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RICE PRODUCTION AND PRODUCTIVITY IN ANDHRA PRADESH

Report Prepared as part of the Summer Internship for
Masters in Development Studies,
Tata Institute of Social Studies, Mumbai

Ms. Ananya Chakraborty
under the guidance of
EV Murray, GM NABARD

Report Submitted to
National Bank for Agriculture and Rural Development,
Andhra Pradesh Regional Office, Hyderabad

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Ananya Chakraborty
Summer Intern, NABARD, APRO,
21/06/2011

Table of Contents

| | |
|--|----|
| Acknowledgement | 1 |
| List of Tables | 4 |
| List of Figures | 6 |
| EXECUTIVE SUMMARY | 6 |
| 1. INTRODUCTION | 11 |
| 1.1 Importance of Rice | 11 |
| 1.2 The Rice Economy of India | 12 |
| 1.3 Objectives and Scope of the Study..... | 16 |
| 1.4 Methodology of the study..... | 17 |
| 2. Status of Rice Production in Andhra Pradesh | 20 |
| 2.1 A Historical Perspective on Agriculture..... | 20 |
| 2.2 The Agricultural Economy of Andhra Pradesh | 20 |
| 2.3 An Introduction to Rice Economy of the State..... | 23 |
| 2.4 Conclusion | 26 |
| 3 Rice Productivity in Andhra Pradesh – A Critical Analysis..... | 27 |
| 3.1 Role and Importance of Productivity Gains | 27 |
| 3.2 Factors influencing Productivity..... | 27 |
| 3.3 Conclusion..... | 38 |
| Chapter 4: Economics of Rice Cultivation | 39 |
| 4.1 Price Linkages and Agricultural development..... | 39 |
| 4.2 Estimation of Farm Incomes | 39 |
| 4.3 NATIONAL SCENARIO REGARDS TO COST OF CULTIVATION AND MSP | 45 |
| 4.4 MSP for paddy raised by Rs. 80 | 46 |
| 4.4 ROLE OF INSTITUTIONAL AND GOVERNMENT SUPPORT TO RICE PRODUCTION..... | 47 |
| 5 Problems and Prospects of Rice Cultivation in Andhra Pradesh..... | 52 |
| 5.1 West Godavari..... | 52 |
| 5.2 An Assessment of the Cultivation Practices in West Godavari | 54 |
| 5.3 Karimnagar | 56 |

| | |
|--|----|
| 5.4 Karimnagar-An assessment of cultivation practices | 58 |
| 6 Conclusions and Observations | 60 |
| 6.1 Need for Second Green Revolution..... | 60 |
| 6.2 Andhra Rice Production and NFSM..... | 60 |
| 6.3 Problems and prospects of rice cultivation in Andhra Pradesh | 61 |
| LIST OF REFERENCES | 62 |

Annexures

- I Questionnaire for productivity of Rice
- II Cost of Cultivation of Paddy in Rabi in West Godavari Dist
- III Estimated cost of Production of Paddy per Ha (Rabi – West Godavari)
- IV Cost of Cultivation of Paddy in Rabi in Karimnagar Dist
- V Estimated cost of Production of Paddy per Ha (Rabi – Karimnagar)

List of Tables

- 1.1 World Rice Production
- 1.2 Compound Growth Rate of Area, Production and Productivity under Rice
- 1.3 Area, Production and Productivity of Rice in India
- 1.4 Productivity Trends of Rice in India
- 1.5 State-wise Rice Production in India, 2008-09
- 2.1 Contribution of Agriculture to Employment
- 2.2 Area, Production and Productivity of Rice in Andhra Pradesh
- 2.3 Source wise Net Irrigated Area
- 2.4 Season-wise State Average Yield for Rice under various conditions
- 2.5 District wise Area, Production and Productivity
- 3.1 Area, Production and Productivity of Rice Crop (2008-09)
- 3.2 Indicators of major Rice Producing Districts
- 3.3 Rainfall data for Andhra Pradesh, 2009-10
- 3.4 Cropped Areas in Districts of Andhra Pradesh
- 3.5 Source wise Irrigation in districts of Andhra Pradesh
- 3.6 Work Participation rates
- 3.7 Average Wages (in Rs.) for Agricultural Workers
- 3.8 Land holding patterns
- 3.9 Consumption of Fertilizers (in tonnes)
- 3.10 Agricultural Machinery and Implements
- 3.11 Power Consumption in MKWH
- 3.12 Agency wise Flow of Ground level Credit to Agricultural Sector
- 4.1 Cost of Cultivation for Paddy for 2010-11 (Kharif)
- 4.2 Scale of Finance per acre for Paddy Cultivators in West Godavari
- 4.3 Estimated Cost of Production of Paddy Per Ha (2009-10), Kharif

- 4.4 Estimated Cost of Cultivation for Paddy in Karimnagar
- 4.5 Estimated Cost of Production of Paddy Per Ha (2009-10), Kharif
- 4.6 MSP for Paddy Raised by Rs. 80
- 4.7 Cost of Cultivation in Selected States in India
- 4.8 Procurement of Rice from the main rice Producing Districts
- 4.9 Seed Subsidy in Andhra Pradesh for all crops, 2009-10
- 4.10 Crop loan for Paddy in Andhra Pradesh, 2010-11
- 5.1 Irrigation Coverage
- 5.2 Major Crops: Area, Production and Yield
- 5.3 Area, Production and Productivity of Rice in Karimnagar
- 5.4 Irrigation Profile
- 5.5 Irrigation for Paddy
- 5.6 Area under Paddy, various modern varieties, yield and production
- 5.7 scale of finance, Karimnagar
- 6.1 Green Revolution v/s Evergreen Revolution

List of Figures

- 1.1 Shares in World Rice Production
- 1.2 Productivity Levels of major Rice Producing States, 2008-09
- 2.1 Sectoral Composition of GSDP at Constant Prices 2008-09
- 2.2 Land Utilization Particulars 2009-10
- 2.3 Source wise Net Area Irrigated
- 3.1 Area, Production and Productivity of Rice Crop (2008-09)
- 3.2 Rainfall from South West Monsoon Winds, 2009-10
- 3.3 Source wise Irrigation In districts of Andhra Pradesh
- 3.4 Irrigated Areas under Rice
- 5.1 Production of Paddy seeds in Karimnagar

EXECUTIVE SUMMARY

- Rice (*Oryza Sativa*) is the second highest produced grain in the world after corn (maize). It is the most important grain with regard to human nutrition and calorific intake, providing more than one fifth of the calories consumed by worldwide by the human species.
- During the recent times, there has been a declining trend in rice production and productivity accompanied by a rapid fall in the area under cultivation of rice. This necessitates massive increases in productivity to commensurate with the population growth.
- India ranks second world-wide in the production of rice, only after China, with a share of 22% of the total world rice production. However, Indian productivity is lower than that of many other nations of the world.
- In India, the major rice producing states are West Bengal Andhra Pradesh, Punjab, Uttar Pradesh and Tamil Nadu, Karnataka, Chhattisgarh, and Orissa, etc. The productivity trends of rice in India have shown a disturbing trend, reaching a near stagnation during the recent decade. The CAGR in productivity decreased from 3.19% to 1.61% since beginning of the new millennium. The area under rice in 2008 was 45.54 million hectares, with a production of 99.18 million tonnes and productivity rate of 2178 kg/ha.
- State intervention in the foodgrain sector has served more to hamper productivity growth than serve as an effective tool of development. State initiated actions like regional shifts in foodgrain production, diversification in the pattern of agricultural growth in major foodgrain producing states, etc has hurt in various ways. It has lead to increased incidents of soil pollution, limited entitlement expansion, increasing unemployment and disguised employment, etc.
- This study focuses on Rice Production and Productivity in Andhra Pradesh, mainly done through data collection at field levels in the rice bowl areas of West Godavari and Karimnagar.
- Historical land tenure system of Ryotwari in Coastal Andhra, was akin to peasant proprietorship which encouraged investment and enterprise by the farmers, aided by a

massive well developed irrigation system. This was also one of the core Green Revolution areas.

- Andhra Pradesh is an agriculturally developed state, with nearly 23.9% of the GSDP coming from the agriculture sector employing about 62.17% in this sector. The agricultural sector employs around 60% of the main work force of the state and 76% of the marginal work force, thus proving to be the largest employment generating sector.
- Nearly 45.24% (i.e. 45.63 lakh hectares) is under paddy cultivation in Andhra Pradesh. This contributes to 69.1% of the total foodgrains production of the state. The yield rate of paddy in Andhra Pradesh is higher than the average yield rate for India at 2178 kgs/ hectare. Despite the advances in cultivation profile of the state, rice productivity is still significantly lower than Punjab's productivity (4022 kgs/ hectare).
- Rice cultivation in the state is typically done under irrigated conditions. This is one of the prime reasons for higher productivity from the state. However, this has lead to problems of ground water exploitation and depletion of ground level reserves. A major source of irrigation other than wells and tube wells is canal irrigation form the rivers of Krishna and Godavari.
- Andhra Pradesh enjoys a comparative advantage in rice production in relation to many other states in terms of availability of labour, geographical conditions and governmental support.
- Increases in Productivity are vital for agricultural profitability and development. As long as productivity per hectare rises, the commercial profitability per hectare may be expected to rise despite relative stability in the unit prices of inputs and outputs. However, when yield response to input use begins to decline, commercial profitability per hectare is threatened
- The main factors that affect productivity are availability of water and irrigation facilities, suitable rainfall and climatic conditions, soil fertility levels, credit, availability and application of fertilizers and pesticides in cautious amounts, inter crop linkages and policy and institutional support.

- Rice is grown in almost all districts of Andhra Pradesh. However, the Krishna Godavari delta areas are the main 'rice bowl' areas of Andhra Pradesh.
- Andhra Pradesh has a pre-dominant rural economic structure. The agrarian relations that determine the structure of the agricultural economy of the state are complex and multi-layered. The dominant mode of production in the rural regions of Andhra Pradesh is however capitalist in nature. As a way out of the present agrarian crisis plaguing the cultivators of Andhra Pradesh, reforms and policy interventions that serve to increase yields and hence incomes are necessary. Increasing productivity is the only way to ensure vertical expansion of the farm sector.
- The main factors influencing productivity of rice are the geographical and human factors. Rainfall, soil types, climate etc determine the possibility of production geographically. Human factors like development of irrigation, labour availability, pesticides and fertilizer application, mechanization levels, credit availability influence the trends in productivity.
- Agricultural Prices and determination of MSP serve as measuring rods of profitability of rice producers and signals of market demand and supply. Therefore, it is of paramount importance to 'get the prices right'. In India, the terms of trade has been kept against agriculture deliberately.
- The CACP method of estimation of farm incomes has been used to determine the profitability of rice cultivation in the two districts of study. In West Godavari the per quintal cost of cultivation of rice comes to Rs 1086.25 which is higher than the MSP for the year 2010-11. In Karimnagar, the cost comes to Rs. 1038. This shows that farmers lose around 80-100 Rs. per quintal of produce.
- Rice cultivation in Andhra Pradesh is ensured not primarily due to MSP margins but due to governmental assurance of procurement. Various studies have been conducted to prove this.
- Agricultural extension, irrigation, electrification, credit availability, subsidised inputs, transportation and procurement are various dimensions of the public sector investment in agriculture.

- West Godavari is the ‘granary of rice’ of Andhra Pradesh. The two Mandals visited here had separate agronomical practices and hence their problems and prospects have to be viewed separately. Dwarka Tirumala being primarily well irrigated has potential to be brought under SRI cultivation. Achanta is the core delta area of production. However, farmers here suffer from problems like degradation of soil health, labour dependence, spurious seeds, marketing and procurement issues, etc. The levels of mechanisation are also low in the district.
- Karimnagar in Telangana region primarily depends on wells for irrigation. It hence can be brought under SRI cultivation through governmental support and credit extension. Karimnagar Mandal farmers face problems in credit and input procurement. They also need a transparent and credible marketing mechanism in place to continue rice cultivation.
- Indian Agriculture suffers from the paradox of ‘Grain Mountains and Hungry Millions’. It is essential to ensure that farmers incomes are expanded to commensurate their efforts and investments. Dr. Swaminathan calls this the need for an ‘Evergreen Revolution’ in India.
- The role of NABARD as a premiere institution in rural banking and development assistor need to be strengthened through increasing the reach of timely credit delivery at appropriate rates of interest, increased assistance to small and marginal farmers, investing in rural technology improvement and put in place a control mechanism for integrating the commercial banks in servicing the rural areas.

