Supply Response of Farmers: Regional Variations in 'United' Andhra Pradesh

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BY

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……Dedicated to my Parents

Nageswara Rao
Hrudaya Mary

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CHAPTER 1

INTRODUCTION

1.1 Context

There has been ample discussion on the issue of agrarian crisis in recent years. The manifestation of crisis has taken the form of large number of suicides. However, agrarian crisis is a multidimensional phenomenon. Sharp rise in the cost of living (index for CPIAL)[1] coupled with deteriorating farm income has pushed the peasant into crisis (Reddy D N and Srijit Mishra, 2009). Crisis in agriculture reduced the primacy of public provision and increased the dominance of private institutions. Privatised institutions of agricultural sector like Andhra Pradesh State Irrigation Development Corporation, Andhra Pradesh Seeds Development Corporation, Andhra Pradesh Agro Industries Corporation, Cooperative Sugar factories and Cooperative Spinning Mills have increased the pressure on farming community. Agrarian crisis has resulted in the decline of production, productivity and value of output of majority of crops since mid-nineties (Srijit Mishra, 2008). Agriculture, the dominant economic activity in the South Indian state of erstwhile Andhra Pradesh[2] has also been facing severe structural and institutional constraints. Andhra Pradesh is one of the states which is identified as being prone to agrarian crisis and has reported highest incidence of suicides. Many studies have attempted to analyze the reasons for farmer suicides at national level, state level and district level. Though various reasons such as predominance of small holdings, groundwater irrigation and low share of priority sector advances to

agriculture etc. have been highlighted, farmer suicides are highest in areas with higher acreage under non-foodgrain crops, particularly cotton.

At this juncture, it is essential to note whether farmers are engaged in rational supply response in Andhra Pradesh. The present study's focus is on this. Due to the influence of demand and supply forces, if the price of a particular commodity increases, there would be a natural inclination on the part of the farmers to bring change in their cropping pattern and bring more acreage under that particular crop. This response may differ from one region to other and is also crop-specific. So, the present study mainly focuses on this issue of variance and institutional forces[3] that are influencing the farmers of three regions[4] in erstwhile Andhra Pradesh. The study makes an important departure from earlier studies with regard to regional peculiarities within the state.

Several studies have been conducted on the aspect of supply responses of farmers. However, the estimates of supply elasticities arrived at by these researchers varied and this may be because of differences in samples, estimating techniques and specification of variables. Most supply response studies [Raj Krishna (1963), Hazell, et al (1995), Mishra, (1998), Adam Ozanne (1999), Chandrasekhar Rao, (2004), Mythili, (2008)] emphasized the significant impact of both price and non-price aspects on acreage decisions of farmers. These studies mainly estimated price elasticities of supply for different crops with positive and negative impacts. Many of the studies have followed the methodology given by Nerlove with some modifications.

A group of economists like Nerlove (1958), Askari and Cummings (1976), Rajkrishna (1963) and Narayana N.S.S and Kirit S. Parikh (1981) found that farmers have responded positively to changes in prices in India and elsewhere. Mythili (2006) examined the supply elasticities of major crops in India in the pre- and post-reform periods. Rao (2004) examined output as a response to price. There have been a number of empirical studies on supply responses of farmers in both developed and developing economies. Some of them are Adam Ozanne (1999), Maurice Schiff and Claudio E. Montenegro (1997) and Julie Subervie (2008). Vakulabharanam,V (2004) made an attempt to investigate anomalous supply response in Telangana, one among the three regions of Andhra Pradesh. Results prove negative non-foodgrain acreage response to price during agricultural liberalisation.

Some of the studies are concerned with the regional variations in Andhra Pradesh for individual crops. Ramulu (1996) with inter-regional analysis shows that sugarcane acreage is positively significant to its relative price in selected sample districts of the three regions except in West Godavari district. Janaiah, Subbaramaraju and Krishnaiah (1990) studied the area production and yield response behaviour of farmers to cotton through adjustment mechanism at regional level. Their results show that supply behaviour of farmers in the coastal Andhra region is more price elastic compared to Telangana and Rayalaseema. Sankar and Naidu (2013) did a regional analysis of responses of area, production and productivity of cotton crop which revealed that current year acreage responds positively to previous year's area, production, price and irrigation.

1.2 The Problem

The present study focuses on the South Indian state of erstwhile Andhra Pradesh. It investigates the growth patterns and supply response of farmers towards food grains and non-foodgrains across the three regions of the then Andhra Pradesh, namely Coastal Andhra, Rayalaseema and Telangana. The farmers in these three regions show dissimilar supply response due to regional variations in climate, geography and institutional structures. It is observed that in Telangana, the relative prices of food grains over non-foodgrains are rising whereas non-foodgrain prices over food grain prices are falling. So, logically, one would expect the area under food grain cultivation to increase. But the supply response of Telangana farmers is not along the expected lines. The area under food grain cultivation reduced and the area under non-foodgrain cultivation increased during the post-liberalization period. This seemingly irrational behaviour of farmers may actually be a result of certain institutional factors.

Rayalaseema region also exhibited a similar trend in the post-liberalisation period i.e. farmers increased the area under non-food grains though the prices falling during post-liberalisation period. In Coastal Andhra, prices of food grains over non-foodgrains are increasing and non-foodgrain prices over food grain prices are falling. So the expected tendency is an increase in the area under food grain cultivation. In this region, the area under food grain cultivation and non-foodgrain cultivation increased and decreased respectively. This is a rational outcome of the price change. Therefore, this thesis investigates the discrepancy in the farming patterns exhibited by the farmers in the three regions of Andhra

Pradesh. This work is an attempt to find out why Telangana and Rayalaseema agriculture defy the expected trend while the Coastal Andhra farmers carry out agriculture in accordance with the change of prices of food grains and non-foodgrains.

1.3 Objectives of the Study

- To examine the trends in growth of agriculture between the years 1983 and 2007 in the three regions, viz., Telangana, Rayalaseema and Coastal Andhra in the undivided state of Andhra Pradesh.
- To estimate the food and non-foodgrain acreage responses of farmers in the three regions.
- To analyse, with the help of a sample survey, the institutional forces that are influencing the acreage decisions of farmers in these regions.

1.4 Hypothesis

Price plays an imperative role as a decisive factor in determining the choice of acreage under different crops. Farmers are usually rational and respond positively to product price changes. Acreage responsiveness of farmers is positive to changes in the prices of food grains and non-foodgrains. A positive relationship exists between the price of food grains and the area under its cultivation. In other words, an increase in the prices of food grains results in an increase in the area under cultivation of those crops. The same holds true for non-foodgrains. An increase in the prices of non-foodgrains results in a corresponding increase in the area under its cultivation. However, this simple relation may be influenced and mediated by institutional factors, thereby altering it.

1.5 Sources of Data and Methodology

The methodology adopted for the present study involves secondary data analysis and fieldwork based methodology. Secondary data for this study is mostly drawn from Statistical Abstracts of Andhra Pradesh for different years and Compendium of Area and Land Use Statistics of Andhra Pradesh (1955-56 to 2004-05). The data collected is the state-wise, region-wise and district-level information on area, production and prices of different crops. Rice, jowar, bajra, maize, ragi, bengalgram, redgram, greengram, horsegram and blackgram have been considered as food grains and non-foodgrains such as groundnut, castor, sesamum, cotton, sugarcane, tobacco, chillies and turmeric have been included. All these food grains and non-foodgrains account for more than 80 percent of the gross cropped area of all the three regions of the state.

The whole period has been divided into two parts - 1983-1995 and 1995-2007 time periods respectively. These sub-periods denote the pre and post liberalisation years and are significant since it helps to factor in the effect of liberalisation on the performance of agriculture in the state. The prices for the year 1980-81 have been taken as the constant prices.

For measuring the growth rates in different sub-periods, exponential growth rates have been used. Region-wise growth decomposition method has been used to know the contributions of different components on growth. At constant prices, the value of output is decomposed into three components, i.e., area, yield and cropping pattern. Further, to estimate agricultural supply response,

the modified model of Vakulabharanam, V (2004) has been employed. The relative prices of food grains and non-foodgrains have been computed by using Laspeyres index. Supply responses of the food grains and non-foodgrains have been estimated for the three regions of Andhra Pradesh. Ordinary Least Squares method has been used for estimating the parameters. To correct for autocorrelation in the model because of the lagged variables, Cochrane-Orcutt procedure is also used.

The primary data has been collected by surveying the sample farmer households with the help of a structured questionnaire. The focus of the primary study is the examination of the differences in the supply responses of farmers in the three regions of Andhra Pradesh. Guntur district from Coastal Andhra Region, Warangal district from Telangana region and Anantapur district from Rayalaseema region have been chosen as representative districts to explain the supply response of each region on the basis of purposive sampling. The chosen districts can be considered as representative since they are the major commercial crop growing districts in their respective regions. For example, cotton in Warangal; cotton, chillies and sugarcane in Guntur and groundnut in Anantapur are major non-foodgrain crops. Moreover, a notable fact is that a large number of suicides have been identified in the cash crop growing sector. Thus, it is important to investigate the crucial factors which influence the cultivation of non-foodgrain crops and these districts, by virtue of their extensively growing major non-foodgrain crops, can be considered as ideal samples.

One sample village has been selected from each district of each region. To explore the class and caste dynamics, selection of the villages has been done after taking into consideration, all social and economic categories and both food grain and non-foodgrain growing areas. The pilot study was mainly held on indicators such as primary livelihoods, land-holding size and crops grown by all the households in the village. Subsequently, 50 households from the selected villages were identified as samples to examine the supply response of farmers. Selection of households was made in proportion to the farm size and caste distribution. The data collected pertains to the agricultural year 2010-11[5]. Simple tabular analysis has been used as the main statistical tool for making sense of primary data.

1.6 Structure of the Thesis

The present chapter gives an understanding of the background of the problem, objectives, hypothesis and methodology adopted. Chapter 2 analyzes the growth rates of the agrarian economy of Andhra Pradesh and across regions from 1983 to 2007. Regional variations in the food grain and non-foodgrain area responsiveness of farmers are analyzed in chapter 3. The data on supply responsiveness of farmers, collected through a sample survey in the select districts of Coastal Andhra, Telangana and Rayalaseema, are presented in chapters 4, 5 and 6 respectively. Chapter 7 analyzes the regional variations in supply responses of farmers in Andhra Pradesh at micro-level. The study arrives at an explanation of the supply response puzzles with the aid of micro-level evidence and finally some conclusions are presented in chapter 8.

End Notes

[1] To analyse the impact of retail prices on the cost of living of agricultural labourers, CPIAL is calculated every month by the Labour Bureau.

[2] As of June 2, 2014, the state of Andhra Pradesh is bifurcated into two, namely Telangana and Andhra Pradesh.

[3] Institutional forces include factors such as tenancy, credit, marketing, storage, transport, etc.

[4] Before June 2, 2014, United Andhra Pradesh consisted of three regions, i.e., Coastal Andhra, Rayalaseema and Telangana. Coastal Andhra comprise 13 districts namely Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore. Rayalaseema contain 4 districts namely Kadapa, Kurnool, Ananthapur and Kurnool. Telangana includes 10 districts namely Adilabad, Nizamabad, Karimnagar, Medak, Ranga Reddy, Hyderabad, Mahabubnagar, Nalgonda, Warangal and Khammam.

[5] The Field survey was conducted during the period of 2011-12 in order to gather the vital information related to supply response for the agricultural year 2010-11.

CHAPTER 2

AGRICULTURAL GROWTH PATTERNS IN ANDHRA PRADESH

2.1 Introduction

To know the agricultural development in the state, it is important to study the growth in agricultural production over a period of time. Before going into the detailed analysis of Andhra Pradesh's agricultural growth patterns, it is quite essential to have a brief look at the growth performance of Indian agriculture. Indian agriculture registered significant improvements in its growth rates in the post-independence period. It has come a long way since the era of frequent droughts and vulnerability to food shortages. Today, India is a significant exporter of agricultural commodities. However, growth performance of agriculture is facing serious challenges in maintaining sustainability and sustained levels of growth in the recent past. Production and productivity crisis is an observed phenomenon in agriculture at national level.

India in post-liberalisation period witnessed a deceleration in growth rate of agriculture in terms of Gross Domestic Product (GDP) and output compared to pre-liberalisation period. Growth rate of agriculture has been slow, uneven and has been subjected to wide fluctuations since 1991.Growth rate of Agricultural Gross Domestic product has declined to a significant extent, i.e., from 3.19 percent during 80s to 1.96 percent during 90s (Reddy D N and Srijit Mishra, 2009). The major reason for this deceleration is decline in production levels induced by the decline in food grain production. Low Productivity levels of some

of the food crops have contributed to the low growth in food grain production. Tremendous changes have taken place during the last three decades. Vijay Paul Sharma (2012) shows the trends in crop sector in pre and post reform periods. Area under food grain cultivation recorded negative growth rate, i.e., -0.23 percent in 1980s. Production and productivity growth were 2.85 percent and 2.74 percent respectively. Hence, productivity induced growth can be observed during this period. Area expansion and productivity contributed to the 3.7 percent growth rate in non-foodgrain production during 1980s. The introduction of liberalisation policy framework in the early 1990s brought about significant changes in agricultural growth. As a result, growth rate of production and yield of both food and non-foodgrain crops have fallen to a significant extent in the decades that followed the 80s. Again after 2004, the slow growth in agriculture started gaining momentum with the increase of gross capital formation in agriculture.

Ramesh Chand and Pramod Kumar (2004) studied determinants of private investment, causes for the deceleration of public investment and the implications of capital formation on agricultural growth through an empirical estimation. It was found that the private investment is determined by rate of return on investment, addition of new farm holdings and institutional credit available for agriculture in terms of short, medium and long term loans. Public sector capital formation has been adversely affected by the rise in farm subsidies and decline in revenue receipts. A study by Balakrishnan Pulapre, Ramesh Golait and Pankaj Kumar (2008) addresses the slow growth since 1991. Among price and non-price factors, non-price factors seem to be the major reason behind the slow pace of

growth. The investigation of non-price factors reveals that stagnation of public investment, slowing of irrigation expansion, and decreasing production due to fragmentation of farm holdings are responsible for lull in agricultural growth. Mishra V N and N Govind Rao (2003) have also found that the growth in aggregate crop output was 3.17 percent in the 1980s and it declined to 2.26 percent per annum during the 1990s. Public investment, which is a good criterion for judging growth performance, also declined to 0.43 percent in 90s from 3.49 percent per annum during 80s. The adverse impact of declining public investment on agricultural output has been attributed to the higher spending on subsidies. Ramesh Chand, S S Raju and L M Pandey (2007) examined the trends of agricultural growth and highlighted the factors underlying the slowdown at national level. They explained that almost all factors turned unfavourable for the growth of agricultural output after 1996-97. Along with these unfavourable factors, major setbacks such as trade terms and slowdown of expansion of irrigation also added to the problem. Reddy D N (2006) found that growth performance of agriculture in Andhra Pradesh was not impressive and when compared to the national annual average agricultural growth percentage of 3.1 percent during 1990s, it has shown low growth performance of 2.2 percent.

Majority of the literature on agriculture deals with the determinants of agricultural growth at national and state levels. In these studies, the contributions of various components to the growth of agricultural output have been analyzed. The review of these studies concerning agricultural growth patterns gives some insights regarding the growth performance at national and state levels. Results of

various studies conclude that the changes in growth patterns due to the increased use of various modern inputs and higher availability of infrastructure services have contributed significantly to the growth of crop production in agriculture during the 80s. However, decline of public investment resulted in deceleration of agricultural growth during the 90s and this has been pointed out in different studies. It is this problem that this chapter makes an attempt to study with respect to the growth patterns in Andhra Pradesh. The specific objectives are to examine the agricultural growth trends, regional variations and inter-district variations in Andhra Pradesh over the period 1983-2007 and to identify the factors responsible for agricultural growth by decomposing the agricultural output growth to area, productivity and cropping pattern at the state level and across the regions. This chapter also focuses on the analysis of the changes in the regional patterns of growth of agricultural output at the dis-aggregated state and district levels. This chapter is organized in the following manner:

A brief review of literature at national and state levels is followed by section 2 which discusses the data sources and methodology used. Section 3 is devoted to an analysis of the growth pattern at the district, regional and state levels during the years 1982-83[1] to 1994-95[2] and 1994-95 to 2006-07 and explains the results of output growth performance. This is followed by a decomposition analysis to know the impact of different components on the growth of agricultural output at the state and regional levels. Section 4 deals with the decomposition results and section 5 provides conclusion.

2.2 Data

The data used in this chapter is only secondary. It is mostly drawn from Statistical Abstracts of Andhra Pradesh for different years and Compendium of Area and Land Use Statistics of Andhra Pradesh (1955-56 to 2004-05). The data pertaining to area, output and prices of different crops is applicable for the state, region and district levels. Rice, jowar, bajra, maize, ragi, bengalgram, redgram, greengram, horsegram and blackgram have been considered as food grains and non-foodgrains consists of groundnut, castor, sesamum, cotton, sugarcane, tobacco, chillies and turmeric. The prices for the year 1980-81 have been taken as the constant prices. The entire time-period is divided into two sub-periods from 1982-83 to 1994-95 and from 1994-95 to 2006-07. Analytical tools such as exponential growth[3] rates and kinked exponential growth[4] rates have been estimated at the state, regional and district levels. These have been used previously by Vakulabharanam, V (2004). Region-wise growth decomposition is computed to know the contributions of different components to growth. At constant prices, the value of output[5] is decomposed into three components - area, yield and cropping pattern.

Exponential growth rates have been computed at state, regional and district levels using the following formula:

Log (output) = a + bt, where

Output is the agricultural output calculated at constant 1980-81 prices

t is the crop year

b is the exponential growth rate and a is the y-intercept

The equation used to compute the kinked exponential growth rates is as follows:

Log (output) $=a+b_1D_1t+b_2D_2t$ where;

a is the common intercept at the breakpoint between the two periods.

D1 is a dummy variable that takes on a value of 1 in the first sub period and a value of 0 in the second sub-period.

D2 is a dummy variable that takes on a value of 1 in the second sub period and a value of 0 in the first sub-period

t is renormalized so that it is 0 at the break point

b1, b2 are growth rates of first and second sub-periods.

2.3 Agricultural Growth Performance in Andhra Pradesh

Table 2.1 presents the results of exponential growth rates at state and regional levels. Kinked exponential growth rates are also presented in table 2.2. The agricultural growth performance of the state during the first sub-period (1983-1995) was 3 percent and it fell to 1.5 percent in the second sub-period (1995-2007) and the growth performance was 2.1 percent for the whole period (Table 2.1). During 1983-1995, the highest output growth rate of 4 percent was recorded by Telangana region and it was more than the state-level growth rate. It declined to 3.1 percent in the second sub-period. In the whole period, 3.4 percent growth was registered. The growth performance of Coastal Andhra was comparatively lower in the years from 1983 to 1995, i.e., 2.3 percent. This further declined to 1.6 percent in the second sub-period. Rayalaseema experienced better performance with 3.7 percent growth rate during first sub-period. But it failed to

sustain its growth and had negative growth rate in the second sub-period. On the whole, output growth rate of Rayalaseema is very poor.

Vakulabharanam, V (2014) has also analysed the growth rates of crop output and observed regional variations at the state level. It has been witnessed that in Telangana, the growth rate of agriculture was buoyed by the expansion in irrigated area, whereas in Coastal Andhra and Rayalaseema, there was only a slight increase. The high growth in Telangana was induced by the rise in the percentage of land irrigated by wells.

The growth performance is determined by taking into account the growth rates of various crops. Therefore, at this juncture, it is quite essential to know which crops have contributed to the deceleration in the second sub-period. Significant changes in agricultural production and productivity in the state were identified and the cropping pattern is dominated by rice, cotton and groundnut (Reddy D N, 2006). During 1970s and 1980s, productivity of rice increased substantially. However, it declined in 1990s. Reddy D N's study (2006) identifies that in addition to food grain cultivation, the state has witnessed the increased cultivation of cotton in Telangana and an increase in area under groundnut cultivation in Rayalaseema. These emerged as important commercial crops since 1980s and have been pushing up the growth performance for a while. Slow growth in rice production, declining area under cotton crop in the early 2000s and volatility in groundnut production due to its vulnerability to monsoons were observed phenomena in dominant crops in 1990s. The poor growth performance

of crops such as rice, cotton and groundnut restricted the growth rate during 90s (Galab S and P. Prudvikar Reddy, 2014). In terms of cropped area, groundnut is the second major oilseed crop grown in Rayalaseema region. The better performance in Rayalaseema region during first sub-period came from the increase in area under groundnut in the Anantapur district. Groundnut cultivation declined in all the other districts of the state. Fluctuation in its production and productivity levels are the major reason behind the negative performance in the 90s (Galab S and P.Prudhivikar Reddy, 2014). Output elasticity in Rayalaseema also declined during the 90s due to poor recharge of ground water (Subrahmanyam S, 2002).

2.4 Agricultural Growth across districts of Telangana

The growth rates of agricultural output of the districts of Telangana in different periods are shown in table 2.3. Hyderabad is excluded from the analysis as the district is purely urban and does not have any agricultural land. The results indicate that the northern districts of Adilabad, Khammam, Karimnagar and Warangal experienced significant growth rates of over 5 percent in the first sub-period. Excluding Adilabad, Mahabubnagar and Medak, growth rates of all the districts declined in the second sub-period. The growth rate of Karimnagar and Khammam decelerated to 2.2 percent and 3.9 percent respectively. Growth rate of Warangal also reduced to 4.1 percent in the second sub-period. For the whole period, Adilabad and Warangal registered the highest growth rates. Nizamabad witnessed a growth rate of 2 percent for the entire period. The growth rates of

southern districts of Ranga Reddy, Mahabubnagar and Nalgonda were below 3 percent. Among the southern districts, Medak attained highest growth of 4.2 percent in the second sub-period and it is 3.8 percent for the whole period. Here, growth performance in the region needs to be explained in terms of growth in irrigated area. The elasticity of output with respect to irrigation in Telangana contributed to the high output growth. Deterioration of tank irrigation resulted in decline of elasticity of output during 1990s (Subrahmanyam S, 2002).

2.5 Agricultural Growth across districts of Coastal Andhra

The growth patterns in districts in Coastal Andhra are also extremely uneven. North coastal districts of Vizianagaram (5 percent), Visakhapatnam (4.7 percent) and south coastal district of Nellore (4.5) showed better performance with 4 to 5 percent growth rates. Srikakulam, East Godavari, West Godavari, Krishna, Guntur and Prakasam had only 2 percent or below 2 percent growth in output in the first sub-period. When compared to the first sub-period, in the second sub-period, growth rates increased in East Godavari, West Godavari, Guntur and Prakasam districts. During 1995-2007, negative growth rates were observed in Vizianagaram, Visakhapatnam, and Krishna districts. For the period as a whole, all the districts showed poor performance of growth rate of 1 percent except Guntur, Prakasam and Nellore which registered 2 percent growth rate (Table 2.5).

2.6 Agricultural Growth across districts of Rayalaseema

Growth rates among the districts of Rayalaseema are also extremely uneven (Table 2.7). First sub-period of 1983-95 witnessed better growth performances in all the districts. The growth rates are as follows: Anantapur 4 percent; Chittoor 3.3 percent; Kadapa 3.2 percent; and Kurnool 4.4 percent. But in the second sub-period, the situation worsened in all the districts with negative growth rates, except Kurnool which registered a growth rate of 2.7 percent. On the whole, there was no growth observed in Chittoor, whereas Kadapa and Anantapur registered negative growth performances. As mentioned earlier, Anantapur is the groundnut district in the region. Volatility in its production levels caused negative growth performance in the district. Only Kurnool district maintained its growth at 2.6 percent for the entire period.

2.7 Growth Decomposition at State and Regional Levels

Since growth of agricultural output is determined by various factors, it is essential to explore the factors that are associated with the variations in growth rates. In the last section, state and regional growth rates have been analysed. In this section we look at the contribution of various components to the growth of agricultural output in Andhra Pradesh by using a decomposition analysis described by Vakulabharanam, V (2004). The first component is the gross cropped area. The second component is the yield effect on the total production. The third component reflects the impact of the changes in cropping pattern.

Growth decomposition was computed in order to quantify the extent to which differences in area, yield and cropping pattern account for the differences in output growth among the three regions and at state level. The results of decomposition of output growth have been presented in table 2.9.

Gross Cropped Area

Gross cropped area[6] is an important determinant. It is necessary to examine as to what extent gross cropped area is responsible for the agricultural growth in Andhra Pradesh. It could be seen from table 2.9 that the growth of gross cropped area declined from 0.3 percent in 1983-95 to -0.2 percent and it was 0.1 during 1983-2007. In the same way, in all the three regions, the role of gross cropped area in determining output growth is marginal. So the contribution of gross cropped area to the output growth is very little. However, growth in cropped area is minimal since most of the land was under cultivation by 1970s (Vakulabharanam, V 2004). Subramanyam and Aparna (2009) points out a deceleration in gross cropped area in the 1990s. Regional analysis of gross cropped area shows rising fallow land in Telangana and Rayalaseema due to unsustainable agricultural practices in these areas (Reddy D N, 2006).

Yield Component

Yield is nothing but production per unit area. Increase in yield is also an important indicator of the pace of agricultural development. The decomposition of output growth across the regions and the state on the whole shows that yield growth is the most important determinant of output growth. This is also evident

from the study of Vakulabharanam, V (2004) which says that the contribution of yield component to the output growth is significant. As is evident from table 2.9, growth rate of yield for the overall period was positive with 1.6 per cent in the state. During the first sub-period, growth rate of yield was 1.7 percent and it increased marginally to 1.8 percent in the second sub-period. The rate of yield growth in Coastal Andhra increased significantly from 0.2 per cent in first sub-period to 2.5 per cent during second sub-period of study. Thus, it indicates that the yield growth rate increased substantially during second sub-period. Rayalaseema yield growth rate was positive at 1.6 percent in the first sub-period, but there was no observable growth in yield in the second sub-period and it indicates that that there was no change in yield growth rate. There was a marginal decline in growth rate of yield in Telangana region from 2.8 percent in the first sub-period to 2.4 percent in second sub-period. It is observed that for the overall period, growth rate of yield was 2.4 percent. These variations could be attributed to several factors at the state and regional levels.

Along with the availability of new inputs, technological innovations such as increased use of tractors are the major reasons for the increased yield at the state and regional levels. Technology is considered as the main contributor to growth as it raises the production to the same level of input use. To raise the productivity of important crops, green revolution technology has helped a lot. The impact of technological developments in terms of introducing new inputs was significant. The input mainly comprises of high yielding seeds, irrigation and chemical fertilisers.

Therefore, with the advent of hybrid varieties of cotton in the state in the early 1980s, production and productivity levels increased. The beginning of 2000s also witnessed a substantial increase in productivity (Reddy D N, 2006). The most noticeable change is in the structure of inputs and the declining trend in traditional inputs. Fertiliser use also expanded at an impressive rate. It was stated that Andhra Pradesh is one of the states with high consumption of chemical fertilisers. The level of intake is found to be higher in the low-rainfall, low-irrigation regions of Rayalaseema and Telangana. Substantial increase in the pesticide consumption in the state was also observed. This has been very high for some of the crops. An analysis of growth in irrigation in Sri Krishna committee report shows that Telangana (113%) witnessed a significant increase in its net irrigated area when compared to Rayalaseema (30%) and Coastal Andhra (55%). It is also evident from the study of Vakulabharanam, V (2004) that the expansion of well irrigation happened primarily through private investment in Telangana.

Cropping Pattern

Cropping pattern is the acreage under different crops. After yield component, cropping pattern is the most significant determinant of output growth. Different regions follow different cropping systems. It has been found that the growth rate of output due to cropping pattern was high during the first sub-period. It has worsened in the second sub-period at the state and regional levels. The growth of output due to cropping pattern in the two sub-periods in most cases was either 1 percent or negative. Reddy D N (2006) observes that diversification (from

low-value to high-value and high-productivity crops) is a factor contributing to agricultural growth. Since 1980s, acreage under oilseeds has increased. It gained momentum especially in Anantapur with the intensification of groundnut cultivation. However, in south Telangana, oilseed growth became stagnant, and it declined in south Coastal Andhra and north Telangana. North Coastal Andhra witnessed a marginal increase. It is interesting to note that between1980 and 2001, the area under cotton cultivation increased by four times in north Telangana. Area under cotton cultivation increased in south Telangana and south Coastal Andhra also. However, the area under cotton cultivation in north Coastal Andhra was very little and decelerated in Rayalaseema. To sum up, yield growth rate is the most important component in rise in production.

2.8 Conclusion

The observed growth performance implies that compared with the earlier period, region-wise and the state as a whole; there are low levels of output growth during the latter period. Inter-district differences in agricultural production were also identified. The agricultural growth performance showed signs of progress during 1980s because of the technological and institutional improvements in the state. Thus, it could be inferred that it is the new production technology which was influential in introducing a breakthrough in agricultural production at state level. This significant growth of agricultural output did not continue in the later period. In fact, a declining trend has been observed in output growth during 1990s. This is due to the fact that the major crops grown in the state such as rice, groundnut and cotton experienced deceleration in their production growth and

contributed to the overall poor performance. Further, public investment in agriculture has declined. Some of the public institutions were closed down or handed over to the private sector. On the other hand, private investment increased in the form of tapping groundwater resources. Although there are regional variations in agricultural growth patterns, it can be concluded that there has been an overall decline in the state's growth performance during 1990s.

TABLES

Growth at Regional and State level

Table 2.1 Exponential Growth Rates at State and Regional level (1983-2007)

(In percent)

Region	1983-1995	1995-2007	1983-2007
Andhra Pradesh	3.0 (0.00)	1.5 (0.00)	2.1 (0.00)
Telangana	4.0 (0.01)	3.1 (0.01)	3.4 (0.00)
Coastal Andhra	2.3 (0.00)	1.6 (0.00)	1.7 (0.00)
Rayalaseema	3.7 (0.01)	-1.9 (0.01)	0.7 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.2 Kinked Exponential Growth Rates at State and Regional Level (1983-2007)

(In percent)

Region	1983-95	1995-2007	1983-2007
Andhra Pradesh	2.9 (0.00)	1.3 (0.00)	2.1 (0.00)
Telangana	3.8 (0.01)	3.0 (0.01)	3.4 (0.00)
Coastal Andhra	2.0 (0.00)	1.3 (0.00)	1.7 (0.00)
Rayalaseema	3.9 (0.01)	-2.4 (0.01)	0.7 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.3 Exponential Growth Rates of Telangana Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Adilabad	5.1 (0.01)	5.7 (0.01)	5.1 (0.00)
Ranga Reddy	3.2 (0.01)	2.1 (0.01)	2.6 (0.00)
Karimnagar	5.8 (0.01)	2.2 (0.01)	4.1 (0.00)
Khammam	5.2 (0.00)	3.9 (0.01)	3.8 (0.00)
Mahabubnagar	2.3 (0.02)	3.4 (0.01)	2.7 (0.00)
Medak	3.3 (0.01)	4.2 (0.01)	3.8 (0.00)
Nalgonda	2.7 (0.01)	1.1 (0.02)	1.4 (0.00)
Nizamabad	1.3 (0.01)	0.9 (0.01)	2.0 (0.00)
Warangal	5.9 (0.01)	4.1 (0.01)	5.0 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.4 Kinked Exponential Growth Rates of Telangana Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Adilabad	4.4 (0.01)	5.5 (0.01)	5.1 (0.00)
Ranga Reddy	3.1 (0.01)	2.0 (0.01)	2.6 (0.00)
Karimnagar	5.9 (0.01)	2.1 (0.01)	4.1 (0.00)
Khammam	4.1 (0.00)	3.3 (0.01)	3.8 (0.00)
Mahabubnagar	2.5 (0.02)	2.9 (0.01)	2.7 (0.00)
Medak	3.3 (0.01)	4.1 (0.01)	3.8 (0.00)
Nalgonda	2.3 (0.01)	1.4 (0.02)	1.4 (0.00)
Nizamabad	2.1 (0.01)	1.9 (0.01)	2.0 (0.00)
Warangal	5.6 (0.01)	4.2 (0.01)	5.0 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.5 Exponential Growth Rates of Coastal Andhra Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Srikakulam	2.6 (0.02)	1.4 (0.01)	1.1 (0.00)
Vizianagaram	5.0 (0.01)	-1.1 (0.01)	1.6 (0.00)
Visakhapatnam	4.7 (0.02)	-1.3 (0.01)	1.9 (0.00)
East Godavari	1.8 (0.01)	2.1 (0.00)	1.8 (0.00)
West Godavari	1.3 (0.00)	2.0 (0.00)	1.7 (0.00)
Krishna	1.7 (0.00)	-1.0 (0.01)	0.6 (0.00)
Guntur	2.0 (0.00)	3.6 (0.01)	2.3 (0.00)
Prakasam	2.6 (0.01)	3.6 (0.01)	2.1 (0.00)
Nellore	4.5 (0.00)	1.5 (0.01)	2.2 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.6 Kinked Exponential Growth Rates of Coastal Andhra Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Srikakulam	1.5 (0.02)	1.9 (0.01)	1.1 (0.00)
Vizianagaram	4.4 (0.01)	-1.5 (0.01)	1.6 (0.00)
Visakhapatnam	4.7 (0.02)	-1.31 (0.01)	1.9 (0.00)
East Godavari	1.6 (0.01)	2.0 (0.00)	1.8 (0.00)
West Godavari	1.1 (0.00)	2.3 (0.00)	1.7 (0.00)
Krishna	2.0 (0.00)	-0.71 (0.01)	0.6 (0.00)
Guntur	1.6 (0.00)	2.8 (0.01)	2.3 (0.00)
Prakasam	1.7 (0.01)	2.5 (0.01)	2.1 (0.00)
Nellore	3.7 (0.00)	1.5 (0.01)	2.2 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.7 Exponential Growth Rates of Rayalaseema Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Chittoor	3.3 (0.01)	-4.3	0.0 (0.00)
Kadapa	3.2 (0.01)	-1.2	-0.1
Anantapur	4.0 (0.01)	-6.0	-0.4
Kurnool	4.4 (0.01)	2.7 (0.01)	2.6 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.8 Kinked Exponential Growth Rates of Rayalaseema Districts (1983-2007)

(In Percent)

District	1983-1995	1995-2007	1983-2007
Chittoor	4.0 (0.01)	-3.9	0.0 (0.00)
Kadapa	2.9 (0.01)	-3.1	-0.1
Anantapur	5.2 (0.01)	-6.1	-0.4
Kurnool	3.6 (0.01)	1.5 (0.01)	2.6 (0.00)

Note: standard errors in parentheses corrected to two decimal points

Table 2.9 Growth Decomposition at State and Regional level: (In Percent)

Region	Area/ Yield/ Cropping Patter/ Growth Rate	1983-1995	1995-2007	1983-2007
AP	Area	0.3 (0.00)	-0.2 (0.00)	0.1 (0.00)
	Yield	1.7 (0.00)	1.8 (0.00)	1.6 (0.00)
	Cropping pattern	1.0 (0.00)	0.0 (0.00)	0.2 (0.00)
	Growth Rate	3.0 (0.00)	1.5 (0.00)	2.1 (0.00)
Telangana	Area	-1.0 (0.00)	0.7 (0.00)	-0.1 (0.00)
	Yield	2.8 (0.00)	2.4 (0.00)	2.4 (0.00)
	Cropping pattern	1.6 (0.00)	-0.2 (0.00)	0.6 (0.00)
	Growth Rate	4.0 (0.01)	3.1 (0.01)	3.4 (0.00)
Coastal	Area	1.3 (0.00)	-0.8 (0.00)	0.1 (0.00)
	Yield	0.2 (0.00)	2.5 (0.00)	1.2 (0.00)
	Cropping pattern	0.2 (0.00)	0.2 (0.01)	0.3 (0.00)
	Growth Rate	2.3 (0.00)	1.6 (0.00)	1.7 (0.00)
Rayalaseema	Area	0.9 (0.00)	-0.8 (0.00)	0.1 (0.00)
	Yield	1.6 (0.00)	0.0 (0.01)	0.1 (0.00)
	Cropping pattern	0.3 (0.00)	0.4 (0.00)	0.3 (0.00)
	Growth Rate	3.7 (0.01)	-1.9 (0.00)	0.7 (0.00)

Note: standard errors in parentheses corrected to two decimal points

End Notes

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[1] The choice of time period 1982-83 makes sense of rapid commercialisation that was observed in the state during the early 1980s. During 1980-83, high growth rates have been registered.

[2] The period 1994-95 witnessed the liberalisation of agricultural markets and trade in agricultural commodities.

[3] Exponential rates of growth are very convenient for comparison of growth between two periods. It seems more relevant to analyze the movement of agricultural output in terms of exponential rather than other growth rates.

[4] To eliminate discontinuity between sub-periods while comparing sub-period growth rates, kinked exponential model is better.

[5] The output measure and agricultural output value represent the price-weighted sum of output for 18 crops

[6] Gross Cropped Area represents the total area sown once and/or more than once in a particular year, i.e., the area is counted as many times as there are sowings in a year. This is also known as total cropped area or total area sown.

CHAPTER 3

REGIONAL VARIATIONS OF FOOD AND NON-FOODGRAIN SUPPLY RESPONSES OF FARMERS IN ANDHRA PRADESH

3.1 Introduction

The regional variation observed in growth performance of agriculture in the previous chapter illustrates a deceleration in growth rate of output during liberalisation period. The decelerating growth performance across the regions and at the state level specifies that it has been influenced by the reform process of the early 1990s. Hence, in order to understand the growth puzzle, an analysis of supply responses of farmers is inevitable. The changes in the crop-sector reflect the decision-making process of the farmers. The agricultural decisions of the farmers are influenced by different factors in different regions. The study of supply responses at regional level is essential as responses can show variations. This chapter makes an attempt to analyse the supply responses of farmers in the pre and post liberalisation periods[1]. Farmers' supply response has been estimated for food and non-foodgrains. Therefore, the main concern of this chapter is to examine the regional variations in food and non-foodgrain acreage responses in the three regions of Andhra Pradesh. This chapter is ordered in the following manner:

Section 2 discusses the model and variables used for supply response estimation. Section 3 gives the results of estimations followed by conclusions in section 4.

The factors which affect supply responses in different studies vary and regional differences ranging from technological and institutional aspects[2] to micro and macro level elements come into play. However, in the present chapter, an attempt has been made to analyse the intra-regional supply responses of farmers for food and non-foodgrains in Andhra Pradesh during the period 1970-2007[3]. The analysis has been restricted to regional variations of food and non-foodgrain supply responses and does not take into account the state level indicators.

3.2 The Model

Supply elasticities of food and non-foodgrains in pre and post liberalisation periods are estimated by using the model modified by Vakulabharanam, V (2004) for Telangana which uses area adjustment model. The general Nerlovian model (see Vakulabharanam,V 2004) can be written in the form of the following equation:

1. $\mathbf{A_t^d = b_1 + b_2 P_t^e + b_3 Z_t + u_t}$

A_t^d = desired area at time t

P_t^e = expected prices

Z_t = exogenous variables at time t

u_t = error term

First equation states the factors influencing desired acreage. Long run supply elasticity is represented by b_2.

2. $\mathbf{A_t - A_{t-1} = \delta (A_t^d - A_{t-1}) + v_t}$

A_t = area at t

A_{t-1} = acreage of crops in year $t-_1$

A_t^d = desired area in time t

v_t = error term

Equation (2) is the partial supply responses of crops with area adjustment process.

3. $\mathbf{P_t^e = \gamma P_{t-1} + (1-\gamma) P_{t-1}^e + w_t}$

P_t^e = expected price

P_{t-1}^e = expected price in year $t-_1$

γ = adaptive expectations coefficient

w_t = error term

Equation (3) represents the adaptive expectations model. Unobserved variables $\mathbf{A_t^d}$ and $\mathbf{P_t^e}$ are eliminated and equation (4) was arrived at by substituting equations (1) and (3) in (2).

