of the area was occupied by land put to non agricultural use. Area under miscellanious crops and pastures is nearly 6% while the area under the fallow lands put together accounts for 4% of the total geographical area. The important feature is that the net area sown is about 53% which is a redeeming factor, while the total cropped area is about 71%.

### 4.1.8 Soils

The Guntur district has 4 types of soils. Of which sandy clay soils account for 6.4% of the total area, clay soils 1.1%, red loamy soils 23.4% and the black cotton soils 69.1%. It is interesting to note that black cotton soils occupy nearly 70% of the area. In general about 85% of the soils in the district are considered to be average or above average. The soils under the Nagarjuna Sagar project (NSP) area were tested on a wide range and the results revealed that 60% of the

Table 4.5: Soils of Guntur district

| | Soil type | % to total |
|---|---|---|
| 1. | Black cotton soils | 69.10% |
| 2. | Red loamy soils | 23.40% |
| 3. | Sandy clay soils | 6.40% |
| 4. | Clay soils | 1.10% |

Source: 1. Hand book of Mandal statistics, 1985

2. Records of the Chief Planning Officer Guntur district

soil contains moderate organic carbon while 80% of the soils are deficient in phosphorous. Nearly 60% of the soils contain less than moderate amount of potash and deficiency in zinc is also observed.

### 4.1.9 Irrigation

Guntur district gets water from Krishna delta system for irrigating wet lands. In uplands, rainfall is supplemented by flow irrigation from tanks and lift irrigation from the river beds. The water level is very high throughout the coastal belt, probably due to heavy floods during monsoon. Irrigation wells are deep in other areas ranging from 15-40 feet. In the coastal belt where the soils are sandy, the level of water will be very high - 2 to 3 feet in winter and 4 - 10 feet below the surface in summer. The vast stretch of sands in the coastal belt has a peculiar system of irrigation through splash watering taken from shallow ponds locally called as 'Doruvus'.

Distribution of area under different sources of irrigation is presented in Table 4.6.

It is evident from figures in the table that canals cover 92% of the gross irrigated area followed by wells with 4.65%. Tanks account for only 0.87% of the total irrigated area and the remaining area of 5000

Table 4.6: Sources of irrigation in Guntur district (1986-87)

| Source | Gross area irrigated (in 1000 hectares) | % to gross irrigated area |
|---|---|---|
| 1. Canals | 317 | 92.15% |
| 2. Tanks | 3 | 0.87% |
| 3. Tube wells | 16 | 4.65% |
| 4. Other wells | 3 | 0.87% |
| 5. Other sources | 5 | 1.45% |
| Net area irrigated | 336 | --- |
| Area irrigated more than once | 8 | --- |
| Gross irrigated area | 344 | --- |

Source: An out line of Agril. situation in A.P. 1986-87

**Table 4.7: Cropping pattern in Guntur District (1986-87)**

| Crop | Area (in '000 hectares) | % to total area |
|---|---|---|
| **Food Crops** | | |
| Paddy | 303 | 34.91 |
| Jowar | 11 | 1.27 |
| Bajra | 3 | 0.35 |
| Maize | 5 | 0.58 |
| Varagu | 3 | 0.35 |
| Redgram | 23 | 2.65 |
| Blackgram | 146 | 16.82 |
| Greengram | 14 | 1.61 |
| Bengalgram | 3 | 0.35 |
| Total Food Crops | 565 | 58.87 |
| **Non-Food Crops** | | |
| Cotton | 131 | 15.09 |
| Chillies | 26 | 2.99 |
| Tobacco | 4 | 0.46 |
| Sugarcane | 2 | 0.23 |
| Turmeric | 3 | 0.35 |
| Groundnut | 12 | 1.38 |
| Castor | 171 | 19.70 |
| Sesamum | 8 | 0.92 |
| Total Non-food crops | 235 | 41.13 |
| Grand total | 800 | 100 |

Source: An outline of Agr. situation in A.P. 1986-87

hectares was irrigated by other sources which accounted to 1.45%. Further the net area irrigated is 3,36,000 hectares out of total irrigated area of 3,44,000 hectares.

### 4.1.10 Cropping pattern

The predominant crops grown in the district are paddy and cotton covering an area of 50% of the total cropped area. The other important crops grown in the district are blackgram, green gram, redgram, jowar, groundnut, chillies, tobacco and turmeric.

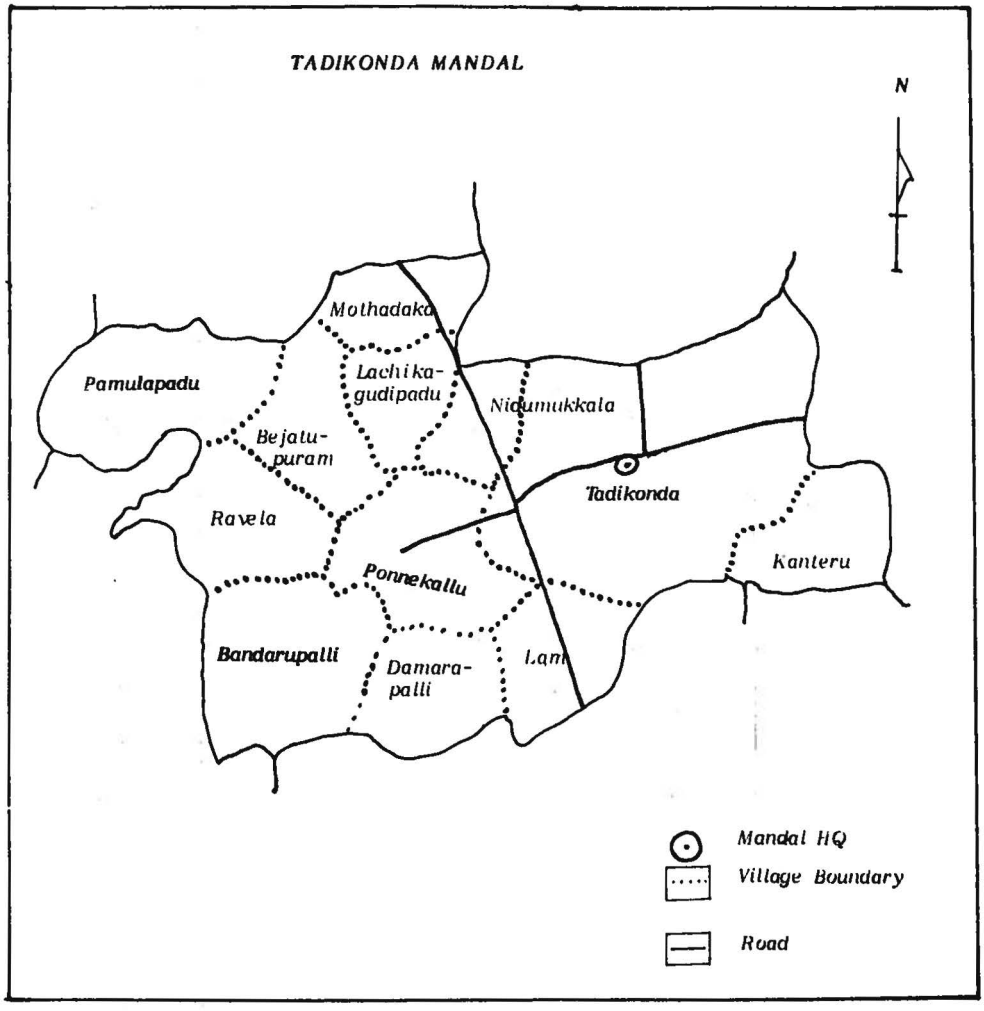
The details of the cropping pattern in the district are given in Table 4.7.

## 4.2 SELECTED MANDALS

### 4.2.1 Location

#### 1. Tadikonda mandal

The mandal was formed in 1985 after the policy decision regarding the formation of mandals instead of taluks. A total of 12 villages, 3 from Guntur taluk and 9 from Mangalagiri taluk forms this mandal. It is bounded on the North by Amaravathi mandal while Guntur mandal on the South. On the Eastern side this is differentiated by Mangalagiri mandal and on the Western


TADIKONDA MANDAL
N
Mothadaka
Pamulapadu
Lachika-
gudipadu
Nidumukkala
Bejatu-
puram
Tadikonda
Ravela
Kanteru
Ponnekallu
Bandarupalli
Damara-
palli
Mandal HQ
Village Boundary
Road

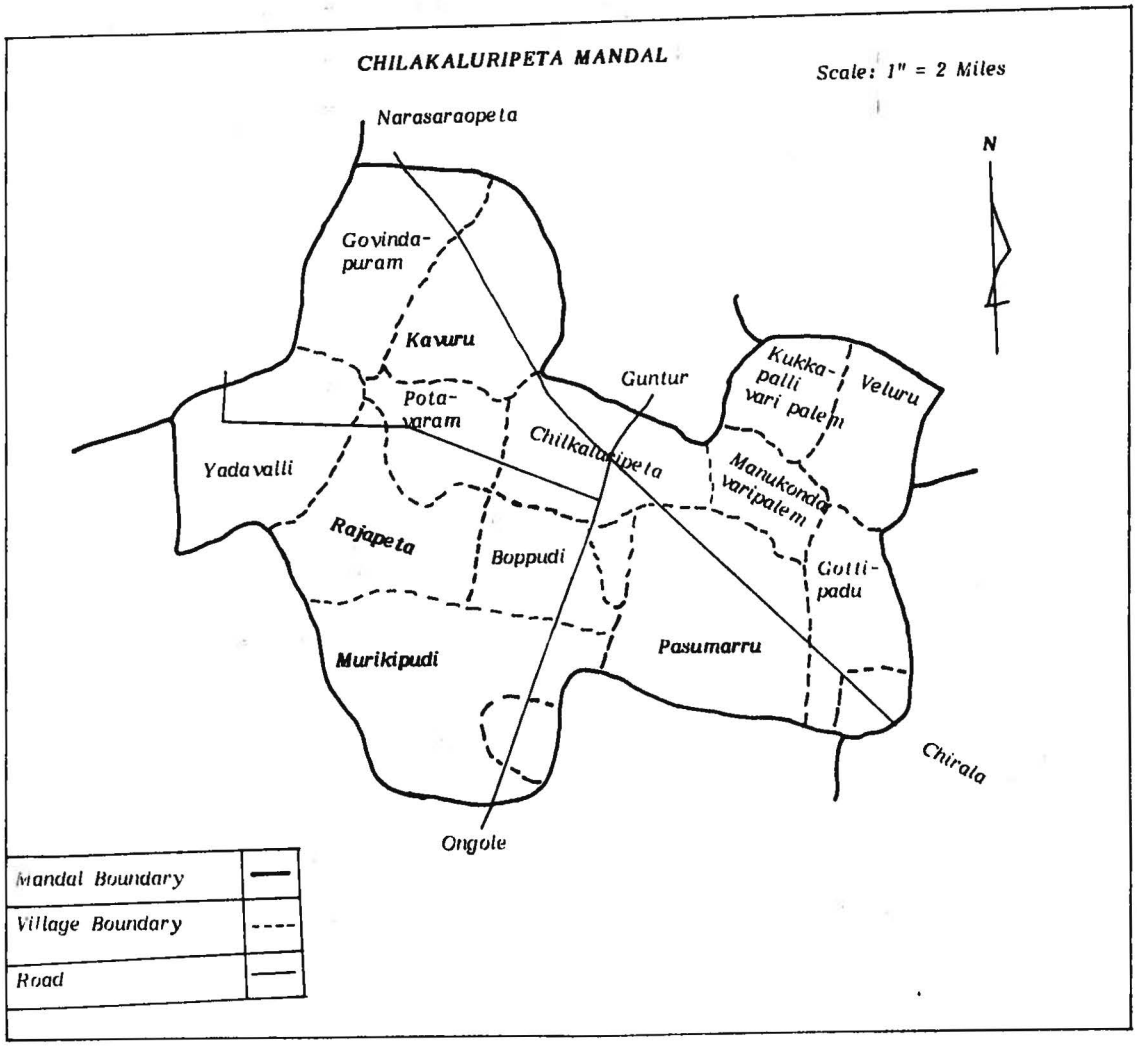

CHILAKALURIPETA MANDAL
Scale: 1" = 2 Miles
N
Narasaraopeta
Govinda-puram
Kavuru
Pota-varam
Guntur
Kukka-palli vari palem
Veluru
Chilkaluripeta
Manukonda varipalem
Yadavalli
Rajapeta
Boppudi
Gotti-padu
Murikipudi
Pasumarru
Chirala
Ongole
Mandal Boundary
Village Boundary
Road

**Table 4.8: Demographic features of the selected mandals**

| Particulars | Population | |
|---|---|---|
| | Tadikonda | Chilakaluripet |
| Population | 58,637 | 1,11,989 |
| Males | 29,855 | 56,727 |
| Females | 28,782 | 55,262 |
| Literates | 21,670 | 39,380 |
| Cultivators | 9,211 | 8,992 |
| Agrl. Labourers | 17,149 | 17,835 |
| Other workers | 4,441 | 21,844 |
| Total main workers | 31,188 | 50,343 |
| Density of population per sq.km | 302 | 541 |

Source: Hand book of Mandal and village statistics - Tadikonda and Chilakaluripet mandals (1985)

side it is bounded by Pedakurapadu mandal. It has an area of 194.23 sq. km of geographical area.

**2. Chilakaluripet mandal**

This mandal is bounded by Edlapadu mandal on North, Martur mandal on South, Pedanandipadu on East and Narasaraopet mandal on West. There are 16 villages in the mandal with a population of 1,11,989. This covers an area of 207.37 sq.km in the district.

**4.2.2 Demographic features**

The Tadikonda mandal has a total population of 58,637 composing of 29,855 males and 28,782 females. It is seen that 36.9% of the population is literates. There are 9211 cultivators, 17,149 agril. labourers and 4,441 other workers making a total of 31,188. The density of population per sq.km calculated to be is 302 persons.

With respect to Chilakaluripet mandal, there are 50,343 main workers of which 8992 cultivators, from a total population of 1,11,989. It is found that 35.1% of the population in this mandal are literates. The density of population was 541 per sq.km.

### 4.2.3 Climate and rainfall

The climate in these mandals is hot, specially during summer season. The average rainfall is 902mm in Tadikonda and 751 mm in Chilakaluripet. But, the actual rainfall received during 1986-87 is quite high than the normal. South-West monsoon accounts for nearly 60% of the total rainfall in both the mandals. The rest of the rain is covered by North-East monsoon and winter period.

The details of rainfall for 1986-87 in these two mandals are given in Table 4.9.

### 4.2.4 Land utilisation

Land utilisation details of the selected mandals are given in Table 4.10.

It is found that there are 373 hectares of forest land out of the total geographical area of 19,190 hectares in Tadikonda mandal. An area of 385 hectares are under barren lands, while 1068 hectares under non-agril use. It is also seen that 162 hectares are under pastures and grazing land, 344 hectares under miscellanious crops, 80 hectares under cultivable waste and nearly 650 hectares under fallow lands.

In case of Chilakaluripet mandal, it is observed that there are no forest lands. But the area

**Table 4.9: Average rainfall of the selected mandals (1986-87)**
(in millimeters)

| Month | Tadikonda | | Chilakaluripet | |
|---|---|---|---|---|
| | Normal | Actual | Normal | Actual |
| January | 4.8 | 20.4 | 6.9 | 25.4 |
| Febraury | 12.9 | 11.6 | 11.4 | 16.8 |
| March | 8.1 | -- | 11.9 | -- |
| April | 24.9 | -- | 23.1 | 40.4 |
| May | 46.0 | 36.2 | 46.7 | 42.1 |
| June | 125.2 | 119.4 | 79.0 | 53.4 |
| July | 171.5 | 186.8 | 121.4 | 137.3 |
| August | 160.5 | 320.0 | 112.8 | 180.2 |
| September | 145.0 | 133.8 | 128.5 | 146.2 |
| October | 128.0 | 49.2 | 123.7 | 59.2 |
| November | 67.6 | 32.8 | 71.6 | 97.0 |
| December | 7.4 | 2.4 | 14.0 | 1.8 |
| Annual Total | 901.10 | 955.0 | 751.0 | 820.90 |

Source: Records of the Asst. Director of Agriculture, Guntur

**Table 4.10: Land utilization in the selected mandals (1986-87)**

| Classification | Area in hectares | |
|---|---|---|
| | Tadikonda | Chilakaluripet |
| Forests | 373.2 | --- |
| Barren and uncultivable land | 385.6 | 3,946.0 |
| Land put to non-agril. use | 1068.4 | 3,264.8 |
| Permanent pastures and other grazing lands | 164.4 | 1,338.0 |
| Miscellaneous crops | 344.4 | 2,016.8 |
| Cultivable waste | 80.0 | 2,022.4 |
| Other fallow lands | 24.0 | 257.2 |
| Current fallows | 629.6 | ---- |
| Net area sown | 16123.2 | 11787.6 |
| Total geographical area | 19190.8 | 24632.8 |

Source: Records of the Asst. Director of agriculture, Guntur

under barren and uncultivable land, grazing land miscellanious crops and fallow lands is quite high compared to Tadikonda mandal. Net area sown in this mandal is 11787 hectares out of the total geographical area of 24632 hectares.