1. INTRODUCTION

1.1 Importance of Rice

FAO during the International Year of Rice, 2004 stated “Rice contributes to many aspects of society and therefore can be considered a crystal or prism through which the complexities of sustainable agriculture and food systems can be viewed. The issues related to rice production should not be viewed in isolation but in the framework of agricultural production systems through ecological and integrated systems.ⁱ” This succinctly delivers indivisibility of rice, not only as one of the most important food crops but also as an intricate part of the socio-cultural aspects of the lives of many people in the major rice producing regions of the world. Rice (*Oryza Sativa*) is the second highest produced grain in the world after corn (maize). However, since a large portion of corn is produced for purposes other than human consumption, rice is the most important grain with regard to human nutrition and calorific intake, providing more than one fifth of the calories consumed by worldwide by the human species.

Throughout history, rice has been one of the most important food crops for humans. This unique grain is the lifeline for nearly two-thirds of the world's population. It is deeply embedded in the cultural and economic heritage of their societies. About four-fifths of the world's rice is produced on small-scale by farmers and is consumed locally. Rice cultivation is the principal activity and source of income for about 100 million households in Asia and Africa.

However, in the recent times, rice production all over the world has shown a major decline, especially since 2007. This has happened due many reasons including climatic conditions in many large rice producing countries as well as policy decisions regarding rice export by the respective governments of countries.ⁱⁱ The same is manifested in the table 1.1.

Table 1.1 World Production of Rice

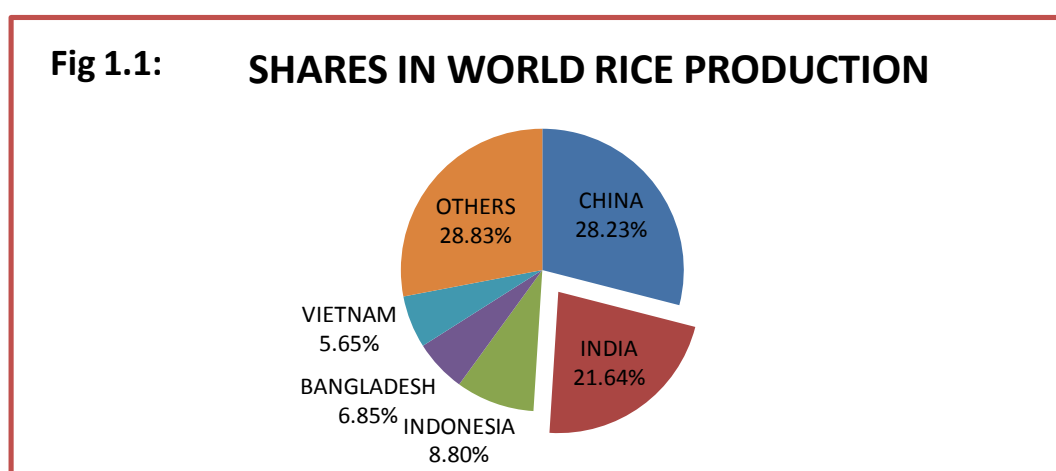
| Year | Rice Area ('000 ha) | Rice Production ('000 Tons) | Rice Yield (tonnes/ha) |
|------|---------------------|-----------------------------|------------------------|
| 2005 | 154701 | 623260 | 4.07 |
| 2006 | 166302 | 627311 | 4.07 |
| 2007 | 156688 | 647077 | 4.18 |
| 2008 | NA | 661811 | 4.25 |

Source: www.irri.org

The productivity of India is much lower than that of other major rice producers like China (6.35 tonnes/ha), Egypt (9.97 tonnes/ ha) or USA (8.08 tonnes/ha). Indian productivity ranks close to the yield levels of her neighbouring nations like Pakistan (3.19 tonnes/ha) and Sri Lanka (3.93 tonnes/ha). For a world leader in production of rice, India needs to hike the productivity levels.

1.2 The Rice Economy of India

India is the second largest producer of rice in the world after China, with a share as large as about 22% of the world's rice production. India's total rice production was 99.18 million tonnes in 2008. As such, India plays a major role in the rice dynamics of the world.ⁱⁱⁱ



Gujja B. & Thiagarajan T.M. write that “Rice is (more) an integral part of Indian culture. It is life line; this life line has extended in more than 540 districts of 604 districts in India. It is a

versatile crop grown in all most all agro-climatic zones...^{iv} It is one of the most important crops of India occupying around 23.3 per cent of gross cropped area of the country. It contributes 43 percent of total food grain production of the nation and amount to 46 per cent of total cereal production.^v

However, India still falls below the targets requirement for rice set by our planners. For the year 2010-11, the target production of rice was pegged at 102 million tonnes of which 94.01 million has been realised. This is a shortage of around 8% between the production and the target^{vi}. The area under rice and its production and productivity has been declining since the beginning of the new millennium. The same has been assessed for pre and post millennium and presented in the table 1.2 showing the Compound Growth Rates of Area, Production and Productivity of Rice over two decades to confirm this trend.

Table 1.2: Compound Growth Rates of Area, Production and Productivity under Rice

| Years | Area | Production | Productivity |
|--------------------|-------|------------|--------------|
| 1980-81 to 1989-90 | 0.41 | 3.62 | 3.19 |
| 2000-01 to 2009-10 | -0.03 | 1.59 | 1.61 |

Source: Economic Survey of India, 2010-11, GoI, pp: 190.

The table 1.3 shows the fluctuations in productivity, area, and production in India from 1990 onwards. It can be observed that area under rice has decreased over the past two decades from 426.9 lakh ha to 369.5 lakh ha. This is mainly due to diversification of land from rice production to various other crops. The production of rice during this period has also shown corresponding stagnation. A main reason for this is the meagre increase in the productivity of rice. For the burgeoning population and diminishing areas it is imperative to increase the productivity of rice in India through modern technologies and machineries, governmental intervention through extension services and public investment in developmental infrastructure.

Table 1.3 Area, Production and Productivity of Rice in India

| Year | Area (lakh ha) | Production (in lakh t) | Productivity (kgs/Ha) |
|-------------|-----------------------|-----------------------------------|----------------------------------|
| 1990-91 | 426.9 | 742.9 | 1740 |
| 1991-92 | 426.5 | 746.8 | 1751 |
| 1992-93 | 417.8 | 728.6 | 1744 |
| 1993-94 | 425.4 | 803.0 | 1888 |
| 1994-95 | 428.1 | 818.1 | 1911 |
| 1995-96 | 428.4 | 769.8 | 1797 |
| 1996-97 | 434.3 | 817.4 | 1882 |
| 1997-98 | 434.4 | 825.3 | 1900 |
| 1998-99 | 448.0 | 860.7 | 1921 |
| 1999-2000 | 451.6 | 896.8 | 1986 |
| 2000-01 | 447.1 | 849.7 | 1901 |
| 2001-02 | 449.0 | 933.4 | 2079 |
| 2002-03 | 411.7 | 718.2 | 1744 |
| 2003-04 | 425.9 | 885.2 | 2078 |
| 2004-05 | 419.0 | 831.3 | 1984 |
| 2005-06 | 436.5 | 917.9 | 2102 |
| 2006-07 | 438.1 | 933.6 | 2131 |
| 2007-08 | 439.1 | 966.9 | 2202 |
| 2008-09 | 455.4 | 991.8 | 2178 |
| 2009-10 | 418.5 | 891.3 | 2130 |
| 2010-11 | 369.5 | 804.1 | 2177 |

In India, the major rice producing states are West Bengal Andhra Pradesh, Punjab, Uttar Pradesh and Tamil Nadu, Karnataka, Chhattisgarh, and Orissa, etc. The productivity trends of rice in India have shown a disturbing trend, reaching a near stagnation during the recent decade. The CAGR in productivity decreased from 3.19% to 1.61% since beginning of the new millennium. The area under rice in 2008 was 45.54 million hectares, with a production of 99.18 million tonnes and productivity rate of 2178 kg/ha. Table 1.2 and 1.3 corroborate this claim.

Rice productivity during the early post independence period was just 1013 kgs/ ha, which increased to 1336 kgs/ha in the post Green revolution era. Interestingly the rice productivity during the early 20th century was around 1600 kg/ha, which declined to 1139 kg/ha during 1940-41.^{vii} The exponential increases in yields in the post independence period were mainly a result of introduction of new high yielding varieties coupled with better irrigation and increased use of chemical fertilizers and pesticides.

Table 1.4: Productivity trends of rice in India

| Year | Productivity (yield/hectare in kgs) |
|---------|-------------------------------------|
| 1950-51 | 668 |
| 1960-61 | 1013 |
| 1970-71 | 1123 |
| 1980-81 | 1336 |
| 1990-91 | 1740 |
| 2000-01 | 1901 |
| 2001-02 | 2079 |
| 2002-03 | 1744 |
| 2003-04 | 2077 |
| 2004-05 | 1984 |
| 2005-06 | 2102 |
| 2006-07 | 2131 |
| 2007-08 | 2202 |
| 2008-09 | 2178 |
| 2009-10 | 2130 |
| 2010-11 | 2178 |

Source: Directorate of Economics and Statistics, Department of Agriculture Cooperation

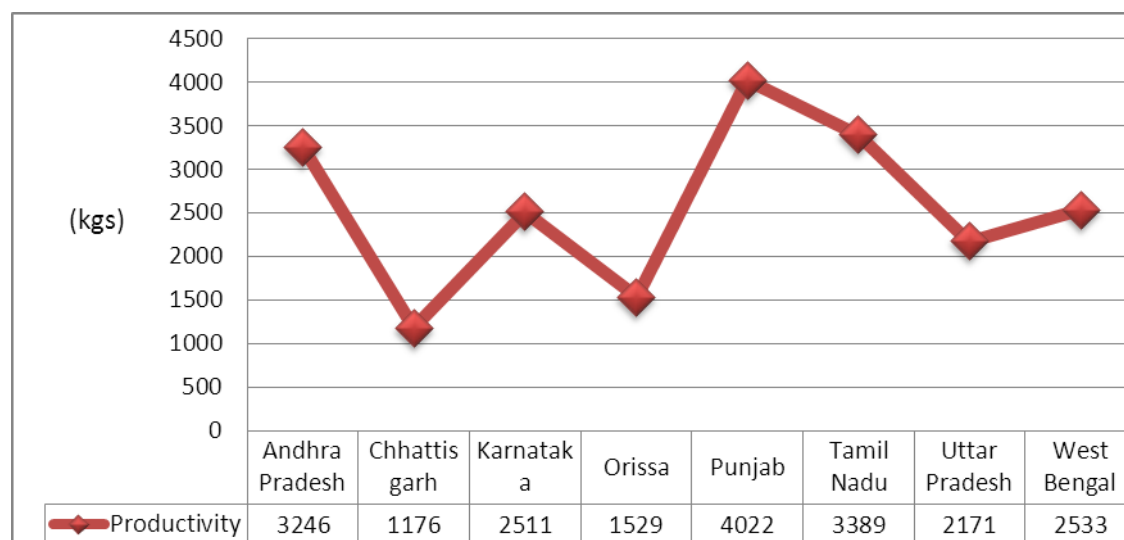
Rice productivity in the new millennium however has not shown a significant growth. It has fluctuated from 1901 kgs/ha in 2000-01 to 2178kgs/ha in 2010-11, a compound growth of merely 0.014 (Table1.2). The near stagnation of productivity in rice in turn affects its prices in the commodities and futures trading markets leaving a majority of the population vulnerable to the price shocks, which is directly manifested in other social development indicators like health and nutrition. Besides, state intervention in the foodgrain sector has served more to hamper productivity growth than serve as an effective tool of development. State initiated actions like regional shifts in foodgrain production, diversification in the pattern of agricultural growth in major foodgrain producing states, etc has hurt the poor in various ways (e.g. limited expansion of employment opportunities, lower food and other entitlements)^{viii}.