4. $\mathbf{A_t = c_1 + c_2 P_{t-1} + c_3 A_{t-1} + c_4 A_{t-2} + c_5 Z_t + c_6 Z_{t-1} + e_t}$

A_t = actual area at time t

P_{t-1} = prices lagged by one year

A_{t-1} = area lagged by one year

A_{t-2} = area lagged by second year

Z_t = other observed, exogenous factors affecting supply at time t

Z_{t-1}= other observed, exogenous factors affecting supply at time t-1

e_t = error term

In equation (4), $\mathbf{c_2}$ indicates short-run supply elasticity**,** by using the estimated coefficients in equation (4) structural parameters b_1, b_2, b_3, δ, and γ can be solved. Since using non-linear maximum likelihood estimation model leads to moving

from six parameters to five, there is a non-linear constraint in the model for estimation. In the modified model, expected price is last year's price. This was observed through a field survey in Telangana (Vakulabharanam, V 2004). Price expectations coefficient value equals 1. Therefore, the modified model in the form of equation is as follows:

$$\mathbf{A_t = c_1 + c_2P_{t-1} + c_3A_{t-1} + c_4Z_t + e_t}$$

Where A_t = actual area at time t

P_{t-1}= prices lagged by one year

A_{t-1}= area lagged by one year

Z_t = exogenous factors affecting supply at time t

e_t = error term

Structural parameters can be solved as $\delta = 1\text{-}c_{3:}\ b_{1=}\ c_{1/}\ \delta$; $b_{3=}\ c_{4/}\ \delta$

Residuals = $\delta u_{t+}\ v_t$

Appropriate exogeneous variables (Z_t) that influence supply elasticities will be presented later.

3.3 Data

The data sources used for the estimation of supply response are taken from various issues of Statistical Abstracts published annually by Directorate of Economics and Statistics, Andhra Pradesh. Data for different variables such as actual planted area, nominal prices of various commodities are taken from these abstracts. The empirical analysis covers the period from 1970[4] to 2007. Data has been transformed to calculate different variables. Methods used for this transformation are explained below:

The Area Variable

Supply response is the response of the acreage to price and non-price factors. It is the planted area that can be controlled by the farmers as opposed to output, which cannot be controlled. So, planted area is the response variable to changes in these variables. Regarding the response variable through which the farmers' decisions are reflected, some researchers namely Askari and Cummings (1976), Behrman (1998) and Vakulabharanam, V (2004) argue that area under the crop cultivation is a better proxy for supply response estimations. Due to these reasons, in the present study, area has been used as the indicator of supply response.

The Price Variable

Price is one of the important variables which influence the production decisions of the farmers. Since farmers respond to the prices of the competing crops, relative prices have been used instead of nominal prices in the analysis. The role of relative price in affecting the decision-making process of farmers was well supported by literature on supply response studies such as Vakulabharanam's study (2004) based on the field survey in Telangana region. The relative price of a crop can be calculated by dividing the nominal prices with the nominal price index of competing crops. Laspeyeres price index[5] is used to compute the prices of crop aggregates.

The Subjective Risk Variable

The risk variable can be calculated through the coefficient of variation of last three years' prices. To know the variability of prices, farmers roughly remember previous three years' prices (Vakulabharanam, V 2004).

The Expected Yield Variable

Expected yield influences the decisions of producers regarding resource allocation such as use of inputs and technology. Yield levels also show the influence of other factors such as rainfall. The yield variable is calculated through the index developed by Vakulabharanam, V (2004). The expected yield variable is used for the estimation. Expected yield is nothing but last year's yield.

The Liberalisation Dummy

To capture the structural shift due to the liberalisation policies in supply response estimation, the liberalisation dummy variable[6] is used. This variable gives the impact of liberalisation policies on agriculture since 1995. So the values of 1 for the period from 1995 to 2007 and 0 for the other years have been given to liberalisation dummy variable.

Structural Break Variables

The impact of structural break can be explained through variables such as liberalisation price, liberalisation, and liberalisation risk. These variables are

helpful in capturing the structural break due to liberalisation policies in the supply response estimations.

3.4 Estimation of Supply Response

Supply responses of food and non-food grains have been estimated for three regions of Andhra Pradesh. Ordinary Least Squares method was used for estimating the parameters. To correct for autocorrelation in the model because of the presence of the lagged variables, Cochrane - Orcutt procedure is used. Cochrane-Orcutt is an algorithm for estimating a time series linear regression in the presence of auto-correlated errors.

3.5 Estimation of Food Grain Supply Response in Telangana

Table 3.1 shows the supply response estimation results of food grains in Telangana. Lagged area, liberalisation dummy and liberalisation price variables are highly significant at 1 percent. The sign of the coefficient liberalisation dummy has a reasonable explanation of shift in the food-cropping pattern from food grain crops to non-foodgrain crops (Vakulabharanam,V 2004). Liberalisation price has a positive sign indicating that as food grain prices rise, farmers shift to food grains. The coefficient of lagged area significance implies that last year's area allocation has significant impact on the current-year area. The other variables such as yield and risk variables do not have any significant impact on acreage decisions of food grain crops.

3.6 Estimation of Non-Foodgrain Supply Response in Telangana

The non-foodgrain acreage response estimation results are presented in table 3.2. Price and lagged area are significant at 1 percent. While the overall effect of price on acreage is positive for the whole period, surprisingly, non-foodgrain price response shows that farmers responded negatively during liberalisation. Liberalisation dummy is also significant and positive. This indicates that even the falling non-foodgrain prices induced farmers to increase the area allocated to these crops in the liberalisation period. The coefficients of other variables such as yield and risk factors are insignificant.

3.7 Estimation of Food Grain Supply Response in Coastal Andhra

Results of food grain supply response elasticities in Coastal Andhra are presented in table 3.3 indicating that coefficients of all the variables are insignificant. The insignificance of these variables proves that the food grain acreage response is influenced by variables other than the variables in the estimation. As Coastal Andhra is a better off region with respect to resources, institutional mechanisms work well in the region in the form of better irrigation facilities and institutional credit facilities. This trend was observed in the field survey conducted in the region.

3.8 Estimation of Non-Foodgrain Supply Response in Coastal Andhra

Table 3.4 gives the results of non-foodgrain supply response estimations in Coastal Andhra. The coefficient of lagged area is significant. This indicates that previous year's area allocation has significant impact on present year's acreage decision. Significance of price coefficient implies that farmers are responding to price unlike in the case of food grains. So, for non-foodgrains, lagged area and price seem to be important for acreage allocation decisions of farmers. The other variables do not seem to be significant in area allocation.

3.9 Estimation of Food Grain Supply Response in Rayalaseema

It can be observed from table 3.5 that the regression coefficients with respect to price and lagged variables are statistically significant. The price elasticities obtained for food grains are positive. On the other hand, elasticities of yield and other risk factors appear to be insignificant. During liberalisation, there is evidence of a negative supply response. Liberalisation policies do not have any impact on the food grain acreage and it is indicated by the insignificance of yield and other risk variables (Table 3.5).

3.10 Estimation of Non-Foodgrain Supply Response in Rayalaseema

In the case of non-food crop acreage response, the lagged acreage and price are significant (Table 3.6). This implies that last year's area has a significant impact on current year area allocation decision. The significance of price coefficient implies that farmers are responsive to price variable. Interestingly,

non-foodgrain acreage is negatively responsive to liberalisation price. It is similar to the pattern observed in Telangana non-food acreage response. This suggests that highly uncertain rainfall and weather conditions in the region seems to determine the acreage decision. Both yield and risk factors are not significant. Rather, the supply elasticities for non-foodgrains reveal that in spite of the fall in prices, there was an increase in area under non-foodgrain cultivation during liberalisation period.

3.11 Conclusion

An attempt has been made to estimate the food and non-foodgrain supply responses across the three regions in Andhra Pradesh. The inter-regional analysis of supply response estimations shows considerable diversity among regions and across crops. Present application of the model reveals some significant results among regions for non-foodgrains. From the supply response analysis, it can be inferred that price is a negatively significant factor in Telangana indicating that the fall in non-foodgrain prices result in an increase in the area under non-foodgrains during liberalisation period. The results of Rayalaseema supply response estimations of non-foodgrains during liberalisation period also indicate the negative relationship between non-foodgrain acreage and price. This shows that price components in Telangana and Rayalaseema play a negatively significant role in non-food acreage decision of farmers. The result of the empirical findings in Coastal Andhra further reveals positively insignificant price response during liberalisation period for non-foodgrains. The next four chapters strive to explain the factors that underlie this supply response pattern.

TABLES

TELANGANA

Table 3.1: Food Grain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	2.49**	1.21	2.04	-1.94	1.24	.56
lnprice	.10	.18	.55	.11***	.19	2.95
lnlag1	.38***	.16	2.38	.47	.15	-.36
lnyield	-.06	.10	-.65	-.04	.11	.72
lnrisk	.04	.04	.87	.03***	.05	-3.17
Lib	-6.92***	2.16	-3.19	-6.97***	2.20	3.25
libprice	1.75***	.52	3.32	1.75***	.53	-2.68
librisk	-.21	.07	-2.91	-2.0	.07	1.55
R – squared		.70		.75		
Durbin-Watson		2.07		1.99		

***-significant at 1%; **-significant at 5%; * - significant at 10%

Table 3.2: Non-Foodgrain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	-2.46**	1.21	-2.03	-2.25*	1.31	-1.71
lnprice	.67***	.26	2.56	.64***	.27	2.36
lnlag1	.62***	.12	5.14	.59***	.13	4.58
lnyield	.15	.13	1.17	.16	.13	1.15
lnrisk	.08	.07	1.13	.08	.07	1.19
Lib	5.68*	2.92	1.94	6.28**	3.02	2.07
libprice	-1.21*	.63	-1.90	-1.34**	.66	-2.03
librisk	-.00	.10	-.01	-.0	.10	-.009
R – squared		.83		.80		
Durbin-Watson		1.86		1.95		

***-significant at 1%; **-significant at 5%; * - significant at 10%

COASTAL ANDHRA

Table 3.3: Food Grain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	5.46**	2.72	2.00	7.32***	2.47	2.96
Lnlag1	-.11	.20	-.55	-.08	.21	.40
lnprice	-.01	.29	-.05	-.53*	.27	-1.91
lnyield	-.08	.20	-.40	-.005	.20	-.02
lnrisk	.00	.04	.17	.007	.04	.14
Lib	-1.21	3.71	-.32	-4.68	4.48	-1.04
libprice	.30	.89	.34	1.08	1.07	1.01
librisk	-.00	.06	-.04	.05	.06	.89
R – squared		.04		.20		
Durbin-Watson		1.95		1.66		

***-significant at 1%; **-significant at 5%; * - significant at 10%

Table 3.4: Non-Foodgrain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	-1.10	1.39	-.78	1.24	1.30	-.95
lnprice	.40*	.22	1.82	.40*	.22	1.80
lnlag1	.65***	.14	4.45	.72***	.13	5.26
lnyield	.18*	.09	1.85	.14	.10	1.43
lnrisk	.01	.03	.44	.01	.03	.51
Lib	-.45	2.45	-.18	.46	2.48	-.18
libprice	.06	.54	.12	.07	.54	.13
librisk	.03	.07	.42	.02	.07	.39
R – squared		.56		.66		
Durbin-Watson		2.20		2.08		

***-significant at 1%; **-significant at 5%; * - significant at 10%

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Table 3.5: Food Grain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	-.64	.99	-.64	-1.38*	.71	-1.94
lnprice	.43***	.16	2.68	.34***	.10	3.17
lnlag1	.66***	.14	4.64	.89***	.09	9.62
lnyield	.05	.12	.42	.11	.09	1.30
Lnrisk	.00	.03	.08	-.04*	.02	-1.72
Lib	2.78	2.03	1.36	2.17*	1.17	1.84
libprice	-.69	.49	-1.39	-.58**	.28	-2.01
librisk	.02	.04	.41	.06*	.03	1.86
R – squared		.915		.97		
Durbin-Watson		2.84		1.94		

***-significant at 1%; **-significant at 5%; * - significant at 10%

Table 3.6: Non-Foodgrain Supply Response:

Dependent variable: logarithm (Planted area)

	OLS			Cochrane-Orcutt		
	Coefficient	SE	T	Coefficient	SE	t
Constant	-1.23	1.24	-.98	-1.37	1.29	-1.06
lnprice	.68***	.25	2.70	.68***	.26	2.62
lnlag1	.53***	.16	3.20	.55***	.17	3.24
lnyield	-.00	.14	-.00	.003	.15	.02
lnrisk	.05	.07	.67	.05	.08	.66
Lib	5.25**	2.57	2.04	5.03*	2.68	1.87
libprice	-1.13**	.53	-2.10	-1.07*	.55	-1.93
librisk	.01	.08	.19	.01	.09	.13
R – squared		.73		.75		
Durbin-Watson		1.98		1.95		

***-significant at 1%; **-significant at 5%; * - significant at 10%

End Notes

[1] Pre-liberalisation period in agriculture witnessed the impact of new agricultural technology which raised yield and growth of agricultural output levels throughout the regions in India. Post-liberalisation period led to significant changes with opening of the economy to market forces in the agricultural sector in India leading to a visible deceleration of agricultural growth.

[2] Technological aspects include high-yielding varieties of seeds, fertilizers, pesticides, irrigation, farm machinery etc., and institutional aspects such as land, labour, marketing, credit, research and extension.

[3]Supply response has been analyzed for the period 1970-71 to 2006-07. This period is further divided into two sub-periods: pre-liberalisation period (1970-71 to 1994-95) and post-liberalisation period (1994-95 to 2006-2007).

[4] The time period 1970-71 has been chosen since it witnessed the spread of green revolution. The initial period of green revolution, starting from 1970 led to a widespread growth of agricultural sector all over the state.

[5] Laspeyers price index uses base period quantities as weights. It measures the changing value of a group of commodities due to price change.

[6] Dependent variable in regression analysis is also influenced by the qualitative variables. In that case dummy variable can be used. Dummy variable quantifies the qualitative variables by indicating the value of 1 (presence of the attribute) or 0 (absence of attribute).

CHAPTER 4
SUPPLY RESPONSE OF FARMERS IN COASTAL ANDHRA: MICRO-LEVEL ISSUES

4.1 Introduction

In the previous chapter, an attempt has been made to estimate the supply response of food and non-foodgrains crops in Coastal Andhra Pradesh. This chapter gives the socio-economic profiles and agrarian features which determine the supply response of farmers in Coastal Andhra region at micro level. Due to the highly productive agricultural sector, Coastal Andhra region is prosperous and is considered as the granary of South India. The contribution of agriculture to GDP in Coastal Andhra is about 29 percent (Amarender Reddy A, 2011) highest when compared to the other two regions. In terms of per capita income, i.e., both agricultural and non-agricultural income, Coastal Andhra ranks the highest among the regions. The development of agriculture in this region could be attributed to the higher investment in irrigation and favorable government policies[1]. The region has been provided with better resource endowments and there are considerable public and private investments in the agriculture sector. Better resource endowments and irrigation system facilitated the grabbing of benefits of Green Revolution[2] and commercialization process. The development of irrigation facilities enhanced the productivity of the three major crops, paddy, groundnut and cotton.

Despite being highly mechanized, the region has the highest employment-generation capacity since it is a highly productive region. This has been proved by the fact that it supports majority of the agricultural labourers. The flow of credit[3] from formal credit institutions has become advantageous to the Coastal Andhra region compared to other regions. On the whole, many developmental indicators of Coastal Andhra reveal that other regions of the state are lagging far behind.

This chapter is devoted to examining, based on the field survey, the role played by the factors in determining supply response. Guntur district from Coastal Andhra Region was specially selected for the study. Field study was conducted in Mandepudi village of Amaravati mandal. Guntur boasts one of the largest centers of chilly and tobacco trade in this region.

The remainder of this chapter is divided into four sections. Section 2 begins with description of the agrarian profile of the field in terms of demographic characteristics and structure of agriculture. Section 3 examines socio-economic profile of sample households. Section 4 details the institutional structure of agriculture in terms of land use, cropping pattern, credit institutions, crop yields, marketing, structure of employment and agricultural wages. Section 5 provides conclusion.

4.2 **Brief Agricultural Profile of the selected district**

Land utilization details of the district shows that the total geographical area is 11 lakh, 39 thousand hectares. Gross cropped area is 7 lakh, 96 thousand hectares and net area sown is 6 lakh, 11 thousand hectares. Area sown more than

once is 1 lakh, 85 thousand hectares. Cropping intensity of the district is 1.30. Actual rainfall of the district is 695.7 mms per year (Districts at a glance 2010), and normal rainfall is 853.0 mms per year. The two major irrigation projects in the district are Old Krishna Ayacut[4], now renamed as Prakasam Barrage with an ayacut of 2,02,032 hectares and Nagarjuna Sagar[5] Project with an ayacut of 2,54,583 hectares. Both the projects have been constructed on river Krishna. A medium-size irrigation channel named Guntur Branch Canal (GBC) having an ayacut of 10823 hectares and tanks, filter points, tube wells etc., are other sources of irrigation. The soil in general is very fertile and major soil types are black cotton, red loamy and sandy loamy. Black cotton soil covers 72 percent; red soil covers 17 percent; coastal sandy soils account for 9 percent; and alluvial soil is present in about 2 percent of the total area in the district. The predominant crops grown in the district are paddy, jowar and bajra among cereals; blackgram, greengram and redgram among pulses; and cotton, chillies, turmeric and tobacco among non-foodgrain crops. The area under food crops is 36.92 lakh hectares and under non-foodgrain crops is 19.05 lack hectares (Statistical Abstract 2009). A research center has been established in Laam near Guntur for the development of quality seeds.

4.3 Agricultural Profile of the Surveyed Village

Field survey was conducted in Mandepudi village of Amaravati mandal. This village is 30 kms away from district headquarters. Agriculture is the predominant occupation of the village. Self Help Groups[6] are functioning in the village. Village has one anganwadi centre[7] and one primary school. The

educational needs of the school-going children are being served by the Zilla Parishad high school in the village. Children of this village and those of nearby villagers study in this school. The predominant crops grown in the village are paddy, chillies and cotton. The main source of irrigation is canal.

4.4. Socio-Economic Profile of Sample Farm Households

Farm size-wise Distribution of Sample Households

Farm size-wise distribution of the total sample households is furnished in Table 4.1. They are categorized[8] into 5 groups. Out of the total sample households, 48 percent are marginal farmers having below 2 acres of land. Highest number of households falls in the category of farmers having 1-2 acre or smaller than 1-acre landholdings. Another 26 percent are small farm households which consist of 2-4 acres of landholding. About 12 percent are semi-medium farmers who possess 4-9 acres of land. Medium farmers comprise 10 percent and have 9-24 acres of land. Large farmers constitute only 4 percent and have 25 or above 25 acres of land.

Caste-wise Distribution

Major caste groups in the village are Other Caste (OC), Backward Caste (BC), Scheduled Castes (SC) and Scheduled Tribes (ST). Those who do not fall under these groups such as Muslims are categorized as Others. About 48 percent of the households belong to Other Castes; 10 percent to Backward Caste; 18 percent to Scheduled Castes; 8 percent to Scheduled Tribes and others make up 16 percent. OC consists of Kamma community and BC consists of Mangala and

Jangala communities. SC category contains mala and Madiga communities. ST refers to Yerukula community. On the whole, OC community people dominate all the farm categories. This shows that land ownership is mainly concentrated with OC communities (Table 4.2).

Housing Structure

It has been observed that 95 percent of the families of the agricultural households are residents of village in the study area. Around 5 percent of the families have migrated to urban areas. Housing particulars such as ownership, type of structure were collected from the sample households. About 82 percent of the sample families live in pucca houses, indicating that better housing structure exists in the village. 10 percent have semi-pucca houses. 8 percent of households have kutcha houses (Table 4.3).

Family Size Composition

Table 4.4 gives the family composition details of sample households. About 48 percentage of households have 4-member families. Around 22 percent of households have five family members.

Age Group

For the purpose of the present study, 3 broad categories of age groups have been considered. Farmers within 21-40 years of age group make up 30 percent and those who are between 41-60 years constitute 62 percent. Farmers above 60 years of age account for 8 percent only (Table 4.5).

Literacy

The literacy levels of farmers are given in Table 4.6. The level of illiteracy among marginal farmers is high. Around 38 percent of the total surveyed households are illiterate. About 30 percent of the households have primary schooling. Around 30 percent have been educated up to secondary level and 2 percent have higher secondary-level education. It was also found that children from all castes study in the government school in the village.

Occupation

Nearly 90 percent of the households depend on farming and related activities. Field data (Table 4.7) reveals that most households depend on agriculture for livelihood. While majority of them farm their own land, there are considerable number of households that combine agricultural wage work and cultivation of leased land. However, about 10 per cent of them indulge in secondary occupations such as electrical work, pump set repairing, tractor driving, and so on.

Monthly Food Expenditure

Composition of food expenditure varies across income. Income is an important determinant of expenditure patterns. The food expenditure patterns across farm groups are presented in Table 4.8. Total monthly food expenditure of farm households ranges from below Rs 2000/- to Rs 8000/-. Majority of the farm group is in the expenditure range of Rs 4000/- to Rs 5000/- of which, the proportion of semi-medium farmers is high. It is followed by large and medium

farmers. Most of the marginal and small farmers' food expenditure ranges between Rs 2001-3000/- and Rs 4001-5000/-. Only 8 percent of the total number of farm households spend Rs 7001-8000/-.

Annual Non-food Expenditure

The non-food expenditure of farm household categories is presented in Table 4.9. The annual non-food expenditure across farm household categories with the relative contribution of various items has been presented. Substantial differences exist between farm households in their non-food expenditure. The expenditure incurred on education by marginal and small groups are 2.1% and 10.4% respectively. For semi-medium and medium farm groups, percentages of expenditure on education are 3.2 and 2.6 respectively. Medical expenditure of marginal- and small-farm groups are the highest. Expenditure on clothing is also high among small and marginal farm categories. For alcohol and other intoxicants, marginal farmers spend a relatively larger proportion (22.2 percent) of their incomes. For social activities, small farmers spend less than farmers belonging to other categories. The data indicates that currently, small and marginal farmers are forced to spend more on health, children's education and transport.

Livestock

Livestock sector is emerging as a crucial component of agriculture in rural areas. In Table 4.10, the percentage of households having livestock, namely sheep, goats and poultry, along with their percentages per farm category have

been presented. Size of landholding is an important determinant of the ownership of livestock. In terms of percentage and ownership composition of livestock, there exists a substantial variation across different landholding sizes. Positive relationship was observed between the percent of the agricultural households possessing milch animals and farm size. The percentage of households having milch animals increases as the farm size increases from marginal to large. Availability of fodder from one's own land is the main determinant of the ownership pattern of milch animals. Goats are popular (4.5 percent) among marginal, small and semi-medium farmers and the ownership percentages are 3.1, 9.1 and 33.3 respectively. Poultry population is found only in marginal and small landholdings. Poultry accounts for 52.2 per cent of the total livestock population.

Farm Implements

Although it displaces labor, mechanization of agriculture is an important element in achieving high levels of productivity since it reduces the time and cost for various farm operations. Table 4.11 presents the various farm implements owned across farm groups. Medium and large farmers own tractors. Hiring the services of tractor is common to small and marginal farmers. Majority of the farmers own sprayer. They possess different types of sprayers. This indicates the rampant use of fertilisers and pesticides. These sprayers are also given on subsidy. The percentages of sprayers possessed by the total sample are 42.4 percent, 29.6 percent, 31.3 percent, 26.3 percent and 10.5 percent for small, marginal, semi-medium, medium and large holdings respectively. After sprayer, major chunk of

the all the categories of farmers have electric motors. Only 14.8 percent of small; 6.3 percent of semi-medium; and 5.3 percent of medium farmers own bullock carts indicating that its usage is very less. Percentage of farmers owning ploughs is also very low among all categories. 12.5 percent of semi-medium farmers and 5.3 percent of large farmers have pump sets. Simple and most-frequently owned tools such as sickles, baskets, and pickaxes were the other implements owned by all the farm groups.

4.5 Agro-Economic Analysis of Sample Farm Households

Average Size of Land Holdings

In Table 4.12, land ownership details of sample farm households are presented. The total farm area in the sample is 262 acres. Total area owned by marginal farm category is 15.8 percent and average size of holding is 1.7 acres. Small farm households own 17.2 percent of land with average size of holding at 3.5 acres. Land ownership by the semi-medium holdings is 14.7 percent and 6.4 acres is the average size of holding. Major share of area is owned by medium farmers in the total sample and it comprises 28.6 percent and the average holding size is 15 acres. Though the percentage of large farmers in the sample is only 4 percent, the area owned by them is 23.7 percent and 31 acres is the average size of land holding.

Tenure Type

It has been observed from Table 4.13 that 50 percent of the farmers cultivate their own land and 28 percent of the farmers combine their own and leased land for cultivation. With the enhancement of irrigation facilities, farmers have started cultivating their entire land. So leased land accounts only for 22 percent of the total sample.

Sources of Irrigation

Irrigation plays a significant role in determining the crop choice. Canal irrigation is predominant in the village. The village is a lift-irrigated area of canal water. Irrigation equity among farm groups has been observed. All categories of farms have access to canal irrigation (Table 4.14).

Acreage under Food and Non-Foodgrain crops

Table 4.14 represents the area allocated to food and non-food grain crops by each farm category. The highest percentage of area allotted to non-foodgrain crops is by semi-medium farmers. It has been observed that marginal farmers have allotted more area (83.1 percent) to non-foodgrain crops compared to large farmers. Large farmers have allotted 35.5 percent of area to foodgrain crops. Area allocated to food crops by marginal farmers accounts for 16.9 percent. One notable feature of the cropping pattern is the dominance of non-foodgrain crops in all farm categories and much more so in marginal farmers.

Crops Grown

In Kharif season, paddy and cotton are the main crops while Rabi season is dominated by chillies. Non-food crops are given more importance by all the categories of farmers. Emergence of commercial crop cultivation among marginal and small groups can be attributed to irrigation and increased access to non-institutional credit. The acreage under chillies constitute 34 percent, of which major share is cultivated by marginal farmers followed by small farmers. A combination of paddy, chillies and cotton is grown by 24 percent of small, semi-medium and medium farmers and large farmers. About 20 percent of farmers raise cotton and chillies of which major contribution is by large farmers. A negligible 2 percent of farmers are found to be growing only cotton. As far as paddy is concerned, the percentage is 8 percent. However, chilli is the major crop irrespective of the sizes of holdings in the village. Only a few farmers have gone for other crops such as paddy and cotton. Large holdings grow different crops simultaneously whereas small and marginal farmers have to depend on a single crop at any given time (Table 4.15).

Sources of Credit

The costs of package of inputs have increased substantially and it has escalated the expenses. In Table 4.16 the details regarding different sources are presented. All farmers across the categories of holdings have borrowed both from institutional and non-institutional sources. Non-institutional sources emerge as an important source of credit for a substantial number of households. Among non-

institutional sources, the most common sources are commission agents, followed by fertilizer dealers, relatives, gold loan, other big farmers and friends. Major portion of marginal farmers procure credit from commission agents. Majority of the semi-medium, medium and large farmers avail gold loan.

Purpose of Credit

In Table 4.17, the percentage of households availing credit for different purposes is presented. In almost all the cases, money was borrowed for a combination of different reasons. The various purposes reported are agriculture, health and education, purchasing livestock, marriage and to repay debts. About 70.8 percent of agricultural households take loans for agricultural purposes and 1.6 percent for purchase of livestock. Around 11.8 percent take loans for consumption and very few farmers take loans for other purposes. These percentages show a logical correlation between credit and size of landholding of the farmer.

In Table 4.18, the average amount of credit availed by households are presented. The average amount of loan availed by an agricultural household increases according to the increase in farm size. As per the field survey conducted for the year 2011-12, the average loan was Rs 74,348 for a marginal farmer and Rs 5,85,000/- for a large farmer. The outstanding loans (Table 4.19) of the farmers range from Rs 68,478/- for a marginal farmer to Rs 4,97,500/- for a large farmer.

Cost of Cultivation

The cost of cultivation of crops is presented along with the components of cost and percentages of their contributions to the overall cost for the 5 categories of farmers. The major components of costs considered are material costs which include seeds, chemical fertilizers and pesticides. Labour costs include tractor charges, sowing and weeding charges, application of fertilizers and pesticides and harvesting.

Rice

The costs of cultivation of paddy per acre for farmers belonging to various categories are presented in Table 4.20. The material cost is around 30 to 35 percent of the overall cost. In the case of labor expenditure, the maximum amount is spent on harvesting operations followed by sowing and weeding operations and post-harvest activities. The structural patterns of cost components as revealed by their contributions are more or less uniform for all the categories of farmers.

Chillies

The contribution of total input expenses to the overall costs is given in Table 4.21. It could be observed that cultivation of chillies is highly capital-intensive and requires more investment than other crops. In the case of chillies, the largest expenditure (45 to 48.7 percent of the total input costs) was on labor followed by material costs. The cost of hired labour for harvesting could be a significant share in the total cost of cultivation. Land revenue paid by the sample farmers is not significant as it is very nominal and depends on the crops grown.

The rates per year are Rs 200/-, Rs 10/- and Rs 125/-.for paddy, cotton and chillies respectively.

Cotton

In cotton cultivation, the material and labour cost per acre are the major components. The material cost is 36 percent in case of marginal farmers and 35.4 percent for large farmers. Maximum labour is required for harvesting and the cost ranges from 40.8 to 45.8 percent (Table 4.22).

Production

The production, consumption and sale of the three crops - rice, cotton and chillies in the study area have been analysed. On an average, about 24 to 31 bags per acre paddy are produced by all the farm categories. Marginal, small, medium and large farmers sell maximum share of their produce. Semi-medium farmers are an exception. All farmers keep aside some of their produce for consumption. The average price per bag of rice was Rs 650/- to Rs 800/- (Table 4.23). Farm size-specific variations in production of cotton show that the quantity produced ranges from 13 to 14 quintal per acre. In the case of cotton, the entire output is marketed. Average price obtained by the different categories of farmers ranges from Rs. 4,500/- to Rs 5,250/- per acre. The quantities produced by semi-medium, medium and large farmers account for most of the total production as the area allotted to this crop is high among these farmers (Table 4.24).

Significant progress has been observed in the production of chillies. Chilli production has been boosted largely by increase in its acreage in addition to yield-increase. On the whole, the output produced by medium farmers contributes much

to the total production. All the farmers sell the output. The average price obtained by the large farmers is high (Rs. 8,250/-) when compared to other categories (Table 4.25).

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

Performance of the scheme can be seen as per the data (Table 4.26) on workers engaged in MGNREGS[9] from different farm groups. Most of the workers (45.8 percent) are from marginal farm group. Small farmers constitute 23.1 per cent and they are followed by semi-medium farmers (16.7 percent).

4.6 Conclusion

This chapter is an attempt to analyse the various factors influencing supply response of the farmers. The acreage responses in the village could be attributed to various factors. Some of them are; firstly, the resource endowment (irrigation facility) of farm groups facilitated the adoption of the commercial cropping pattern. Secondly, the structure of credit institutions further encouraged the commercial cropping pattern in the village. Credit provided by banks depends on the crops grown. For instance, if farmers grow high-value crops like chillies, they get more amount of loan compared to others. As returns from these crops are more, banks provide more credit. Thirdly, marginal and small farmers devote their limited land resource to non-foodgrain crops. The net returns from these crops are higher than other crops. So farmers allocate their land based on relative profitability.

TABLES

Table 4.1

Farm Size distribution of sample Households

Farmers category	Frequency	Percent
Marginal Farmers	24	48.0
Small Farmers	13	26.0
Semi-medium Farmers	6	12.0
Medium Farmers	5	10.0
Large Farmers	2	4.0
Total	**50**	**100.0**

Source: Field Survey, 2011-12

Figure 4.1

Farm Size distribution of sample Households (In percent)

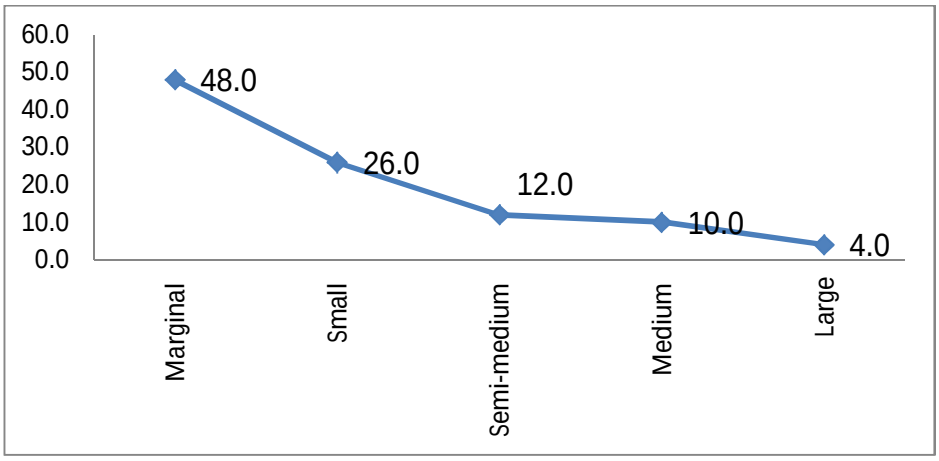


Table 4.2

Caste-wise distribution

Farmer Category	SC	ST	BC	OC	Muslims	Total
Marginal	8 (33.3)	3 (12.5)	1 (4.2)	7 (29.2)	5 (20.8)	24 (100.0)
Small	1 (7.7)	1 (7.7)	3 (23.1)	7 (53.8)	1 (7.7)	13 (100.0)
Semi-medium	0 (0.0)	0 (0.0)	1 (16.7)	3 (50.0)	2 (33.3)	6 (100.0)
Medium	0 (0.0)	0 (0.0)	0 (0.0)	5 (100.0)	0 (0.0)	5 (100.0)
Large	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
Total	**9 (18.0)**	**4 (8.0)**	**5 (10.0)**	**24 (48.0)**	**8 (16.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 4.2

Caste-wise distribution (In Percent)

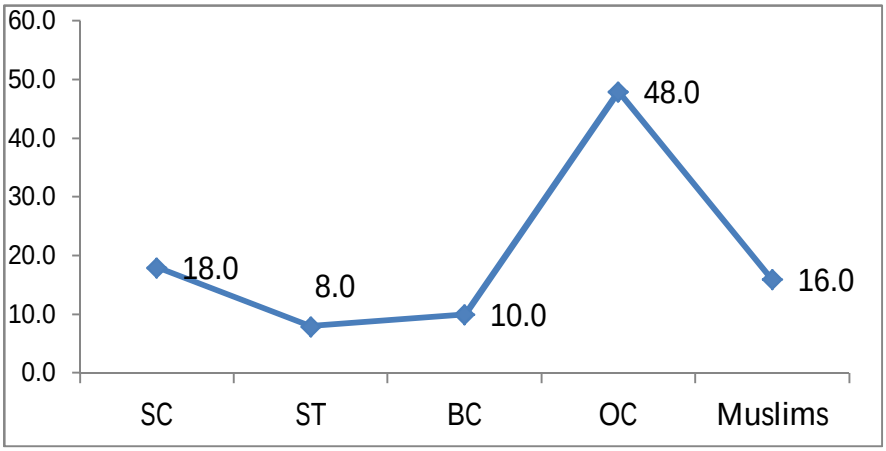


Table 4.3

Housing Structure

Farmers category	Kutcha	Pucca	Semi Pucca	Total
Marginal	3 (12.5)	20 (83.3)	1 (4.2)	24 (100.0)
Small	1 (7.7)	8 (61.5)	4 (30.8)	13 (100.0)
Semi-medium	0 (0.0)	6 (100.0)	0 (0.0)	6 (100.0)
Medium	0 (0.0)	5 (100.0)	0 (0.0)	5 (100.0)
Large	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
Total	**4 (8.0)**	**41 (82.0)**	**5 (10.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure: 4.3

Housing Structure

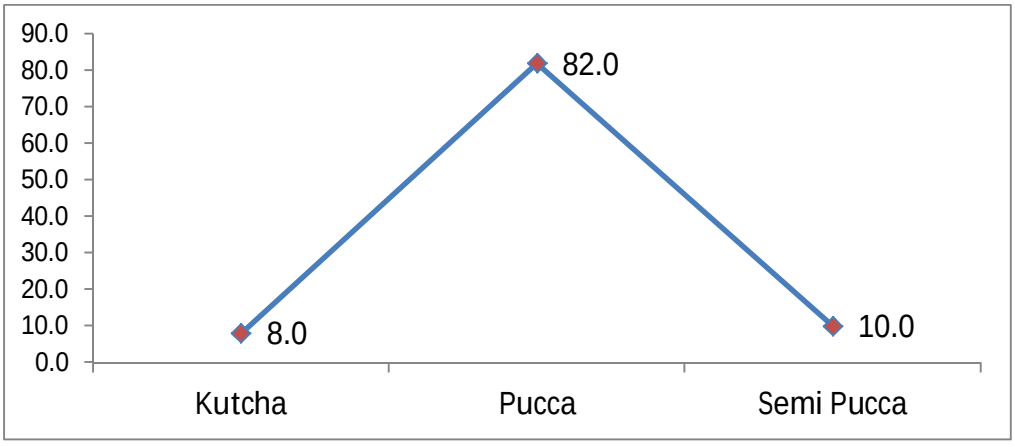


Table 4.4

Family size Composition

Farmers Category	Family Composition								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Marginal	1 (4.2)	0 (0.0)	9 (66.7)	5 (20.8)	1 (4.2)	1 (4.2)	0 (0.0)	0 (0.0)	24 (100.0)
Small	1 (7.7)	4 (30.8)	4 (30.8)	3 (23.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.7)	13 (100.0)
Semi-medium	0 (0.0)	1 (16.7)	2 (33.3)	2 (33.3)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	6 (100.0)
Medium	0 (0.0)	1 (20.0)	1 (20.0)	1 (20.0)	0 (0.0)	1 (20.0)	1 (20.0)	0 (0.0)	5 (100.0)
Large	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	**2 (4.0)**	**6 (12.0)**	**24 (48.0)**	**11 (22.0)**	**2 (4.0)**	**3 (6.0)**	**1 (2.0)**	**1 (2.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 4.5

Age Group

Farmer Category	21-40	41 - 60	Above 60	Total
Marginal	8 (33.3)	14 (58.3)	2 (8.3)	24 (100.0)
Small	4 (30.8)	8 (61.5)	1 (7.7)	13 (100.0)
Semi-medium	3 (50.0)	3 (50.0)	0 (0.0)	6 (100.0)
Medium	0 (0.0)	4 (80.0)	1 (20.0)	5 (100.0)
Large	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
Total	**15 (30.0)**	**31 (62.0)**	**4 (8.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 4.6

Literacy

Farmer Category	Illiterate	Primary	Secondary	Higher Secondary	Total
Marginal	13 (54.2)	7 (29.2)	4 (16.7)	0 (0.0)	24 (100.0)
Small	6 (46.2)	4 (30.8)	3 (23.1)	0 (0.0)	13 (100.0)
Semi-medium	0 (0.0)	3 (50)	2 (33.3)	1 (16.7)	6 (100.0)
Medium	0 (0.0)	1 (20.0)	4 (80.0)	0 (0.0)	5 (100.0)
Large	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
Total	**19 (38.0)**	**12 (30.0)**	**15 (30.0)**	**1 (2.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 4.4

Literacy (In percent)

