# ECONOMICS OF OLERICULTURE IN GUNTUR DISTRICT OF ANDHRA PRADESH

By

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## CERTIFICATE

Ms. D. SAILAJA has satisfactorily prosecuted the course of research and that the thesis entitled "**ECONOMICS OF OLERICULTURE IN GUNTUR DISTRICT OF ANDHRA PRADESH**" submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part thereof has not been previously submitted by her for a degree of any University.

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MAJOR ADVISOR

## CERTIFICATE

This is to certify that the thesis entitled **"ECONOMICS OF OLERICULTURE IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted in partial fulfillment of the requirements for the degree of Master of Science in Agriculture of Andhra Pradesh Agricultural University, Hyderabad is a record of the bonafide research work carried out by **Ms. D.SAILAJA** under my guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee.

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

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D. Sailaja

Date: 24-8-1996 **[D. SAILAJA]**

## DECLARATION

I, **D. SAILAJA**, hereby declare that the thesis entitled "ECONOMICS OF OLERICULTURE IN GUNTUR DISTRICT OF ANDHRA PRADESH" submitted to the Andhra Pradesh Agricultural University for the degree of Master of Science in Agriculture in the major field of Agricultural Economics is the result of original research work done by me. I also declare that any material contained in the thesis has not been published earlier.

Date: 24-8-1996

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# ABSTRACT


| | | |
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The present study was undertaken in four villages of Mangalagiri and Chebrolu mandals of Guntur district of Andhra Pradesh, with the objectives

1. To estimate the costs and returns in cultivation of vegetable crops.
2. To study the resource productivity and returns to scale on vegetable farms.
3. To study the marketing practices and price spreads under the existing market conditions.
4. To study the consumer preferences of vegetables.
5. To study the seasonal price trend and price variations of vegetables.

6. To identify the problems in production and marketing of vegetables and to suggest appropriate remedial measures.

A three stage proportionate random sampling was adopted to select 90 farmers. For the present study the vegetable crops selected were tomato, brinjal, cauliflower and coccinia. The period of reference for this study was 1995-'96 agricultural year. For the selected vegetables costs and returns were calculated. To know the resource productivity and resource use efficiency Cobb-Douglas production function was estimated. Marketing costs incurred by producer and intermediaries, marketing margins of intermediaries, and price spread were calculated. Seasonal indices of the selected vegetable crops prices were estimated. The human labour requirement and cost of production in coccinia cultivation were high compared to brinjal, cauliflower and tomato. Returns were also highest for coccinia, because of greater productivity and cultivated throughout the year. Functional analysis indicated the operation of diminishing returns to scale in case of tomato and brinjal, constant returns to scale in cauliflower and increasing returns to scale in coccinia farms. This offers the scope for the adjustment and increased use of resources to fetch higher returns. The producer's share in consumer's

rupee varied from 33.67 per cent in coccinia to 57.91 per cent in brinjal. This offers the need to reorganize the marketing system for the increasing of producers share in consumers price.

Marketing efficiency was more in case of brinjal. The seasonal indices of prices constructed for 1990-'95 period were low during crop growth period (season) and higher during summer months (lean season). Consumer preference was greater towards tomato. The important production and marketing problems faced by farmers were non-availability of quality seed, non-availability of human labour, injudicious use of plant protection chemicals, lack of proper post harvesting technology, higher middleman margins and price fluctuations. These problems must be rectified to obtain greater profits.

# *INTRODUCTION*

# INTRODUCTION

India is predominantly an Agricultural country bestowed with various types of soils and climates ranging from tropical to temperate providing unique opportunities for growing wide range of vegetables. In the context of improving the quality of food to meet the nutritional requirements, vegetables have exclusive importance in providing vitamins, minerals and proteins besides energy and dietary fiber. Vegetables are considered as protective food. Vegetables grow quickly and respond well to intensive technology. Vegetable crop cultivation provides more employment potential than food grains. Vegetables have generally short growing season and some of them can be grown throughout the year.

There is universal recognition that vegetables are important food. The vegetable production, marketing and processing are significant contributors to income. Population growth, and urbanization are creating increased demand for food and concerns are rising about malnutrition, especially in urban areas. In India, vegetables constitute 10 per cent of the total food intake which is extremely low as compared to Japan, where it constitutes 45 per cent. The annual per capita consumption of vegetables in countries

like U.S.A. was five times more than that of an average Indian.

India is the second largest producer of vegetables in the world (12% of world production) next to China with an estimated production of about 48 million tonnes from an area of over 4.5 million hectares which is far below the requirement of rapidly growing population. Eventhough India produces large variety of vegetables in the world, the daily per capita consumption of vegetables in India is only 135 gms which is quite less against the requirement of about 285 gms for a balanced diet. By 2000 A.D. the requirement of vegetables increased to 10 million tonnes.

The present production and consumption of vegetables in the country are very inadequate. In order to improve the quality of balanced diet of the people, it is essential that the production of vegetables should be increased considerably. This objective can be achieved by increasing the yield per unit area by adopting better agricultural techniques and by increasing the present area under vegetables. So, this has drawn the attention of both scientists and policy makers to increase the vegetable production on a big scale.

During first and second Five year plans vegetable production was not emphasized much. During the third five year plan, importance was given to vegetable production. The Government of India has launched vegetable production schemes in the third Five year plan. In fourth plan, the greater emphasis was laid on vegetable production. In Fifth Five Year Plan, the amount was subsequently increased to Rs.2 crores from Rs.5 lakhs in third Five year plan. The Sixth Five Year Plan does not make any specific provision for the vegetable production. However, it has been planned to bring an additional area of 3 lakh hectares under vegetable cultivation in addition to the already exist... 27 lakh hectares. The Eighth Five Year Plan proposed a growth rate of 7.21 in vegetable production.

In India the total vegetable area is 4.5 million hectares, of which Tomato contributes .. 2,90,279 ha (6.45%), brinjal 2,99,770 ha (6.66%) and cauliflower 2,38,632 ha (5.30%) with the production of 46,03,446 tonnes, 31,24,487 tonnes and 33,94,897 tonnes contributing .. 9.59 per cent, 6.50 per cent and 7.07 per cent of the total production, respectively. Out of these vegetables, processed foods of tomato (i.e., tomato sauce/ketchup) contributes to 35,400 tonnes. Indian fruits and vegetables exported after value

addition is only one eighth of those exported fresh. Dried vegetables export earns Rs.8,700 lakh per 39,000 tonnes.

The total vegetable cultivated area in Andhra Pradesh was 94,704 ha of the total area, tomato contributes 40;301 ha (42.51%), brinjal 17,501 ha (18.46%) and cauliflower 1,157 ha (1.22%).

**Tomato:**

In Andhra Pradesh, Rayalseema region stands 1st in tomato cultivated area with 16,439 ha followed by Telangana region 13,109 ha and Coastal Andhra 10,573 ha. In Coastal Andhra, Prakasam district stands 1st with 3,625 ha followed by Visakhapatnam district 2,321 ha and Guntur district 1,411 ha.

**Brinjal:**

Coastal Andhra stands 1st with 10,988 ha under brinjal. In Coastal Andhra region, East Godavari district stands 1st with 2,150 ha and Guntur district stands 3rd with 1,478 ha of brinjal cultivated area.

**PROBLEM SETTING**

Vegetables, apart from adoring the table, also act as the source of returns which are higher than that of food grains. Moreover, farmers receive returns early because of

the short duration of the crop. The average farmer was unable to meet the high cost of investment because of the hike in prices of fertilizers and pesticides and the large labour requirement so the present study is aimed to investigate into the cost of cultivation, returns, profitability and the resource productivity in vegetable farming.

The vegetable grower is not sure of his returns because of the highly flexible prices. There was not much has been done to solve the number of problems associated with vegetable marketing. Hence, marketing aspects of vegetables are also included in this study. It is generally believed that the marketing infrastructure for vegetables is weak. Relatively the producer's share of consumer's rupee is very much less when compared to that of commercial and food grain crops.

In this study, it is also aimed at examining the existing organisational set up of the vegetable marketing, and estimation of the producer's share in consumer's rupee.

As the prices of vegetables are highly flexible, it is also aimed to study the seasonal variations in price by calculating seasonal indices for each month. Finally, it is

also aimed to study the consumer preferences towards vegetables.

**OBJECTIVES**

The present study has been undertaken with the following specific objectives.

1. To estimate the costs and returns in cultivation of vegetable crops.
2. To study the resource productivity and returns to scale on vegetable farms.
3. To study the marketing practices and price spreads under the existing market conditions.
4. To study the consumer preferences of vegetables.
5. To study the seasonal trend and price variations of vegetables.
6. To identify the problems in production and marketing of vegetables and to suggest appropriate remedial measures.

**PLAN OF THE THESIS**

This dissertation consists of Six chapters beginning with introduction followed by review of literature pertaining to the general studies on production and marketing of vegetables. In the third chapter an attempt is made to describe the materials and methods in the study. Fourth chapter gives an account of agro-economic features of

the study area and in fifth chapter the results of the study are discussed. The final chapter contains summary and conclusions.

# *REVIEW OF LITERATURE*

# REVIEW OF LITERATURE

In this chapter, a review of the earlier works on the economics of the vegetable production is presented so as to guide the reader in formulating the concepts and to draw meaningful conclusions. Hence, a brief account of the previous work done on problem taken is presented under the following heads.

2.1 Costs, returns and profitability.

2.2 Resource productivity and returns to scale.

2.3 Marketing aspects.

2.4 Consumer preference.

2.5 Seasonal trend and price variations.

## 2.1 COSTS, RETURNS AND PROFITABILITY

In a survey conducted by the Department of Horticulture, College of Agriculture, Rajendranagar, Andhra Pradesh Agricultural University (1980), the gross returns per hectare estimated for brinjal, tomato, chillies and ridgegourd were Rs.12,000, Rs.15,000, Rs.25,000 and Rs.10,000, respectively. The respective net returns for the same crops were Rs.6,905, Rs.9,430, Rs.16,570 and Rs.5,620. The yields of brinjal, tomato, chillies and ridgegourd were reported to be 20, 30, 20 and 10 tonnes per hectare, respectively.

Murthy (1980) computed the gross returns and net profits per acre of rainfed chillies were Rs.3,500 and Rs.1,283, respectively. Whereas, in the case of irrigated crop these were Rs.6,000 and Rs.2,725, respectively.

Basavaraja (1980) estimated that the total cost of cultivation per hectare was Rs.8,869.83 for hybrid tomato, whereas, it was Rs.4,080.68 for the local tomato. Labour contributes to major item of input in the cultivation of hybrid tomato with Rs.2,212 and local tomato with Rs.1,167 accounting for 29 per cent and 37 per cent of total cost respectively. Fertilizer input accounted for about 25.84 per cent and 18.95 per cent of the total costs in hybrid and local tomato varieties. Whereas FYM accounted for 11 per cent and 16 per cent of total cost in hybrid and local tomato varieties. The study also revealed that the gross returns from one hectare of hybrid and local tomato were Rs.34,481.60 and Rs.14,318.83. The net returns were Rs.25,611.77 for hybrid and Rs.10,237.97 for local tomato.

Dasharathy (1981) reported that the total cost of cultivation of brinjal was Rs.1,500 and Rs.1,000 for green chillies, and Rs.2,000 for onion per acre.

Shah (1982) analysed that the total variable costs per hectare of onion were Rs.3,754.40, Rs.3,098.00 for tomato, Rs.2,936.35 for brinjal, and Rs.2,857.43 for chillies. The gross and net returns for these vegetable were Rs.7,650 and Rs.4,551.10 for onion, Rs.5,336.25 and Rs.2,399.90 for brinjal and Rs.7,887 and Rs.5,029.59 for chillies. The cost benefit ratios were 1:2.47, 1:1.82 and 1:2.76, respectively. The average yields of tomato, brinjal and chillies were 51, 71.54 and 9.54 quintals per hectare.

Singh (1982) pointed out that the total cost of cultivation per hectare was the highest for chillies with Rs.7,603 followed by tomato Rs.7,119, brinjal Rs.6,503 and ridgegourd Rs.979. The study also indicated that the gross returns were maximum in case of tomato (Rs.10,983) followed by chillies (Rs.10,179), followed by brinjal (Rs.9,303) and ridgegourd (Rs.7,594).

Singh and Gupta (1983) indicated that there was considerable increase in cost of cultivation per hectare in potato during 1980-81. It was Rs.7,391.42. This rise in total cost was mainly due to rise in cost of all input factors. The cost of production per hectare and per quintal of output were reported to be Rs.8,761.53 and Rs.44.76

Subrahmanyam (1983) estimated that the gross returns per hectare of tomato was Rs.18,289 in Kharif and Rs.17,833 in Rabi. It was Rs.17,501 for brinjal grown in Rabi season. On the basis of input-output ratio, it was found that tomato followed by brinjal were profitable in Kharif.

Nahatkar and Pant (1984) reported that the cost of cultivation of dry chillies was Rs.4,260.27 per hectare on all farms, Rs.4,942.66 on small farms, Rs.4,133.58 on medium farms and Rs.3,704.64 on large farms. This pointed out that the cost of cultivation has decreased with the increase in scale of chilli cultivation.

Bhalerao and Maurya (1985) studied the total cost of cultivation of tomato and cauliflower per hectare in different farm sizes. In small farms it was Rs.3,467.44 and Rs.3,281.17 in marginal farms it was Rs.2,485.09 and Rs.2,961.97 and in large farms it was Rs.2,555.32 and Rs.3,046.27, respectively. The net income obtained from tomato and cauliflower was Rs.1,001.27 and Rs.1,182.13, respectively.

Prasad (1986) found that the total cost of production was high for green chillies during

Kharif and for tomato in Rabi. Marketing cost was found to be the major component of cost in all the farm sizes.

Ratnaprasad (1986) reported that the total cost of cultivation per hectare of brinjal was Rs.11,964, whereas for ridgegourd it was Rs.8,334 and Rs.14,307 for green chillies and for tomato the cost of cultivation per hectare was Rs.11,521.

Divakar (1986) estimated that the total cost of production per hectare of tomato in Kharif ranged from Rs.9.940 to Rs.13,722 from small to large farms. The gross income from tomato was observed to be Rs.15,216 whereas net income was Rs.3,695 over cost C and Rs.8,406 over prime costs. For every rupee investment an out turn of Rs.1.32 was realised.

Lohar (1987) observed that the total cost of cultivation of hybrid tomato per hectare was about Rs.54,698.78 with gross returns of Rs.1,15,902.11. The cost-benefit ratio was found to be 1:2.11.

Saraf and Mishra (1987) reported that marginal cost was more for potato (accounting for 55 per cent of total

costs) followed by cauliflower (47%), brinjal (39%) and tomato (35%).

Vikas Kanwar (1988) observed that the total cost of cultivation of tomato and cauliflower were amounted to be Rs.3,650 and Rs.3,545 per hectare, respectively. The net returns gained were Rs.2,934 and Rs.1,816 respectively with the yields 65.84 qtl and 71.49 qtl respectively. The benefit cost ratio for tomato and cauliflower were 1:1.80 and 1:1.50 respectively.

Reddy (1988) estimated that the total cost of cultivation per hectare of tomato was Rs.7,270, Rs.6,529.37 and Rs.5,560.52 for marginal, small and large farms respectively. An inverse relationship of Cost $A_1$, Cost B and Cost C with that of farm size was noticed. Farm business income and family labour income were more on marginal farms while farm investment income was high on large farms.

Venkatanarayana (1990) concluded that the total cost of cultivation was positively correlated with the farm size. Variable costs contributed to 74.15 per cent of total cost of cultivation and exhibited direct relationship with farm size. There was a direct relationship between the farm size

and productivity of chillies. Both the gross and net returns were positively correlated with farm size.

Patil *et al.* (1990) reveals that the total cost of cultivation per acre was Rs.2,372.18, Rs.1,954.88, Rs.2,684.49 and Rs.3,299.64 for tomato, brinjal, onion and chillies. The per acre paid out cost (Cost-A) required for the prcduction of onion was the highest (Rs.2,056.04) followed by chilli (Rs.1,555.64), tomato (Rs.1,257.46) and it was the lowest for brinjal. The per acre gross returns worked to be Rs.4,531.61, Rs.2,578.68, Rs.6,749.63 and Rs.4,200.00, respectively for tomato, brinjal, onion and chilli.

Raghuram *et al.* (1990) concluded the study that the cost of cultivation of curry leaf per hectare was higher in first year over the rest of the years. They were in the order of Rs.38,710, Rs.25,880, Rs.24,002 and Rs.27,729, respectively for four years. The per hectare yield was 27, 44, 47 and 44 tonnes, respectively for four years. The gross returns obtained were Rs.54,032, Rs.88,200, Rs.93,326 and Rs.87,256, respectively for four years. The net returns gained were Rs.15,322, Rs.62,320, Rs.69,324 and Rs.59,527 for the four successive years respectively. The benefit cost ratio was also high with 1:1.80.

Goswami (1990) study's estimates the total cost of production of brinjal per hectare (cost of cultivation plus marketing charge) was Rs.7,687.31. The cost of production per quintal was worked out to Rs.72.18. Brinjal yielded a net returns of Rs.2,912.69. Marketing costs accounted to Rs.9.57 per quintal.

Vagdevi (1991) reported that Cost A, Cost B and Cost C have direct relationship with size of the farm in case of tomato, and for brinjal cost $A_1$ was Rs.18,395.25, Cost B was Rs.22,075.25 and Cost C Rs.22,466.56. For bhendi Cost $A_1$, Cost B and C were Rs.6,264.76, Rs.8,252.66, Rs.8,453.16, respectively and for ridgegourd Cost $A_1$, B and C were Rs.3,780.97, Rs.5,717.97 and Rs.5,860.90, respectively whereas the gross returns per hectare of brinjal, bhendi and ridgegourd were Rs.25,749, Rs.9,855.82 and Rs.8,582, respectively. The net returns per hectare for brinjal, bhendi and ridgegourd were Rs.3,282.44, Rs.1,402.66 and Rs.2,721.10, respectively. The cost benefit ratios worked out for brinjal, bhendi and ridgegourd were 1:1.14, 1:1.16 and 1:1.46 respectively and the farm business income calculated was Rs.7,353.75 for brinjal, Rs.3,591.06 in case of bhendi and for ridgegourd it was Rs.4,801.03.

Agro-Economic Research (1992) study reveals that Cost $A_1$ was about Rs.10,107 per hectare of potato. The cost $A_1$ and $A_2$ were found to be the same in absence of any leased-in land. The cost C worked out to be about Rs.17,698 per hectare of potato. The cost of production was Rs.123.33 per bag.

Ramesh Kumar *et al.* (1993) conclude that the total cost of cultivation of tomato (including marketing costs) worked out to Rs.59,227.66 out of which Rs.31,165.11 formed operational cost (52.62%) Rs.7,490 formed the fixed costs (12.65%) and marketing cost amounted to Rs.20,572.55 forming 34.73 per cent of total cost of cultivation. On an average gross returns received from hectare of tomato was Rs.1,54,437.50 and the net returns per hectare was Rs.95,209.84.

Singh (1993) computed the total cost of cultivation of cauliflower and capsicum per hectare was Rs.12,572.28 and Rs.11,312.40. While, the gross returns were Rs.21,891.01 and Rs.20,210.52 and the net returns over total costs were Rs.9,318.73 and Rs.8,898.12 per hectare of cauliflower and capsicum.

Mahajan *et al.* (1994) revealed that production of brinjal and tomato was capital intensive as it is seen from Cost $A_1$ which was 60.29 per cent and 56.00 per cent for brinjal and tomato. The total cost of cultivation was 96.41 and 106.71 per quintal and the cost of marketing was 32.75 and 35.50 per quintal of brinjal and tomato, respectively. The gross returns were Rs.23,175.65 and Rs.23,755.50 per hectare of brinjal and tomato. The benefit cost ratio worked out to be 1:1.20 and 1:1.07 for brinjal and tomato, respectively.

Shyamasundar *et al.* (1995) study indicates that the total cost of production per acre of onion worked out to be Rs.11,976 out of which the recurring expenses share was the highest accounting for about 79 per cent followed by overheads (around 14%) and marketing expenses (8%). The cost of production per quintal of onion worked out to be Rs.145 and the gross returns realized per quintal was Rs.227 with a net margin of Rs.82.00 for every quintal of onion sold.

## 2.2 RESOURCE PRODUCTIVITY AND PRODUCTION FUNCTION ANALYSIS

Raghubanshi *et al.* (1974) computed multiple regression for tomato and hill capsicum of the Sapron valley and observed that the elasticities of production function for

fertilizer was found to be negatively signed in both the crops, indicating excessive use of fertilizers.

Rathore *et al.* (1974) examined the resource productivity with the ratios of marginal value product to factor cost for different variables. It indicated a vast scope for the reallocation of resources in potato, ginger, tomato, French beans and chillies. It was observed that there was a good scope for more investment in quality seeds except in ginger and fertilizer/manures in tomatoes to increase farm income substantially.

Rathore *et al.* (1975) estimated that the ratios of marginal value product to factor cost for different variables, which indicated vast scope for the reallocation of resources in tomato and chilli farms of Himachal Pradesh.

Venkateswarlu *et al.* (1977) computed Cobb-Douglas production function for green chilli farms of coastal belt of Andhra Pradesh and estimated that the regression coefficients of manure and fertilizers were high and significant at 1 per cent level indicating scope for further use of this input to fetch higher returns. Similarly, the regression coefficients of land and labour were significant at 5 per cent level.

Basavaraja (1980) fitted Cobb-Douglas production function for tomato and suggested shifting land from local to hybrid tomato production as the marginal productivity of an hectare of land was more in cultivating hybrid tomato. The study reported that land and plant protection chemicals were important resources which influenced the production of hybrid tomato.

Naidu and Gupta (1983) computed resource use efficiency in chilli fallow in Prathipadu area of Prakasam district by employing Cobb-Douglas production function and found that the regression coefficients of all the variables (land, human labour, manures and fertilizers) except motive power were significant. The sum of elasticities was found to be 1.0731, which indicated the operation of constant returns to scale. The MVP of human labour was higher than the marginal cost. The marginal productivity of land, manure and fertilizers were 454.47 and 2.44 respectively.

Nahatkar and Pant (1984) employed Cobb-Douglas production function for estimation of resource productivity in chilli farms in Chindawara district. The elasticity of production of each input on all farms was less than one, which shows the operation of diminishing returns. Sum of regression coefficients found to one indicating constant

returns to scale. The MVP of expenditure on fertilizers and pesticides indicated that there was scope for increasing profit by increasing the use of these inputs. The ratio of MVP to its factor cost was very high for land and very low for human labour.

Babar and Waghmore (1985) fitted a multiple regression equation to onion cultivation in Kharif and Rabi. The estimated $R^2$ value varied from 78 to 91 per cent. The regression coefficient of expenditure on manures and fertilizers was statistically significant in the case of Rabi onion on medium and average farm situations. All the coefficients were positive but statistically non significant in respect of Kharif onion.

Sharma and Tewari (1986) fitted the Cobb-Douglas production function to examine the production efficiency of individual inputs on two categories of farms. The sum of the regression coefficient estimated was 0.949 and 1.082 on category 'A' and 'B' farms, indicating the constant returns to scale.

Reddy (1988) employed Cobb-Douglas production function to indicate the constant returns to scale in all the size groups MVP to MFC ratios clearly indicated the high

profitability to expand the area under tomato beyond its present geometric mean level on small and large farms.

Venkatanarayana (1990) concluded that the production function analysis indicated the operation of diminishing returns in general on all the farm size groups. Constant returns to scale was observed on small, medium and overall farms as against increasing scale returns on large farms. Further, the marginal value product to opportunity cost ratios indicated a high degree of resource-use inefficiency and revealed the scope of reorganisation of resources so as to obtain higher productivity on chilli farms.