Table 1.5: State wise Rice Production in India in 2008-09

| State | Area (In million ha.) | Production (Mill. Tons) | Productivity |
|----------------|--------------------------|----------------------------|--------------|
| Andhra Pradesh | 4.39 | 14.24 | 3246 |
| Chhattisgarh | 3.73 | 4.39 | 1176 |
| Karnataka | 1.51 | 3.80 | 2511 |
| Orissa | 4.45 | 6.81 | 1529 |
| Punjab | 2.74 | 11.00 | 4022 |
| Tamil Nadu | 1.93 | 5.18 | 3389 |
| Uttar Pradesh | 6.03 | 13.10 | 2171 |
| West Bengal | 5.94 | 15.04 | 2533 |
| ALL INDIA | 45.54 | 99.18 | 2178 |

Source: table 4.6 (b) www.dacnet.nic.in

Fig 1.2: Productivity levels of Major Rice Producing States, 2008-09



The Figure 1.2 shows the productivity levels of the major rice producers in India. Andhra Pradesh, the focus study area of this project, is placed third after Punjab and Tamil Nadu.

1.3 Objectives and Scope of the Study

So as to understand problems in rice production and the reasons for near stagnation of productivity in the country, especially in large producing state like Andhra Pradesh and to suggest possible remedies for improving production it has been decided to undertake a study of Rice Production in Andhra Pradesh. In order to understand the rice economy, its

importance, an attempt has been to analyse the “Rice Production and Productivity in Andhra Pradesh. Further, to understand the field level problems and prospectus of rice production, two top rice growing districts i.e., Karimnagar and West Godavari belonging to different geographical regions of the state were selected. The conclusions inferred are based on these micro studies, Hence effective generalizations and policy conclusions drawn may not be generalised and should be used judiciously, considering the limited scope of study, constraints of time and resources of the researcher.

The study shall focus on the following aspects:

- To enquire into the factors those have lead to the recent trends in productivity.
- To seek ways to break out of the yield levels and achieve higher yields.
- To study the economics of rice cultivation.
- To assess the role of extension and breakthrough in procedures of rice cultivation

1.4 Methodology of the study

As mentioned earlier the study was conducted in two prominent districts of the state, West Godavari (Coastal Andhra) and Karimnagar (Telangana) with a sample size of 40 farmer families chosen by the random sampling method. In West Godavari, two blocks / Mandals were selected based on the production and agronomical situation and ten farmers from two villages from each Mandal /block were selected for detailed field study. In Karimnagar twenty farmers from a village in one Mandal were interviewed making a cumulative sample of 40 farmers.

The study was conducted on both qualitative and quantitative lines, making use of tools like Questionnaire and discussions. It also looks into the primary and secondary sources of data from the government publications, market yards at both panchayat levels and district/taluka level, and from the database of the Directorate of Economics and Statistics. The study tries to address the issues of productivity levels of rice cultivators, their profitability, problems and prospects of rice cultivators.

- **Selection of the District:**

On the basis of secondary data available in the public domain like data from the Directorate of Economics and Statistics, State Focus Papers published by NABARD, websites of the Department of Agriculture of both the State and Central Government,

other literature sources it was evident that the major rice producing areas of Andhra Pradesh are West Godavari, East Godavari, Krishna (Coastal Andhra) and Karimnagar (Telangana). Hence, the highest producers in both the Krishna Godavari delta region and Telangana were selected namely West Godavari and Karimnagar.

- **Sample Size:**

The present study was done with a sample size of 40 rice cultivating farmers selected through a method of simple random sampling. However, ultimate efforts were made to incorporate farmers from various groups based on the size of their landholdings and socio-economic situations.

- **Data Collection Sources:**

In order to achieve a holistic picture of rice productivity and production, data was collected from other government agencies like Agriculture Departments of the selected districts, Market Yards, District Cooperative Central Banks (DCCBs) and Primary Agriculture Credit Societies (PACs). Besides focused discussions were also carried out with the District Development Managers (DDMs), Agricultural Extension Officers (AEOs) and Private Dealers. Focussed discussions were also held with scientists from Andhra Pradesh Rice Research Institute (APRRI), Maruteru. Papers published by academicians and others, published in journals and newspapers were also used for drawing effective analysis and theoretical arguments and propositions.

- **Tools of Data Collection:**

Structured Questionnaires were used to collect data from farmers, Agriculture Departments, Market Yards and PACS (see Annexure 1a, 1b and 1c). Besides, focussed interviews were conducted with Agricultural Extension Officers and District Development Managers and Private Dealers to elicit their views on the issue. Similar discussions were also conducted with the secretaries of the PACS and other important officials. Few non rice producing farmers were also interviewed.

- **Tools of Analysis:**

Data collected from various sources was subjected to arithmetic and statistical treatments like computation of Percentages and Averages, calculation of Standard Deviation and Compound Annual Growth Rates (CAGR) and Trend Analysis.

- **Reference Year**

For working out economics, the year of production i.e, 2010-11 was taken for both input and output prices

2. Status of Rice Production in Andhra Pradesh

2.1 A Historical Perspective on Agriculture

During the colonial period, the government policy with respect to land settlement and the extent of commercial penetration into the agrarian economy differed from region to region. The differences in the various land tenure systems were based on various considerations such as extraction of raw materials, mobilizing revenues, defence etc from these areas. Hence, various forms of land tenures came in existence like the zamindari and the Ryotwari systems. Unlike the exploitative Zamindari system that emerged in the Indo Gangetic plains, the land system in Coastal Andhra was characterized by a tenurial system based on peasant proprietorship which was more conducive to personal initiative and entrepreneurship. Furthermore, this region benefited from massive public investments in irrigation even prior to independence.^{ix} These regional differences in tenurial conditions and the irrigation policy of the government resulted in the emergence of small enclaves of growth and vast areas of low productivity and stagnation which encouraged the emergence of an agriculturally prosperous class in this region.

The post independence period saw that agriculture was entrusted as a State subject under the Constitution. Hence, the policies of the state governments play an important role in the allocation of resources for agriculture, and various dominant farmers' lobbies actively influence the establishment of input and output prices. The historical superiority of the state was one of the main reasons it became one of the core Green Revolution areas, along with the likes of Punjab, Western Uttar Pradesh and Haryana.

2.2 The Agricultural Economy of Andhra Pradesh

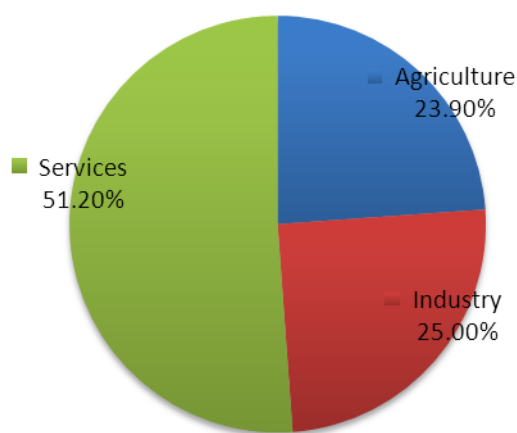
Andhra Pradesh is one of the most bountiful states of India, both in terms of natural and human capital. It is the fourth largest state in India in terms of area with 8.37% of the total geographical area of India supporting nearly 7.1% of the total Indian population.

The major rivers Krishna and Godavari along with various others ensure continuous water supply. The total surface water of entire river systems is estimated to be of the order of 2764 TMC (Thousand Million Cubic Feet) at 75% dependability^x. Andhra Pradesh has fertile lands with favourable agro-climatic conditions, which have been accentuated by the human efforts

making Andhra Pradesh one of the most agriculturally prosperous states of India. Andhra Pradesh is a leading producer of rice. Besides it also enjoys an eminent position in production of crops like tobacco, groundnuts, chillies, turmeric, oilseeds, sugarcane, and jute and various other horticultural crops like mangoes, guava, and banana.^{xi}

The growth rate of Andhra Pradesh has been impressive since 2005-06, since when the state has registered an average growth rate of 8.75% till 2009-10, which is higher than the National Growth Rate of 8.62%. This impressive growth has certainly been propelled due to the Information Technology boom, however the other sectors have also recorded high growth rates. The sector-wise growth of GSDP comprises of 8.39% in Agriculture sector, 7.79% in Industries sector and an impressive growth of 9.61% in the Services sector for the year 2010-11. As such, agriculture contributes to 23.9% to the Gross State Domestic Produce (GSDP).

Fig 2.1 Sectoral Composition of GSDP at Constant Prices (2008-09)

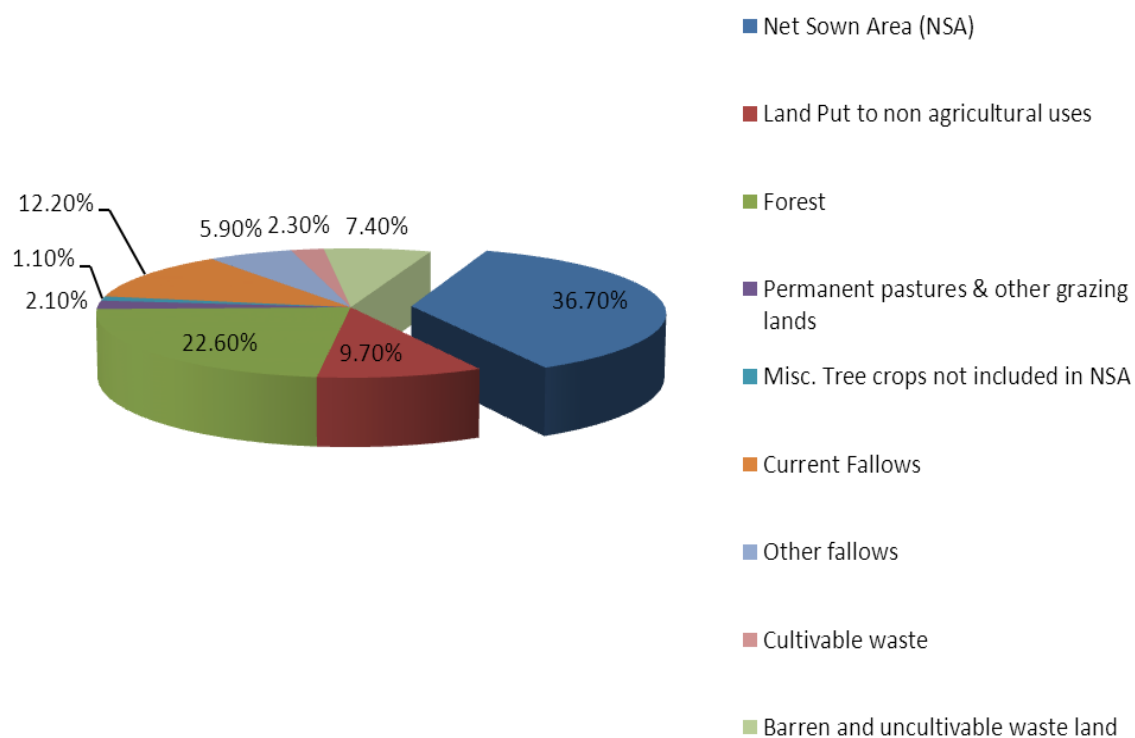


Source: State Focus Paper, 2010-11, Andhra Pradesh, NABARD

In the year 2009-2010, out of the Total Geographical Area of 275.04 lakh hectares in the State, the Net Area Sown including area under Fish Culture was 100.85 lakh hectares (36.7%). Around 12.20% of the total land had been currently kept fallow during the year. Whereas, around 2.30% of the total land has the potential to be brought under cultivation as it was a part of cultivable wastelands.

Fig 2.2

Land Utilization Particulars for 2009-10



Source: Agricultural Statistics at a Glance, Andhra Pradesh, 2009-10

The agricultural sector employs around 60% of the main work force of the state and 76% of the marginal work force, thus proving to be the largest employment generating sector.^{xii} Overall 62.17% of the working population is still dependent on Agriculture.^{xiii}

Table 2.1 Contribution of Agriculture to Employment

| Sr. No. | Occupational Distribution | No. Of Workers | Percentage to Total |
|---------|---------------------------|----------------|---------------------|
| A. | Main Workers | | |
| i. | Cultivators | 73,97,688 | 25.47 |
| ii. | Agricultural Labourers | 98,23,264 | 33.83 |
| B | Marginal Workers | | |
| i. | Cultivators | 4,61,846 | 7.89 |
| ii. | Agricultural Labourers | 40,08,888 | 68.846 |

Source: Handbook of Statistics Andhra Pradesh, 2010. GoAP.

The cropping intensity i.e. the ratio of gross area sown to net area sown was 1.26 in 2009-2010. The level of cropping intensity moves in consonance with the behaviour of the monsoon and availability of irrigation water. The irrigation intensity was 1.37 in 2009-10.