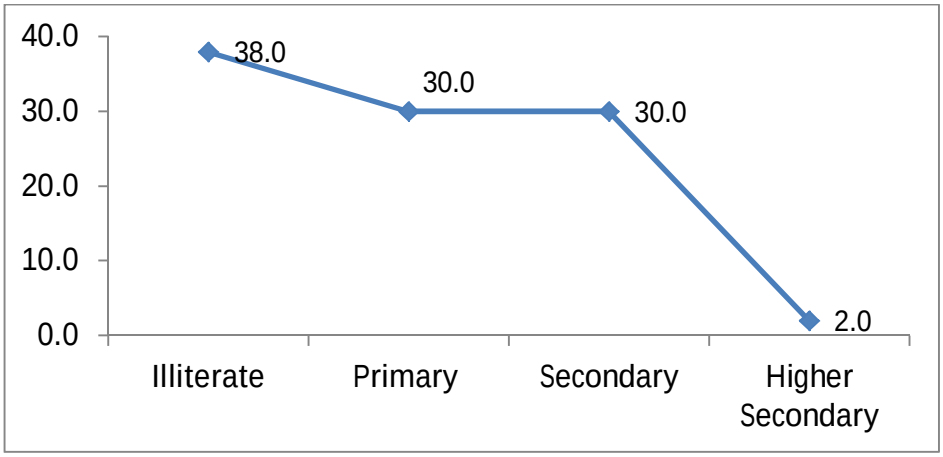


Table 4.7

Occupation

Farmer Category	Agriculture	Agriculture & Others	Total
Marginal	19 (79.2)	5 (20.8)	24 (100.0)
Small	13 (100.0)	0 (0.0)	13 (100.0)
Semi-medium	6 (100.0)	0 (0.0)	6 (100.0)
Medium	5 (100.0)	0 (0.0)	5 (100.0)
Large	2 (100.0)	0 (0.0)	2 (100.0)
Total	**45 (90.0)**	**5 (10.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 4.5

Occupation (In Percent)

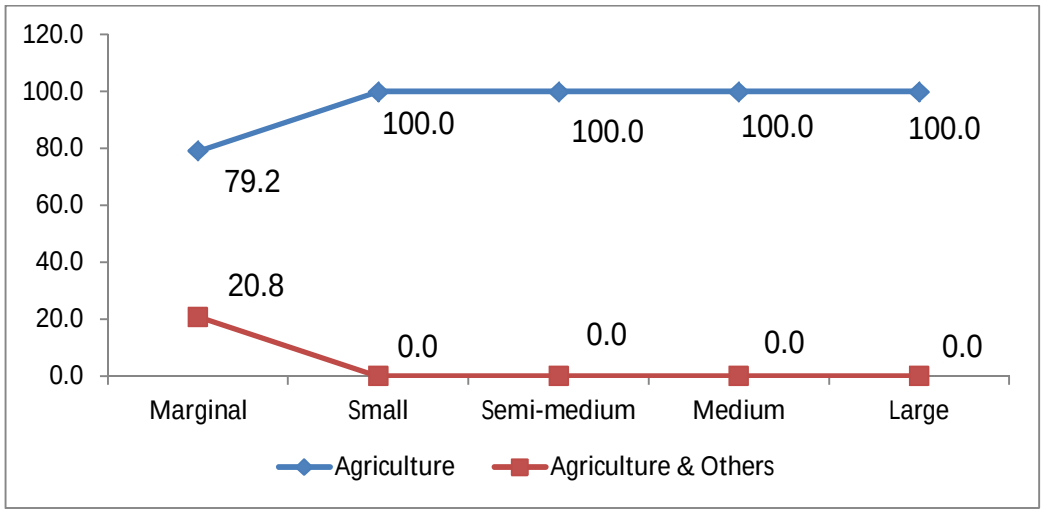


Table 4.8

Monthly Food Expenditure

Farmers Category	Monthly food expenditure						
	Below 2000	**2001-3000**	**3001-4000**	**4001-5000**	**5001-6000**	**7001-8000**	**Total**
Marginal	1 (4.20)	4 (16.70)	6 (25.00)	8 (33.30)	4 (16.70)	1 (4.20)	24 (100.00)
Small	1 (7.70)	4 (30.80)	0 (0.00)	4 (30.80)	3 (23.10)	1 (7.70)	13 (100.00)
Semi-medium	0 (0.00)	1 (16.70)	1 (16.70)	4 (66.70)	0 (0.00)	0 (0.00)	6 (100.00)
Medium	0 (0.00)	2 (40.00)	0 (0.00)	2 (40.00)	0 (0.00)	1 (20.00)	5 (100.00)
Large	0 (0.00)	0 (0.00)	0 (0.00)	1 (50.00)	0 (0.00)	1 (50.00)	2 (100.00)
Total	**2 (4.00)**	**11 (22.00)**	**7 (14.00)**	**19 (38.00)**	**7 (14.00)**	**4 (8.00)**	**50 (100.00)**

Source: Field Survey, 2011-12

Table 4.9

Annual Non-food Expenditure

Farmers Category	Education	Health	Clothing	Social Activities	Bills	Alcohol and other intoxicants	Transport	Savings	Others
Marginal	2.1	13.6	20.4	19.0	5.5	22.2	4.1	6.3	6.8
Small	10.4	11.2	22.4	10.4	5.4	19.2	4.7	7.4	8.9
Semi-Medium	3.2	4.5	19.3	21.1	4.9	15.0	3.2	24.2	4.6
Medium	2.6	9.8	14.5	15.9	4.7	13.3	6.8	28.2	4.2
Large	0.0	5.6	14.6	19.8	4.2	14.6	5.3	30.7	5.2

Source: Field Survey, 2011-12

Table 4.10

Livestock

Farmers Category	Milch Animals	Sheep	Goat	Poultry	Others	Total
Marginal	29 (22.1)	0 (0.0)	4 (3.1)	88 (67.2)	10 (7.6)	131 (100.0)
Small	15 (68.2)	0 (0.0)	2 (9.1)	5 (22.7)	0 (0.0)	22 (100.0)
Semi-medium	4 (66.7)	0 (0.0)	2 (33.3)	0 (0.0)	0 (0.0)	6 (100.0)
Medium	10 (90.9)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	11 (100.0)
Large	8 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (100.0)
Total	**66 (37.1)**	**1 (0.6)**	**8 (4.5)**	**93 (52.2)**	**10 (5.6)**	**178 (100.0)**

Source: Field Survey, 2011-12

Figure 4.6

Livestock (In percent)

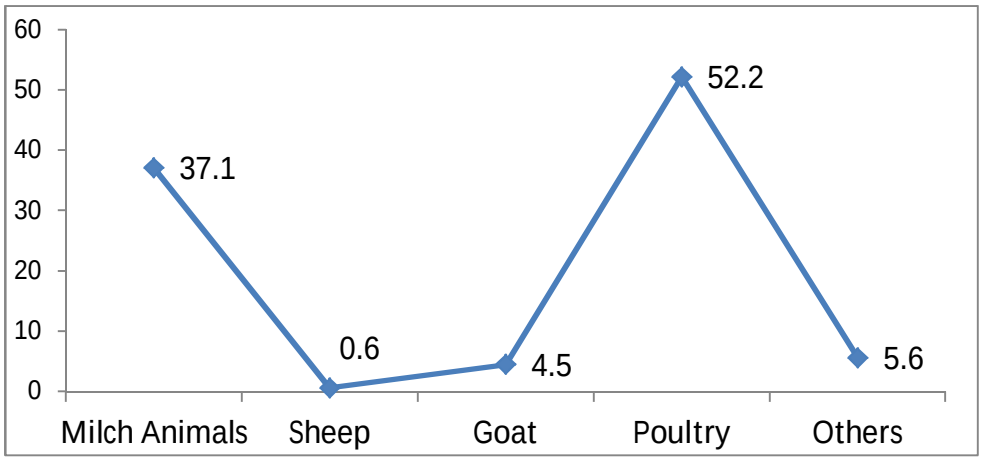


Table 4.11

Farm Machinery, Implements & Equipments

Farmers Category	Pump sets	Oil engine	Sprayer	Tractor	Bullock cart	Ploughs	Electric Motor	Others	Total
Marginal	0 (0.0)	1 (3.0)	14 (42.4)	0 (0.0)	0 (0.0)	2 (6.1)	16 (48.5)	0 (0.0)	33 (100.0)
Small	0 (0.0)	2 (7.4)	8 (29.6)	0 (0.0)	4 (14.8)	3 (11.1)	10 (37.0)	0 (0.0)	27 (100)
Semi-medium	2 (12.5)	2 (12.5)	5 (31.3)	0 (0.0)	1 (6.3)	0 (0.0)	6 (37.5)	0 (0.0)	16 (100)
Medium	0 (0.0)	4 (21.1)	5 (26.3)	2 (10.5)	1 (5.3)	2 (10.5)	5 (26.3)	0 (0.0)	19 (100)
Large	1 (5.3)	2 (10.5)	2 (10.5)	2 (10.5)	0 (0.0)	2 (10.5)	2 (10.5)	8 (42.1)	19 (100)
Total	**3 (2.6)**	**11 (9.6)**	**34 (29.8)**	**4 (3.5)**	**6 (5.3)**	**9 (7.9)**	**39 (34.2)**	**8 (7.1)**	**114 (100.0)**

Source: Field Survey, 2011-12

Figure 4.7

Farm Machinery, Implements & Equipments (In Percent)

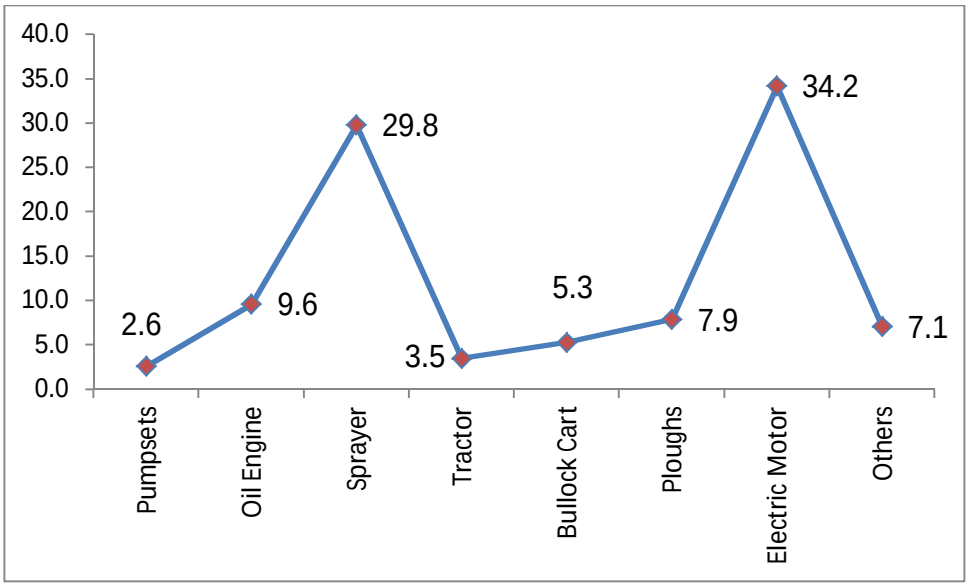


Table 4.12

Average size of land holdings

Farmer Category	No of Farmers	% of Farmers	Total Land	% of Land	Average
Marginal	24	**48.0**	41.5	**15.8**	1.7
Small	13	**26.0**	45.0	**17.2**	3.5
Semi-Medium	6	**12.0**	38.5	**14.7**	6.4
Medium	5	**10.0**	75.0	**28.6**	15.0
Large	2	**4.0**	62.0	**23.7**	31.0
Total	**50**	**100.0**	**262.0**	**100.0**	**5.24**

Source: Field Survey, 2011-12

Figure 4.8

Average size of land holdings (In Percent)

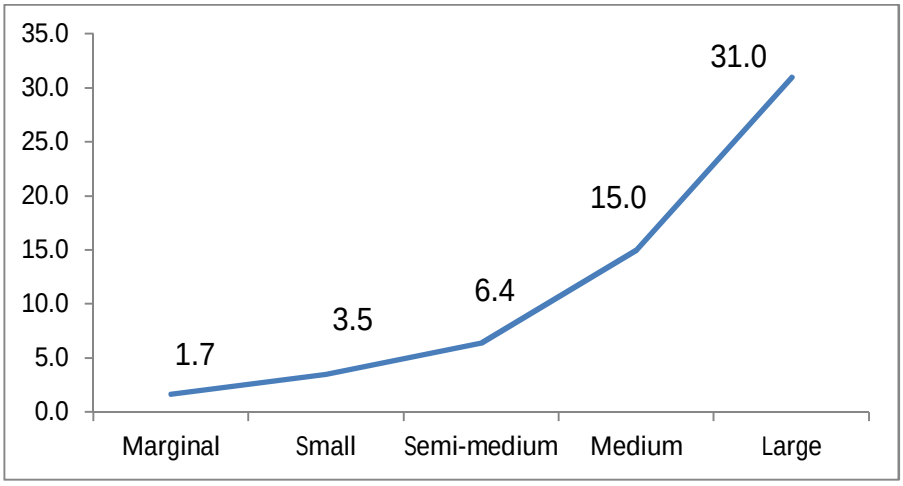


Table 4.13

Tenure Type

Farmers Category	Tenure Type			
	Leased in	Own	Own & Leased in	Total
Marginal	9 (37.5)	12 (50.0)	3 (12.5)	24 (100.0)
Small	2 (15.4)	8 (61.5)	3 (23.1)	13 (100.0)
Semi-medium	0 (0.0)	2 (33.3)	4 (66.7)	6 (100.0)
Medium	0 (0.0)	2 (40.0)	3 (60.0)	5 (100.0)
Large	0 (0.0)	1 (50.0)	1 (50.0)	2 (100.0)
Total	**11 (22.0)**	**25 (50.0)**	**14 (28.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 4.9

Tenure Type

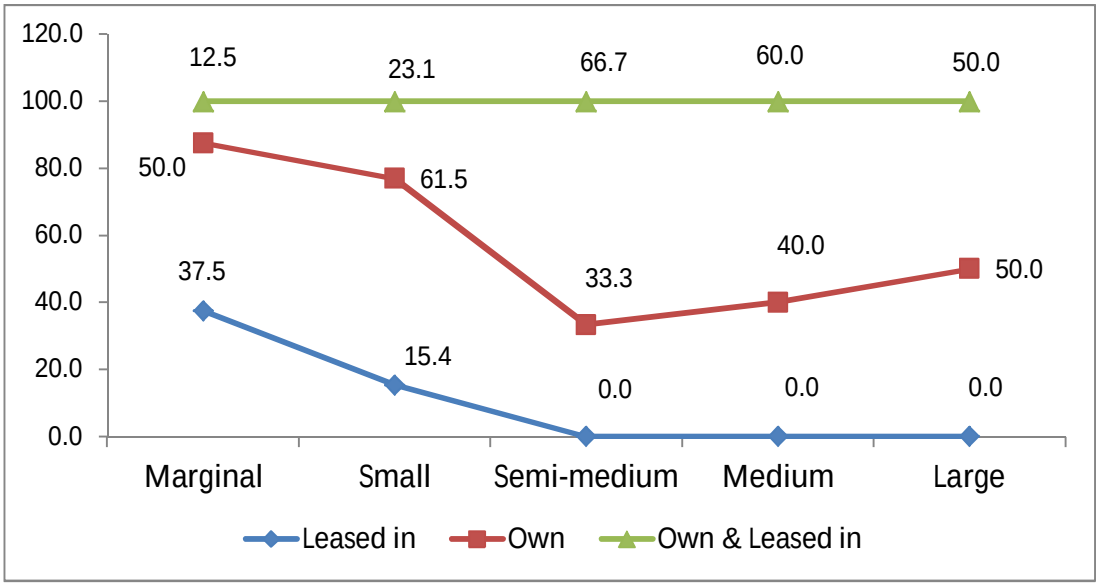


Table 4.14

Acreage under Food and Non-Foodgrain crops

Farmers Category	Food	Non-Food
Marginal	16.9	83.1
Small	26.8	73.2
Semi-Medium	9.1	90.9
Medium	20.0	80.0
Large	35.5	64.5
Total	**23.7**	**76.3**

Source: Field Survey, 2011-12

Figure 4.10

Acreage under Food and Non-Foodgrain crops

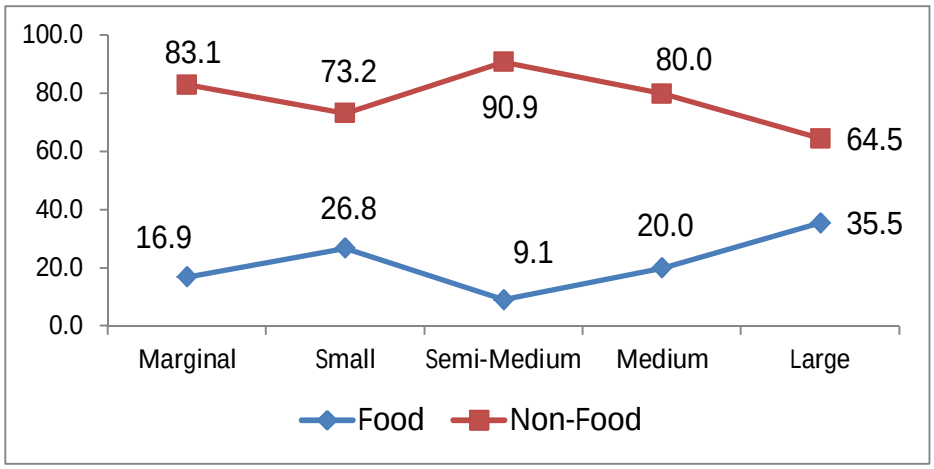


Table 4.15

Crops Grown

Farmer Category	Crops Grown						
	Paddy, Chillies, Cotton	**Cotton, Chillies**	**Chillies**	**Paddy Chillies**	**Cotton**	**Paddy**	**Total**
Marginal	0 (0.00)	4 (16.70)	13 (54.20)	4 (16.70)	1 (4.20)	2 (8.30)	24 (100.00)
Small	3 (23.10)	3 (23.10)	3 (23.10)	2 (15.40)	0 (0.00)	2 (15.40)	13 (100.00)
Semi-medium	4 (66.70)	2 (33.30)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	6 (100.00)
Medium	4 (80.00)	0 (0.00)	1 (20.00)	0 (0.00)	0 (0.00)	0 (0.00)	5 (100.00)
Large	1 (50.00)	1 (50.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (100.00)
Total	**12 (24.00)**	**10 (20.00)**	**17 (34.00)**	**6 (12.00)**	**1 (2.00)**	**4 (8.00)**	**50 (100.00)**

Source: Field Survey, 2011-12

Figure 4.11

Crops Grown (In Percent)

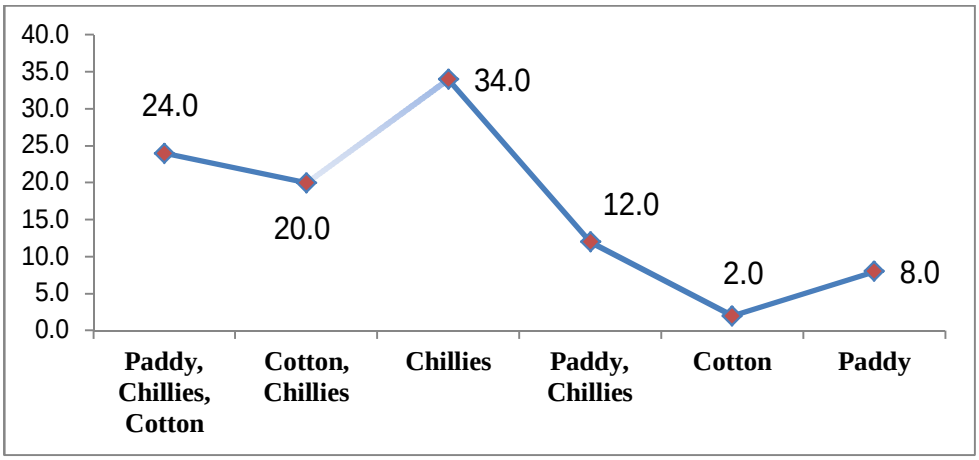


Table 4.16

Source of Credit

Farmers Category	SOURCE OF CREDIT							
	Banks	**MCGs***	**Commission Agents**	**Fertilizer Dealers**	**Relatives**	**Gold Loans**	**Big Farmers**	**Friends**
Marginal	17.9	28.4	25.4	10.4	9.0	0.0	4.5	4.5
Small	25.0	22.7	13.6	15.9	11.4	2.3	6.8	2.3
Semi-Medium	28.6	4.8	14.3	14.3	9.5	14.3	14.3	0.0
Medium	18.5	14.8	18.5	18.5	7.4	18.5	0.0	3.7
Large	20.0	10.0	20.0	20.0	10.0	20.0	0.0	0.0
Total	**21.3**	**20.7**	**19.5**	**14.2**	**9.5**	**6.5**	**5.3**	**3.0**

**Micro-Credit Groups*

Source: Field Survey, 2011-12

Figure 4.12

Source of Credit (In Percent)

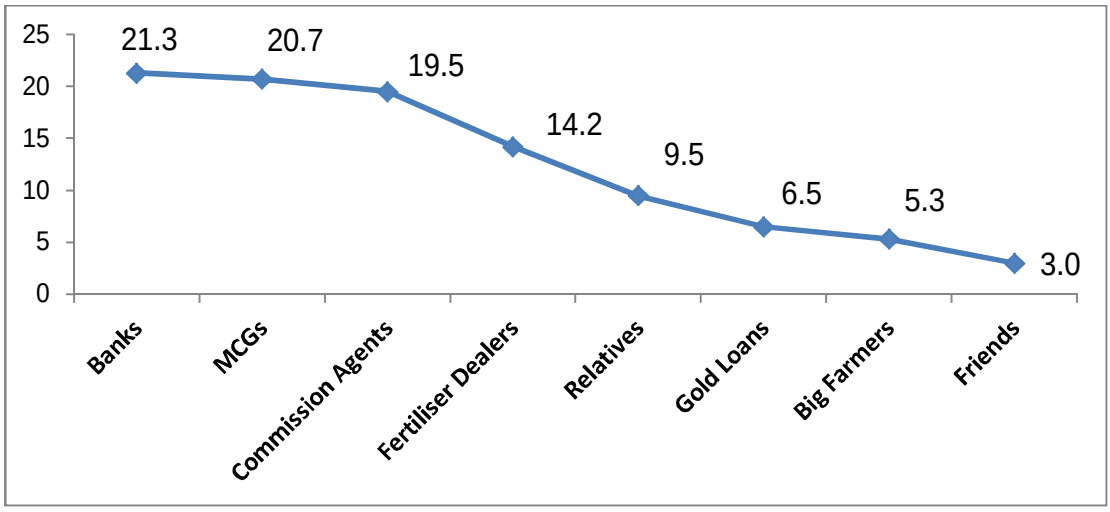


Table 4.17

Purpose of Credit

Farmers Category	Agri culture	Live stock	Consum-ption	Educa tion	Health	Marriage	Paid Debts
Marginal	60.2	4.2	16.2	8.1	2.5	6.9	1.9
Small	68.8	0.0	17.4	1.2	1.8	4.6	6.2
Semi-Medium	66.4	3.7	12.5	9.6	0.0	7.8	0.0
Medium	77.1	0.0	10.6	8.6	3.7	0.0	0.0
Large	81.4	0.0	2.2	11.3	5.1	0.0	0.0
Overall	**70.8**	**1.6**	**11.8**	**7.8**	**2.6**	**3.9**	**1.5**

Source: Field Survey, 2011-12

Figure 4.13

Purpose of Credit (In Percent)

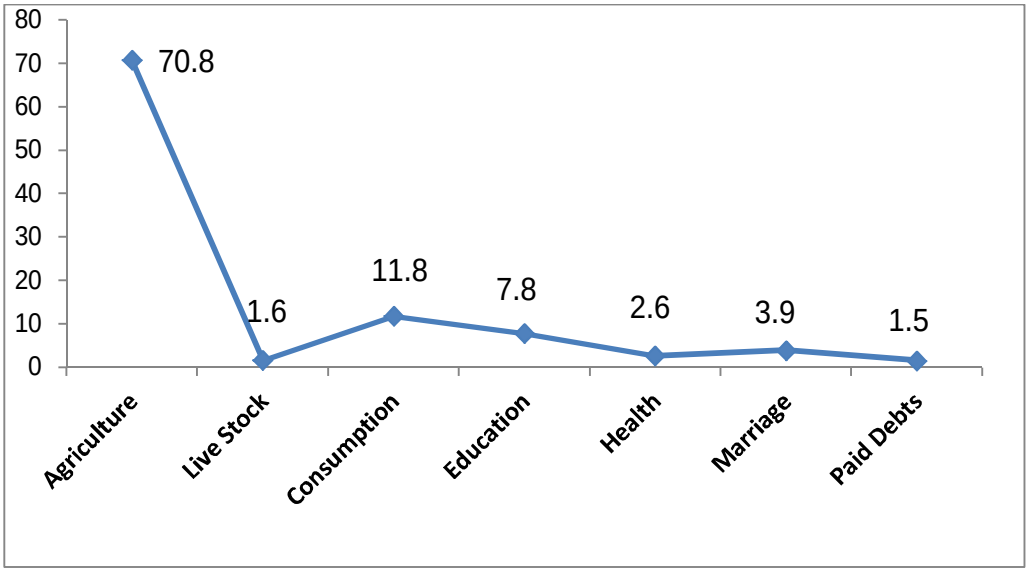


Table 4.18

Average amount of credit per household Loan Amount

Farmers Category	% of Farmers	Avg. Amount of Credit
Marginal	46.9	74348
Small	26.5	104230
Semi-Medium	12.2	246666
Medium	10.2	598000
Large	4.2	585000
Total	**100.0**	

Source: Field Survey, 2011-12

Figure 4.14

Average amount of credit per household Loan Amount

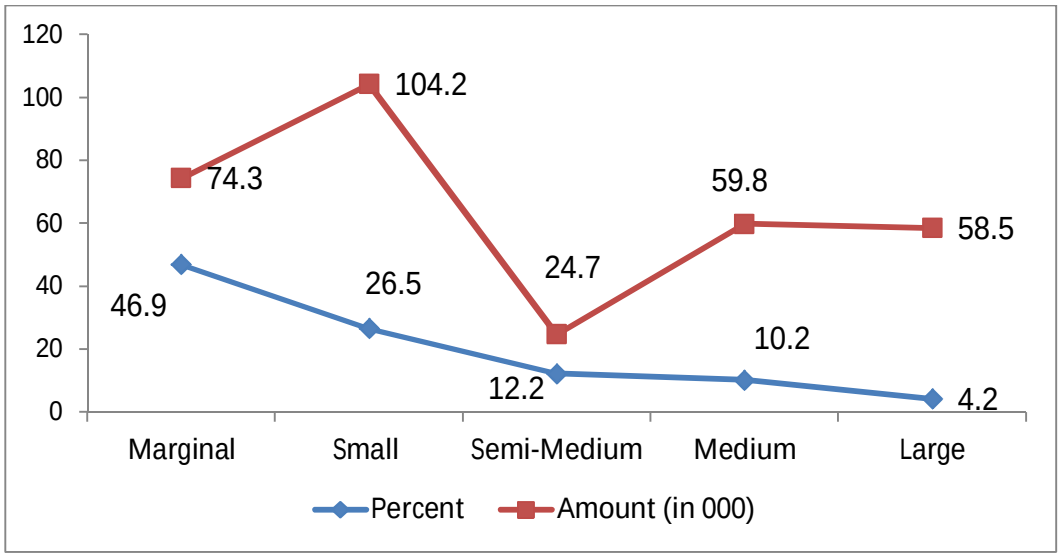


Table 4.19

Average amount of Loan Outstanding

Farmers Category	% of Farmers	Avg. Amount of Outstanding
Marginal	47.9	68478
Small	25.0	93416
Semi-Medium	12.5	180666
Medium	10.4	509400
Large	4.2	497500
Total	**100.0**	

Source: Field Survey, 2011-12

Figure 4.15

Average amount of Loan Outstanding

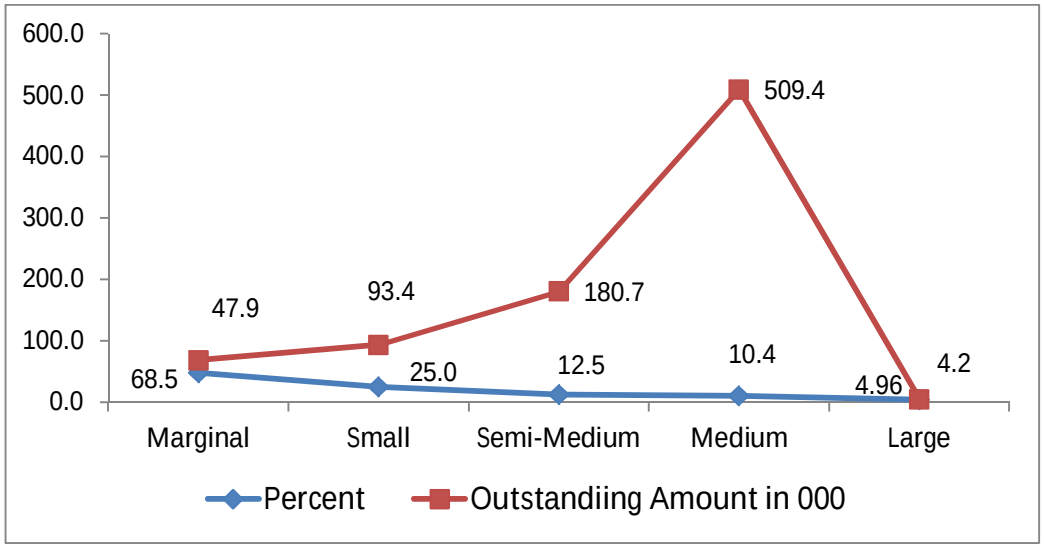


Table 4.20

Percentage Contribution of different Components towards Cost of cultivation of Paddy crop

Cost Structure	Marginal	Small	Semi-Medium	Medium	Large
Cost of Ploughing with bullock or Tractor	13.5	13.2	12.1	12.9	15.1
Material Costs	33.7	35.5	34.7	34	33.0
Labour Costs	44.8	41.0	44.5	43	46.0
Other Costs	8.0	10.4	8.7	10.1	6.0

Source: Field Survey, 2011-12

Table 4.21

Percentage Contribution of different Components towards Cost of cultivation of Chillies crop

Cost Structure	Marginal	Small	Semi-Medium	Medium	Large
Cost of Ploughing with bullock or Tractor	4.7	6.4	4.0	4.1	6.3
Material Costs	40.0	36.5	37.3	36.6	40.7
Labour Costs	45.0	46.0	47.3	48.5	48.7
Other Costs	10.4	11.1	11.4	10.8	4.3

Source: Field Survey, 2011-12

Table 4.22

Percentage Contribution of different Components towards Cost of cultivation of Cotton crop

Cost Structure	Marginal	Small	Semi-Medium	Medium	Large
Cost of Ploughing with bullock or Tractor	10.4	9.4	10.7	11.7	9.8
Material Costs	36.2	37.7	35.8	36.9	35.4
Labour Costs	41.9	40.8	45.9	41.3	45.8
Other Costs	11.5	12.1	7.6	10.1	9.0

Source: Field Survey, 2011-12

Table 4.23

Paddy Crop Output

Farmers Category	Percent of Farmers	Acres	Quantity produced (No of bags) per acre	Total Production (bags)	Quantity sold (bags)	Consumption (bags)	Avg. price
Marginal	27.27	7.0	25.0	180	105	75	741
Small	31.82	12.5	27.2	301	223	78	746
Semi-Medium	18.18	3.0	24.8	191	50	143	650
Medium	18.18	14.0	31.3	445	345	100	850
Large	4.55	13.0	28.0	364	344	20	800

Source: Field Survey, 2011-12

Table 4.24

Cotton Crop Output

Farmers Category	Percent of Farmers	Acres	Quantity produced (No of quintals) per acre	Total Production	Quantity sold	Avg. price
Marginal	22.73	6	13.2	66	66	4700
Small	22.73	7	14.0	83	83	4740
Semi-Medium	27.27	12	14.2	153	153	4833
Medium	18.18	22	13.5	291	291	4500
Large	9.09	25	13.0	316	316	5250

Source: Field Survey, 2011-12

Table 4.25

Chillies Crop Output

Farmers Category	Percent of Farmers	Acres	Quantity produced (No of quintals) per acre	Total Production	Quantity sold	Avg. price
Marginal	47.73	28.5	24.3	560	560	6833
Small	22.73	23.0	25.1	455	455	6740
Semi-Medium	13.64	18.0	23.7	334	380	7483
Medium	11.36	34.0	24.6	1545	1545	8000
Large	4.55	24.0	25.5	635	635	8250

Source: Field Survey, 2011-12

Table 4.26

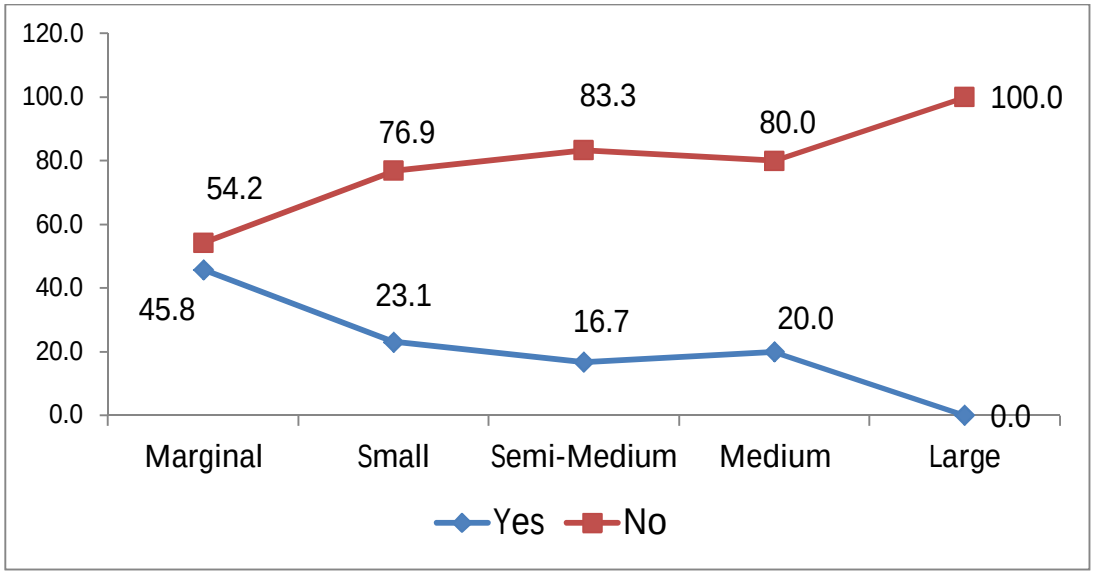
Participation in MGNREGS

Farmers Category	Yes	No	Total
Marginal	11 (45.8)	13 (54.2)	24 (100.0)
Small	3 (23.1)	10 (76.9)	13 (100.0)
Semi-Medium	1 (16.7)	5 (83.3)	6 (100.0)
Medium	1 (20.0)	4 (80.0)	5 (100.0)
Large	0 (0.0)	2 (100.0)	2 (100.0)
Total	16 (32.0)	34 (68.0)	50 (100.0)

Source: Field Survey, 2011-12

Figure 4.16

Participation in MGNREGS



End Notes

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[1] There exist considerable differences in the matter of provision of policies, programmes and investment in developing irrigation across regions. Favorable government policies play a crucial role in development and growth of agriculture by facilitating the use of technology in Coastal Andhra mainly through the allocation of resources to the region.

[2] Highly productive agricultural sector in coastal Andhra is indicative of its better resource endowments and technological progress led by green revolution for the major crops grown in the region.

[3] As the provision of agricultural credit varies across regions, its flow from formal credit institutions has become advantageous to the Coastal Andhra region compared to other regions. Usually agriculturally developed regions could be provided more credit from banks in order to facilitate the need for large amounts of inputs for high value crops.

[4] Ayacut is the area served by an irrigation project such as canal, dam and or a tank.

[5] Nagarjuna Sagar Project Dam was one of the huge infrastructure initiative during Green Revolution in India. It was constructed at a place called Nagarjuna Sagar where Krishna river links the border of Nalgonda of Telangana state and Guntur of Andhra Pradesh. Along with the generation of hydro-electricity, it serves water for irrigation purpose.

[6] Self Help Groups (SHGs) is a group of women who makes a mutual agreement to fund to a common account to be lent to its members according to the group members' decision. This group is a voluntarily formed, small and homogeneous group of rural poor.

[7] Anganwadi Centre is local centre which usually take care of pregnant women, new born babies and children by providing nutritional supplements to have healthy life.

[8] Five Categories of Farmers are; 1 as Marginal farmer with below 1.0 hectares, 2 as Small farmer possessing the land between 1.0-2.0 hectares, 3 reflects the Semi medium farmer possessing 2.0-4.0hectares of land, 4 as the medium with 4.0-10.0 hectares and 5 shows the Large farmer having 10.0 hectares and above.

[9] Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is huge national rural employment scheme which was initiated by UPA government in 2006. Its main aim is to provide 100 days employment to the rural household in order to give food security for the rural households.

CHAPTER 5
SUPPLY RESPONSE OF FARMERS IN TELANGANA: MICRO-LEVEL ISSUES

5.1 Introduction

Andhra Pradesh was formed with different levels of resource endowments and development experiences across its regions. A well-known fact about Telangana region is its backwardness with respect to social, economic, cultural and political developments. The rule of Nizams[1] and feudal relations resulted in the break out of 'The Great Telangana Armed Struggle'. However, Hyderabad has been growing rapidly since 1999. Its per-capita income has grown exponentially. But this growth is not felt in districts such as Adilabad, Nizamabad, Karimnagar and other districts within Telangana.

Apart from political aspirations, the backwardness of Telangana is reflected in the agrarian economy. For several years, agriculture in Telangana has remained stagnant and backward. The agrarian structure in the region has been changing with the increase in area and the number of marginal and small farmers. Unlike Coastal Andhra, marginal and small farmers of this region are in a most disadvantageous position since they spend extra money on digging wells[2]. It is also argued that the neglect of Telangana by the Andhra Pradesh government has resulted in the region suffering from insufficient irrigation resources. It has resulted in high output growth rates induced by the physical and financial resources and also by borrowing money by farmers. It is quite interesting to note

that this growth in output is accompanied by an increase in acreage under non-foodgrains (Vakulabharanam, V 2004).

Warangal district was chosen as the representative district to explain the supply response of the region on the basis of purposive sampling. A village named Chandraiapalli was selected from Narsampet mandal. Warangal district was chosen for micro-level study since it has recorded the highest number of farmer suicides in Telangana. Cropping pattern of the district is dominated by cotton, a major non-foodgrain crop of the region. However, this chapter emphasizes the role of different factors in determining supply response in the selected village.

The chapter is divided into four sections. Section 1 begins with agrarian profile of the study area described by considering demographic characteristics and structure of agriculture. Section 2 examines socio-economic profile of sample households. Section 3 deals with institutional structure of agriculture in the village such as land use, cropping pattern, credit institutions, crop yields, marketing, structure of employment and agricultural wages. Section 4 provides conclusion.

5.2 Brief Agricultural Profile of the Selected District

The total geographical area of Warangal district is 12, 85,000 hectares. The net area sown is 4, 34,000 hectares. 1, 23,000 hectares were sown more than once in 2010. Rainfall in the district is 629.5mm. Substantial area in the district is irrigated with the help of major irrigation sources fed by Ramappa, Malluruvagu, Pakal, Lakhnavaram and Salivagu projects. Tube wells, open wells and tanks play

a major role in irrigation.Net area irrigated is 2,45,000 hectares. A relatively small area in this district is canal-irrigated. In order to bring more area under irrigation, new projects like Kakatiya Canal, Sri Ram Sagar Project (SRSP) Stage-II Canal and Flood Flow Canal are being constructed. In Andhra Pradesh, the biggest cotton-growing district is Warangal. Cotton production and cotton ginning are famous in the district and they are supplied to places such as Mumbai and Coimbatore. Other major crops grown in the district comprise of chillies, groundnut, jowar and maize. The acreages under food crops and non-foodgrain crops are 4, 14,791 hectares and 2,23,841 hectares respectively (Statistical Abstract 2009).The soils in the district consists of red soil (about 55 percent), black soil (about 22 percent) and loamy soil (about percent 14 percent).