Thakur *et al.* (1990) fitted the Cobb-Douglas production function for potato. The sum of the elasticities of all inputs was 1.10 indicated the constant returns to scale where the marginal value productivity of human labour was 5.83 and irrigation was 13.52 of all the inputs, human labour and irrigation charges are significant at 1 per cent level of productivity. The estimated $R^2$ value was 0.86.

Dangat *et al.* (1991) employed the Cobb-Douglas production function to study the resource productivities of inputs (human labour, plant protection chemicals and working capital). The total variation in yield explained by these

three inputs was varied 19.85 per cent in small, 27.86 per cent in medium and 17.74 per cent in large size group. The regression coefficients of human labour for medium size group was negative but statistically significant. The regression coefficient of plant protection for small size group was negative and statistically significant and the regression coefficient of working capital invested was negative and statistically non-significant indicating the use of seed, manures, fertilizers, irrigation and support material was in excess in all the size groups of tomato growers.

Aswatha Reddy *et al.* (1994) fitted the Cobb-Douglas production function on potato cultivated farms. the significant variation in productivity of potato was explained by different resources i.e., human labour (0.2486), seed cost (0.2686), plant protection chemicals (0.3094) and fertilizers (0.2049). The estimated $R^2$ value varied from 0.89-0.99. Further, the study indicates that incomes of the potato growers could be increased with more use of these inputs.

Nagaraja *et al.* (1994) employed the Cobb-Douglas production function for local variety and HYV of brinjal. The partial elasticities of the production function

indicating the constant return to scale. The share of land in brinjal production was the maximum in local variety of brinjal whereas in HYV of brinjal the share of fertilizer was the maximum. The share of labour decreased as one moved LV to HYV of brinjal. The HYV of brinjal production required intensive application of fertilizer and plant protection, therefore the share of capital inputs in HYV of brinjal was high compared to local variety of brinjal.

## 2.3 MARKETING ASPECTS

Basavaraj (1980) reported that the cost of transportation and the commission paid accounted for 74 per cent of the total marketing cost of both hybrid and local tomato. the total marketing cost per hectare of hybrid tomato was Rs.6,894 while that of local tomato was Rs.2,907 accounting for 44 per cent of the total costs.

Shete *et al.* (1980) studied the price spread of tomatoes, the producer's share in consumer's rupee was found to be 52.57 and 56.33 per cent in case of tomatoes produced under rainfed and irrigated conditions, respectively. The intermediary share was heavy for itinerant traders and retailers viz., 16.83 and 12.8 per cent under rainfed conditions and 13.05 and 12.93 per cent under irrigated condition, respectively.

Raghubanshi and Tewari (1981) reveals the study on distribution of Himachal's "off-season" tomatoes. The study revealed that, transportation cost accounted for 49 per cent of total marketing cost for sales in Delhi market, and for Chandighar market this cost accounted for about 36 per cent of the total marketing cost.

Ramaswamy and Punazhendhi (1981) studied that, in case of bhendi, farmers received about 38 per cent of consumer's rupee as their share. the respective shares of wholesalers and retailers were 25 and 13 per cent.

Ramaswamy (1981) observed that producer share in the consumer's rupee varied from 36.81 to 57.40 per cent. The wholesaler's margin was 25 per cent and retailer's margin was around 10 per cent.

Tyagi and Patil (1981) study revealed that producer's share in the consumer's rupee was 57.33 per cent, while the retailer's margin was 39.98 per cent in onion. The analysis of price spread indicated that in onion, potato and green chillies producer's share in consumer's rupee was on an average about 57 per cent, and the margin of the retailer was about 33 per cent.

Singh (1982) concluded that the producer's share in consumer's rupee among the vegetables varied from 29.44 per cent in the case of chillies, to 44.83 per cent in the case of tomato.

Singh and Gupta (1983) study estimates that higher marketing cost was due to transport charges which accounted for 57.14 per cent to the total marketing cost followed by bardana charges 21.43 per cent, loading and unloading charges 11.43 per cent, commission of 5.71 per cent and mandi charges of 4.29 per cent.

Nagaraj *et al.* (1985) identified different channels for different fruits and vegetables. For vegetables the channel identified was producer —> commission agent —> retailer —> consumer.

Prasad (1985) study reveals the price spread for different vegetables in Bangalore city. The producer's net share in the consumer's rupee was as low as 50.9 per cent for beans, 55.2 per cent for cabbage and 58.47 per cent for brinjal. The producer-consumer channel was the best.

Reddy (1988) concluded that marketing costs incurred by producer had shown an inverse relationship with that of

farm size. Producer's share in consumer's rupee was only 45.75 per cent. While, remaining 54.25 per cent of the consumer's rupee was distributed among different intermediary agencies like commission agents, wholesalers and retailers.

Kalyankar and Rajmane (1987) study reveals marketing costs and arrivals of potato, out of total marketing cost, the major cost accounted was market commission i.e., 26.45 per cent, the next important cost was transportation followed by grading and packing. The producer's share in consumer's rupee was 65.71 per cent (Rs.110.40/qtl.), the price paid by the wholesaler was 77.26 per cent (Rs.129.78/qtl.). The margin of wholesaler and retailer were 7.44 per cent and 11.31 per cent respectively. The price paid by retailer was 85.17 per cent (Rs.143.08/qtl.) and finally the price paid by the consumer's was 100 per cent (Rs.167.99/qtl.)

Dibakar Naik and Patnaik (1987) worked out the costs and margins of potato in two models. In first model the marketing channel was village trader-wholesaler-retailer, whereas in second model the marketing channel was producer-wholesaler-retailer. The producer's net share in consumer's rupee in model I was 70 per cent. Whereas, in model II it

was 72.13 per cent. The total marketing costs and margins worked out in model I was 30 per cent and it was 27.85 per cent in model II.

Gupta and Arora (1987) study indicates the details of costs incurred by soybean producers in carrying different marketing functions. Out of total marketing costs, the transportation considers to be maximum, followed by storage. The cost of transportation varies according to distance it is found to be Rs.3.00, Rs.3.41 and Rs.2.16 per quintal on marginal, small and large farms respectively. The total marketing costs incurred by farmers was found to be Rs.4.40, Rs.5.09 and Rs.3.96 on marginal, small and large farms, respectively.

Yadav *et al.* (1988) concluded that out of the total costs, transport charges occupy 50 to 60 per cent for different vegetables producer's share in consumer's rupee was 41.53 to 62.42 per cent for different vegetables.

Subrahmanyam (1988) study reveals that most of the produce was marketed through commission agents (79 to 99%). Sale to wholesalers was almost nil in case of all the vegetables, whereas in case of bhendi (21%), brinjal (5%) and tomato (2%). Sale to pre-harvest contractors to the

extent of 10 per cent and 20 per cent was observed in case of cabbage and cauliflower. The commission charges paid varied from around 7 per cent to 10 per cent.

Subrahmanyam (1988) estimates the marketing cost for different vegetables ranged from around Rs.20 per quintal in case of brinjal to Rs.24 per quintal in case of cauliflower. Among the various items, transport and commission charges are the two items accounting for major portion of the marketing costs. The transport cost account for 31 to 45 per cent, the commission charges accounted to 43 to 54 per cent of the total marketing cost and the rest is accounted by items like loading and unloading, packing etc.

Srivastava and Lal (1989) concluded that smaller the channel of marketing higher would be the producer's share in consumer's rupee. The price paid by consumer found to be higher in markets having larger consumer concentration. The increase in consumer's price was absorbed by the retailer.

Khemnar *et al.* (1989) showed that per quintal cost of marketing of tomato between different size groups was not significant, price spread in marketing of tomatc indicated that producer's share in the consumer's rupee ranged between 49 to 50 per cent.

Agro-Economic Research (1989) study indicated that the margins of the middlemen in private trade channels are so high that producers hardly get 40 per cent of the rupee paid by the consumer in vegetable marketing. Somtimes it may be 44 per cent. If the vegetable growers sell the product directly to the consumers, the producer's net share was 86 per cent of the consumer's rupee.

Goswami (1990) study estimates the total marketing costs per quintal of brinjal accounted to be Rs.9.57, out of marketing costs transport accounted for the highest expenditure 61.34 per cent followed by labour with 20.06 per cent and packing with 13.38 per cent. The producer's share in the consumer's rupee comes to 30.38 per cent.

Goswami (1991) study indicates that the price spread was 84.68 per cent of the consumer's price when tomatoes were sold through village traders and wholesalers (Channel I). While, it was 76.28 per cent of the consumers price when sold through village traders (Channel II) while the price spread was the lowest at 65.18 per cent when it sold through retailer (Channel III).

Vagdevi (1991) study indicates the marketing aspects of different vegetables. The producer's share in the

consumer's rupee was the highest in case of bhendi (50.55%) followed by brinjal (49.89%), ridgegourd (42.44%) and tomato (40.86%). The commission agents fee was ranging from 1.14 per cent to 2.61 per cent of the consumer's rupee. On the other hand, the wholesalers margins varied from 9.35 to 14.33 per cent and the retailers were retaining the chunk of the consumer's rupee varying from 31.16 to 36.88 per cent.

Agro-Economic Research (1992) computed the total marketing costs of potato was about Rs.67 per bag. If marketing was through private traders the cost comes to Rs.68.38, the cost of transportation was worked out to be 58.38 per cent of the total marketing cost. The producer's share in the consumer's rupee was found to be 50 per cent.

Shyamasundar (1995) indicated the onion producers of Chickballapur taluk had chosen mainly three intermediaries. The total quantity of onion sold by sample producers was 16,583.25 quintals, of which 12.30 per cent moved through village traders (Channel I), 69.36 per cent through wholesalers (Channel II) and 18.34 per cent through commission agents (Channel III). The producer's share in the consumer's rupee was estimated to 64.62 per cent, 72.45 per cent and 63.53 per cent in Channel I, Channel II and Channel III.

Parmar *et al.* (1995) studied the market share of different marketing agencies in marketing of the vegetables. In this study 72 per cent of total production of vegetables was sold through co-operative societies (Channel I), 38 per cent through private traders (Channel II). the net price received by growers per quintal of brinjal, cabbage, okra and clusterbean was found higher in channel I when compared to channel II (except tomato). The commission charges are found considerably low in channel I as compared to channel II. The retailer's margin for most of the vegetables was found higher in channel I, this affected the producer's share in consumer's share.

Hariharan and Rajagopalan (1995) study reveals different market channels in marketing of vegetables. The per cent of commission to commission agents on sale value vary for each vegetable. For tomato it was 10 per cent, for brinjal 10 per cent, for cauliflower 10 per cent, for onion 7 per cent and for potato it was 3 per cent.

Nawadkar *et al.* (1995) the per quintal cost of marketing of tomato worked out to Rs.96.04, Rs.95.90 and Rs.94.55 for small, medium and large size groups of farmers, respectively. There was no significant difference between the per quintal costs for various categories of farms.

Major components of marketing cost borne by the cultivators were packing, transport and commission charges. These charges together contributed to the extent of 91.08, 91.10 and 90.99 per cent of the total marketing costs for small, medium and large size groups, respectively. Expenditure on account of packing charges was the highest. It alone spared 42.33, 42.52 and 42.31 per cent of the total marketing costs for small, medium and large size groups of farms, respectively. It is because tomatoes require very smooth and careful handling.

Naik *et al*. (1995) studied two important channels are identified in marketing of onion. In Channel I village merchants and wholesaler/retailer are included. In Channel II only wholesaler/retailer was included. The total marketing margins in Channel I were Rs.133.12 and Rs.123.73 in small and large farmers, respectively. the higher marketing margins under Channel I was due to involvement of village merchant. In Channel II the total marketing margins were Rs.100.68 and Rs.101.93 in small and large farmers, respectively. In Channel II, farmers transported the produce directly to regulated market. Channel II was found to be the most efficient one from the point of view of better returns to the producer.

## 2.4 CONSUMER PREFERENCE

Samad and Hossain (1993) study reveals consumption pattern of different commodities on the basis of elasticities. The income elasticity coefficients of vegetables and pulses marked a slight increase in rural area from 1985 to 1989 whereas, in urban area the elasticity coefficients remains unchanged. According to the expenditure elasticities, the vegetables and potato remain as necessary items both in rural and urban areas.

## 2.5 SEASONAL TREND AND PRICE VARIATIONS

Singh and Sidhu (1980) concluded that the price indices of potato was lowest in January and highest in the month of October. Further it was indicated that there existed price variations between seasons which were Rs.12 per quintal between peak and mid, Rs.16 between mid and lean and Rs.28 between peak and lean seasons.

Balakrishnan *et al.* (1981) computed the seasonal indices of prices which revealed that the lowest prices were prevailed in September and higher prices during months of November, December, January and February in the case of potato.

Chatha and Kaul (1982) estimated the potato prices have shown a definite cycle of 3 years period that was statistically significant. The analysis also showed divergent pattern in behaviour of prices of potato.

Kahlon and Chandra (1982) stated that the per quintal wholesale prices of potato during 1974-75 at Farrukhabad and Jullundur markets were Rs.18.30 and Rs.23.00 and they slumped to Rs.14 and Rs.16 in respective markets during 1978-79. Further, they pointed out that per quintal price of onion at Nasik increased from Rs.31 in May, 1977 to Rs.149 in August, 1977 and from Rs.40 in March 1979 to Rs.250 in December, 1979. They also indicated that the price per quintal of Bellary variety of onion rose from Rs.52 in April, 1977 to Rs.112 in December, 1977 and from Rs.41 in April, 1979 to Rs.257 in December, 1979.

Singh and Gupta (1983) found wide fluctuations among different months in potato prices for the year 1980-81 in Farrukhabad district (U.P.). The prices of military type potato were much higher as compared to desi varieties like O.N.1645.

Sabur and Gangwar (1984) found wide seasonal fluctuations in potato prices in all selected markets and

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Sabur and Gangwar (1984) found wide seasonal fluctuations in potato prices in all selected markets and

the seasonal variations in prices were of similar nature in all the selected markets. The seasonal price indices of potato was lowest in February followed by March. Further, they stated that the prices begin to firm up by July and reach peak level in November.

Diwakar (1987) study indicates that the potato arrivals and prices were inversely related. The total variations in prices was explained by market arrivals of different markets. The arrivals of ON-1645 potato explained barely 4 per cent in Kaimganj and the arrivals of the same variety explained 71.54 per cent in Farrukhabad. The average prices in all the markets were found higher in the lean period of potato arrivals i.e., August to early December in comparison to post-harvest period of potato.

Brahm Prakash and Sushila Srivastava (1995) study revealed that the inter year variations in wholesale prices varied between 60.3 and 163.2 per cent from the average price prevailed during last decade. A clear upward trend was noticed in prices. The prices touched the peak during 1993-94. The prices of peas recorded 131.7 per cent higher during 1993-94 as compared to prices prevailed during 1984-85. This continuous hike in price of peas during the period under study can be attributed to increasing demand of

pulses due to growth in population, varied tastes and changes in demand due to increase in the real income of the people and the general inflationary trend of the economy.

Talathi and Thakare (1995) study reveals the temporal changes in absolute whole prices. the percentage of increase in prices was maximum for clusterbeans (80.82%) followed by capsicum (58%), bittergourd (53%), green chillies (47%) and cauliflower (40%). The lower increase in price hike over time was tomato and brinjal (above 3%). the percentage change in prices of other vegetable may be due to inflation except for green chillies and cluster beans for which supply is the major reason due to shortage of arrivals. The comparison of real prices of vegetables for 1992-93 over the year 1987-88 revealed the fall in real prices of all the selected vegetables except for cluster beans which indicated 8.10 per cent increase over the base year price. In the year 1992-93, the highest reduction in real prices over the base year price was for green chillies (40%) followed by tomato and lady's finger (38%) cucumber, brinjal (27%) and cabbage (50%).

Nawadkar *et al.* (1995) study indicates that the prices of tomato are highest during the month of August to December while, they are lowest in the months of January, February

and March. High seasonality is observed in the prices of tomato. Differential in prices is also very high. If the benefit of the seasonality in prices is to be reaped by the producers, transportation of tomato seedlings should be done in such a way that harvest should be taken during the months of August to December.

# *MATERIALS AND METHODS*

# MATERIALS AND METHODS

The present study was undertaken in Guntur district of Andhra Pradesh. The selection is justified on the basis of large volume of business of vegetables and involvement of functionaries in the vegetable market located at Guntur as well as at the nearby urban area viz., Vijawayada. The sampling design, methods of evaluation and the tools of analysis for achieving the objectives specified in the introductory chapter are discussed in this section.

## 3.1 SAMPLING PROCEDURE

A three stage sampling was adopted in this study to select the sample farmers. Two mandals were selected based on the highest area under the vegetable crops. Two villages from each mandal were selected based on the highest area under the vegetable crops. From the selected villages 90 vegetable farmers were selected based on the proportionate random sampling.

### 3.1.1 Selection of Mandals

The data pertaining to the area under vegetable crops in each mandal was obtained from District Statistical Officer, Guntur. Two mandals were selected in the district

based on the highest area under vegetable cultivation, The selected mandals were Mangalagiri and Chebrolu.

### 3.1.2 Selection of Villages

From each mandal two villages were selected having highest vegetable cultivated area after arranging all the villages in descending order based on the total vegetable cultivating area. Thus four villages, two from each mandal were selected purposively. The selected villages were Nutakki and Chinakakani representing Mangalagiri mandal, Chebrolu and Narakoduru representing Chebrolu mandal.

### 3.1.3 Selection of Vegetable Growers

The ultimate sample of 90 farmers were selected from the four villages based on probability proportion to total area under vegetable crops in each village. From each village the vegetable growers were selected randomly. The village wise distribution of total sample in the four villages are presented in Table 3.1 .

## 3.2 METHODS OF ENQUIRY AND COLLECTION OF DATA

The primary data pertaining to farm and family particulars, cropping pattern, farm assets, livestock, inputs employed and output obtained were collected by using specially devised pre-tested schedule by survey method.

Table 3.1 Distribution of sample vegetable growers

| Mandal/village | Area (ha.) | Sample size | Percent to total |
|---|---|---|---|
| I. **Mangalagiri mandal** | | | |
| a) Nutakki | 195.87 | 17 | 18.89 |
| b) Chinakakani | 224.19 | 20 | 22.22 |
| Sub Total | | 37 | 41.11 |
| II. **Chebrolu mandal** | | | |
| a) Chebrolu | 206.00 | 18 | 20.00 |
| b) Narakoduru | 394.98 | 35 | 30.89 |
| Sub Total | | 53 | 58.89 |
| Total | | 90 | 100.00 |

Another set of questionnaire was used to obtain the data on price spread and market margins. ... Opinion survey was also carried out with another pre-tested questionnaire designed for identifying the constraints in vegetable production and marketing. The reference period was 1995-96 agricultural year for the present study.

Secondary data pertaining to month wise average retail prices of vegetables like tomato, brinjal, coccinia and cauliflower in Guntur vegetable market were collected from Annual Administrative Reports of Department of Marketing, Guntur for the study of seasonal variations in price during 1990 to 1995 period.

### 3.3 EVALUATION TECHNIQUES

Some of the inputs used in the production process are owned by the farmer and his family. In computing the cost of cultivation, it is necessary to include the value of these owned inputs also.

**Human Labour:**

Human labour includes permanent labour, casual labour and family labour. In the case of permanent labour payments made in kind like grain, vegetables, food and other perquisites were evaluated at prevailing prices. Payments

made in cash were added. Then the average per day Wage for the permanent labour was calculated. For evaluating the family labour (male), the average per day rate for permanent labour was considered. While in the case of family labour (female) the prevailing wage rate of hired women labour was charged.

**Machine Labour:**

In the case of owned machinery, the cost per hour was adopted for evaluation, whereas actual hired Wage was taken into consideration for hired machines.

**Seed:**

If the seed was farm produced, it was evaluated at the purchase price prevailing at the time of harvesting in the village. If the seed was purchased, the actual amount paid was considered.

**Manures and Fertilizers:**

Farm yard manures were charged at prevailing local rates. The chemical fertilizer and other manures purchased were charged at the prevailing market prices.

**Plant Protection Chemicals:**

The actual costs incurred in the purchase of plant protection chemicals were considered.

**Irrigation Charges:**

The expenses towards electricity charges in case of electric motors were taken into consideration. In other cases the actual amount paid towards irrigation charges were considered. The irrigation charges were included in machine labour in this thesis.

**Transport Costs:**

In case of self transportation the wages for human and bullock labour used were considered, otherwise, the actual cost paid for transportation was considered.

**Interest on Working Capital:**

Interest has been charged at the rate of 12.5 per cent per annum for half of the crop period on the working capital i.e., cash or kind expenses incurred during the period of cultivation.

**Marketing Costs:**

The actual amount paid by the cultivator for unloading, weighing, transportation costs, market fees and commission fees were considered as marketing costs.

**Interest on Fixed Capital:**

Interest on the present value of fixed assets (excluding land) such as farm buildings, implements, machinery, irrigation structures and livestock has been charged at the rate of 10 per cent per annum.

**Rental Value of Owned Land:**

Take actual rent prevailing in the respective villages.

**3.3.1 Procedure for Evaluation of Farm Assets**

Farm Buildings (Cattle sheds, storage sheds etc.):

They were evaluated at prices prevailed in the villages.

Implements and other farm machinery:

Evaluated at prevalent market prices.

Livestock:

they were evaluated at market prices.

## 3.4 TOOLS OF ANALYSIS

The collected data was subjected to both tabular and functional analysis.

### 3.4.1 Tabular Analysis

This was done by working out simple averages, and percentages, various costs as per cost concepts, measures of farm income, price spread, market margins and market efficiency.

Cost Concepts:

The cost concept i.e., Cost $A_1$, Cost $A_2$, Cost B and Cost C were followed in the analysis. These concepts are given in detail below.

Cost $A_1$ :-

Value of hired human labour + attached labour + charges on owned and hired machinery + value of seed (both farm produced and purchased) + value of owned and purchased manures + value of fertilizers + value of plant protection chemicals used + depreciation + repairs and maintenance of farm machinery and implements and farm buildings + land revenue, cesses + irrigation charges and interest on working capital.

Cost $A_2$:-

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

Cost B:-

Cost $A_2$ + imputed rental value of owned land + imputed interest on owned fixed capital excluding land.

Cost C:-

Cost B + imputed value of family labour.

Farm Business Measures: It includes;

Gross income : Value of total output.

Net income : Gross income - Cost 'C'.

Farm business income : Gross income - Cost $A_1$ or Cost $A_2$.

Family labour income : Gross income - Cost B.

Farm investment income: Farm business income - imputed value of family labour.

Net Benefit cost ratio:

Net returns/total cost of cultivation.

Producer's share in Consumer's rupee:

It is the price received by the farmer ($P_f$) expressed as a percentage to the retail price, $p_r$ (i.e., price paid by

consumer). If $P_r$ is the retail price and $P_f$ is the producer's price, then the producer's share in consumer's rupee was expressed as follows:

$$P_s = (P_f \times 100)/P_r$$

Marketing margin of middlemen:

This is the difference between the total payments (costs + purchase price) and receipts (sale price) of middle man ($i^{th}$ agency).

$$\text{Percent profit margin of } i^{th} \text{ middlemen} = \frac{P_{Ri} - (P_{pi} + C_{mi})}{P_{Ri}} \times 100$$

where,

$P_{Ri}$ = Total value of receipts per unit (Sale price)

$P_{Pi}$ = Purchase value of goods per unit (Purchase price)

$C_{mi}$ = Costs incurred on marketing per unit.

Marketing Efficiency:

Shepherd suggested that the ratio of the total value of goods marketed to the marketing cost may be used as a measure of efficiency. The higher the ratio, the higher the efficiency and vice-versa.

An expression of Shepherd's idea is M.E = (V/I) - 1.

where,

M.E. = Index of marketing efficiency.

V = Value of the goods sold (Consumer's price)

I = Total marketing cost.