2.3 An Introduction to Rice Economy of the State

From the total net sown area around 45. 24% (i.e. 45.63 lakh hectares) is under paddy cultivation. This contributes to 69.1% of the total foodgrains production of the state.^{xiv} The total production in 2008-09 was 142.10 lakh tonnes with one of the highest yield rate of 3246 kgs/hectare. However, due to unfavourable climatic conditions the production in 2009-10 fell to 108.38 lakh tonnes with a productivity of 3150. The yield rate of paddy in Andhra Pradesh is higher than the average yield rate for India at 2178 kgs/ hectare. Despite the advances in cultivation profile of the state, rice productivity is still significantly lower than Punjab's productivity (4022 kgs/ hectare).

In the last decade the area under rice crop has grown from 38.25 lakh hectares in 2001-02 to 45.63 lakh hectares in 2010-11, a compound growth of 0.035, which has lead to a considerable increase in the total production of Andhra Pradesh at a compound growth rate of 0.043. However, the rise in productivity is miniscule with a compound growth of 0.011. The Table 2.2 gives a clear picture of the rice production and productivity scenario in Andhra Pradesh today. The current focus, of both the Government and the farmers, on crop diversification is surely going to further affect the area under rice drastically. It may lead to a colossal decline in production of rice from Andhra Pradesh, unless effective measures are taken to scale up the productivity levels to commensurate the losses arising from declining area under rice.

Table 2.2 Area, Productivity and Production of Rice in Andhra Pradesh

| Year | Area in Lakh Ha | | | Productivity in Kgs/ha | | | Production in lakh tonnes | | |
|-----------|-----------------|-------|-------|------------------------|------|-------|---------------------------|-------|--------|
| | Kharif | Rabi | Total | Kharif | Rabi | Total | Kharif | Rabi | Total |
| 2001-2002 | 24.26 | 13.99 | 38.25 | 2679 | 3496 | 2978 | 65.01 | 48.89 | 113.90 |
| 2002-2003 | 21.09 | 7.13 | 28.22 | 2397 | 3189 | 2597 | 50.54 | 22.73 | 73.27 |
| 2003-2004 | 21.09 | 8.66 | 29.75 | 2722 | 3594 | 3011 | 58.42 | 31.11 | 89.53 |
| 2005-2006 | 22.15 | 8.71 | 30.86 | 2886 | 3683 | 3111 | 63.93 | 32.08 | 96.01 |
| 2005-2006 | 25.26 | 14.56 | 39.82 | 2524 | 3659 | 2939 | 63.77 | 53.27 | 117.04 |
| 2006-07 | 26.41 | 13.37 | 39.78 | 2631 | 3681 | 2984 | 69.49 | 49.23 | 118.72 |
| 2007-08 | 25.78 | 14.06 | 39.84 | 3178 | 3650 | 3345 | 81.91 | 51.33 | 113.25 |
| 2008-09 | 28.03 | 15.84 | 43.87 | 2990 | 3680 | 3239 | 83.81 | 58.29 | 142.10 |
| 2009-10 | 20.63 | 13.78 | 34.41 | 2887 | 3543 | 3150 | 59.56 | 48.82 | 108.38 |
| 2010-11* | 29.24 | 16.39 | 45.63 | 2550 | 3647 | 2944 | 74.56 | 59.77 | 134.33 |
| CAGR% | | | 0.035 | | | 0.011 | | | 0.043 |

Source: <http://agri.ap.nic.in/crops1.htm> (accessed on: 29/04/2011)

*: Second Revised Advance Estimates

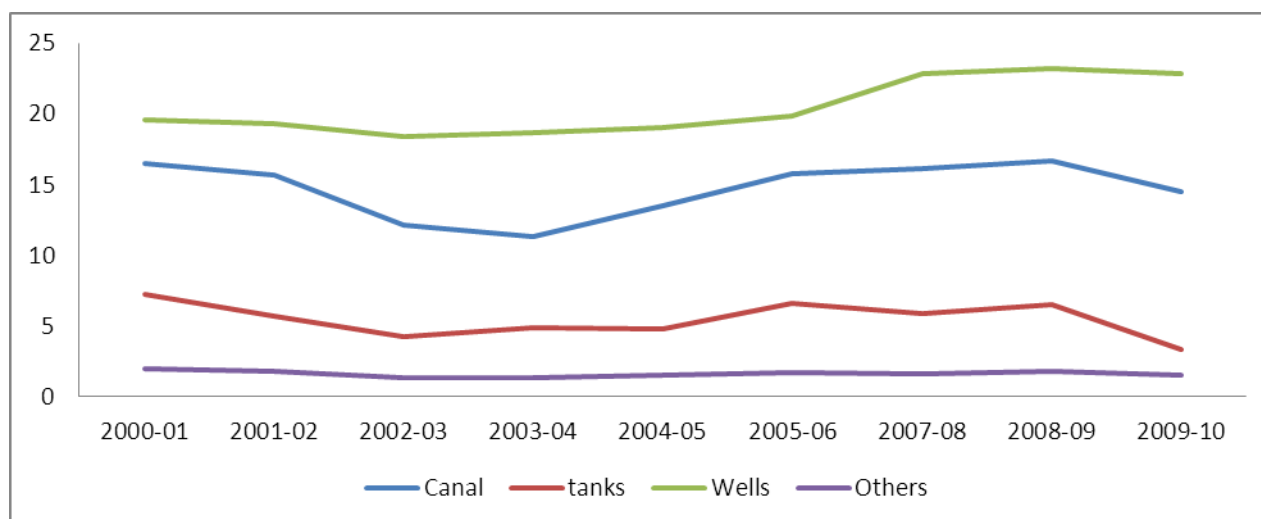
Andhra Pradesh gets most of its rainfall from the south-west monsoon winds. The normal rainfall for the state is around 960 mm. However, rice cultivation in Andhra Pradesh has been typically done under irrigated conditions, which is also a major cause of the high production from the state. A look at the patterns of irrigation development demonstrates that there is an increasing exploitation of groundwater reserves, which can lead to problems of brackishness and depleted reserves, if not prudently utilised. The table 2.3 gives the source wise Net Irrigated area estimates from which the fore mentioned proposition is evident. For further clarification of this trend, Figure 2.3 shows that as the area under canal has been diminishing at an increasing rate, the well irrigated areas have been increasing at a faster rate.

Table 2.3 Source Wise Net Irrigated Area

| Year | Canal | tanks | Wells | Others | Total |
|---------|-------|-------|-------|--------|-------|
| 2000-01 | 16.49 | 7.27 | 19.54 | 1.98 | 45.28 |
| 2001-02 | 15.63 | 5.67 | 19.28 | 1.80 | 42.38 |
| 2002-03 | 12.09 | 4.25 | 18.43 | 1.37 | 36.14 |
| 2003-04 | 11.36 | 4.90 | 18.70 | 1.38 | 36.34 |
| 2004-05 | 13.46 | 4.77 | 19.03 | 1.55 | 38.81 |
| 2005-06 | 15.72 | 6.62 | 19.87 | 1.72 | 43.93 |
| 2007-08 | 16.10 | 5.85 | 22.87 | 1.62 | 46.44 |
| 2008-09 | 16.70 | 6.48 | 23.23 | 1.80 | 48.21 |
| 2009-10 | 14.46 | 3.32 | 22.84 | 1.53 | 42.15 |

Source: Socio-Economic Survey of Andhra Pradesh, 2010-11

Fig 2.3 Source Wise Net Irrigated Area



Source: Socio-Economic Survey of Andhra Pradesh, 2010-11

Recent calculation by Directorate of Economics and Statistics show that rice production under unirrigated conditions are extremely non profitable due to the low yield levels.^{xv} Therefore it has been noticed that most of the rice cultivation of the state is done in the irrigated tracts.

Table 2.4 Season-Wise State Average Yields for Rice under Various Conditions

| Sr No. | Particulars | Average Yields in Kgs/hectare |
|--------|---------------------------------|-------------------------------|
| 1. | Kharif Unirrigated Rice | 1164 |
| 2. | Kharif Irrigated Rice | 2963 |
| | Pooled Estimate for Kharif rice | 2888 |
| 3. | Rabi Rice | 3543 |

Source: Annual Administration Report, 2009-10, Directorate of Economics and Statistics

The table 2.5 shows the district-wise rice area, productivity and production for the year 2009-10 and 2008-09. The additional figures for 2008-09 have been given to denote the normal conditions as 2009-10 was a drought year.

Table 2.5 District Wise Area, Production and Productivity

| Sr No. | District | Area (in '000 Ha) | | Production (in '000 tonnes) | | Productivity | |
|--------|----------------|----------------------|---------|--------------------------------|-------|--------------|-------|
| | | 2009-10 | 2008-09 | 09-10 | 08-09 | 09-10 | 08-09 |
| 1. | Adilabad | 48 | 98 | 98 | 198 | 2047 | 2567 |
| 2. | Nizamabad | 122 | 190 | 389 | 680 | 3208 | 3576 |
| 3. | Karimnagar | 162 | 336 | 513 | 1176 | 3163 | 3500 |
| 4. | Medak | 84 | 124 | 232 | 358 | 2800 | 2885 |
| 5. | Hyderabad | 0 | 0 | 0 | 0 | 0 | 0 |
| 6. | Rangareddy | 35 | 32 | 93 | 92 | 2620 | 2867 |
| 7. | Mahabubnagar | 164 | 144 | 401 | 421 | 2448 | 2910 |
| 8. | Nalagonda | 274 | 362 | 919 | 1150 | 3361 | 3179 |
| 9. | Warangal | 124 | 231 | 316 | 690 | 2542 | 2989 |
| 10. | Khammam | 103 | 195 | 306 | 596 | 2973 | 3058 |
| 11. | Srikakulam | 180 | 206 | 378 | 415 | 2104 | 2014 |
| 12. | Vizianagaram | 109 | 131 | 239 | 312 | 2209 | 2388 |
| 13. | Vishakhapatnam | 68 | 102 | 74 | 172 | 1076 | 1689 |
| 14. | East Godavari | 306 | 410 | 1074 | 1513 | 3500 | 3690 |
| 15. | West Godavari | 329 | 451 | 1115 | 1600 | 3394 | 3553 |
| 16. | Krishna | 336 | 315 | 1209 | 1427 | 3592 | 3618 |
| 17. | Guntur | 303 | 332 | 1067 | 1147 | 3522 | 3446 |
| 18. | Prakasam | 129 | 137 | 489 | 482 | 3786 | 3671 |
| 19. | S.P.S. Nellore | 267 | 257 | 1004 | 997 | 3762 | 3877 |
| 20. | Y.S.R. Kadapa | 65 | 65 | 188 | 129 | 2877 | 1974 |
| 21. | Kurnool | 127 | 111 | 415 | 377 | 3271 | 3382 |
| 22. | Ananthapur | 51 | 48 | 149 | 144 | 2873 | 2964 |
| 23. | Chittoor | 55 | 56 | 170 | 165 | 3098 | 2910 |
| | Total | 3441 | 4387 | 10838 | 14241 | 3150 | 3246 |

Source: Agricultural Statistics at a Glance - Andhra Pradesh, 2009-2010

2.4 Conclusion

Andhra Pradesh enjoys a comparative advantage^{xvi} in the production of rice, given the availability of labour, favourable climatic conditions and a well developed irrigation system over most of the other regions of India, where rice cultivation is done under rainfed conditions. Rice is cultivated in almost all the 22 districts of Andhra Pradesh, both in the Kharif and Rabi season. However, production is mainly concentrated in the districts of West Godavari, East Godavari and Karimnagar. Hence Andhra Pradesh has been a veritable 'Rice Bowl for India'.^{xvii}

3 Rice Productivity in Andhra Pradesh – A Critical Analysis

3.1 Role and Importance of Productivity Gains

Since the inception of Green Revolution, there has been substantial growth in commercial agriculture mainly from rice producing districts of the Krishna-Godavari delta region where output surplus and production increase, primarily due to increased productivity through the use of HYV seeds.