5.3 Agricultural Profile of the Surveyed Village

Chandraiahpalli village from Narsampet mandal was selected for field study. The village is 9 kms away from mandal headquarters and 48 kms away from district headquarters. This village was formed in 1995 by combining the 3 thandas[3] namely Ramnagar, Rajeswararaopally, Buchinaikthanda. It has become gram panchayat (GP) now. The GP has its own primary school, high school and andanganwadi centre. Agriculture is the predominant occupation of the village. The main crops grown in the village are paddy, chillies, cotton and groundnut.

5.4. Socio-Economic Profile of Sample Farm Households

Farm size-wise Distribution of Sample Households

The Distribution of Sample Households (Table 5.1) reveals that out of the total sample households, 54 percent are marginal farmers, small farmers account for 34 per cent followed by 8 percent of semi-medium farmers and 4 percent of medium farmers.

Caste-wise Distribution

It can be noted from Table 5.2 that the village has a very high proportion of BCs. They account for 56 per cent of the total sample. The study area has higher concentration of Scheduled Tribes (STs) as the village is a combination of 3 thandas. They constitute 24 percent of the total sample. Share of OC farm households is small and accounts only for 12 percent. Only 8 percent consists of Scheduled Castes. Caste composition indicates that majority of households are from backward castes followed by scheduled tribes.

Housing Structure

The details (Table 5.3) of housing structure were collected from the sample households. About 46 percent of the families live in pucca houses. Around 34 percent of the families have semi-pucca houses. About 20 percent of the families live in kutcha houses.

Family size Composition:

The family size composition of the selected farm households is presented in Table 5.4. Most families have 3 to 6 members. Few families have 6 to 8 members.

Age group

A large number (44 percent) of farm households are within the age group of 21 to 40 years followed by 41-60 age group which constitute 38 percent of the total sample. Among 21-40 age group, marginal farmers are the highest. They account for 51.9 percent followed by small and semi-medium farmers with 41.2 percent and 25 percent respectively. Semi-medium farms are highest in the 41-60 age group. Very few farm households (18 percent) are in the above 60 age group (Table 5.5).

Literacy

The study area has a very low rate of literacy. Only 44 per cent of the people are literate. Literacy rate among small farmers is 29.4 per cent and illiteracy is high among semi-medium farmers (75 percent). Around 16 percent of farmers have below primary level education. Upper-primary level and secondary education are higher among marginal and small farmers. About 29.4 percent of small farmers have higher-secondary education. Only 4 percent have graduate-level education among marginal farmers. Literacy rate of the selected farmers was not found to be impressive (Table 5.6).

Occupation

The occupation-wise distribution of sample households is presented in Table 5.7. It shows that agriculture (26 percent) is the major occupation of all the households. Along with agriculture, significant portion (74 percent) of farmers indulges in agricultural labor and non-agricultural activities.

Monthly Food Expenditure

The pattern of food expenditure is presented in Table 5.8. It is observed that the majority of marginal farmers (59.3 percent) spend Rs 2001-3000 per month on food. Large farmers spend more than small farmers on food since the former earn more. The food expenditures of medium and large farm households are more than double the expenses of small households.

Annual Non-Food Expenditure

Non-food expenditure across farm groups is analyzed in Table 5.9. It shows that small and marginal farmers spend a significant amount on items such as alcohol, intoxicants and social activities, followed by clothing and health. The amount spent on festivals and ceremonies is very small. Major portion of non-food expenditure of semi-medium and medium farmers is for social activities. A significant amount is paid towards clothing by all categories of farmers.

Livestock

An important source of livelihood for marginalized landholders is livestock. An analysis pertaining to livestock ownership pattern is given in Table 5.10. It shows that milch animals are owned by 22.2 percent of farmers; sheep are owned by 18.5 percent; goats are owned by 3.7 percent; and poultry is owned by 55.6 percent of farmers. Marginal and small farm households have a larger proportion of livestock resources. Poultry makes up about 55.6 per cent of the total livestock population. Poultry production is predominant among marginal and small farmers. Sheep are reared mainly by marginal, small and semi-medium farmers. Semi-medium farmers possess highest share of sheep population. Medium farmers have the lowest share in the total livestock composition. Livestock ownership of medium farmers comprises only of milch animals and goat population accounts for 50 percent. This means that marginal and small landholders obtain a significant proportion of their incomes from livestock.

Farm Implements:

Various types of agricultural implements owned by different farm groups are shown in Table 5.11.It can be observed that pump sets, electric motors and sprayers are popular among all the categories of farmers. Only one medium farmer owned a tractor. There are a considerable number of bullock carts and ploughs. Among the sample households, 19.7 percent possess pump sets; 16.3 percent possess sprayers; 19.1 percent possess ploughs; and 17.1 percent possess

electric motors. Wide variations were not found in the ownership of farm implements by different categories of farmers.

5.5 Agro-Economic Analysis of Sample Farm Households

Average Size of Landholding

Cropping pattern is mainly influenced by the nature of land ownership of farmers. The average size of land owned by the sample farmers is 3.23 acres. Data in Table 5.12 highlights the distribution of land among the different categories of farm households. Firstly, 54 percent of marginal holdings own only 25.7 percent of the land. The average size of holdings among marginal farmer category is 1.4 acres. Percentage share of small farmer group in the total area operated by all the farms is 46.44. Semi-medium and medium holdings account only for 8 percent and 4 percent respectively, of the total number of holdings. About 14.24 percent of the operated area is under semi-medium farmer group. Medium holdings account for only 13.62 per cent of total cultivated area. It could be observed that there is a predominance of marginal and small farmers in both the number of holdings and area under them.

Tenure Type

About 88 percent of all categories of farmers cultivate the land on their own. Only 12 percent of farmers combine their own and leased land for cultivation. The practice of taking land for lease was observed among marginal, small and medium farmers categories. Depending on the type of land and yield

per acre, rent is decided. Leased land rent ranges between Rs15,000/- and Rs18,000/- (Table 5.13) per acre.

Acreage under Food and Non-Foodgrain Crops

An analysis (Table 5.14) of food and non-foodgrain crops grown in the village indicates that majority are cultivating non-foodgrain crops (87.5 percent). Much importance has been given to commercial crops and only a small portion of the land is under food grain cultivation (12.5 percent).

Source of Irrigation

Table 5.15 highlights the irrigation details. Wells are the major sources of irrigation and it irrigates 88.4 percent of the irrigated area. Around 3.6 percent of land is under tank irrigation and 8 percent of land is rain fed.

Crops Grown

From Table 5.16, it is clear that around 30 per cent of the total cultivated area is devoted to cotton. Around 26 percent of farmers grow cotton and chillies followed by 8 percent of them growing cotton, chillies and paddy. Very less area is allocated to other crops. Interestingly, this table also highlights the fact that marginal farmers allocate more area to cotton. It was revealed that even if the commercial crop failed in giving substantial income, they were able to maintain the food requirements due to paddy cultivation.

Sources of Credit

Data presented in Table 5.17 illustrates that banks play a crucial role in providing loans to 35.1 percent of farmers. About 5.8 percent of farmers have acquired loans from commission agents and micro-credit groups. Fertilizer dealers also play a prominent role in giving loans either in cash or agriculture inputs, or both. Quite a few farmers have acquired loans from big farmers and friends. Majority have got loans from banks and micro-credit groups. A few farmers have taken loans from multiple sources.

From Table 5.18, the utilization of loan amount for different purposes can be assessed. Around 51.8 percent of the total loan taken was used for agriculture. A total of 16.8 percent and 13.9 percent of the loan were spent for consumption and education respectively. It was found that 6.3 percent of the loan was spent for health needs. The extent of loan taken from different sources across different categories of farmers is presented in Table 5.19. The average amount of loan is Rs 88,860/- for marginal farmers and Rs. 1,99,500/- for medium farmers. It is clear that the amount of the loan is directly proportional to the size of the land holding. The average outstanding loan (Table 5.20) is Rs. 79,180/- for marginal farmers and Rs 1,93,900/- for medium farmers.

Cost of cultivation:

Costs of cultivation of paddy across different categories of farms have been shown in Table 5.21. Per acre use of material cost is high due to the increase

in seed cost. The labour costs are also high in the cultivation of paddy for all the farmer categories.

Operation-related cost structure of cotton shows that (Table 5.22) harvesting consumes almost 44.9 percent of the total cost for semi-medium farmers. Material is the second highest cost component. In the case of cotton, weeding expenses add to overall expenditure. However, it is to be noted that depending upon the season, rainfall and availability of water, the cost slightly varies across the farmer groups.

Table 5.23 reveals the percentage contribution of different components of the cultivation costs of chillies**.** The labour cost per acre for chilli crop is different for small and medium farms. The variation is due to the differences in costs of human labor incurred by these farmers. It shows that chilli cultivation is highly labour intensive, especially during harvesting season, and the expenses are also correspondingly high. The expenses for hired labour were found to increase with the increase in farm size. This might be because marginal farms are dependent more on family labor for carrying out various agricultural operations, while the large farms have to pay for hired labor.

Production

The production details of paddy in Table 5.24 show that marginal farmers have allocated relatively more area to paddy cultivation. Average quantity produced is the highest for medium farmers, i.e., 21 bags per acre. Highest

contribution to total production is by marginal farmers. Irrespective of the farm size, significant portion of the output produced is kept aside for family consumption.

In Table 5.25, the per-acre production data of cotton is presented. The average quantity of cotton produced across farm categories range between 10 to 13 quintals[4] per acre. Marginal, small and semi-medium farmers sell the entire output. The average price obtained is Rs 4,666/-.Yield gap is not much across farmer categories. It is evident that the increased production of cotton is due to its financial viability since the demand for cotton is on the rise.

In the case of chillies, the average output produced by the medium farmers is the highest, i.e., 17.50 quintals per acre. All the sample farms sold their output. The largest crop cultivated by small farmers is chillies and it gives maximum output. Medium farmers get the highest average price of Rs. 10,000/- per acre. Small farmers get a relatively low average price of Rs 8,875/-per acre (Table 5.26).

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

Data on MGNREGS effectiveness in terms of employment participation of different categories of farmers is presented in Table 5.27. MGNREGS is more popular among small and marginal farmers. Among the farmer groups, more workers participated from the households of marginal farmers. The representation

of workers from the small farms is 76.5 percent. All the surveyed semi-medium farmers go for MGNREGS work. 50 percent of medium farmers avail work under this scheme.

5.6 Conclusion

Supply response of agricultural commodities exhibit variations across crops and regions. Besides the price, supply of an agricultural commodity depends on other factors such as class and caste composition of land ownership, crops grown, irrigation, credit, agricultural markets, etc. This chapter emphasizes the role of these factors in determining supply response to acreage at micro level. The above findings from the micro-level issues give us significant data to explain the supply response of farmers in Telangana region. Findings from the field work help us analyze the key factors that affect the supply response in this region. An in-depth analysis of indicative factors from the micro level that affect supply response is discussed in chapter 7.

TABLES

Table 5 .1

Farm Size distribution of sample Households

Farmers category	Frequency	Percent
Marginal	27	54.0
Small	17	34.0
Semi-medium	4	8.0
Medium	2	4.0
Total	**50**	**100.0**

Source: Field Survey, 2011-12

Figure 5 .1

Farm Size distribution of sample Households (In Percent)

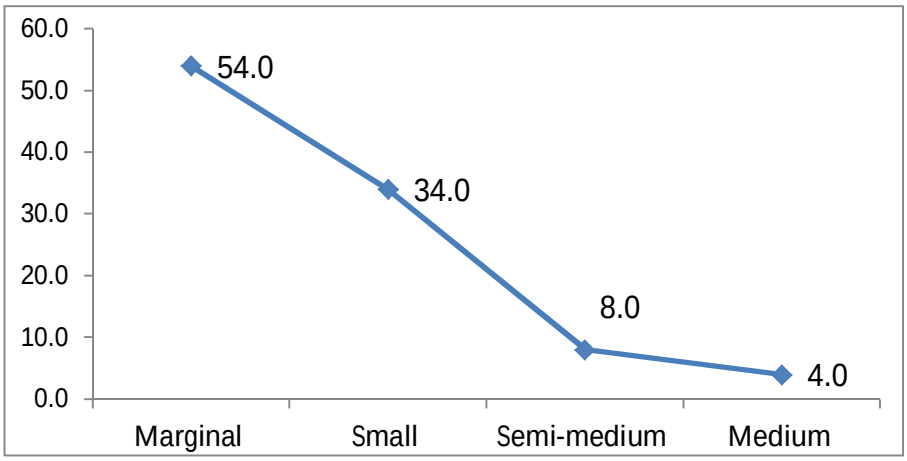


Table 5.2

Caste-wise distribution

Farmers category	SC	ST	BC	OC	Total
Marginal	3 (11.1)	6 (22.2)	16 (59.3)	2 (7.4)	27 (100.0)
Small	0 (0.0)	5 (29.4)	10 (58.8)	2 (11.8)	17 (100.0)
Semi-medium	1 (25.0)	0 (0.0)	2 (50.0)	1 (25.0)	4 (100.0)
Medium	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	2 (100.0)
Total	**4 (8.0)**	**12 (24.0)**	**28 (56.0)**	**6 (12.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 5.2

Caste-wise distribution (In Percent)

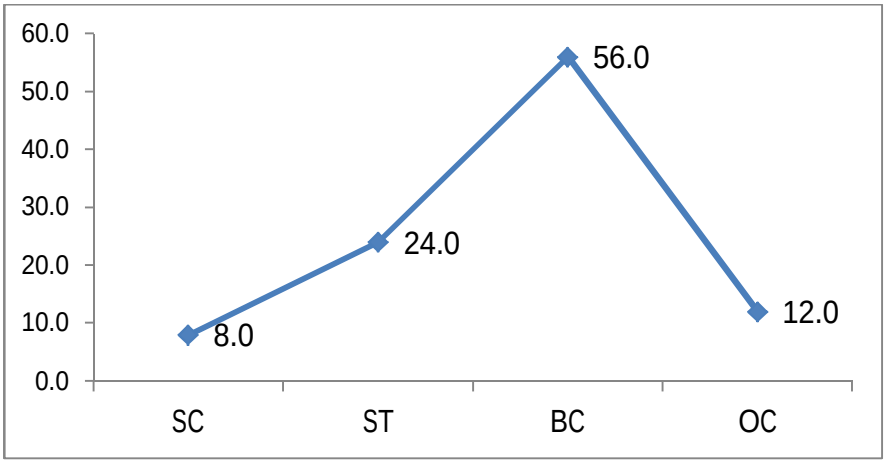


Table 5.3
Housing Structure

Farmers category	Kutcha	Pucca	Semi Pucca	Total
Marginal	8 (29.6)	11 (40.7)	8 (29.6)	27 (100.0)
Small	2 (11.8)	9 (53.0)	6 (35.3)	17 (100.0)
Semi-medium	0 (0.0)	2 (50.0)	2 (50.0)	4 (100.0)
Medium	0 (0.0)	1 (50.0)	1 (50.0)	2 (100.0)
Total	**10 (20.0)**	**23 (46.0)**	**17 (34.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 5.4
Family Size Composition

Farmers category	2	3	4	5	6	7	8	Total
Marginal	3 (11.1)	4 (14.8)	13 (48.1)	7 (25.9)	0 (0.0)	0 (0.0)	0 (0.0)	27 (100.0)
Small	2 (11.8)	3 (17.6)	5 (29.4)	4 (23.5)	1 (5.9)	2 (11.8)	0 (0.0)	17 (100.0)
Semi-medium	0 (0.0)	1 (25.0)	0 (0.0)	0 (0.0)	2 (50.0)	1 (25.0)	0 (0.0)	4 (100.0)
Medium	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	2 (100.0)
Total	**5 (10.0)**	**8 (16.0)**	**18 (36.0)**	**11 (22.0)**	**4 (8.0)**	**3 (6.0)**	**1 (2.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 5.5
Age Group

Farmers Category	21-40	41-60	Above 40	Total
Marginal	14 (51.9)	10 (37.0)	3 (11.1)	27 (100.0)
Small	7 (41.2)	7 (41.2)	3 (17.6)	17 (100.00)
Semi-medium	1 (25.0)	2 (50.0)	1 (25.0)	4 (100.0)
Medium	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Total	22 (44.0)	19 (38.0)	9 (18.0)	50 (100.0)

Source: Field Survey, 2011-12

Table 5.6

Literacy

Farmers Category	Illiterate	Below Primary	Primary	Upper Primary	Secondary	Higher Secondary	Graduate	Total
Marginal	17 (63.0)	4 (14.8)	0 (0.0)	3 (11.1)	1 (3.7)	0 (0.0)	2 (7.4)	27 (100.0)
Small	6 (35.3)	3 (17.6)	1 (5.9)	2 (11.8)	0 (0.0)	5 (29.4)	0 (0.0)	17 (100.0)
Semi-medium	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (100.0)
Medium	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	**28 (56.0)**	**8 (16.0)**	**1 (2.0)**	**5 (10.0)**	**1 (2.0)**	**5 (10.0)**	**2 (4.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 5.3

Literacy (In Percent)

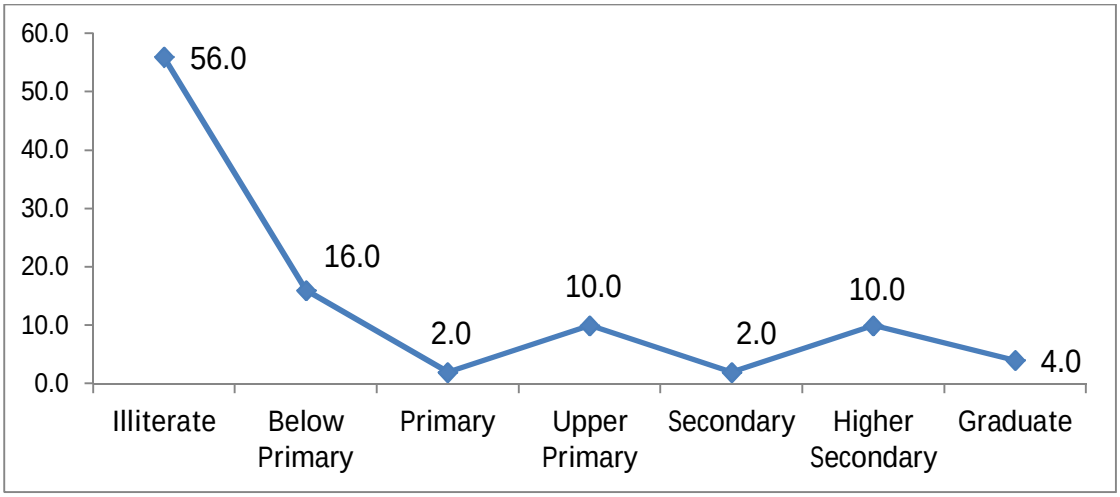


Table 5.7

Occupation

Farmers Category	Agriculture	Agriculture & Others	Total
Marginal	6 (22.2)	21 (77.8)	27 (100.0)
Small	5 (29.4)	12 (70.6)	17 (100.0)
Semi-medium	1 (25.0)	3 (75.0)	4 (100.0)
Medium	1 (50.0)	1 (50.0)	2 (100.0)
Total	**13 (26.0)**	**37 (74.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 5.4

Occupation (In Percent)

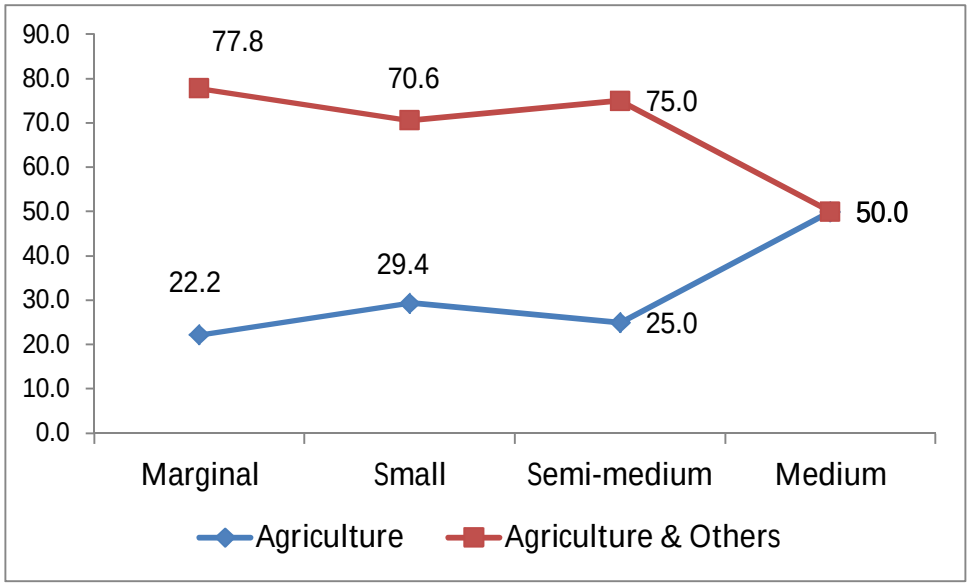


Table 5.8

Monthly Food Expenditure

Farmers category	Below 2000	2001-3000	3001-4000	4001-5000	Total
Marginal	10 (37.0)	16 (59.3)	0 (0.0)	1 (3.7)	27 (100.0)
Small	1 (5.9)	9 (52.9)	7 (41.2)	0 (0.0)	17 (100.0)
Semi-medium	1 (25.0)	0 (0.0)	3 (75.0)	0 (0.0)	4 (100.0)
Medium	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)	2 (100.0)
Total	**12 (24.0)**	**25 (50.0)**	**11 (22.0)**	**2 (4.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 5.9

Annual Non-Food Expenditure

Farmers Category	Educa-tion	Health	Cloth-ing	Social Activities	Bills	Alcohol and other intoxicants	Trans-port	Savings
Marginal	8.4	15.8	12.3	25.3	1.5	25.2	8.9	2.6
Small	4.8	26.0	17.2	17.0	1.1	27.0	4.1	2.8
Semi-Medium	9.8	13.3	12.0	21.6	0.8	13.0	9.0	20.5
Medium	6.3	7.6	12.4	22.5	4.4	16.2	12.4	18.2

Source: Field Survey, 2011-12

Table 5.10

Livestock

Farmers Category	Milch Animals	Sheep	Goat	Poultry	Total
Marginal	2 (18.2)	2 (18.2)	0 (0.0)	7 (63.6)	11 (100.0)
Small	3 (25.0)	2 (16.7)	0 (0.0)	7 (58.3)	12 (100.0)
Semi-medium	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	2 (100.0)
Medium	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	2 (100.0)
Total	**6 (22.2)**	**5 (18.5)**	**1 (3.7)**	**15 (55.6)**	**27 (100.0)**

Source: Field Survey, 2011-12

Figure 5.5

Livestock (In Percent)

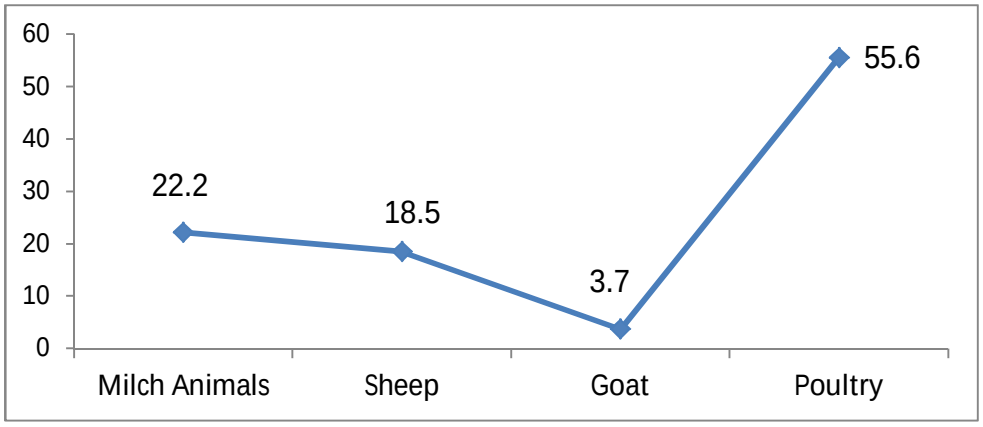


Table 5.11

Farm Machinery, Implements & Equipments

Farmers Category	Pump sets	Sprayer	Tractor	Bullock cart	Ploughs	Electric Motor	Others	Total
Marginal	21 (22.3)	16 (17.0)	0 (0.0)	6 (6.4)	13 (13.8)	20 (21.3)	18 (19.1)	94 (100.0)
Small	22 (18.8)	18 (15.4)	0 (0.0)	10 (8.5)	25 (21.4)	14 (12.0)	28 (23.9)	117 (100.0)
Semi-medium	3 (15.0)	3 (15.0)	0 (0.0)	2 (10.0)	5 (25.0)	5 (25.0)	2 (10.0)	20 (100.0)
Medium	3 (20.0)	3 (20.0)	1 (6.7)	1 (6.7)	4 (26.7)	3 (20.0)	0 (0.0)	15 (100.0)
Total	**49 (19.9)**	**40 (16.3)**	**1 (0.4)**	**19 (7.7)**	**47 (19.1)**	**42 (17.1)**	**48 (19.5)**	**246 (100.0)**

Source: Field Survey, 2011-12

Figure 5.6

Farm Machinery, Implements & Equipments (In Percent)

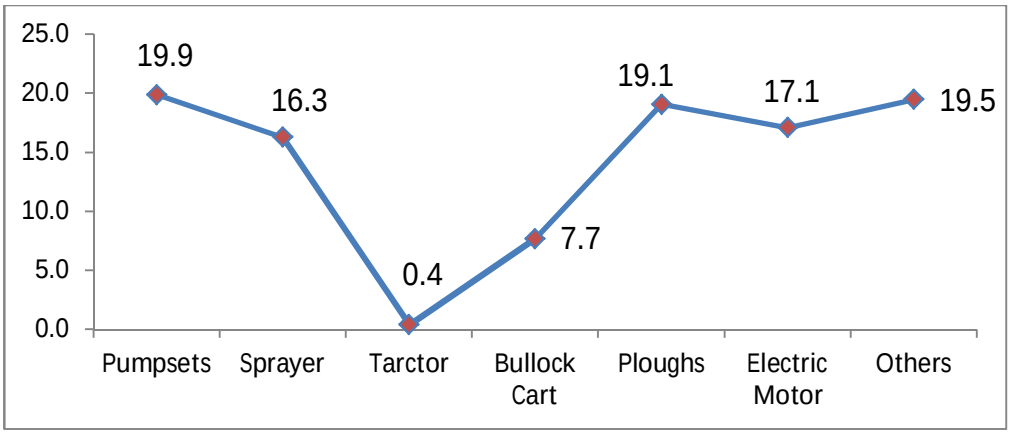


Table 5.12

Average size of land holdings

Farmer Category	No of Farmers	Percent of Farmers	Total Land	Percent of Land	Average
Marginal	27	**54.0**	41.5	**25.70**	1.4
Small	17	**34.0**	75.0	**46.44**	3.6
Semi-Medium	4	**8.0**	23.0	**14.24**	5.6
Medium	2	**4.0**	22.0	**13.62**	7.3
Total	**50**	**100.0**	**161.5**	**100.00**	**3.23**

Source: Field Survey, 2011-12

Figure 5.7

Average size of land holdings

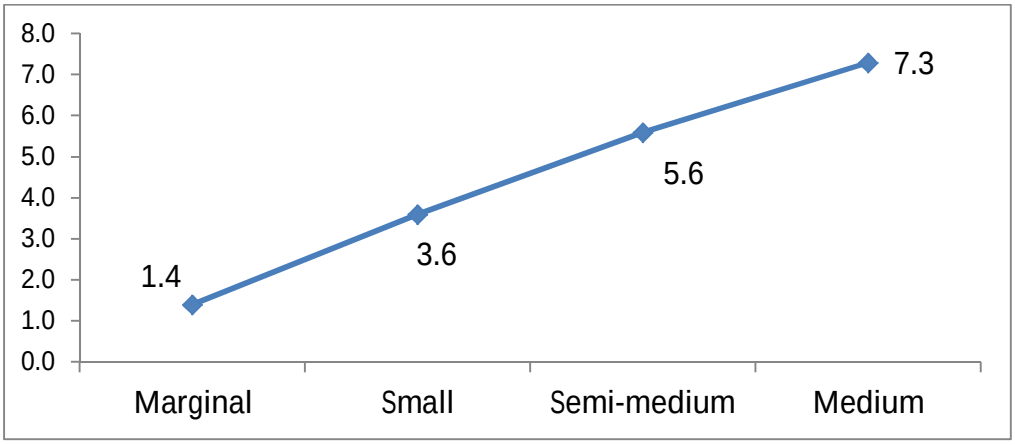


Table 5.13

Tenure Type

Farmers category	Own	Own & Leased-in	Total
Marginal	26 (96.3)	1 (3.7)	27 (100.0)
Small	13 (76.5)	4 (23.5)	17 (100.0)
Semi-medium	4 (100.0)	0 (0.0)	4 (100.0)
Medium	1 (50.0)	1 (50.0)	2 (100.0)
Total	**44 (88.0)**	**6 (12.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 5.8

Tenure Type (In Percent)

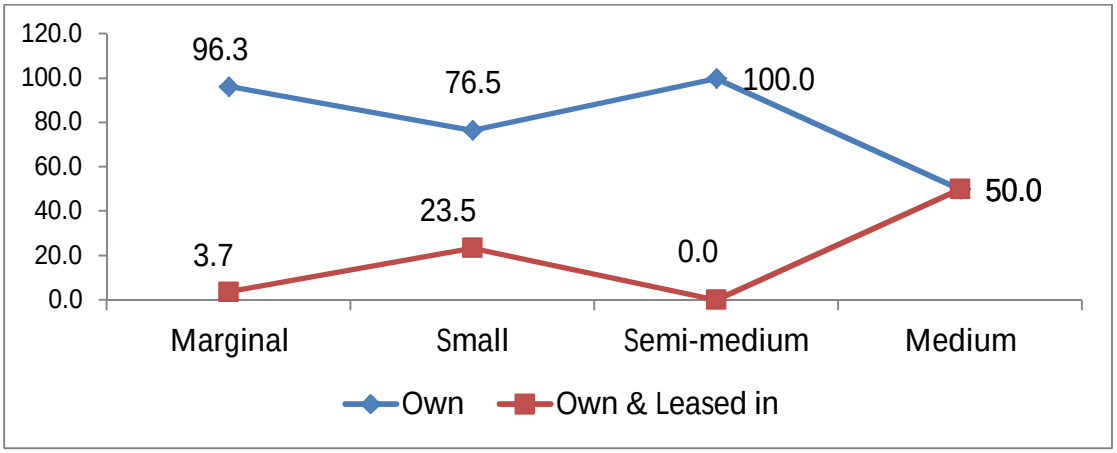


Table 5.14

Acreage under Food and Non-Foodgrain crops

Farmers Category	Food	Non-Food
Marginal	16.4	83.6
Small	7.2	92.8
Semi-Medium	16.4	83.6
Medium	16.7	83.3
Total	**12.5**	**87.5**

Source: Field Survey, 2011-12

Figure 5.9

Acreage under Food and Non-Foodgrain crops (In Percent)

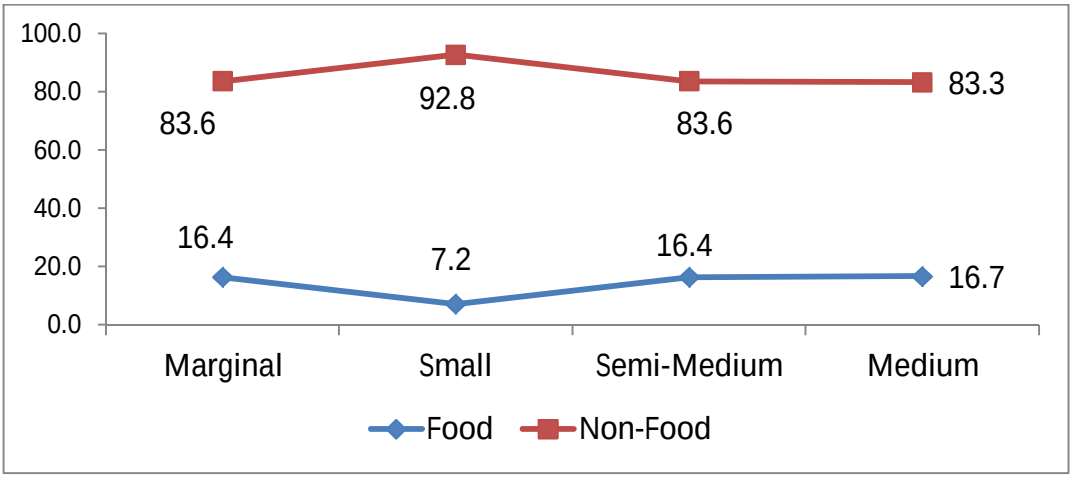


Table 5.15

Source of irrigation

Farmers Category	Rainfed	Tanks	Wells*
Marginal	16.7	8.3	75.0
Small	7.2	2.6	90.2
Semi-medium	0.0	0.0	100.0
Medium	0.0	0.0	100.0
Total	**8.0**	**3.6**	**88.4**

***including bore wells, tube wells, and open wells*

Source: Field Survey, 2011-12

Figure 5.10

Source of irrigation (In Percent)

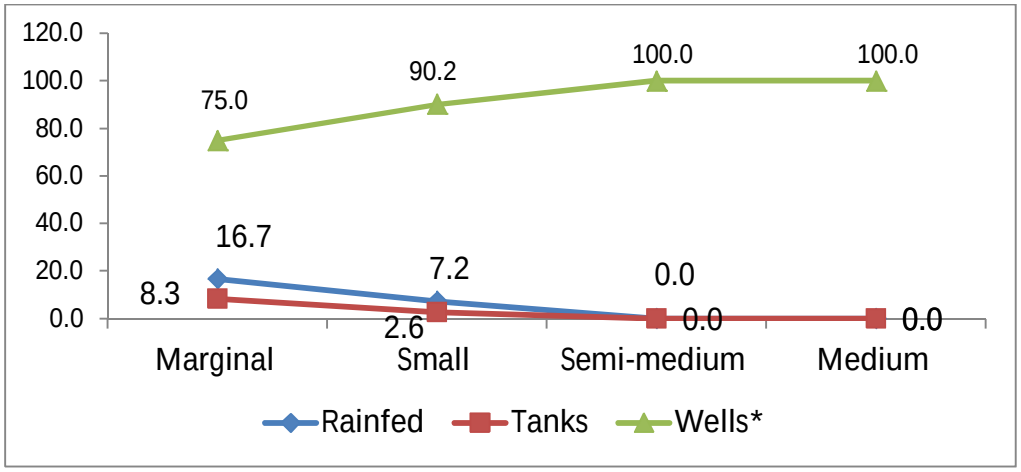


Table 5.16

Crops Grown

Farmers category	Chillies & Paddy	Cotton & Paddy	Cotton & Chillies	Cotton	Chillies	Cotton, Paddy & Chillies	Cotton & Castor	Paddy	Chillies & Groundnut	Groundnut, Chillies & Paddy	Cotton, Turmeric & Chillies	Total
Marginal	3 (11.1)	0 (0.0)	6 (22.2)	12 (44.4)	1 (3.7)	1 (3.7)	0 (0.0)	3 (11.1)	1 (3.7)	0 (0.0)	0 (0.0)	27 (100.0)
Small	0 (0.0)	2 (11.8)	7 (41.2)	2 (11.8)	0 (0.0)	2 (11.8)	1 (5.9)	0 (0.0)	1 (5.9)	1 (5.9)	1 (5.9)	17 (100.0)
Semi-medium	0 (0.0)	0 (0.0)	0 (0.0)	1 (25.0)	2 (50.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (100.0)
Medium	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	**3 (6.0)**	**2 (4.0)**	**13 (26.0)**	**15 (30.0)**	**5 (10.0)**	**4 (8.0)**	**1 (2.0)**	**3 (6.0)**	**2 (4.0)**	**1 (2.0)**	**1 (2.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 5.11

Crops Grown (In percent)

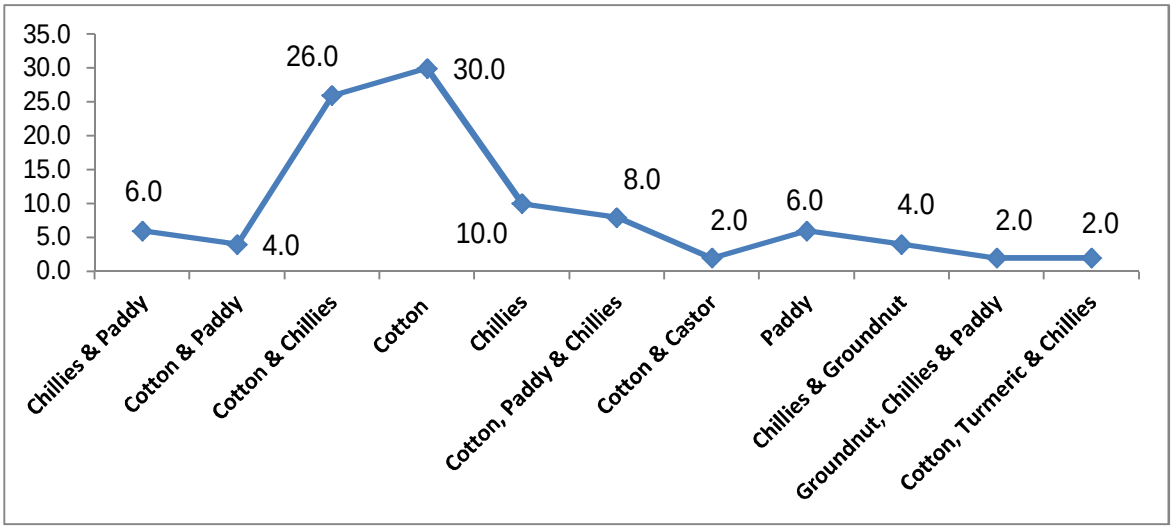


Table 5.17

Source of Credit

Farmers Category	Banks	MCGs*	Commission Agents	Fertilizer Dealers	Relatives	Land Lords	Big Farmers	Friends
Marginal	31.3	12.5	7.8	20.3	12.5	7.8	4.7	3.1
Small	40.0	15.0	2.5	15.0	15.0	5.0	0.0	7.5
Semi-medium	40.0	20.0	10.0	20.0	0.0	0.0	0.0	10.0
Medium	42.9	14.3	0.0	14.3	28.6	0.0	0.0	0.0
Overall	**35.1**	**14.2**	**5.8**	**18.3**	**13.3**	**5.8**	**2.5**	**5.0**

**Micro-Credit Groups*
Source: Field Survey, 2011-12

Figure 5.12

Source of Credit (In Percent)