### 4.2.5 Soils

Black cotton soils occupy major portion in both the mandals. These soils occupy nearly 80% of the total area. The remaining 20% is covered by red loamy soils. These black cotton soils in both the mandals are under the Command Area of NSP canals.

### 4.2.6 Sources of irrigation

The details giving various sources of irrigation in the two selected mandals are given in Table 4.11.

In both the mandals, canals account for a major share of irrigation. 83% of the different sources of irrigation is covered by canals in Tadikonda and the same was 69% in Chilakaluripet mandal. The net area irrigated is 1975 ha out of the gross irrigated area of 1993 in Tadikonda mandal and the same was 1671 hectares out of 1821 hectares in Chilakaluripet mandal.

**Table 4.11: Source of irrigation in the selected mandals (1984-85)**

| Source | Area irrigated in hectares | |
|---|---|---|
| | Tadikonda | Chilakaluripet |
| 1. Canals | 1663 | 1250 |
| 2. Tanks | 316 | 24 |
| 3. Tube wells | 2 | 97 |
| 4. Other wells | 4 | 300 |
| 5. Other sources | 6 | --- |
| Net area irrigated | 1975 | 1671 |
| Area irrigated more than once | 18 | 150 |
| Gross irrigated area | 1993 | 1821 |

Source: Hand book of Mandal statistics, Guntur district (1984-85)

### 4.2.7 Cropping pattern

The details giving total area under various crops are given in Table 4.12.

It is seen that the predominant crops grown in these mandals are paddy and cotton covering nearly 50% of the total cropped area. Apart from these two, pulses like redgram, greengram, blackgram are also being grown. Commercial crops like turmeric, chillies, tobacco, groundnut are also cultivated in these mandals.

## 4.3 SELECTED VILLAGES

### 1. Tadikonda

This village is situated at a distance of 18 km from the district head quarters with a total population of 17,632 (1981 census). Out of them 9061 were males and 8571 were females. Coming to occupational distribution there are 1883 cultivators, 5538 agricultural labourers and 1341 other workers, out of the total workers of 8935 in the village. The literacy percentage in the village is 43.72.

Among the farmers there are 2050 small farmers, 406 medium farmers and 228 large farmers.

**Table 4.12: Cropping pattern in the selected mandals (1986-87)**

| Crop | Area in Hectares | |
|---|---|---|
| | Tadikonda | Chilakaluripet |
| **Food Crops** | | |
| Paddy | 1750.4 | 1830.8 |
| Jowar | 462.4 | 229.2 |
| Maize | 184.0 | 101.6 |
| Varagu | 14.8 | -- |
| Redgram | 380.8 | 1656.0 |
| Blackgram | 2709.6 | 89.6 |
| Greengram | 1514.0 | 518.0 |
| Bengalgram | 30.8 | 28.4 |
| Total Food Crops | 8,446.8 | 4,811.6 |
| **Non-Food Crops** | | |
| Cotton | 8,386.4 | 5,654.8 |
| Chillies | 1,295.6 | 37.2 |
| Tobacco | 82.4 | 154.4 |
| Sugarcane | --- | 6.0 |
| Turmeric | 6.8 | 1.6 |
| Groundnut | 16.4 | 62.0 |
| Castor | --- | 12.0 |
| Sesamum | 518.8 | 284.8 |
| Total non-food crops | 10,888.4 | 8,335.2 |
| Grand total | 19,335.2 | 13,146.8 |

Source: Records of Asst. director of Agriculture, Guntur

Table 4.13: Demographic features of the selected villages (1981 census)

| Particulars | Number | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tadikonda | Bandarpalli | Pamulapadu | Ponnekallu | Pasumaaru | Murikipadu | Kavuru | Rajapet |
| Total Population | 17632 | 4087 | 2488 | 8624 | 7757 | 5295 | 5389 | 4062 |
| A. Males | 9061 | 2119 | 1275 | 4336 | 3888 | 2707 | 2737 | 2067 |
| B. Females | 8571 | 1968 | 1213 | 4288 | 3869 | 2588 | 2652 | 1995 |
| Cultivators | 1883 | 869 | 482 | 1728 | 738 | 402 | 1059 | 583 |
| Agri. Labourers | 5538 | 988 | 818 | 2761 | 1028 | 2153 | 1431 | 987 |
| Other workers | 1341 | 135 | 83 | 570 | 1396 | 291 | 427 | 446 |
| Total main workers | 8935 | 2007 | 1398 | 5137 | 3836 | 2856 | 3076 | 2222 |
| Literates | 7708 | 1457 | 891 | 3138 | 2786 | 1276 | 1531 | 1193 |
| Literacy rate | 43.72% | 35.65% | 35.81% | 36.39% | 35.92% | 24.10% | 28.41% | 29.37% |

Source: Hand book of Mandal and village statistics.
Tadikonda and Chilakaluripet mandals.

The total geographical area of the village is 5118.95 hectares. There are no forests in the village. The total cropped area in the village during 1986-87 agricultural year is 4799.2 hectares. Out of this the net area sown is 4771.2 hectares.

The important crops grown in the village are cotton, paddy and a little area of redgram, blackgram and greengram. Further, crops like jowar, maize, chillies and oil seeds are also grown in the village. Cotton occupies major portion among all the crops occupying 3121.2 hectares in the village.

**2. Bandarpally**

This village is located at a distance of 17 km from the district head quarters. There are 2119 males and 1968 females in the village aggregating a total of 4087 in the village. Out of 8935 total workers in the village, there are 869 cultivators, 988 Agril. labourers and 135 other workers. The literacy % of the village is 35.65%.

There are 813 small farmers, 245 medium farmers and 62 large farmers in the village.

The total geographical area of the village is 1909.2 hectares. There are no forests in this village

Table 4.14: Structural distribution of holdings in selected villages (1986-87)

| Particulars | Number | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tadikonda | Bandarpalli | Pamulapadu | Ponnekallu | Pasumaaru | Murikipadu | Kavuru | Rajapet |
| Small farms | | | | | | | | |
| less than 2 hectares | 2050 | 813 | 1072 | 626 | 1322 | 1105 | 830 | 490 |
| Medium farms | | | | | | | | |
| 2-4 hectares | 406 | 245 | 136 | 68 | 253 | 156 | 215 | 124 |
| Large farms | | | | | | | | |
| 4 & more than 4 hectres | 228 | 62 | 44 | 74 | 89 | 100 | 41 | 103 |

Source: Records of the village assistants.

too. The net area sown in the village during 1986-87 is 1582.45 hectares and the total cropped area is 1718.85 hectares.

The important crops grown in the village are paddy, chillies, oilseeds, jowar and pulses while the major crop being cotton which occupies an area of 1315 hectares in the village.

**3. Pamulapadu**

This village is situated at a distance of 36 km from district head quarters and spreads over an area of 16.94 sq. km. There are 1275 males and 1213 females out of a total population of 2488. Of the 1398 main workers, there are 482 cultivators, 818 agrilcultural labourers, 83 other workers. About 36 persons out of every 100 persons are literates.

In the farming community there are 1072 small farmers (0-2 hectares), 136 medium farmers (2-4 hectares) and 44 large farmers (4 and more than 4 hectares).

The total geographical area of the village is 1444.28 hectares. The net area sown is 1188.81 hectares while the total cropped area is 1265.21 hectares in the

Table 4.15: Land utilisation in selected villages (1986-87)

| Particulars | Area in hectares | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tadikonda | Bandarpalli | Pamulapadu | Ponnekallu | Pasumaaru | Murikipadu | Kavuru | Rajapet |
| Forests | --- | ---- | ---- | ----- | ----- | ---- | --- | --- |
| Barren and uncultivable land | 8 | ---- | --- | 80 | 0.44 | 56.99 | --- | 8.99 |
| Land put to non-agri. use | 339.75 | 230.4 | 72 | 95.6 | 240.59 | 241.69 | 255.13 | 190.52 |
| Cultivable waste | -- | --- | --- | --- | 66.00 | 104 | 54.06 | 108.24 |
| Permanent pastures and other grazing lands | --- | --- | 108 | --- | --- | 76 | --- | 12.52 |
| Miscellaneous crops | --- | --- | --- | --- | --- | 100.61 | 18 | 40 |
| Current fallows | --- | 96.17 | 75.47 | 106.15 | 108.23 | 92 | 54 | 144.2 |
| Other fallows | --- | --- | --- | --- | 96.14 | 110 | 42.12 | 186.0 |
| Total geographical area | 5118.95 | 1909.2 | 1444.28 | 1325.95 | 2939.35 | 2399.88 | 1702.22 | 1890.72 |
| Net area sown | 4771.2 | 1582.45 | 1188.81 | 1044.2 | 2427.69 | 1638.31 | 1280.51 | 1200.25 |
| Area sown more than once | 28 | 136.4 | 76.4 | 65.6 | N.A | N.A | N.A. | N.A. |
| Total cropped area | 4799.2 | 1718.85 | 1265.21 | 1109.80 | N.A | N.A | N.A | N.A. |

Note: N.A = Not available

Source: Records of the Mandal statistician, Tadikonda and Chilakaluripet mandals

village. This exhibits little scope for second crop system.

The important crops grown in the village are cotton, paddy, chillies, jowar and pulses while cotton occupies an area of 1224.4 hectares.

**4. Ponnekallu**

This village is situated at a distance of 18 km from the district headquarters. Out of the total population of 8624, 4336 were males and 4288 were females. There are 1728 cultivators, 2761 agrl. labourers 570 other workers, making the total workers to 5137. The literacy % in the village is 36%.

There are 626 small farmers (0-2 hectares). 68 medium farmers (2-4 hectares) and 74 large farmers (4 hectares and above).

The total geographical area of the village is 1325.95 hectares. The net area sown is 1044.2 hectares out of the total cropped area of 1109.80 hectares.

The important crops grown in the village are cotton, paddy, chillies, jowar and pulses but cotton is cultivated in an area of 1194 hectares on an average.

Table 4.16: Cropping pattern in the selected villages (1987-88 kharif season)

| Crops | Area in hectares | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tadikonda | Bandarpalli | Pamulapadu | Ponnekallu | Pasumaaru | Murikipadu | Kavuru | Rajapet |
| Paddy | 383.2 | 43.6 | 104.0 | 23.2 | --- | 3.6 | 8.8 | 18.4 |
| Jowar | 40.0 | 12.0 | 34.0 | 12.0 | --- | --- | --- | --- |
| Maize | 4.4 | 0.4 | -- | --- | 1.4 | --- | 0.8 | 1.28 |
| Pulses | 323.6 | 17.6 | 58.0 | 41.6 | --- | N.A | N.A. | N.A. |
| Chillies | 25.2 | 108.0 | 44.8 | 38.4 | --- | N.A. | N.A. | N.A. |
| Oil seeds | 53.6 | 18.0 | 3.2 | 1.6 | --- | N.A. | N.A. | N.A. |
| Cotton | 3121.2 | 1315.2 | 1224.4 | 1194.0 | 2260.8 | 1343.6 | 1214.4 | 1159.2 |

Note: N.A. = Not available

Source: Records of the Village assistant, Tadikonda

Records of the Mandal statistician, Chilakaluripet

**5. Pasumarru**

This village is situated at a distance of 20 km from mandal headquarters with a population of 7757. Out of 3836 main workers, there are 738 cultivators, 1028 agril. workers, 1396 other workers. It is seen that 35.92% of the population is literates.

Among the farmers 1322 are small farmers (0-2 hectares), 253 are medium farmers (2-4 hectares) and 89 large farmers (4 hectares and above).

The total geographical area of the village is 2939.35 hectares. Net area sown is 2427.69 hectares.

Cotton is the predominant crop grown in the village and this is the prestigeous crop which was cultivated on a total area of 2260.8 hectares.

**6. Murikipadu**

This village is situted at a distance of about 18 km from the mandal head quarters. This has a total population of 5295 comprising 2707 males and 2588 females. The total main workers are 2856. There are 402 cultivators, 2153 agrl labourers, 291 other workers. The literacy % of the village is 24%.

The total farmers are 1361 of which 1105 are small farmers (0-2 hectares), 156 are medium farmers (2-4 hectares) and 100 large farmers (4 hectares and above).

Total geographical area of the village is 2399.88 hectares, while the net area sown in the village is 1638.31 hectares.

Cotton is cultivated on 1343.6 hectares leaving the rest for paddy and pulses.

**7. Kavuru**

This village is located at a distance of about 10 km from the mandal head quarters. This has a population of 5389 comprising of 2737 males and 2652 females. There are 1059 cultivators, 1431 agril. labourers, 427 other workers making a total of 3076 workers. There are 1531 literates out of the total population of 5389 accounting to 28% of the literacy rate.

Among the farming community, there are 830 farmers whose holdings are not more than 2 hectares, 215 farmers are having holdings of 2-4 hectares and 41 farmers are having 4 hectares and more of land.

The total geographical area of the village is 1702.22 hectares. Out of this, the net area sown is 1280.51 hectares.

Cotton is the predominant crop grown in the village. Besides paddy, maize and jowar are also grown.

**8. Rajapet**

This village is situated at a distance of about 16 km from the mandal head quarters with a total population of 4062. Out of this, 2067 are males and 1995 are females. There are 583 cultivators 987 agrl. labourers, 446 other workers making a total of 2222 main workers in the village. The literacy level in the village is 29.37%.

With respect to small, medium and large farmers there are 490 small farmers (0-2 hectares), 124 medium farmers (2-4 hectares) and 103 large farmers (4 hectares and above).

The total geographical area of the village is 1890.72 hectares. Out of this the net area sown is 1200.25 hectares.

In this village also, the predominant crop grown is cotton which is raised in a total area of 1159.2 hectares. Besides this, paddy and maize are also grown.

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# RESULTS & DISCUSSION

# RESULTS AND DISCUSSION

In this chapter, the results of the study and discussions there upon are presented. The various sub-heads adopted are enumerated hereunder.

**(i) Basic characteristics of the selected holdings**

**(ii) Cost of cultivation**

**(iii) Productivity of cotton**

**(iv) Cost of production of cotton per qunital**

**(v) Returns from cotton cultivation**

**(vi) Profitability in cotton cultivation**

**(vii) Resource productivity, returns to scale and resource use efficiency on cotton farms**

**(viii) Bulk line cost of production**

**(ix) Yield gap analysis**

**(x) Production problems of cotton**

## 5.I BASIC CHARACTERISTICS OF THE SELECTED HOLDINGS

In this section, average size of family, average size of holdings and the farm assets structure are discussed.

### 5.1.1 Family size

The particulars regarding the size of the family are incorporated in Table 5.1.

Table 5.1. Average size of the family

| Particulars | Size of the farms | | | |
|---|---|---|---|---|
| | Small | Medium | Large | Pooled |
| Males | 2.00 | 2.50 | 3.70 | 2.73 |
| Females | 1.79 | 2.01 | 3.20 | 2.33 |
| Children | 3.29 | 3.08 | 2.75 | 3.04 |
| Total | 7.08 | 7.60 | 9.66 | 8.11 |
| Family labour | | | | |
| Males | 1.98 | 2.08 | 1.10 | 1.72 |
| Females | 1.71 | 1.68 | 0.62 | 1.33 |
| Children | 2.68 | 2.43 | -- | 1.70 |
| Total | 6.37 | 6.19 | 1.72 | 4.76 |

It is observed from the figures in Table that the family size had increased with the farm size. On an average the size of the family ranged from 7.08 on small farms to 9.66 on large farms with an overall average of 8.11 for the sample as a whole. The same for the medium farms is 7.60 members. The number of children have been decreased as the farm size increased. This indicates, to a certain extent, that awareness among the progressive farmers about the family planning measures is impressive. They are conscious about their balanced economic planning towards their family size as well as the society. But, the small farmers are not maintaining any family planning measures and consequently poverty among small and marginal farmers is very high. This indirectly indicates that the poor man is becoming poorest and rich becoming richest in our society.

It is further observed that the number of family workers showed a tremendous decline when it comes to the turn of large farms. It is observed from the figures in Table that the average members for small, medium and large farms are 6.37, 6.19 and 1.72 respectively with on overall average of 4.76. It is evident from the figures that with an increase in the farm size, the quantum of female workers had declined

progressively reflecting the social status of the farmers. On the other hand, the number of hired labour and permanent labour increased with the size of the farm. It can also be observed from the Table that the number of child labour decreased from 2.68 on small farms to 2.43 on medium farms and with no child labour in case of large farms. This again indicated a step towards progressive path because most of the large farmers are sending their children or diverting them either towards higher education or to a settlement in business lines.