The United Nations in its World Development Report, 2008, titled “Agriculture for Development” gives a prominent role to ‘increased productivity’ as an important aspect to break free from the agrarian crisis and as an effective tool for poverty reduction and increasing entitlements^{xviii}. It states that agricultural productivity determines the price of food, which in turn determines the wage costs and competitiveness of the tradable sectors. Productivity of food staples is the key to growth.^{xix} As long as productivity per hectare rises, the commercial profitability per hectare may be expected to rise despite relative stability in the unit prices of inputs and outputs. However, when yield response to input use begins to decline, commercial profitability per hectare is threatened.

Productivity increases in isolation do not and cannot lead to reduction in poverty reduction. The poverty-alleviating effects of increased production in the farm sector depend upon the net marketing position of the poor and the price elasticity of food demand. Poor net-food-buying households benefit from lower food prices, as long as the gain from reduced spending on food exceeds the loss from reduced wage income. Poor net-food-selling producers, by contrast, gain only if productivity grows faster than prices fall. Given that the demand for staple crops is usually price inelastic, producers may well lose. Even so, increasing staple crop productivity usually reduces poverty overall, because in addition to the urban poor, more than half of poor rural households are also typically net food buyers, a little appreciated fact.^{xx}

3.2 Factors influencing Productivity

Theoretically, the main factors that affect productivity are availability of water and irrigation facilities, suitable rainfall and climatic conditions, soil fertility levels, credit, availability and application of fertilizers and pesticides in cautious amounts, inter crop linkages and policy and institutional support.

Rice is grown in almost all the districts of Andhra Pradesh. However, the major rice producing districts of Andhra Pradesh are situated in the fertile Krishna Godavari basin region. The districts that have earned the name “the rice bowl of India” are West Godavari, East Godavari and Krishna. Besides the in the irrigated regions of Telangana, namely in the district of Karimnagar too, rice is cultivated as a major crop. Despite the predominance of agriculture as a major source of livelihood, there are certain problems facing the farmers which need state intervention, specifically in the problems related to flash floods or droughts, deteriorating soil health, lack of access to formal credit sources, maintenance of irrigation structures and extension services.

This study mainly focuses on the dynamics of rice production in the ‘rice bowl areas’ which are the four major districts- West Godavari, East Godavari, Krishna and Karimnagar. Hence much of the data analysed shall pertain to an inter-district comparison between them with cross tabular analysis of the statistics for the whole of Andhra Pradesh.

District wise analysis of Production and Productivity of Rice

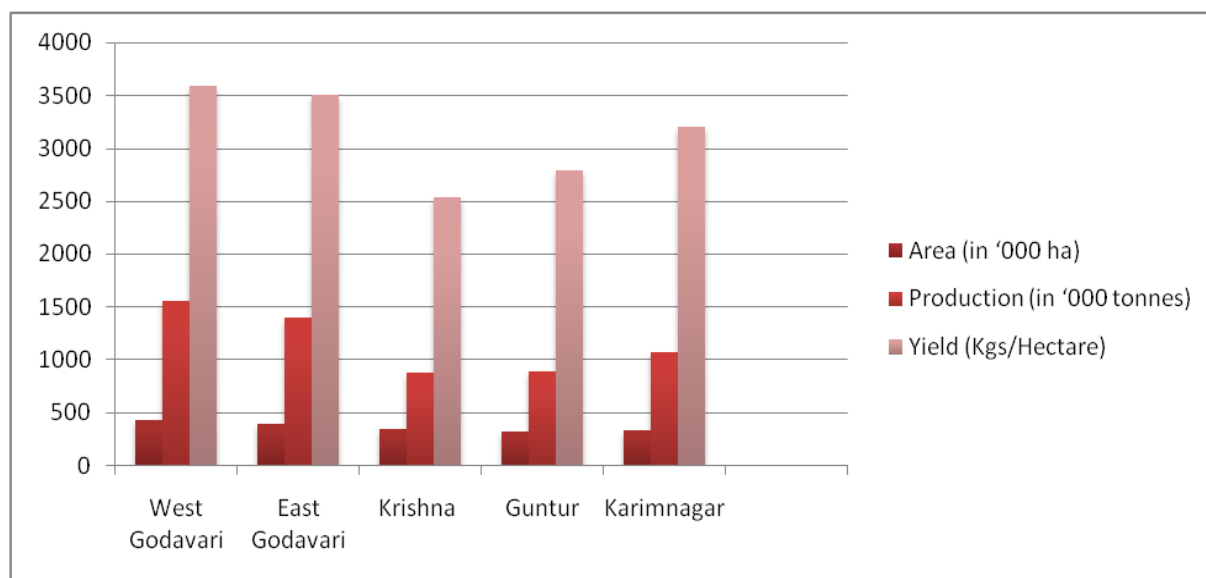
The four major rice producing districts of Andhra Pradesh together account for around 38 of the total area under rice of the state with as much as 50 share in the total output. As it can be seen from the table 3.1, with the exception of Krishna, all the other districts also have a *productivity rate higher than the state average of 2984 kgs/hectare.*

Table 3.1 Area, Production and Productivity of Rice Crop (2008-09)

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|----------------------------|---------------|---------------|---------|------------|----------------|
| Area in ‘000 ha) | 434 | 397 | 346 | 334 | 3978 |
| Production in ‘000 tonnes) | 1557 | 1394 | 877 | 1070 | 11872 |
| Yield Kgs/Hectare) | 3587 | 3511 | 2532 | 3207 | 2984 |

Source: Agricultural Statistics at a Glance - Andhra Pradesh, 2009-2010

Fig 3.1 Area, Production and Productivity of Rice Crop (2008-09)



Rural Nature of the Economy:

Andhra Pradesh is predominantly composed of rural population. A look into the district profile of the prominent rice growing areas also reveals the same Table 3.2. Around 72 of the state population reside in rural areas. As such, the agrarian relations that determine the structure of the agricultural economy of the state are complex and multi-layered. The dominant mode of production in the rural regions of Andhra Pradesh is however capitalist in nature.

As a way out of the present agrarian crisis plaguing the cultivators of Andhra Pradesh, reforms and policy interventions that serve to increase yields and hence incomes are necessary. Increasing productivity is the only way to ensure vertical expansion of the farm sector.

Table 3.2 Indicators of the Major Rice Producing Districts

| Indicator | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|--|---------------|---------------|---------|------------|----------------|
| Geographical Area (in '00 sq. Kms) | 7.7 | 10.8 | 8.7 | 11.8 | 275.0 |
| No. Of Gram Panchayats | 888 | 1011 | 973 | 1194 | 21895 |
| No. Of Rural Households | 770429 | 930679 | 708724 | 667824 | 12607167 |
| Rural Population (in '000) | 3053 | 3749 | 2844 | 2813 | 55401 |
| Percentage of rural population to total population (%) | 80.26 | 76.50 | 67.92 | 80.56 | 72.20 |

Source: Districts at a Glance-Andhra Pradesh 2007, Directorate of Economics and Statistics, GoAP

Geographical Factors influencing Productivity:

Geography of a particular area plays an intrinsic role in determining agricultural production and output. West Godavari, East Godavari and Krishna fall in the coastal belt of Andhra Pradesh which has fertile alluvial, black regur and ferruginous. These soil types are highly fertile and naturally aid production. Karimnagar is characterized by sandy loamy and red soils. This soil type has low water retaining capacity and comparatively lower fertility levels than the soil type of coastal Andhra.

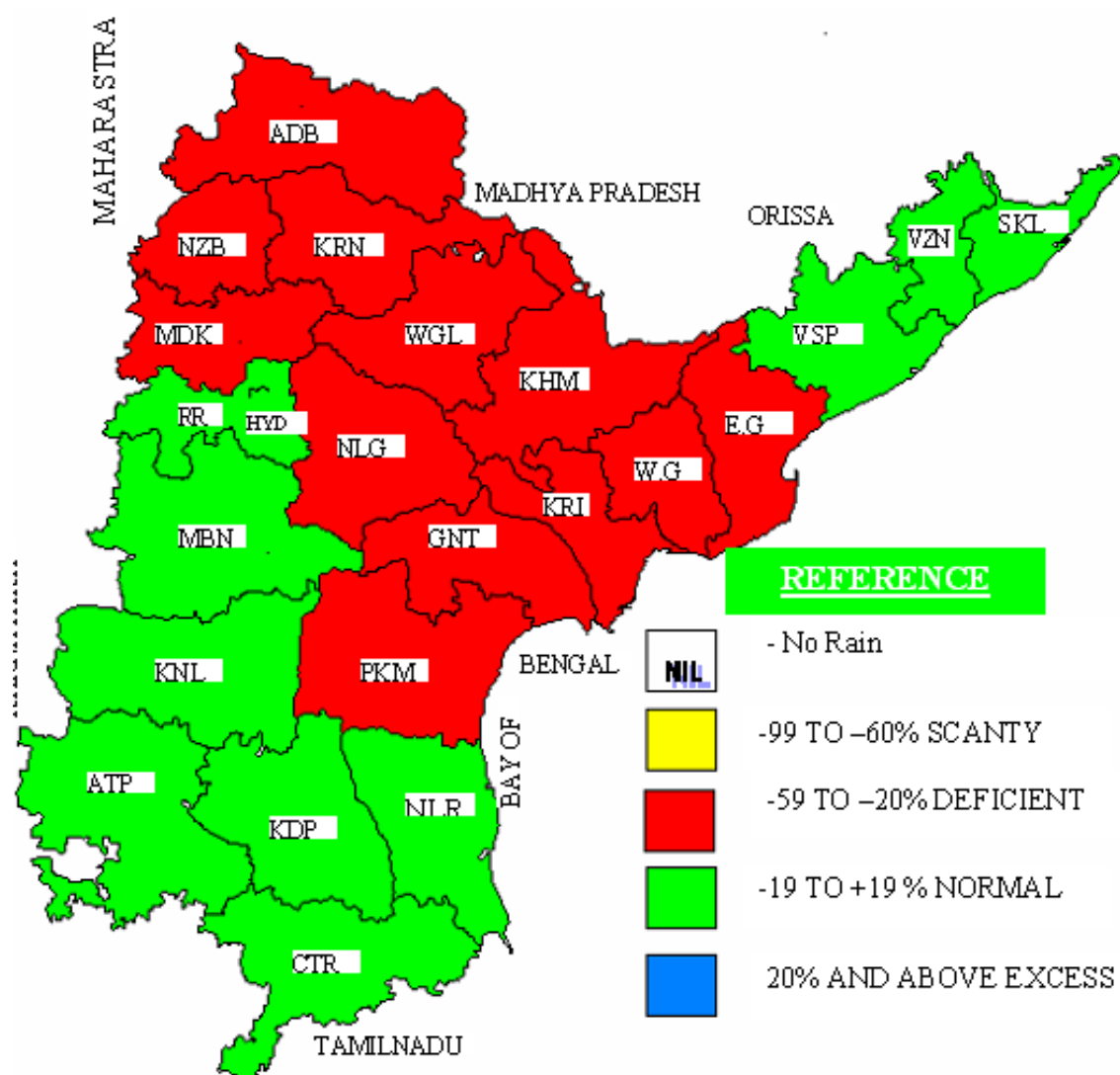
The availability of rainfall and photonic energy are another very important determining factor of productivity. The coastal Andhra and Telangana regions receive a very high rainfall, generally around 1000 mm per annum. The table 3.3 shows the region wise rainfall data. Most of Andhra Pradesh falls under the tropical climate. Hence the temperatures range from between 30-40°C. The coastal regions typically have hot and humid climate which is suitable for rice cultivation.

Table 3.3 Rainfall data for Andhra Pradesh, 2009-10

| Region | Normal (in mm) | Actual (in mm) | % deviation over normal |
|----------------|-------------------|-------------------|-------------------------|
| Coastal Andhra | 1078 | 903 | -16.2 |
| Rayalseema | 715 | 686 | -4.1 |
| Telangana | 907 | 687 | -24.2 |
| Andhra Pradesh | 940 | 760 | -19.1 |

Source: Agricultural Statistics at a Glance - Andhra Pradesh, 2009-2010

Fig 3.2 Rainfall from South West Monsoon Winds, 2009-10



Cultivation is the major occupation in the Rice Bowl areas. As most of these tracts are irrigated, and hence are cultivated twice or thrice. The cropping pattern in the coastal Andhra region follows mostly Rice-Rice-Pulse or Rice-Rice-Fallow. In some areas the Kharif crop taken is Rice followed by Groundnut or Maize as the Rabi crop. The Table 3.4 gives an estimate of the net and gross cultivated areas in these districts.