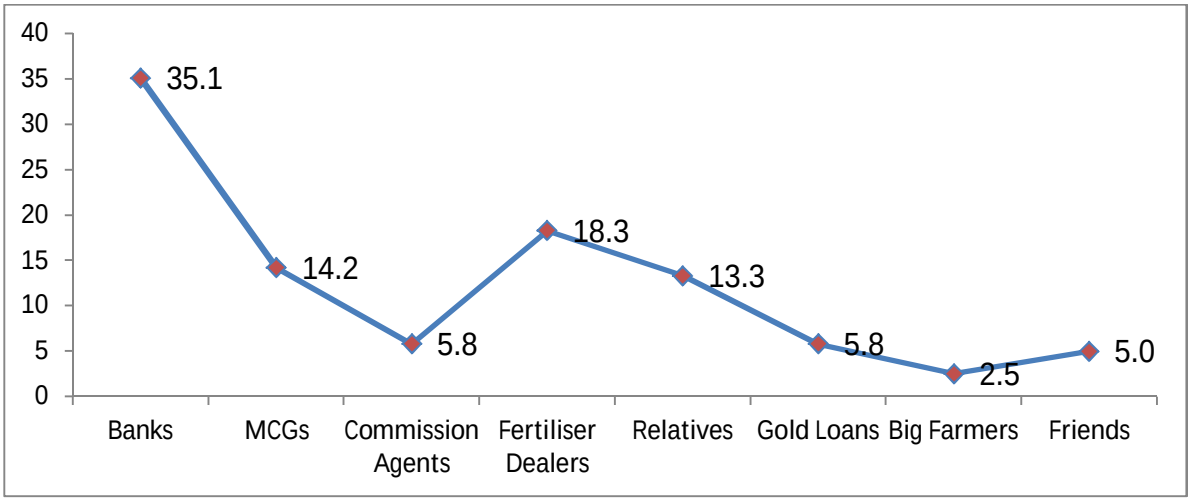


Table 5.18

Purpose of Credit

Farmers category	Agriculture	Dug well	Live stock	Consumption	Education	Health	Marriage	Land Purchase
Marginal	36.2	1.5	6.1	26.1	16.3	6.2	4.6	3.1
Small	50.0	2.3	0.0	10.5	18.2	9.1	0.0	0.0
Semi-medium	54.5	9.1	3.7	9.1	13.7	10.0	0.0	0.0
Medium	57.1	0.0	0.0	21.5	7.2	0.0	14.3	0.0
Overall	**51.8**	**3.2**	**2.5**	**16.8**	**13.9**	**6.3**	**4.7**	**0.8**

Source: Field Survey, 2011-12

Figure 5.13

Purpose of Credit (In Percent)

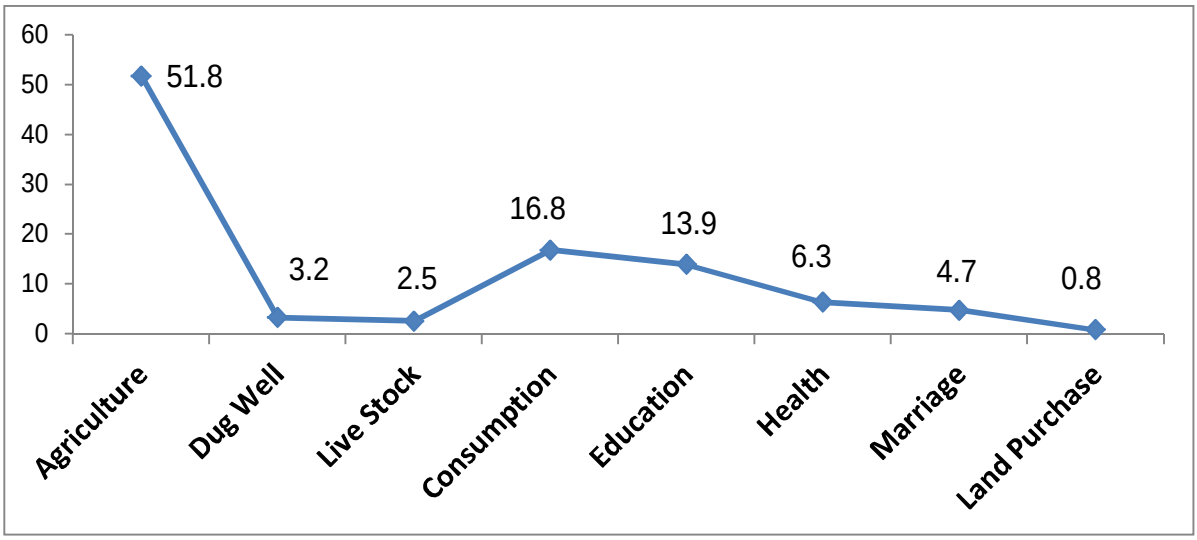


Table 5.19

Average amount of credit per household

Farmers Category	% of Farmers	Avg. Amount of Credit
Marginal	53.2	88860
Small	34.0	100500
Semi-medium	8.5	152500
Medium	4.3	199500
Total	**100.0**	

Source: Field Survey, 2011-12

Figure 5.14

Average amount of credit per household

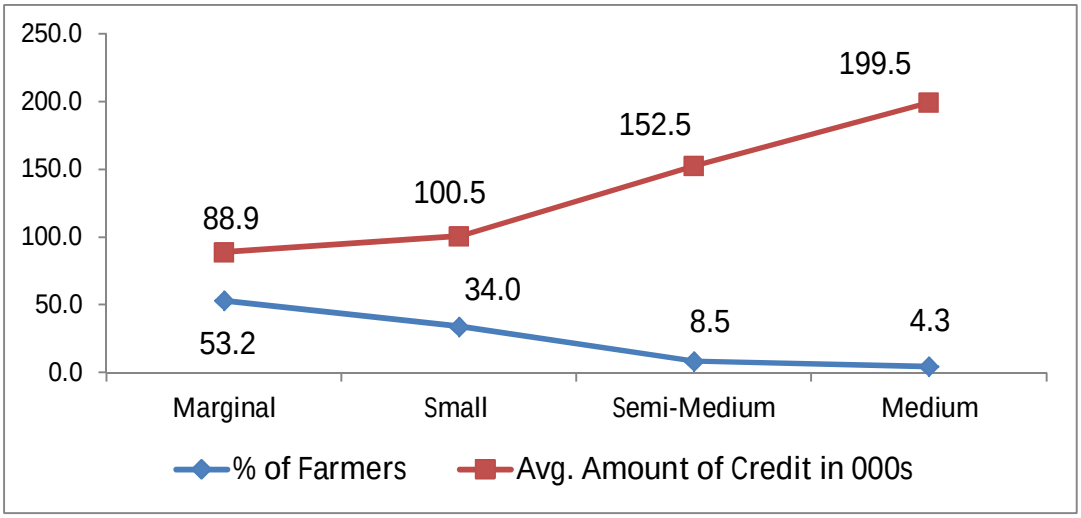


Table 5.20

Loan Outstanding

Farmers Category	% of Farmers	Avg. Amount of outstanding
Marginal	54.3	79180
Small	34.8	120125
Semi-medium	6.5	115000
Medium	4.3	193900
Total	100.0	

Source: Field Survey, 2011-12

Figure 5.15

Loan Outstanding

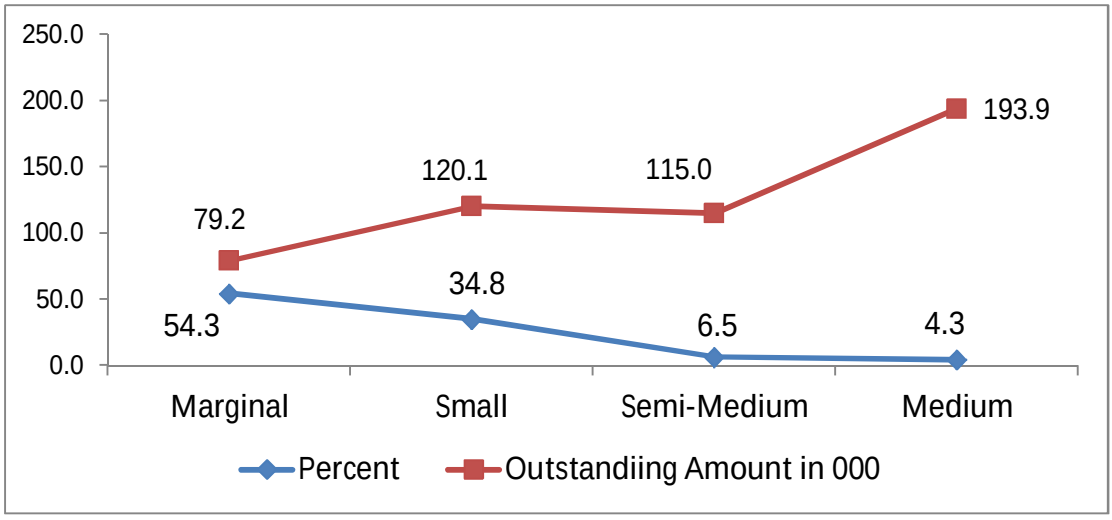


Table 5.21

Percentage Contribution of different Components towards Cost of cultivation of Paddy crop

Cost Structure	Marginal	Small	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	17.3	18.2	18.5	18.4
Material Costs	42.9	38	41.4	40.4
Labour Costs	31.3	30.6	32.2	33.1
Other Costs	8.5	4.3	7.9	8.1

Source: Field Survey, 2011-12

Table 5.22

Percentage Contribution of different Components towards Cost of cultivation of Cotton crop

Cost Structure	Marginal	Small	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	12.4	14.3	11.4	11.3
Material Costs	35.8	36.7	34.5	40
Labour Costs	38.9	39.2	44.9	41.2
Other Costs	**12.9**	**9.8**	**9.2**	**7.5**

Source: Field Survey, 2011-12

Table 5.23

Percentage Contribution of different Components towards Cost of cultivation of Chillies crop

Cost Structure	Marginal	Small	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	10.8	9.1	8.4	9.1
Material Costs	35.1	37.1	34.3	35.4
Labour Costs	44.5	41.2	46.1	48.9
Other Costs	9.6	12.6	11.2	6.6

Source: Field Survey, 2011-12

Table 5.24

Paddy Crop Output

Farmers Category	No of farmers	Acres	Avg. Quantity produced (No of bags) per acre	Total Production (bags)	Quantity sold (bags)	Consumption (bags)	Avg. price
Marginal	7	8.0	17.00	137	82	49	1043
Small	5	5.5	16.60	93	38	45	1000
Semi-Medium	3	4.5	18.33	90	20	35	1000
Medium	1	4.0	21.00	84	--	--	960

Source: Field Survey, 2011-12

Table 5.25

Cotton Crop Output

Farmers Category	No of farmers	Acres	Avg. Quantity produced (No of quintals per acre)	Total Production	Quantity sold	Avg price
Marginal	18	26.75	10.72	303.0	303.0	4772.00
Small	14	43.00	11.43	473.5	473.5	4559.37
Semi-Medium	3	14.00	10.00	126.0	126.0	4833.00
Medium	2	13.00	13.00	160.0	0.0	4500.00

Source: Field Survey, 2011-12

Table 5.26

Chillies Crop Output

Farmers Category	No of farmers	Acres	Avg. Quantity produced (No of quintals per acre)	Total Production	Quantity sold	Avg price
Marginal	11	**12**	**11.63**	**143**	**143**	**9136.36**
Small	13	22	11.07	289	289	8875.00
Semi-Medium	3	9	12.00	120	120	9000.00
Medium	2	7	17.50	110	106	10000.00

Source: Field Survey, 2011-12

Table 5.27

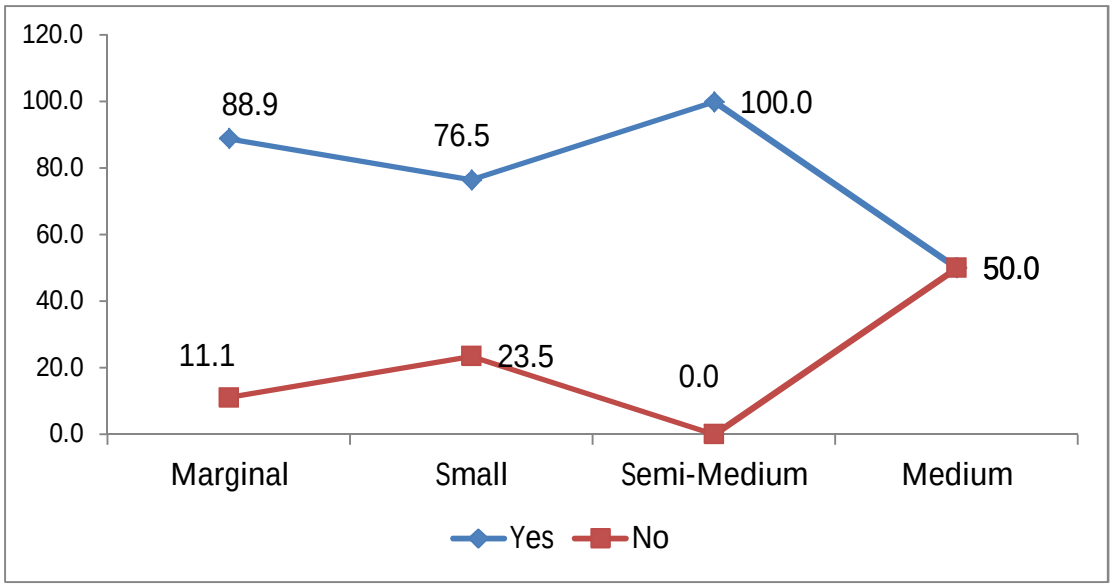
Participation in MGNREGS

Farmers Category	Yes	No	Total
Marginal	24 (88.9)	3 (11.1)	27 (100.0)
Small	13 (76.5)	4 (23.5)	17 (100.0)
Semi-Medium	4 (100.0)	0 (0.0)	4 (100.0)
Medium	1 (50.0)	1 (50.0)	2 (100.0)
Total	42 (84.0)	8 (16.0)	50 (100.0)

Source: Field Survey, 2011-12

Figure 5.16

Participation in MGNREGS (In Percent)



End Notes

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[1] Telangana region had been suffered under the oppression of the feudal regime of the Nizam. The Great Telangana Armed Struggle was the struggle of poor peasants against the tyranny of landlordism.

[2] Utilization of groundwater through borewells is higher in Telangana.

[3] Thandas are usually group of households of same social group staying near to a village. Geographically they are not part of the village but officially they come under Gram Panchayat of nearby village.

[4]'Quintals' word is usually a local term which defines weight of the ouput. Quintal is equal to 100 kgs.

CHAPTER 6

SUPPLY RESPONSE OF FARMERS IN RAYALASEEMA: MICRO-LEVEL ISSUES

6.1 Introduction

Rayalaseema region has been considered as a drought-prone region[1] with poor resource endowments and underutilization of resources. The region is far behind other regions in terms of its per capita income and productivity in agriculture. Due to the less productive land, Rayalaseema region supports very less agricultural labourers[2]. The southern-most district of the Rayalaseema region, Anantapur has been selected as a representative district for field study. Anantapur district is characterized as drought-prone and located in the rain-shadow region[3] of Andhra Pradesh. Agriculture in the district suffers from high levels of instability and uncertainty. It is a known fact that agrarian crisis is widespread across the country and the drier tracts of have become more vulnerable. As the district is endowed with rich deposits of iron ore, lime stone and other minerals, mining has also become an important activity of the district. This chapter studies the supply response in Rayalaseema. Field study was conducted in Basinepalli village of Gooty mandal.

The chapter is divided into four sections. Section 1 begins with agrarian profile of the study area and details demographic characteristics and structure of agriculture. Section 2 examines socio-economic profile of sample households. Section 3 deals with the structure of agriculture in terms of land use, cropping

pattern, credit institutions, crop yields, marketing, structure of employment and agricultural wages. Section 4 provides conclusions.

6.2 Brief Agricultural Profile of the Selected District

Among all the districts of Andhra Pradesh, Anantapur district receives the least rainfall of 553.0 mm per annum. Red soil is predominant in Anantapur district. It constitutes 78 percent of the area, black soil constitutes 20 percent and the remaining 2 percent consists of other soils. In some mandals such as Gooty, red and black soils are present in equal proportions. The district occupies the bottom-most position with respect to irrigation facilities[4]. Only 14.08% of the gross cropped area had been irrigated during 2006-2007. Minor millets such as varagu, korra and major millet such as sorghum, various pulses and paddy are the major food grains in the district. Anantapur has the largest share of groundnut acreage in Andhra Pradesh. Acreage under groundnut has increased over time as it is a shorter-duration and drought-resistant crop and demands less drudgery in cultivation.

Overall, contribution of Anantapur district to food grain production has declined with the popularity of groundnut cultivation[5]. Open dug wells and tube wells have not been able to compensate for the loss of irrigation from other sources. Though the importance of open dug wells has declined over the years, they continue to be a vital source of irrigation in the district. It is estimated that 63 percent of the total geographical area of the district is covered by sandy loam; 14 percent by rock land; and about 19 percent by clay. Agriculture in Anantapur is

highly commercialized and hence about 56.5 percent of the total gross cropped area of 105 lakh hectares is under non-food crops, especially groundnut (19 percent of the area).

6.3 Agriculture Profile of the Surveyed Village

As mentioned before, field survey was conducted in Basinepalli village of Gooty mandal. This village is 8 kms away from mandal headquarters and 50 kms away from district headquarters. This village was transformed into gram panchayat in 1974 by combining Basinepalli thanda. There are 10 tractors in the village. There are 30 Self-Help Groups (SHGs) working in the village. The village has one anganwadi centre, one primary school and a public distribution system. There are 10 SHGs functioning in the thanda. RDT (Rural Development Trust) [6] primary school is also present here. Agriculture is the predominant activity in the village. The major crops grown in the village are groundnut, castor, jowar, paddy, chillies and cotton. Rural Development Trust commenced its welfare programmes in Basinepalli thanda in 1995.

6.4 Socio-Economic Profile of the Sample Households

Farm Size-wise Distribution of Sample Households

Total sample comprised of 50 farmers representing various farm groups. The data covers 14 marginal (28 percent), 20 small (40 percent), 9 semi-medium (18 percent) and 7 medium (14 percent) farmers (Table 6.1). Land holdings

mostly belong to the category of small farms. About 40 percent of farm households cultivate less than an aggregate of 2-4 acres of land.

Caste-wise Categorization

Caste-wise distribution of sample households is presented in Table 6.2. Backward Caste emerges as the dominant group with 46 per cent of the farmers belonging to this category. This is followed by Scheduled Tribes (26 per cent). OCs and SCs constitute 20 percent and 8 percent respectively.

Housing Structure

Table 6.3 gives the housing particulars collected from the sample households. All the sample families live in their own houses. Around 68 percent of the households have pucca houses. About 32 percent of households own semi-pucca houses.

Family-Size Composition

It can be observed from Table 6.4 that the sizes of most of the families range from 3 to5 members. There are very few large families of 6-9 members.

Age Group

Most of the farmers (50 percent) are in the age group of 41-60 years. Significant portion of farmers are also there in the 21-40 age group and they account for 42 percent. Only 8 percent of farmers are above the age group of 60 years (Table 6.5).

Literacy

A big chunk of the farmers are illiterates (38 percent). More than 40 percent of the illiterates are in marginal- and small-farmer categories. A good number of farmers, i.e., 20 percent, have education upto secondary level. Farmers who are educated up to higher secondary and graduation levels constitute 12 percent and 6 percent respectively. This reveals the educational development in the village. The village is surrounded by many educational institutions and many developmental activities are undertaken by RDT. Financial help is also provided to the children in the village. To improve the literacy of female children, every year they deposit Rs 700 for each boy and Rs 500 for each girl in their names in the bank. The deposits are made till they turn 18. RDT has built special school buildings for the children studying in classes 1 to 5 to avoid dropouts. Literacy rates of the selected families were found to be impressive and large farm households have higher levels of literacy (Table 6.6).

Occupation

Table 6.7 shows that many of the farmers are involved in non-agricultural activities along with the agriculture as the primary occupation. Agriculture is the only livelihood of 20 percent of the farmers. Agriculture as well as agricultural labour and non-agricultural labour were the sources of income for majority (80 per cent) in the village. Semi-medium and medium farmers present a different picture where agriculture is the only occupation. Dairying has become a profitable occupation for farmers and it has led to a significant improvement in the

livelihoods of small and marginal farmers. Most of them supplement their agricultural incomes with dairy farming.

Monthly Food Expenditure

The pattern of food expenditure is presented in Table 6.8. Total per capita monthly expenditure of 50 percent of the total households lies between Rs 2001-3000, followed by 38 percent who spend less than Rs 2000 per month for food items. Only 12 percent of the farmers have monthly food expenditure of Rs. 3001-4000 of which majority falls in semi-medium and medium farmers.

Annual Non-food Expenditure

The percentage contribution of different items to non-food expenditure is explained in Table 6.9. The level of expenditure on education is high for semi-medium farmers. Savings rates are low for small farm groups as their incomes are low. Semi--medium and large farmers save 7.5 percent and 6.1 percent of their respective incomes. Expenditure on alcohol is relatively low for semi-medium and medium farmers. Expenditure on social activities and clothes is considerable for most households.

Livestock

Generally livestock in the villages are raised on fodder obtained from crop residues. Livestock composition is usually determined by the supply of fodder and investment capabilities of the farmers**.** Hence, the development of the livestock sector is linked to the performance of field crops. Consecutive crop failures, extreme weather shocks such as drought, cause decline in field crops which leads

to scarcity of feed. This in turn leads to decline in animal productivity. Table 6.10 gives the livestock composition across farmer groups. The concentration of milch animals is higher among the medium (21.4 percent) and small farmers (25.5 percent). Small-farmer group has the highest share of milch animals, followed by semi-medium and medium groups. Only one farmer from the marginal farm group possesses a milch animal. Only marginal-farmer group rears goats. Marginal and semi- medium farmers own higher share of poultry. Poultry accounts for 78 percent of the total livestock population.

Farm Implements

Details of agricultural implements are presented in Table 6.11. It has become difficult to rear animals due to drought conditions and scarcity of fodder. So most of the farmers have the small agricultural implements (bullock cart, nagali, jambu, guntuka[7]) and are farming with tractor. Ownership of agricultural implements has a direct relationship with farm size. Farmers with large holdings possess more implements and farmers with small holdings possess the least. Medium and small holdings do not possess tractor, so they hire tractors from others. Sprayers and electric motors are common items owned by all types of farmers. Generally, tractor-use capacity increases with the increase in farm size. But in recent times, tractors have been made available to even the marginal- and small-farmer groups. To protect the crop from pests, pesticides are applied using different kinds of sprayers. This is common for groundnut, paddy and cotton crops. Though farm mechanization gives a positive contribution to the production, the extent and use of this power is relatively low in the village.

6.5 Agro-Economic Analysis of Sample Farm Households

Average Size of Land Holding

Marginal and small holdings occupy 8.48 and 27.14 percent of the total area respectively (Table 6.12). Medium holdings account for 41.09 percent of the total operated area in the selected sample. 18 percent of semi-medium holdings occupy nearly 23.27 percent of operational area.

Tenure Type

The details regarding tenure types are presented in Table 6.13 indicate that only 6 percent of the farmers use rented land. Around 88 percent of farmers cultivate their own land. As there is scarcity of water, no one is interested in taking land for lease. Only 6 percent of the farmers combine their own and leased lands for cultivation. The quantity of rainfall is getting reduced with each passing year. Since crops are not performing well, the farmers do not earn enough to pay rent even if they lease land. If anyone takes land for lease, they have to pay rent to the tune of Rs1,500/-per acre. The rent further increases to Rs.8,000-10,000/- per acre if there are irrigation facilities.

Source of Irrigation

The region is at a disadvantageous position with respect to irrigation. Table 6.14 depicts the distribution of area under different sources of irrigation. It can be observed that irrespective of the size of the farm, the proportion of area under well irrigation is substantially high. Though well irrigation is highly capital

intensive, exploitation of groundwater resources has increased rapidly. Nearly half of the area is rain-fed. A significant part of area owned by semi-medium farmers (64.3 percent) is under borewell irrigation.

Acreage under Food and Non-Foodgrain Crops

Paddy and jowar are the food grains and groundnut, chillies, cotton and castor are the non- foodgrain crops grown in the village. The percentages of areas under these crops are shown in Table 6.15. Non-foodgrain crops account for 79 percent of the total area. This proves the farmer's preference for non-foodgrain crops. Only 21 percent of the area is under food grain cultivation. The share of non-foodgrains crops is 86.9 percent for small farmers and 79.2 percent for medium farmers.

Crops Grown

Details of area allocated to various crops are presented in Table 6.16. The table shows that 62 percent of the cultivators allocated their land to groundnut cultivation. The percentage of area allotted to groundnut crop in the case of small farmers is slightly more than the other groups. It accounts for 85 percent of the total area cultivated by small farmers. As far as other crops are concerned, it could be observed that the marginal farmers have allotted 28.6 percent of area for castor cultivation. Lesser amounts of area are allotted to cultivating redgram, jowar, cotton and chillies.

Sources of Credit

Table 6.17 shows formal and informal credit access to different categories of farm households. It could be observed that the commercial banks and micro-credit societies are the most popular institutions providing credit, irrespective of the size of the farms. Banks provide credit to 38.2 percent of farm households. Only 10 percent medium farms and 4.5 percent of semi-medium farmers borrow from Commission agents. About 16.7 percent of farmers borrow from relatives. It is clear that non-institutional sources constitute a major share of total loan provided. A small percentage of loan is provided by landlords, big farmers and friends. The relative importance of non-institutional sources of credit is high. More than half of the loan amount is spent on agriculture by all the farm groups. Next to agriculture, farmers spent the loan amount for digging borewells, education and consumption purposes. A negligible proportion of loan was spent on business, cattle purchase, house construction, health, and marriage (Table 6.18).

The average amounts of credit availed across farm households are given in Table 6.19. The loans amount to an average of Rs 62,384/acre, Rs 1,00,500/acre and Rs 1,03,333/acre for marginal, small and semi-medium farmers respectively. Medium farmers borrowed an average of Rs.1,99,857/acre. Table 6.20 shows that marginal farmers have an average outstanding loan of Rs 46,508/-. Large farmers have the highest average outstanding loan of Rs 1,86,000/-.

Production Cost

Cost per acre for groundnut cultivation according to the size of holdings is shown in Table 6.21. It shows that the costs of seeds and fertilsers are a significant component of the total cost of cultivation. It is followed by labour costs across different farm groups. The analysis of production costs of castor crop across marginal and small farms reveals that cost of seeds is high. For marginal farmers it is 46.3 percent and for it is 40.1 percent (Table 6.22). Labour costs incurred are 30.7 percent and 32.3 percent for marginal and small farmers respectively. It is observed that material cost (including seeds and fertilizers) is the highest contributor to the total cost of cultivation of paddy followed by labor costs. However, paddy is grown only by small and medium categories of farmers (Table 6.23). Similar observations have been made for crops such as jowar and redgram (Tables 6.24 and 6.25). Tables 6.26 and 6.27 give the cultivation cost components of chillies and cotton respectively. These crops are more labor-intensive crops. So it is observed that the contribution of labour cost component is more for these crops.

Production

The acreage and production details of groundnut in the sample farm households are given in Table 6.28. For groundnut, small farms have the highest total production of 153.75 quintals. Significant variations are observed in the production of groundnut. Average price attained is more or less similar for all categories of farms. Lesser amount of land is allocated to castor crop. Castor

cultivation was introduced in the village in the recent years. Total quantity produced by the marginal and medium farmers is 3.5 quintals (Table 6.29). Production details (Table 6.30) of chillies show that only 2 farmers from semi-medium holdings are cultivating the crop. As far as acreage is concerned, groundnut is followed by jowar (Table 6.31). The entire output of paddy is utilized by all the categories of farmers for home consumption (Table 6.33).

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

The data on the participation of MGNREGS workers according to the farm categories is given in Table 6.34. It reveals that 80 percent of small farmers, 78.6 percent of marginal farmers and 55.6 percent of semi-medium farmers took up NREGS employment. Most notable feature is medium farmers' participation in the scheme which is a significant depiction of the large scale unemployment that exist in the region

6.6 Conclusion

The analysis of primary data on Rayalaseema region provides a micro-picture of the determinants of supply response. An agro-economic analysis of sample households with specific references to class and caste-wise composition of land ownership, cropping pattern, cost of cultivation, irrigation, sources of credit, output produced and marketing facilities have been provided. To conclude, an attempt has been made to explain the agricultural profile of the district and the selected village. It also elaborated the socio-economic profile of the selected

households and their agro-economic characters. These parameters help to analyse supply response of farmers in Rayalaseema region. An elaborate analysis of the factors that affect supply response will be discussed in the chapter 7.

TABLES

Table 6.1

Farm Size distribution of sample Households

Farmers category	Frequency	Percent
Marginal	14	28.0
Small	20	40.0
Semi-medium	9	18.0
Medium Farmers	7	14.0
Total	**50**	**100.0**

Source: Field Survey, 2011-12

Figure 6.1

Farm Size distribution of sample Households (In Percent)

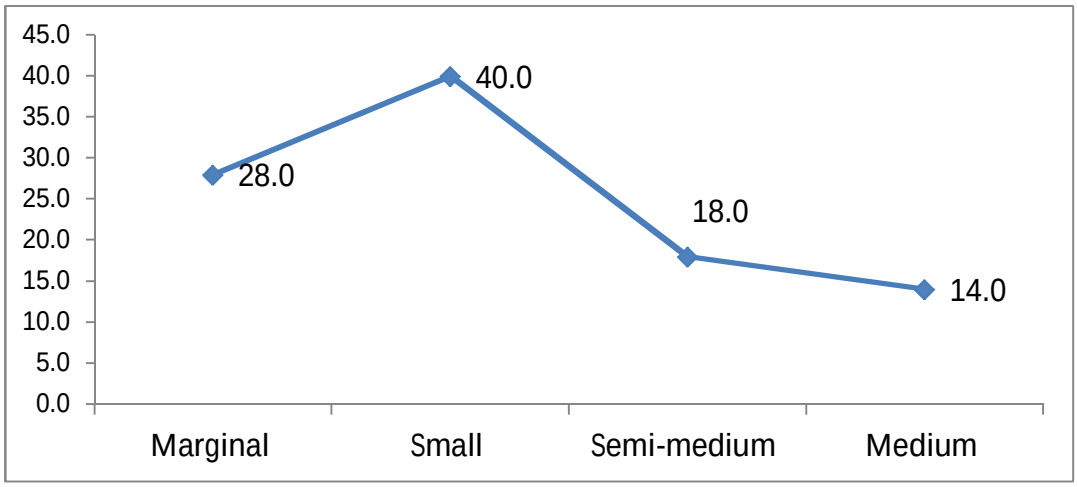


Table 6.2

Caste-wise distribution

Farmers category	SC	ST	BC	OC	Muslims	Total
Marginal	1 (7.1)	4 (28.6)	7 (50.0)	1 (7.1)	1 (7.1)	14 (100.0)
Small	2 (10.0)	7 (35.0)	7 (35.0)	3 (15.0)	1 (5.0)	20 (100.0)
Semi-medium	1 (11.1)	1 (11.1)	5 (55.6)	1 (11.1)	1 (11.1)	9 (100.0)
Medium	0 (0.0)	1 (14.3)	4 (57.1)	2 (28.6)	0 (0.0)	7 (100.0)
Total	**4 (8.0)**	**13 (26.0)**	**23 (46.0)**	**7 (14.0)**	**3 (6.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.2

Caste-wise distribution (In Percent)

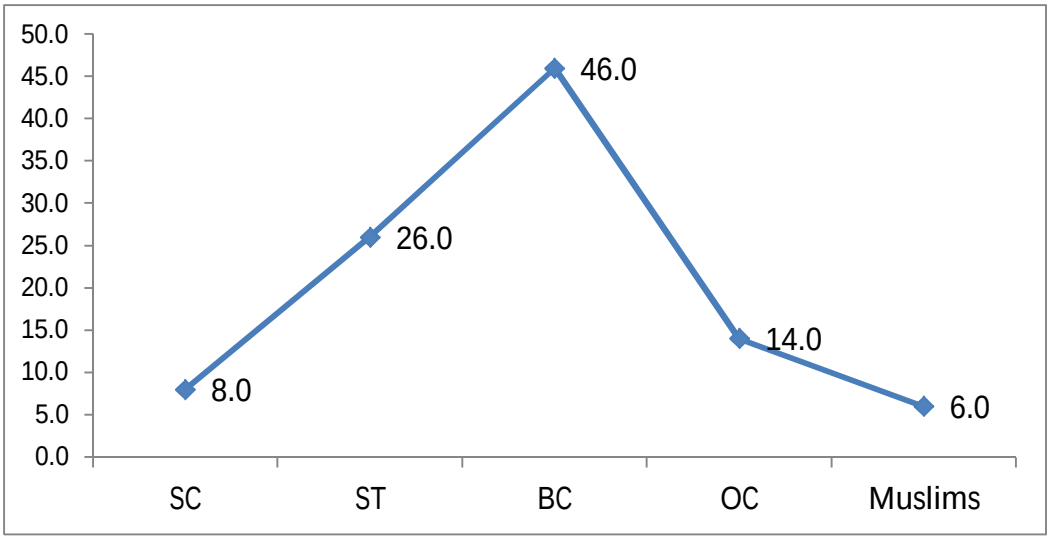


Table 6.3

Housing Structure

Farmers category	Kutcha	Pucca	Semi Pucca	Total
Marginal	0 (0.0)	11 (78.6)	3 (21.4)	14 (100.0)
Small	0 (0.0)	15 (75.0)	5 (25.0)	20 (100.0)
Semi-medium	0 (0.0)	5 (55.5)	4 (44.4)	9 (100.0)
Medium	0 (0.0)	3 (42.9)	4 (57.1)	7 (100.0)
Total	**0 (0.0)**	**34 (68.0)**	**16 (32.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.3

Housing Structure (In Percent)

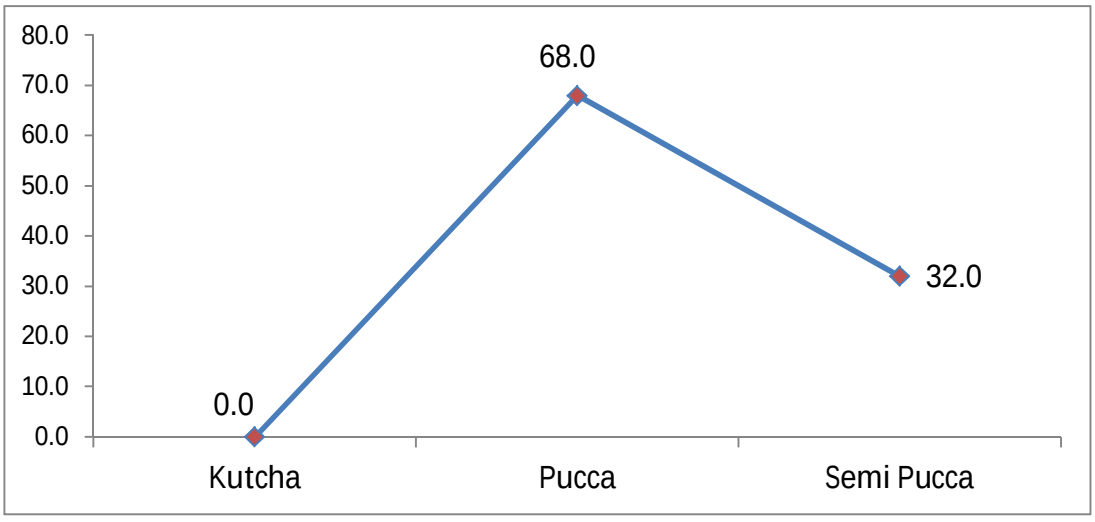


Table 6.4

Family Size Composition

Farmers Category	2	3	4	5	6	7	8	9	Total
Marginal	1 (7.1)	4 (28.6)	5 (35.7)	3 (21.4)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	14 (100.0)
Small	3 (15.0)	5 (25.0)	6 (30.0)	3 (15.0)	2 (10.0)	0 (0.0)	0 (0.0)	1 (5.0)	20 (100.0)
Semi-medium	1 (11.1)	1 (11.1)	2 (22.2)	2 (22.2)	2 (22.2)	1 (11.1)	0 (0.0)	0 (0.0)	9 (100.0)
Medium	1 (14.3)	0 (0.0)	1 (14.3)	2 (28.6)	0 (0.0)	1 (14.3)	2 (28.6)	0 (0.0)	7 (100.0)
Total	**6 (12.0)**	**10 (20.0)**	**14 (28.0)**	**10 (20.0)**	**4 (8.0)**	**3 (6.0)**	**2 (4.0)**	**1 (2.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 6.5

Age Group

Farmers Category	21-40	41-60	Above 60	Total
Marginal	5 (35.7)	8 (57.1)	1 (7.1)	14 (100.0)
Small	12 (60.0)	8 (40.0)	0 (0.0)	20 (100.0)
Semi-medium	2 (22.2)	6 (66.7)	1 (11.1)	9 (100.0)
Medium	2 (28.6)	3 (42.9)	2 (28.6)	7 (100.0)
Total	**21 (42.0)**	**25 (50.0)**	**4 (8.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 6.6

Literacy

Farmers Category	Illiterate	Below Primary	Primary	Upper Primary	Secondary	Higher Secondary	Graduate	Total
Marginal	6 (42.9)	2 (14.3)	1 (7.1)	2 (14.3)	0 (0.0)	3 (21.4)	0 (0.0)	14 (100.0)
Small	8 (40.0)	1 (5.0)	0 (0.0)	3 (15.0)	5 (25.0)	1 (5.0)	2 (10.0)	20 (100.0)
Semi-medium	2 (22.2)	1 (11.1)	0 (0.0)	2 (22.2)	3 (33.3)	1 (11.1)	0 (0.0)	9 (100.0)
Medium	3 (42.9)	0 (0.0)	0 (0.0)	0 (0.0)	2 (28.6)	1 (14.3)	1 (14.3)	7 (100.0)
Total	**19 (38.0)**	**4 (8.0)**	**1 (2.0)**	**7 (14.0)**	**10 (20.0)**	**6 (12.0)**	**3 (6.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.4

Literacy (In Percent)

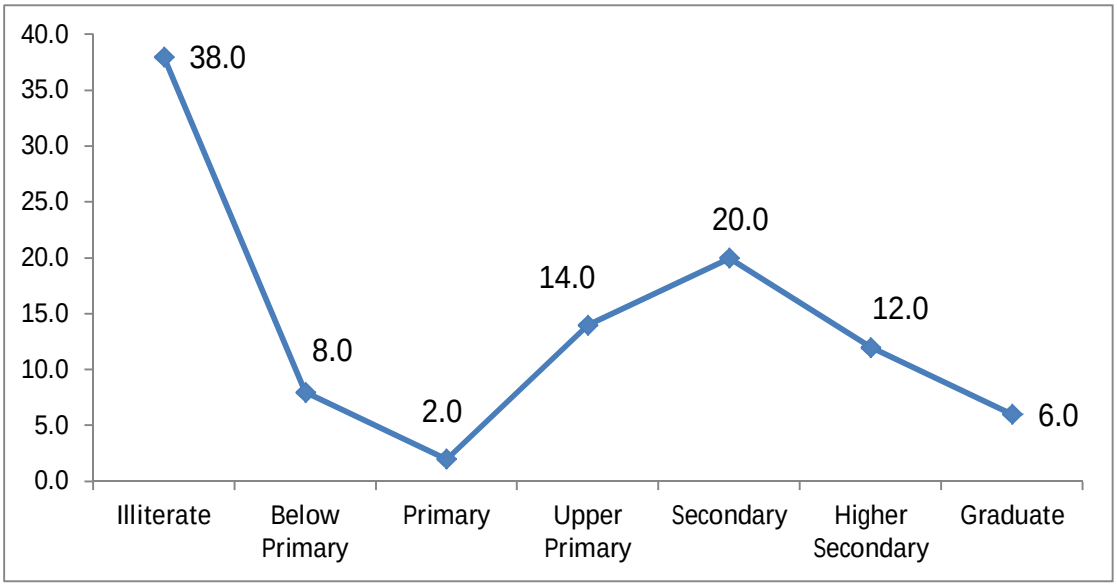


Table 6.7

Occupation

Farmers Category	Agriculture	Agriculture & Others	Total
Marginal	3 (21.4)	11 (78.6)	14 (100.0)
Small	2 (10.0)	18 (90.0)	20 (100.0)
Semi-medium	2 (22.2)	7 (77.8)	9 (100.0)
Medium	3 (42.9)	4 (57.1)	7 (100.0)
Total	**10 (20.0)**	**40 (80.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.5

Occupation (In Percent)