### 3.4.2 Functional Analysis

To study the resource productivity, returns to scale, and resource use efficiency the functional analysis was employed. For this purpose, in the present study, Cobb-Douglas production function was adopted for its flexibility and suitability to the heterogeneous data and to know the nature of returns to scale.

The usual form of this function is as follows:

$$Y = a\ X_1^{b1}\ X_2^{b2} \ldots\ldots\ X_n^{bn}\ .\ U$$

where,

Y : Dependent variable.

$X_1\ X_2\ \ldots\ X_n$ : the variable inputs selected for the study.

$b_1\ b_2\ \ldots\ b_n$ : Regression coefficients.

U : Error term, and

a : Constant (Intercept)

The function in the double logarithemic form would be

$$\text{Log } Y = \text{Log } a + b_1 \text{ Log } X_1 + b_2 \text{ log } X_2 + \ldots b_n \text{ log } x_n + \text{log } U$$

The specific function used in the study was

$$Y = a\ X_1^{b1} . X_2^{b2} . X_3^{b3} . X_4^{b4} . X_5^{b5} . U$$

The variables specified in present study are as follows:

$Y$ = Gross returns in rupees.

$X_1$ = Seed material in rupees.

$X_2$ = Human labour value in rupees.

$X_3$ = Value of Machine labour in rupees.

$X_4$ = Fertilizer and manure expenses in rupees.

$X_5$ = Plant protection chemicals value in rupees.

Test for Regression Coefficients:

For testing the regression coefficients or production elasticities, 't' test was employed using the formula.

$$t = \frac{b_i}{\text{SE of } b_i}$$

$b_i$ = Regression coefficient of input $X_i$

SE of $b_i$ = Standard error of $b_i$.

Returns to scale:

The sum of production elasticities of all the inputs ($\Sigma b_i$) indicates returns to scale.

If $\Sigma b_i = 1$ indicates constant returns to scale.

$\Sigma b_i = >1$ indicates increasing returns to scale.

$\Sigma b_i$ = <1 indicates decreasing returns to scale.

't' test was employed to know whether $\Sigma b_i$ is significantly deviating from unity or not. The formula is:

$$t = \frac{\Sigma b_i - 1}{SE \text{ of} \Sigma b_i}$$

$$= \frac{\Sigma b_i - 1}{\sqrt{S(C_{11}+C_{22}+....C_{nn}+2C_{12}+2C_{13}+ \ldots 2C_{mn}}}$$

$C_{11}$, $C_{22}$, $C_{12}$, $C_{13}$ are the elements of variance and covariance matrix obtained from inverse matrix.

### 3.5 CONCEPTS AND TERMS USED IN THE STUDY

Farm Worker:-

Farm worker refers to a person wholly working on farm i.e., farmer, family member and farm servant.

Total cropped area:-

Total cropped area represents the area covered with crops i.e, the sum total of area covered by all the individual crop.

Cropping intensity:-

Cropping intensity is obtained by dividing the total cropped area by net area sown and multiplied by hundred.

Irrigation intensity:-

Irrigation intensity is obtained by dividing gross area irrigated by net area irrigated and multiplying by hundred.

Farm asset structure:-

Farm asset structure refers to investment on farm buildings, implements and other farm machinery, irrigation structures and livestock.

Implements and machinery:-

It refers to wooden ploughs, iron ploughs, cultivators, harrows, dusters, sprayers, spades and crowbars, etc.

Farm buildings:-

Farm buildings refer to cattle sheds, storage sheds, and implement sheds.

Manday:-

It is the work done by a male adult within a duration of 8 hours. 1.5 female day is considered to be equal to one man day.

Total costs:-

Total costs include both fixed costs and variable costs.

Fixed costs:-

This includes the rental value of the owned land, depreciation, land revenue and interest on fixed capital.

Variable costs:-

The components of the variable costs included were human labour, bullock labour, machine labour, seed, manures and fertilizers, plant protection chemicals, irrigation charges, transportation charges, interest on working capital and marketing charges.

Net benefit cost ratio:-

This is the ratio of the net returns to total cost.

Resource use efficiency:-

A resource is said to be employed efficiently if its marginal value product is just sufficient to meet the acquisition or purchase or opportunity costs.

Marginal value products:-

The marginal value products were computed by multiplying the regression coefficients of the given resource with the ratio of geometric mean of resource and output. The marginal value product would be $MVP_{xi} = b_i \bar{Y}/\bar{X}_i$ Py. Where $MVP_{xi}$ is the marginal value of $i^{th}$ input x (where i = 1 ..... 5) and $\bar{X}$ and $\bar{Y}$ are geometric means of input and output, $b_i$ is the regression coefficient of variable $X_i$ and Py is the price of output.

In order to evaluate the efficiency of the resource, the marginal value product of input factors should be compared with their respective acquisition costs. If the ratio is equal to unity, that indicates the optimum use of factors, if the ratio is more than unity, it indicates that the returns can be increased by using more of that resource and if the ratio is less than unity, it warrants the economic use of resource should be decreased to minimise the losses.

**Opportunity Cost:**

For the various resources the opportunity costs are the market prices that prevailed in those areas. In this study for the resources the acquisition costs were taken as unity.

**Marketing Channel:**

It is the path over which a commodity is passed as it moves from producer into the hands of the ultimate consumer.

**Marketing Cost:**

It is the actual costs incurred in running the goods and services from the producer to the consumer. The costs

may be paid by the producer or marketing agency and sometimes by consumers too.

**Market Margins:**

It refers to the difference between the price paid and received by a specific marketing agency such as a single retailer or by any type of marketing agency such as retailers or assemblers.

**Seasonal trend and price variation:**

For studying seasonal trend and variation in prices, seasonal indices were constructed for 1990-'95 period by adopting the procedure "relative method of calculating seasonal variation". The formula used for the calculation of the indices was

$$S.I. = \frac{\text{Average prices of particular month}}{\text{Average of monthly averages of prices}} \times 100$$

S.I. = Seasonal indices.

## 3.6 LIMITATIONS OF THE STUDY

Survey method of enquiry was adopted because of its advantage of cheaper in cost and less time taking in investigation. However, few limitations were faced during the period of enquiry such as:

1. Absence of maintenance of farm records by the growers.
2. The estimates furnished were based on the recall memory.
3. Cultivators were not quite accustomed to this type of surveys, hence an element of fear overcast them to this type of survey to disclose the details needed.
4. Due to fluctuations in the prices of vegetables, the average prices during the study period have been taken for the calculation of the price spread, margins, marketing efficiencies and price indices. Hence, it is one of the limitation of the study.

# *AGRO-ECONOMIC FEATURES*

# AGRO-ECONOMIC FEATURES

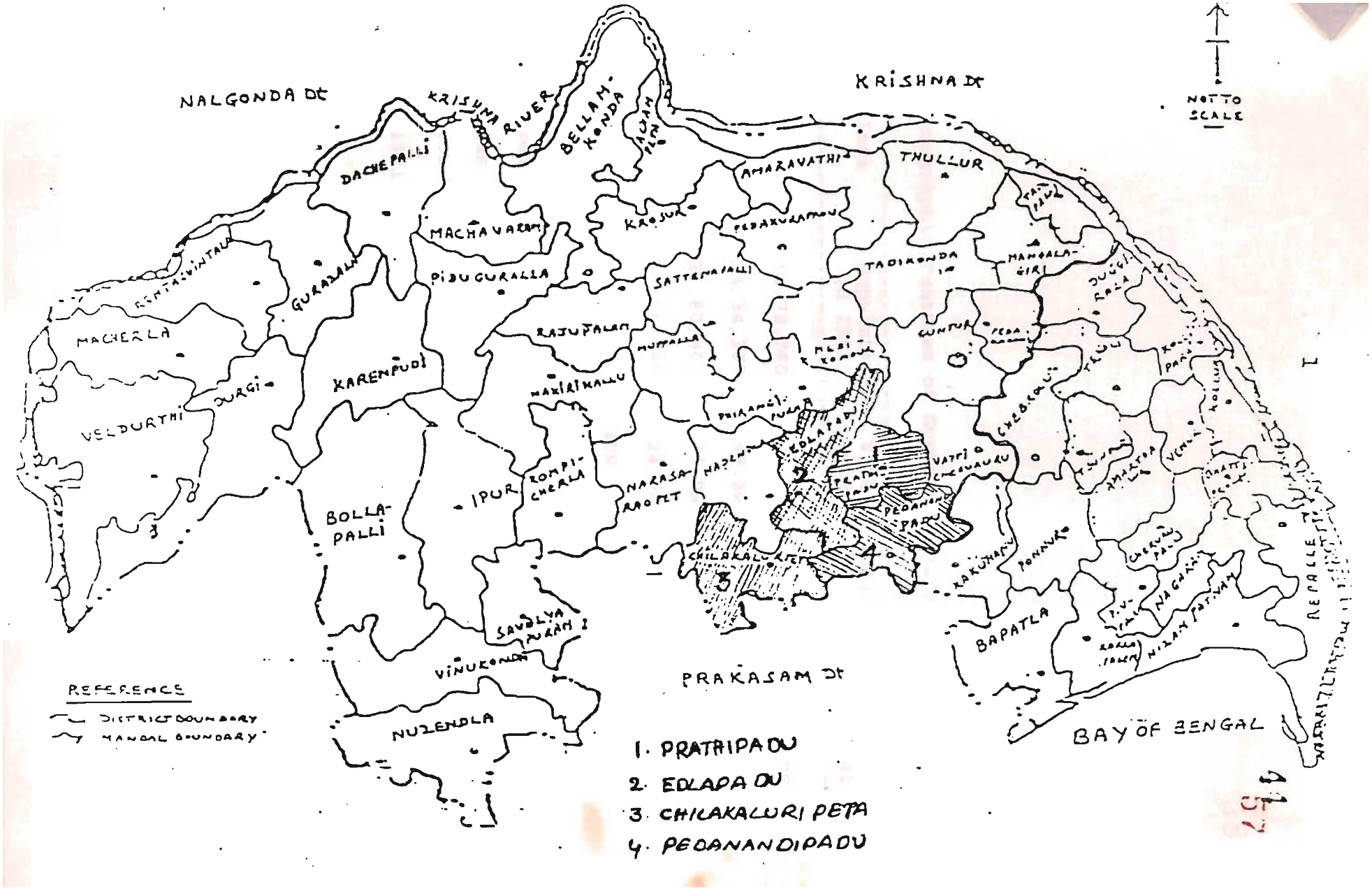
This chapter is mainly prepared to emphasize the discussion in detail about the Agro-economic features of the selected district, Guntur and selected mandals Mangalagiri and Chebrolu and selected villages Nutakki, Chinna Kakani, Chebrolu and Narakoduru, where the concentration of vegetable cultivation area was the highest and there is scope to increase the area under vegetable production in the Guntur district of Andhra Pradesh.

## GUNTUR DISTRICT

Guntur district lies between 15°18' and 16°80' of the North latitude and 79°10' and 80°55' of the East longitude. It is bound by Krishna and Nalgonda districts on the North, Bay of Bengal on the east, Guntur is adjoined by Prakasam district on the south, Mahaboobnagar district on the west. It consists of 57 mandals with a total geographical area of 11,377 sq.km.

## POPULATION

Demographic features of the district are presented in Table 4.1. The total population of the district was 41,06,999 (1991 census) comprising 20,22,519 females and 20,84,480 males. The rural population in the district was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KRISHNA Dt
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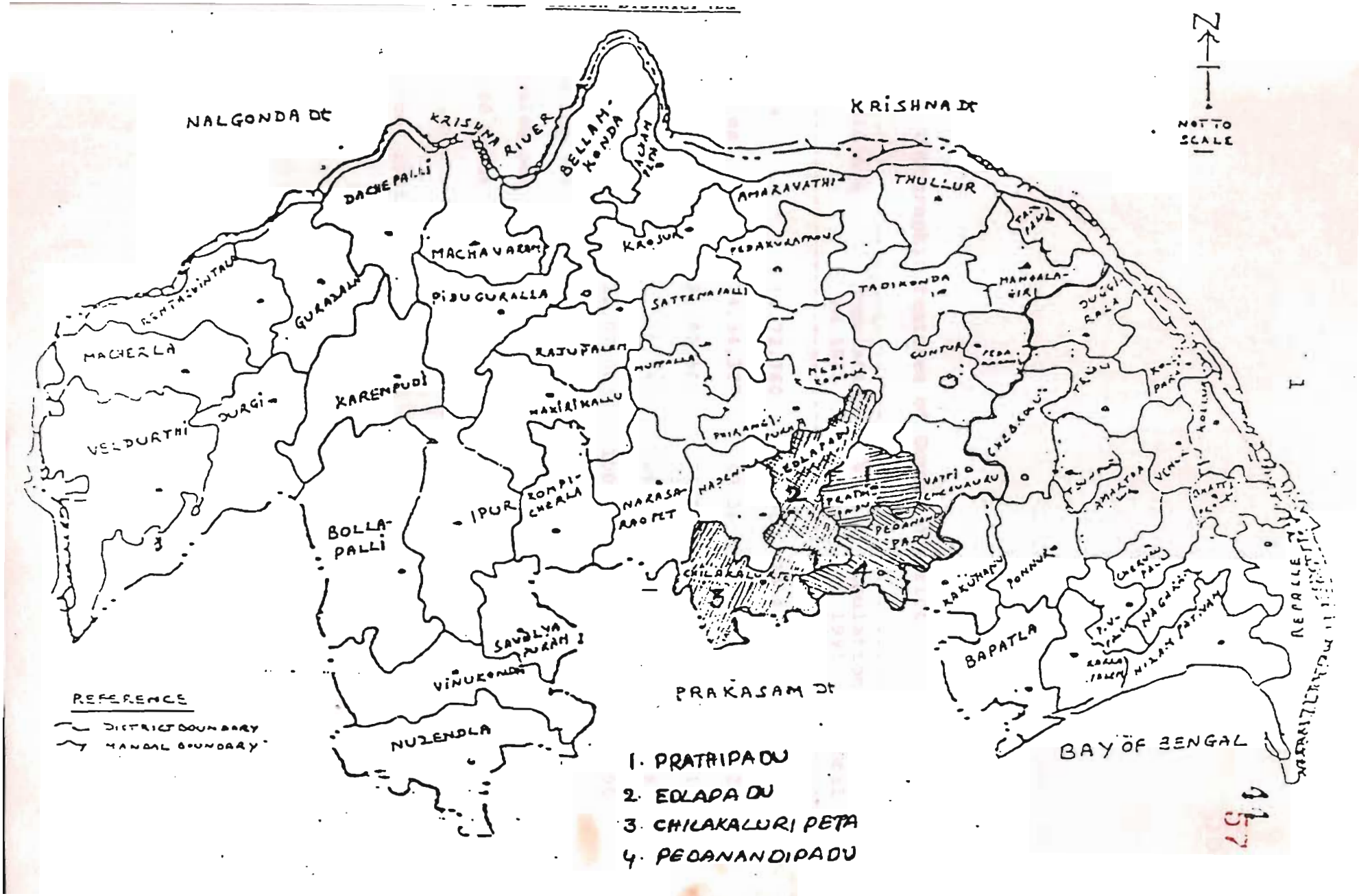
DACHEPALLI
MACHAVARAM
KANAMA-LURU
AMARAVATHI
TNULLUR
KAZUR
PEDAKURAPADU
TADIKONDA
MANGALA-GIRI
DUGGI-RALA
PIDUGURALLA
SATTENAPALLI
GURAZALA
RENTACHINTALA
MACHERLA
RAJUPALEM
NUTHALAPADU
KARAMCHEDU
DURGI
VELDURTHI
NARASARAOPET
BOLLA-PALLI
IPUR
ROMPI-CHERLA
SAVALYA PURAM
VINUKONDA
NUZENDLA
CHILAKALURIPET
PEDANANDI-PADU
KAKUTHARU
PONNUR
BAPATLA
BAY OF BENGAL
NIZAM PATNAM
NAGARAM
REFERENCE
DISTRICT BOUNDARY
MANDAL BOUNDARY
NOT TO SCALE
1. PRATHIPADU
2. EDLAPADU
3. CHILAKALURIPETA
4. PEDANANDIPADU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PIDUGURALLA
MACHERLA
VELDURTHI
DURGI
KAREMPUDI
RAJUPALEM
NUTTALLA
MARRIPALLU
SATTENAPALLI
KANUMOLU
AMARAVATHI
KROSURU
PEDAKURAPADU
THULLUR
TADIKONDA
MANGALA-GIRI
GUNTUR
PEDA KAKANI
TENALI
PRATHIPADU
EDLAPADU
PEDANANDIPADU
CHILAKALURI PETA
NARASA-RAOPET
NADENDLA
KOMPI-CHERLA
IPUR
BOLLA-PALLI
SAVALYA PURAM
VINUKONDA
NUZENDLA
VATTI CHEMUKURU
KAKUTHARU
PONNURU
BAPATLA
REFERENCE
DISTRICT BOUNDARY
MANDAL BOUNDARY
NOT TO SCALE
1. PRATHIPADU
2. EDLAPADU
3. CHILAKALURI PETA
4. PEDANANDIPADU
BAY OF BENGAL

4.1 Demographic features of Guntur district

| Particulars | Population in 1981 | % to total | Population in 1991 | % to total |
|---|---|---|---|---|
| Males | 14,72,760 | 50.70 | 20,84,480 | 50.75 |
| Females | 14,34,307 | 49.30 | 20,22,519 | 49.25 |
| Rural | 21,80,800 | 75.05 | 29,20,299 | 71.10 |
| Urban | 7,26,267 | 24.98 | 11,86,700 | 28.89 |
| Total | 22,07,067 | 100.00 | 41,06,999 | 100.00 |
| Density per sq.km | 256 | -- | 361 | -- |
| Females per 100 males | 974 | -- | 970 | -- |

Source: 1991 census.

Table 4.2 Literacy status in Guntur district

| Particulars | Population | Males | Females |
|---|---|---|---|
| Total | 16,20,864 (46.35%) | 10,03,130 (56.54%) | 6,17,234 (35.85%) |
| Rural | 9,96,111 (40.22%) | 6,39,607 (50.80%) | 3,56,504 (29.28%) |
| Urban | 6,24,253 (61.26%) | 3,63,523 (70.56%) | 2,60,730 (51.74%) |

Note: Figures in parentheses indicates % to total.
Source: 1991 Census.

29,20,299. Density of population per sq.km. worked out to be 361. There are 970 women per 1000 men in the district.

**LITERACY STATUS**

In above 7 years age group of the total population, the literacy rate was 46.35%. It is evident from Table 4.2 that out of the total population, male literates were 10,03,130 (56.54%) and female literates were 6,17,234 (35.85%). In rural population 50.8 per cent of males and 29.28 per cent of females were literates. In the urban population the male literates were 3,63,523 (70.56%) and female literates were 2,60,770 (57.74%).

**PHYSIOGRAPHY**

The interesting features of Guntur district are Rivers, Plains and Sea coast. Generally, the land is rising gently from sea level through undulating plains to an average attitude of 1,500 feet in the hills. Guntur district has a flat open plain of black and red soils. The district can be divided into 4 distinct regions viz., (i) The delta (ii) The West stony upland (iii) The black cotton plains and (iv) The Eastern sea coast.

Table 4.3 Rainfall pattern in Guntur district (1995-'96)

| Year | Month | Amount of rainfall (mm) |
|---|---|---|
| 1995 | January | 41.7 |
| | February | 34.4 |
| | March | -- |
| | April | -- |
| | May | -- |
| | June | 71.9 |
| | July | 174.7 |
| | August | 227.3 |
| | September | 88.0 |
| | October | 250.1 |
| | November | 14.0 |
| | December | 0.1 |
| 1996 | January | -- |
| | February | 1.8 |
| | March | -- |
| | April | 11.0 |
| | May | 16.6 |

Table 4.4 Sources of irrigation in Guntur district (1995-96)

| Particulars | Area irrigated (ha.) | % to net irrigated area |
|---|---|---|
| Canals | 2,77,482.55 | 86.58 |
| Tanks | 4,801.77 | 1.50 |
| Tube wells and filter point | 23,454.39 | 7.31 |
| Other wells | 4,568.66 | 1.42 |
| Lift irrigation | 10,503.58 | 3.27 |
| Net irrigated area | 3,20,810.95 | 100.00 |
| Area irrigated more than once | 13,823.34 | 4.31 |
| Gross irrigated area | 3,34,634.28 | 104.31 |

Source: Hand book of Statistics, Guntur district, 1995-'96
Chief Planning Officer, Guntur.

**Climate and Rainfall**

The climate is generally very warm. During the year 1995 the maximum rainfall was observed in the month of October followed by August. It was evident from Table 4.3.

**Soils**

The soils of Guntur district can be broadly classified into three types viz., (1) Black cotton soils (70%), (2) Red loamy soils (24%) and (3) coastal sands (6%) from this it can be inferred that most of the soils are black cotton soils.

**Irrigation**

The source of irrigation in Guntur district is mentioned in Table 4.4. Guntur district gets irrigation mainly from canals. In uplands, rainfall is supplemented by tanks, tube wells and lift irrigation. In the coastal belt the soils are sandy and the level of water table is very high i.e., 2 to 3 feet in winter and 4 to 6 feet in summer. Irrigation wells are deep in other areas ranging from 15 to 40 feet. Most of the area in the coastal belt has a peculiar system of irrigation through splash watering.

Table 4.5 Cropping pattern in Guntur district (1995-96)

| Crop | Area (ha.) | % to gross cropped area |
|---|---|---|
| Paddy | 2,78,973.06 | 32.98 |
| Maize | 5,919.95 | 0.70 |
| Other cereals and millets | 1,629.73 | 0.19 |
| Greengram | 13,478.53 | 1.59 |
| Blackgram | 1,77,772.56 | 21.02 |
| Redgram | 24,031.09 | 2.84 |
| Bengalgram | 2,138.03 | 0.25 |
| Groundnut | 8,542.03 | 1.01 |
| Other oil seeds | 16,007.91 | 1.89 |
| Cotton | 1,92,481.17 | 22.76 |
| Turmeric | 4,644.17 | 0.55 |
| Sugarcane | 3,401.50 | 0.40 |
| Fruits | 9,977.47 | 1.18 |
| Chillies | 24,330.97 | 2.88 |
| Vegetables | 11,190.76 | 1.32 |
| Others | 71,239.75 | 8.42 |
| Gross cropped area | 8,45,784.14 | 100.00 |

Source: Hand book of Statistics, Guntur district, 1995-'96

Chief Planning Officer, Guntur.

Table 4.6 Livestock population in Guntur district

| S.No. | Particulars | Population | % to total |
|---|---|---|---|
| 1. | Cattle | 1,90,265 | 6.14 |
| 2. | Buffaloes | 8,56,876 | 27.67 |
| 3. | Sheep | 2,72,023 | 8.78 |
| 4. | Goat | 1,33,215 | 4.30 |
| 5. | Horses and Ponies | 517 | 0.02 |
| 6. | Donkeys | 336 | 0.01 |
| 7. | Pigs | 52,667 | 1.70 |
| 8. | Fowls | 15,77,906 | 50.45 |
| 9. | Ducks | 13,214 | 0.43 |
| | Total | 30,97,029 | 100.00 |

Source: 1987 Livestock census

Table 4.7 Land utilization pattern in Guntur district (1995-96)

| S.No. | Particulars | Area (ha.) | % to total |
|---|---|---|---|
| 1. | Forests | 1,56,100.88 | 13.78 |
| 2. | Barren and uncultivated land | 41,323.92 | 3.65 |
| 3. | Land put to non-agril uses | 1,55,849.11 | 13.76 |
| 4. | Permanent pastures and other grazing land | 24,279.57 | 2.14 |
| 5. | Miscellaneous tree crops | 42,035.78 | 3.71 |
| 6. | Cultivable waste | 44,965.00 | 3.97 |
| 7. | Current fallows and and other fallows | 59,321.74 | 5.24 |
| 8. | Net area sown | 6,08,986.08 | 53.76 |
| 9. | Area sown more than once | 2,36,798.46 | 20.90 |
| 10. | Gross cropped area | 8,45,784.15 | 74.66 |
| | Total Geographical area | 11,32,862.10 | 100.00 |

Source: Hand book of Statistics, Guntur district, 1995-'96
Chief Planning Officer, Guntur.