### 5.1.2 Average size of the holding

The holding particulars according to farm size are presented in Table 5.2.

It is observed that the average size of the holding varied from 1.71 hectares in case of small farms to 8.69 hectares in large farms with an overall average of 4.81 hectares for the sample as a whole. The same for the medium farms is 4.05 hectares. It is further observed that the large chunks of the area is cultivated under rainfed conditions. It ranged from 1.67 to 3.08 on small and medium farms respectively while it is 5.87 hectares on large farms with an overall

**Table 5.2: Holding pattern of the selected farms**

(Area in hectares)

| Particulars | Size of the farms | | | |
|---|---|---|---|---|
| | Small | Medium | Large | Pooled |
| Irrigated | 0.04 | 0.96 | 2.81 | 1.27 |
| Unirrigated | 1.67 | 3.08 | 5.87 | 3.54 |
| Total area | 1.71 | 4.05 | 8.69 | 4.81 |
| Net area sown | 1.42 | 3.36 | 6.55 | 3.77 |
| Gross cropped area | 1.48 | 3.75 | 7.59 | 4.27 |
| Cropping intensity | 86.63 | 92.59 | 87.39 | 88.76 |
| Area under cotton | 1.40 | 3.06 | 5.76 | 3.41 |
| % of cotton to gross cropped area | 95.60 | 82.27 | 78.78 | 85.55 |

unirrigated land of 3.54 hectares for the entire sample.

It is further observed that the area under cotton to gross cropped area is the highest on small farms and gets decreased with the farm size. The percentage of cotton to gross cropped area on small, medium, large and pooled farms are in the order of 95.60, 82.27, 78.78 and 85.55 respectively.

Cropping intensity indicated that the percentage of gross cropped area to total cultivated area was the highest in medium farms and more or less equal on small, large and pooled farms. The cropping intensity revealed 92.59% for all the crops together on medium farms, 86.63% on small farms and 87.39% on large farms with an overall average of 88.76% for the entire sample.

### 5.1.3 Value of farm assets

The study of the farm assets in general reveals the economic background of the farmer and the risk bearing ability of the farmers largely depends on the value of the assets owned by him.

The values of farm assets among the different size groups are presented in Table 5.3.

Table 5.3: Farm Asset structure of the selected farms

(Value in rupees)

| Particulars | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | per farm | per hectare | per farm | per hectare | per farm | per hectare | per farm | per hectare |
| 1. Land value | 66947.91 | 39084.16 (87.24%) | 151950.00 | 37487.66 (86.96%) | 390291.66 | 44899.81 (90.00%) | 203063.19 | 42132.93 (88.91%) |
| 2. Value of farm buildings | 989.37 | 577.59 (1.28%) | 2367.99 | 584.21 (1.35%) | 5431.42 | 624.84 (1.25%) | 2929.59 | 607.85 (1.28%) |
| 3. Value of wells | --- | --- | 375.00 | 92.54 (0.21%) | 1166.66 | 134.21 (0.26%) | 513.80 | 106.62 (0.22%) |
| 4. Value of implements and machinery | 1480.81 | 864.26 (1.92%) | 3665.26 | 904.26 (2.09%) | 8816.62 | 1014.28 (2.03%) | 4654.10 | 965.66 (2.03%) |
| 5. Value of livestock | 7319.79 | 4273.29 (9.53%) | 16367.92 | 4038.14 (9.36%) | 27939.52 | 3214.21 (6.44%) | 17209.07 | 3570.65 (7.53%) |
| Value of total assets | 76737.50 | 44799.31 (100%) | 174726.19 | 43106.79 (100%) | 433645.90 | 49887.36 (100%) | 228369.86 | 47383.73 (100%) |

Note: Figures in the parentheses indicate % to total

It is observed from the table that on an average, the value of farm assets per hectare was the highest on large farms with Rs.49887.36 and lowest on medium farms at Rs.43106.79. The same for small and pooled farms was Rs: 44799.31 and Rs.47383.73 respectively.

On an average, irrespective of the size group, land accounted for 89% of the total value of assets. The value of non-land farm assets per hectare indicated no perceptible relationship with the farm size. Similar is the case regarding the value of farm buildings. The value of farm buildings ranged from Rs. 577.59 per hectare on small farms to Rs. 624.84 on large farms with an overall average of Rs.607.85 for the sample as a whole. The same for the medium farms is Rs.584.21 per hectare. The estimated value of wells are very less and these accounted for neglibible amount compared to the total assets. The value of implements ranged from Rs. 1014.28 per hectare on large farms to Rs.904.26 on medium farms. The same for small and pooled farms was Rs.864.26 and Rs.965.66 respectively.

The value of livestock per hectare ranged from Rs.4273.29 per hectare on small farms to Rs.3214.21 on large farms. The same for medium and pooled farms was Rs.4038.14 and Rs.3570.65 respectively. This clearly

showed the nature of indivisibility of this asset particularly on small farms. As the farm size increased the problem of indivisibility ceased.

## 5.2 COST OF CULTIVATION

All the farmers cultivated the cotton crop under rainfed farming in the selected areas. To facilitate the discussion and comparison of economics, the results of the study are presented on a comparative basis according to the farm size.

In this section, the results and discussion are presented as follows:

(1) Labour requirement per hectare of cotton according to farm size.
(2) Cost of cultivation according to input wise.
(3) Cultivation expenses according to operation wise.
(4) Structure of costs according to cost concepts.

### 5.2.1 Labour requirement

Labour is an important input in the production process. The labour employment on the farm depends on the nature of operation, size of the farm, nature of the crop and availability of the labour.

In general, the main sources of labour energy is of three types i.e., Human labour, Cattle labour and machine labour.

The human labour has three different components viz., family labour, permanent labour and casual labour.

The cattle labour is employed for ploughing preparatory cultivation, interculture, transporting manures and fertilizers besides produce including byproducts.

The labour requirement of cotton per hectare according to farm size is presented in Table 5.4.

The analysis of figures revealed no perceptible relationship between human labour utilisation and farm size in cotton production. It is observed from the figures that on an average cotton crop utilised 76 mandays per hectare for the sample as a whole. Between the farm size groups it varied from 75 to 80 mandays per hectare. Among the operations, the plant protection operation had accounted for the largest share of human labour. It is evident from the figures that the per hectare mandays utilisation had a direct relationship with the farm size. This indicates the intensity of pest attack particularly during the

Table 5.4: Labour utilization per hectare of cotton according to farm size and operations

| Operations | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | CPD | MD | CPD | MD | CPD | MD | CPD | MD |
| 1. Preparatory cultivation | 9.66 (46.71%) | 9.66 (12.08%) | 9.16 (48.08%) | 9.16 (11.40%) | 6.94 (48.66%) | 6.94 (9.24%) | 7.98 (48.13%) | 7.98 (10.50%) |
| 2. Sowing | -- | 9.37 (11.72%) | -- | 9.26 (11.52%) | -- | 8.26 (11.00%) | -- | 8.71 (11.46%) |
| 3. Manures & fertilizer application | 2.13 (10.29%) | 4.77 (5.96%) | 2.13 (11.18%) | 5.73 (7.13%) | 1.27 (8.90%) | 5.32 (7.08%) | 1.65 (9.95%) | 5.37 (7.06%) |
| 4. Intercultivation | 8.89 (42.98%) | 13.35 (16.70%) | 7.76 (40.73%) | 12.28 (15.28%) | 6.05 (42.42%) | 10.88 (14.49%) | 6.95 (41.91%) | 11.64 (15.31%) |
| 5. Plant protection | -- | 33.55 (41.98%) | -- | 34.86 (43.39%) | -- | 34.78 (46.33%) | -- | 34.63 (45.57%) |
| 6. Picking | -- | 9.21 (11.52%) | -- | 9.04 (11.25%) | -- | 8.88 (11.83%) | -- | 7.65 (10.06%) |
| Total | 20.68 (100%) | 79.91 (100%) | 19.05 (100%) | 80.33 (100%) | 14.26 (100%) | 75.06 (100%) | 16.58 (100%) | 75.98 (100%) |

Note: Figures in Parentheses indicate % to total

CPD = Cattle pair days

MD = mandays

year of study. The problem of pest was so acute that some of the farmers even employed human labour for hand picking of certain pests like American boll worm, white fly apart from controlling them with synthetic pyrethroids. Despite all these efforts no body realised even the cost of pesticides from cotton cultivation. This is one of the main reasons for suicides in some villages by cotton growers. Next important operation in case of mandays utilisation per hectare is interculture. It varied from 16 to 14 on small and large farms with a slight fluctuation of 15 mandays/ hectare on medium and pooled farms. The remaining all the operations consumed almost the same amount of mandays except the fertilizers application. The exact labour requirement for preparatory operations are in the order of 9.66, 9.16, 9.16, 6.94, 7.98 on small, medium, large and pooled farms in the same order. Sowing also needed almost the same amount but with slight modifications such as 9.37, 9.26, 8.26, 8.71 on small, medium, large and pooled farms respectively. The next operaton which is in the same ranking is picking and the mandays utilisation are 9.21 on small farms, 9.04 on medium farms, 8.88 on large farms and 7.65 on pooled farms. The least ranked operation which does not require more of labour days are fertilizer application. This

requirement ranged from 4.77 on small farms to 5.32 on large farms. The same for medium and pooled farms are 5.73 and 5.37 in the same order.

With respect to total cattle labour utilization an inverse relationship is observed with the farm size. The total cattle labour requirement varied from 14.26 CPDs on large farms to 20.68 CPDs on small farms with an overall average of 16.58 CPDs for the sample as a whole. The same for the medium farms was 19.05 CPDs per hectare. Preparatory cultivation accounted for the largest share in this case followed by interculture where in about 45% of CPDs have been utilized on an average. Similarly weeding also accounted for 41-43 CPDs per hectare.

### 5.2.2 Cost of cultivation according to cost items

The costs of cultivation are presented in Table 5.5.

The analysis of figures in Table 5.5 revealed that the cost of cultivation is directly proportional to farm size. The total cost of cultivation varied from Rs.10,000 to Rs.12,000 per hectare between different groups of farms. The actual cost of cultivation for small, medium and large is in the order of Rs.10939.83,

Table 5.5: Cost of cultivation of cotton per hectare according to farm size and cost items

(Rs/hectare)

| Particulars | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | Cost | % to total | Cost | % to total | Cost | % to total | Cost | % to total |
| VARIABLE COSTS | | | | | | | | |
| 1. Human labour | | | | | | | | |
| Hired | 377.06 | 3.44 | 516.21 | 4.49 | 678.84 | 5.74 | 588.64 | 5.07 |
| Family | 579.73 | 5.29 | 476.42 | 4.14 | 244.60 | 2.07 | 360.08 | 3.10 |
| Total | 956.79 | 8.74 | 992.63 | 8.63 | 923.44 | 7.81 | 948.72 | 8.18 |
| 2. Cattle labour | | | | | | | | |
| Hired | 102.39 | 0.93 | 154.45 | 1.34 | 132.24 | 1.11 | 134.8 | 1.16 |
| Family | 201.36 | 1.84 | 147.68 | 1.28 | 116.96 | 0.99 | 137.75 | 1.18 |
| Total | 303.75 | 2.77 | 302.13 | 2.62 | 249.2 | 2.11 | 272.55 | 2.35 |
| 3. Machine labour | | | | | | | | |
| Hired | 101.53 | 0.93 | 114.71 | 0.99 | 182.50 | 1.54 | 151.03 | 1.30 |
| Family | -- | -- | -- | -- | -- | -- | -- | -- |
| Total | 101.53 | 0.93 | 114.71 | 0.99 | 182.50 | 1.54 | 151.03 | 1.30 |
| 4. Seed | 312.50 | 2.85 | 386.2 | 3.36 | 520.89 | 4.41 | 451.89 | 3.89 |
| 5. Manures & fertilizers | | | | | | | | |
| Purchased | 1922.84 | 17.57 | 2040.19 | 17.75 | 2116.12 | 17.91 | 2066.74 | 17.82 |
| Produced | 286.35 | 2.61 | 132.19 | 1.15 | 98.95 | 0.83 | 134.62 | 1.16 |
| Total | 2209.19 | 20.19 | 2172.38 | 18.90 | 2215.07 | 18.75 | 2201.36 | 18.98 |
| 6. Plant protection chemicals | 5355.93 | 48.95 | 5526.92 | 48.09 | 5528.57 | 46.81 | 5504.15 | 47.47 |
| 7. Interest on working capital | 423.13 | 3.86 | 457.12 | 3.97 | 482.35 | 4.08 | 466.63 | 4.02 |
| Total variable costs | 9662.82 | 88.32 | 9952.09 | 86.61 | 10102.02 | 85.54 | 9996.33 | 86.21 |
| FIXED COSTS | | | | | | | | |
| 1. Rental value of own land | 1073.10 | 9.80 | 1315.79 | 11.45 | 1481.89 | 12.54 | 1375.93 | 11.86 |
| 2. Land revenue | -- | -- | -- | -- | -- | -- | -- | -- |
| 3. Depreciation | 69.71 | 0.63 | 74.22 | 0.64 | 75.26 | 0.63 | 74.18 | 0.63 |
| 4. Interest on fixed capital | 134.2 | 1.22 | 148.45 | 1.29 | 150.52 | 1.27 | 147.65 | 1.27 |
| Total fixed costs | 1277.01 | 11.67 | 1538.46 | 13.38 | 1707.67 | 14.45 | 1597.76 | 13.78 |
| Total cultivation costs | 10939.83 | 100 | 11490.55 | 100 | 11809.69 | 100 | 11594.09 | 100 |

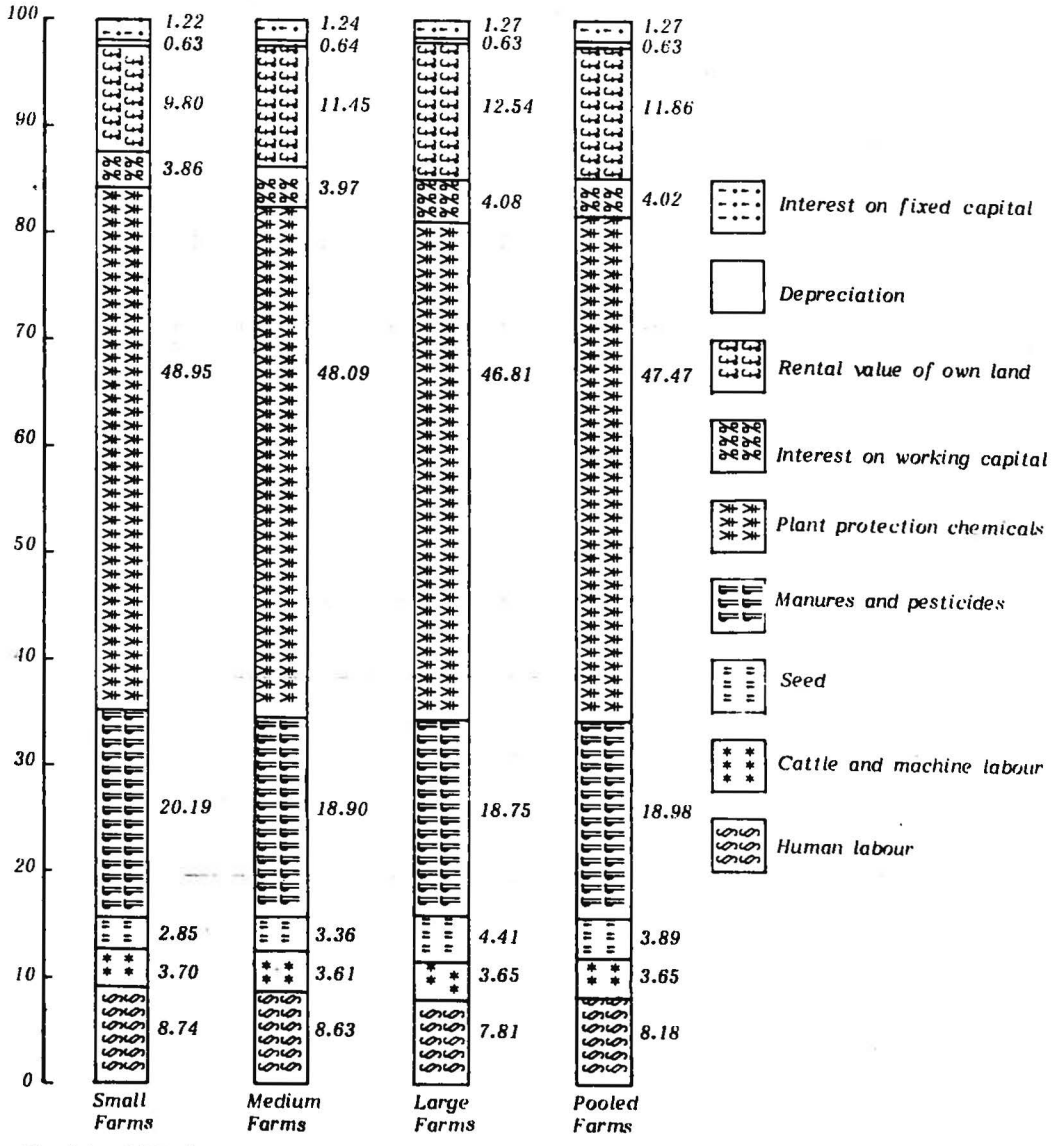


***Fig. 5.1 : COMPONENTS OF CULTIVATION COSTS OF COTTON***

11490.69 respectively. The same for pooled farms is Rs.11594.09 per hectare of cultivated cotton.