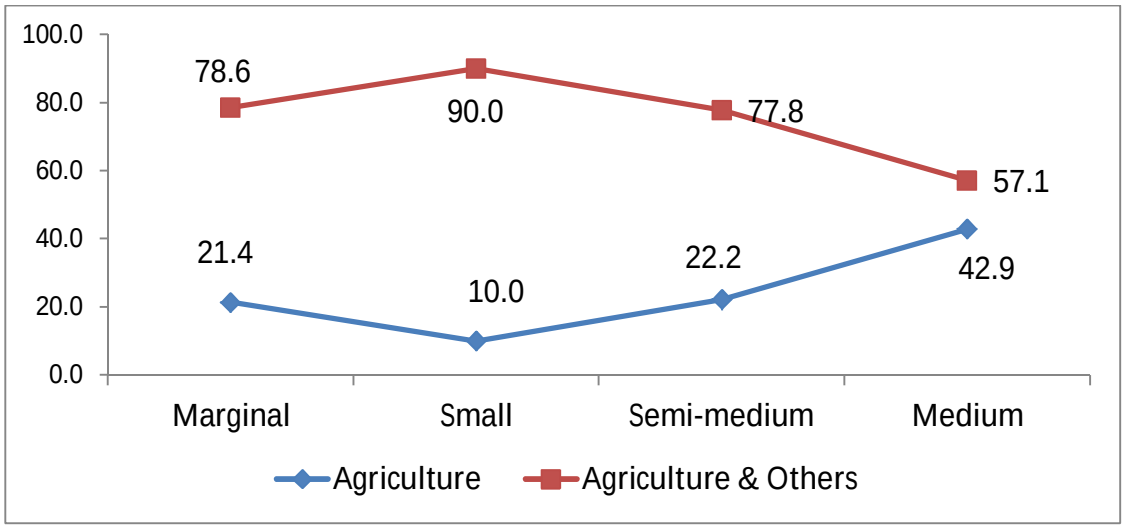


Table 6.8

Monthly Food Expenditure

Farmers Category	Below 2000	2001-3000	3001-4000	Total
Marginal	6 (42.9)	7 (50.0)	1 (7.1)	14 (100.0)
Small	9 (45.0)	10 (50.0)	1 (5.0)	20 (100.0)
Semi-medium	3 (33.3)	4 (44.4)	2 (22.2)	9 (100.0)
Medium	1 (14.3)	4 (57.1)	2 (28.6)	7 (100.0)
Total	**19 (38.0)**	**25 (50.0)**	**6 (12.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Table 6.9

Annual Non-Food Expenditure

Farmers Category	Educa-tion	Health	Clot-hing	Social Activities	Bills	Alcohol & other intoxicants	Trans port	Sav-ings	Others
Marginal	7.3	13.8	22.3	20.1	4.2	23.5	5.9	2.3	0.6
Small	8.9	14.6	15.1	24.0	4.4	19.8	8.1	4.2	0.9
Semi-Medium	10.8	17.6	10.4	22.5	5.8	15.7	8.9	7.5	0.8
Medium	5.0	15.7	21.8	21.2	8.1	12.7	8.6	6.1	0.8

Source: Field Survey, 2011-12

Table 6.10

Livestock

Farmers Category	Milch Animals	Goat	Poultry	Others	Total
Marginal	1 (1.6)	1 (1.6)	57 (93.4)	2 (3.3)	61 (100.0)
Small	24 (25.5)	0 (0.0)	66 (70.2)	4 (4.3)	94 (100.0)
Semi-medium	3 (10.3)	0 (0.0)	26 (89.7)	0 (0.0)	29 (100.0)
Medium	3 (21.4)	0 (0.0)	7 (50.0)	4 (28.6)	14 (100.0)
Total	**31 (15.7)**	**1 (0.5)**	**156 (78.8)**	**10 (5.0)**	**198 (100.0)**

Source: Field Survey, 2011-12

Figure 6.6

Livestock (In Percent)

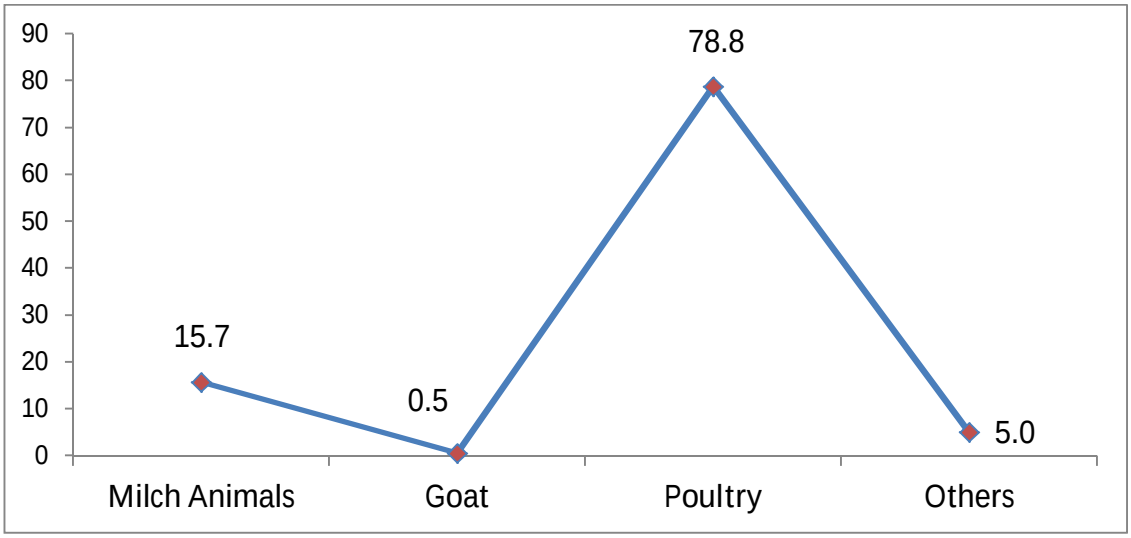


Table 6.11

Farm Machinery, Implements & Equipments

Farmers Category	Sprayer	Tractor	Bullock cart	Ploughs	Electric Motor	Others	Total
Marginal	1 (5.6)	0 (0.0)	0 (0.0)	3 (16.7)	4 (22.2)	10 (55.6)	18 (100.0)
Small	5 (16.1)	1 (3.2)	3 (9.7)	1 (3.2)	5 (16.1)	16 (51.6)	31 (100.0)
Semi-medium	3 (14.3)	0 (0.0)	3 (14.3)	1 (4.8)	6 (28.6)	8 (38.1)	21 (100.0)
Medium	5 (20.0)	1 (4.0)	3 (12.0)	3 (12.0)	7 (28.0)	6 (24.0)	25 (100.0)
Total	**14 (14.7)**	**2 (2.1)**	**9 (9.5)**	**8 (8.4)**	**22 (23.2)**	**40 (42.1)**	**95 (100.0)**

Source: Field Survey, 2011-12

Figure 6.7

Farm Machinery, Implements & Equipments (In Percent)

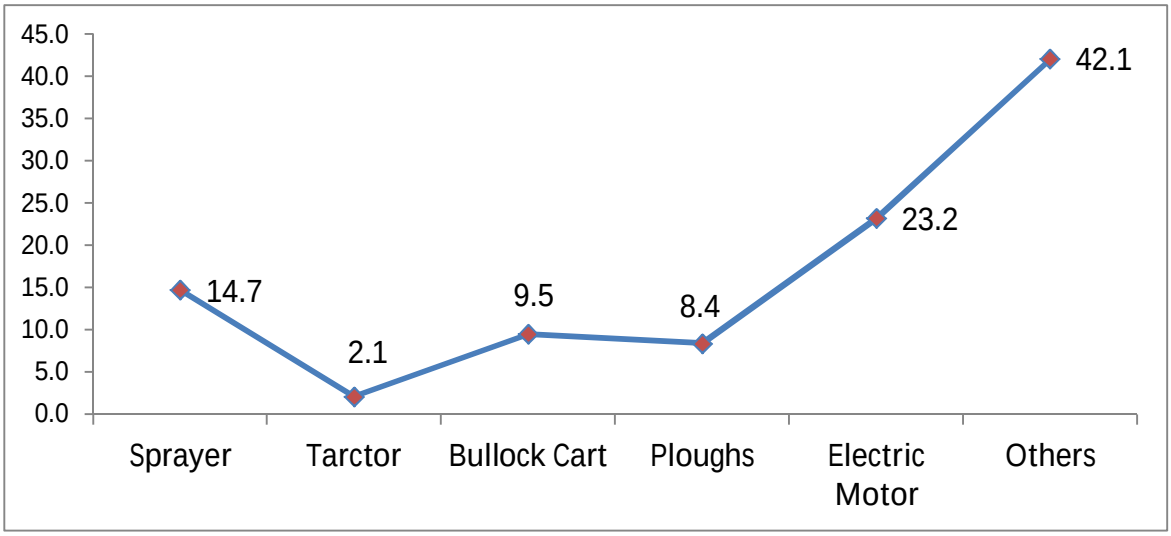


Table 6.12

Average size of land holdings

Farmer Category	No of Farmers	Percent of Farmers	Total Land	Percent of Land	Average Land Holding size
Marginal	14	**28.0**	22.50	**8.48**	1.7
Small	20	**40.0**	72.00	**27.14**	3.6
Semi-Medium	9	**18.0**	61.75	**23.27**	6.8
Medium	7	**14.0**	109.00	**41.09**	15.57
Total	**50**	**100.0**	**265.25**	**100.00**	**5.3**

Source: Field Survey, 2011-12

Figure 6.8

Average size of land holdings

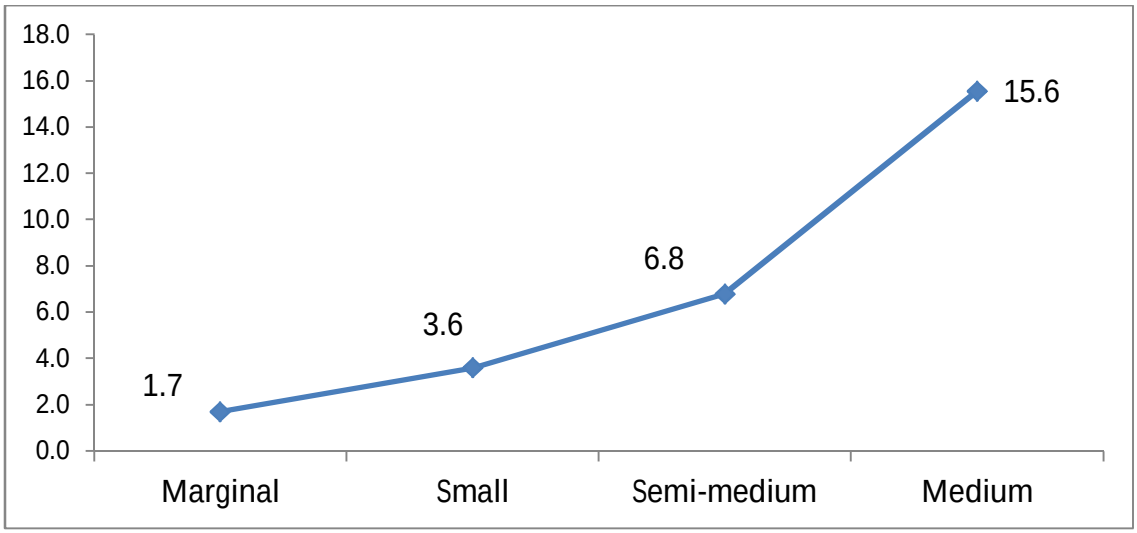


Table 6.13

Tenure Type

Farmers Category	Leased in	Own	Own & Leased-in	Total
Marginal	0 (0.0)	14 (100.0)	0 (0.0)	14 (100.0)
Small	2 (10.0)	18 (90.0)	0 (0.0)	20 (100.0)
Semi-medium	1 (11.1)	7 (77.8)	1 (11.1)	9 (100.0)
Medium	0 (0.0)	5 (71.4)	2 (28.6)	7 (100.0)
Total	**3 (6.0)**	**44 (88.0)**	**3 (6.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.9

Tenure Type (In Percent)

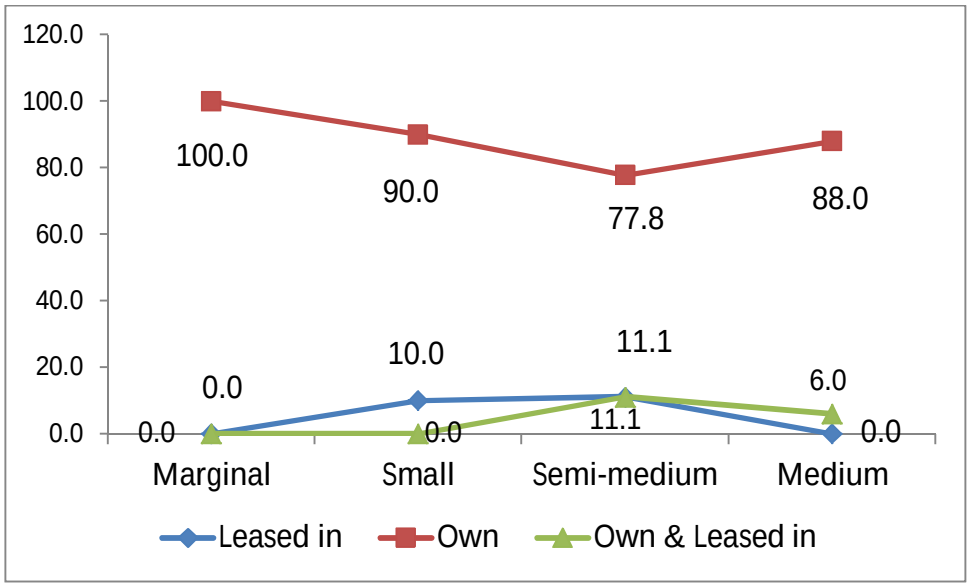


Table 6.14

Source of irrigation

Farmers Category	Rainfed	Borewell	Dug well
Marginal	72.9	18.8	8.3
Small	62.5	31.9	5.6
Semi-medium	35.6	64.3	0.0
Medium	32.7	36.4	30.9
Total	**45.0**	**40.0**	**15.0**

Source: Field Survey, 2011-12

Figure 6.10

Source of Irrigation (In Percent)

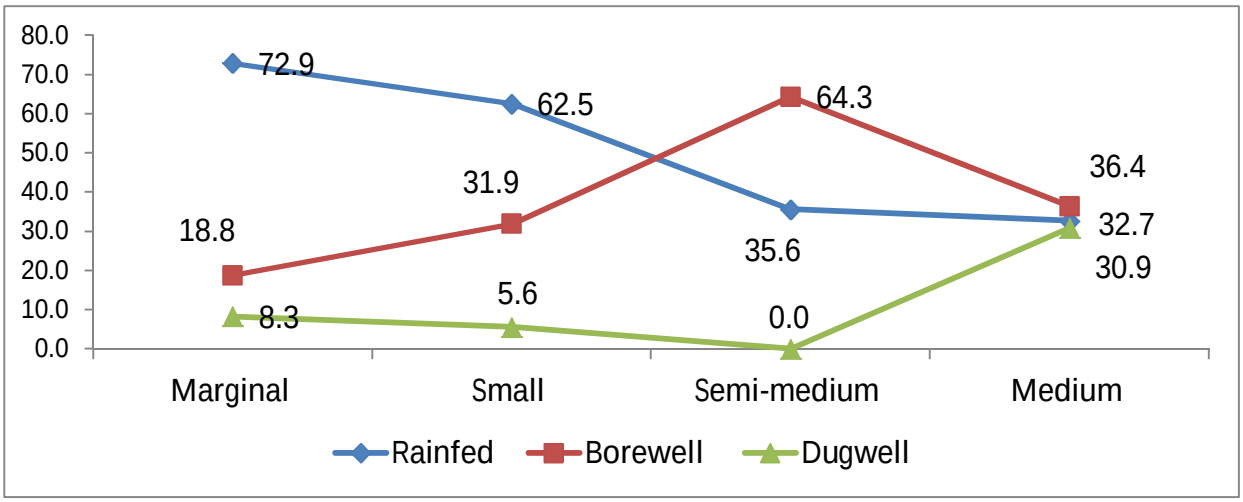


Table 6.15

Acreage under Food and Non-Foodgrain crops

Farmers Category	Food	Non-foodgrain
Marginal	18.8	81.3
Small	13.1	86.9
Semi-Medium	32.6	67.4
Medium	20.8	79.2
Total	**21.0**	**79.0**

Source: Field Survey, 2011-12

Figure 6.11

Acreage under Food and Non-Foodgrain crops (In Percent)

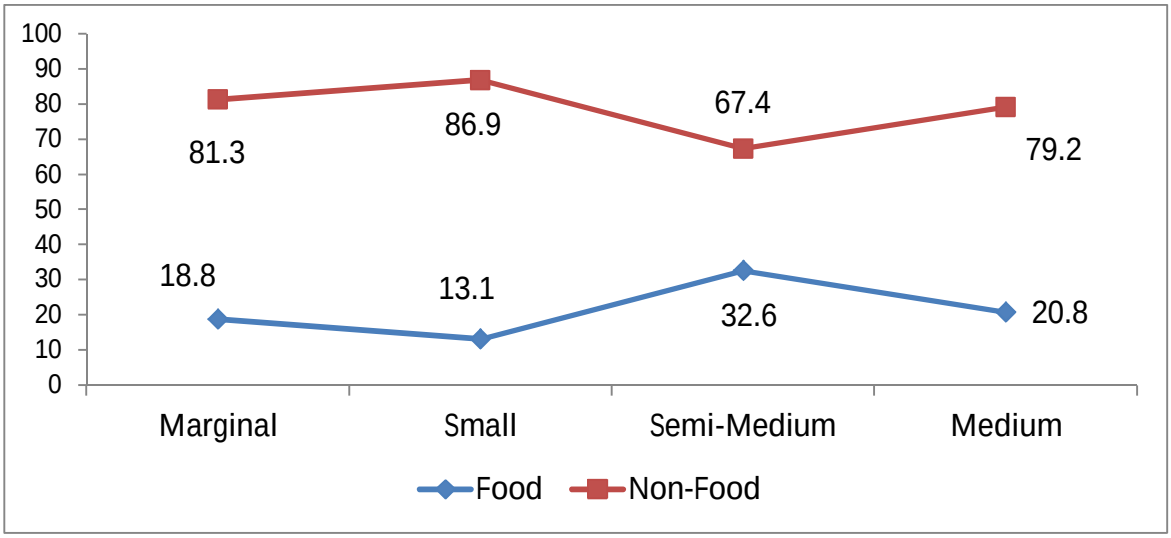


Table 6.16
Crops Grown

Farmers Category	Castor	Cotton, Chillies	Cotton, Groundnut	Ground nut	Jowar	Onion, Groundnut, Castor	Paddy, Castor, Groundnut	Paddy, Cotton, Chillies	Paddy, Groundnut	Red gram	Red- gram, Groundnut	Total
Marginal	4 (28.6)	0 (0.0)	0 (0.0)	7 (50.0)	2 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.1)	14 (100.0)
Small	0 (0.0)	0 (0.0)	0 (0.0)	17 (85.0)	1 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.0)	1 (5.0)	0 (0.0)	20 (100.0)
Semi-medium	0 (0.0)	1 (11.1)	0 (0.0)	4 (44.4)	1 (11.1)	0 (0.0)	0 (0.0)	1 (11.1)	0 (0.0)	1 (11.1)	1 (11.1)	9 (100.0)
Medium	0 (0.0)	0 (0.0)	1 (14.3)	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (100.0)
Total	**4 (8.0)**	**1 (2.0)**	**1 (2.0)**	**31 (62.0)**	**5 (10.0)**	**1 (2.0)**	**1 (2.0)**	**1 (2.0)**	**1 (2.0)**	**2 (4.0)**	**2 (4.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.12
Crops Grown

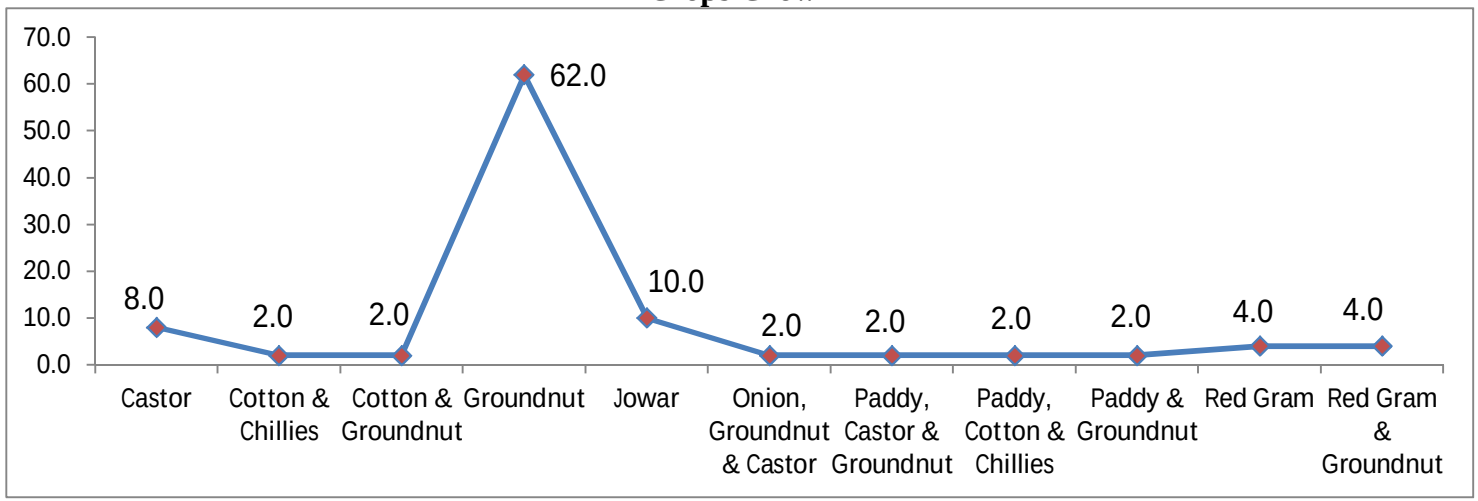


Table 6.17

Source of Credit

Farmers Category	Banks	MCGs*	Commission Agents	Fertilizer Dealers	Relatives	Land Lords	Big Farmers	Friends
Marginal	37.4	21.9	6.3	0.0	21.9	0.0	3.1	9.4
Small	39.1	28.3	10.9	4.3	10.9	4.3	2.2	0.0
Semi-medium	36.4	27.3	4.5	0.0	22.7	0.0	9.1	0.0
Medium	40.0	20.0	10.0	0.0	15.0	0.0	5.0	10.0
Overall	**38.2**	**25.0**	**8.3**	**1.7**	**16.7**	**1.7**	**4.2**	**4.2**

**Micro-Credit Groups*

Source: Field Survey, 2011-12

Figure 6.13
Source of Credit

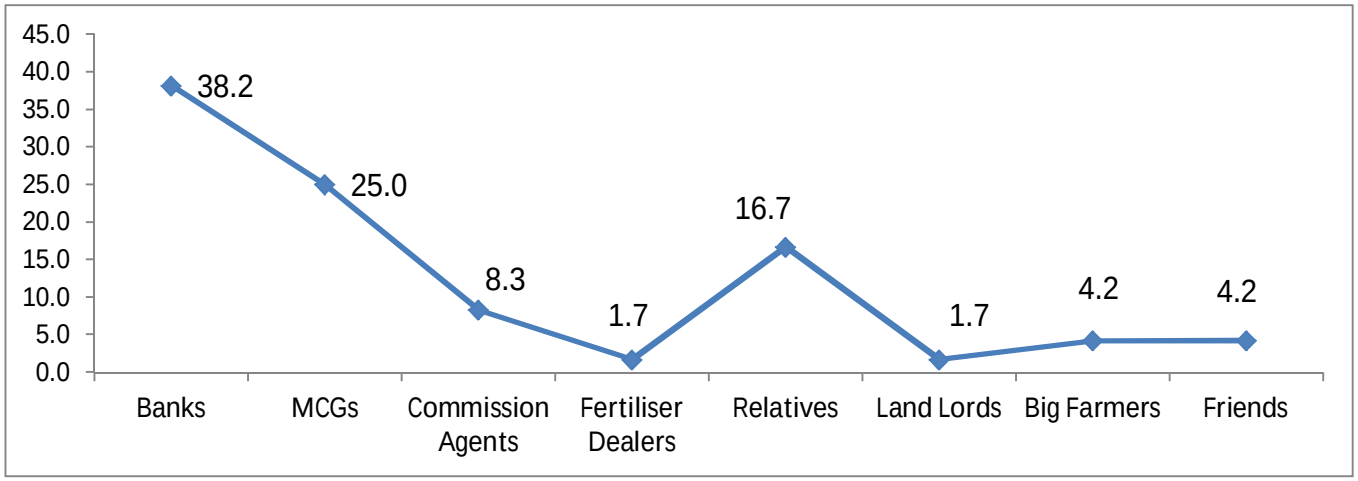


Table 6.18

Purpose of Credit

Farmers Category	Agri culture	Bore well	Live stock	Consum-ption	Educa tion	Health	Marriage	Paid Debts	House Construction	Business
Marginal	36.0	14.0	0.0	15.6	21.9	0.0	9.4	0.0	3.1	0.0
Small	33.9	17.1	8.5	12.8	10.6	4.3	2.1	4.3	4.3	2.1
Semi-medium	54.5	13.6	0.0	4.5	13.6	4.5	0.3	4.5	4.5	0.0
Medium	57.9	26.3	0.0	15.8	0.0	0.0	0.0	0.0	0.0	0.0
Overall	**45.6**	**17.8**	**2.1**	**12.2**	**11.5**	**2.2**	**3.0**	**2.2**	**3.0**	**0.5**

Source: Field Survey, 2011-12

Figure 6.14
Purpose of Credit

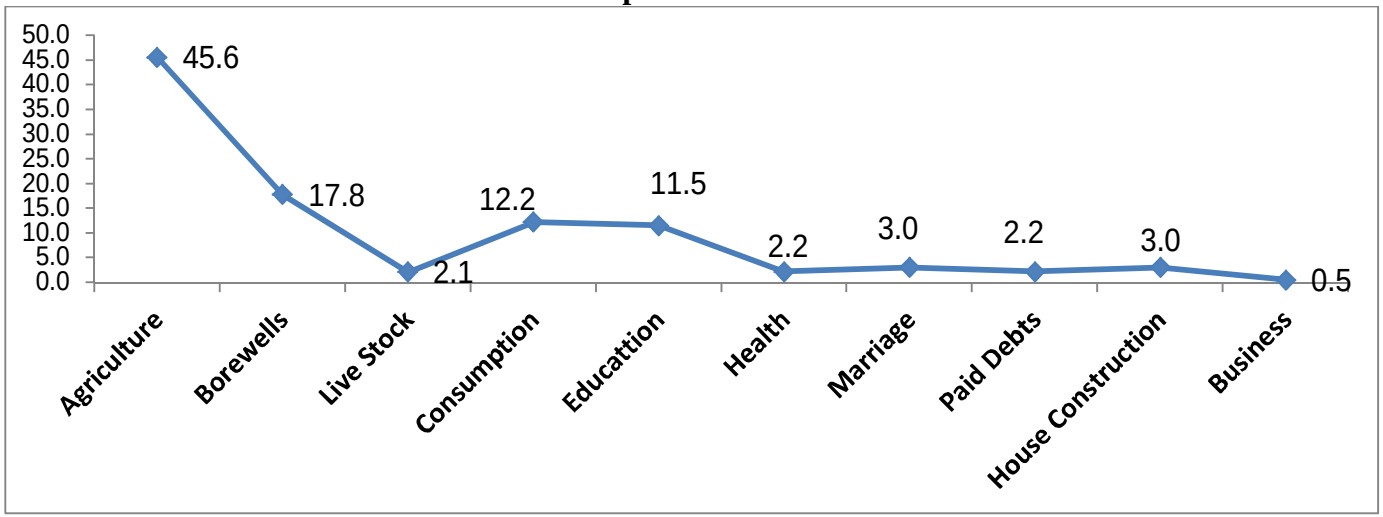


Table 6.19

Average amount of credit per household

Farmers Category	Percent of Farmers	Avg. amount of credit
Marginal	26.5	62384
Small	40.8	100500
Semi-medium	18.4	103333
Medium	14.3	199857
Total	**100.0**	

Source: Field Survey, 2011-12

Figure 6.15

Average amount of credit per household

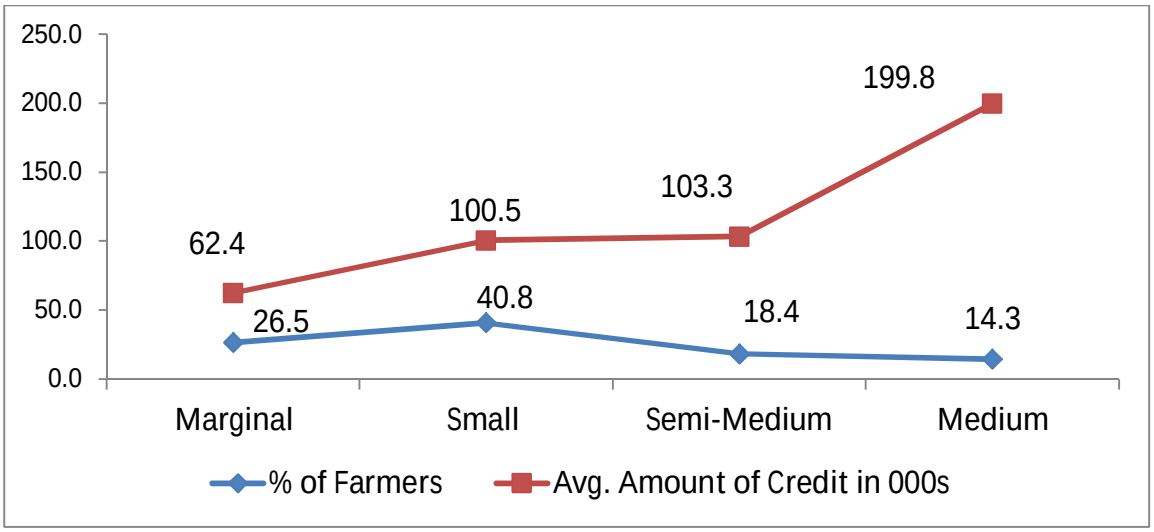


Table 6.20

Loan Outstanding

Farmers Category	Percent of Farmers	Avg. amount of Outstanding
Marginal	26.5	46508
Small	40.8	88400
Semi-medium	18.4	79111
Medium	14.3	186000
	100.0	

Source: Field Survey, 2011-12

Figure 6.16

Loan Outstanding

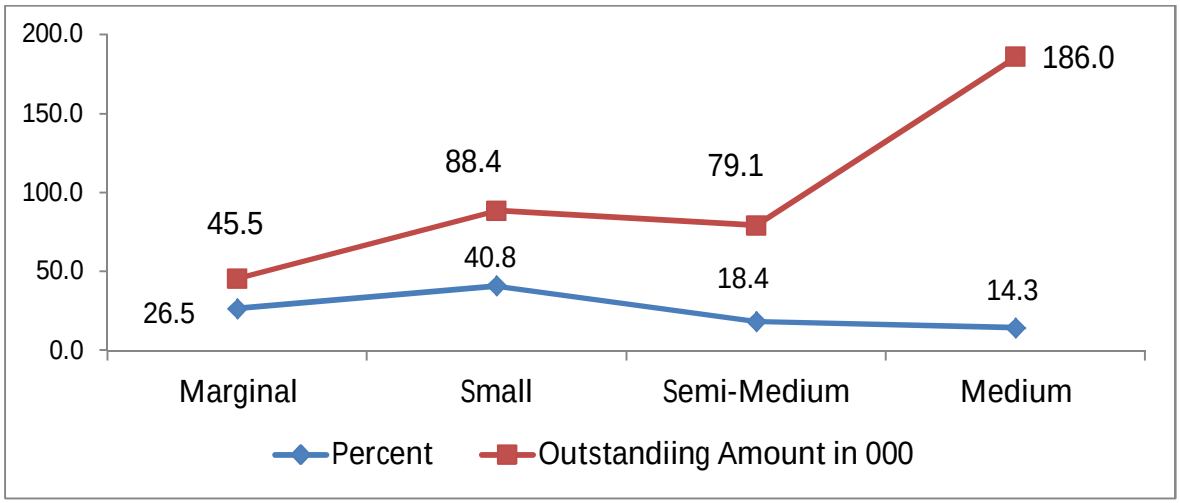


Table 6.21

Percentage Contribution of different Components towards Cost of cultivation of Groundnut crop

Cost Structure	Marginal	Small	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	14.5	14.3	22.9	21.1
Material Costs	48.6	49.0	33.1	39.1
Labour Costs	30.8	30.5	29.9	29.7
Other Costs	6.1	6.2	14.1	10.1

Source: Field Survey, 2011-12

Table 6.22

Percentage Contribution of different Components towards Cost of cultivation of Castor crop

Cost Structure	Marginal	Small
Cost of Ploughing with bullock or Tractor	17.3	20.2
Material Costs	46.3	40.1
Labour Costs	30.7	32.3
Other Costs	5.7	7.4

Source: Field Survey, 2011-12

Table 6.23

Percentage Contribution of different Components towards Cost of cultivation of Paddy crop

Cost Structure	Small	Medium
Cost of Ploughing with bullock or Tractor	17.5	20
Material Costs	38.6	35.3
Labour Costs	33.6	32.6
Other Costs	10.3	12.1

Source: Field Survey, 2011-12

Table 6.24

Percentage Contribution of different Components towards Cost of cultivation of Jowar crop

Cost Structure	Marginal	Small	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	15.5	16.2	18.5	15.4
Material Costs	39	38.4	39.5	38.9
Labour Costs	32.7	34.2	33.5	34.4
Other Costs	12.8	11.2	8.5	11.3

Source: Field Survey, 2011-12

Table 6.25

Percentage Contribution of different Components towards Cost of cultivation of Redgram crop

Cost Structure	Marginal	Small	Semi-Medium
Cost of Ploughing with bullock or Tractor	15.8	13.8	13.7
Material Costs	37.9	39.8	39.6
Labour Costs	36.7	35.2	34.9
Other Costs	9.6	11.2	11.8

Source: Field Survey, 2011-12

Table 6.26

Percentage Contribution of different Components towards Cost of cultivation of Cotton crop

Cost Structure	Semi-Medium	Medium
Cost of Ploughing with bullock or Tractor	16.3	15.1
Material Costs	37.1	36.8
Labour Costs	38.2	37.7
Other Costs	8.4	10.4

Source: Field Survey, 2011-12

Table 6.27

Percentage Contribution of different Components towards Cost of cultivation of Chillies crop

Cost Structure	Semi-Medium
Cost of Ploughing with bullock or Tractor	16.1
Material Costs	31.2
Labour Costs	40.9
Other Costs	11.8

Source: Field Survey, 2011-12

Table 6.28

Groundnut Crop Output

Farmer Category	No of farmers	Acres	Quantity produced (Quintals) per acre	Total Production (Quintals)	Quantity sold (Quintals)	Avg. Price
Marginal	8	**14.00**	**1.75**	**19.41**	**19.41**	**2212**
Small	18	63.00	2.30	153.75	153.75	2138
Semi-Medium	5	33.75	2.40	82.00	82.00	2140
Medium	6	66.00	1.50	123.00	123.00	2025

Source: Field Survey, 2011-12

Table 6.29

Castor Crop Output

Farmer Category	No of farmers	Acres	Quantity produced (Quintals) per acre	Total Production (Quintals)	Quantity sold (Quintals)	Avg. Price
Marginal	4	5.5	2.5	21.5	21.5	2820
Medium	2	14.0	1.0	5.0	5.0	2500

Source: Field Survey, 2011-12

Table 6.30

Chillies Crop Output

Farmer Category	No. of Farmers	Acres	Quantity produced (Quintals) per acre	Total Production (Quintals)	Quantity sold (Quintals)	Avg. Price
Semi-Medium	2	3.5	10	35	35	6000

Source: Field Survey, 2011-12

Table 6.31

Jowar Crop Output

Farmers Category	No. of Farmers	Acres	Quantity produced (Quintals) per acre	Total Production (Quintals)	Quantity sold (Quintals)	Avg. Price
Marginal	2	3.5	2.25	9.25	9.25	2400
Small	1	4.0	2.00	8.00	8.00	2000
Semi-Medium	1	9.0	2.00	18.00	18.00	2200
Medium	1	20.0	1.00	20.00	20.00	2000

Source: Field Survey, 2011-12

Table 6.32

Redgram Crop Output

Farmer Category	No. of Farmers	Acres	Quantity produced (Quintals) per acre	Total Production (Quintals)	Quantity sold (Quintals)	Avg. Price
Small	1	4	2	8	8	2500
Semi-Medium	2	8	3	12	12	2400

Source: Field Survey, 2011-12

Table 6.33

Paddy Crop Output

Farmers Category	No. of Farmers	Acres	Quantity produced (bags) per acre	Consumption (bags)
Small	1	1.0	14	14
Semi-Medium	1	1.5	18	18
Medium	1	1.0	12	12

Source: Field Survey, 2011-12

Table 6.34

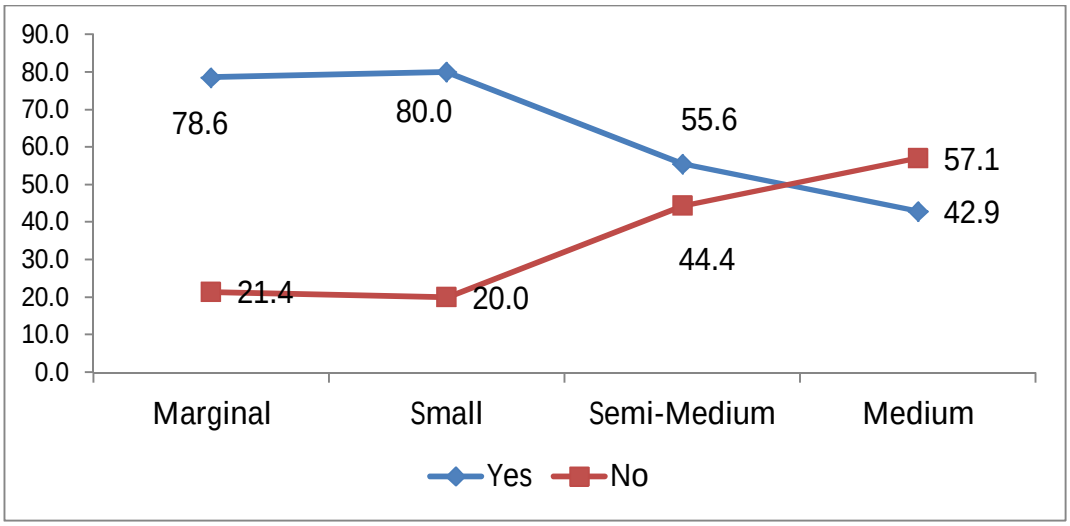
Participation in MGNREGS

Farmers Category	Yes	No	Total
Marginal	11 (78.6)	3 (21.4)	14 (100.0)
Small	16 (80.0)	4 (20.0)	20 (100.0)
Semi-medium	5 (55.6)	4 (44.4)	9 (100.)
Medium	3 (42.9)	4 (57.1)	7 (100.0)
Total	**35 (70.0)**	**15 (30.0)**	**50 (100.0)**

Source: Field Survey, 2011-12

Figure 6.17

Participation in MGNREGS (In Percent)



End Notes

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[1] As there is low rainfall for a longer period and inadequate soil moisture to grow crops Anantapur has been identified as one among the Drought Prone districts identified by the Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India.

[2] The district suffers from high levels of instability and uncertainty of climatic conditions. Insufficient distribution and amount of rainfall lead to low yield levels and in turn supports very less agricultural labourers in the region.

[3] High degree of variability in rainfall was found to be the key factor affecting the region

[4] Some of the contributing factors for the bottom most position with respect to irrigation facilities in the district are low rainfall low fertility of the soil and insufficient investment.