## CROPPING PATTERN

Cropping pattern gives an idea of the cultivated area for each of the crops grown in the area. The details are presented in Table 4.5. It is found from the table that among the various food crops grown, rice occupies prime place and accounted for 32.98 per cent of gross cropped area.

## LIVE STOCK POPULATION

The total livestock population in the district stands at 30,97,029 as per 1987 livestock census. The Table 4.6 reveals that buffaloes occupy 27.67 per cent, cattle 6.14 per cent, sheep 8.78 per cent and fowls occupied 50.95 per cent, respectively.

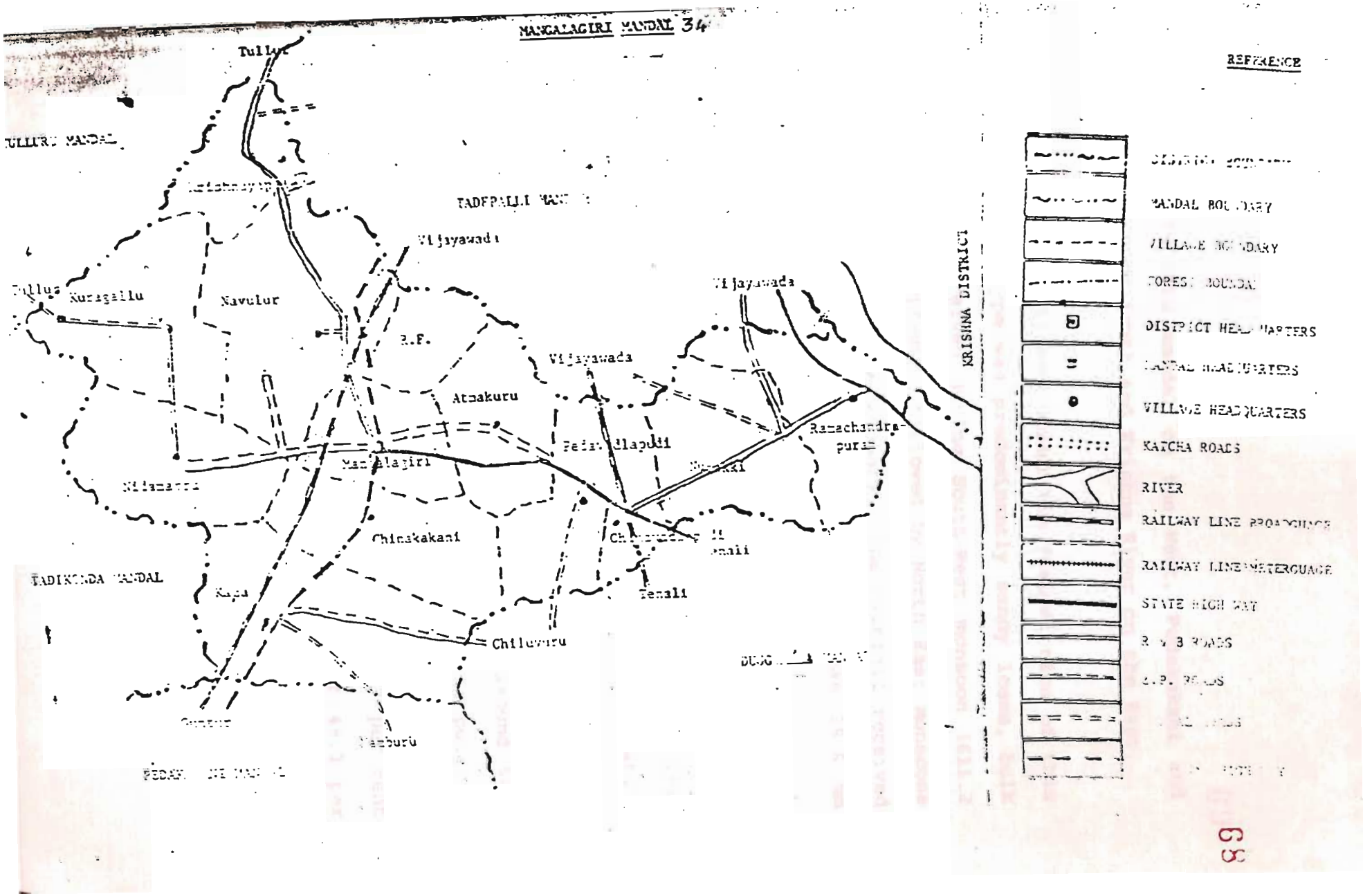
## LAND UTILIZATION PATTERN

Table 4.7 gives a wide picture of land utilization pattern follows and net area sown in the district.

## SELECTED MANDALS

### 4.1.1 Mangalagiri Mandal

The Mangalagiri mandal was formed in the year 1982. This mandal was surrounded by Tadepalli on the North,


MANGALAGIRI MANDAL 34
Tullur
TULLURU MANDAL
TADEPALLI MANDAL
Vijayawada
Tullur
Kuragallu
Navulur
R.F.
Atmakuru
Vijayawada
Vijayawada
Ramachandra-puram
Mangalagiri
Nidamarru
Chinakakant
Tenali
TADIKONDA MANDAL
Kaza
Chiluvuru
Nambуru
KRISHNA DISTRICT
REFERENCE
MANDAL BOUNDARY
VILLAGE BOUNDARY
DISTRICT HEAD QUARTERS
MANDAL HEADQUARTERS
VILLAGE HEADQUARTERS
KATCHA ROADS
RIVER
RAILWAY LINE BROADGUAGE
RAILWAY LINE METERGUAGE
STATE HIGH WAY
R & B ROADS
38

Tadikonda and Tulluru mandal on the West, Pedakakani and Duggirala mandals on South and Krishna River on the East.

There were 12 villages under the jurisdiction of this mandal. The soil type was predominantly sandy loams, bulk of rainfall was received during South-West monsoon (611.2 mm) viz., June to September followed by North-East monsoons (313.8 mm) viz., October to January. The rainfall received during hot weather period (February to May) was 28.6 mm only.

**Population**

The total population of Mangalagiri mandal as per 1991 census was 1.22 lakhs. The details of the population statistics was given in the Table 4.8.

The total male population accounted for around 50.8 per cent to total population, whereas the female population constituted to 49.2 per cent. The females per 100 males was 96.84. The total rural population was about 51.7 per cent whereas the urban population was to the tune of 48.3 per cent.

Table 4.8 Population particulars of Mangalagiri Mandal and selected villages

| Sl. No. | Particulars | Mangalagiri Mandal | % to total population | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chinna Kakani | % to total population | Nutakki | % to total population |
| 1. | Males | 62,350 | 50.8 | 2,506 | 51.6 | 4,140 | 51.14 |
| 2. | Females | 60,383 | 49.2 | 2,351 | 48.4 | 3,955 | 48.86 |
| 3. | Females per 100 males | 96.84 | | 93.81 | | 95.53 | |
| 4. | Rural population | 63,457 | 51.7 | 4,857 | 100 | 8,095 | 100 |
| 5. | Urban population | 59,276 | 48.3 | | | | |
| 6. | Total | 1,22,733 | 100 | 4,857 | 100 | 8,095 | 100 |

Source: 1991 Census.

Table 4.9 Occupational pattern in Mangalagiri Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Mangalagiri Mandal | % to total population | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chinna Kakani | % to total population | Nutakki | % to total population |
| 1. | Cultivators | 5,354 | 8.44 | 325 | 6.69 | 966 | 11.94 |
| 2. | Agricultural labour | 17,974 | 28.32 | 1,424 | 29.32 | 1,956 | 24.16 |
| 3. | Other workers | 8,020 | 12.64 | 491 | 10.11 | 2,017 | 24.92 |
| 4. | Marginal workers | 1,114 | 1.76 | 56 | 1.15 | 35 | 0.43 |
| 5. | Total Workers | 32,462 | 51.16 | 2,296 | 47.27 | 4,974 | 61.45 |
| 6. | Total Non-workers | 30,995 | 48.84 | 2,561 | 52.73 | 3,121 | 38.55 |
| 7. | Total population | 63,457 | 100 | 4,857 | 100 | 8,095 | 100 |

Source: Records of Mandal Statistics of Mangalagiri mandal.

**Occupational Pattern**

The details regarding the mandal wise occupational pattern are given in the Table 4.9. The total number of workers were 32,462 and the number of non-workers were 30,995, accounting for 51.16 per cent and 48.84 per cent of the total population, respectively.

It was evident from the table that the number of cultivators accounted for 8.44 per cent to total population whereas the agricultural labourers constituted 28.32 per cent. There were 355 cultivators and 1,193 agricultural labourers per 1000 hectare of gross cropped area.

**Land Uitilisation Pattern**

As per the Table 4.10 total geographical area of the mandal was 13.65 thousand hectares. The net area sown was to an extent of 9.8 thousand hectares (73.47% of total geographical area) and the gross cropped area was about 15.06 thousand hectares.

The total area under permanent pastures and other grazing land was 32.77 hectares which accounts for 0.25 per cent of the total geographical area. The land put to non-agricultural uses and barren and uncultivable land was about

Table 4.10 Land utililization pattern in Mangalagiri Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Mangalagiri Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chinna Kakani | | Nutakki | |
| | | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area |
| 1. | Total geo-graphical area | 13,365.20 | 100 | 1,080.14 | 100 | 1,122.64 | 100 |
| 2. | Barren and uncultivated land | 116.95 | 0.88 | -- | - | -- | - |
| 3. | Land put to non-agri-cultural uses | 2,853.94 | 21.35 | 228.25 | 21.13 | 53.42 | 4.76 |
| 4. | Permanent pastures and other grazing land | 32.77 | 0.25 | -- | - | 32.78 | 2.92 |
| 5. | Miscellaneous tree crops | 365.85 | 2.74 | -- | - | -- | - |
| 6. | Other fallows | 175.64 | 1.31 | -- | - | -- | - |
| 7. | Net area sown | 9,820.05 | 73.47 | 851.89 | 78.87 | 1,036.44 | 92.32 |
| 8. | Area sown more than once | 5,240.05 | 39.21 | 559.30 | 51.78 | 492.11 | 43.83 |
| 9. | Gross cropped area | 15,060.10 | 112.68 | 1,411.19 | 130.65 | 1,528.55 | 136.16 |

Source: Records of Mandal Statistics of Mangalgiri mandal.

Table 4.10 Land utilization pattern in Mangalagiri Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Mangalagiri Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chinna Kakani | | Nutakki | |
| | | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area |
| 1. | Total geographical area | 13,365.20 | 100 | 1,080.14 | 100 | 1,122.64 | 100 |
| 2. | Barren and uncultivated land | 116.95 | 0.88 | -- | - | -- | - |
| 3. | Land put to non-agricultural uses | 2,853.94 | 21.35 | 228.25 | 21.13 | 53.42 | 4.76 |
| 4. | Permanent pastures and other grazing land | 32.77 | 0.25 | -- | - | 32.78 | 2.92 |
| 5. | Miscellaneous tree crops | 365.85 | 2.74 | -- | - | -- | - |
| 6. | Other fallows | 175.64 | 1.31 | -- | - | -- | - |
| 7. | Net area sown | 9,820.05 | 73.47 | 851.89 | 78.87 | 1,036.44 | 92.32 |
| 8. | Area sown more than once | 5,240.05 | 39.21 | 559.30 | 51.78 | 492.11 | 43.83 |
| 9. | Gross cropped area | 15,060.10 | 112.68 | 1,411.19 | 130.65 | 1,528.55 | 136.16 |

Source: Records of Mandal Statistics of Mangalgiri mandal.

Table 4.11 Source wise irrigation in Mangalagiri Mandal and selected villages (1995-'96)

| Sl. No. | Source | Mangalagiri Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | China Kakani | | Nutakki | |
| | | Area irrigated (Hectares) | % to net irrigated area | Area irrigated (Hectares) | % to net irrigated area | Area irrigated (Hectares) | % to net irrigated area |
| 1. | Canals | 2,352.93 | 42.02 | 427.36 | 80.36 | 184.95 | 19.04 |
| 2. | Tube wells and filter points | 1,934.87 | 34.55 | -- | - | 786.33 | 80.96 |
| 3. | Other wells | 159.44 | 2.84 | 16.59 | 3.12 | -- | - |
| 4. | Lift irrigation | 1,152.18 | 20.58 | 87.83 | 16.52 | -- | - |
| 5. | Net irrigated area | 5,599.43 | 100.00 | 531.78 | 100.00 | 971.28 | 100.00 |
| 6. | Area irrigated more than once | 1,500.22 | 26.79 | 65.15 | 12.25 | 251.32 | 25.88 |
| 7. | Gross irrigated area | 7,099.65 | 126.79 | 596.93 | 112.25 | 1,222.60 | 125.88 |
| 8. | Percentage gross irrigated area to gross cropped area | -- | 47.14 | -- | 42.30 | -- | 79.98 |

Source: Records of Mandal Statistics of Mangalgiri mandal.

2853.94 hectares (21.35%) and 116.95 hectares (0.88%) respectively. The total cultivable waste was nil. The total area sown more than once was around 5.24 thousand hectares. The cropping intensity in the Mangalagiri mandal was observed to be 1.53.

**Sources of Irrigation**

Particulars of the sources of irrigation in the selected mandals during 1995-96 year are presented in the Table 4.11.

It is evident from the table that the canals formed the major source of irrigation followed by tube wells and filter points. These sources provide an assured source of irrigation for vegetable production in all the seasons.

The intensity of irrigation was around 1.26 and the percentage of irrigated area to gross cropped area was only 47.14. The net irrigated area was about 5.59 thousand hectares. The area under canals was 2.35 thousand hectares (42.02%) followed by tube wells and filter points which constituted to an extent of 1.93 thousand hectares (34.55%).

Table 4.12 Cropping pattern in Mangalagiri Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Mangalagiri Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | China Kakani | | Nutakki | |
| | | Area (Hectares) | % to gross cropped area | Area (Hectares) | % to gross cropped area | Area (Hectares) | % to gross cropped area |
| 1. | Paddy | 4,365.50 | 28.99 | 526.11 | 37.28 | 246.87 | 16.15 |
| 2. | Maize | 356.14 | 2.36 | 30.00 | 2.13 | 108.05 | 7.07 |
| 3. | Other cereals and millets | 310.82 | 2.06 | -- | - | -- | - |
| 4. | Greengram | 310.40 | 2.06 | 82.56 | 5.84 | -- | - |
| 5. | Blackgram | 3,497.11 | 23.22 | 447.19 | 31.69 | 234.73 | 15.36 |
| 6. | Redgram | 384.06 | 2.55 | 25.09 | 1.78 | 20.24 | 1.32 |
| 7. | Bengalgram | 38.85 | 0.26 | -- | - | -- | - |
| 8. | Other food crops | 863.63 | 5.73 | 50.32 | 3.57 | -- | - |
| 9. | Groundnut | 645.80 | 4.29 | 25.09 | 1.78 | -- | - |
| 10. | Sesamum | 121.81 | 0.81 | -- | - | -- | - |
| 11. | Turmeric | 403.48 | 2.68 | 4.86 | 0.34 | 180.10 | 11.78 |
| 12. | Sugarcane | 521.66 | 3.46 | -- | - | 231.08 | 15.12 |
| 13. | Tobacco | 353.14 | 2.36 | -- | - | -- | - |
| 14. | Fruits | 927.65 | 6.16 | 24.10 | 1.71 | 283.29 | 18.53 |
| 15. | Spices and condiments | 57.87 | 0.38 | -- | - | -- | - |
| 16. | Chillies | 364.15 | 2.42 | -- | - | -- | - |
| 17. | Vegetables | 1,535.03 | 10.19 | 195.87 | 13.88 | 224.19 | 14.67 |
| | Gross cropped area | 15,060.10 | 100 | 1,411.19 | 100 | 1,528.55 | 100 |

Source: Records of Mandal Statistics of Mangalagiri mandal.

**Cropping Pattern**

Mandal wise cropping pattern is presented in the Table 4.12. The salient features obtained from the table were paddy was the major crop which constituted 28.99 per cent to total cropped area, followed by blackgram which was to an extent of 23.22 per cent of gross cropped area.

The total vegetable cultivating area in Kharif season was 721.18 hectares and 813.85 hectares during Rabi season. The total area under chillies was 365.15 hectares, which is 2.42 per cent of the total cropped area. The total area under vegetables was 1535.03 hectares (10.19% of the gross cropped area).

**4.1.2 Chebrolu Mandal**

Chebrolu mandal was formed in 1982. The Chebrolu mandal was surrounded by Pedakakani mandal on North, Vatticherukuru mandal on the West, Schunduru mandal on South and Tenali Mandal on the North.

There are 11 villages under the jurisdiction of this mandal. The soils were mostly red loams and blacky in nature. Bulk of rainfall was received during South-West monsoons (June to September) viz., (567.6 mm) followed by

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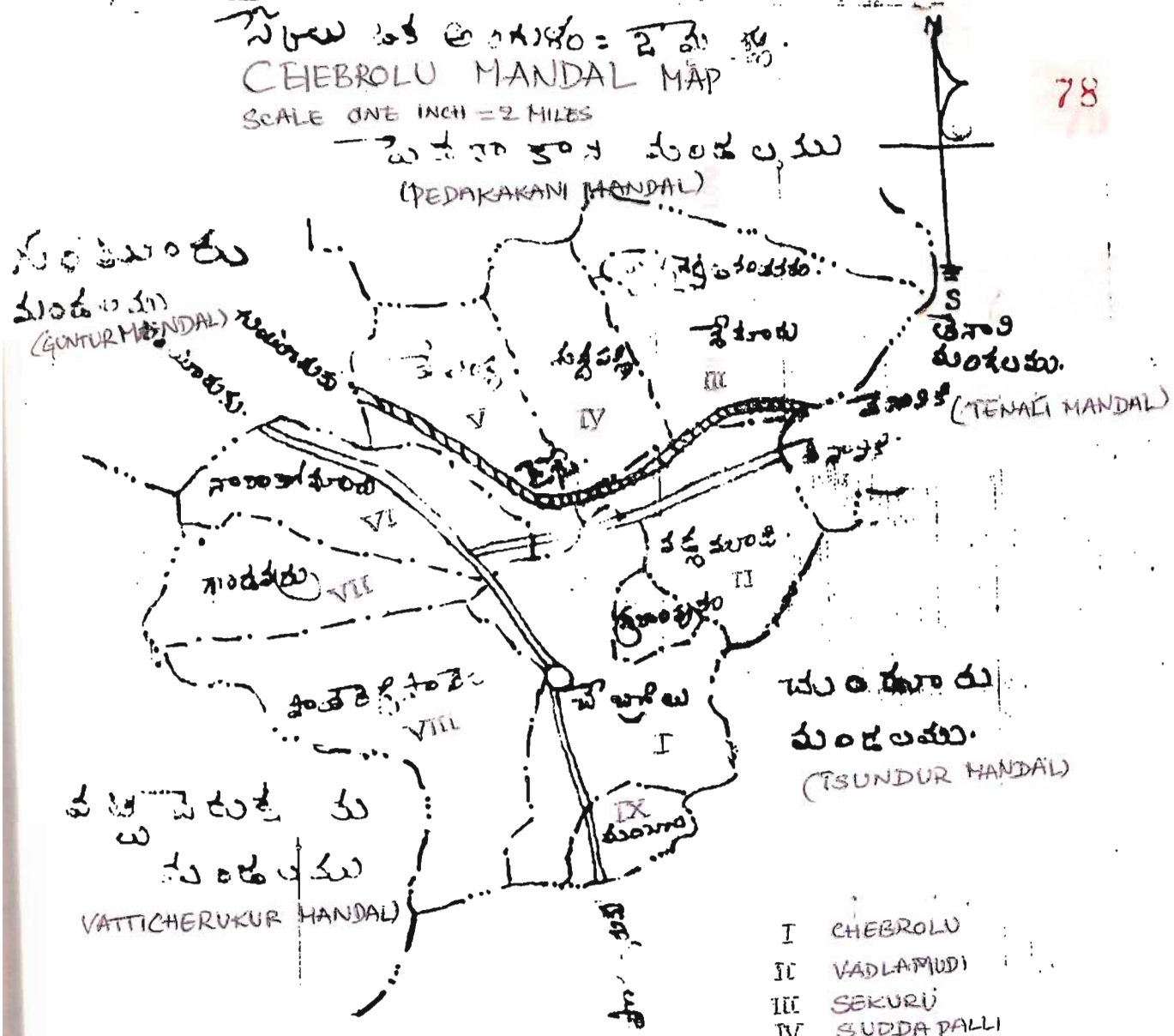
CHEBROLU MANDAL MAP

SCALE ONE INCH = 2 MILES






I CHEBROLU
II VADLAMUDI
III SEKURU
IV SUDDA PALLI
V VEJENDLA
VI NARAKODURU
VII GODAVARRU
VIII PATAREDDYPALEM
IX MANCHALA

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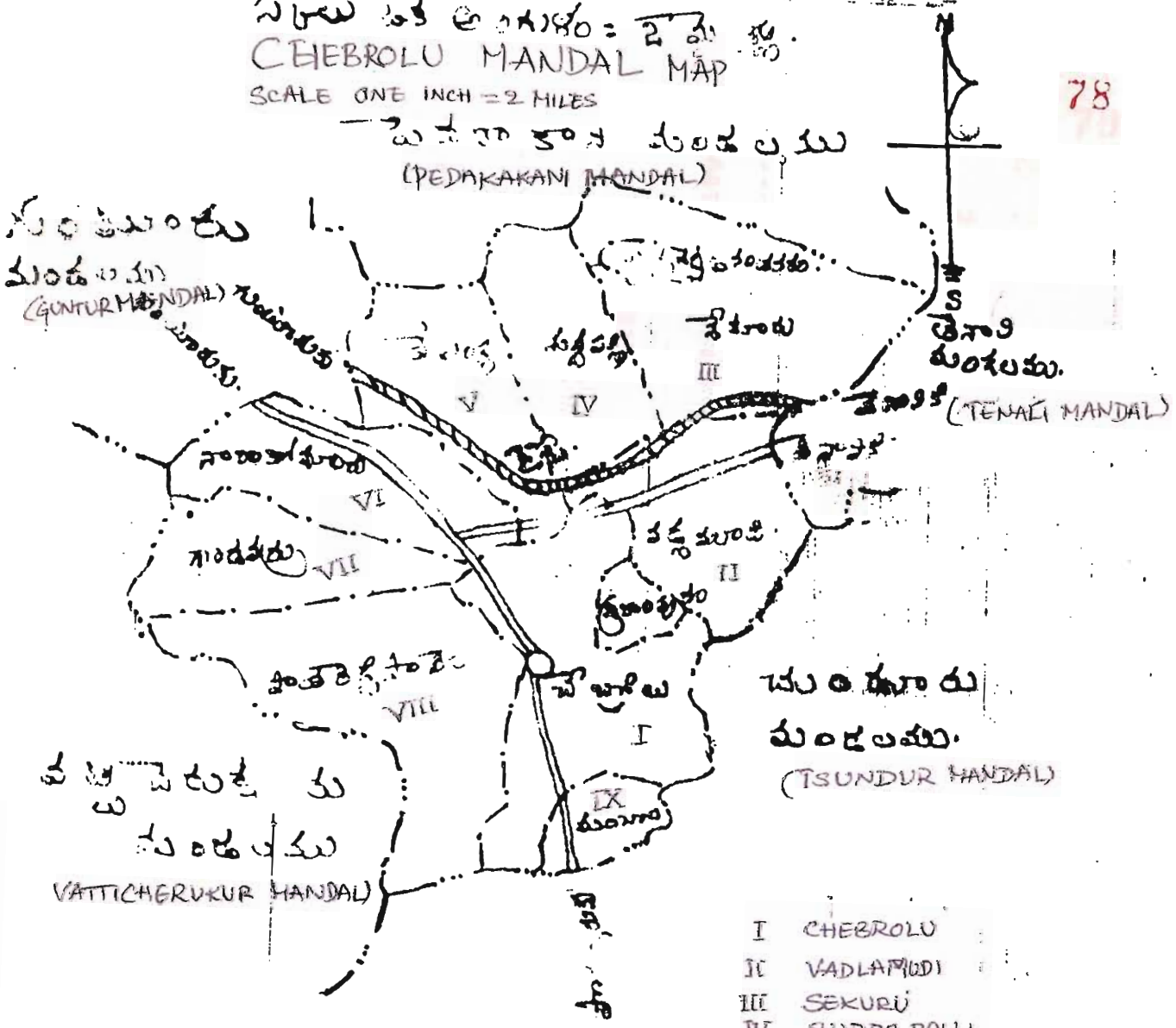
CHEBROLU MANDAL MAP

SCALE ONE INCH = 2 MILES



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| III | SEKURU |
| IV | SUDDA PALLI |
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| VII | GODAVARRU |
| VIII | PATAREDDYPALEM |
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Table 4.13 Population particulars of Chebrolu Mandal and selected villages

| Sl. No. | Particulars | Chebrolu Mandal | % to total population | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | % to total population | Narakoduru | % to total population |
| 1. | Males | 33,385 | 51.3 | 5,070 | 51.24 | 2,973 | 50.64 |
| 2. | Females | 31,699 | 48.7 | 4,824 | 48.76 | 2,898 | 49.36 |
| 3. | Females per 100 males | 94.95 | | 95.15 | | 97.48 | |
| 4. | Total | 65,084 | 100 | 9,894 | 100 | 5,871 | 100 |

Source: 1991 Census.