At the same time, if analysed the structure of variable costs, it is evident that the cost goes on decreasing as the size of the farm increased. No doubt, the actual cost increased with the size of the farm, but in terms of percentage, it is evident that this has a clear inverse relationship with the farm size. The variable costs fluctuated from 85% to 88% between sizes.

In case of fixed costs too the same relationship as that of total cost existed. These costs also have an increasing trend with the size of the farm.

Among the components of variable costs, the pesticides consumed nearly 50% of the variable costs on all the farms irrespective of its size. Next in the order of importance is manures and fertilizers which fluctuated from 18% to 20% on all farms. The remaining all the components of variable costs shared almost equal amount of money. The actual order of importance is human labour, seed, cattle labour, interest on working capital and lastly the machine labour in the descending order.

In case of fixed costs, the different components existed in the order of rental value of owned

land, interest on fixed capital and depreciation on fixed assets.

Despite all the efforts and investments, it is a pitiable thing that the farmer could not recover even the cost of pesticides from the cotton cultivation this year.

### 5.2.3 Cost of cultivation according to operations

The cost of cultivation can also be viewed from a separate angle i.e., operation wise. This will be useful to highlight the relative importance of the various cultural operations in the cultivation of cotton. In fact, the operation wise analysis of the cost is nothing but re-arrangement of the variable cost component excluding the interest on working capital.

The details pertaining to operation wise costs are presented in Table 5.6.

It can be seen from the Table that the cost of cultivation per hectare of cotton varied from Rs.9239.46 on small farms to Rs.9619.66 on large farms while medium farms accounted for Rs.9494.96 per hectare and with an overall average of Rs.9529.70/hectare. This indicates a direct relationship with the farm size.

Table 5.6: Cost of cultivation of cotton per hectare according to farm size and operation wise

(Rs/hectare)

| Operations | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | Cost | % to total | Cost | % to total | Cost | % to total | Cost | % to total |
| 1. PREPARATORY CULTIVATION | | | | | | | | |
| Human labour | 120.38 | 1.30 | 121.90 | 1.28 | 98.40 | 1.02 | 108.46 | 1.13 |
| Cattle labour | 159.45 | 1.72 | 166.89 | 1.75 | 138.84 | 1.44 | 150.08 | 1.57 |
| Machine labour | 101.33 | 1.09 | 114.71 | 1.20 | 182.50 | 1.89 | 151.03 | 1.58 |
| Total | 381.16 | 4.12 | 403.5 | 4.24 | 419.72 | 4.36 | 409.57 | 4.29 |
| 2. SEEDS AND SOWING | | | | | | | | |
| Human labour | 132.7 | 1.43 | 130.29 | 1.37 | 113.36 | 1.17 | 121.08 | 1.27 |
| Material cost | 312.5 | 3.38 | 386.20 | 4.06 | 520.89 | 5.41 | 451.89 | 4.74 |
| Total | 445.20 | 4.81 | 516.49 | 5.43 | 634.25 | 6.59 | 572.97 | 6.01 |
| 3. MANURES & FERTILIZER APPLICATION | | | | | | | | |
| Human labour | 51.48 | 0.55 | 66.13 | 0.69 | 56.88 | 0.59 | 58.91 | 0.61 |
| Cattle labour | 33.08 | 0.35 | 33.61 | 0.35 | 21.23 | 0.22 | 26.57 | 0.27 |
| Material cost | 2209.19 | 23.91 | 2172.39 | 22.87 | 2215.08 | 23.02 | 2201.38 | 23.1 |
| Total | 2293.75 | 24.82 | 2272.13 | 23.92 | 2293.19 | 23.83 | 2286.86 | 23.99 |
| 4. PLANT PROTECTION | | | | | | | | |
| Human labour | 494.39 | 5.35 | 522.91 | 5.5 | 521.84 | 5.42 | 518.37 | 5.43 |
| Material cost | 5355.93 | 57.96 | 5526.92 | 58.2 | 5528.57 | 57.47 | 5504.15 | 57.75 |
| Total | 5850.32 | 63.31 | 6049.83 | 63.71 | 6050.41 | 62.89 | 6022.52 | 63.19 |
| 5. INTERCULTIVATION | | | | | | | | |
| Human labour | 71.00 | 0.76 | 66.54 | 0.70 | 58.62 | 0.60 | 62.69 | 0.65 |
| Cattle labour | 111.21 | 1.20 | 101.63 | 1.07 | 89.13 | 0.92 | 95.90 | 1.00 |
| Total | 182.21 | 1.97 | 168.17 | 1.77 | 147.75 | 1.53 | 158.59 | 1.66 |
| 6. PICKING | 86.82 | 0.93 | 84.84 | 0.89 | 74.32 | 0.77 | 79.19 | 0.83 |
| Grand total | 9239.46 | 100 | 9494.96 | 100 | 9619.66 | 100 | 9529.7 | 100 |

In case of plant protection too, it has the largest share. The costs indicated a direct relationship with pesticides ranged from Rs.5355.93 on small farm to Rs.5528.57 on large farms with an overall average of Rs.5504.15 per hectare of cotton. The same for medium farms was 5526.92 rupees per hectare.

Next, in the order of importance is manures and fertilizers which shared nearly 25% of the total operational costs. The costs incurred on fertilisation on small, medium, large and pooled farms is of the order of Rs.2293.75, Rs.2272.13, Rs.2293.19 and Rs.2286.86 respectively. This does not indicate any perceptible relationship with the farm size.

After manures and fertilizers, it is the cost of seeds and sowing in the order of importance. Next to seeds is preparatory cultivation followed by interculture and picking.

While the costs incurred on preparatory cultivation and sowing indicated a direct relationship with farm size, the cost incurred on interculture and picking had an inverse relationship with the farm size.

On an aggregate basis the cost incurred in plant protection is very high both on operation wise as well as item wise costs.

### 5.2.4 Cost of cultivation according to cost concepts

The cost of cultivation of a crop is not uniquely defined on account of the fact that various components of costs differ in their economic significance and therefore it becomes necessary to workout aggregate costs differing in composition.

The cost of production of cotton crop is also worked out by adopting the cost concepts used in farm management studies undertaken by the Govt. of India. cost $A_1$, cost $A_2$, cost B, cost C which are the prime costs have been adopted. However cost $A_2$ is not considered in this study as there was no tenant farmer in the sample. The concept of cost C is the most comprehensive one. It includes all costs both fixed and variable including paid and unpaid costs. Hence, this provides a basis for comparison between different sizes of operational holdings.

The cost worked out on the basis of cost $A_1$ is the variable cost incurred in cash or kind by a owner farmer which excludes the imputed value of famiily labour. Under cost B, besides cost $A_1$, where indirect costs such as interest on fixed capital and rental value of owned land are also included. Cost C is computed by adding to cost B, the imputed value of family labour.

The concept of prime cost has been introduced to indicate the variable costs incurred for raising a particular crop. As such, it does not include land revenue and cesses, rent paid on leased in land, rental value of owned land and interest on owned fixed capital. The imputed value of family labour is included in prime costs because even though family labour is considered to be a fixed one for the farm as a whole, it can be varied from crop to crop, depending upon its labour requirements and necessity to use more family labour.

Distribution of cultivation costs according to cost concepts perhectare is incorporated in Table 5.7.

The figures in Table 5.7 revealed the same relationship on all costs i.e., cost $A_1$, Cost B, Cost C and prime cost. All these costs had direct relationship with farm size.

Cost $A_1$ ranged from Rs.9152.80/hectare on small farms, Rs.9549.89 for medium farms, Rs.9932.68 on large farms with an over all average of Rs. 9710.43.

Cost B also fluctuated in the same manner as that of Cost $A_1$. This varied from Rs.10360.10 to Rs.11565.09. The same for medium and pooled farms was Rs.11014.13 and 11234.01 respectively.

Table 5.7: Cost of cultivation of cotton according to cost concepts

(Rupees/hectare)

| Particulars | Total VC | Total FC | Cost A1 | Cost B | Cost C | Prime cost | Percentage to total cost |
|---|---|---|---|---|---|---|---|
| Small Farms | 9662.82 | 1277.01 | 9152.80 | 10360.10 | 10939.83 | 9732.53 | 88.96 |
| Medium Farms | 9952.09 | 1538.46 | 9549.89 | 11014.13 | 11490.55 | 10026.31 | 87.25 |
| Large Farms | 10102.02 | 1707.67 | 9932.68 | 11565.09 | 11809.69 | 10177.28 | 86.17 |
| Pooled Farms | 9996.33 | 1597.76 | 9710.43 | 11234.01 | 11594.09 | 10070.51 | 86.85 |

In case of cost C, small farms worked out to Rs.10939.83, medium farms Rs.11490.55, large farms Rs.11809.69 with an average for the sample as a whole at Rs.11594.09 per hectare.

Lastly, prime costs also indicated the same relationship as that of other costs. The actual costs for small, medium, large and pooled farms were in the order of Rs.9732.53, Rs.10026.31, Rs.10177.28 and Rs.10070.51 respectively.

To sum up, the discussion revealed that in cotton, the cost of cultivation per hectare according to various cost concepts related directly with the farm size.

## 5.3 PRODUCTIVITY OF COTTON

The productivity on farms according to farm size is presented in Table 5.8.

The yield per unit of land indicates the production of a particular crop. The productivity of cotton clearly shows a direct relationship with farm size. It is found that yields have increased with increase in farm size.

Further, the analysis revealed the average yield of cotton per hectare is 5.38 quintals on small

Table 5.8: Average yields of cotton according to farm size

| Farm Size | Yield/hectare in quintals |
|---|---|
| Small farms | 5.38 |
| Medium farms | 6.51 |
| Large farms | 7.20 |
| Pooled farms | 6.74 |

farms, 6.51 qtls on medium farms and 7.20 qtls on large farms, while the average yield on pooled farms is 6.74 quintals per hectare of cotton.

## 5.4 COST OF PRODUCTION PER QUINTAL OF COTTON

It is generally considered that it would be better to take unit costs into consideration rather than going by the average cost alone. The unit costs will be useful for decision making at micro level and to sort out the policy implications at macro level. Hence, the costs per quintal are also worked out for cotton and presented in Table 5.9.

According to the analytical figures it is clear that the total cost of cultivation of cotton gets decreased with the increase in the farm size. It shows a clear inverse relationship with the farm size. The total cost of cultivation of cotton per quintal ranged from Rs.2033.42 on small farms, Rs.1765.06 on medium farms and Rs.1640.23 on large farms with an overall average of Rs.1720.19 per hectare.

Besides the total cost, all the remaining costs such as total variable costs, cost $A_1$, Cost B, prime costs also show a declining trend with the increase in farm size, while the total fixed cost showed no perceptible relationship with the farm size.

In case of total variable costs the minimum and maximum levels for production of quintal of cotton is Rs.1403.05 on large farms to Rs.1796.06 on small farms. The same for medium and pooled farms was Rs.1528.73 and Rs.1483.13 in the same order.

The total fixed costs showed no perceptible relationship with the farm size. The variation in cost per quintal of cotton is negligible. The actual range for small, medium and large farms was Rs.1.04 between small and medium, Rs.0.19 between small and large farms and Rs.0.85 between medium and large farms with an overall average of Rs.0.31, Rs.0.73 and Rs.0.12 for small, medium and large farms respectively.

With regard to cost $A_1$ there is a clear declining trend with the increase in farm size. This cost is Rs.1701.26 on small farms to Rs.1379.53 for large farms with an overall average of Rs.1440.71 per hectare per quintal.

In case of the remaining costs such as cost B and prime costs also the same inverse relationship with the farm size was observed. The ranges of cost B are Rs.1925.66 on small farms to Rs.1606.26 on large farms with the average cost of Rs.1666.76 per quintal. The same for prime costs are Rs.1809.02, Rs.1413.51 and

Table 5.9: Cost of production of cotton per quintal according to cost concepts and farm size

(in rupees)

| Particulars | Total VC | Total FC | Cost A1 | Cost B | Cost C | Prime Cost | Gross returns |
|---|---|---|---|---|---|---|---|
| Small Farms | 1796.06 | 237.36 | 1701.26 | 1925.66 | 2033.42 | 1809.02 | |
| Medium Farms | 1528.73 | 236.32 | 1466.95 | 1691.87 | 1765.06 | 1540.13 | |
| Large Farms | 1403.05 | 237.17 | 1379.53 | 1606.26 | 1640.23 | 1413.51 | |
| Pooled Farms | 1483.13 | 237.05 | 1440.71 | 1666.76 | 1720.19 | 1494.14 | |

Note: VC = Variable Cost

FC = Fixed Cost

Table 5.10: Returns from cotton cultivation

(Rupees/Hectare)

| Particulars | Gross returns | Net Returns | | Farm Business Income | Family Labour Income | Farm Investment Income |
|---|---|---|---|---|---|---|
| | | Over Cost C | Over Prime cost | | | |
| Small farms | 4292.43 | -6647.40 | -5440.10 | -4860.37 | -6067.67 | -5440.10 |
| Medium farms | 5263.17 | -6227.38 | -4763.14 | -4286.72 | -5750.96 | -4763.14 |
| Large farms | 5927.56 | -5882.13 | -4249.72 | -4005.12 | -5637.53 | -4249.72 |
| Pooled farms | 5503.75 | -6090.34 | -4566.76 | -4206.68 | -5730.26 | -4566.76 |

Rs.1494.14 for small, large and pooled farms respectively.

The final analysis clearly shows an inverse relationship of unit costs with the farm size except the total fixed costs where there is no perceptible relationship between unit costs and farm size.

## 5.5 RETURNS FROM COTTON CULTIVATION

An attempt is made in this section to assess all the five measures of income viz., Gross income, Net income, Farm business income, Family labour income and Farm investment income.

The comparative picture of the various income measures per hectare for different size groups are presented in Table 5.10.

### 1. Gross income

This is the total return received by the cultivator through sale of cotton produce in the market.

The returns per hectare of cotton ranges from Rs.4292.43 on small farms to Rs.5927.56 on large farms with an overall average of Rs.5503.75. The same for medium farms is Rs.5263.17 per hectare.

It is quite clear from the analysis that gross returns indicated direct relationship with the farm size indicating the presence of scale economics in cotton cultivation.

**2. Net income**

The net returns are estimated as

(i) over cost 'C'

(ii) and over prime cost

The analysis of net returns in cotton cultivation has clearly established the fact that under the present conditions of farming, cotton cultivation is a loosing proposition since no farmer irrespective of the size group, had recovered even the prime costs from cotton cultivation during the year of study. On the other hand the magnitude of loss is so high that no farmer could with stand the situation confronted by the cotton farmers. This is more serious in case of small farmers.

According to the opinion survey analysis, the dominance of spurious pesticides in the market, their adulteration to the maximum extent and severe pest attack on cotton by the white fly during the year are

the major reasons for not getting the returns equal to prime costs.

Cotton which all these years brought prosperity to thousands of families in the coastal districts of A.P. has suddenly become a killer crop. It looks as if they had entered into a suicide pact. Farmers began consuming pesticides that once saved their crops. It is horrible to hear that some of the small farmers pledged all their assets including the 'mangala sutrum' to meet the costs of raising the crop. They had also borrowed from Co-operative Societies, money lenders, besides all available sources. But the fate has driven them to death trap. Most of them had been cultivating cotton for the last 4 years. But during the last 2 years, two significant factors mainly contributed to the gloom. One was the white fly menace and other which was more dangerous was the sale of spurious pesticides where the Govt. was a silent spectator. Instead of heavy returns, the farmers fell into heavy debts.