[5] Groundnut is the most significant oilseed crop and is its acreage is higher in Anantapur, of all the other districts of the Rayalaseema region

[6]T o improve the quality of the rural poor and marginalized sections Rural Development Trust (Non-Governmental Organization) in Anantapur, is carrying out its welfare programmes in the areas such as education, health, women, hospitals, community habitat and ecology

[7]Nagali, jambu and guntuka are some of the local names of agricultural implements

CHAPTER 7

EXPLAINING THE REGIONAL VARIATIONS OF SUPPLY RESPONSE IN 'UNITED'ANDHRA PRADESH

7.1 Introduction

Indian economy with the introduction of economic reforms has shifted in the direction of open economy. The greater dependence on market forces and foreign investment has made the local market more susceptible to tremors from the global market. The agricultural sector is no exception. The poor indebted small-time cultivator is forced to bargain with the mighty traders of the international market. Adjustment in exchange rates directly affects the agricultural input-output prices and exports (Chand Ramesh, 1998). The economy, particularly agricultural sector, was able to gain neither noteworthy growth nor the anticipated benefits of economic reforms. Unlike the immediate timeline of pre-liberalisation, the post-liberalisation years saw the spectacle of deceleration in agricultural growth (Bhalla and Singh, 2009). During 1990s, agricultural growth deceleration was identified by comparing the growth rates in the 90s and 80s. From 3.19 per annum in the period from 1980-81 to 1990-91, it had come down to 1.96 in the period from 1990-91 to 2000-01 (Deshpande R S et al., 2004). Decline in agricultural productivity and income- levels along with distress during post-liberalization is another observed phenomenon. However, the sector has also suffered due to decline in investment in areas such as irrigation, soil conservation, water-management system and other allied fields.

Though measures such as the initiation of seed markets and deregulating of fertilizer prices has taken place, agriculture is out of policy attention (Vakulabharanam, V 2005). It is evident that the central government's whimsical policies are having a debilitating effect on the agriculture in India. Parallel to this, agriculture with the dependency on monsoons, degrading land fertility, existence of disparities in productivity levels, mushrooming middle-men in input and output markets etc., has pushed Indian farmers to distress situation.

Andhra Pradesh agriculture has undergone severe social, structural, economical, institutional and non-institutional changes. This is especially true from the farmer's perspective. The liberal policies were geared more towards creating a pan-Indian primary commodity market with a unified price, in alignment with the global price and this has clearly worked against farmers in Andhra Pradesh. Thus, farmers' supply response towards different crops is an interesting puzzle and it varies from region to region and is affected by price and non-price factors. With this background, the present chapter observes the behavioral patterns of farmers in response to price changes in three regions of Andhra Pradesh during pre and post liberalisation periods. The liberalisation policy framework in the 1990s brought about substantial changes in agricultural growth in Andhra Pradesh. Compared to the 1980s, production and yield of both food and non-food crops have fallen significantly.

The remaining sections of this chapter will deal with different aspects of supply response of farmers in Andhra Pradesh. Section 2 of this chapter evaluates the results of the agricultural growth phenomenon and gives an explanation of regional patterns and its

decomposition observed through secondary statistics. Section 3 recaps the food and non-foodgrain supply response puzzles. Section 4 brings out an analysis of regional variations through the institutional proxies across the regions, Section 5 attempts to explain the supply response puzzles through micro level evidences across the three regions in Andhra Pradesh and Section Six gives the conclusion.

7.2 Growth phenomenon across the regions:

This section deals with the results of the agricultural growth phenomenon across the regions and its decomposition to various factors observed through the exercise of secondary statistics (see chapter 2). The agricultural growth performance of the state during 1983-1995 was 3 percent and it has fallen to 1.5 percent during 1995-2007. A high output growth rate of 4 percent was observed during pre-liberalization period in Telangana region which is more than the state level growth rate and in post liberalisation it has declined to 3.1 percent. Here, growth performance in the Telangana region could be explained in terms of growth in irrigated area. The elasticity of output with respect to irrigation in Telangana accounts for the high output growth during pre-liberalisation period. The Coastal Andhra growth performance was relatively lower in 1983-1995, i.e., 2.3 percent and it further declined to 1.6 percent in the second sub-period. Overall output growth rates during pre and post liberalisation periods are very poor. Rayalaseema has registered 3.7 percent growth rate during first sub-period. But it has failed to maintain its growth and had negative growth rate in the second sub-period. Output elasticity in Rayalaseema also declined during the 90s due to poor recharge of ground water (Subrahmanyam S, 2002).

Gross cropped area is an important determinant of agricultural growth. However, it is noted that the share of gross cropped area in determining output growth is marginal in all the three regions. At state-level, the growth of gross cropped area has declined from 0.3 percent in pre-liberalisation period to -0.2 percent in post-liberalisation regime. Previous studies have identified that though more land was brought under cultivation by 1970s, the growth rate was less in the cropped areas (Vakulabharanam, V 2004). A study by Subramanyam and Aparna (2009) identifies a deceleration in gross cropped area in 1990s. Due to unsustainable agricultural practices, fallow land is on the rise in Telangana and Rayalaseema (Reddy D N, 2006).

The contribution of yield component to output growth is significant. With the advent of technological developments in terms of introduction of new inputs, high-yielding seeds, chemical fertilizers and irrigation in the early 1980s, the productivity levels of major crops increased. In addition to the availability of new inputs, technological innovations such as increased use of tractors further accentuated the yield-levels at the state and region levels. Apart from yield component, cropping pattern is also a major contributor to output growth. From the secondary statistics, it is noted that regional dimensions of cropping pattern show that the contribution of cropping pattern to output growth is high during pre-liberalisation and it has decreased in post-liberalisation period. Evidences from preceding researches highlight the diversification towards high-value and high-productivity crops.

7.3 Supply response puzzles across the regions:

As far as the growth patterns across regions of Andhra Pradesh are concerned, the growth performance of agriculture is primarily dictated by allocation of areas to the cultivation of distinct crops. In order to analyse this, supply response phenomenon was observed for food and non-foodgrains in chapter 3. The analysis of crop economy of Andhra Pradesh was carried out through supply response estimations and the supply response puzzles that presented themselves as a result of this analysis have been explained below.

Price component in Telangana and Rayalaseema played a negative role for non-foodgrain acreage decision of farmers during post-liberalisation period. The area under food grain cultivation did not increase as expected in Telangana and Rayalaseema, though the prices of food grains increased. On the one hand, the area under food grain cultivation reduced and on the other hand, the area under non-foodgrain cultivation increased during the liberalisation period. This reflects the seemingly irrational behaviour of farmers which may actually be because of some institutional factors in these regions. In Coastal Andhra, the apparently rational behavior of farmers is reflected in the slightly positive price response for non-foodgrains during post-liberalisation period.

7.4 Micro-level issues: Analysis of regional variations

In order to know the crop economy from the farmer's perspective, it is essential to identify the role of farmers in terms of their resource use, institutional mechanism[1] and

their response to policy initiatives across regions. The villages selected at the micro level from the three regions are Mandepudi from Guntur district in Coastal Andhra region, Chandraiahpalli from Warangal district in Telangana region and Basinepalli from Anantapur district in Rayalaseema region. Hence, this section brings out the micro-level issues by analyzing regional variations through the institutional proxies identified across the regions.

Land holding structure of farm households:

Land as a prime factor of production is influential in the area-allocation decision of farmers. Therefore, it is necessary to look at the land ownership details of the three regions of Andhra Pradesh**.** Firstly, in the regions of Coastal Andhra, Telangana and Rayalaseema, it is observed that the major proportion of land holdings is owned by small and marginal farmers. Reddy D N (2006) identifies that the proportion of marginal and small holdings increased from 65.6 percent in 1970-71 to 83 percent in 2000-01. A significant portion of large holdings is in the Coastal Andhra region. Neither Telangana nor Rayalaseema possess large holdings. In order to understand the land ownership patterns in Rayalaseema region, it is quite essential to take a look at faction culture which developed on the basis of the traditional *polegar*[2] system that existed in this region (Purendra Prasad, N 2015). As a result of land reforms and peasant struggles, land holdings have been transferred from Brahmins to Reddys and Kammas. In this region, major proportion of the land is controlled by the Reddy community. Medium farmers have a large share of land in Coastal Andhra, whereas in the other two regions, small and medium farmers own a significant share of the land. The other significant feature of the

structure of land holdings is that the land concentration is relatively high in Coastal Andhra and Rayalaseema and low in Telangana.

Caste-wise distribution of land holdings:

Various debates have recognized the crucial role of caste in determining access to land. Very complex and varied caste and class relations exist in the three regions. Over a period of time, substantial changes in social relations have taken place in the agrarian economy of Andhra Pradesh (Purendra Prasad, N 2015). Caste-wise distribution of land holdings shows significant aspects across regions at micro-level. In the village surveyed in Coastal Andhra, there is a domination of Kamma community in land holdings of all sizes. It was identified that Reddy and Kamma communities own nearly half of the total land of South Coastal Andhra (Sambi Reddy C et al., 2012). In terms of land ownership, the Kamma community is followed by SCs, and then by Muslims. A noticeable feature of Coastal Andhra is that small and marginal holdings are owned by farmers from all the communities including the Muslim community, in the village. In Telangana and Rayalaseema, major proportion of ownership of land is with certain backward communities followed by STs. The share of land owned by SCs is small in these regions. Subsequently, large holdings have declined due to the fragmentation of land holdings. The power of the dominant farming castes in agrarian society has declined while backward communities, and to a lesser extent SCs, have more control over land in Telangana and Rayalaseema (Reddy D N, 2006).

Tenancy:

Land Revenue Act of1999 mandates the recording of the names of tenants in the land revenue records. However it continues to be more informal and barely there is any maintenance of recording tenancy (Reddy D N, 2006). Tenants have access neither to formal credit nor to any other benefits such as subsidized seeds and fertilizers. All the benefits go to the owner of the land. In Coastal Andhra, small farmers who are largely involved in taking land on lease, pay the rent at the end of the harvest by selling their output. Lease rent depends on the water facility and its proximity to the main road. Previous crop output value also plays a role in deciding rent. If last year's crop is cotton, tenants pay more for that land as it is more suitable to cultivate chillies. It is also observed that most of the tenants are from the categories of small and marginal farmers in Coastal Andhra region. The practice of taking land on lease is considerably less in Telangana and Rayalaseema regions. Though tenancy is relatively low in these regions, farmers tend to pay high rates of interest to the non- institutional credit sources. Tenants are forced to take credit from non-institutional sources and end up paying higher rates of interest due to improper and insufficient support from the institutional sources.

Cropping Pattern:

In the sample village in Coastal Andhra, majority of the cropped area has been devoted to chilli cultivation for the last 15 years. Farmers, who take land for lease, prefer to cultivate only chillies. They used to grow paddy, jowar, groundnut and turmeric 15 years ago. Now the area under paddy cultivation has declined significantly. Usually, they grow chillies for two consecutive years and continue to do so for one more year if the

yield is good. But in the fourth year, it becomes essential to rotate the crop. They are not specific about price at this time. Crop rotations eliminate pests and balance soil fertility and its nutrients. Through crop rotation, farmers can keep their fields under continuous production. Crop rotation is practiced by the farmers irrespective of the sizes of their land holdings.

In Telangana, the major crops grown are chillies, cotton, paddy, groundnut and turmeric. Cotton emerged as an important commercial crop between 1980-81 and 2000-01 and the largest increase in cultivation was in North Telangana (Reddy D N, 2006). In North Telangana, the area under cotton cultivation increased from 4 to 8 percent during the 1990s (Krishna Rao Y.V., S. Subramanyam, 2002). It is observed that even if the commercial crop fails in giving substantial income, they are able to take care of food requirements since paddy is also cultivated for family consumption along with the commercial crop.

Rayalaseema is the largest groundnut-producing region in Andhra Pradesh. Groundnut has become a mono-crop in Rayalaseema, especially in Anantapur district (Reddy D N, 2006). With regard to change in crops grown, it is observed that they have been growing groundnut for the last 30-40 years. However, during the past 3 to 4 years, the yield-levels have fallen significantly. The district is not getting sufficient rains during the past decade and most of the wells have dried up. Recently, a farmer named Pulikonda used traditional methods and acquired good output by growing castor crop. Inspired by him, some of the farmers in the village started growing castor in the agricultural year 2011-12, but not to a significant extent. They have been slowly switching to castor crop.

The major reason behind such a shift is lack of sufficient resources to cultivate groundnut. Castor crop absorbs more rainwater, gives more output with higher survival percentage and plant growth. Cost of cultivation for castor is also relatively low and there is less demand of labour for this crop. On the whole, it is found that the cropping pattern across the regions is more in favour of non-foodgrains and the acreage under food grain cultivation is very low.

Irrigation sources:

In agricultural development, water is the main driving source and a substantial variation has been observed in irrigation development of the three regions of Andhra Pradesh. The major irrigation source in Coastal Andhra is the canal system. The farmers in well-developed Coastal Andhra relatively enjoy the benefits of stable and high level of irrigation which was developed through public investment (Reddy D N, 2006). On the other hand, Telangana and Rayalaseema farmers depend on groundwater resources. In Telangana, predominant source of irrigation used to be tank irrigation. Gradually, well irrigation also gained prominence (Bhat K.S. and S.Vijaya Kumar, 2006). In the surveyed village well is the major source of irrigation. Groundwater dependency in Telangana has acquired very high levels since rain has been consistently failing (Reddy D N, 2006). Earlier, there used to be one well for every 10 acres, but now there is one well for every 4 acres. For the past 3 to 4 years, there is no water in the small tanks surrounding the village due to lack of proper rainfall. With the passage of time, tank Irrigation has been neglected and borewells have become the main source of irrigation.

As is the case with drought-prone areas, Anantapur lacks the presence of perennial rivers. The rainfall is very erratic and uncertain and is mainly responsible for creating moisture scarcity, and crop failures due to rainfed conditions. In addition to the declining quantum of rainfall, variability in rainfall is also an important issue affecting the village. High degree of variability in rainfall is noticed in all seasons in the village. Given this environment, the rapid increase in bore-well irrigation has resulted in the depletion of ground water-levels in the last 10-12 years. High cost of digging bore wells combined with low success rate of bore wells and the cost involved in mobilizing the finances etc. have pushed several farmers into debt traps. Field survey identifies that there are totally 160 bore wells in the village. Only 90 among them are working. Due to the depletion of ground water for the last 15 years, openwells have dried up. Initially, water was found at the level of 40 feet. Now wells have to be deepened to about 250 feet to reach the water-table. This has resulted in significant indebtedness among farmers. Due to this, agriculture has become largely unprofitable for several classes of farmers.

Institutional credit:

In Coastal Andhra, it may be noted that the credit facilities are made available by banks, micro-credit groups, moneylenders, commission agents and fertilizer dealers. However, most of the households depend on non-institutional as well as institutional credit sources. Institutional credit such as crop loans depends on the crops grown by the farmers. In Telangana, banks provide loans ranging from Rs.25,000/- to 40,000/- per acre depending on the land and crops they grow. Along with this, in order to meet production needs, farmers take loans from moneylenders from Warangal and Narsampet at 24% per annum interest. After harvesting, farmers sell the produce to the same moneylender

against the loan taken by them. Some women take loans from Self-Help Groups (SHGs) and use the loan amount for agriculture.

In Rayalaseema, Self-Help Groups play a significant role in providing credit. The women of the village are aware of the benefits of SHGs and take an initiative in starting them. There has been a substantial increase in the number of such groups. The SHG loans are also helpful in meeting the production needs. However, sometimes they face problems in repaying due to insufficient output level. The women in this region contribute the much-needed financial support to the household head for agriculture through SHGs loans and by establishing cottage units. It must be noted that the institutional credit is provided based on the crops grown by farmers in each region. So area allocation decisions can be influenced by the credit facilities provided to the farmers. Despite the regional disparities in sources of credit, effectiveness of institutional credit is also area-specific.

Labour:

Since agriculture is conventionally a seasonal activity, labour market always suffers from imperfections. The demand for labour is mostly seasonal. However, there has been some kind of order and balance based on supply and demand for labour with respect to season, skills, gender, age, health and nature of work/operation. An analysis of regional variations in the use of labour is quite significant. Farmers of chillies relatively hire more labour in Coastal Andhra. Labour availability is not there in accordance with the demand. With heavy demand of seasonal labour during peak season, there is a dependence on migrant labour. Contract labour[3] is preferred to daily wage labour since

the latter is more expensive. In contract labour, the payment is task based. For weeding, mostly they hire daily-wage labour and for the remaining tasks, they go for contract labour. Large farmers are likely to hire more labour compared to others as the role of family members in contributing to labour is less. Adult male workers get Rs. 120 wage per day in lean season and Rs. 200 per day in peak season. Women workers get Rs. 100 wage per day in lean season and Rs. 130 per day in peak season.

In Telangana, labour market is highly influenced by demand and supply conditions. Most often, labourers are paid different wages on account of a combination of demand and supply-side factors such as skills accompanied by productivity differentials, and labour market shortages and surpluses. Since farmers are growing more labour intensive crops such as chillies and cotton, severe labour shortage exists during peak season. For chilies, harvesting should be done in proper time. Otherwise the color of the produce will change, leading to depreciation of price. So every year from January to March, the farmer is forced to pay higher wages to the tune of Rs.200-300/- for males and Rs.100-200/- for females. On the other hand, workers are also of the opinion that if they go for Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) work, they can earn more money in shorter time. If they go for agricultural work, working hours are longer and wages are less.

A significant deceleration in crop-production and yield has reduced the income and employment opportunities of the working groups in Rayalaseema. However, the seasonal unemployment normally results in the migration of workers to other places such as Tadipatri, Anantapur, Gooty, Kurnool and Nandyala in Rayalaseema and Guntur in

Coastal Andhra in search of employment. Some of the families commute from the village to a nearby cement company to do non-agricultural work.

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

In Coastal Andhra, the inclusion of the socially-disadvantaged individuals in MGNREGS is encouraging from the poverty alleviation point of view. The impact of the scheme during peak agricultural operations is less in terms of labour supply. As a result, during harvesting, large farmers who need more labour, depend on migrant labour from other places like Anantapur. Majority of the large farmers claimed that the scheme has adversely affected them since the labourers demand higher wages for various agricultural operations.

In the sample village in Telangana, MGNREGS was successful in improving the employment opportunities and income of the workers. Agricultural wages have increased significantly after the initiation of the scheme. The scheme has made the labourers reluctant to go for other work since there is no stringent supervision or stress in doing the work provided by MGNREGS. Thus, labour market difficulties arise in the form of shortage of supply of farm labour. Large farmers are in a position to pay high wages, but this situation has a negative impact on small farmers who also need to pay higher wages. Once the wage went as high as Rs 300-400 during harvest season in the area in which field work was conducted.

In Rayalaseema, to enhance the livelihood security of the rural people, MGNREGS scheme was introduced. It has created more jobs and benefits through its

works for the poor workers. Most importantly, seasonal rural-urban out-migrations were reduced considerably during the lean season. In general, rain-fed agricultural areas witness growing migration. But migration has reduced to some extent with the introduction of the programme in the village. When compared to agricultural work, labourers feel that MGNREGS is good in terms of less working hours and equal wage rate for males and females. There are no seasonal variations in wage rate under MGNREGS. In spite of all this, it is perceived that it has adversely affected the availability of labour for agricultural operations. At times, during harvest seasons, the farmers are forced to go to the extent of requesting officials to stop MGNREGS work due to labour shortage. The employment scheme itself is suffering from issues of implementation with some needy workers still waiting for job cards and some farmers being incorporated into the scheme in the region.

Marketing:

In Coastal Andhra, almost all categories of farmers sell their produce on their own. All the sample respondents expressed the view that marketing facilities have improved compared with the past decades. Marketing of the output is determined by their individual need for money. Small and marginal farmers, due to their indebtedness, sell their produce in the village itself to the local moneylenders. The increased role of middlemen in a range of activities like sale of inputs, moneylending and trading in agricultural commodities proves that nothing can move without their consent. Generally, marginal and small farmers are in need of money quickly and own limited surpluses. So they sell the produce to the village moneylender-cum-trader. If they do not need money

and expect high price they keep the produce in cold storages. Most of the farmers got high price in the year 2010-11 for chillies, therefore majority of them took land for lease in 2011-12 to grow more chillies. In Telangana, farmers are marketing the output of chillies in Nagpur (Maharashtra) and cotton in Warangal. Every year, 60-70 lorries go from this village to Nagpur. Farmers have a belief that they would get better price in Nagpur market is different from the prices in their local markets. In Rayalaseema, for the past 3 to 4 years, due to severe drought conditions, low rainfall, duplicate seeds, overuse of pesticides, the yield of groundnut per acre has reduced from 2 quintals to 25 kgs. Since the village is located at road heads, Lorries from Gooty take the output to market at a low cost for sale in the outside market. All the groundnut producers sell their output in Adoni. On the whole, farmers face many difficulties in marketing their produce. Among others, they face problems such as the necessity to pay higher charges to cold storage, low price during harvesting period, seasonal variations in prices and price-controlling by powerful middlemen.

Explaining the supply response puzzles across the regions

The following section elaborates the factors of distinctive regional characteristics and connects these aspects to the supply response results accrued based on the secondary data.

7.5 Explaining Telangana supply response puzzle

The estimates of the non-foodgrain supply response to price showed significantly negative response in Telangana region (chapter 3). This phenomenon was indicative of the seemingly irrational behavior of the farmers and their area allocation behavior was

not in accordance with the economic rationale. This tendency is quite opposite to the logic of allocating area to the crop which would fetch better price. A similar trend was observed in the study of Vakulabharanam, V (2004). The study gives us the explanation that the negative supply response of non-foodgrain crops is due to interplay between global and local markets. This interesting regional phenomenon is carefully explained with the help of the following macro-economic policy framework and observations collected from field study.

Cotton, chillies and paddy are most cultivated crops in this region. Farming is dependent on groundwater irrigation. The observed phenomenon of preference for non-foodgrain cultivation seems to be due to various reasons which work in tandem, resulting in the farmers cultivating these crops in the region. Telangana farmer is dragged by expected returns and the moneylenders have a big role in deciding the crop in the region. Also, expecting high prices Telangana farmer increased the area of non-food cropping though the output prices declined. This condition is described as 'anomalous' by Vakulabharanam, V (2004). In Telangana, major portion of the area was under the cultivation of jowar which used to be the principal and single largest food crop which accounted for 27 percent of cultivation in South Telangana and 31 percent of cultivation in North Telangana in the triennium ending 1958. However, it had declined to 17 and 9 percentages in South and North Telangana respectively by 2004-05 (Reddy D N, 2006). By the late 1980s, the wave of commercialisation led to the domination of cotton cultivation in Telangana (Vakulabharanam,V 2004). In response to the agro-climatic conditions of the region, farmers in this region have shifted from low-value crops to

relatively high-value crops (Reddy D N 2006). This shift has pushed the farmers to high risk and unstable incomes.

Later, the impact of liberalisation policies geared the trend more towards cultivation of non-foodgrains in Telangana region (Vijaya Kumar, S 2006). India's integration with the global market arena increased the demand for Indian crops and encouraged the cultivation of export-oriented cash crops. Higher prices of non-foodgrains in global market attracted the small and marginal farmers and made them switch to more non-foodgrain production. However, trade liberalisation has adversely affected the non-foodgrain cultivation by reducing the import duty and further fall in their market price (Reddy D N, 2006). An excess export of these crops in the global market has resulted in deterioration of their prices. Cultivating these crops is making farmers extremely vulnerable, as it is more inclined to global market fluctuations and has also created a vacuum in dilemma of shifting, unsure, unpredictable prices (Sainath, 2006; Reddy D N, 2006).

Compared to food grains, non-foodgrains like chillies and cotton are more input-intensive and the farmer incurs more input costs. The increasing dependence on inputs from the market and rising input costs increased the demand for credit. Inadequate institutional credit support to the needy farmers and the increased credit needs amplified the preponderance of the moneylenders. There are different kinds of inter-linkages in lending and trade practices. They are land-product, land-labour and credit and product market linkages. In the case of Telangana, credit and product markets are interlinked. The higher cost of production incurred for these crops is provided by moneylender at higher rates of interest. Moreover, the rate of interest charged by the moneylender is three times

higher than the bank rate of interest. According to field survey, the average cost per acre in the case of food grain crops like paddy is Rs. 16,482/-, whereas the average cost for non- foodgrain crops like chillies is Rs. 48,217/-, i.e., three times higher than paddy. The average cost of cultivation in the case of cotton crop is around Rs. 25,617 /- and it is higher than the costs incurred to paddy cultivation (See Table 7.1). Thus, because of the high costs involved in non-foodgrains, farmer is taking more loans with high rates of interest from the moneylender. When prices of these non-foodgrains decline, more share of the output is transferred to the moneylender against the loan taken by him. Since farmers are forced to sell output to the same moneylenders, they are unable to retain their produce. This demonstrates the inter-linkage of credit and product markets. At this juncture, money lender-trader is able to swallow more output from the farmer against the credit given by him. At the end they are caught in the clutches of moneylender who increases his control over peasants and dictates the choice of the crop and makes the farmers cultivate the same crop year after year.

The field-level interactions with the farmers clearly proved that they make area decisions by keeping in view the relative profitability of crops and amount of cash at hand. It is observed that the farmers remember previous 3-4 years' crop prices. The prices of cotton and chillies substantially vary every year. In the year 2011-12, i.e., in the year in which the field work was conducted, the prices of these crops were comparatively high hence they are not the average prices. To get the average prices, farm harvest prices[6] of different crops which were available in Directorate of Economics and Statistics, Govt. of India have been taken (See Table 7.2). As per field survey, the average cost of cultivation of paddy is Rs. 16,482/- per acre. The average output obtained is 18.4 bags

per acre with the average price of Rs.1,169/- per bag. The profit obtained from cultivating paddy after deducting the total cost of cultivation is only Rs.5027/- per acre. The profit from chillies and cotton are Rs. 26,518/- and Rs.11,180/- per acre respectively. Although, the prices of non-foodgrains are declining, compared to food grains, profit per acre is higher in the case of non-foodgrains. Farmers prefer the crop which gives them higher profits and more ready cash. Accordingly, they are more inclined towards cultivating non-foodgrains in this region. The exploitative relation between the moneylender and farmer is making them cultivate non-foodgrains. The farmer in this region who is subjected to global market fluctuations and the tyranny of local informal credit elements resorts to increasing the acreage of non-foodgrains though the prices of these crops are declining.

7.6 Explaining Rayalaseema supply response puzzle

The statistical estimations on secondary data sheds light on the puzzle of negative non-foodgrain supply response during post-liberalisation period. This means that the farmers are inclined to increase the area under non-foodgrain crops in spite of fall in their prices. The results indicate that, price plays a negative role in acreage decisions. In order to test the secondary statistical output, field study was carried out to observe the micro-level issues and the following section elaborates the process.

The southern region of Andhra Pradesh, Rayalaseema is dominated by large swathes of dry and less irrigated land and it is in the queue of less developed socio-economic development meter. A region can be defined as developed or backward on the basis of the existence of imbalances in natural endowments and in the use of the

endowments through careful planning in the development process. Partial or complete failure of the crops due to the uncertainty and inadequacy of rainfall over a long period leads to famines and these conditions have been cyclically occurring in the last few decades in Rayalaseema region. Rayalaseema suffers from recurrent deprivation due to shortage of rainfall and limited groundwater deposits (Rayudu.C.S, 1992). Hence, availability of water resources is considered as a very crucial factor for the agriculture sector in this region.

Groundnut is the major crop grown in this region followed by jowar and castor and they are dependent on groundwater irrigation. Still farmers in Rayalaseema are in underprivileged condition though most of the Chief Minister's tenure was occupied by Rayalaseema region leaders. In response to the crop failures and uncertainty of per acre profitability over a period in this region, large holdings have declined and there are more small holdings. Farmers in this region are averse to the lease concept due to regular drought and absence of assured returns from the sown field. Few of them have left the soil without cultivation to avoid monetary and physical risks.

During early 1960s, Rayalaseema region was dominated by food grains such as paddy, millets, and pulses and non-foodgrain crops such as cotton and groundnut. Since the late 1970s, due to the climate change in the region over time, the area under food grain cultivation has declined. Since 1980s, there has been a substantial increase in area under oilseed cultivation. Groundnut has become the major non-foodgrain mono-crop[4]. Rayalaseema has become largest groundnut-producing region in Andhra Pradesh. The cultivation is more concentrated in Anantapur district. Hence, majority of the area in the

region is occupied by groundnut farming and it has emerged as a high-value crop. Farmers prefer this crop as it is a shorter-duration crop and involved less drudgery in cultivation. It also survives in the rough terrain, with low level of irrigation, and can withstand long dry spells and uncertain rainfall. The main motivation for the sharp rise in the area under groundnut cultivation may be because of the habit persistence behaviour, suitability of red soils and more economic returns from groundnut.

Several attempts to increase irrigation facilities by farmers have not been successful in the region. Scenario shows that the groundwater levels are rapidly falling, resulting in dysfunctional bore wells. A decline in the amount of rainfall has also been observed. Farmers get caught in borewell trap[5] or "borewell mania" since they invest huge amounts in digging multiple bore wells until they hit water. This leads to debt trap due to high investments and low success rate of borewell. It is observed that loans taken by the farmers from different sources are primarily used for digging bore wells. The farmers' prospects lie in fair economic returns from the present crop. In the absence of appropriate returns from the produce and crop failure, the farmer produces the same non-foodgrains which would fetch him higher income and more ready cash than food grains.

Farmers compare the profitability of food and non-foodgrains and consequently his preference is for non-foodgrains in this region. As per the micro-level observations, though farmer invests around Rs10,940/- per acre to cultivate groundnut crop, he incurs negative returns due to crop failure. A similar situation has been identified in the case of jowar crop. In order to explain the negative supply response of farmers to non-foodgrains, data of farm harvest prices of major crops grown in this region was taken from Directorate of Economics and Statistics, Govt. of India. The figures show that there

has been a gradual increase in the groundnut prices from Rs. 2,093/- per quintal in 2006-07 to Rs.2,714/- per quintal in 2010-11. The price trend of jowar shows that there was a marginal increase from Rs.932/- in 2006-07 to Rs.1,353/- in 2010-11. (See Table 7.3) Hence, farmers perceive that growing non-foodgrains is more profitable. The ultimate aim of the farmer is to sustain himself in farming and struggle to come out of the debt trap making him to prefer the crops which gives him remunerative price. However, low rainfall and other climatic conditions coupled with absence of institutional credit; make him cultivate the same crop in spite of negative returns.

7.7 Explaining Coastal Andhra supply response puzzle

Based on the estimations of supply response of farmers in Coastal Andhra region, it is identified that the non-foodgrains' supply response to price is positively insignificant during liberalisation period. So the expected tendency is an increase in the area under food grain cultivation and a reduction in the area under non-foodgrain cultivation.

Among the three regions of Andhra Pradesh, Coastal Andhra region is considered the most fertile. The fertile estuary regions of Godavari and Krishna rivers and the presence of perennial canals, tanks and wells make the land apt for farming. Coastal regions with better agro-climatic endowments are expected to attract more public and private investments. This leads to better farm investment and results in better supply response (Lalmani Pandey et al, 2012). Higher public investments in irrigation due to the higher irrigated area in Coastal Andhra is facilitated by its lower gradient and higher rainfall. Unlike other two regions, this region has diverse sources of irrigation. The behavioral patterns towards grabbing the profits of socio-economic and natural resources

in the mankind are considered as one of the main concern in this region. The dynamics of caste, class with the support of natural resources is diversified with the elite rural cum business oriented section.

Capitalist tendencies in the sphere of agriculture production and high productivity with ample profit rates in agriculture have generated surpluses leading to more profitable enterprises (Upadhya Carol B, 1988) in this region. Agriculture is both a form of livelihood and a profitable venture for large farmers in this region due to the major agricultural transformations that took place with the advent of Green Revolution. It created economic disparities between the landed and landless (Upadhya Carol B, 1988). After the advent of green revolution, a new capitalist class of farmers with assured irrigation facilities and higher rates of return emerged in Coastal Andhra (Parthasarathy 2004). Greater profitability on their investment was achieved by making use of new technologies of high-yielding inputs, irrigation technologies, tractors, etc. (Purendra Prasad N, 2015). Hence, production relations are still dominated by upper-castes who have more access of land. The small poor farmers remain in distress and face a highly volatile agricultural scenario. In accumulation of economic capital and political domain, the role of caste has strengthened in spite of market reforms. The credit flow through formal credit institutions is higher in this region when compared to the high density of bank accounts in Rayalaseema (Sri Krishna Committee Report, 2011 and Reddy, 2006). For instance, micro-level observations point out those crop-specific loans to the farmers encourages them to grow non-foodgrains. Flow of adequate credit gives them an incentive to go for high-value crops.

In this region, food crops such as rice, jowar, bajra, greengram, blackgram, redgram, etc., and non-foodgrain crops like cotton, chillies, groundnut, sugarcane, tobacco, etc., are cultivated. Farmers' are required to shell out much more money for commercial crops due to the usage of technology and purchased inputs. In Coastal Andhra, during the 1970s and 1980s, the single largest dominant food crop was rice followed by jowar, bajra, horsegram etc. Since 1990s, area under rice cultivation has steadily increased. Greengram and blackgram farming have also increased. Area under jowar cultivation has declined to a significant extent during this period. Since 2000s, though the area devoted to rice cultivation has been falling, it still remains dominant and accounts for 70.4 percent of the total area under food grain cultivation [(Various issues of Directorate of Economics and Statistics, GoAP (See Tables 7.4 &7.5).]

As far as the area under non-foodgrain cultivation is concerned, in the 70s, groundnut was leading, followed by tobacco, cotton, sesamum, sugarcane and chillies. Since 1980s, groundnut has been occupying 30 percent of the total area under non-foodgrain crops. Notable increase in the area under cotton cultivation has been identified after the advent of liberalisation policies. In terms of increase in cultivation, cotton is followed by groundnut, sugarcane, tobacco, chillies and sesamum. Since 2000s, there has been a sharp decline of area under groundnut cultivation. The area under chilli, cotton and sugarcane cultivation has continued to rise in this period [Various issues of Directorate of Economics and Statistics, Government of Andhra Pradesh (GoAP)]. Thus the area under non-foodgrain cultivation has started slowly increasing from 1990s onwards. However, rice continues to be the predominant crop in Coastal Andhra.

The results of non-foodgrain supply response estimations show that farmers response for non-foodgrain price changes is positively insignificant in the liberalisation period. It can be observed that there was a marginal increase in the percentage of area under food grain cultivation, i.e., it increased from 77.1 percent in the years 1983-95 to 79.6 percent in 1996-2007. On the other hand, the area under non-foodgrain cultivation has declined marginally from 22.9 percent in the years 1983-95 to 20.4 percent during 1996-2007. Hence, though non-foodgrain prices have declined, there has been no substantial corresponding decline in the area under non-foodgrain cultivation. So, the supply response for non-foodgrains is positive, but not significant in Coastal Andhra region.

7.8 Conclusion

An attempt has been made in this chapter to look at interregional variations in the performance of agriculture which influences the supply response of the farmers in the three regions of Andhra Pradesh. Explanations have been given for the negative non-foodgrain supply response in Telangana, Rayalaseema and positively non significant non-foodgrain supply response in Coastal Andhra. Regional disparities are caused by the interplay of an array of factors associated with the process of economic liberalisation and local institutional mechanism. However, inter regional disparities suggest that the major explanatory factors are the dependence on informal credit agents, erratic rainfall and inadequate irrigation facilities. The uneven performance over the regions can be attributed to the differential institutional mechanisms and the agro-climatic conditions. The next chapter deals with the policy implications of the lacunae identified across the regions.

TABLES

Table 7.1

Crop-wise profits in surveyed village in Telangana

Crop	Avg. Cost	Avg. Output	Profit (in Rs.)
Chillies	48217	13.24 (Q per acre)	26518
Cotton	25617	10.98 (Q per acre)	11180
Paddy	16482	18.40 (bags per acre)	5027

Source: Field Survey, 2011-12

Table 7.2

Farm Harvest prices of different crops in Warangal district

Year	Chillies	Cotton	Paddy
2005-06	2812	1915	638
2006-07	4468	1936	677
2007-08	4070	2037	810
2008-09	4614	2785	1038
2009-10	4596	2896	1487
2010-11	7724	4373	981

Source: Various issues of Directorate of Economics and Statistics, GoI.

Table 7.3

Farm Harvest prices of different crops in Anantapur district

Year	Groundnut	Jowar	Castor
2005-06	1557	664	1344
2006-07	2093	932	1578
2007-08	2177	850	1788
2008-09	2249	1018	2234
2009-10	2585	1114	2400
2010-11	2714	1353	3450

Source: Various issues of Directorate of Economics and Statistics, GoI.

Table 7.4

Percentage of area under Foodgrains in Coastal Andhra

Period	Rice	Jowar	Bajra	Maize	Ragi	Bengal-gram	Red-gram	Green-gram	Horse-gram	Black-gram
1970-1982	64.3	10.6	5.8	0.3	5.0	0.3	1.1	3.8	4.5	4.5
1983-1995	69.3	4.0	3.6	0.7	2.8	0.2	2.0	4.3	2.5	10.6
1996-2007	70.4	0.5	1.4	2.1	1.6	1.5	3.3	5.4	1.7	12.0

Source: Authors calculation from the various issues of Directorate of Economics and Statistics, GoI.

Table 7.5

Percentage of area under Non-Foodgrains in Coastal Andhra

Period	Groundnut	Castor	Sesamum	Cotton	Sugarcane	Tobacco	Chillies	Turmeric
1970-1982	29.5	3.3	12.1	12.1	11.8	19.8	10.2	1.1
1983-1995	29.8	3.0	8.9	24.9	11.4	12.3	8.7	1.0
1996-2007	18.8	1.8	9.9	29.4	15.3	12.7	11.0	1.1

Source: Authors calculation from the various issues of Directorate of Economics and Statistics, GoI.

End Notes

[1] Institutional mechanism implies the working of the institutions such as credit, marketing

[2] Polegar system was identified in the Rayalaseema region. They are powerful local elite people who used violence and domination to grab money coercively from the farmers.

[3]Contract Labour refers to giving specific agricultural operations on contract basis to the labourers.

[4] Growing a single crop year after year on the same land is referred as the practice of Mono-cropping. There will be absence of crop-rotation by growing other crops.

[5]As the ground water levels are getting deteriorated farmers need to incur high cost of digging bore wells to deeper extent of the soil. In addition frequent failure of these borewells also becoming burden to the farmers

[6] Farm Harvest Prices are the prices at open market at which producers sell their output mostly to traders and processors at harvest time. These prices are collected by state revenue departments at the end of each crop season.

CHAPTER 8

CONCLUSION AND POLICY IMPLICATIONS

8.1 Introduction

The global market forces have transformed the paradigms of decision making for farmers with respect to the choice of crops in Andhra Pradesh. The opening up of the economy to more export-oriented agricultural commodities and higher global prices for these commodities have led many farmers to change their cropping pattern from subsistence food crops to high risk/high cost cash crops for both domestic and global markets. The changes in cropping pattern reached its zenith in the post-reform period though they had got initiated in the eighties. The acreage under food grains has declined noticeably and export crops are given preference. Corresponding to the fall in area under food grain cultivation, there is a rise in acreage under non-foodgrain crops. However, diversion of area to non-foodgrain crops has increased the risks faced by the farmers in terms of costs of cultivation, credit, irrigation, etc. Farmers are moving towards non-foodgrain crops in order to sustain their income flows. In view of the several factors influencing the behavior of farmers, significant variations in the supply responses of food grain and non- foodgrains have been observed among regions. The analysis of supply responses (see chapter 3) of farmers in Andhra Pradesh offer following results:

The analysis focused on understanding the various components of supply response. The supply responses of non-foodgrain have undergone significant changes across regions in the state. The statistical exercise on secondary data sheds light on the

puzzle of negative supply response, and explains that the farmers are inclined to increase the area under non-foodgrain crops in spite of fall in their output prices. The result of estimates pertaining to the post-liberalisation period for non-foodgrain acreage response shows negative elasticities for Telangana and Rayalaseema regions. The results indicate that, price plays a negatively significant role in acreage decisions. In order to examine the secondary statistical output, a parallel field study was carried out to observe the micro-level issues influencing the supply response of farmers. An explanation was given for the supply response puzzles with the help of micro-level observations from field survey. The emphasis on food grains have reduced and non-foodgrain crops have gained importance in Telangana and Rayalaseema regions. However, in Coastal Andhra, supply response results show positively insignificant non-foodgrain price response to acreage. In this context, it is important to take a look at some of the critical reasons behind the regional variations in supply responses of farmers. This chapter also points out some of the policy changes that ought to be introduced.