North-East monsoon (376.4 mm) viz., October to January. The rainfall received during summer (February to April) was very negligible i.e., 35.7 mm.

**Population**

The total population of Chebrolu mandal as per 1991 census was 0.65 lakhs. The male population was 51.3 per cent of the total population and female population was 48.7 per cent of the total population. The females per 100 males was 94.95 as per the population statistics shown in Table 4.13.

**Occupational Pattern**

The total number of cultivators in this mandal were 6.37 thousand which accounted for about 9.8 per cent of the total population, whereas in case of agricultural labourers, it was accounted for about 17,738 (27.25%). The total number of workers were 0.32 lakhs and the non-workers were 0.33 lakhs which accounted for 50 per cent and 50 per cent of the total population respectively. There were 33.9 cultivators and 94.3 agricultural labourers per 1000 hectare of land area. These conclusions were made from the Table 4.14.

Table 4.14 Occupational pattern in Chebrolu Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Chebrolu Mandal | % to total population | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | % to total population | Narakoduru | % to total population |
| 1. | Cultivators | 6,378 | 9.80 | 714 | 7.22 | 1,317 | 22.43 |
| 2. | Agricultural labour | 17,738 | 27.25 | 2,060 | 20.82 | 1,123 | 19.13 |
| 3. | Other workers | 1,904 | 2.93 | 367 | 3.70 | 84 | 1.43 |
| 4. | Marginal workers | 5,912 | 9.08 | 1,198 | 12.11 | 453 | 7.72 |
| 5. | Total Workers | 32,547 | 50.00 | 4,449 | 44.97 | 3,075 | 52.38 |
| 6. | Total Non-workers | 32,537 | 50.00 | 5,445 | 55.03 | 2,796 | 47.62 |
| 7. | Total population | 65,084 | 100 | 9,895 | 100 | 5,871 | 100 |

Source: Records of Mandal Statistics of Chebrolu mandal.

| Sl. No. | Particulars | Chebrolu Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | | Narakoduru | |
| | | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area |
| 1. | Total geographical area | 13,882.82 | 100 | 2,127.00 | 100 | 1,205.13 | 100 |
| 2. | Barren and uncultivated land | 55.85 | 0.40 | -- | - | -- | - |
| 3. | Land put to non-agricultural uses | 2,345.64 | 16.90 | 343.49 | 16.15 | 132.68 | 11.01 |
| 4. | Permanent pastures and other grazing land | 1.46 | 0.01 | -- | - | -- | - |
| 5. | Miscellaneous tree crops | 154.60 | 1.11 | -- | - | -- | - |
| 6. | Current fallows | 299.48 | 2.16 | 63.54 | 2.99 | -- | - |
| 7. | Net area sown | 11,022.81 | 79.40 | 1,719.98 | 80.86 | 1,072.46 | 88.99 |
| 8. | Area sown more than once | 7,782.38 | 56.06 | 1,357.77 | 63.84 | 468.64 | 38.89 |
| 9. | Gross cropped area | 18,805.19 | 135.46 | 3,077.75 | 144.70 | 1,541.10 | 127.88 |

Source: Records of Mandal Statistics of Chebrolu mandal.

Table 4.15 Land utililization pattern in Chebrolu Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Chebrolu Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | | Narakoduru | |
| | | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area | Area (Hectares) | % to total Geographical area |
| 1. | Total geographical area | 13,882.82 | 100 | 2,127.00 | 100 | 1,205.13 | 100 |
| 2. | Barren and uncultivated land | 55.85 | 0.40 | -- | - | -- | - |
| 3. | Land put to non-agricultural uses | 2,345.64 | 16.90 | 343.49 | 16.15 | 132.68 | 11.01 |
| 4. | Permanent pastures and other grazing land | 1.46 | 0.01 | -- | - | -- | - |
| 5. | Miscellaneous tree crops | 154.60 | 1.11 | -- | - | -- | - |
| 6. | Current fallows | 299.48 | 2.16 | 63.54 | 2.99 | -- | - |
| 7. | Net area sown | 11,022.81 | 79.40 | 1,719.98 | 80.86 | 1,072.46 | 88.99 |
| 8. | Area sown more than once | 7,782.38 | 56.06 | 1,357.77 | 63.84 | 468.64 | 38.89 |
| 9. | Gross cropped area | 18,805.19 | 135.46 | 3,077.75 | 144.70 | 1,541.10 | 127.88 |

Source: Records of Mandal Statistics of Chebrolu mandal.

**Land Utilisation Pattern**

The total geographical area of the mandal was 13,882.82 hectares. The net area sown was 11,022.81 thousand hectares (79.4% of geographical area) and the gross cropped area was to an extent of 18.80 thousand hectares. The total area under permanent pastures was 1.462 hectares. The land put to non-agricultural purposes was 2.34 thousand hectares which accounted to 16.9 per cent of the total geographical area. The cropping intensity in this mandal was 1.70. The other particulars were given in the Table 4.15.

**Sources of Irrigation**

The source wise irrigation for 1995-96 is presented in the Table 4.16. It was observed from the table that the canals form the major source of irrigation followed by other wells which accounted for 89.99 per cent and 7.75 per cent, respectively. The percentage of irrigated area to gross cropped area was about 39.54.

**Cropping Pattern**

From the cropping pattern particulars it was revealed that the paddy was the major crop having an area of 6.98 thousand hectares under cultivation which represented 32.17 per cent of the gross cropped area. Blackgram was the

Table 4.16 Source wise irrigation in Chebrolu Mandal and selected villages (1995-'96)

| Sl. No. | Source | Chebrolu Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | | Narakoduru | |
| | | Area irrigated (Hectares) | % to net irrigated area | Area irrigated (Hectares) | % to net irrigated area | Area irrigated (Hectares) | % to net irrigated area |
| 1. | Canals | 6,691.72 | 89.99 | 1,263.07 | 90.33 | 300.29 | 56.34 |
| 2. | Tube wells and filter points | 62.32 | 0.84 | 10.12 | 0.72 | -- | -- |
| 3. | Other wells | 576.29 | 7.75 | 76.49 | 5.46 | 232.70 | 43.66 |
| 4. | Lift irrigation | 106.03 | 1.43 | 48.56 | 3.47 | -- | - |
| 5. | Net irrigated area | 7,436.36 | 100.00 | 1,398.24 | 100.00 | 532.99 | 100.00 |
| 6. | Area irrigated more than once | -- | - | -- | - | -- | - |
| 7. | Gross irrigated area | 7,436.36 | 100.00 | 1,398.24 | 100.00 | 532.99 | 100.00 |
| 8. | Percentage gross irrigated area to gross cropped area | -- | 39.55 | -- | 45.43 | -- | 34.59 |

Source: Records of Mandal Statistics of Chebrolu mandal.

Table 4.17 Cropping pattern in Chebrolu Mandal and selected villages (1995-'96)

| Sl. No. | Particulars | Chebrolu Mandal | | Selected villages | | | |
|---|---|---|---|---|---|---|---|
| | | | | Chebrolu | | Narakoduru | |
| | | Area (Hectares) | % to gross cropped area | Area (Hectares) | % to gross cropped area | Area (Hectares) | % to gross cropped area |
| 1. | Paddy | 6,989.98 | 32.17 | 1,417.26 | 46.05 | 300.29 | 19.49 |
| 2. | Maize | 36.02 | 0.19 | -- | - | -- | - |
| 3. | Greengram | 259.82 | 1.38 | -- | - | 20.24 | 1.31 |
| 4. | Blackgram | 5,667.00 | 30.14 | 1,183.34 | 38.45 | 291.38 | 18.91 |
| 5. | Redgram | 279.65 | 1.49 | 39.66 | 1.29 | 19.83 | 1.29 |
| 6. | Bengalgram | 114.93 | 0.21 | -- | - | 14.16 | 0.92 |
| 7. | Other food crops | 1,036.03 | 5.51 | 51.40 | 1.67 | 24.28 | 1.58 |
| 8. | Groundnut | 542.70 | 2.89 | 8.09 | 0.26 | -- | - |
| 9. | Sesamum | 463.79 | 2.47 | 74.46 | 2.42 | -- | - |
| 10. | Turmeric | 55.04 | 0.29 | 1.21 | 0.04 | -- | - |
| 11. | Sugarcane | 2.83 | 0.02 | 2.83 | 0.09 | -- | - |
| 12. | Tobacco | 44.92 | 0.24 | 3.24 | 0.11 | 4.04 | 0.26 |
| 13. | Fruits | 367.06 | 1.95 | 34.40 | 1.12 | 2.43 | 0.16 |
| 14. | Other oilseeds | 64.35 | 0.34 | -- | - | 41.28 | 2.68 |
| 15. | Chillies | 359.37 | 1.91 | 41.28 | 1.34 | 112.51 | 7.30 |
| 16. | Cotton | 1,014.58 | 5.40 | 12.15 | 0.39 | 315.67 | 20.48 |
| 17. | Vegetables | 1,475.15 | 7.84 | 206.00 | 6.69 | 394.98 | 25.63 |
| | Gross cropped area | 18,805.19 | 100 | 3,077.74 | 100 | 1,541.10 | 100 |

Source: Records of Mandal Statistics of Chebrolu mandal.

second major crop having an area of 5.667 thousand hectares and it occupied about 30.14 per cent of area of the gross cropped area. The total area under vegetables was 1,475.15 hectares with 1,157.45 hectares in Kharif season and 317.7 hectare in Rabi season. The total area under chilli crop was 359.37 hectares which worked out to be 1.91 per cent of gross cropped area as depicted in the Table 4.17.

## 4.2 SELECTED VILLAGES

The discussion relating to the agro-climatic features of the selected villages according to the mandal wise is presented below. The selected villages were Nutakki and Chinna Kakani in Mangalagiri mandal, Chebrolu and Narakoduru in Chebrolu mandal based on the concentration of vegetable cultivating area.

### 4.2.1 Nutakki and Chinna Kakani villages

**Population**

The total population in Nutakki and Chinna Kakani villages was 8,095 and 4,857 respectively as per 1991 census. The details of population statistics given in the Table 4.8.

In Chinna Kakani total male population accounted for around 51.6 per cent, the female population was about 48.4 per cent. In Nutakki the total male population was 51.14 per cent and female population was 48.86 per cent of total population.

**Occupational Pattern**

The total number of cultivators in the Nutakki and Chinna Kakani villages as per the Table 4.9 were 966 and 325 and it constituted 11.94 per cent and 6.69 per cent, respectively, in total population. The number of agricultural labourers were higher than the number of cultivators in both the mandals.

There were about 631.97 cultivators and 1,279.64 agricultural labourers for every 1000 hectare of land in Nutakki village whereas in Chinna Kakani the number of cultivators were 230 and agricultural labourers were 1,009. The details pertaining to occupational pattern is given in the Table 4.9.

**Land Utilisation Pattern**

The land utilisation particulars of the villages in each mandal are presented in the Table 4.10. It was

revealed that the total geographical area of Nutakki and Chinna Kakani were 1,122.64 hectares and 1,080.14 hectares, respectively. In Nutakki the total area under permanent pastures and other grazing land was 32.78 hectares (2.92%) and the land put to non-agricultural purposes was 53.42 hectares (4.76%). The net area sown was 1,036.44 hectares in Nutakki and 851.89 hectares in Chinna Kakani. The cropping intensity was 1.47 in Nutakki and 1.65 in Chinna Kakani villages. The total gross cropped area in Nutakki and Chinna Kakani villages was 1,528.55 and 1,411.19 hectares, respectively.

**Sources of Irrigation**

Source wise irrigation particulars are given in the Table 4.11 canals (about 80.36%) form the major source of irrigation followed by the wells (about 3.12%) in Chinna Kakani. The net irrigated area was 531.78 hectares in Chinna Kakani and 971.28 hectares (about 1%) in Nutakki and the gross irrigated area was 1,222.6 hectares in Nutakki and 596.93 hectares in case of Chinna Kakani.

The area irrigated more than once accounted for about 25.88 per cent (251.32 hectare) in Nutakki and it was 12.25 per cent (65.15 hectare) in Chinna Kakani. The irrigation

intensity was 1.25 and 1.12 in Nutakki and Chinna Kakani villages respectively. The percentage of irrigated area to gross cropped area was about 79.98 in Nutakki and 42.3 in Chinna Kakani.

**Cropping Pattern**

The details regarding the cropping pattern in the selected villages is given in the Table 4.12.

The major crops grown in the Nutakki and Chinna Kakani villages were paddy followed by vegetables, and blackgram and fruits. The total vegetable area was 224.19 hectares (about 14.67%) in Nutakki and 195.87 hectares (about 13.88%) in Chinna Kakani.

**4.2.2 Chebrolu and Narakoduru villages**

**Population**

Details pertaining to the population statistics are given in the Table 4.13. It was evident from the table that the number of males in Chebrolu were about 5,070, females were 4,824. The total male population accounted for 51.24 per cent and female population 48.76 per cent in Chebrolu and in Narakoduru the total male population was 50.64 per cent and total female population was 49.36 per cent.

**Occupational Pattern**

The total number of cultivators in Chebrolu and Narakoduru villages were 714 and 1,317 which accounted for 7.22 per cent and about 22.43 per cent in the respective villages. The total number of agricultural labourers in Chebrolu were 2.06 thousands (around 20.82%) and 1.12 thousands (19.13%) in Narakoduru.

There was 231.98 cultivators and 669.32 agricultural labourers for every 1000 hectare of gross cropped area in Chebrolu whereas in the case of Narakoduru there were 854.50 cultivators and 728.70 agricultural labourers. These particulars regarding the occupational pattern are mentioned in the Table 4.14.

**Land Utilization Pattern**

The total geographical area of Cherbolu and Narakoduru villages was 212.7 and 1,205.13 hectares respectively. The net area sown was 1,719.98 hectares in Chebrolu and 1,072.46 hectares in Narakoduru, respectively. The land put to non-agricultural purposes in Chebrolu was 343.49 hectares and in Narakoduru it was about 132.68 hectares. The cropping intensity in Chebrolu was 1.78 and in Narakoduru it was

1.43. The details are drawn from the statistics presented in the Table 4.15.

**Source of Irrigation**

Canals form the main source of irrigation in Chebrolu and Narakoduru. The total area covered under canal irrigation in Chebrolu was 1,263.07 hectares (90.33%) and 300.29 hectares in Narakoduru. The net area irrigated was 1,398.24 hectares in Chebrolu and 532.99 hectares in Narakoduru. The irrigation intensity was 100 per cent in both the villages while the per cent of irrigated area to gross cropped area form 45.43 per cent in Chebrolu and 34.59 per cent in Narakoduru (Table 4.16).

**Cropping Pattern**

In Chebrolu village paddy forms the major share in total area i.e., 1,417.26 hectares (46.05%) followed by blackgram (1,183.34 hectare) vegetables (206 hectare) whereas, in Narakoduru vegetables occupy major share with 394.98 hectares (25.63%) followed by paddy 300.29 hectares (19.49%) the data is presented in Table 4.17.

# *RESULTS AND DISCUSSION*

# RESULTS AND DISCUSSION

The present study pertains to the production and marketing of vegetables (tomato, brinjal, cauliflower, coccinia) in Guntur district of Andhra Pradesh. Here an attempt was made to analyse the costs and returns of different vegetables and marketing aspects of these vegetables. The results obtained on the above aspects are presented and discussed in this chapter. For easy understanding this chapter is divided into number of sub-heads

5.1 Characteristics of selected holdings.

5.2 Labour utilization in vegetable farms.

5.3 Estimation of cost of cultivation of vegetable crops.

5.4 Costs according to cost concepts.

5.5 Farm income measures.

5.6 Resource use efficiency.

5.7 Marketing pattern.

5.8 Price spread and market margins.

5.9 Seasonal variations in prices of vegetables.

5.10 Consumer preference.

5.11 Problems associated with production and marketing of vegetables.

Table 5.1 Farm family composition

| Sl.No. | Particulars | Average per family |
|---|---|---|
| 1. | Size of the family | |
| | a) Males | 1.87 |
| | b) Females | 1.67 |
| | c) Children | 1.98 |
| | Total | 5.52 |
| 2. | Farm Working Members | |
| | a) Males | 1.67 |
| | b) Females | 1.20 |
| | Total | 2.87 |
| 3. | Percentage of farm workers to total | 51.99 |

## 5.1 CHARACTERISTICS OF SELECTED HOLDINGS

A comprehensive idea of composition of family education status of the farmers and cropping pattern of the selected farmers was studied and presented in this section.

### Farm Family Composition

The average size of family was 5.52 with 1.87 males, 1.67 females and 1.98 children. About 1.67 male members and 1.2 female members were working on farm among the total family members. Total number of farm workers in the family were 2.87 which constituted 51.99 per cent of the total family members (Table 5.1).

### Educational Status of the Farmers

From Table 5.2, it was found that majority of the vegetable cultivating farmers were found to be completely illiterate or literate without formal education. The percentage of farmers with education upto matriculation and graduate levels were 16.7 per cent and 5.6 per cent only. This reveals that majority of the farmers in selected villages were by and large ignorant about the technology and market information available.

Table 5.2 Educational status of the farmers

| S.No. | Educational background | Total | % to total |
|---|---|---|---|
| 1. | Illiterates | 45 | 50.0 |
| 2. | Literates without formal education | 25 | 27.7 |
| 3. | Matriculation and below | 15 | 16.7 |
| 4. | Graduates | 5 | 5.6 |
| | Total | 90 | 100.0 |

Table 5.3 Cropping pattern on the selected farms

| Sl.. No. | Crops | Area in hectares | Average area for selected farm (ha) | Percent to total |
|---|---|---|---|---|
| 1. | Cereals | 86.8 | 0.96 | 39.24 |
| 2. | Vegetables | | | |
| | a) Tomato | 22.0 | 0.24 | 9.94 |
| | b) Brinjal | 16.2 | 0.18 | 7.32 |
| | c) Coccinia | 27.0 | 0.30 | 12.20 |
| | d) Beans | 6.8 | 0.08 | 3.07 |
| | e) Cauliflower | 26.6 | 0.30 | 12.02 |
| 3. | Flowers | 13.2 | 0.15 | 5.97 |
| 4. | Cotton | 15.4 | 0.17 | 7.00 |
| 5. | Chillies | 7.2 | 0.08 | 3.25 |
| | Total | 221.2 | 2.46 | 100.00 |

**Cropping Pattern on the Selected Farm**

The cropping pattern in the study area is presented in Table 5.3 for the selected cultivators. It was observed from the Table 5.3 that the farmers were cultivating cereals, vegetables, flowers, cotton and chilies.

The total cropped area was 221.2 hectares, of which area under cereals was at 86.8 hectares represent 39.24 per cent of total cropped area, and vegetables with an area of 98.6 hectares with 44.57 per cent of the total area.

**Structure of Farm Assets**

Farm assets include fixed assets and working assets. The value of fixed and working assets have been worked out per hectare for the entire sample. The fixed assets include the value of land both wet and dry, . The value of land depends on fertility status and its accessibility. The working assets include implements, equipments, bullock carts, cattle sheds and value of work animals and livestock and other miscellaneous items.

It was observed from Table 5.4 that the value of land per hectare was Rs.1,40,000 and the value of total working assets per hectare were Rs.30,060, respectively.

Table 5.4 Structure of farm assets on the selected farm

(In Rupees)

| Sl.No. | Particulars | Per hectare |
|---|---|---|
| 1. | Fixed assets | 1,40,000 |
| 2. | Working assets | 30,060 |
| | Total assets | 1,70,060 |

**Distribution of area under vegetable crops in selected farms**

As it could be seen from the Table 5.5 that the average area under tomato was 0.65 hectares and 0.63 hectares, 0.77 hectares and 0.56 hectares under brinjal, cauliflower and coccinia, respectively.

Table 5.5 Distribution of area under vegetable crops in selected farms

| Particulars | Vegetable farms | | | | Average size of farm (ha) |
|---|---|---|---|---|---|
| | Tomato | Brinjal | Cauli flower | Coccinia | |
| Average area under each crop (ha) | 0.65 | 0.63 | 0.77 | 0.56 | 2.46 |

## 5.2 LABOUR UTILIZATION IN VEGETABLE FARMS

Labour is one of the major constituents of total cost incurred in vegetable farming. Cropping pattern and cropping intensity have influence on labour utilization. As some crops are labour intensive and others are less intensive, availability of labour determines the combination of crops, hence labour utilization in vegetable farms was studied and are discussed below (Crop wise).

The labour utilization on tomato and brinjal are given in Table 5.6 and cauliflower and coccinia are illustrated in Table 5.7.

**Tomato**

It was evident from the Table 5.6 that total labour utilization for tomato was about Rs.22,533.33 of which the human labour was amounted to Rs.15,883.33 with 529 mandays. The human labour allotted for various operations were, Rs.3,125 for weeding (104 mandays) Rs.9,000 for harvesting (300 mandays), Rs.1,875 for irrigation (63 mandays), Rs.519.03 for sowing of seed (17 mandays) and Rs.1,364.3 for application of farm yard manure and fertilizer (45 mandays).

The hired human labour amounted to Rs.13,091.68, Rs.1,875 to permanent labour and Rs.916.65 family labour.