Table 3.4 Cropped Areas in Districts of Andhra Pradesh

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|----------------------------|---------------|---------------|---------|------------|----------------|
| Net Sown Area (in '000 ha) | 432 | 418 | 463 | 454 | 10147 |
| Area Sown more than once | 268 | 349 | 254 | 247 | 2664 |
| Gross Sown Area | 700 | 767 | 717 | 701 | 12811 |
| Cropping intensity | 1.62% | 1.83% | 1.55% | 1.54% | 1.26% |

Irrigation and Productivity

Irrigation plays a major role in determining productivity. As already discussed in Chapter 2, productivity levels widely differ in the irrigated and non irrigated areas. Hence the development of irrigation and assured water supply to farmers is one of the imperatives for yield improvement. Table 3.5 and Fig 3.3 depict the irrigation scenario in the rice bowl areas.

Fig 3.3 Source wise irrigation in Districts of Andhra Pradesh

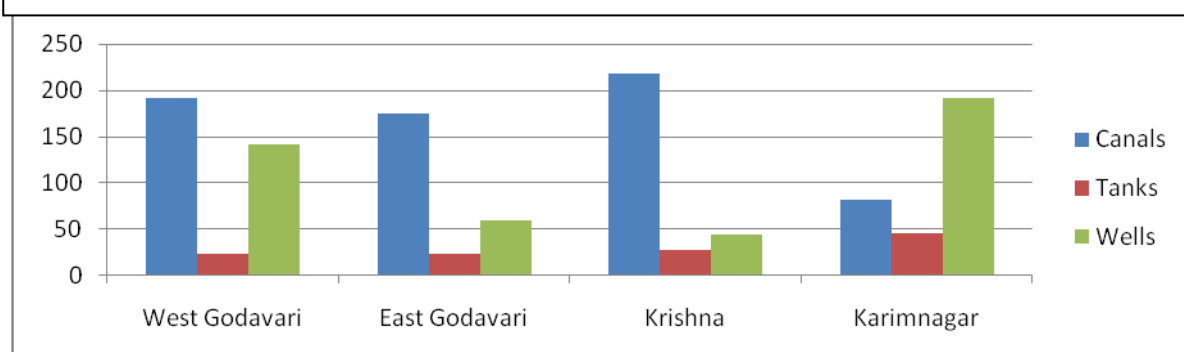
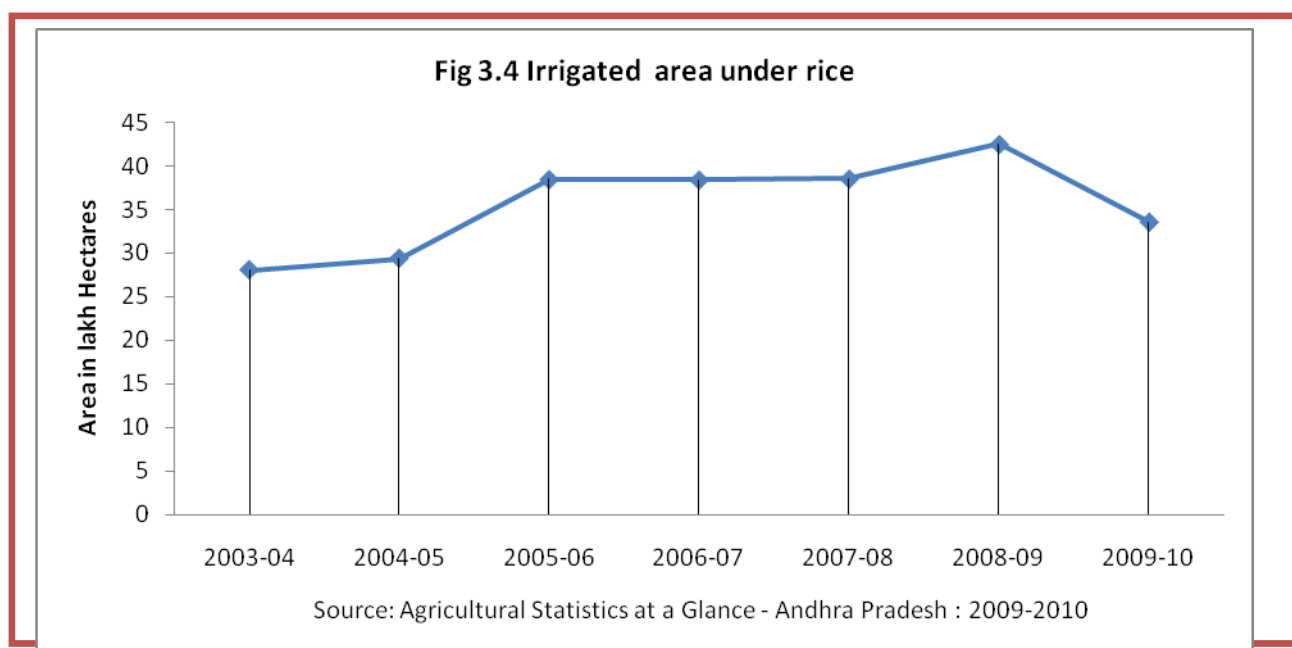


Table 3.5 Source wise irrigation in Districts of Andhra Pradesh

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|--------------------------|---------------|---------------|---------|------------|----------------|
| Canals | 192 | 175 | 218 | 81 | 1572 |
| Tanks | 23 | 23 | 27 | 45 | 662 |
| Wells | 141 | 58 | 43 | 192 | 1987 |
| Irrigation Intensity (%) | 1.71 | 1.79 | 1.47 | 1.52 | 1.36 |

Source: Districts at a Glance-Andhra Pradesh 2007, Directorate of Economics and Statistics, GoAP

The Fig 3.4 shows the irrigated area under rice from 2003-04 onwards. The trend demonstrates that the irrigated area under rice has been steadily increasing. However, there needs to be greater emphasis on canal irrigation.



Human Capital and Labour

The availability of labour at correct times and at correct wages is one of the most important factors that determine rice production in a country like India, where the small size of land holdings necessitate the use of human capital. As shown in table 2.1, agriculture employs a large number of workers. The work participation rates for these districts are given in the table 3.6. It is higher in the Karimnagar than in the Coastal Andhra region.

Table 3.6 Work Participation Rates

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|-----------------------------------|---------------|---------------|---------|------------|----------------|
| Total Work Participation Rate (%) | 46.6 | 41.9 | 49.2 | 53.9 | 45.8 |

Source: Agricultural Statistics at a Glance - Andhra Pradesh : 2009-2010

The average wages for male agricultural labourers grew at 24.37% in 2010 over the previous year, while for females it grew at 27.01%. The table 3.7 gives the average wage rates for the state for both male and female field labourers.

Table 3.7 Average wages (in Rs.) for Agricultural Labourers in Andhra Pradesh

| | Male | Female |
|----------|--------|--------|
| 2009 | 114.28 | 85.43 |
| 2010 | 142.14 | 108.51 |
| % change | 24.37 | 27.01 |

Source: Economic Survey of Andhra Pradesh, 2010-11, GoAP.

Landholding Pattern

The land holding pattern demonstrates the non egalitarian nature of the Andhra society. While 51% of the farming society has just 21% of the land area, 0.4% of the large farmers own more than 5% of the total land area.

The divide in the land holding pattern is evident everywhere throughout the state. Small farm size has important ramifications on the productivity levels from the farm. The average size of farms in Andhra Pradesh is 1.20 hectares, however it is only about 0.89 ha in West Godavari. The size of the holdings is smaller in coastal Andhra Region than in Karimnagar, Telangana Region which is an important reason for relatively low levels of mechanization in this region.

Table 3.8 Land holding Patterns in Andhra Pradesh

| | West Godavari | | East Godavari | | Krishna | | Karimnagar | | Andhra Pradesh | |
|----------------------|---------------|--------|---------------|--------|---------|--------|------------|--------|----------------|---------|
| | No. | Area | NO. | Area | No. | Area | No. | Area | No. | Area |
| Marginal upto 1 ha | 429752 | 175905 | 541689 | 198840 | 388671 | 173286 | 396999 | 173442 | 7417461 | 3287034 |
| % | 73.91 | 33.93 | 78.98 | 38.29 | 69.46 | 31.48 | 66.19 | 27.8 | 57.05 | 21.11 |
| Small 1-2 ha | 92025 | 128395 | 90324 | 125203 | 106010 | 145851 | 127433 | 178420 | 2639110 | 3730303 |
| % | 15.82 | 24.77 | 13.17 | 24.11 | 18.94 | 26.49 | 21.24 | 28.6 | 20.22 | 23.96 |
| Semi-Medium 2-4 ha | 44308 | 118954 | 40330 | 108411 | 48779 | 131034 | 57328 | 153542 | 1444083 | 3835072 |
| % | 7.62 | 22.95 | 5.88 | 20.87 | 8.72 | 23.8 | 9.56 | 24.6 | 11.1 | 24.64 |
| Medium 4-10ha | 14298 | 78740 | 12410 | 68349 | 15031 | 82180 | 16333 | 90809 | 1444083 | 3835072 |
| % | 2.45 | 15.19 | 1.8 | 13.16 | 2.69 | 14.93 | 2.72 | 14.5 | 11.1 | 24.63 |
| Large more than 10ha | 998 | 16308 | 1031 | 18452 | 1041 | 18046 | 1684 | 27005 | 56041 | 877734 |
| % | 0.17 | 3.15 | 0.15 | 3.55 | 0.19 | 3.28 | 0.28 | 4.33 | 0.43 | 5.64 |
| Total | 581381 | | 685784 | | 559531 | | 599777 | | | |
| Average Holding ha | 0.89 | | 0.76 | | 0.98 | | 1.04 | | 1.2 | |

Inputs and Machinery

Ever since the Green Revolution the role of chemical fertilizers and farm implements and machinery has been pivotal in increasing the production. The total factor Productivity has risen due to the use of modern technology in agriculture which has enabled agriculture to escape the Ricardian law of Diminishing Returns, which is one of the major drawbacks of the agricultural sector.^{xxi} Technical change in agriculture increases production at the same level of input-use. An increase in production due to technical changes and mechanization reduces unit costs in real terms for the farmers making farming more profitable. However, the levels of mechanisation that are adopted at many times do not commensurate to the investments involved in adopting them. The cost-time savings attitude of the farmers coupled with the non-availability of agricultural labourers has lead to crop losses for many farmers. Farm mechanisation needs to be implemented on a wider scale for increasing productivity in the state.

The table 3.9 depicts the Fertilizer use in the state. The tables 3.10 and 3.11 show the farm implements availability and energy consumption in the different districts of Andhra Pradesh.

Table 3.9 Consumption of Fertilizers (in tonnes) 2005-06

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|-------------|---------------|---------------|---------|------------|----------------|
| Nitrogen N | 137614 | 97687 | 117923 | 112368 | 1522087 |
| Phosphate P | 63639 | 34130 | 55996 | 14330 | 690093 |
| Potash K | 40493 | 26128 | 40480 | 14330 | 340364 |
| N+P+K | 241746 | 157945 | 214399 | 162064 | 2552544 |

Source: Districts at a Glance, 2007-08

Table 3.10 Agricultural Machinery and Implements

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|---------------------------------|---------------|---------------|---------|------------|----------------|
| Hand Operated | 162760 | 56131 | 33477 | 25575 | 1376864 |
| Animal Operated | 38463 | 57518 | 69404 | 376456 | 6029657 |
| Tractors | 2500 | 2500 | 1500 | 1800 | 18595 |
| Power Tillers | 1000 | 4000 | 520 | 200 | 8647 |
| Harvesters | 50 | 25 | 30 | 60 | 501 |
| Agricultural Equipment (others) | 5000 | 2972 | 8195 | 396 | 25008 |

Source: State Focus Paper, Andhra Pradesh, 2011-12

Table 3.11 Power Consumption in MKWH

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|--------------------------------------|---------------|---------------|---------|------------|----------------|
| For agricultural purposes | 763.99 | 301.81 | 185.31 | 516.03 | 13266.96 |
| Energised Agricultural Pumpsets (No) | 65085 | 34715 | 55093 | 256736 | 2440823 |

Source: Districts at a Glance-Andhra Pradesh 2007, Directorate of Economics and Statistics, GoAP.