In the present study, the analysis clearly showed a net loss of nearly 1000 rupees for quintal of cotton. The small farmers are the worst affected group. The net loss for small, medium and large farms was Rs.6547.40, Rs.6227.38 and Rs.5882.13 respectively with an average loss of Rs.6070.34 per hectare of cotton.

With respect to net loss over prime cost is Rs.5440.10 on small farms, Rs.4763.14 per hectare for medium farms, Rs.4249.76 in large farms with an overall loss of Rs.4566.76 in pooled farms.

**3. Farm business income**

The farm business income is the return to the farm operator for his family labour and investment on owned land and fixed capital. Farm business income has been obtained by deducting cost $A_1$ from gross income. Like returns over prime cost, returns over farm business income is also a measure of decision making with respect to the continuation of cultivation of a particular enterprise.

The study revealed that this income measure is negative in all groups irrespective of its size. The study further revealed that small farms were the worst affected group even with respect to farm business income. The actual farm business income limits were of the order of Rs.-4860.37, Rs.-4286.72, Rs.-4005.12, and Rs.-4206.68 for small, medium, large and overall farms in the same order.

**4. Family labour income**

Family labour income which is the return to the labour of the operator and his family is obtained by deducting cost B from gross returns. This analysis supported the fact that the small farms group is the worst affected one among all the groups.

**5. Farm investment income**

This is a measure of return from cotton cultivation to the fixed capital investment of the farm. It is obtained by adding rental value of owned land and interest on fixed capital to the net returns. Even this income measure also showed the same inverse relationship with the farm size. The actual negative return on farm investment income was of the order of Rs.-5440.10 on small farms, Rs.-4763.14 on medium farms, Rs.-4249.72 on large farms and an overall average of Rs.-4566.76 for the sample as a whole.

**5.5.1 Returns per quintal of cotton**

Having discussed the returns in cotton cultivation per hectare, an attempt has been made to present the returns per quintal of cotton according to farm size.

The particulars are presented in Table 5.11.

After the perusal of above figures the analysis clearly supports our previous findings that the returns got increased with the increase in size of the farm. No doubt every farmer incurred a net loss of nearly 1000 rupees per quintal of cotton. But the study brought out the fact that the returns can be increased with the farm size. This may be due to efficient use of resources and economics of scale.

The gross returns per quintal of cotton is Rs.797.87 on small farms, Rs.808.47 on medium farms and Rs.823.27 on large farms with an overall average of Rs.816.58 for the whole sample.

With respect to net returns, it is Rs.-1235.57 on small farms, Rs.-956.57 on medium farms, and Rs.-816.96 on large farms, while it is Rs.-903.61 for pooled farms. The same sequence for net returns over prime cost was of the order of Rs.-1011.17, Rs.-731.66, Rs.-590.23 and Rs.-677.56 for small, medium, large and pooled farms respectively.

Net returns analysis showed a clear cut loss of nearly 1000 rupees on every quintal of cotton irrespective of the size of the farm. As expressed

Table 5.11: Returns per quintal in cotton cultivation according to farm size

| Particulars | Gross returns (Rs) | Net returns (Rs) | |
|---|---|---|---|
| | | Over cost 'C' | Over prime cost |
| Small farms | 797.84 | -1235.57 | -1011.17 |
| Medium farms | 808.47 | -956.58 | -731.66 |
| Large farms | 823.27 | -816.96 | -590.23 |
| Pooled farms | 816.58 | -903.61 | -677.56 |

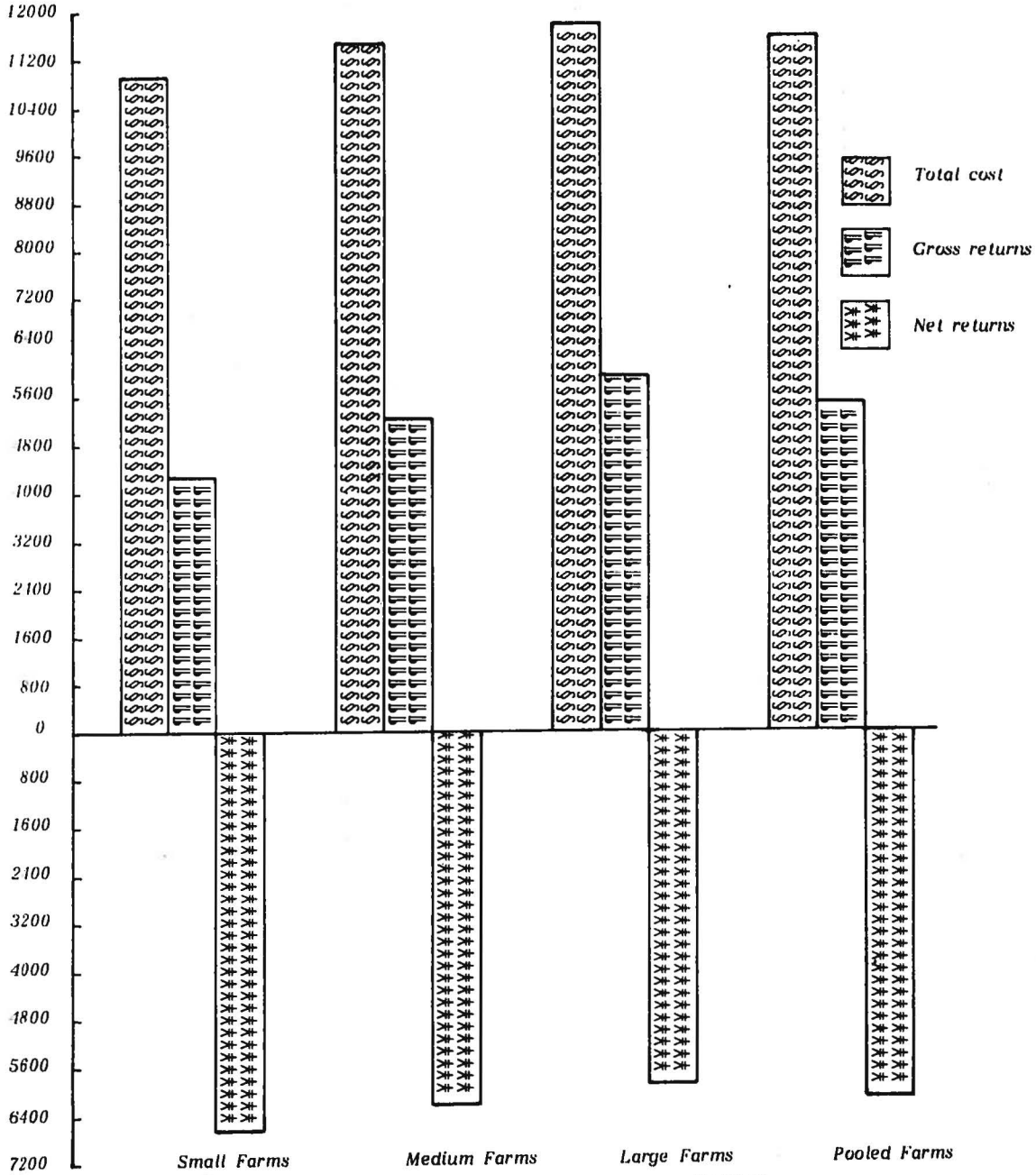


*Fig. 5.2 : COSTS AND RETURNS IN COTTON CULTIVATION*

earlier no farmer could escape from the clutches of this phenomenon during this year due to cotton cultivation.

To sum up, the cotton cultivation in these mandals is a loosing proposition now. Farmers may not recover from their debts, since the magnitude of net loss was very high in respect of all categories farms.

Under the present situation the State Govt. has to interfere at this juncture and should extend its helping hand to the worst affected groups like small and marginal farmers.

## 5.6 PROFITABILITY IN COTTON CULTIVATION

Having discussed the gross returns and net returns in cotton production in the previous section, an attempt has been made to examine the profitability in cotton cultivation.

Generally, profitability is worked out by considering the gross returns and total cost. Certain economists used input output ratio (O/I) to assess the profitability and some also regarded it as cost-benefit ratio. Others used the management tool i.e., break-even analysis to study the viability and profitability. In fact the latter is the better tool because it indicates the point of maximum loss and breakeven level of output

and there by suggests optimum level of operation; Whereas the input output ratio suggests the return for every rupee invested in a particular enterprise. In this study both the techniques are attempted.

### 5.6.1 Input-output ratio/cost-benefit ratio in cotton cultivation

This ratio explains the return for every rupee of expenditure in cotton production. It is computed by dividing the gross returns by cost C and prime cost. To take a decision whether to go for cultivation of cotton or not, the prime cost is the most important one. As such, input-output ratio is estimated by considering the total cost and prime cost and the details are presented in Table 5.12.

It is seen that the input-output ratio for small farms is 1:0.39, for medium farms 1:0.45, for large farms 1:0.50. While it is 1:0.47 for pooled farms. This is computed on the basis of total cost.

With respect to input-output ratio on the basis of prime cost is 1:0.44, 1:0.52, 1:0.58 and 1:0.54 for small, medium, large and pooled farms respectively.

Thus, the above analysis clearly showed an unbearable net loss, specially in case of small farms,

Table 5.12: Input-output ratios in cotton cultivation according to farm size

| Particulars | Gross returns Rs/ha | Total cost Rs/ha | Prime cost Rs/ha | Input-output ratio (O/I) on the basis of | | Net loss per rs investment on basis of | |
|---|---|---|---|---|---|---|---|
| | | | | Cost 'C' | Prime cost | Cost 'C' | Prime |
| Small farms | 4292.43 | 10939.83 | 9732.53 | 1: 0.39 | 1: 0.44 | 0.61 | 0.5 |
| Medium farms | 5263.17 | 11490.55 | 10026.31 | 1: 0.45 | 1: 0.52 | 0.55 | 0.4 |
| Large farms | 5927.56 | 11809.69 | 10177.28 | 1: 0.50 | 1: 0.58 | 0.50 | 0.4 |
| Pooled farms | 5503.75 | 11594.09 | 10070.51 | 1: 0.47 | 1: 0.54 | 0.53 | 0.4 |

Table 5.13: Break-even output in cotton cultivation according to farm size

| Particulars | Average yield per farm (Qtls) | Fixed cost per farm (Rs) | Variable cost per quintal (Rs) | Price per quintal (Rs) | BEO per farm (Qtls) | Difference between BEO & Average out put (Qtls) |
|---|---|---|---|---|---|---|
| Small farms | 7.56 | 1793.15 | 1796.06 | 787.50 | -1.77 | -9.33 |
| Medium farms | 20.00 | 4720.50 | 1528.73 | 795.83 | -6.44 | -26.44 |
| Large farms | 41.49 | 9836.89 | 1403.05 | 810.41 | -16.59 | -58.08 |
| Pooled farms | 23.01 | 5450.18 | 1483.13 | 797.91 | -7.95 | -30.96 |

is Rs.0.61 for every one rupee investment on cotton production. The net loss in case of medium and large farms is relatively less. In fact the magnitude of net loss got decreased with the increase in farm size. It means that there is an inverse relationship of net loss with farm size. This may be due to greater risk bearing ability with large farms. Even in case of prime costs also, the net loss is almost 50% for every 100 rupees investment in cotton production. Thus, the analysis showed a loosing proposition trend in these mandals and thus farmers may not resort to cotton cultivation in a near future.

### 5.6.2 Break-Even Analysis

This tool will be of greater use to find out the directions of total cost and total revenue as the output changes from one level to another.

To locate break even output, the components considered are total revenue, fixed and variable costs and output produced on the farm. The total revenue is nothing but the total value of the produce produced and the value is estimated at the market price. Fixed and variable costs are taken from the cost data. The break even output is arrived at by using the formula given below:

$$\text{Break even output} = \frac{\text{Total fixed costs per farm}}{\text{Price per Quintal-Variable cost per Quintal}}$$

Thus, the break even outputs are being located on charts and graphs. From these charts it can be clearly seen whether the farmers are producing in loss or profit. The break even output indicates the level of output at which there is neither profit nor loss.

The details of break even output and average output levels are presented in Table 5.13.

The above results reveal (Table) the fact that the farmers are unnecessarily producing the output without getting even marginal profit. Moreover, every farmer who entered into this business is incurring an unparallel net loss of 50-60 NP for every one rupee investment on cotton. Under the present market prices it can be inferred that no small farmer should attempt to produce cotton. All the break even output levels were located on the negative quadrants. It can also be inferred under the current market prices that no farmer should attempt to cultivate cotton. It is necessary that low cost strategies are to be invented so as to keep the farmers in the business.

In view of the unprecedented condition that State Govt. should intervene and do justice to ill

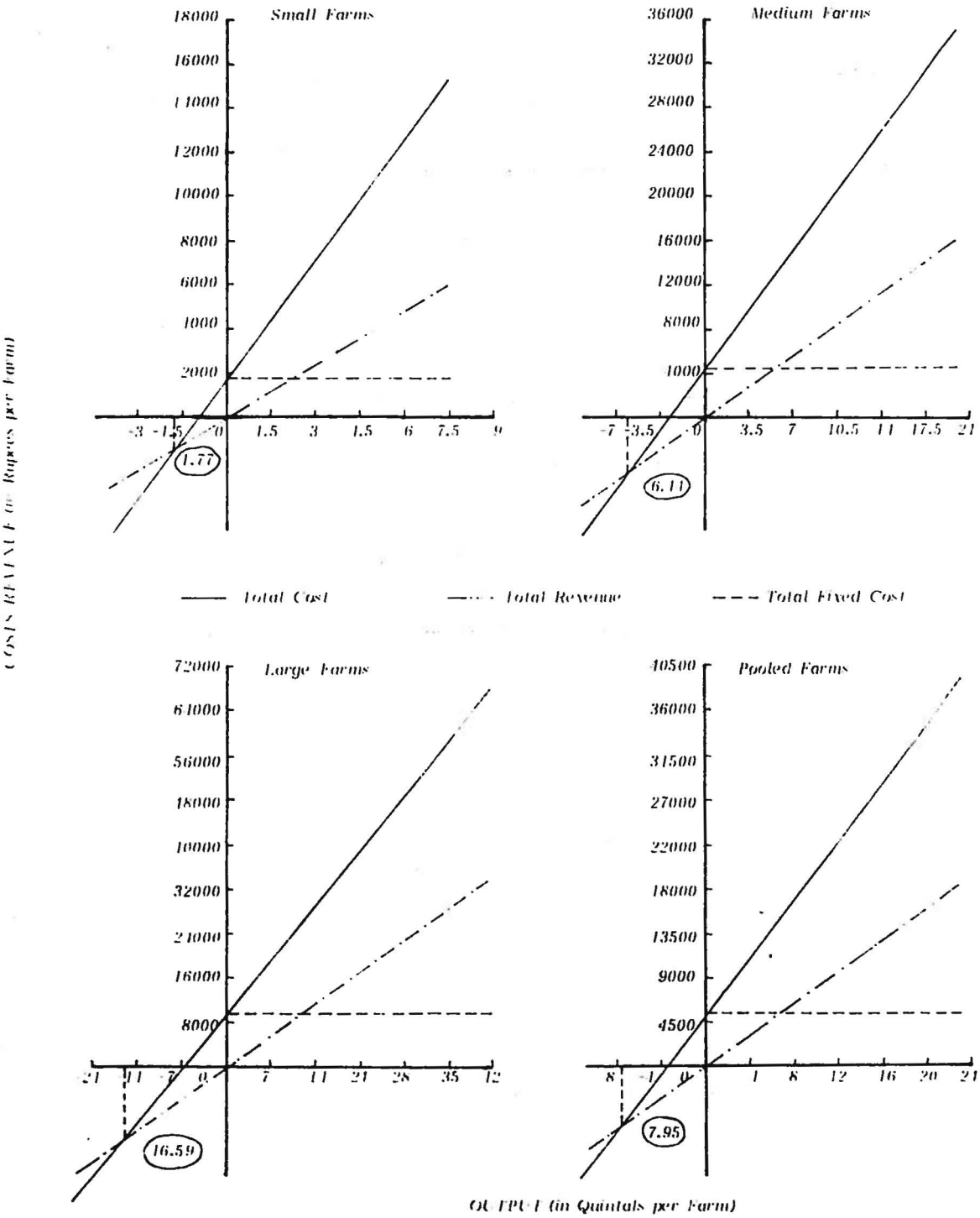


**Fig. 5.3 : BREAK-EVEN OUTPUT IN COTTON CULTIVATION**

fated farmers. The price per quintal should be increased with immediate effect. There is an urgent need for this effort to satisfy the needs of the farmer.

## 5.7 RESOURCE PRODUCTIVITY, RETURNS TO SCALE AND RESOURCE USE EFFICIENCY ON COTTON FARMS

In this section, the resource productivity, returns to scale and resource use efficiency in cotton production according to farm size are discussed below:

The production function analysis provides the co-efficients which explain the relationship of each of the variables with the output. The use of production function analysis could help planning resource use at the optimum level and make necessary adjustments if need be. In a attempt has been made to discuss the resource returns, returns to scale and resource use efficiency on all farms with the help of production function analysis.