8.2 Explaining the different supply response findings in each region

The supply response of farmers in terms of which crops to cultivate, how much area to allocate, etc. are determined by their price expectations, impact of government's policies, climatic conditions, irrigation, expected yield, etc. The following are the region-specific issues concerned with the supply response of farmers in Andhra Pradesh:

In Telangana, small and marginal farmers' categories occupy major proportion of land holdings with meager presence of large holdings. Backward Communities (BCs) which are the most dominant group in Telangana region and Scheduled Caste (SC)

farmers are lesser in number. Money lenders cum traders play a crucial role in this region in acreage decisions. Undoubtedly their hands are controlling the farming activities along with market formalities. But there is no control of government on these non-institutional elements (Bhatt K.S. and S.Vijaya Kumar, 2006). At this situation, farmers are forced to cultivate the crops as directed by the money lenders. Farmers prefer non-foodgrains and expand the acreage due to the profits obtained. Money lenders' role is very evident at the micro-level in this region as they lend money for cultivating only those crops which fetch high-revenue for them. The farmer becomes helpless in deciding the future crop and has to cultivate the crop beneficial to the money lenders. In addition to this, farmers are unable to retain their output and are forced to sell it to the money lenders against the loan taken by them. The needy farmer's access to institutional credit is severely hampered since credit is dispensed based on acreage and crop. This combined with unregulated informal credit practices and dominance of money lenders has led to a peculiar kind of supply response where the cropping area becomes positive, to the non-foodgrains in spite of fall in their prices. Thus an area-allocation decision is the outcome of a complex inter-play of informal credit and product market practices. Along with this, the prices of non-foodgrain crops produced by farmers have become more volatile due to the influence of international prices and fluctuations in such prices. This is especially true in the case of crops like cotton, chillies and groundnut. This has created a hostile economic climate where the profits of farmers become unstable and unpredictable. Uncertainty of profitability and feasibility is a general phenomenon of all types of crops, but it is more sharply felt in the cotton crop (Revathi, 2006) which is a dominant non-foodgrain crop in the region. And also Telangana region is more dependent on tube-wells and it demands

high investments in power for pumping up water from water-table which is situated deep down. It has been observed that bore wells have replaced wells as the major sources of irrigation. Due to poor irrigation resources, factors such as seed availability, fertilizer prices, labour costs, profitability, non-institutional factors, etc. have a stronger influence on farmers in this region. Compared to other regions, Rayalaseema region is perceived as being less developed and hold dry land agriculture. Major portion of land holding is occupied by the small and marginal farmers and large-size holdings have got reduced due to the increasing uncertainty of climatic conditions. During the recent years, land ownership by Backward Communities has steadily increased. There is a negligible number of land-owning Scheduled Castes (Reddy D N, 2006). Apart from this gross bias in land ownership, policy framework by the state, central and global institutions adds to the problems of this region. It is identified that in Rayalaseema, crop failures and uncertainty of per acre profitability has become a common phenomenon over a period. However it was observed that in the region, in spite of falling prices of non-foodgrain crops, farmers take up the same crop season after season. Being a defaulter in the credit repayment due to the crop failure the farmer feels that the easier way to earn money is by cultivating the crop that gives him maximum cash returns. With regard to the flow of credit and its usage, most notable point here is that the loans sanctioned to the farmers were used primarily for the digging of bore wells.

The micro-level study in Coastal Andhra tells us that small and marginal farmers occupy a huge share of the land holdings in this region. Besides this, unlike Telangana and Rayalaseema, predominance of large farmers with large holdings was observed in the field survey. Particularly in this region, the domination of Kamma community in all the

categories of land holding was observed. Scheduled Caste farmers with their own land combine it with leased land and carry out cultivation since there are improved and sufficient irrigation sources. In this region, each district has a specific dominant crop whereas south Coastal Andhra is dominated by cotton and chillies and north Coastal Andhra is dominated to a large extent by food grain crops like rice. In spite of all the institutional support, an insignificant non-foodgrain supply response was observed in the region.

To sum up the supply response findings of the three regions, in the recent past with the adoption of modern technology, the capital requirements of farmers have been growing since they have started growing non-foodgrain crops. The critical role played by the credit institutions has been explored in the earlier chapters. Though the flow of credit to agriculture has increased over the years, its access to farmers is still fraught with irregularities. However, regional disparities are wide in the performances of institutional and non-institutional sources of credit. It was observed that proportion of credit from institutional sources is more in Coastal Andhra. This is because of the cultivation of high-value crops with higher production cost. Another point to be highlighted is the presence of interlocking of credit and product markets that was identified in Telangana region. This interlocking here is mainly a consequence of high financial requirements and the production of highly capital intensive crops.

Irrigation has been found to be the major determinant of area allocation variations among regions. There are regional disparities in the extent of irrigation. In Coastal Andhra canal irrigation is the major source of irrigation and it makes the region better off

compared to other regions. However, the irrigation potential of Telangana and Rayalaseema has worsened with ground water being increasingly exploited by small and marginal farmers. Ground water irrigation which is largely based on private investment has become a substantial burden to the farmers. Fragmentation of land holdings is another cause for the reduction in the irrigation potential of the Telangana region.

8.3 Policy initiatives:

Although there is a need for devising region-specific policies, irrigation is an essential input which determines the growth of agricultural output. Substantial state investment is required to facilitate the development of irrigation potential of the backward regions. The backwardness of Telangana and Rayalaseema in the context of irrigation emphasizes the need for providing state help in the form of public investment in the irrigation sector. State's attention is vital for the expansion of adequate irrigation networks. The expansion of canal irrigation played a significant role in transforming Coastal Andhra from a famine-ridden region to a prosperous region. To reduce yearly seasonal fluctuations and thereby impart a measure of stability to agricultural output, the expansion of irrigation in the rain-fed areas should be the central focus. The first priority should be development of irrigation and investment in other rural infrastructure followed by timely availability of sufficient institutional credit to the farmers, so that dependence on private money lenders is totally eliminated.

Regional disparities in the distribution of credit were observed in the surveyed villages. Credit requirements of farmers are changing across time and space. Widespread fluctuations in the acreage and production of food grains pose a serious question of food

security. In the context of the initiation of Food Security Bill, 2011, which gives hope to millions of hungry Indians, it is necessary to maintain self-sufficiency in food-grain production. So it is quite obvious that ensuring food security lies in sustainable food-grain production. Incentives are to be provided to farmers in order to encourage them to grow food crops.

Dry land areas suffer from productivity constraints due to their exclusive dependence on rainfall. Switching towards low water consuming crops is another important measure which can be suggested to the farmers of dry land regions. It is already being practiced in the Rayalaseema region with the cultivation of castor crop (Field Survey, 2012).

Even after significant technological and institutional advancements, the crisis in agriculture has been increasing in the recent years. Undoubtedly liberalisation has enhanced the trade competitiveness of agriculture products. But this would surely affect the domestic products and their prices. So there is a need to assess the impact of liberalisation and policies have to be developed to ensure the welfare of the farmers. Appropriate mechanisms for protecting these farmers from drastic fluctuations in global prices of crops need to be developed.

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Synopsis of the Thesis Entitled

Supply Response of Farmers: Regional Variations in 'United' Andhra Pradesh

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By

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1. Introduction

There has been ample discussion on the issue of agrarian crisis in recent years. The manifestation of crisis has taken the form of large number of suicides. Sharp rise in the cost of living (index for CPIAL) coupled with deteriorating farm income has pushed the peasant into crisis (Reddy D N and Srijit Mishra, 2009). Crisis in agriculture reduced the primacy of public provision and increased the dominance of private institutions. Agrarian crisis has resulted in the decline of production, productivity and value of output of majority of crops since mid-nineties. Agriculture, the dominant economic activity in the South Indian state of erstwhile Andhra Pradesh has also been facing severe structural and institutional constraints. Andhra Pradesh is one of the states which is identified as being prone to agrarian crisis and has reported highest incidence of suicides. Though various reasons such as predominance of small holdings, groundwater irrigation and low share of priority sector advances to agriculture etc. have been highlighted, farmer suicides are highest in areas with higher acreage under non-foodgrain crops, particularly cotton.

At this juncture, it is essential to note whether farmers are engaged in rational supply response in Andhra Pradesh. The present study's focus is on this. Due to the influence of demand and supply forces, if the price of a particular commodity increases, there would be a natural inclination on the part of the farmers to bring change in their cropping pattern and bring more acreage under that particular crop. This response may differ from one region to other and is also crop-specific. So, the present study mainly focuses on this issue of variance and institutional forces that are influencing the farmers of three regions in erstwhile Andhra

Pradesh. The study makes an important departure from earlier studies with regard to regional peculiarities within the state.

Most supply response studies [Raj Krishna (1963), Hazell, et al (1995), Mishra, (1998), Adam Ozanne (1999), Chandrasekhar Rao, (2004), Mythili, (2008)] emphasized the significant impact of both price and non-price aspects on acreage decisions of farmers and mainly estimated price elasticities of supply for different crops with positive and negative impacts. Economists like Nerlove (1958), Askari and Cummings (1976), Rajkrishna (1963) and Narayana N.S.S and Kirit S. Parikh (1981) found that farmers have responded positively to changes in prices in India and elsewhere. Mythili (2006) examined the supply elasticities of major crops in India in the pre- and post-reform periods. Studies dealing with supply responses of farmers in both developed and developing economies are Adam Ozanne (1999), Maurice Schiff and Claudio E. Montenegro (1997) and Julie Subervie (2008). Vakulabharanam,V (2004) made an attempt to investigate anomalous supply response in Telangana, one among the three regions of Andhra Pradesh and found the negative non-foodgrain acreage response to price during agricultural liberalisation.

Studies concerning the regional variations in Andhra Pradesh for individual crops are conducted by Ramulu (1996) shows that sugarcane acreage is positively significant to its relative price in selected sample districts of the three regions except in West Godavari district. Janaiah, Subbaramaraju and Krishnaiah (1990) analysed the area production and yield response behaviour of farmers to cotton through adjustment mechanism at regional level. Their results show that supply behaviour of farmers in the coastal Andhra region is more price elastic compared to Telangana and Rayalaseema. Sankar and Naidu (2013)

analysis of responses of area, production and productivity of cotton crop revealed that current year acreage responds positively to previous year's area, production, price and irrigation.

2. The Problem

In Telangana, it is observed that the relative prices of food grains over non-foodgrains are rising whereas non-foodgrain prices over food grain prices are falling. So, logically, one would expect the area under food grain cultivation to increase. But the supply response of Telangana farmers is not along the expected lines. The area under food grain cultivation reduced and the area under non-foodgrain cultivation increased during the post-liberalisation period. This seemingly irrational behaviour of farmers may actually be a result of certain institutional factors.

Rayalaseema region also exhibited a similar trend in the post-liberalisation period i.e. farmers increased the area under non-food grains though the prices falling during post-liberalisation period. In Coastal Andhra, prices of food grains over non-foodgrains are increasing and non-foodgrain prices over food grain prices are falling. So the expected tendency is an increase in the area under food grain cultivation. In this region, the area under food grain cultivation and non-foodgrain cultivation increased and decreased respectively. This is a rational outcome of the price change. Therefore, this thesis investigates the discrepancy in the farming patterns exhibited by the farmers in the three regions of Andhra Pradesh. This work is an attempt to find out why Telangana and Rayalaseema agriculture defy the expected trend while the Coastal Andhra farmers carry out agriculture in accordance with the change of prices of food grains and non-foodgrains.

3. Objectives of the Study

- To examine the trends in growth of agriculture between the years 1983 and 2007 in the three regions, viz., Telangana, Rayalaseema and Coastal Andhra in the undivided state of Andhra Pradesh.
- To estimate the food and non-foodgrain acreage responses of farmers in the three regions.
- To analyse, with the help of a sample survey, the institutional forces that are influencing the acreage decisions of farmers in these regions.

4. Hypothesis

Price plays an imperative role as a decisive factor in determining the choice of acreage under different crops. Farmers are usually rational and respond positively to product price changes. Acreage responsiveness of farmers is positive to changes in the prices of food grains and non-foodgrains. A positive relationship exists between the price of food grains and the area under its cultivation. In other words, an increase in the prices of food grains results in an increase in the area under cultivation of those crops. The same holds true for non-foodgrains. An increase in the prices of non-foodgrains results in a corresponding increase in the area under its cultivation. However, this simple relation may be influenced and mediated by institutional factors, thereby altering it.

5. Sources of Data and Methodology

The methodology adopted for the present study involves secondary data analysis and fieldwork based methodology. Secondary data for this study is mostly drawn from Statistical Abstracts of Andhra Pradesh for different years and Compendium of Area and Land Use

Statistics of Andhra Pradesh (1955-56 to 2004-05). The data collected is the state-wise, region-wise and district-level information on area, production and prices of different crops. Rice, jowar, bajra, maize, ragi, bengalgram, redgram, greengram, horsegram and blackgram have been considered as food grains and non-foodgrains such as groundnut, castor, sesamum, cotton, sugarcane, tobacco, chillies and turmeric have been included. All these food grains and non-foodgrains account for more than 80 percent of the gross cropped area of all the three regions of the state.

The whole period has been divided into two parts - 1983-1995 and 1995-2007 time periods respectively. These sub-periods denote the pre and post liberalisation years and are significant since it helps to factor in the effect of liberalisation on the performance of agriculture in the state. The prices for the year 1980-81 have been taken as the constant prices.

For measuring the growth rates in different sub-periods, exponential growth rates have been used. Region-wise growth decomposition method has been used to know the contributions of different components on growth. At constant prices, the value of output is decomposed into three components, i.e., area, yield and cropping pattern. Further, to estimate agricultural supply response, the modified model of Vakulabharanam, V (2004) has been employed. The relative prices of food grains and non-foodgrains have been computed by using Laspeyres index. Supply responses of the food grains and non-foodgrains have been estimated for the three regions of Andhra Pradesh. Ordinary Least Squares method has been used for estimating the parameters. To correct for autocorrelation in the model because of the lagged variables, Cochrane-Orcutt procedure is also used.

The primary data has been collected by surveying the sample farmer households with the help of a structured questionnaire. The focus of the primary study is the examination of the differences in the supply responses of farmers in the three regions of Andhra Pradesh. Guntur district from Coastal Andhra Region, Warangal district from Telangana region and Anantapur district from Rayalaseema region have been chosen as representative districts to explain the supply response of each region on the basis of purposive sampling. The chosen districts can be considered as representative since they are the major commercial crop growing districts in their respective regions. For example, cotton in Warangal; cotton, chillies and sugarcane in Guntur and groundnut in Anantapur are major non-foodgrain crops. Moreover, a notable fact is that a large number of suicides have been identified in the cash crop growing sector. Thus, it is important to investigate the crucial factors which influence the cultivation of non-foodgrain crops and these districts, by virtue of their extensively growing major non-foodgrain crops, can be considered as ideal samples.

One sample village has been selected from each district of each region. To explore the class and caste dynamics, selection of the villages has been done after taking into consideration, all social and economic categories and both food grain and non-foodgrain growing areas. The pilot study was mainly held on indicators such as primary livelihoods, land-holding size and crops grown by all the households in the village. Subsequently, 50 households from the selected villages were identified as samples to examine the supply response of farmers. Selection of households was made in proportion to the farm size and caste distribution. The data collected pertains to the agricultural year 2010-11. Simple tabular analysis has been used as the main statistical tool for making sense of primary data.

6. Structure of the Thesis

Chapter 1 gives an understanding of the background of the problem, objectives, hypothesis and methodology adopted. Chapter 2 analyzes the growth rates of the agrarian economy of Andhra Pradesh and across regions from 1983 to 2007. Regional variations in the food grain and non-foodgrain area responsiveness of farmers are analyzed in chapter 3. The data on supply responsiveness of farmers, collected through a sample survey in the select districts of Coastal Andhra, Telangana and Rayalaseema, are presented in chapters 4, 5 and 6 respectively. Chapter 7 analyzes the regional variations in supply responses of farmers in Andhra Pradesh at micro-level. The study arrives at an explanation of the supply response puzzles with the aid of micro-level evidence and finally some conclusions are presented in chapter 8.

7. Chapter-wise findings:

An attempt has been made in **Chapter 2,** to review the literature on growth trends followed by discussion on data sources and methodology used and to study the growth patterns in Andhra Pradesh. Regional and inter-district variations in agricultural growth trends, in Andhra Pradesh over the period 1983-2007 has been examined and to identify the factors responsible for agricultural growth by decomposing the agricultural output growth to area, productivity and cropping pattern at the state level and across the regions.

The results of the agricultural growth phenomenon across the regions and its decomposition to various factors observed through the exercise of secondary statistics. The agricultural growth performance of the state during 1983-1995 was 3 percent and it has fallen to 1.5 percent during 1995-2007. A high output growth rate of 4 percent was observed during

pre-liberalization period in Telangana region which is more than the state level growth rate and in post liberalisation it has declined to 3.1 percent. Here, growth performance in the Telangana region could be explained in terms of growth in irrigated area. The elasticity of output with respect to irrigation in Telangana accounts for the high output growth during pre-liberalisation period. The Coastal Andhra growth performance was relatively lower in 1983-1995, i.e., 2.3 percent and it further declined to 1.6 percent in the second sub-period. Overall output growth rates during pre and post liberalisation periods are very poor. Rayalaseema has registered 3.7 percent growth rate during first sub-period. But it has failed to maintain its growth and had negative growth rate in the second sub-period.

Gross cropped area being an important determinant of agricultural growth, its share in determining output growth is marginal in all the three regions. At state-level, the growth of gross cropped area has declined from 0.3 percent in pre-liberalisation period to -0.2 percent in post-liberalisation regime. Previous studies have identified that though more land was brought under cultivation by 1970s, the growth rate was less in the cropped areas (Vakulabharanam, V 2004). A study by Subramanyam and Aparna (2009) identifies a deceleration in gross cropped area in 1990s. Due to unsustainable agricultural practices, fallow land is on the rise in Telangana and Rayalaseema (Reddy D N, 2006).

The contribution of yield component to output growth is significant. With the advent of technological developments in terms of introduction of new inputs, high-yielding seeds, chemical fertilizers and irrigation in the early 1980s, the productivity levels of major crops increased. In addition to the availability of new inputs, technological innovations such as increased use of tractors further accentuated the yield-levels at the state and region levels.

Apart from yield component, cropping pattern is also a major contributor to output growth. From the secondary statistics, it is noted that regional dimensions of cropping pattern show that the contribution of cropping pattern to output growth is high during pre-liberalisation and it has decreased in post-liberalisation period. Evidences from preceding researches highlight the diversification towards high-value and high-productivity crops.

In order to analyse growth performance of agriculture as it is primarily dictated by allocation of areas to the cultivation of distinct crops, an attempt has been made to observe the supply response phenomenon for food and non-foodgrains across the three regions of Andhra Pradesh in **3rd Chapter**. The supply response estimations arrived at the supply response puzzles in post liberalisation periods. The inter-regional analysis of supply response estimations reveals some significant results among regions for non-foodgrains. From the supply response analysis, it can be inferred that price is a negatively significant factor in Telangana indicating that the fall in non-foodgrain prices result in an increase in the area under non-foodgrains during liberalisation period. The results of Rayalaseema supply response estimations of non-foodgrains during liberalisation period also indicate the negative relationship between non-foodgrain acreage and price. This shows that price components in Telangana and Rayalaseema play a negatively significant role in non-food acreage decision of farmers. The result of the empirical findings in Coastal Andhra further reveals positively insignificant price response during liberalisation period for non-foodgrains.

Supply response of farmers' exhibit variations across crops and regions. Besides the price, supply response depends on other factors such as class and caste composition of land ownership, crops grown, irrigation, credit, agricultural markets, etc. Hence, **4th, 5th and 6th**

Chapters emphasizes the factors that determining the supply response to acreage at micro level among the three regions. In order to know the crop economy from the farmer's perspective, an analysis of micro-picture of the determinants of supply response in three regions of Andhra Pradesh has been explained. The socio-economic profile and an agro-economic analysis of sample households with specific references to class and caste-wise composition of land ownership, cropping pattern, cost of cultivation, irrigation, sources of credit, output produced and marketing facilities have been provided in the selected villages. The villages selected at the micro level from the three regions are Mandepudi from Guntur district in Coastal Andhra region, Chandraiahpalli from Warangal district in Telangana region and Basinepalli from Anantapur district in Rayalaseema region.

An Analysis of regional variations through the micro-level issues identified across the regions are given below.

Land holding structure of farm households: Land as a prime factor of production is influential in the area-allocation decision of farmers. Firstly, in the regions of Coastal Andhra, Telangana and Rayalaseema, it is observed that the major proportion of land holdings is owned by small and marginal farmers. A significant portion of large holdings is in the Coastal Andhra region. Neither Telangana nor Rayalaseema possess large holdings. Medium farmers have a large share of land in Coastal Andhra, whereas in the other two regions, small and medium farmers own a significant share of the land. The other significant feature of the structure of land holdings is that the land concentration is relatively high in Coastal Andhra and Rayalaseema and low in Telangana.

Caste-wise distribution of land holdings: In the village surveyed in Coastal Andhra, there is a domination of Kamma community in land holdings of all sizes. In terms of land ownership, the Kamma community is followed by SCs, and then by Muslims. A noticeable feature of Coastal Andhra is that small and marginal holdings are owned by farmers from all the communities including the Muslim community, in the village. In Telangana and Rayalaseema, major proportion of ownership of land is with certain backward communities followed by STs. The share of land owned by SCs is small in these regions. Subsequently, large holdings have declined due to the fragmentation of land holdings. The power of the dominant farming castes in agrarian society has declined while backward communities, and to a lesser extent SCs, have more control over land in Telangana and Rayalaseema

Tenancy: In Coastal Andhra, small farmers who are largely involved in taking land on lease, pay the rent at the end of the harvest by selling their output. Lease rent depends on the water facility and its proximity to the main road. Previous crop output value also plays a role in deciding rent. It is also observed that most of the tenants are from the categories of small and marginal farmers in Coastal Andhra region. The practice of taking land on lease is considerably less in Telangana and Rayalaseema regions. Though tenancy is relatively low in these regions, farmers tend to pay high rates of interest to the non- institutional credit sources. Tenants are forced to take credit from non-institutional sources and end up paying higher rates of interest due to improper and insufficient support from the institutional sources.

Cropping Pattern: In the sample village in Coastal Andhra, majority of the cropped area has been devoted to chilli cultivation for the last 15 years. Farmers, who take land for lease, prefer to cultivate only chillies. They used to grow paddy, jowar, groundnut and

turmeric 15 years ago. Now the area under paddy cultivation has declined significantly. In Telangana, the major crops grown are chillies, cotton, paddy, groundnut and turmeric. It is observed that even if the commercial crop fails in giving substantial income, they are able to take care of food requirements since paddy is also cultivated for family consumption along with the commercial crop. In Rayalaseema it is observed that they have been growing groundnut for the last 30-40 years. However, during the past 3 to 4 years, the yield-levels have fallen significantly. They have been slowly switching to castor crop. The major reason behind such a shift is lack of sufficient resources to cultivate groundnut. Castor crop absorbs more rainwater, gives more output with higher survival percentage and plant growth. Cost of cultivation for castor is also relatively low and there is less demand of labour for this crop. On the whole, it is found that the cropping pattern across the regions is more in favour of non-foodgrains and the acreage under food grain cultivation is very low.

Irrigation sources: The major irrigation source in Coastal Andhra is the canal system. The farmers in well-developed Coastal Andhra relatively enjoy the benefits of stable and high level of irrigation which was developed through public investment (Reddy D N, 2006). On the other hand, Telangana and Rayalaseema farmers depend on groundwater resources. In the surveyed village of Telangana, well is the major source of irrigation. With the passage of time, tank Irrigation has been neglected and borewells have become the main source of irrigation.

As is the case with drought-prone areas, Anantapur lacks the presence of perennial rivers. The rainfall is very erratic and uncertain and is mainly responsible for creating moisture scarcity and crop failures due to rainfed conditions. Given this environment, the

rapid increase in bore-well irrigation has resulted in the depletion of ground water-levels in the last 10-12 years. High cost of digging bore wells combined with low success rate of bore wells and the cost involved in mobilizing the finances etc. have pushed several farmers into debt traps. This has resulted in significant indebtedness among farmers. Due to this, agriculture has become largely unprofitable for several classes of farmers.

Institutional credit: In Coastal Andhra, it may be noted that the credit facilities are made available by banks, micro-credit groups, moneylenders, commission agents and fertilizer dealers. However, most of the households depend on non-institutional as well as institutional credit sources. Institutional credit such as crop loans depends on the crops grown by the farmers. In Telangana, banks provide loans ranging from Rs.25,000/- to 40,000/- per acre depending on the land and crops they grow. Along with this, in order to meet production needs, farmers take loans from moneylenders from Warangal and Narsampet at 24% per annum interest. After harvesting, farmers sell the produce to the same moneylender against the loan taken by them. Some women take loans from Self-Help Groups (SHGs) and use the loan amount for agriculture. In Rayalaseema, Self-Help Groups play a significant role in providing credit. It must be noted that the institutional credit is provided based on the crops grown by farmers in each region. So area allocation decisions can be influenced by the credit facilities provided to the farmers. Despite the regional disparities in sources of credit, effectiveness of institutional credit is also area-specific.

Labour: An analysis of regional variations in the use of labour is quite significant. Farmers of chillies relatively hire more labour in Coastal Andhra. With heavy demand of seasonal labour during peak season, there is a dependence on migrant labour. Contract labour

is preferred to daily wage labour since the latter is more expensive. Large farmers are likely to hire more labour compared to others as the role of family members in contributing to labour is less. In Telangana, labour market is highly influenced by demand and supply conditions. Most often, labourers are paid different wages on account of a combination of demand and supply-side factors such as skills accompanied by productivity differentials, and labour market shortages and surpluses. Since farmers are growing more labour intensive crops such as chillies and cotton, severe labour shortage exists during peak season. So every year during peak season, the farmer is forced to pay higher wages to the tune of Rs.200-300/- for males and Rs.100-200/- for females. On the other hand, workers are also of the opinion that if they go for Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) work, they can earn more money in shorter time. A significant deceleration in crop-production and yield has reduced the income and employment opportunities of the working groups in Rayalaseema. However, the seasonal unemployment normally results in the migration of workers to other places such as Tadipatri, Anantapur, Gooty, Kurnool and Nandyala in Rayalaseema and Guntur in Coastal Andhra in search of employment. Some of the families commute from the village to a nearby cement company to do non-agricultural work.

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS): The impact of MGNREGS during peak agricultural operations is less in terms of labour supply in Coastal Andhra. So during harvesting, large farmers who need more labour, depend on migrant labour from other places like Anantapur. Majority of the large farmers claimed that the scheme has adversely affected them since the labourers demand higher wages for various agricultural operations. In the sample village in Telangana,

MGNREGS was successful in improving the employment opportunities and income of the workers. The scheme has made the labourers reluctant to go for other work since there is no stringent supervision or stress in doing the work provided by MGNREGS. Thus, labour market difficulties arise in the form of shortage of supply of farm labour. Large farmers are in a position to pay high wages, but this situation has a negative impact on small farmers who also need to pay higher wages. Once the wage went as high as Rs 300-400 during harvest season in the area in which field work was conducted. In Rayalaseema, MGNREGS has created more jobs and benefits through its works for the poor workers. Most importantly, seasonal rural-urban out-migrations were reduced considerably during the lean season. When compared to agricultural work, labourers feel that MGNREGS is good in terms of less working hours and equal wage rate for males and females. There are no seasonal variations in wage rate under MGNREGS. In spite of all this, it is perceived that it has adversely affected the availability of labour for agricultural operations.

Marketing: In Coastal Andhra, almost all categories of farmers sell their produce on their own. All the sample respondents expressed the view that marketing facilities have improved compared with the past decades. Marketing of the output is determined by their individual need for money. Small and marginal farmers, due to their indebtedness, sell their produce in the village itself to the local moneylenders. The increased role of middlemen in a range of activities like sale of inputs, moneylending and trading in agricultural commodities proves that nothing can move without their consent. Generally, marginal and small farmers are in need of money quickly and own limited surpluses. So they sell the produce to the village moneylender-cum-trader. If they do not need money and expect high price they keep the produce in cold storages. In Telangana, farmers are marketing the output of chillies in

Nagpur (Maharashtra) and cotton in Warangal. Farmers have a belief that they would get better price in Nagpur market and is different from the prices in their local markets. In Rayalaseema, for the past 3 to 4 years, due to severe drought conditions, low rainfall, duplicate seeds, overuse of pesticides, the yield of groundnut per acre has reduced from 2 quintals to 25 kgs. Since the village is located at road heads, Lorries from Gooty take the output to market at a low cost for sale in the outside market. On the whole, farmers face many difficulties in marketing their produce. They face problems such as the necessity to pay higher charges to cold storage, low price during harvesting period, seasonal variations in prices and price-controlling by powerful middlemen.

Chapter-7 recapitulates the results of the agricultural growth phenomenon and gives an explanation of regional patterns and its decomposition observed through secondary statistics and also explains the food and non-foodgrain supply response puzzles. Then, an analysis of regional variations through the institutional proxies across the regions has been explained. It also attempts to explain the supply response puzzles through micro level evidences across the three regions in Andhra Pradesh. They are as follows;

Explaining Telangana supply response puzzle: The observed phenomenon of preference for non-foodgrain cultivation seems to be due to various reasons which work in tandem, resulting in the farmers cultivating these crops in the region. Telangana farmer is dragged by expected returns and the moneylenders have a big role in deciding the crop in the region. Also, expecting high prices Telangana farmer increased the area of non-food cropping though the output prices declined. This condition is described as ‘anomalous’ by Vakulabharanam, V (2004). In response to the agro-climatic conditions of the region, farmers

in this region have shifted from low-value crops to relatively high-value crops (Reddy D N 2006). This shift has pushed the farmers to high risk and unstable incomes.

Later, the impact of liberalisation policies geared the trend more towards cultivation of non-foodgrains in Telangana region (Vijaya Kumar, S 2006). Higher prices of non-foodgrains in global market attracted the small and marginal farmers and made them switch to more non-foodgrain production. However, trade liberalisation has adversely affected the non-foodgrain cultivation by reducing the import duty and further fall in their market price (Reddy D N, 2006). Cultivating these crops is making farmers extremely vulnerable, as it is more inclined to global market fluctuations and has also created a vacuum in dilemma of shifting, unsure, unpredictable prices (Sainath, 2006; Reddy D N, 2006).

Compared to food grains, non-foodgrains like chillies and cotton are more input-intensive and the farmer incurs more input costs. The increasing dependence on inputs from the market and rising input costs increased the demand for credit. Inadequate institutional credit support to the needy farmers and the increased credit needs amplified the preponderance of the moneylenders. There are different kinds of inter-linkages in lending and trade practices. They are land-product, land-labour and credit and product market linkages. In the case of Telangana, credit and product markets are interlinked. The higher cost of production incurred for these crops is provided by moneylender at higher rates of interest. Moreover, the rate of interest charged by the moneylender is three times higher than the bank rate of interest. According to field survey, the average cost per acre in the case of food grain crops like paddy is Rs. 16,482/-, whereas the average cost for non- foodgrain crops like chillies is Rs. 48,217/-, i.e., three times higher than paddy. The average cost of cultivation in the case of cotton crop is around Rs. 25,617 /- and it is higher than the costs

incurred to paddy cultivation. Thus, because of the high costs involved in non-foodgrains, farmer is taking more loans with high rates of interest from the moneylender. When prices of these non-foodgrains decline, more share of the output is transferred to the moneylender against the loan taken by him. Since farmers are forced to sell output to the same moneylenders, they are unable to retain their produce. This demonstrates the inter-linkage of credit and product markets. At this juncture, money lender-trader is able to swallow more output from the farmer against the credit given by him. At the end they are caught in the clutches of moneylender who increases his control over peasants and dictates the choice of the crop and makes the farmers cultivate the same crop year after year.

The field-level interactions with the farmers clearly proved that they make area decisions by keeping in view the relative profitability of crops and amount of cash at hand. It is observed that the farmers remember previous 3-4 years' crop prices. The prices of cotton and chillies substantially vary every year. In the year 2011-12, i.e., in the year in which the field work was conducted, the prices of these crops were comparatively high hence they are not the average prices. To get the average prices, farm harvest prices[6] of different crops which were available in Directorate of Economics and Statistics, Govt. of India have been taken. As per field survey, the average cost of cultivation of paddy is Rs. 16,482/- per acre. The average output obtained is 18.4 bags per acre with the average price of Rs.1,169/- per bag. The profit obtained from cultivating paddy after deducting the total cost of cultivation is only Rs.5027/- per acre. The profit from chillies and cotton are Rs. 26,518/- and Rs.11,180/- per acre respectively. Although, the prices of non-foodgrains are declining, compared to food grains, profit per acre is higher in the case of non-foodgrains. Farmers prefer the crop which gives them higher profits and more ready cash. Accordingly, they are more inclined

towards cultivating non-foodgrains in this region. The exploitative relation between the moneylender and farmer is making them cultivate non-foodgrains. The farmer in this region who is subjected to global market fluctuations and the tyranny of local informal credit elements resorts to increasing the acreage of non-foodgrains though the prices of these crops are declining.

Explaining Rayalaseema supply response puzzle: The southern region of Andhra Pradesh, Rayalaseema is dominated by large swathes of dry and less irrigated land and it is in the queue of less developed socio-economic development meter. A region can be defined as developed or backward on the basis of the existence of imbalances in natural endowments and in the use of the endowments through careful planning in the development process. Partial or complete failure of the crops due to the uncertainty and inadequacy of rainfall over a long period leads to famines and these conditions have been cyclically occurring in the last few decades in Rayalaseema region. Rayalaseema suffers from recurrent deprivation due to shortage of rainfall and limited groundwater deposits (Rayudu.C.S, 1992). Hence, availability of water resources is considered as a very crucial factor for the agriculture sector in this region.

Groundnut is the major crop grown in this region followed by jowar and castor and they are dependent on groundwater irrigation. Majority of the area in the region is occupied by groundnut farming and it has emerged as a high-value crop. Farmers prefer this crop as it is a shorter-duration crop and involved less drudgery in cultivation. It also survives in the rough terrain, with low level of irrigation, and can withstand long dry spells and uncertain rainfall. The main motivation for the sharp rise in the area under groundnut cultivation may

be because of the habit persistence behaviour, suitability of red soils and more economic returns from groundnut.

Several attempts to increase irrigation facilities by farmers have not been successful in the region. Scenario shows that the groundwater levels are rapidly falling, resulting in dysfunctional bore wells. A decline in the amount of rainfall has also been observed. Farmers get caught in borewell trap or "borewell mania" since they invest huge amounts in digging multiple bore wells until they hit water. This leads to debt trap due to high investments and low success rate of borewell. It is observed that loans taken by the farmers from different sources are primarily used for digging bore wells. The farmers' prospects lie in fair economic returns from the present crop. In the absence of appropriate returns from the produce and crop failure, the farmer produces the same non-foodgrains which would fetch him higher income and more ready cash than food grains.

Farmers compare the profitability of food and non-foodgrains and consequently his preference is for non-foodgrains in this region. As per the micro-level observations, though farmer invests around Rs10,940/- per acre to cultivate groundnut crop, he incurs negative returns due to crop failure. A similar situation has been identified in the case of jowar crop. In order to explain the negative supply response of farmers to non-foodgrains, data of farm harvest prices of major crops grown in this region was taken from Directorate of Economics and Statistics, Govt. of India. The figures show that there has been a gradual increase in the groundnut prices from Rs. 2,093/- per quintal in 2006-07 to Rs.2,714/- per quintal in 2010-11. The price trend of jowar shows that there was a marginal increase from Rs.932/- in 2006-07 to Rs.1,353/- in 2010-11. Hence, farmers perceive that growing non-foodgrains is more profitable. The ultimate aim of the farmer is to sustain himself in farming

and struggle to come out of the debt trap making him to prefer the crops which gives him remunerative price. However, low rainfall and other climatic conditions coupled with absence of institutional credit; make him cultivate the same crop in spite of negative returns.

Explaining Coastal Andhra supply response puzzle: Among the three regions of Andhra Pradesh, Coastal Andhra region is considered the most fertile. The fertile estuary regions of Godavari and Krishna rivers and the presence of perennial canals, tanks and wells make the land apt for farming. Coastal regions with better agro-climatic endowments are expected to attract more public and private investments. Unlike other two regions, this region has diverse sources of irrigation. The behavioral patterns towards grabbing the profits of socio-economic and natural resources in the mankind are considered as one of the main concern in this region. The dynamics of caste, class with the support of natural resources is diversified with the elite rural cum business oriented section.

The results of non-foodgrain supply response estimations show that farmers' response for non-foodgrain price changes is positively insignificant in the liberalisation period. It can be observed that there was a marginal increase in the percentage of area under food grain cultivation, i.e., it increased from 77.1 percent in the years 1983-95 to 79.6 percent in 1996-2007. On the other hand, the area under non-foodgrain cultivation has declined marginally from 22.9 percent in the years 1983-95 to 20.4 percent during 1996-2007. Hence, though non-foodgrain prices have declined, there has been no substantial corresponding decline in the area under non-foodgrain cultivation. So, the supply response for non-foodgrains is positive, but not significant in Coastal Andhra region.

8. Policy initiatives:

Chapter 8 recapitulates the different supply response findings in each region and suggests policy initiatives. Although there is a need for devising region-specific policies, irrigation is an essential input which determines the growth of agricultural output. Substantial state investment is required to facilitate the development of irrigation potential of the backward regions. The backwardness of Telangana and Rayalaseema in the context of irrigation emphasizes the need for providing state help in the form of public investment in the irrigation sector. The expansion of canal irrigation played a significant role in transforming Coastal Andhra from a famine-ridden region to a prosperous region. To reduce yearly seasonal fluctuations and thereby impart a measure of stability to agricultural output, the expansion of irrigation in the rain-fed areas should be the central focus. The first priority should be development of irrigation and investment in other rural infrastructure followed by timely availability of sufficient institutional credit to the farmers, so that dependence on private money lenders is totally eliminated.

Regional disparities in the distribution of credit were observed in the surveyed villages. Credit requirements of farmers are changing across time and space. Widespread fluctuations in the acreage and production of food grains pose a serious question of food security. In the context of the initiation of Food Security Bill, 2011, which gives hope to millions of hungry Indians, it is necessary to maintain self-sufficiency in food-grain production. So it is quite obvious that ensuring food security lies in sustainable food-grain production. Incentives are to be provided to farmers in order to encourage them to grow food crops.

Dry land areas suffer from productivity constraints due to their exclusive dependence on rainfall. Switching towards low water consuming crops is another important measure which can be suggested to the farmers of dry land regions. It is already being practiced in the Rayalaseema region with the cultivation of castor crop (Field Survey, 2012).

Even after significant technological and institutional advancements, the crisis in agriculture has been increasing in the recent years. Undoubtedly liberalisation has enhanced the trade competitiveness of agriculture products. But this would surely affect the domestic products and their prices. So there is a need to assess the impact of liberalisation and policies have to be developed to ensure the welfare of the farmers. Appropriate mechanisms for protecting these farmers from drastic fluctuations in global prices of crops need to be developed.

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