Credit:

Agricultural Credit forms the base requirement for investment and development. Financial assistance and governmental involvement in producing credit to farmers in sufficient quantities and at reasonable rates of interest is of utmost importance for the growth of agricultural sector. Andhra Pradesh has a well developed network of banking system, strengthening the institutional credit delivery to farmers in the form of crop loans, development loans, Agricultural term loans, etc. The table 3.12 denotes a picture of ground level credit available to the farm sector in Andhra Pradesh over a period of time.

Table 3.12 Agency Wise Flow of Ground Level Credit to Agricultural Sector**(Rs.Crore)**

| Particulars | 2006-07 | | | 2007-08 | | | 2008-09 | | | 2009-10 |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Target | Ach | % | Target | Ach | % | Target | Ach | % | Target |
| Crop Loans | | | | | | | | | | |
| CBs | 9384 | 9415 | 100.33 | 10757 | 10540 | 97.98 | 12507.45 | 11958.46 | 95.61 | 14335 |
| SCBs/CCBs | 3603 | 3568 | 99.03 | 3559 | 3994.29 | 112.23 | 3984.04 | 1846.77 | 46.35 | 5194.35 |
| RRBs | 2713 | 2735 | 100.81 | 2984 | 3061.70 | 102.60 | 3508.51 | 2663.77 | 75.92 | 3970.37 |
| Sub-total | 15700 | 15718 | 100.11 | 17300 | 17596 | 101.71 | 20000 | 16469 | 82.35 | 23500 |
| Term Loans | | | | | | | | | | |
| CBs | 3353 | 2508 | 74.80 | 3751 | 3943.83 | 105.14 | 4233.28 | 6096.40 | 144.01 | 7618.98 |
| SCBs/CCBs | 835 | 529 | 63.35 | 786 | 831.63 | 105.81 | 847.52 | 77.39 | 9.13 | 120 |
| RRBs | 682 | 588 | 86.22 | 813 | 924.54 | 113.72 | 919.20 | 998.21 | 108.60 | 1261.02 |
| Sub-total | 4870 | 3625 | 74.44 | 5350 | 5700 | 106.54 | 6000 | 7172 | 119.53 | 9000 |
| Total Agricultural Credit | | | | | | | | | | |
| CBs | 12737 | 11923 | 93.61 | 14508 | 14483.83 | 99.83 | 16740.73 | 18054 | 107.85 | 21954.26 |
| SCBs/CCBs | 4438 | 4097 | 92.32 | 4345 | 4825.92 | 111.07 | 4831.56 | 1924 | 39.82 | 5314.35 |
| RRBs | 3395 | 3323 | 97.88 | 3797 | 3986.24 | 104.98 | 4427.71 | 3661.98 | 82.71 | 5231.39 |
| Total | 20570 | 19343 | 94.04 | 22650 | 23296 | 97.98 | 26000 | 23641 | 90.93 | 32500 |

Source: State Focus Paper, Andhra Pradesh, 2011-12, NABARD

3.3 Conclusion

It can be concluded from the above arguments that rice yields in Andhra Pradesh today is the product of interplay between various macro and micro factors over the past two decades. The policies of the agricultural department of both the Central and state governments, ideological shifts to free but not necessarily 'fair' trade, after effects of the optimism caused by the Green revolution and inadequate knowledge impartment to the farmers, neglect of soil health and natural calamities all together have led to the present stagnation in yields of rice.

Productivity of rice cannot be seen as an isolated event, but has to be linked to micro and macro variables, geographical events and human efforts. The various determinants and variables of productivity that have been discussed have immense implications for farm sector development. Rice yields are generally a function of natural factors, availability of irrigation and power, seeds, fertilizers, pesticides and credit support. A major constraint for increasing productivity for the farmers is timely availability of institutional credit. Hence there needs to be an exhaustive coverage of the banking structure to ensure and strengthen the credit delivery system in the state. Coupled with political will and institutional support, the above variables can certainly lead to productivity increases from rice.

Chapter 4: Economics of Rice Cultivation

4.1 Price Linkages and Agricultural development

Capitalist farming, i.e. surplus production in agriculture or producing not for consumption but for sale, brings with it the issue of pricing of the output. In a developing country like India agriculture is generally viewed as the ‘bargain sector’, however what is generally overlooked is the role of agriculture in supporting over 60% of the total population. Hence, it is of paramount importance that the prices given to the farmers for their produce are determined by considerate and cautious policy decisions. Thus ‘getting the prices right^{xxii}’ is an important consideration, which helps farmers at making farm-related decisions as in the neo-classical world today, prices function as ‘measuring rods’ to indicate market signals.

Agricultural Prices as an instrument of resource transfer

In the Indian political scenario, it has often been noticed that the terms of trade have purposefully been kept against agricultural sector to facilitate resource transfers from agriculture to industries. In simple national income accounting language, the net total transfers from agriculture equals the gross savings in agriculture less the investments in agriculture plus net transfers (in the form of direct expenditure and implicit taxes) from agriculture to government^{xxiii}. There occur ‘invisible outflows’ from agriculture to finance the development of other sectors of the economy.

4.2 Estimation of Farm Incomes

Given the wide range of distortions that can occur in prices of agricultural commodities, it was considered essential by the government to calculate and determine the cost of cultivation for various commodities. The Commission for Agricultural Costs and Prices (CACP) hence formed the Cost of Cultivation of Principal Crops (CCPC) under it in 1971-72. The methodology used by them has been reviewed and revised over time. The latest revision was done in 1990, when the Government of India constituted the Second Review Committee under the Chairmanship of C. H. Hanumantha Rao. The major recommendations of the Committee were^{xxiv}:

a) That the crop complex approach be supplemented with a single-crop approach to ensure that aspects of cultivation of minor crops are also studied;

- b) That family labour be valued on the basis of actual wages paid to casual labourers rather than on the basis of the wage rates of attached farm servants; and
- c) That management costs be calculated by taking 10 per cent of the paid out cost (Cost A₂).

The method of estimation of incomes from produce the definition provided by the Commission on Agricultural Prices (CACP) on the components of cost A₂ shall be employed to estimate the farm incomes from rice cultivation in Andhra Pradesh, with a cross analysis with the scale of finance approved by the District Co-Operative Central Banks for the same in the two districts of survey. The method to be used is described as below:

Cost A₁= Includes all the “out of pocket expenses” made by the cultivator.

The components of Cost A₁ are,

- Value of hired human labour
- Value of hired and owned bullock labour
- Value of owned machine labour
- Value of hired machine charges
- Value of seed (both farm produces and purchased)
- Value of insecticides and pesticides
- Value of manures (owned and purchased)
- Value of fertilizers
- Irrigation charges
- Depreciation of implements and farm buildings
- Land revenue, cesses and other taxes
- Interest on working capital
- Other miscellaneous expenses

Cost A₂ = Cost A₁ + Rent paid for leased in land^{xxv}

Income = Total Revenue – Costs of cultivation

Dr. M.S. Swaminathan, the father of Green Revolution in India and the visionary of ‘Evergreen Revolution’ states that The Commission on Agricultural Costs and Prices (CACP) should be an autonomous statutory organization with its primary mandate being the

recommendation of remunerative prices for the principal agricultural commodities of both dry farming and irrigated areas. The minimum support price (MSP) should be at least 50% more than the weighted average cost of production. CACP should become an important policy instrument for safeguarding the survival of farmers and farming.

He further states that the pricing policy for farm commodities should have the following three components^{xxvi}:

- Minimum support price (MSP) announced before the sowing season; MSP should be cost plus 50 per cent (i.e. 50% more than the total cost of production).
- Procurement price at the time of purchase which should be the best available market price,
- Post-procurement adjustment through smart cards issued to those who sell their produce for public good like PDS, ICDS, and school noon-meal, among others. In case government has to import food grains at a price much higher than given to our farmers, the smart card should enable them to obtain essential inputs at a concessional price.

Thus, a farmer friendly integrated MSP, procurement price and post-procurement adjustment system will help our farmers to tap the existing unutilized yield reservoir and thereby improve the productivity and profitability of farms.

Case Study I

ESTIMATED COST OF CULTIVATION OF PADDY IN WEST GODAVARI DISTRICT, COASTAL ANDHRA:

The agriculture department of the various districts of Andhra Pradesh calculate the cost of cultivation for determining the scale of finance and Minimum Support Prices (MSP) for various crops. The Table 4.1 shows the estimate of cost of cultivation for paddy in West Godavari during Kharif season.

Table 4.1: Cost of Cultivation for Paddy for 2010-11 (Kharif)

| Sr no | Item of Expenditure | Bullock Labour | | | Human Labour | | | Inputs | | | Total cost per acre |
|-------|--|----------------|-----|-------------|--------------|-----|--------------|--------|-------|-------------|---------------------|
| | | U | R | C | U | R | C | U | R | C | |
| I | Preparation of Land | | | | | | | | | | |
| 1 | Ploughing Twice, trimming and land formation | 2 | 550 | 1100 | 2 | 300 | 600 | | | | 1700 |
| II | Seed & Sowing | | | | | | | | | | |
| 1 | Cost of Seed and Sowing and transplanting | | | | 20 | 250 | 5000 | 35 | 17.14 | 600 | 5600 |
| III | Manure & Fertilizer | | | | | | | | | | |
| 1 | Chemical Fertilizers | | | | 4 | 250 | 1000 | 4 | 400 | 1600 | 2600 |
| 2 | Farmyard Manure | | | | | | | | | | |
| IV | After Care | | | | | | | | | | |
| 1 | Weeding (twice) | | | | 10 | 250 | 2500 | | | | 2500 |
| 2 | Plant Protection | | | | 4 | 250 | 1000 | | | 1300 | 2300 |
| 3 | Irrigation | | | | | | | | | 200 | 200 |
| 4 | Harvesting and tying | | | | 10 | 300 | 3000 | | | | 3000 |
| 5 | Transport to market Yards (tractor) | | | | | | | | | | |
| | Grand Total | | | 1100 | | | 13100 | | | 3700 | 17900 |

U- Unit, R-Rate, C-Cost

Hence the cost of cultivation of an acre of paddy is Rs. 17900 during the Kharif Season. Similar estimations for paddy cultivation in Rabi come to Rs. 19000 for cultivation of per acre of paddy crop.

These estimates are based on field observation and data collection from the farmers. The estimates of cost of cultivation given the governmental sources are Rs. 14274 for Kharif paddy and Rs 16000 for Rabi.

The scale of finance as determined by the DCCB West Godavari for the last five years is given in the table 4.2.

Table 4.2 Scale of Finance per acre for Paddy Cultivators in West Godavari

(All figures in Rs.)

| Year | Kharif | Rabi |
|---------|----------------------|------------------------|
| | (April To September) | (November to February) |
| 2006-07 | 8500 | 9630 |
| 2007-08 | 8500-9000 | 10,000 |
| 2008-09 | 11,000-11500 | 13,000 |
| 2009-10 | 11,000-12,000 | 13,000-14,000 |
| 2010-11 | 13,000-14,000 | 14,000-15,000 |
| 2011-12 | 14,000-15,700 | 15500-17,000 |

Although the scale of finance determined by the DCCB covers the cost of cultivation of the farmers, the value of imputed items of expenditure, like family labour, depreciation charges, value of land, cost of owned machinery, etc is not reflected in the above estimations.

For this, the agricultural department has also estimated the per quintal cost of cultivation which is shown in the Table 4.3. Annexure II and III calculate similar estimates for Rabi paddy cultivation costs.

| TABLE 4.3 | | |
|---|---|----------------------|
| ESTIMATED COST OF PRODUCTION OF PADDY PER HECTARE DURING 2009-2010 | | |
| KHARIF, 2009-10 | | WEST GODAVARI |
| Sr. No. | Item | Rs. |
| I | A1 Cost (Cost of Cultivation) | 44750 |
| II | A2 Cost (A1 plus rent paid for leased land) | 54750 |
| III | B1 Cost (A1 plus interest on value of owned capital assets) | 58250 |
| IV | B2 Cost (B1 plus rented value of owned labour) | 58250 |
| V | C1 Cost (B1 plus imputed value of family labour) | 59250 |
| VI | C2 Cost (B2 plus imputed value of family labour) | 59250 |
| VII | C3 Cost (C2 plus 10% managerial cost on C2) | 65175 |
| VIII | Total Cost | 65175 |
| IX | Yield of Straw in Quintals | 400 |
| X | Value of Bi- Products @ Rs. 100/- | 4000 |
| XI | Total Net Costs | 65175 |
| XII | Yield per hectare in Qtls. | 60 |
| COST OF PRODUCTION PER QUINTAL | | 1086.25 |

For the year 2010-11 the MSP decided by the government was Rs. 1030 for Grade A variety, and it was Rs. 1000 for the common variety. As most of the farmers in West Godavari district cultivated either the MTU 1010 or BPT 5204 varieties which fall under the Common Variety

of rice, they got only around Rs. 1000 for their efforts which meant a loss of approximately Rs. 80-100 per quintal.