Among various forms of production function models, the Cobb-Douglas production function model is choosen to estimate the resource use efficiency and returns to scale. This is a power function which is extensively used by research workers because of its ease in computation, simplicity in interpretation and more particularly its feasibility in depicting the ralation-ship of input to output.

### 5.7.1 Specification of variables for detailed study

1. Land (X1) : The actual area under cotton is considered as the land variable taken in hectares.

2. Seed (X2): This variable is considered in monetary terms only since the actual price paid was taken into consideration.

3. Human labour (X3): The total human labour (family and hired) utilised on each farm was taken and converted into the mandays of 8 hours. For the purpose of standardisation, the wage rate was taken as the basis because it has been assumed that the wage rates indicate the normal productivity of the labour. For functional analysis the total human labour days were converted into rupees per farm.

4. Cattle labour (X4): The total cattle labour utilisation was taken and it was converted into the cattle pair days and finally CPDs were converted into rupees/farm, based on the hire charges for employing one cattle pair per day of 8 hours.

5. Manures & fertiliizers (X5): This variable is taken in monetary terms per farm. The farm produced as well as purchased manures and fertilizers were evaluated at the prevailing local market rates. In case of

fertilizers, the actual amount paid for its purchase is considered.

6. Plant protection chemicals (X6): This variable is taken in monetary terms per farm based on the actual amount incurred for the purchase of required materials.

Out put (Y): This represents the total output produced on the farm and this is considered for functional analysis. This is taken in monetary terms per farm i.e., gross value.

The functional model adopted is of the following form:

$$Y = a\ x_1^{b1}\ x_2^{b2}\ x_3^{b3}\ x_4^{b4}\ x_5^{b5}\ x_6^{b6}$$

Where,

Y = Output per farm in rupees

a = Constant

$x_1$ = Land area in hectares

$x_2$ = Value of seed in rupees/farm

$x_3$ = Human labour in rupees/farm

$x_4$ = Cattle labour in rupees/farm

$x_5$ = Value of manures & fertilizers in rupees/farm

$x_6$ = Value of plant protection chemicals in rupees/farm

$b_1 - b_6$ = Respective elasticity coefficients of the variables

This power function was transformed into log linear form for the estimation. The coefficients are estimated by using Least Square Method.

The type of returns to each factor is indicated by the exponent bi. If bi is equal to one, it means a percentage change in input causes same percentage change in output, when all other factors are held constant. If bi is greater than one it indicates increasing returns to the factor while and if bi is less than one, it indicates decreasing returns to the factor.

These individual elasticities when summed up indicates the scale coefficient-Ebi. If Ebi is equal to one, constant returns to scale holds true indicating a given % increase in input of all factors causes the output to increase by the same %. If Ebi is less than one, it indicates decreasing returns to scale and if it is more than one, it reveals increasing returns to scale.

### 5.7.2 Marginal value productivity

The marginal product indicates the expected increase in output forth coming from the use of an additional unit of the relevant input, when the levels of other inputs remaining unchanged. This is obtained by differentiating the production function. In

general, the marginal productivity of any resource depends on the quantity used and onthe levels of other resources with which it is combined in the production process. The formula used for computing marginal value product is

$$\text{MVP of } xi = bi \frac{\bar{Y}}{\bar{xi}}$$

Where,

$\bar{Y}$ = Geometric mean of output

$\bar{xi}$ = Geometric mean of the respective input

bi = Elasticity of output of a given variable

P.S : The resultant $bi \frac{\bar{Y}}{\bar{xi}}$ is not multiplied by PY (price of output) since Y is taken as the output in monetary terms. Hence we consider

$bi \frac{Y}{xi}$ as the MVP of xi

### 5.7.3 Resource use efficiency

The measure of allocative efficiency is provided by the ratio of marginal value product to opportunity cost or factor cost. This ratio indicates the direction of changes that can be made in resource allocation, if profits are to be maximised. If the ratio is less than one, it indicates that too much of

the respective resource is being used under the existing price conditions and vice versa. Equality of marginal value product to opportunity cost indicates the efficient resource use. Deviation from unity indicates the degree of inefficiency in resource use.

After the estimates of productivity of various resources have been determined, the following issues are being surfaced.

a) How much of increase in output may be obtained by a unit increase in a particular input, when other inputs are kept at a geometric mean level?

b) If all the inputs are increased proportionately what is the proportionate increase in output ?

c) Are the various marginal value products are greater or smaller than their costs ?

d) How to achieve profitability in production ?

### 5.7.4 Production elasticities and returns to scale

Production elasticities and their respective standard errors are given according to the farm size in Table 5.14.

Table 5.14: Production elasticities and related statistics in cotton production

| Particulars | Small farms | Medium farms | Large farms | Pooled farms |
|---|---|---|---|---|
| No of farms | 24 | 24 | 24 | 72 |
| Constant (log a) | 10.7835 | -2.0201 | -2.3390 | 1.0622 |
| | (46.71%) | (12.08%) | (48.08%) | (11.40%) |
| PRODUCTION ELASTICITIES | | | | |
| Land (ha) | 2.8044 | -0.4811 | -0.2489 | 0.2633 |
| Seed (Rs) | 0.1004 | -0.0950* | 0.0981*** | 0.0388 |
| Human labour (Rs) | -0.8708** | 0.0236 | 0.5106 | 0.0044 |
| Cattle labour (Rs) | 0.5545 | -0.3989 | 0.4196 | 0.6825** |
| Manures & fertilizers (Rs) | -0.8304** | -0.0409** | -0.1316** | -0.0663** |
| Pesticides (Rs) | -0.9317** | 0.8945** | -0.8724** | -0.2293** |
| Sum of elasticities Ebi | 0.8264 | -1.8868 | -0.2246 | 0.6834 |
| R2 | 0.7624 | 0.7928 | 0.8127 | 0.9068 |
| STANDARD ERRORS | | | | |
| Land (ha) | 1.6447 | 0.9156 | 0.7815 | 0.3516 |
| Seed (Rs) | 1.1715 | 0.0423 | 0.0530 | 0.0963 |
| Human labour (Rs) | 0.2653 | 0.0522 | 0.6553 | 0.1143 |
| Cattle labour (Rs) | 0.3822 | 1.4740 | 0.3300 | 0.2178 |
| Manures & fertilizers (Rs) | 0.2513 | 0.0135 | 0.0372 | 0.0160 |
| Pesticides (Rs) | 0.2786 | 0.2957 | 0.2026 | 0.0650 |
| GEOMETRIC MEANS | | | | |
| Output (Rs) | 3.7144 | 4.1170 | 4.5014 | 4.1109 |
| Land (ha) | 0.1125 | 0.4919 | 0.7498 | 0.4514 |
| Seed (Rs) | 2.6122 | 3.1227 | 3.4192 | 3.0514 |
| Human labour (Rs) | 3.1036 | 3.4167 | 3.7211 | 3.4138 |
| Cattle labour (Rs) | 4.7099 | 3.1050 | 3.3781 | 3.0643 |
| Manures & fertilizers (Rs) | 3.4589 | 3.9279 | 4.0929 | 3.8266 |
| Pesticides (Rs) | 3.8361 | 4.2173 | 4.4841 | 4.1792 |

* significant at 5% level

** Significant at 1% level

*** Significant at 10% level

It is observed that the co-efficients of Multiple Determination ($R^2$) were significant at one per cent level of probability accounting for 76%, 79%, 81% and 90% of the variance in output by the explanatory variables included in the functions for small, medium, large and pooled farms respectively.

1. **Land** ($X_1$): The production elasticities of land in all the types of farms are not statistically significant. They are positive in case of small and pooled farms, while they are negative in respect of medium and large farms. It means, the level of input has not reached the stage of influencing the output.

2. **Seed** ($X_2$): The regression co-efficients are not significant in case of small and pooled farms indicating their non-influence in changing the output. The production elasticity is negatively significant at 5% level in medium farms. It shows that one per cent level increase in seed would decrease in gross returns by 0.0950 per cent. However, in large farms, the regression coefficient is significantly positive at 10 per cent indicating the scope for increasing the

production by increasing the level of this input.

3. **Human labour** ($X_3$): The production elasticity in case of small farms is negatively significant because of its excessive use. It means that an increase of the input by one per cent, would decrease in gross returns by 0.8708 per cent. They may be due to large scale utilization of family labour on the farms to gainfully employ themselves. In case of other three groups of farms though the production elasticities are positive, they are non-significant in influencing the output level.

4. **Cattle labour** ($X_4$): Though the production elasticities are positive in small and large farms and negative in case of medium farms, they are not statistically significant. In case of pooled farms, the regression coefficient is significant at one per cent level. It means an increase of input by one per cent, keeping other inputs at geometric mean levels, the gross returns would increase by 0.6825 per cent.

5. **Manures & fertilizers** ($X_5$): This is a very critical input. It is found that all the production elasticities are negatively significant at one per cent level. It means that one per cent increase in this variable, keeping others at constant level would decrease the gross income by 0.8304, 0.0409, 0.1316 and 0.0663 per cent in small, medium, large and pooled farms in the same order. This phenomenon is due to excessive use of manures and fertilizers indiscriminately.

6. **Pesticides** ($X_6$): This is another peculiar situation. In all the farm types, the production elasticities are negatively significant at one per cent level. It means that an increase of the input by one per cent level, would decrease the gross income by 0.9317, 0.8945, 0.8724 and 0.2293 per cent on small, medium, large and pooled farms respectively. Farmers used pesticides and insecticides lavishly without any discrimination.

The summation of production elasticities Ebi which indicates the measure of returns to scale is given, duly carrying out the test of significance, to determine whether the Ebi has

deviated significantly from unity. It is observed that diminishing returns to scale exists in all the farms under study.

### 5.7.5 Resource use efficiency in cotton cultivation

The marginal value products, opportunity costs of independant variables and the MVP to opportunity cost ratios have been presented in Table 5.15.

The marginal value productives of factors taken in conjunction with their opportunity costs/market costs indicate the efficiency of resource use. Marginal value products that are higher than the opportunity cost of factors indicate the scope of raising the output profitably through the increased use of the resource concerned where as those less than the opportunity/ market costs depict the unprofitable nature of resource use. Any factor input is considered to be used most efficiently if its MVP is just sufficient to offset its cost. Equality of MVP to factor cost is, therefore, the basic condition that should be satisfied to find out the efficient use of resources.

1. **Land** ($X_1$): The marginal value product of land, when compared to its opportunity cost, the ratio is greater than zero in case of small

Table 5.15: Marginal value products, opportunity costs and ratios of Mup to opportunity costs

| Particulars | Small farms | Medium farms | Large farms | Pooled farms |
|---|---|---|---|---|
| MARGINAL VALUE PRODUCTS (Rs) | | | | |
| Land (ha) | 92.5925 | -4.0266 | -1.4942 | 2.3978 |
| Seed (Rs) | 0.1427 | -0.1252 | 0.1291 | 0.0522 |
| Human labour (Rs) | -1.0421 | 0.0284 | 0.6176 | 0.0052 |
| Cattle labour (Rs) | 0.7600 | -0.5289 | 0.5591 | 0.9156 |
| Manures & fertilizers (Rs) | -0.8917 | -0.0428 | -0.1447 | -0.0712 |
| Pesticides (Rs) | -0.9021 | -0.8732 | -0.8757 | -0.2255 |
| OPPORTUNITY COSTS | | | | |
| Land (ha) | 1073.10 | 1315.79 | 1481.89 | 1375.93 |
| Seed (Rs) | 1.00 | 1.00 | 1.00 | 1.00 |
| Human labour (Rs) | 10.00 | 10.00 | 10.00 | 10.00 |
| Cattle labour (Rs) | 20.00 | 20.00 | 20.00 | 20.00 |
| Manures & fertilizers (Rs) | 1.00 | 1.00 | 1.00 | 1.00 |
| Pesticides (Rs) | 1.00 | 1.00 | 1.00 | 1.00 |
| MVP TO OPPORTUNITY COST RATIOS | | | | |
| Land (ha) | 0.0862 | -0.0030 | -0.0010 | -0.0017 |
| Seed (Rs) | 0.1427 | -0.1252 | 0.1291 | 0.0522 |
| Human labour (Rs) | -0.1042 | 0.0028 | 0.0617 | 0.0005 |
| Cattle labour (Rs) | 0.0380 | -0.0264 | 0.0279 | 0.0457 |
| Manures & fertilizers (Rs) | -0.8917 | -0.0428 | -0.1447 | -0.0712 |
| Pesticides (Rs) | -0.9021 | -0.8732 | -0.8757 | -0.2255 |

farms and the output can be maximized by increasing the hectares of land. In case of medium, large and pooled farms, the MVP's are negative and the ratios are less than zero. Thus, it would be profitable to drastically reduce the input.

2. **Seed** ($X_2$): The marginal value products compared to their respective acquisition costs, the ratios are greater than zero in case of small, large and pooled farms indicating the scope for increasing returns by enhancing the input application. But, in case of medium farms, the MVP is negative and less than zero. Thus, it would be profitable to reduce the input till it reached optimality.

3. **Human labour** ($X_3$): The MVP of the input is negative and the ratio between MVP and its acquisition cost is less than zero, which warrants the reduction of the input, while in all the other three cases the ratios are greater than zero indicating the scope for increasing the output as result of increasing the application of the respective input.

4. **Cattle labour** ($X_4$): In this case, the ratios between the MVP's and the respective acquisition costs of the inputs, all are positive and greater than zero except in medium farms. In all the cases, output can be maximized through further application of the input, whereas in medium farms, the input is to be reduced to get the optimality.

5. **Manures & fertilizers** ($X_5$): In case of this independent variable, all the production elasticities were negative, consequently the MVP's. When the ratios between MVP's and acquisition costs were calculated, all the ratios are negative and less than zero, implying that there is need to reduce the input in all the cases to get optimum output.

6. **Pesticides** ($X_6$): All the production elasticities are negative and consequently the MVP's. When ratios are derived between MVP's and their acquisition costs, all are negative and less than zero, which implies the drastic reduction of the input to get optimum results.

To sum up, it is found that manures and fertilizers besides pesticides are used excessively by all the categories of farms, since the cotton farmers are over anxious to increase their returns by indiscriminate application of these critical inputs.

## 5.8 BULK LINE COST OF PRODUCTION

To arrive at the remunerative price on the basis of average cost of production is always misleading and as such the concept of bulkline cost of production has been used to arrive at remunerative prices. The bulk line cost of production has been taken as that cost which covered 85% of production. To determine the bulk line cost of production, the commercial cost i.e., cost C has been considered. The price received was less than the price at which the farmer could sell the produce in the market.

The bulk line cost of production is derived for different size groups in cotton. The data needed to work out the bulk line cost are given in appendix and the relevant figures are incorporated in Table 5.16 and also in the graphic figures.

The analysis revealed that the bulk line cost of production of cotton is very high compared to normal market price. The normal price received by the farmers in the market is very less. Particularly this year the farmers could not get even 50% of the bulk line cost. This clearly indicates the sad state of affairs of the cotton growers specially this year.