**Brinjal**

It was observed from Table 5.6 that the human labour employed in cultivation of brinjal was Rs.13,350.00 per hectare (445 mandays) it contributes to 61.35 per cent of total labour (Rs.21,690.25). The machine labour accounted to Rs.8,340.25 (38.45%). the distribution of human labour among various operations were as follows for sowing of seeds Rs.500 (16 mandays), Rs.1,875 for fertilizer and manure application (63 mandays). For weeding Rs.2,850 (96 mandays), Rs.1,875 for irrigation (63 mandays) and the amount towards harvesting was Rs.6,250.00 (208 mandays). In the total human labour, hired human labour was Rs.10,771,

Table 5.6 Operation wise human labour utilization on tomato and brinjal farms

(Rs. per ha.)

| Sl. No. | Particulars | Tomato | | | Brinjal | | |
|---|---|---|---|---|---|---|---|
| | | Rs. | Mandays | % to total | Rs. | Mandays | % to total |
| 1. | Sowing of seed | 519.03 | 17 | 3.26 | 500 | 16 | 3.75 |
| 2. | Application of manures & fertilizer | 1,364.30 | 45 | 8.58 | 1,875 | 63 | 14.05 |
| 3. | irrigation | 1,875.00 | 63 | 14.05 | 1,875 | 63 | 14.05 |
| 4. | Weeding | 3,125.00 | 104 | 19.67 | 2,850 | 95 | 21.35 |
| 5. | Harvesting | 9,000.00 | 300 | 56.66 | 6,250 | 208 | 46.81 |
| 6. | Total human labour | 15,883.33 | 529 | 100.00 | 13,350 | 445 | 100.00 |
| 7. | Machine labour | 6,650.00 | | 29.51 | 8,340.25 | | 38.45 |
| 8. | Total labour | 22,533.33 | | 100.00 | 21,690.25 | | 100.00 |
| 9. | Human labour | 15,883.33 | | 70.49 | 13.350 | | 61.55 |
| | a) Hired human labour | 13,091.68 | 436 | 58.09 | 10,771 | 359 | 49.65 |
| | b) Permanent labour | 1,875.00 | 62 | 8.33 | 1,458 | 49 | 6.73 |
| | c) Family labour | 916.65 | 31 | 4.07 | 1,121 | 37 | 5.17 |

family labour was Rs.1,121 and permanent labour was Rs.1,458.

**Cauliflower**

The Table 5.7 shown that the human labour utilized in cultivation of cauliflower crop was Rs.22,176.65 with 739 mandays. The details of human labour employed were 485 mandays, 62 mandays, 117 mandays, 50 mandays and 25 mandays for harvesting, irrigation, weeding, manure and fertilizer application and seed sowing respectively. The permanent labour contributed to 7.51 per cent (Rs.1,666.65) of total human labour, and Rs.19,163.75 and Rs.1,346.25 for hired human labour and family labour, respectively.

**Coccinia**

The Table 5.7 illustrates that the permanent labour employed accounted to Rs.2,708.33 and family labour Rs.1,537.51 and casual labour Rs.20,224.66, respectively. The total labour employed in cultivation of coccinia was Rs.36,803.66, of which Rs.24,470.50 was towards human labour and Rs.12,333.16 to machine labour.

In the total human labour, Rs.15,970.50 spent towards harvesting (232 mandays), Rs.3,125 towards irrigation (104 mandays), Rs.2,500 towards weeding (84 mandays), Rs.2,500

Table 5.7 Operation wise human labour utilization on cauliflower and coccinia farms

(Rs. per ha.)

| Sl. No. | Particulars | Cauliflower | | | Coccinia | | |
|---|---|---|---|---|---|---|---|
| | | Rs. | Mandays | % to total | Rs. | Mandays | % to total |
| 1. | Sowing of seed | 750.00 | 25 | 3.38 | 375 | 12 | 1.53 |
| 2. | Application of manures & fertilizer | 1,500.00 | 50 | 6.76 | 2,500 | 84 | 10.22 |
| 3. | irrigation | 1,875.00 | 62 | 8.46 | 3,125 | 104 | 12.77 |
| 4. | Weeding | 3,500.00 | 117 | 15.78 | 2,500 | 84 | 10.22 |
| 5. | Harvesting | 14,551.65 | 485 | 65.62 | 15,970.50 | 532 | 65.26 |
| 6. | Total human labour | 22,176.65 | 739 | 100.00 | 24,470 50 | 816 | 100.00 |
| 7. | Machine labour | 3,722.07 | | 14.37 | 12,333.16 | | 33.51 |
| 8. | Total labour | 25,898.72 | | 100.00 | 36,803.66 | | 100.00 |
| 9. | Human labour | 22,176.65 | | 85.63 | 24,470.50 | | 66.49 |
| | a) Hired human labour | 19,163.75 | 639 | 73.99 | 20,224.66 | 675 | 54.95 |
| | b) Permanent labour | 1,666.65 | 55 | 6.45 | 2,708.33 | 90 | 7.36 |
| | c) Family labour | 1,346.25 | 45 | 5.19 | 1,537.51 | 51 | 4.18 |

*Fig.5.1 Human labour utilization on tomato, brinjal, cauliflower and coccinia farms*

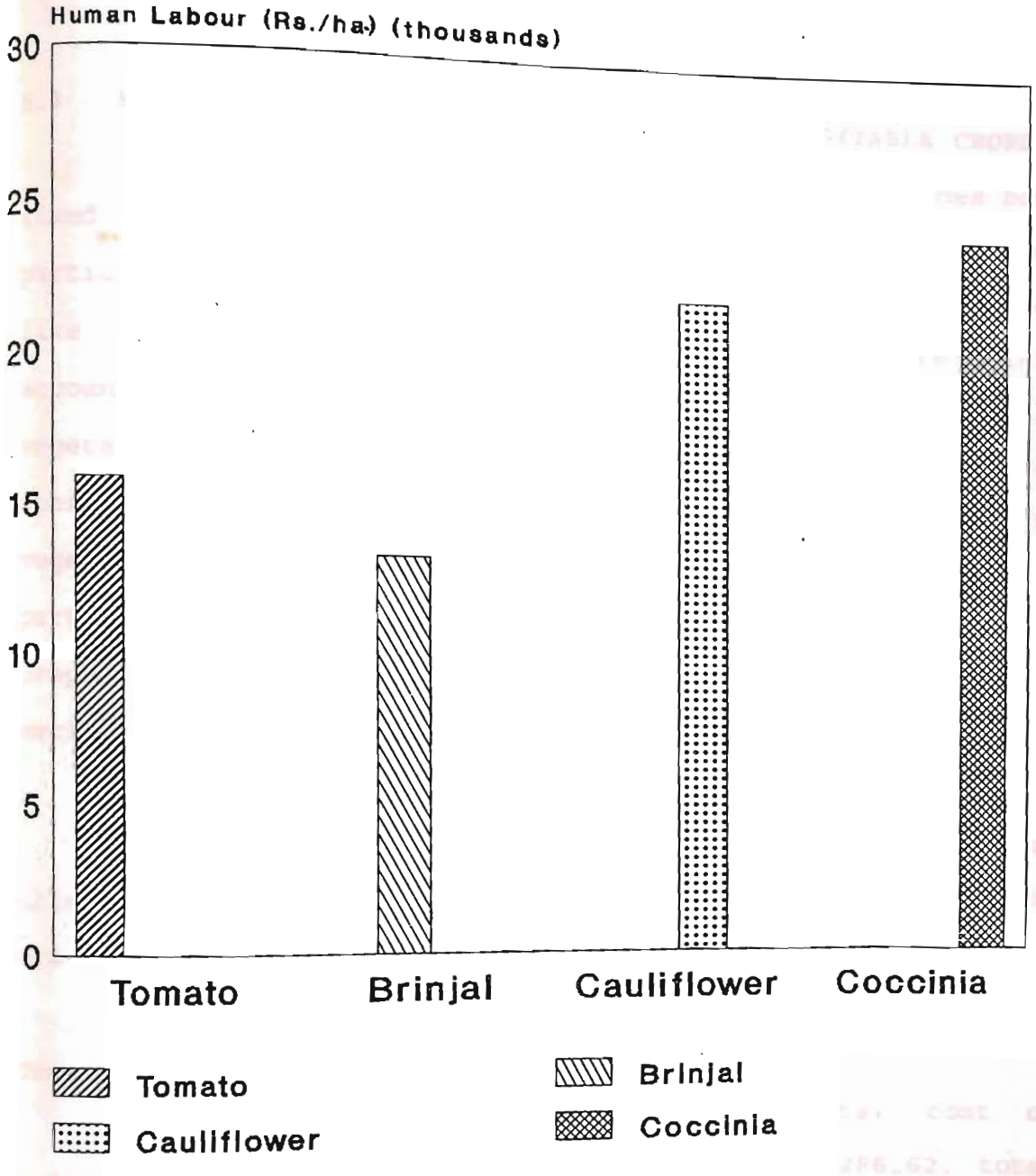
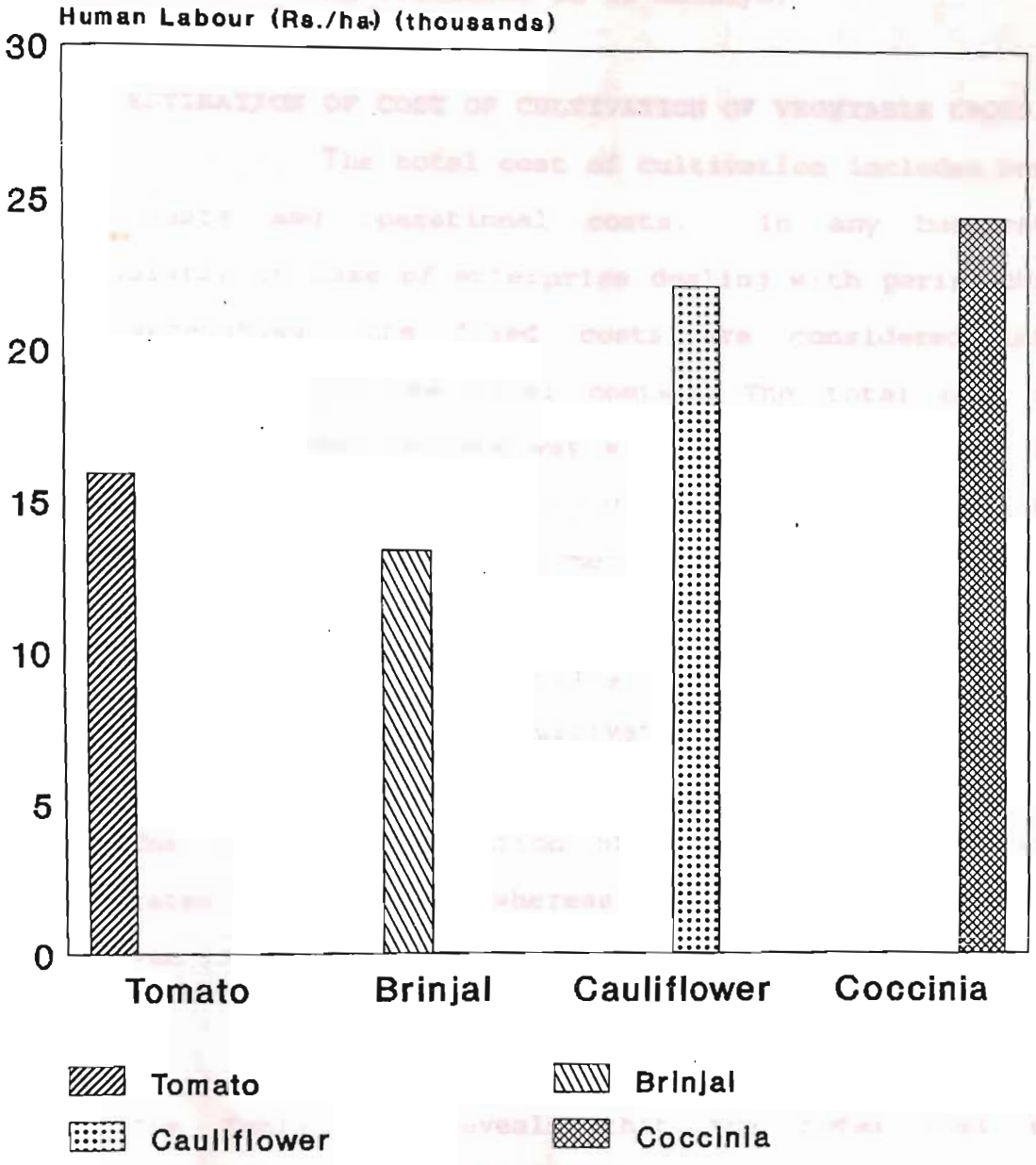


*Fig.5.1 Human labour utilization on tomato, brinjal, cauliflower and coccinia farms*



towards application of manure (84 mandays) and Rs.375 towards seed sowing accounted to 12 mandays.

## 5.3 ESTIMATION OF COST OF CULTIVATION OF VEGETABLE CROPS

The total cost of cultivation includes both fixed costs and operational costs. In any business, particularly in case of enterprise dealing with perishables like vegetables, the fixed costs are considered into account, to arrive the total costs. The total cost of vegetable crops per hectare was worked out on the basis of operational costs upto harvesting and preparing the vegetables for marketing by farmers. As the same labour who participated in harvesting will also complete the work of preparing the crop for marketing the marketing costs are excluded from total cost of cultivation.

The cost of cultivation of tomato and brinjal are illustrated in Table 5.8 whereas cauliflower and coccinia are given in Table 5.9.

**Tomato**

The Table 5.8 reveals that the total cost of cultivation per hectare of tomato was Rs.58,286.62, total operational costs was Rs.42,471.62 (72.86%) and Rs.15,815 (27.13%) for fixed costs.

Ta
- s

Table 5.8 Cost of cultivation of tomato and brinjal (Rs./ha)

| S.No. | Particulars | Tomato | | Brinjal | |
|---|---|---|---|---|---|
| | | Cost | % to total | Cost | % to total |
| 1. | **Operational costs:** | | | | |
| a) | Seed material | 1,044.56 | 1.79 | 977.08 | 1.70 |
| b) | Human labour | 15,883.33 | 27.25 | 13,350.00 | 23.22 |
| c) | Machine labour | 6,650.00 | 11.40 | 8,340.25 | 14.50 |
| d) | Fertilizers and manures | 10,331.50 | 17.73 | 9,581.57 | 16.66 |
| e) | Plant Protection Chemicals | 7,484.15 | 12.84 | 8,677.65 | 15.09 |
| f) | Interest on working capital | 1,078.08 | 1.85 | 852.62 | 1.48 |
| | **TOTAL OPERATIONAL COST** | 42,471.62 | 72.86 | 41,779.17 | 72.67 |
| 2. | **Fixed costs:** | | | | |
| a) | Rental value of owned land | 12,500.00 | 21.45 | 12,500.00 | 21.74 |
| b) | Depreciation charges | 1,410.00 | 2.42 | 1,357.50 | 2.36 |
| c) | Interest on fixed capital | 1,695.00 | 2.90 | 1,642.50 | 2.86 |
| d) | Land revenue | 210.00 | 0.37 | 210.00 | 0.37 |
| | **TOTAL FIXED COST** | 15,815.00 | 27.14 | 15,710.00 | 27.33 |
| 3. | **Total Cost:** | 58,286.62 | 100.00 | 57,489.17 | 100.00 |

The major cost component in the operational cost was human labour accounted to Rs.15,883.33 (27.25%). Next to human labour, it was fertilizer and manure Rs.10,331.50 (17.73%), plant protection chemicals Rs.7,484.15 (12.84%), machine labour Rs.6,650 (11.40%) and seed material Rs.1,044.56 (1.79%).

Next to operational costs, the fixed costs occupy a major share in the total cost of cultivation out of the fixed costs, the imputed rental value of owned land contributed Rs.12,500 (21.45%), followed by interest on fixed capital Rs.1,695 (2.90%), and depreciation charges Rs.1,410 (2.42%).

**Brinjal**

The per hectare cost of cultivation of brinjal was Rs.57,489.17, out of which Rs.41,779.17 (72.67%) was operational cost and Rs.15,710 (27.33%) was fixed cost.

Total operational costs including human labour accounts the major cost component with Rs.13,350.00 (23.22%) followed by fertilizers and manure Rs.9,581.57 (16.66%), plant protection chemicals Rs.8,677.65 (15.09%) machine labour Rs.8,340.25 (14.50%) and seed material Rs.977.08 (1.70%).

The total fixed costs includes imputed rental value of owned land occupies a major share with Rs.12,500 per hectare followed by interest on fixed capital and depreciation charges.

**Cauliflower**

From Table 5.9 it was observed that total cost of cultivation of cauliflower per hectare estimated was Rs.54,637.08, of which Rs.38,937.08 (71.26%) were operational costs and Rs.15,700 (28.74%) were fixed costs.

Out of the total operational costs, human labour occupies a major share with Rs.22,176.65 (40.59%), fertilizer and manure with Rs.7,524.58 (13.77%), machine labour with Rs.3,722.07 (6.81%), plant protection chemicals with Rs.3,664.58 (6.7%) and seed material with Rs.1,054.57 (1.93%). Out of the total fixed costs imputed rental value of owned land occupied a major share with Rs.12,500 followed by interest on fixed capital Rs.1,647.50 and depreciation charges Rs.1,342.50.

**Coccinia**

It was found that the total cost of cultivation of coccinia per hectare was the Rs.90,282.26. It was the highest among the crops studied. Out of this, Rs.69,967.26

Table 5.9 Cost of cultivation of cauliflower and coccinia (Rs./ha)

| S.No. | Particulars | Cauliflower | | Coccinia | |
|---|---|---|---|---|---|
| | | cost | % to total | cost | % to total |
| 1. | **Operational costs:** | | | | |
| a) | Seed material | 1,054.57 | 1.93 | 662.50 | 0.73 |
| b) | Human labour | 22,176.65 | 40.59 | 24,470.50 | 27.10 |
| c) | Machine labour | 3,722.07 | 6.81 | 12,333.16 | 13.66 |
| d) | Fertilizers and manures | 7,524.58 | 13.77 | 15,131.25 | 16.76 |
| e) | Plant Protection Chemicals | 3,664.58 | 6.70 | 13,254.15 | 14.68 |
| f) | Interest on working capital | 794.63 | 1.45 | 4,115.70 | 4.56 |
| | **TOTAL OPERATIONAL COST** | 38,937.08 | 71.26 | 69,967.26 | 77.50 |
| 2. | **Fixed costs:** | | | | |
| a) | Rental value of owned land | 12,500.00 | 22.88 | 15,000.00 | 16.61 |
| b) | Depreciation charges | 1,342.50 | 2.46 | 1,632.50 | 1.81 |
| c) | Interest on fixed capital | 1,647.50 | 3.02 | 3,472.50 | 3.84 |
| d) | Land revenue | 210.00 | 0.38 | 210.00 | 0.23 |
| | **TOTAL FIXED COST** | 15,700.00 | 28.74 | 20,315.00 | 22.50 |
| 3. | **Total Cost:** | 54,637.08 | 100.00 | 90,282.26 | 100.00 |

(77.5%) was operational costs and Rs.20,315 (22.5%) was fixed costs.

Among operational costs, human labour occupies major share with Rs.24,470.50 (27.10%) followed by fertilizer and manure with Rs.15,131.25 (16.76%), plant protection chemicals Rs.13,254.15 (14.68%), machine labour Rs.12,333.16 (13.66%) and seed material Rs.662.5 (0.73%).

Among the total fixed costs, rental value of owned land account for Rs.15,000 (16.61%) followed by interest on fixed capital Rs.3,472.50 (3.84%) and depreciation charges Rs.1,632.50 (1.81%).

It can be inferred that the cost of cultivation per hectare was maximum on coccinia, followed by tomato, brinjal and cauliflower.

Because, coccina is cultivated throughout the year and fixed costs incurred on bamboo pandals and labour costs incurred on establishing pandals was recorded to be high.

*Fig.5.2 Cost of cultivation of tomato, brinjal, cauliflower and coccinia*

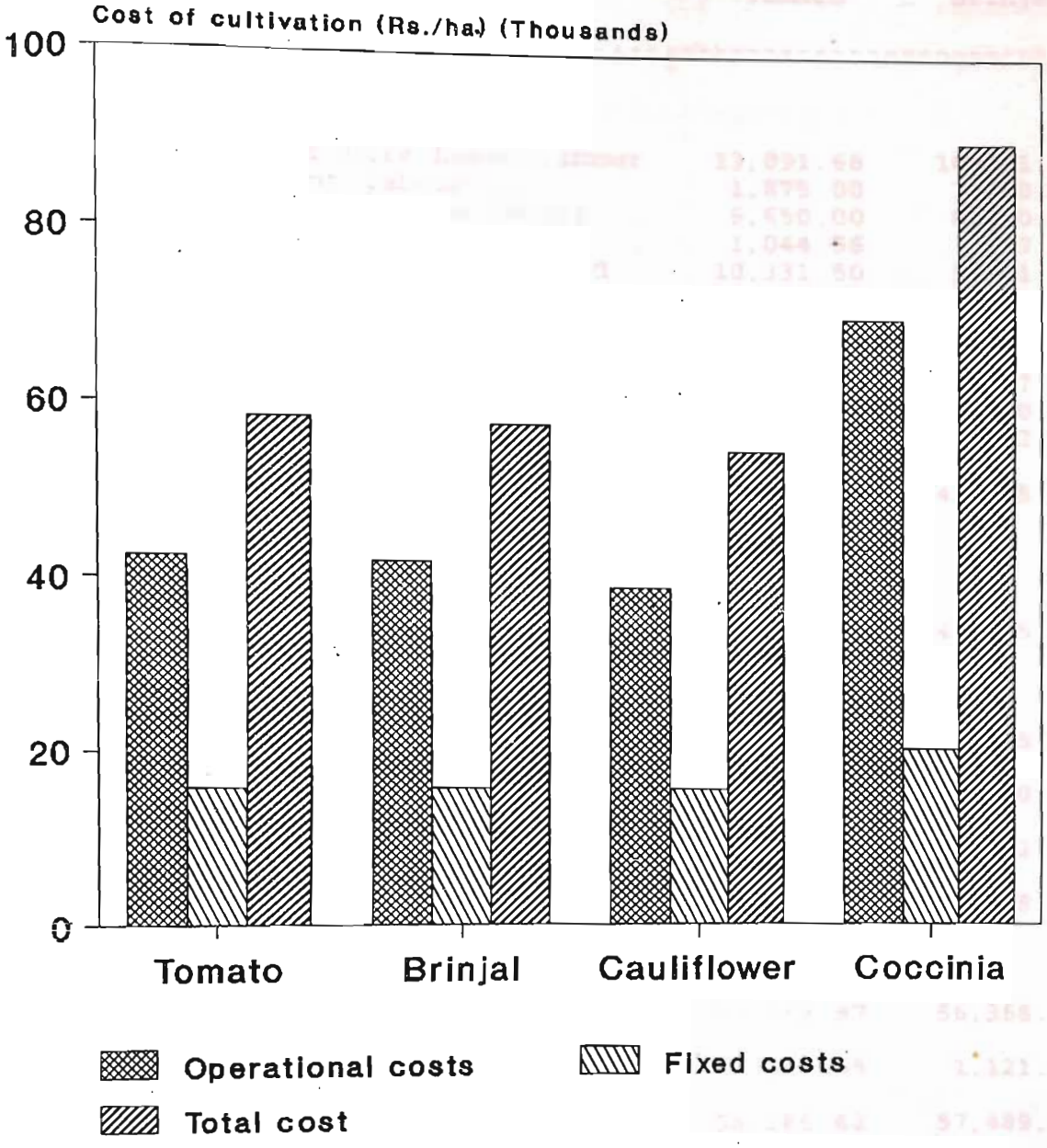


Table 5.10 Cost of cultivation according to cost concepts on tomato and brinjal farms

(Rs./ha)

| Sl. No. | Particulars | Tomato | Brinjal |
|---|---|---|---|
| I | Cost $A_1$ | | |
| | a) Value of hire human labour | 13,091.68 | 10,771.00 |
| | b) Permanent labour | 1,875.00 | 1,458.00 |
| | c) Value of machine labour | 6,650.00 | 8,340.25 |
| | d) Value of seed | 1,044.56 | 977.08 |
| | e) Value of fertilizers and manures | 10,331.50 | 9,581.57 |
| | f) Value of plant protection chemicals | 7,484.15 | 8,677.65 |
| | g) Depreciation charges | 1,410.00 | 1,357.50 |
| | h) Land revenue | 210.00 | 210.00 |
| | i) Interest on working capital | 1,078.08 | 852.62 |
| | Cost $A_1$ | 43,174.97 | 42,225.67 |
| II | Cost $A_2$ | | |
| | Cost $A_1$ + Rent paid on leased in land | 43,174.97 | 42,225.67 |
| III | Cost B: | | |
| | a) Cost $A_2$ | 43,174.97 | 42,225.67 |
| | b) +Imputed rental value of owned land | 12,500.00 | 12,500.00 |
| | c) +Interest on owned fixed capital | 1,695.00 | 1,642.50 |
| | Cost B: | 57,369.97 | 56,368.17 |
| IV | Cost C: | | |
| | a) Cost B | 57,369.97 | 56,368.17 |
| | b) +Imputed value of family labour | 916.65 | 1,121.00 |
| | Cost C: | 58,286.62 | 57,489.17 |

## 5.4 COST OF CULTIVATION ACCORDING TO COST CONCEPTS

Table 5.10 and 5.11 present the information regarding the cost of cultivation according to cost concepts per hectare for the vegetables studied, respectively.