Further, if farming is to be considered as a business and the cotton being a commercial enterprise, the business principles of farming are to be adhered while assessing

**Table 5.16: Bulk line cost of production of cotton**

| Farm size | Cost of Production Rs/quintal |
|---|---|
| Small farms | 2130 |
| Medium farms | 1770 |
| Large farms | 1710 |
| Pooled farms | 1740 |

**Table 5.17: Remunerative price suggested for cotton**

| Farm Size | Remunerative price Rs/qunital |
|---|---|
| Small farms | 2449.50 |
| Medium farms | 2035.50 |
| Large farms | 1966.50 |
| Pooled farms | 2001.00 |

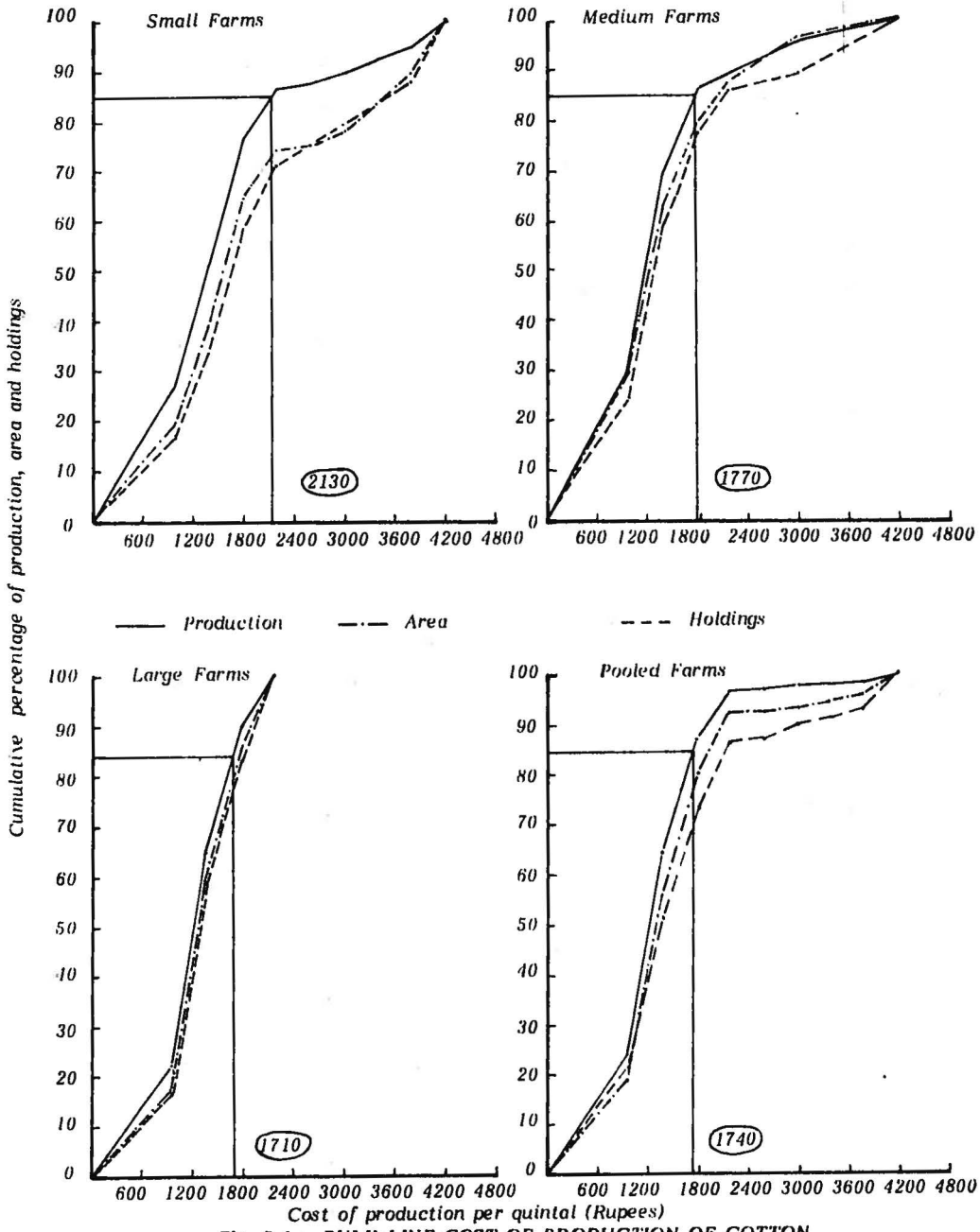


Fig. 5.4 : BULK-LINE COST OF PRODUCTION OF COTTON

whether cotton cultivation is worth while or not. If the remunerative price is defined as that which not only covers the cost of production (bulk line cost) but also provide a cushion against risk and uncertainity, an allowance is to be made and this is to be added to the bulk line cost. It is also appropriate to give an allowance for management too. Thus, the remunerative price for cotton has been worked out on the basis of bulk line cost considering an allowance of 15% of the total cost of production per quintal towards the risk and uncertainity and management.

The details giving remunerative prices for various groups of farms was presented in Table 5.17. It is found that the remunerative price of cotton is Rs.2549.50 for small farms, Rs.2035.50 for medium farms and Rs.1966.50 for large farms with an overall average of Rs.2001.00 for the sample as a whole.

If the rates are compared to normal market price, it is clear that the market price is far less than the remunerative price. This clearly reflects the fate of the cotton growers specially the small and marginal farmers.

This warrants the immediate need for the Government to intervene in this worst situation and extend their helping hand to the ill fated cotton growers.

## 5.9 YIELD GAP ANALYSIS

An attempt has been made in this study to measure the gap between potential yield and actual yield obtained on farms under real situation. To measure the gap, information on yields obtained by the progressive cultivators, yields obtained at the Research Station and the average yields obtained by the sample farmers were considered. The details are presented in Table 5.18.

It is observed from the analysis that the potential yield (Research station) was very much higher than yields obtained by the sample farmers in cotton. While the potential yield of cotton was 38 quintals/hectare, the actual average yields obtained by different size groups of farmers ranged from 5.38 quintals on small farms to 7.20 quintals on large farms with the average of 6.74 quintals for the whole sample. The yield obtained by the progressive cultivator is 30 quintals per hectare. The analysis thus showed a wide gap between the potential yield and the actual yields obtained on cultivators fields.

From the Table 5.18 it is further observed that as the size of the farm increases the yield gap between research station and farms was reduced. The same pattern was observed when compared with the yield obtained by the progressive farmers. Perhaps this might be due to better adoption of practices and accessibility of critical inputs within the reach of the large size groups. This clearly

Table 5.18: Yield gap analysis

| Particulars | Yield/hectare (Qtls) | Gap between Research station others | Gap between Best cultivator and others |
|---|---|---|---|
| Research station | 38.0 | -- | -- |
| Progressive cultivator | 30.0 | 8.0 | -- |
| Average yields of | | | |
| Small farms | 5.38 | 32.62 | 24.62 |
| Medium farms | 6.51 | 31.49 | 23.49 |
| Large farms | 7.20 | 30.80 | 22.80 |
| Pooled farms | 6.74 | 31.26 | 23.26 |

Table 5.19: Opinion regarding the profitability of cotton cultivation

| Particulars of the Opinion | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No | Yes | No |
| Is cotton cultivation profitable ? | 14 | 10 | 13 | 11 | 17 | 7 | 44 | 28 |
| | (58.33) | (41.67) | (54.17) | (45.83) | (70.83) | (29.17) | (61.11) | (38.89) |
| Are you willing to increase the area under cotton ? | -- | 24 | -- | 24 | -- | 24 | -- | 72 |
| | | (100.00) | | (100.00) | | (100.00) | | (100.00) |

Note: Figures in the parentheses indicate % to the total

brings the need to supply all the critical and essential inputs on priority basis to the small farmers. This would go a long way in increasing the yields on these farms.

## 5.10 PRODUCTION PROBLEMS

The opinions regarding the production problems of cotton growers were also collected, analysed and the results are presented below: The parameters considered were:

1. Profitability of cotton cultivators
2. Procurement of inputs
3. Non-adoption of improved practices
4. Availability of technical advice
5. Type and source of credit/ and
6. The time gap in receiving the credit.

### 5.10.1 Opinion regarding the profitability of cotton cultivation

It is seen from the Table 5.19 that 60% of the selected farmers were of the opinion that cotton cultivation is really profitable over other commercial crops. But, it may be due to poor fate of the cotton growers this year, the yields obtained are very very low.

There are many factors which are beyond the control of the farmers such as weather, pest attack during boll formation and flowering stage. All these factors had a concerted effort causing unbearable devastation of the crop during 1987-88.

Unfortunately the same crop which all these years brought prosperity to thousands of families has suddenly become a killer crop.

Many farmers are still with the opinion that cotton crop is really profitable over other commercial crops.

### 5.10.2 Opinion regarding the procurement of inputs

It is seen from the figures in Table 5.20 about the seed availability and its problems that nearly 60% of the selected farmers were of the opinion that the availability of good quality seed was a problem in the present situation. Some farmers had expressed in this context that the seed was also adulterated with unwanted material and there by poor quality in germination percentage. This implies the urgent need to rectify this problem.

In case of labour availability almost 89% of the farmers were of the opinion that labour availability was quite a major problem specially at the peak seasons. Due to this, the farmers have to resort to hire from the neighbouring villages at higher wages.

With regard to soil testing, 80.6% of farmers out of the total had not gone for soil testing. The remaining 19.4% did get their soil tested. However, even the farmers who had their soils tested opined that there was too much of delay in getting the results on the soils tested. 50% of the farmers were unaware about the appropriate dose of fertilizers while 66.66% of the small farmers, 45.83% of

Table 5.20: Opinion regarding the procurement of inputs

| Particulars of the Opinion | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No | Yes | No |
| 1. Seed problems | 16 (66.66) | 8 (33.34) | 13 (54.17) | 11 (45.83) | 14 (58.33) | 10 (41.67) | 43 (59.72) | 29 (40.28) |
| 2. Labour problems | 20 (83.33) | 4 (16.67) | 20 (83.33) | 4 (16.67) | 24 (100) | 0 -- | 64 (88.89) | 8 (11.11) |
| 3. Do you get your soil tested ? | 2 (8.34) | 22 (91.66) | 4 (16.67) | 20 (83.33) | 8 (33.34) | 16 (66.66) | 14 (19.45) | 58 (80.55) |
| 4. Do you know the required dose of fertilizer ? | 8 (33.34) | 16 (66.66) | 13 (54.17) | 11 (45.83) | 15 (62.50) | 9 (37.50) | 36 (50.00) | 36 (50.00) |
| 5. Are you applying the required quantity of fertilizers? | 15 (62.50) | 9 (37.50) | 20 (83.33) | 4 (16.67) | 22 (91.66) | 2 (8.34) | 57 (79.17) | 15 (20.83) |
| 6. Do you take any prophylactic measures | 13 (54.17) | 11 (45.83) | 18 (75.00) | 6 (25.00) | 15 (62.50) | 9 (37.50) | 46 (63.68) | 26 (36.12) |
| 7. Are you applying the recommended plant protection chemicals ? | 18 (75.00) | 6 (25.00) | 20 (83.33) | 4 (16.67) | 21 (87.50) | 3 (12.50) | 59 (81.94) | 13 (8.06) |
| 8. Use of power sprayer ? | 20 (83.33) | 4 (16.67) | 22 (91.67) | 2 (8.33) | 23 (95.83) | 1 (4.17) | 65 (90.28) | 7 (9.42) |
| 9. Tractor ploughing ? | 5 (20.83) | 19 (79.17) | 7 (29.17) | 17 (70.83) | 14 (58.33) | 10 (41.67) | 26 (36.11) | 46 (63.89) |

Note: Figures in the parentheses indicate % to the total

the medium farmers, and 37.50% of the large farmers had revealed their ignorance. However, 62.5% of the small farmers, 83.33% of the medium farmers, 91.66% of the large farmers had applied the required quantity of fertilizers. In certain cases the applied doses were either higher or lower than required.

With regard to prophylactic measures, 63.88% of the selected farmers have adopted these measures. About 75% of the farmers in medium farms had taken prophylactic measures, while it was 54.17 and 62.5% respectively for small and large farms.

With regard to the use of plant protection chemicals, 81.94% of the selected farmers used them. It was maximum in case of large farmers (87.5%) followed by medium farmers (83.33%) and small farmers (75%).

With regard to use of power sprayers, on an average, 90% of the selected farmers used power sprayers and this trend is directly proportional to farm size.

The same relationship holds true in case of tractor ploughing. The use of tractor for ploughing increases with the increase in farm size. Nearly 36% of the selected farmers used tractor for ploughing their fields.

### 5.10.3 Opinion regarding the non-adoption of improved practices

From the Table 5.21 it can be observed that high or prohibitive cost is the main reason for not using tractor to a greater extent. About 50% of the selected farmers are using the tractor for ploughing.

Similar is the case incase of fertilizers and pesticides. The high cost of fertilizers and pesticides is the main reason for lesser utilization. Many farmers, expressed that adulteration is a major issue to be included and avaibility of genuine pesticides is also another issue.

Because of the acute pest attack faced by many farmers specially during this Agril. year (1987-88), many farmers were forced to employ human labour for hand picking and burning pupae/larvae.

With regard to seed treatment about 49% expressed unawareness while 51.38% told that lack of technical know how was the reason.

Table 5.21: Opinion regarding the non-adoption of imporved practices

| Particulars | Reasons | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Costly | | | | Unawareness | | | | Lack of technical know how | | | | Not required | | | |
| | S | M | L | P | S | M | L | P | S | M | L | P | S | M | L | P |
| 1. Tractor ploughing | 18 | 16 | 8 | 42 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2. Seed treatment | -- | -- | -- | -- | 20 | 9 | 6 | 35 | 4 | 15 | 18 | 37 | -- | -- | -- | -- |
| 3. Required dose of fertilizers | 15 | -- | -- | -- | 15 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4. Recommended plant protection chemicals | 20 | 15 | 15 | 50 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

S = Small farms

M = Medium farms

L = Large farms

P = Pooled farms

### 5.10.4 Opinion regarding technical advice

This was presented in Table 5.22.

The survey revealed that majority of the farmers had a good technical advice from the agricultural departments concerned. Nearly 71% of the selected farmers expressed that they received a good technical know-how from the officials. This is not a draw back in case of these cotton growers.

The analysis revealed that 70% of the respondents got technical advice from the Dept. of Agril. and other sources while the remaining 29% were getting from neighbouring farmers.

### 5.10.5 Opinion regarding type and source credit

The survey revealed that the farmers felt that it was difficult to take up cotton cultivation without getting adequate and timely credit. It is seen from Table 5.23 that 95.83% of small farmers, the entire group of medium and large farmers have gone for credit. Almost all the farmers irrespective of the size group (98.61%) have availed short term credit, while 45.83% and 13.88% of the total farmers have resorted to medium and long term credit. There may be some degree of

Table 5.22: Opinion regarding technical advice

| Particulars | Small farms | | Medium farms | | Large farms | | Pooled farms | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No | Yes | No |
| Are you getting any Technical advice | 18 (75.00) | 6 (25.00) | 16 (66.67) | 8 (33.33) | 17 (70.83) | 7 (29.17) | 51 (70.83) | 21 (29.17) |

Table 5.23: Opinion regarding type and source of credit

| Farm size | Have gone for credit | | Type of credit | | | Source of credit | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | ST | MT | LT | Commercial Bank | Co-op Banks | Private Money lenders |
| Small Farms | 23 | 1 | 23 | -- | -- | 4 | 20 | 12 |
| Medium farms | 24 | 0 | 24 | 15 | -- | 19 | 24 | 16 |
| Large farms | 24 | 0 | 24 | 18 | 10 | 18 | 24 | 15 |
| Pooled farms | 71 | 1 | 71 | 33 | 10 | 41 | 68 | 43 |

overlapping because farmers are going for different loans.

The co-operatives are playing an important role in providing credit to farmers. 94.44% of the selected farmers have taken loans from co-operatives, besides availing of the facility from commercial banks and private money lenders. The farmers who approached money lenders had stated that timeliness, adequacy of credit and other consumption problems have prompted them to go to money lenders though the money lenders charge exhorbitant rate of interest.

### 5.10.6 Opinion regarding credit time gap

From the figures in Table 5.24 that credit time gap varied from one month to three months. 70.83% of the small farmers, 58.33% of the medium farmers and 66.66% of the large farmers were affected by the time gap.

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Table 5.24: Opinion regarding credit time gap

| Size group | Credit time gap (Number of farmers) | | |
|---|---|---|---|
| | 1 month | 2 months | 3 months |
| Small farms | -- | 2 (8.33) | 17 (70.83) |
| Medium farms | 2 (8.33) | 3 (12.5) | 14 (58.33) |
| Large farms | 4 (16.66) | 3 (12.5) | 16 (66.66) |
| Pooled farms | 6 (8.33) | 8 (11.11) | 47 (65.28) |

Note: Figures in parentheses indicate the % to total

# SUMMARY & CONCLUSION

## SUMMARY AND CONCLUSIONS

The study has been undertaken in Guntur district of Andhra Pradesh to find out the economics of cotton cultivation with the following objectives:

(i) To study the costs and returns and profitability in cotton cultivation according to farm size.

(ii) To examine the resource returns, returns to scale and resource use efficiency according to farm size.

(iii) To estimate the remunerative prices for cotton under the existing farming conditions.

(iv) To identify the production problems of cotton growers in Guntur district.

Guntur district was selected purposively for this study as it ranks first both in area and production in cotton cultivation in Andhra Pradesh. Two mandals viz., Tadikonda and Chilakaluripet were selected as they accounted for the largest share in area under cotton out of 57 mandals of the Guntur district. A total of 8 villages were selected based on probability proportion to area for the study selecting 4 from each

mandal. All the cotton growers in each selected village were stratified into 3 size groups. viz., small farms (< 2 hectares), medium farms (2-4 hectares) and large farms (> 4 hectares) on the basis of operational area. Nine growers from each village were selected at random giving due representation of three growers for each size group.

The data were collected by personal interview with the help of a specially devised set of schedules. The reference period for the study was agricultural year 1987-88.

Conventional analysis (tabular) has been used to arrive at capital investment, labour requirement, costs and returns. Functional analysis has been used to estimate resource productivity, returns to scale and resource use efficiency. Break even analysis and bulk line cost of production have been used to find out the profitability and to suggest remunerative price for cotton.

**Basic characteristics of the selected holdings:**

The family size had increased with the farm size. The size of the family on an average ranged from 7.08 members on small farms to 9.66 members on large

farms with an overall average of 8.11 members for the sample as a whole. The same for the medium farms was 7.60 members. The number of farm workers per family showed an inverse relationship with the farm size. It varied from 1.72 members on large farms to 6.37 members on small farms. The same for medium and pooled farms was 6.19 and 4.76 members respectively. With the increase in farm size, the quantum of female working members had declined progressively.

The average size of holding varied from 1.71 hectares in case of small farms to 8.69 hectares in large farms with an overall average of 4.81 hectares for the sample as a whole, while it was 4.05 hectares for medium farms. The cropping intensity had not indicated any perceptible relationship with the farm size. It ranged from 86.63% on small farms to 92.59 % on medium farms while it was 87.39% and 88.76% for large and pooled farms respectively.

The value of farm assets was the highest on large farms with Rs.49887.36 and lowest on medium farms at Rs.43106.79. The same for small and pooled farms was Rs.44799.31 and Rs.47383.73 respectively. The value of land accounted for a major share of total assets. It ranged from Rs.39084.16 on small farms to Rs.44899.81

large farms with an overall average of Rs.42132.93 per hectare. The next important component which accounted high to the total assets was live stock. The value of this component was Rs.4273.29 on small farms, Rs.4038.14 on medium farms, Rs.3214.21 on large farms and Rs.3570.65 for pooled farms. Similarly the value of farm buildings and implements was Rs.579.59, Rs.584.21, Rs.624.84 and Rs.607.85 for small, medium, large and pooled farms respectively. The same order in case of implements and machinery was Rs.864.26, Rs.904.26, Rs.1014.18 and Rs.965.66 for small, medium, large and pooled farms. The value of wells was the least share among all the components of farm assets. This ranged from Rs.92.54 on medium farms to Rs.134.21 on large farms with an overall average of Rs.106.62 per hectare.

**Labour utilisation**

The human labour utilisation tends to decrease with the increase in size of the farm. This ranged from 80 man work days on small and medium farms to 75 man work days on large farms with an overall average of 76 man work days. Among the different operations of cotton cultivation, plant protection accounts for the largest share in all the size groups. This had a slight variation of one man work day. However, this ranged

from 33 man work days on medium, large and pooled farms constantly. After plant protection, the next in the order of importance was interculture followed by preparatory cultivation, sowing, picking and fertilizer application.

**Cost of cultivation**

The total cost of cultivation per hectare for cotton had indicated direct relationship with the farm size. It varied from Rs.10939.83 on small farms to Rs.11809.69 on large farms with an overall average of Rs.11594.09 for the sample as a whole. The same for medium farms was Rs. 11490.55. Similarly, the total variable costs as well as fixed costs also showed a direct relationship with farm size. The variable costs ranged from Rs.9662.82 on small farms to Rs.10102.02 on large farms with an average of Rs.9996.33 for the entire sample. Similarly, the total fixed costs for small, medium, large and pooled farms was in the order of Rs. 1277.01. Rs. 1538.46, Rs. 1707.67 and Rs.1597.76 respectively.

The cost of production of cotton per quintal showed an inverse relationship with the farm size. This varied from Rs.2033.42 on small farms to Rs.1640.23 on large farms with an average of Rs.1720.19 for the

whole sample. The same for medium farms was Rs.1765.06/hectare.

**Productivity**

The productivity (average yield/hectare) revealed a direct relationship with farm size. It varied from 5.38 quintals per hectare on small farms to 7.20 qtls/ha on large farms with an intermediate yield of 6.51 qtls/ha on medium farms. The average yield for the whole sample was 6.74 qtls/ha.

**Returns**

The gross returns also showed a direct relationship with farm size. It ranged from Rs.4292.43 on small farms to Rs.5927.56 on large farms. The same for medium and pooled farms was Rs.5263.17 and Rs.5503.75 respectively.

The net returns showed a tremondous loss of nearly 5-7 thousand rupees in all the size groups. The actual net loss over cost 'C' ranged from Rs.6647.40 on small farms to Rs.5882.13 on large farms, while it was Rs.6227.38 per hectare for medium farms. The magnitude of net loss decreased with the increase in farm size.

The returns per quintal showed that net loss increased with the increase in farm size in case of

gross returns. This varied from a loss of Rs.797.84 per quintal on small farms to Rs.823.27 on large farms while it was Rs.808.47 for medium farms.

However, the net loss incase of net returns/qtl over cost 'C' showed an inverse relationship with farm size. It ranged from Rs.816.96 on large farms to Rs.1235.57 on small farms. The same for medium and pooled farms was Rs.903.61 respectively.

**Profitability**

The analysis of input-output ratio revealed the magnitude of huge loss incurred by cotton growers in the district during this agricultural year. The input-output ratio exhibited a loss of Rs.0.61 for small farms, Rs.0.58 on medium farms, Rs.0.50 for large farms for every one rupee investment in cotton cultivation.

This was further supported by the Break-Even Analysis. It refers that the farmers are unnecessarily producing the output under prevailing prices in the market. Further, it was found from the Break-Even Analysis that the farmers would be at equilibrium at a negative output of 1.77, 6.44, 16.59 qtls/ha on small, medium and large farms in the same serial order.

**Resource returns and returns to scale**

Resource productivity and returns to scale in cotton farming was examined with Cobb-Douglas production function analysis. A total of six variables viz., land, seed, human labour, cattle labour, manures and fertilizers and pesticides were selected and fitted into the functional analysis.

The co-efficient of multiple determination ($R^2$) indicated that the selected variables had explained 76%, 79%, 81% variance in gross returns on small, medium and large farms respectively.

The production elasticities of the selected variables were found to be positive while some were negative. The regression co-efficients of manures and fertilizers besides pesticides were uniformly negative in all the sizes of farms.

The scale co-efficient (Ebi) is also found to be less than one in all the groups indicating diminishing returns to scale.

In case of resource use efficiency on all these size groups, the analysis revealed that there was an excessive use of resources in all the farm groups, especially in case of fertilizers and pesticides indica-

ting the need for reduction and reorganisation of these resources to the optimal level.

**Bulk line cost of production**

There is a huge gap between bulk line cost and the actual price received by the farmer in the market. The farmers would be in safer zone if the remunerative price of cotton under the current conditions of farming is Rs.2449.50/quintal on small farms, Rs.2035.50/qtl on medium farms, Rs.1966.50/qtl on large farms. But the actuals were Rs.787.50 for small farms, Rs.795.83 for medium farms and Rs.810.41 in case of large farms.

**Yield gap analysis**

The analysis revealed a wide gap between potential yields and actual yields obtained on farmers' fields. It is interesting to note that potential yield of cotton on research station was 38 qtls/ha, while the actual yields obtained on farmers fields were 5.38 qtls on small farms, 6.51 qtls on medium farms, 7.20 qtls on large farms. Thus, the analysis revealed a huge gap of nearly 30 qtls/ha on all the size groups.

**Production problems**

The opinion survey indicated clearly the fore most problem is the huge yield gap due to vagaries of weather and pest attack during this year. Apart from this, various problems identified were adulteration of pesticides, impure seed, high labour cost, and exhorbitant prices of inputs like fertilizers, pesticides, lack of techincal know-how, besides timely and sufficient credit.

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## CONCLUSIONS

The following conclusions have emerged from the present study:

1. The total labour utilisation indicated an inverse relationship with the farm size. The plant protection, interculture and preparatory cultivation were the important operations which accounted for the major share of the total human labour utilized. Interculture and preparatory cultivation accounted for a major share of cattle labour utilisation on the farms.

2. The total cost of production indicated a direct relationship with farm size.

3. The proportion of paid out costs indicated a direct relationship with farm size.

4. There was a direct relationship between farm size and productivity.

5. Gross returns also indicated a direct relationship with the farm size. However, net returns (net loss) showed an inverse relationship with farm size.

6. The Break-Even Analysis revealed unprofitable nature of cotton cultivation since the break even output was in the 3rd quadrant of the graph. Cost-benefit ratio had also confirmed the unprofitable nature of cotton cultivation at present.

7. It is observed from the study that large farms had a definite advantage over small and medium farms though all the size groups realised maximum negative return from cotton cultivation.

8. The production function analysis had indicated the operation of diminishing factor returns as well as decreasing returns to scale, except incase of large farms. Further, the ratios of marginal value product to opportunity cost showed an excessive use of resources and to a certain extent high degree of inefficiency indicating the scope for resource adjustments.

9. The bulk line cost of production showed a huge gap between bulk line cost and the actual price received by the farmer in the market. This analysis further confirmed the unprofitable nature of cotton cultivation.

10. The yield gap analysis had revealed a wide gap between potential yields and actual yields on the farmers fields.

11. The production problems associated with cotton production are severe pest attack, vagaries of weather, adulteration of inputs like pesticides and seeds, high cost of fertilizers, labour and pesticides besides lack of latest technical know-how and non-availability of timely credit.

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## POLICY IMPLICATIONS

The study has brought out certain important factors which have a bearing on policy implications and require a programme of action.

(1) The first and fore most reason for these low yields during the year is mainly due to pest attack, specially the whitefly. The survey clearly revealed that 90% of low yields are mainly due to predominance of this pest. There is no suitable chemical available in India to control this particular pest. Two effective pesticides against whitefly namely 'Trisophos' and 'Denatol' were not available in India. They had to be imported on a war footing as the pest menace covered the entire nation. Hence, our research should be aimed at the preparation of effective chemicals to with stand against the whitefly. The Govt. should take effective steps either to import that particular pesticide or to make sincere efforts to discover such an effective formulation to control the whitefly as the pest menace covered the entire nation.

(2) Besides the attack of whitefly, the most important and dangerous factor which contri-

buted mainly to this gloomy situation is the sale of spurious pesticides, supplied by companies to exploit the poor farmers. The Govt. should take effective steps to check this anti-social practice by the big whigs of the society. Govt. should see that genuine and correct pesticides are made available to farmers.

(3) Majority of the cotton growers have indicated the absence of quality seed. So, State Seed Certification Agency should plunge into the problem and take effective steps to supply the correct brand seed to the farmers. Govt. also should intervene in the activities of certification agency and should see that this Dept. play its role effectively and efficiently.

(4) Govt. should take effective measures to make available the quality fertilizers and plant protection chemicals at cheaper and reasonable prices. Presence of intermediate marketing agencies which are the chief sources for increasing the cost of inputs by hoarding should be curbed mercilessly.

(5) Lack of timely and adequate credit had forced the farmer in taking loans from private sources. A much felt need is to adopt these villages by the commercial banks and provide adequate loans in time.

(6) Lastly, the price fixed by Govt. should be remunerative and provide cushion to the poor farmers. Thus, the Governmental machinery should gear up in this direction.

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# APPENDICES

Appendix 1: Bulk line cost

Small farms

| Cost of production Rs/quintal Class interval | Holdings | | | Area | | | Production | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of farms | % | Cumulative % | Area | % | Cumulative % | Output Qty | % | Cumulative % |
| 1000-1400 | 4 | 16.66 | 16.66 | 6.6 | 19.58 | 19.58 | 48.8 | 26.88 | 26.88 |
| 1400-1800 | 4 | 16.66 | 33.32 | 6.6 | 19.58 | 39.16 | 44.75 | 24.65 | 51.53 |
| 1800-2200 | 6 | 25 | 58.32 | 8.6 | 25.52 | 64.68 | 46.25 | 25.48 | 77.01 |
| 2200-2600 | 3 | 12.5 | 70.82 | 3.4 | 10.09 | 74.77 | 17 | 9.36 | 86.37 |
| 2600-3000 | 1 | 4.17 | 74.99 | 0.4 | 1.19 | 75.96 | 2.5 | 1.38 | 87.75 |
| 3000-3400 | 1 | 4.17 | 79.16 | 0.8 | 2.37 | 78.33 | 3 | 1.65 | 89.4 |
| 3400-3800 | 1 | 4.17 | 83.33 | 1.8 | 5.34 | 83.67 | 5 | 2.75 | 92.15 |
| 3800-4200 | 1 | 4.17 | 87.5 | 1.9 | 5.65 | 89.32 | 4.75 | 2.62 | 94.77 |
| > 4200 | 3 | 12.5 | 100 | 3.6 | 10.68 | 100 | 9.5 | 5.23 | 100 |
| Total | 24 | | | 33.7 | | | 181.55 | | |

Appendix 2: Bulk line cost

Medium farms

| Cost of production Rs/quintal Class interval | Holdings | | | Area | | | Production | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of farms | % | Cumulative % | Area | % | Cumulative % | Output Qty | % | Cumulative % |
| 1000-1400 | 7 | 29.17 | 29.17 | 17.44 | 23.68 | 23.68 | 141.55 | 29.49 | 29.49 |
| 1400-1800 | 8 | 33.33 | 62.50 | 25.6 | 34.76 | 58.44 | 141.34 | 39.86 | 69.35 |
| 1800-2200 | 4 | 16.67 | 79.17 | 13.9 | 18.88 | 77.32 | 83.37 | 17.37 | 86.72 |
| 2200-2600 | 2 | 8.33 | 87.50 | 6.4 | 8.69 | 86.01 | 35 | 7.29 | 94.01 |
| 2600-3000 | | | | | | | | | |
| 3000-3400 | 1 | 4.17 | 91.67 | 2.4 | 3.26 | 89.27 | 9 | 1.88 | 95.89 |
| 3400-3800 | | | | | | | | | |
| 3800-4200 | | | | | | | | | |
| > 4200 | 2 | 8.33 | 100.00 | 7.9 | 10.73 | 100 | 19.75 | 4.11 | 100 |
| Total | 24 | | | 73.64 | | | 480.01 | | |

Appendix 3: Bulk line cost

Large farms

| Cost of production Rs/quintal Class interval | Holdings | | | Area | | | Production | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of farms | % | Cumulative % | Area | % | Cumulative % | Output Qty | % | Cumulative % |
| 1000-1400 | 4 | 16.67 | 16.67 | 23.20 | 16.75 | 16.78 | 221.00 | 22.19 | 22.19 |
| 1400-1800 | 10 | 41.66 | 58.33 | 58.70 | 42.46 | 59.24 | 427.65 | 42.95 | 65.14 |
| 1800-2200 | 6 | 25.00 | 83.33 | 36.84 | 26.65 | 85.89 | 247.75 | 24.88 | 90.02 |
| 2200-2600 | 4 | 16.67 | 100.00 | 19.52 | 14.11 | 100.00 | 99.37 | 9.98 | 100.00 |
| 2600-3000 | | | | | | | | | |
| 3000-3400 | | | | | | | | | |
| 3400-3800 | | | | | | | | | |
| 3800-4200 | | | | | | | | | |
| > 4200 | | | | | | | | | |
| Total | 24 | | | 138.26 | | | 995.77 | | |

Appendix 4: Bulk line cost

Pooled farms

| Cost of production Rs/quintal Class interval | Holdings | | | Area | | | Production | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of farms | % | Cumulative % | Area | % | Cumulative % | Output Qty | % | Cumulative % |
| 1000-1400 | 15 | 20.83 | 20.83 | 47.24 | 19.23 | 19.23 | 411.35 | 24.82 | 24.82 |
| 1400-1800 | 22 | 30.56 | 51.39 | 90.90 | 37.01 | 56.24 | 663.74 | 40.06 | 64.88 |
| 1800-2200 | 16 | 22.22 | 73.61 | 59.34 | 24.16 | 80.40 | 377.37 | 22.78 | 87.66 |
| 2200-2600 | 9 | 12.50 | 86.11 | 29.32 | 11.94 | 92.34 | 151.37 | 9.13 | 96.79 |
| 2600-3000 | 1 | 1.39 | 87.50 | 0.40 | 0.17 | 92.51 | 2.50 | 0.15 | 96.94 |
| 3000-3400 | 2 | 2.78 | 90.28 | 3.20 | 1.30 | 93.81 | 12.00 | 0.72 | 97.66 |
| 3400-3800 | 1 | 1.39 | 91.67 | 1.80 | 0.74 | 94.55 | 5.00 | 0.30 | 97.96 |
| 3800-4200 | 1 | 1.39 | 93.06 | 1.90 | 0.77 | 95.32 | 4.75 | 0.28 | 98.24 |
| > 4200 | 5 | 6.94 | 100.00 | 11.50 | 4.68 | 100.00 | 29.25 | 1.76 | 100.00 |
| Total | 72 | | | 245.60 | | | 1657.33 | | |

## VITA

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