**Tomato**

It was observed from the table that Cost $A_1$ accounts to Rs.43,174.97 Cost B Rs.57,369.97 and Cost 'C' Rs.58,286.62.

**Brinjal**

Cost $A_1$, Cost B and Cost C estimated for brinjal per hectare were Rs.42,225.67, Rs.56,368.17, and Rs.57,489.17, respectively.

**Cauliflower**

It is evident from the table that, cost $A_1$, Cost B and Cost C per hectare of cauliflower were Rs.39,143.33, Rs.53,290.83 and Rs.54,637.08, respectively.

**Coccinia**

The respective figures of Cost $A_1$, Cost B, and Cost C for coccinia per hectare were Rs.70,272.26, Rs.88,744.76, and Rs.90,282.26.

Table 5.11 Cost of cultivation according to cost concepts on cauliflower and coccinia farms



(Rs./ha)

| Sl. No. | Particulars | Cauliflower | Coccinia |
|---|---|---|---|
| I | Cost $A_1$ | | |
| | a) Value of hire human labour | 19,163.75 | 20,224.66 |
| | b) Permanent labour | 1,666.65 | 2,708.33 |
| | c) Value of machine labour | 3,722.07 | 12,333.16 |
| | d) Value of seed | 1,054.57 | 662.51 |
| | e) Value of fertilizers and manures | 7,524.58 | 15,131.25 |
| | f) Value of plant protection chemicals | 3,664.58 | 13,254.15 |
| | g) Depreciation charges | 1,342.50 | 1,632.50 |
| | h) Land revenue | 210.00 | 210.00 |
| | i) Interest on working capital | 794.63 | 4,115.70 |
| | Cost $A_1$ | 39,143.33 | 70,272.26 |
| II | Cost $A_2$ | | |
| | Cost $A_1$ + Rent paid on leased in land | 39,143.33 | 70,272.26 |
| III | Cost B: | | |
| | a) Cost $A_2$ | 39,143.33 | 70,272.26 |
| | b) +Imputed rental value of owned land | 12,500.00 | 15,000.00 |
| | c) +Interest on owned fixed capital | 1,647.50 | 3,472.50 |
| | Cost B: | 53,290.83 | 88,744.76 |
| IV | Cost C: | | |
| | a) Cost B | 53,290.83 | 88,744.76 |
| | b) +Imputed value of family labour | 1,346.25 | 1,537.50 |
| | Cost C: | 54,637.08 | 90,282.26 |

## PRODUCTIVITY OF VEGETABLES

Yield per unit area indicates the productivity of a particular crop. The average yield per hectare of different vegetables studied are presented in Table 5.12.

The yield per hectare of tomato was 20.42 tonnes and the productivity of brinjal was 20.73 tonnes per hectare, cauliflower was 35.85 tonnes and coccinia was 98.54 tonnes per hectare.

### Cost of Production per Tonne

It is generally believed that it is better to take unit cost into consideration rather than going by the average cost. Hence, the cost of production per tonne for different vegetables are shown in Table 5.13 and discussed below.

### Tomato

It was evident from the Table 5.13 that the operational costs per tonne was Rs.2,079.90, fixed costs was Rs.774.49 per tonne, Cost $A_1$, was Rs.2,114.35, Cost B was Rs.2,089.50 and Cost C was Rs.2,854.39 per tonne, respectively.

Table 5.12 Average yield in tonnes per hectare for different vegetables

| S.No. | Vegetable | Tonnes/ha. |
|---|---|---|
| 1. | Tomato | 20.42 |
| 2. | Brinjal | 20.73 |
| 3. | Cauliflower | 35.85 |
| 4. | Coccinia | 98.54 |

**Brinjal**

It was observed from the table that the total operational costs per tonne was Rs.2,015.40, and total fixed cost was Rs.757.84 and total cost was Rs.2,773.23 per tonne. The Cost $A_1$ and Cost B were Rs.2,036.93 and Rs.2,719.16, respectively.

**Cauliflower**

It can be revealed from the Table 5.13 that total cost of production was Rs.1,524.05 per tonne. This includes the total operational cost Rs.1,086.11 and total fixed cost Rs.437.94 per tonne. Whereas, Cost $A_1$ was Rs.1,091.86 and Cost B was Rs.1,486.49.

**Coccinia**

It can be evident from Table 5.13 that total operational cost per tonne was amounted to Rs.709.97, whereas total fixed cost was Rs.180.77 and Cost-$A_1$, Cost B and Cost C were Rs.713.07, Rs.875.15, and Rs.890.75 per tonne, respectively.

The discussion on costs revealed that the cost of production per tonne was maximum for tomato and minimum for coccinia among the vegetables studied, whereas the cost of cultivation per hectare was maximum in coccinia and minimum

Table 5.13 Cost of production per tonne of different vegetables

(Rs./Tonne)

| Particulars | T.O.C. | T.F.C. | Cost $A_1$ | Cost B | Cost C (Total cost) |
|---|---|---|---|---|---|
| Tomato | 2,079.90 | 774.49 | 2,114.35 | 2,809.50 | 2,854.39 |
| Brinjal | 2,015.40 | 757.84 | 2,036.93 | 2,719.16 | 2,773.23 |
| Cauli-flower | 1,086.11 | 437.94 | 1,091.86 | 1,486.49 | 1,524.05 |
| Coccinia | 709.97 | 180.77 | 713.07 | 875.15 | 890.75 |

on cauliflower. The low cost per tonne of coccinia was due to high productivity of coccinia, in spite of higher cost of cultivation per hectare.

## 5.5 FARM INCOME MEASURES

An attempt was made in this section to estimate the six measures of farm income viz., gross income, net income, farm business income, family labour income, farm investment income and net benefit-cost ratio. Various measures of farm income per hectare of tomato, brinjal, cauliflower and coccinia are presented in Table 5.14.

### Gross Returns

This is the total revenue to the cultivators obtained from the sale of the produce. In case of tomato gross returns per hectare was Rs.71,462.92, whereas the gross returns per hectare of brinjal, cauliflower and coccinia were Rs.72,570.82, Rs.71,700 and Rs.1,13,332.20, respectively.

Among the selected crops, gross returns were the highest for coccinia because, it is a long duration crop (12 months).

**Net Returns**

The net returns were estimated over Cost C. It was evident from the Table 5.4. For tomato, the net returns were observed to be Rs.13,176.30 and for brinjal it was Rs.15,081.65, for cauliflower it was Rs.17,062.92 and for coccinia it was Rs.25,549.94. Among these crops, the net returns were maximum for coccinia crop and minimum for tomato.

**Farm Business Income**

Farm business income of Rs.28,287.95 was realized per hectare of tomato, for brinjal, cauliflower and coccina, it was Rs.30,345.15, Rs.32,556.68 and Rs.43,059.94, respectively.

**Family Labour Income**

Family labour income per hectare of tomato was Rs.14,092.95, Rs.16,202.65 for brinjal, Rs.18,409.18 for cauliflower and Rs.27,087.44 for coccinia.

**Farm Investment Income**

The farm investment income of tomato, brinjal, cauliflower and coccinia amounted to Rs.27,371.30, Rs.29,224.15, Rs.31,210.43 and Rs.41,522.44, respectively.

Table 5.14 Farm income measures in tomato, brinjal, cauliflower and coccinia

(Rs./ha.)

| Sl.No. | Particulars | Tomato | Brinjal | Cauliflower | Coccinia |
|---|---|---|---|---|---|
| 1. | Gross income | 71,462.92 | 72,570.82 | 71,700.00 | 1,13,332.20 |
| 2. | Net income | 13,176.30 | 15,081.65 | 17,062.92 | 25,549.94 |
| 3. | Farm business income | 28,287.95 | 30,345.15 | 32,556.68 | 43,059.94 |
| 4. | Family labour income | 14,092.95 | 16,202.65 | 18,409.18 | 27,087.44 |
| 5. | Farm investment income | 27,371.30 | 29,224.15 | 31,210.43 | 41,522.44 |
| 6. | Net Benefit cost ratio | 0.23 | 0.26 | 0.31 | 0.28 |

**Net Benefit Cost Ratio**

The net benefit cost ratio calculated for tomato, brinjal, cauliflower and coccinia was 0.23, 0.26, 0.31 and 0.28, respectively.

To sum up among the farm income measures all the income measures were highest for coccinia followed by cauliflower, whereas the net benefit cost ratio was highest on cauliflower.

## 5.6 PRODUCTION ELASTICITIES AND RESOURCE USE EFFICIENCY IN VEGETABLES CULTIVATION

Production function analysis is used for the estimation of functional relationship between farm input and output. The main objective of any production function analysis is to find out the efficiency of various factors employed in the production process.

Cobb-Douglas function was selected for this study because of its relative advantages over other production functions. By using this function, production elasticities were computed directly. The sum of the production elasticities ($\Sigma b_i$) indicates the nature of return to scale. The sum equals to one indicates constant return to scale, means an increase in all factors of production by a given

percentage will lead to same percentage increase in output. If the sum is less than one, it indicates diminishing returns to scale while the sum is more than one it indicates increasing return to scale. The most important limitation of this function is that, it allows either constant, increasing or decreasing marginal productivity but not an input-output curve showing all the stages.

In this study, 5 variables were selected for functional analysis viz., seed, human labour, machine labour, fertilizer and manure, and plant protection chemicals.

**Production Elasticities and Return to Scale**

Results of Cobb-Douglas production function for tomato and brinjal are given in Table 5.15.

**Tomato**

It was observed from this table, that the coefficient of multiple determination ($R^2$) was 0.825 indicting that 82 per cent variation in gross returns could be explained by the selected input variables. High $R^2$ value showed the goodness of fit. Production elasticity of seed and plant protection chemicals were negative and statistically significant at 1 per cent level of significance indicating

Table 5.15 Production elasticities on tomato and brinjal farms

| Particulars | Regression coefficients | |
|---|---|---|
| | Tomato | Brinjal |
| Seed material ($X_1$) (Rs.) | -0.8831** (0.1884) | 0.099 (0.077) |
| Human labour ($X_2$) (Rs.) | 1.9216** (0.3057) | 0.517* (0.228) |
| Machine labour ($X_3$) (Rs.) | 0.5087* (0.2111) | -0.5534 (0.5845) |
| Manures and fertilizers ($X_4$) (Rs.) | 1.4369** (0.4612) | 0.5297* (0.1942) |
| Plant protection chemicals ($X_5$) (Rs.) | -1.2691** (0.2474) | 0.0652 (0.1665) |
| $\Sigma b_i$ | 0.697 | 0.6504 |
| $R^2$ | 0.8255 | 0.8661 |

* Significant at 5% level of probability.
**Significant at 1% level of probability.

Figures in paranthesis indicates the standard errors.

excessive usage and requiring adjustment. Variables human labour, and fertilizer and manure were statistically significant at 1 per cent level of significance. Whereas, machine labour was significant at 5 per cent level of significance.

The sum of elasticities ($\Sigma b_i$) is 0.697, indicating the diminishing returns to scale.

**Brinjal**

The coefficient of multiple determination was 0.866 which indicates that all the selected variables have explained about 86.61 per cent of variation in gross returns.

The variables human labour and fertilizer and manure were significant at five per cent level, whereas seed and plant protection chemicals were observed to be non significant.

It was observed from the above that one per cent increase in fertilizer increases the output by 0.529 by keeping other variables constant.

The sum of elasticities ($\Sigma b_i$) was 0.650 showing the diminishing returns to scale.

Results of Cobb-Douglas production function for cauliflower and coccinia are given in Table 5.16.

**Cauliflower**

The regression coefficients of human labour, fertilizer and manure, and plant protection chemicals were found to be positive and significant at 1 per cent level of significance. The per cent increase in expenditure on human labour, fertilizer and manure, and plant protection chemicals, would raise the gross income by 0.3382, 0.3282, and 0.1833 per cent respectively by the corresponding inputs. the coefficient of multiple determination was 0.8534 indicating 85 per cent of influence of variables over gross income.

The sum of elasticities was 1.029 showing the constant returns to scale.

**Coccinia**

The coefficient of multiple determination was 0.9882 which indicates that all the selected variables have explained 98.82 per cent of variation in gross returns.

Table 5.16 Production elasticities on cauliflower and coccinia farms

| Particulars | Regression coefficients | |
|---|---|---|
| | Cauliflower | Coccinia |
| Seed material ($X_1$) (Rs.) | 0.0748 (0.1021) | 0.0521* (0.022) |
| Human labour ($X_2$) (Rs.) | 0.3382** (0.1196) | 4.2424** (0.3357) |
| Machine labour ($X_3$) (Rs.) | 0.1045 (0.1047) | 0.0737* (0.035) |
| Manures and fertilizers ($X_4$) (Rs.) | 0.3282** (0.070) | -0.032 (0.043) |
| Plant protection chemicals ($X_5$) (Rs.) | 0.1833** (0.055) | 0.0298* (0.0141) |
| $\Sigma b_i$ | 1.029 | 4.312 |
| $R^2$ | 0.8931 | 0.9882 |

* Significant at 5% level of probability
**Significant at 1% level of probability

Figures in paranthesis indicates the standard errors.

Among the selected variables human labour was significant at one per cent level, whereas, machine labour, and plant protection chemicals were positively significant at 5 per cent level of significance, seed was negatively significant at 5 per cent level indicating excessive usage.

From the above, it could be understood that keeping other variables at constant level, one per cent increase in human labour, machine labour and plant protection chemicals increase the output by 4.2424, 0.0737 and 0.0298, respectively. Here operation of increasing return to scale was observed.

## 5.7 RESOURCE USE EFFICIENCY

### Marginal value products

To study the resource use efficiency, the production function analysis was used. The general criteria for judging the efficiency of resource use was comparison of marginal returns with marginal cost. If the ratio is less than one, it indicates excessive usage of particular input. Maximum efficiency of resource occurs when the returns from the additional unit of input is equal to cost of that additional input i.e., marginal value product to opportunity cost ratio was equal to one (unity). The estimated marginal

value products (MVP), opportunity cost (OC) and their ratios were presented in Table 5.17 and 5.18.

**Tomato**

It was observed from the Table 5.17 that the marginal value products to opportunity cost ratio for the variables seed, machine labour, and plant protection chemicals were found to be negative, indicating excessive utilization of these inputs. The ratio of MVP to opportunity cost for human labour was found to be higher than unity indicating scope to increase the use of this input to realize higher returns and profits.

**Brinjal**

From the Table 5.17 the MVP to opportunity cost ratio for machine labour had clearly indicated inefficient and excessive use of resource at varying magnitudes since, the ratio was negative. The positive figures showing less than one in MVP to opportunity cost ratio for plant protection chemicals indicates that excessive utilization, whereas more than one for seed, human labour, and fertilizer and manure indicates that the use of these inputs can be increased to get more profits.

Table 5.17 Marginal value product (MVP), opportunity cost (OC) and ratio of MVP to OC of tomato and brinjal

| Particulars | Tomato | | | Brinjal | | |
|---|---|---|---|---|---|---|
| | MVP | OC | MVP/OC | MVP | OC | MVP/OC |
| Seed material | -56.85 | 1 | -56.85 | 6.825 | 1 | 6.82 |
| Human labour | 8.645 | 1 | 8.645 | 2.810 | 1 | 2.810 |
| Machine labour | -5.459 | 1 | -5.459 | -4.815 | 1 | -4.815 |
| Fertilizer and manure | 9.939 | 1 | 9.939 | 4.012 | 1 | 4.012 |
| Plant protection chemicals | -1.211 | 1 | -1.211 | 0.545 | 1 | 0.545 |

The marginal value product to opportunity cost ratios for cauliflower and coccinia were presented in Table 5.18.

**Cauliflower**

The MVP to opportunity cost ratios for various resources are found to be positive for cauliflower. The MVP to opportunity cost ratio of human labour was found be nearly unity indicating maximum resource use efficiency. The marginal value product to opportunity cost ratios for seed, machine labour, fertilizer and manure, and plant protection were more than one indicates that the use of inputs can be increased to get more profits.

**Coccinia**

From the table it is evident that the ratio of MVP to opportunity cost was observed to be negative for seed, and fertilizer and manure indicating excessive utilization of these inputs. Whereas, the ratio of plant protection was positive but less than one indicating the excessive utilization and the ratio for human labour was positive and greater than one indicating that if the use of this input increased, getting more profits is possible.

Table 5.18 Marginal value product (MVP), opportunity cost (OC) and ratio of MVP to OC of cauliflower and coccinia

| Particulars | Cauliflower | | | Coccinia | | |
|---|---|---|---|---|---|---|
| | MVP | OC | MVP/OC | MVP | OC | MVP/OC |
| Seed material | 5.088 | 1 | 5.088 | -8.912 | 1 | -8.912 |
| Human labour | 1.093 | 1 | 1.093 | 19.650 | 1 | 19.650 |
| Machine labour | 2.012 | 1 | 2.012 | 0.677 | 1 | 0.677 |
| Fertilizer and manure | 3.128 | 1 | 3.128 | -0.240 | 1 | -0.240 |
| Plant protection chemicals | 3.586 | 1 | 3.586 | 0.254 | 1 | 0.254 |

## 5.7 MARKETING PATTERN

The study area was located near by Guntur town. There is one wholesale market and several retail markets present in Guntur. In the wholesale market there were 150 wholesalers shops [illegible]. There is one wholesalers association and one union for hammalis. From the study area the vegetables brought to the market mainly by lorries, rikshaws or by two wheelers. The produce reaches the market from the villages nearby Guntur.

The market functionaries involved in marketing were the traders, weighmen and hamalies in the vegetable market. Grading was done at farm level only. After harvesting, the produce was graded at farm level and it was brought to the wholesale market. The produce is brought by the producer/farmer to the market through a commission agent, there, it was sold through open auction. After completion of auction the hamal will carry the produce to the weighing pan where it was weighed.

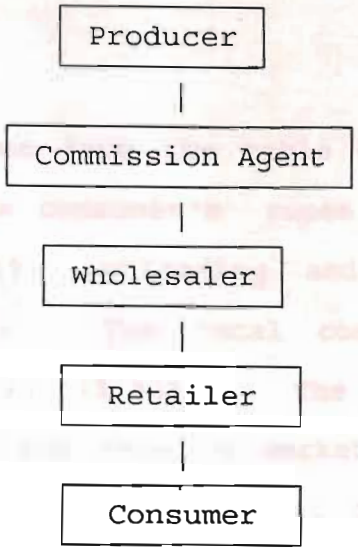
The market fee is 55 paise for one bag weighing 50 kg, 45 paise for 40 kg and 35 paise for one basket weighing about 30 kg. The market does not provide any type of storage facilities to the farmer, the farmer is forced to sell away his produce because of the perishable nature of

the vegetables and at the prices offered by traders. The retailers come to the wholesale market and purchase the produce from them.

In the study area, the important channel is producer -- commission agent -- wholesaler -- retailer -- consumer. The producer/farmer brings produce to the wholesale market situated at Guntur through a commission agent. There the wholesalers sells away the produce to the retailers. From the retailers, the produce ultimately reaches the consumer.

The vegetable growers were complaining about the price at the wholesale level where as the consumer is burdened with the higher prices at the retail level. One of the objectives of this study is to analyse producer's share in the consumer's rupee and examine the margins at different levels. This will be useful to judge whether the profits of the various functionaries are justified. If not what is the proper action that can mitigate this problem.

**Major channel in marketing of vegetables selected for the study:**




The method employed to study the market margins in this study was comparison of the prices at successive levels of marketing and arriving the net margins after deducting the market costs incurred at different stages of marketing. Here in this method marketing costs and margins were estimated by using "concurrent method". The prices prevailing at successive stages of marketing on the same date were taken and the margins were worked out.

## 5.8 PRICE SPREAD AND MARKET MARGINS

The price spread of the tomato and brinjal are presented in Table 5.19. Whereas, the cauliflower and

coccinia are presented in Table 5.20 and discussed below crop wise. For convenience sake the price spreads are calculated per kg of vegetables.

**Tomato**

It was observed from the table that the farmer got 54.5 per cent of the consumer's rupee. Producer incurred transport costs (1%), unloading and weighing (0.33%), commission fee (1%). The total cost incurred by the producer was Rs.0.23 (3.83%). The costs incurred by wholesaler in marketing were on market fee 0.17 per cent spoilage 3.00 per cent, cess 0.5 per cent accounting for a total of 3.67 per cent (Rs.0.22). The retailer also incurs some costs on loading Rs.0.001 (0.02%), transport Rs.0.25 (4.16%), spoilage Rs.0.24 (4.00%) and market fee Rs.0.01 (0.16%). The total cost incurred by retailer was Rs.0.50 (8.33%). Tomato being highly perishable, the spoilage accounts for Rs.0.240.

The wholesaler's share on consumer's rupee was 8.83% while the retailer share on consumer's rupee was 20.83%, total amounting to 29.66 per cent. The price spread in the marketing of tomato was found to be Rs.2.73 which accounts for 45.5 per cent of the consumer's rupee. The share of

Table 5.19 Price spread in tomato and brinjal marketing

| Sl. No. | Particulars | Tomato | | Brinjal | |
|---|---|---|---|---|---|
| | | Rs./kg. | % | Rs./kg. | % |
| 1. | Net price received by the producer | 3.27 | 54.5 | 3.33 | 57.91 |
| 2. | Costs incurred by the producer | | | | |
| | a) Packing | 0.09 | 1.5 | 0.06 | 1.04 |
| | b) Transport | 0.06 | 1.0 | 0.04 | 0.70 |
| | c) Unloading and weighing | 0.02 | 0.33 | 0.02 | 0.35 |
| | d) Commission fee | 0.06 | 1.0 | 0.05 | 0.87 |
| | Sub Total | 0.23 | 3.83 | 0.17 | 2.96 |
| 3. | Producers sale price/wholesalers purchase price | 3.50 | 58.33 | 3.50 | 60.87 |
| 4. | Wholesalers margin | 0.53 | 8.83 | 0.49 | 8.52 |
| 5. | Costs incurred by wholesaler | | | | |
| | a) Market fee | 0.01 | 0.17 | 0.01 | 0.17 |
| | b) Spoilage | 0.18 | 3.00 | 0.12 | 2.09 |
| | c) Cess | 0.03 | 0.50 | 0.03 | 0.52 |
| | Sub Total | 0.22 | 3.67 | 0.16 | 2.78 |

contd....

contd.... Table 5.19

| | | | | |
|---|---|---|---|---|
| 6. | Wholesalers sale price/retailers purchase price | 4.25 | 70.83 | 4.15 | 72.17 |
| 7. | Costs incurred by retailer | | | | |
| | a) Loading | 0.001 | 0.02 | 0.001 | 0.02 |
| | b) Transport | 0.25 | 4.16 | 0.20 | 3.48 |
| | c) Spoilage | 0.24 | 4.00 | 0.17 | 2.96 |
| | d) Market fee | 0.01 | 0.16 | 0.01 | 0.16 |
| | Sub Total | 0.50 | 8.33 | 0.38 | 6.62 |
| 8. | Retailers margin | 1.25 | 20.83 | 1.22 | 21.22 |
| 9. | Consumers price | 6.00 | 100.00 | 5.75 | 100.00 |
| 10. | Price spread | 2.73 | 45.50 | 2.42 | 42.08 |

marketing costs was 15.83 and traders margin was 29.66 per cent in consumer price.

**Brinjal**

The net share of producer was 57.91 per cent of the consumer's rupee. The producer incurs cost on transport Rs.0.04 (0.70%), unloading and weighing Rs.0.02 (0.35%), commission fee Rs.0.05 (0.87%) and packing Rs.0.06 (1.04%). The wholesaler incurs costs on market fee Rs.0.01 (0.17%), spoilage Rs.0.12 (2.09%), cess Rs.0.03 (0.52%). Total cost incurred by wholesaler was Rs.0.160 (2.78%). The wholesaler margin was Rs.0.49 (8.52%). the costs incurred by retailer on transport was Rs.0.20 (3.48%), spoilage Rs.0.17 (2.96%) and market fee Rs.0.01 (0.16%), total accounts for Rs.0.38 (6.62%).

The wholesaler's share on consumer's rupee was 8.52 per cent and retailer's share on consumer's rupee was 21.22 per cent with a total of 29.74 per cent even after meeting their expenses. The price spread in marketing of this vegetable Rs.2.42 (42.08%).

**Cauliflower**

The producers received 45 per cent of consumers' net price by selling his produce. Producer incur transport

costs Rs.0.05 (1.25%), unloading and weighing Rs.0.04 (1.00%), commission fee of Rs.0.07 (1.75%), and packing Rs.0.04 (1.00%). The total cost incurred by the producer to bring the produce to the market was 5.0 per cent. The wholesaler also incurred some costs like market fee, spoilage and cess accounted for a total of 4.65 per cent of consumer's rupee. The retailer incurred costs on transport, loading, spoilage and market fee accounted for a total of 6.18 per cent of consumer's rupee. The wholesaler's and retailer's margin comes to around 39.17 per cent. The price spread of cauliflower was Rs. 2.2 (55%).

**Coccinia**

The study estimated that the producer had received a net share of 33.83 per cent of consumer's Rupee. The producer incurred an expenditure on transport Rs.0.03 (1.0%), unloading and weighing charges was Rs.0.02 (0.67%) and commission fee was Rs.0.05 (1.67%). Thus the total cost incurred by the producer accounts for Rs.0.14 (4.51%).

The wholesaler incurs some costs like market fee, spoilage losses, cess accounted for 0.37, 6.67 and 0.83 per cent respectively. the retailer incurred costs on loading Rs.0.01 (0.33%), transport Rs.0.01 (0.33%), spoilage Rs.0.27 (9.00%) and market fee Rs.0.02 (0.23%) accounting to a total

Table 5.20 Price spread in cauliflower and coccinia marketing



| Sl. No. | Particulars | Cauliflower | | Coccinia | |
|---|---|---|---|---|---|
| | | Rs./kg. | % | Rs./kg. | % |
| 1. | Net price received by the producer | 1.80 | 45.0 | 1.01 | 33.83 |
| 2. | Costs incurred by the producer | | | | |
| | a) Packing | 0.04 | 1.0 | 0.04 | 1.17 |
| | b) Transport | 0.05 | 1.25 | 0.03 | 1.00 |
| | c) Unloading and weighing | 0.04 | 1.00 | 0.02 | 0.67 |
| | d) Commission fee | 0.07 | 1.75 | 0.05 | 0.67 |
| | Sub Total | 0.20 | 5.00 | 0.14 | 4.51 |
| 3. | Producers sale price/wholesalers purchase price | 2.00 | 50.00 | 1.15 | 38.33 |
| 4. | Wholesalers margin | 0.56 | 14.10 | 0.61 | 20.46 |
| 5. | Costs incurred by wholesaler | | | | |
| | a) Market fee | 0.01 | 0.28 | 0.01 | 0.37 |
| | b) Spoilage | 0.15 | 3.75 | 0.20 | 6.67 |
| | c) Cess | 0.03 | 0.63 | 0.03 | 0.83 |
| | Sub Total | 0.19 | 4.65 | 0.24 | 7.87 |

contd....

contd.... Table 5.20



| | | | | |
|---|---|---|---|---|
| 6. Wholesalers sale price/retailers purchase price | 2.75 | 68.75 | 2.00 | 66.66 |
| 7. Costs incurred by retailer | | | | |
| a) Loading | 0.02 | 0.50 | 0.01 | 0.33 |
| b) Transport | 0.02 | 0.50 | 0.01 | 0.33 |
| c) Spoilage | 0.20 | 5.00 | 0.27 | 9.00 |
| d) Market fee | 0.01 | 0.18 | 0.02 | 0.23 |
| Sub Total | 0.25 | 6.18 | 0.30 | 9.90 |
| 8. Retailers margin | 1.00 | 25.07 | 0.70 | 23.43 |
| 9. Consumers price | 4.00 | 100.00 | 3.00 | 100.00 |
| 10. Price spread | 2.20 | 55.00 | 1.99 | 66.16 |

Table 5.21 Summary of price spreads of different vegetables

| Particulars | Tomato | | Brinjal | | Cauliflower | | Coccinia | |
|---|---|---|---|---|---|---|---|---|
| | Rs./kg. | % | Rs./kg. | % | Rs./kg. | % | Rs./kg. | % |
| Producers price | 3.27 | 54.50 | 3.33 | 57.91 | 1.80 | 45.00 | 1.01 | 33.67 |
| Marketing costs | 0.95 | 15.83 | 0.71 | 12.35 | 0.64 | 16.00 | 0.68 | 22.67 |
| Middlemen margin | 1.78 | 29.67 | 1.71 | 29.74 | 1.56 | 39.00 | 1.31 | 43.67 |
| Consumers price | 6.00 | 100.00 | 5.75 | 100.00 | 4.00 | 100.00 | 3.00 | 100.00 |

of Rs.0.30 (9.9%). Retailer's margin of consumer's rupee was Rs.0.70 (23.43%) and that of wholesaler was 20.46 per cent. The price spread for this vegetable was Rs.1.99 (66.16%).

Summary of the price spread in Table 5.21 clearly indicates that the producer's net share of consumer's rupees was 54.5 per cent with respect to tomato, 57.9 per cent in brinjal, 45 per cent in cauliflower and 33.83 per cent in coccinia. So there is need to reduce the margins of the market intermediaries in cauliflower and coccinia marketing.

**Marketing Efficiency**

It is the ratio of market output or satisfaction to marketing input or cost of resources. Marketing efficiency implies that use of the best and low cost methods of marketing with a maximum effectiveness to reduce costs, margins, spoilage and price-spread in the whole marketing system, so marketing efficiency means the maximization of input-output ratio. The marketing efficiency can be expressed in percentage term. A higher ratio denotes high marketing efficiency and vice versa.

The Table 5.22 indicates that, the marketing efficiency was observed to be highest for brinjal crop

Table 5.22 Marketing efficiency in the marketing channels of tomato, brinjal, cauliflower and coccinia

| Particulars | Tomato | Brinjal | Cauliflower | Coccinia |
|---|---|---|---|---|
| Value of the goods sold (V) | 6.00 | 5.75 | 4.00 | 3.00 |
| Marketing cost (I) | 2.73 | 2.42 | 2.20 | 1.99 |
| Marketing efficiency (ME) | 1.19 | 1.38 | 0.82 | 0.51 |

(1.38), followed by tomato 1.19, cauliflower 0.82 and for coccinia it was 0.51. In marketing of brinjal, the middleman intervention was less when compared to other vegetables, so it had greatest marketing efficiency.

## 5.9 SEASONAL TREND IN PRICES OF MAJOR VEGETABLES

The seasonal production and the perishable nature of vegetables makes the prices a seasonal phenomenon. Seasonal variation in prices arise due to seasonality either in supply or demand and other factors. Such as the available stock with the trader. If the quantities of vegetables arriving in the market at the time of harvest, is more than the local needs for consumption, ultimately create glut in the market which results in lowering the price and create a loss to the producer. The price fluctuations are of higher magnitude due to their seasonal character and of perishability. Price variations thus play a predominant role in creating uncertainty in income levels of the vegetable growers. Hence, the seasonal fluctuation of four major vegetable viz., tomato, brinjal, cauliflower and coccinia are discussed in this section based on the estimated seasonal indices using the data on monthly wise average retail prices from 1990 to 1995 in Guntur vegetable market. The calculated price indices are presented in Table 5.23.

Table 5.23 Seasonal indices of different vegetables (1990 to 1995)

| Month | Seasonal indices | | | |
|---|---|---|---|---|
| | Tomato | Brinjal | Cauliflower | Coccinia |
| January | 51.65 | 75.25 | 86.88 | 82.35 |
| February | 45.57 | 87.13 | 109.84 | 94.11 |
| March | 60.76 | 87.13 | -- | 96.47 |
| April | 66.84 | 83.17 | -- | 131.76 |
| May | 88.10 | 106.93 | -- | 150.58 |
| June | 145.82 | 106.93 | - | 138.82 |
| July | 170.12 | 91.09 | -- | 80.00 |
| August | 127.60 | 87.13 | -- | 98.82 |
| September | 88.10 | 110.89 | 127.86 | 112.94 |
| October | 112.40 | 134.65 | 109.83 | 65.88 |
| November | 139.75 | 130.70 | 90.16 | 84.70 |
| December | 103.29 | 99.00 | 75.41 | 63.52 |

**Tomato**

The data in Table 5.23 reveals that the index of seasonal price variations for tomato was lowest in February month and highest in July. In September month lower price index was recorded due to glut in market (Kharif crop harvesting period) and thereafter erratic variations were observed in indices from October to December and during the months of January and February lowest price was recorded due to the arrival of rabi crop of tomato to the market and from there the prices have gradually picked up from March to July due to the nature of lean season.

**Brinjal**

It is obvious from the table that the peak price was recorded during October and minimum price in January. In November month the kharif crop will be harvested hence the prices slumped down, result in lower prices in December. In January, February month lower indices are recorded due to the arrival rabi brinjal. It is interesting to note that the prices were less than 100 during January to April and more than 100 from May to November except August.

**Cauliflower**

It is mainly kharif season crop, the indices were calculated for 6 months by taking previous 5 years data. It

Table 5.24 Maximum and minimum prices of vegetables during 1990-'95 (Rs./kg.)

| Year | Prices of different vegetables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tomato | | Brinjal | | Cauliflower | | Coccinia | |
| | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum |
| 1990-91 | 17 | 3 | 6 | 3 | 6 | 4 | 5 | 2.5 |
| 1991-92 | 10 | 2 | 5 | 3 | 6 | 4 | 7 | 2.5 |
| 1992-93 | 10 | 3 | 5 | 3 | 9 | 5 | 7 | 2.5 |
| 1993-94 | 10 | 4 | 8 | 4 | 8 | 5 | 8 | 2.0 |
| 1994-95 | 15 | 3 | 13 | 5 | 10 | 5 | 8 | 3.0 |

was evident from the Table 5.23 that, the highest indices was recorded in September i.e., during beginning of the season from there onwards started to declined. The lowest price indices was recorded in month of December due to glut in the market and at the end of the season there was slight increase.

**Coccinia**

The crop was grown throughout the year. The price indices are lower than 100 in almost 5 months (i.e., in January, July, October, November and December) and more than 100 and increase from April to June. The maximum price was indicated during May while the minimum price was observed during December.

The maximum and minimum prices of these vegetables during 1990-'95 were presented in Table 5.24.

## 5.10 CONSUMER PREFERENCE

The consumer preference of any vegetable varies with the income level (maximum) and taste (minimum). Which inturn depends on the seasonal variations of prices. For studying this objective a separate 30 sample of consumers were taken and opinion survey was conducted. The results are illustrated in below Table 5.25 it indicated that 35.9

Table 5.25 Consumer preference of selected vegetables

| Vegetable | No. of sample prefered | % to total |
|---|---|---|
| Tomato | 10.71 | 35.71 |
| Brinjal | 4.30 | 14.30 |
| Cauliflower | 6.42 | 21.42 |
| Coccinia | 8.57 | 28.57 |
| Total | 30.00 | 100.00 |

per cent preferred the tomato, as it is a very essential for any curry preparation and due to its sour and salty.taste, whereas brinjal was preferred by a very few people i.e., 14.3% compared to remaining 3 vegetables because of its alergitic contents. Cauliflower preferred by 6.42 people (21.42%) It may be due to seasonal occurrence of vegetable. Finally, coccinia was preferred by 8.57 people (28.57%), slightly higher preference of coccinia than cauliflower may be due to occurrance of this vegetable throughout the year and low prices.

## 5.11 PROBLEMS ASSOCIATED WITH PRODUCTION AND MARKETING OF VEGETABLES

Vegetable production is one of the profitable enterprise, associated with many constraints. The major constraints in vegetable production are availability of inputs, lack of transfer of technology, inefficient post harvest handling, improper marketing and inefficient plant protection measures. The details of each item are discussed below.

**Availability of Inputs**

(a) Seed:-

It was observed that non availability of quality seed, due to inadequate production was the most important

constraint. Due to no quality control measures adopted, the available seed was generally substandard and due to limited production/availability, the cost of seed was too high.

(b) Fertilizer:-

The balanced use of manures and fertilizers, with an integrated approach for the use of farm yard manure, green manure and fertilizers was lacking. Soil testing by the farmers for making optimum use of nutrients was also not done to the extent required. Removal of subsidy resulted in abnormal increase in cost of fertilizers.

(c) Credit:-

Loans to vegetable growers were inadequate and credit was generally not available to the marginal and small farmers in time.

(d) Labour:-

Labour availability was becoming increasingly difficult. Alternatives to human labour for these crops were limited due to labour intensity and cost of labour was very high.

(e) Irrigation:-

There was shortage of good quality water for irrigation water management devices were inadequate and the power supply was unreliable.

**Extension/Transfer of Technology**

Properly trained people particularly in vegetable crops were not available to run extension services. Proper demonstrations to transfer technology from the laboratory to the farmers were not being done.

**Post Harvest Handling**

Low cost technologies for post harvest handling and packaging for domestic and export markets have not been adequately developed and lack of suitable transport facilities for vegetables.

**Marketing**

Marketing facilities for vegetables are limited at the producing areas and mostly in the hands of middlemen commission agents and lack of price support and market intelligence, intermittent situations of gluts and scarcities put both producer and consumer at a disadvantage.

**Plant Protection**

Injudicious use of pesticides causes a serious health hazard. Information on plant protection measures in vegetable crops was inadequate. Integrated pest management systems have not been developed properly. The cost of plant protection chemicals was too high.

**SUGGESTIONS**

For increasing the productivity and improving the quality of vegetables required at national and international markets, proper attention should be given at different levels. There is the need to develop basic infrastructure facilities.

Advanced production technology with adequate use of various inputs was necessary for cultivation of various vegetables. The usage of hybrid seeds in vegetable crops fetch higher profits. So the private organisations are taking the lead not only in releasing such varieties much faster in view of the availability of infrastructural facilities, but also in importing the improved varieties from developed countries. Subsidy should be provided for other inputs like fertilizers, pesticides and agricultural implements and equipments etc.

25-40 per cent losses were due to inadequate knowledge of harvesting, curing, packaging, transport and storage techniques proper washing and waxing should be done.

The production of vegetables in India is faced with another problem of packing. Vegetables are normally packed in jute bags, bamboo baskets, wooden boxes of varying shapes and sizes and also in loose packing resulting in nearly 10 per cent of spoilage during transit. Processing industries and cooperative societies started using plastic crates for transportation of vegetables from the field as well as for storage thereby reducing spoilage to the maximum extent.

Warehouse facilities are lacking in India for vegetable storage. Vegetables are stored normally under open conditions or in trenches and pits. These methods lead to huge losses due to rotting and drying for that A zero energy cool chamber has been developed by IARI for vegetables. More number of warehouses should be established with cold storage facilities to preserve the material during glut seasons.

Since a major portion of vegetables has to come from villages, they have to be transported to the nearby towns and city markets only by road. If village roads are not

proper, there will be delay in transportation and lead to spoilage of vegetables. Government should take steps to strengthen refrigerated facilities, logistics and provision of quick, efficient and cost effective transport systems.

Efficient marketing systems are absolutely essential to help the producers in getting profitable returns. Hence for improving the market efficiency there is a need to control the activities of intermediaries by regulation of trade and by establishing more and more horticultural producers cooperative marketing societies at village, taluk and district levels and by creating marketing boards on the lines of commodity boards.

Fixation of floor prices for atleast important vegetables should be studied and implemented by the respective State Government to see that the producers should get atleast reasonable results for their investments.

The Government has to develop or draw up schemes on crops and provide relief when crops are lost. In India majority of the rural mass are marginal and small farmers normally do not possess financial reserves for taking up cultivation of crops, to protect and safeguard the interests of growers from this type of exploitation, financial

institutions like Nationalized Banks, NABARD, Rural Credit Co-operative Societies, Grameen Banks, etc. with the assistance of Central and State Governments should draw regular schemes and provide term loans by way of cash or kind.

Women play a major role in production and processing of vegetables in developing countries. Intensive production of vegetables is often associated with the availability of female labour. They should be educated about the nutritive value of vegetables and their importance in improving their economical conditions which in turn helps in increasing the vegetables production. So, women youth training and extension program (WYTEP) scheme to train the rural women folk of small and marginal farmers about the production of crops with advanced technology.

# *SUMMARY AND CONCLUSIONS*

# SUMMARY

Vegetables have exclusive importance in the contest of providing vitamins, minerals and proteins besides energy and dietary fibre. India is the second largest producer of vegetables in the world (12% of world production) next to China with an estimated production of about 48 million tonnes from an area of over 4.5 million hectares which was far below the requirement of rapidly growing population. The low productivity was the reason for reduced availability of vegetables. Thus, there was a larger need and scope to increase the vegetable production. Vegetables provide large amount of returns to growers and also possess the export value. As the vegetables were perishable in nature, the production and marketing of vegetables accounts to number of problems. Several functionaries were engaged in marketing of vegetables, so there was need to develop alternative marketing channel. The present study was aimed to observe the production and marketing aspects of four vegetables (tomato, brinjal, cauliflower and coccinia).

The present study was undertaken with the following objectives.

1. To estimate the costs and returns in cultivation of vegetable crops.

2. To study the resource productivity and returns to scale on vegetable farms.
3. To study the marketing practices and price spreads under the existing market conditions.
4. To study the consumer preferences of vegetables.
5. To study the seasonal price trend and price variations of vegetables.
6. To identify the problems in production and marketing of vegetable and to suggest appropriate remedial measures.

Guntur district was purposively selected as the vegetable cultivation was predominant in this district. A three stage random sampling was adopted to select the mandals, villages and farmers. At first stage two mandals Mangalagiri and Chebrolu were selected, at second stage two villages from each mandal, Nutakki and Chinna Kakani from Mangalagiri mandal, and Chebrolu and Narakoduru from Chebrolu mandal. At third stage 90 farmers were selected. Ten wholesalers and ten retailers were selected at random for collection of information pertaining to marketing aspects. the pretested schedules were used to collect the data through survey method. The reference period for the study was 1995-'96.

In present study, analytical tools employed were cost concepts, farm income measures, Cobb-Douglas production function, marketing costs, margins, marketing efficiencies and seasonal price indices, the following results and conclusions were obtained. In total labour utilization, the share of hired human labour was high, followed by machine labour. The cost of cultivation per hectare of tomato, brinjal, cauliflower and coccinia were Rs.58,286.62, Rs.57,489.17, Rs.54,637.08 and Rs.90,282.26. The high cost of cultivation of coccinia was recorded because of long duration (12 months) crop and greater human labour requirement on establishment of bamboo pandals.

Among various inputs human labour, fertilizer and manure and plant protection chemicals contributes to maximum share in total cost of cultivation of all four vegetable crops. Cost of cultivation per hectare according to cost concepts revealed that for tomato cost $A_1$, Cost B and Cost C were Rs.43,174.97, Rs.57,369.97 and Rs.58,286.62 and for brinjal Cost $A_1$ was Rs.42,225.67, Cost B was Rs.56,368.17 and Cost C was Rs.57,489.17. For cauliflower Cost $A_1$, Cost B and Cost C were Rs.39,143.33, Rs.53,290.83 and Rs.54,637.08, respectively and for coccinia Cost $A_1$, B and C were Rs.70,272.26, Rs.88,744.76 and Rs.90,282.26, respectively.

The gross returns per hectare of tomato, brinjal, cauliflower and coccinia were Rs.71,462.92, Rs.72,570.82, Rs.71,700.00 and Rs.1,13,332.20, respectively. The net returns per hectare of tomato was Rs.13,176.30, brinjal Rs.15,081.65, cauliflower Rs.17,062.92 and coccinia Rs.25,549.94. All the income measures were highest for coccinia, followed by cauliflower, brinjal and tomato but the net benefit-cost ratio was highest for cauliflower (0.31), followed by coccinia (0.28), brinjal (0.26) and tomato (0.23).

The functional analysis has revealed that the diminishing returns to scale was operated in tomato and brinjal farms, and constant returns were observed in cauliflower cultivation and increasing returns to scale existed in case of coccinia farms. The marginal value product to opportunity cost ratio had indicated inefficient use of resources. This provides scope to adjust the resources so as to fetch higher returns in vegetable cultivation.

The producer's share in consumer's rupee was highest in case of brinjal (57.91%) followed by tomato (54.50%), cauliflower (45.00%) and coccinia (33.67%). The commission agents fee was ranging from 0.87 per cent to 1.75 per cent

of the consumer's rupee. The middlemen margin was ranged from 29.67 per cent to 43.67 per cent. The margins and marketing costs were high, this warranted the change in marketing structure in order to narrow down the price spread.

The seasonal indices of prices constructed for 1990-'95 period. The index seasonal price variations for tomato was lowest in February and September (crop seasons) highest in July month (lean season). For brinjal the indices were recorded to be minimum from January to April and maximum from May to November except August. The indices of cauliflower were highest at the beginning and end of the season. As the coccinia was grown throughout the year, the price indices were low in almost five months (January, July, October, November and December) and from April to June the indices were high.

Consumer preferences of vegetables depend upon the real income of the people, in the present study the consumer preference was high for tomato which was essential for most of curry preparation, followed by coccinia due to low prices.

Non-availability of quality seed, non-availability of labour during peak period, inadequate credit facilities, lack of storage facilities, lack of technical know-how and lack of confidence among the recommended practices were some of the problems in vegetable production.

**CONCLUSIONS**

1. Among the vegetables, coccinia required highest human labour, followed by cauliflower, tomato and brinjal.
2. The percentage of operational cost to total cost varied from 71.26 to 77.50 in vegetable cultivation.
3. Productivity of coccinia was recorded high, followed by cauliflower, brinjal and tomato.
4. All the farm income measures recorded were high for coccinia, followed by cauliflower, brinjal and tomato.
5. The functional analysis indicated, the operation of diminishing returns in case of brinjal and tomato, constant returns in case of cauliflower, and increasing returns in case of coccinia. The ratio of marginal value product to opportunity cost indicated the resource use efficiency and offer the scope for adjustment of resource, so as to fetch higher returns.
6. The producers share in consumer's rupee was varied from 32.67 per cent (coccinia) to 57.91 per cent (brinjal). the high price spread shows the need to

reorganization of the marketing system for the benefit of producers.

7. Marketing efficiency was higher in case of brinjal (1.38) when compared to other selected crops.
8. The seasonal price indices were high in lean season (summer season) and low indices were recorded during crop growth (kharif and rabi) seasons.
9. The consumer preference was recorded high for tomato, followed by coccinia, cauliflower and brinjal.

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