Case Study II

A similar estimate for cost of cultivation in Karimnagar for Kharif 2010-11 has also been prepared in the table 4.4 and 4.5.

Table 4.4

ESTIMATED COST OF CULTIVATION FOR PADDY IN KARIMNAGAR

DISTRICT, TELANGANA

(kharif)

| Sr no | Item of Expenditure | Machinery | | | Human Labour | | | Inputs | | | Total cost per acre |
|-------|---|-----------|------|-------------|--------------|-----|-------------|--------|----|-------------|---------------------|
| | | U | R | C | U | R | C | U | R | C | |
| I | Preparation of Land | | | | | | | | | | |
| 1 | Ploughing and land formation | 1 | 1800 | 1800 | | | | | | | 1800 |
| II | Seed & Sowing | | | | | | | | | | |
| 1 | Cost of Seed and Sowing and transplanting | | | | 10 | 150 | 1500 | 50 | 13 | 650 | 2150 |
| III | Manure & Fertilizer | | | | | | | | | | |
| 1 | Chemical Fertilizers | | | | 15 | 150 | 2250 | | | 2000 | 4250 |
| 2 | Farmyard Manure | | | | | | | | | | |
| IV | After Care | | | | | | | | | | |
| 1 | Weeding (thrice) | | | | 15 | 150 | 2250 | | | | 2250 |
| 2 | Plant Protection | | | | 6 | 150 | 900 | | | 1300 | 2200 |
| 3 | Irrigation | | | | | | | | | 200 | 200 |
| 4 | Harvesting | 1 | 1500 | 1500 | | | | | | | 1500 |
| 5 | Cleaning | 1 | 500 | 500 | | | | | | | 500 |
| 6 | Transport to market Yards (tractor) | 1 | 800 | 800 | | | | | | | 800 |
| | Grand Total | | | 4600 | | | 6900 | | | 4150 | 15650 |

U- Unit, R-Rate, C-Cost

Table 4.5

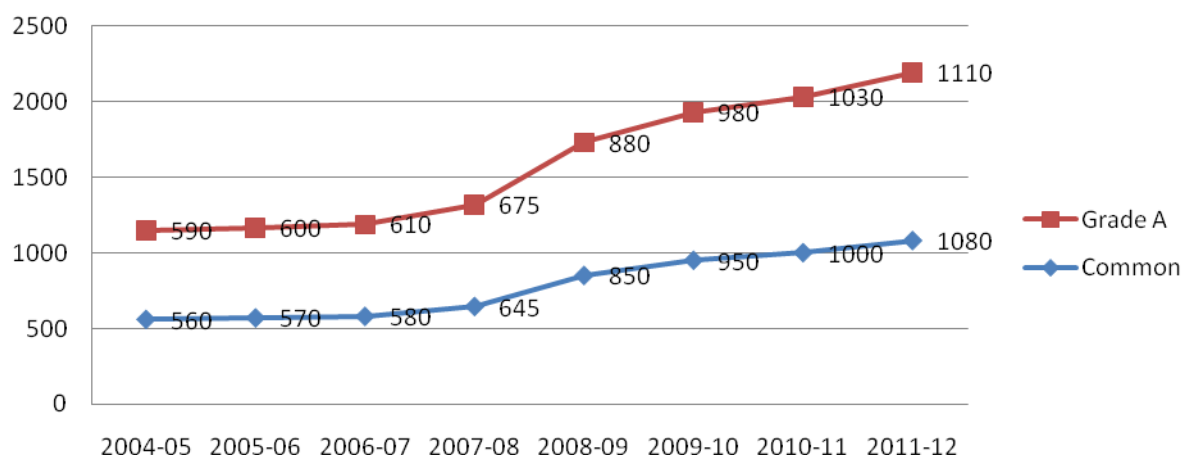
| ESTIMATED COST OF PRODUCTION OF PADDY PER HECTARE DURING 2009-2010 | | |
|---|---|-------------------|
| KHARIF, 2009-10 | | Karimnagar |
| Sr. No. | Item | Rs. |
| I | A1 Cost (Cost of Cultivation) | 39125 |
| II | A2 Cost (A1 plus rent paid for leased land) | 52125 |
| III | B1 Cost (A1 plus interest on value of owned capital assets) | 55625 |
| IV | B2 Cost (B1 plus rented value of owned labour) | 55625 |
| V | C1 Cost (B1 plus imputed value of family labour) | 56625 |
| VI | C2 Cost (B2 plus imputed value of family labour) | 56625 |
| VII | C3 Cost (C2 plus 10% managerial cost on C2) | 62287.5 |
| VIII | Total Cost | 62287.5 |
| IX | Yield of Straw in Quintals | 400 |
| X | Value of Bi- Products @ Rs. 100/- | 4000 |
| XI | Total Net Costs | 62287.5 |
| XII | Yield per hectare in Qtls. | 60 |
| COST OF PRODUCTION PER QUINTAL | | 1038 |

As it can be observed, as against the district of West Godavari, much of the cultivation in Karimnagar is mechanised. Hence, the dependence on labour is relatively less. This also reflects in comparatively lower costs of cultivation. However, the MSP declared by the government for the given year was not sufficient to commensurate the inputs in cultivation process. Besides, the scale of finance declared by the DCCB of Karimnagar was Rs. 12072. The annexure IV and V give similar estimates for the rabi season.

4.3 NATIONAL SCENARIO REGARDS TO COST OF CULTIVATION AND MSP

The Fig 4.1 lays out the trends in the MSP of paddy over the last few years. As the graph clearly indicates the MSP of paddy has been increasing steadily over the past years, however, this is still not sufficient to compromise the farmers for their efforts. The small farmers are the worst affected.

Fig 4.1 YEARWISE MSP of PADDY



MSP for paddy raised by Rs. 80

NEW DELHI, June 10, 2011 Special Correspondent

The Union government on Thursday allowed an increase in the current kharif season and meet the increased demand in case the Food Security Act were to be put in place.

The Cabinet Committee on Economic Affairs fixed the MSP of paddy common at Rs. 1,080 per quintal and of paddy grade A at Rs. 1,110 per quintal, which is an increase of Rs. 80 per quintal over the MSP fixed for 2010-11.

According to sources, the Ministry had proposed an MSP of Rs. 1,160 per quintal for paddy, but the CCEA tempered it in the face of the prevailing high food inflation.

As regards the CACP recommendation for an additional bonus of Rs. 80 per quintal, the CCEA reportedly took the stand that the proposal could be considered later if the export ban on rice continued and there was need to procure more in case the proposed food security law were to be enforced.

Simple arithmetic calculations bring out the fact that farmers lose around Rs. 100-120/ per quintal. The farmers in such a case have reached a condition of diminishing returns from paddy production. They hence have the option of either augmenting incomes through partial crop diversification or abandoning paddy cultivation altogether. The only golden mean out of this situation is to increase the productivity from their lands so as to commensurate the input costs. The table 4.7 depicts the cost of cultivation in the major rice producing states of India.

Table 4.7 COST OF CULTIVATION IN SELECTED STATES OF INDIA

| State | Cost of Cultivation (Rs/Hectare) | | Cost of Production (Rs/ Quintal) | Yield (Quintal/Hectare) |
|----------------|----------------------------------|----------|----------------------------------|-------------------------|
| | A2+FL | C2 | C2 | |
| Andhra Pradesh | 23285.29 | 37443.61 | 638.56 | 55.11 |
| Haryana | 20502.56 | 36005.79 | 676.86 | 52.19 |
| Orissa | 14487.47 | 21713.38 | 599.68 | 32.03 |
| Punjab | 18951.70 | 34781.20 | 505.92 | 68.01 |
| Tamil Nadu | 27148.18 | 37182.96 | 696.79 | 49.36 |
| Uttar Pradesh | 15464.87 | 22301.17 | 600.73 | 35.00 |
| West Bengal | 20043.64 | 28141.88 | 668.34 | 36.70 |

Source: www.dacnet.nic.in (accessed on 27/04/2011)

4.4 ROLE OF INSTITUTIONAL AND GOVERNMENT SUPPORT TO RICE PRODUCTION

Since 1991, the period of New Economic Reforms, farmers were increasingly integrated into the market, leaving them vulnerable to market risks. This took a heavy toll on the farming community plunging the Indian agricultural in a situation of crisis. An assertive role of government initiative and support has become of paramount importance today. The interests of the agricultural sector are protected through various micro and macro- policy initiatives by the government. However, the private agendas of the various political parties, protection and promotion of national interests and directives and policy guidelines from international organizations all work in synchronization to determine the final prices of agricultural commodities.

Government policies with regards to subsidies, irrigation, providing free electricity, credit availability, etc essentially affect the cultivation process in a variety of ways. These government decisions reflect on the final produce and productivity rates from the agricultural sector.

Government Role in Rice Procurement in Andhra Pradesh:

In the case of Andhra Pradesh public market intervention and subsidies have certainly aided the case of rice production and procurement. Andhra Pradesh contributes to roughly 10% of

the total rice production in the country. Water availability through developed irrigation systems has enabled the spread of High Yielding Variety (HYV) seeds. The strong support from the government led to rice production rose from 7 million tons to about 12.5 million tons from 1980-81 to 2000-01, mainly due to a 50% rise in yields during this period.^{xxvii}

Studies indicate that though rice yields in AP are about 45% higher than the national average, cost of production remained comparatively higher in AP than in the Punjab, Uttar Pradesh, and all the eastern states. As a result, profit margins from paddy cultivation are one of the lowest in the country. As the gap between the MSP for rice and C2 costs in Andhra Pradesh is negligible, the paddy cultivators do not benefit much from the MSP.^{xxviii} Nevertheless, Andhra Pradesh accounts for nearly 15-19% of the total rice procurement in the country. Nearly 70% of the marketed surplus in Coastal Andhra and about 35% in the Telangana region is sold to government. It has been noted that it is the assurance of procurement than the MSP which is the stimulator for the farmers to engage in paddy production. Consequently, about 40% of the FCI's storage capacity is located in Andhra Pradesh.

The table 4.8 shows the procurement of rice from the main rice producing districts of Andhra Pradesh

**TABLE 4.8 PROCUREMENT OF RICE FROM THE MAIN RICE
PRODUCING DISTRICTS**

| | West Godavari | East Godavari | Krishna | Karimnagar | Andhra Pradesh |
|---------|---------------|---------------|---------|------------|----------------|
| 2004-05 | | | | | |
| Raw | 854256 | 587825 | 295211 | 25828 | 2635188 |
| Boiled | 32206 | 67215 | 172828 | 158801 | 1254766 |
| Total | 886462 | 655040 | 468039 | 184629 | 3889954 |
| 2005-06 | | | | | |
| Raw | 500205 | 453926 | 309121 | 123742 | 2530839 |
| Boiled | 96346 | 210765 | 269400 | 346044 | 2121719 |
| Total | 596551 | 664691 | 1578521 | 469783 | 4652558 |
| 2006-07 | | | | | |
| Raw | 620940 | 588850 | 369953 | 156277 | 3190311 |
| Boiled | 27957 | 99493 | 159237 | 303806 | 1661121 |
| Total | 648947 | 688343 | 529190 | 460083 | 4851692 |
| 2007-08 | | | | | |
| Raw | 996644 | 962449 | 521780 | 136921 | 4330330 |
| Boiled | 138468 | 395247 | 220154 | 395248 | 2714078 |
| Total | 1135112 | 1357696 | 741934 | 532169 | 7044408 |
| 2008-09 | | | | | |
| Raw | 1156346 | 1073029 | 588891 | 188635 | 5263434 |
| Boiled | 141607 | 446432 | 248685 | 516613 | 3035583 |
| Total | 1297953 | 1519461 | 837576 | 705248 | 8299017 |
| 2009-10 | | | | | |
| Raw | 869434 | 891293 | 589593 | 155914 | 4347287 |
| Boiled | 81128 | 213260 | 118756 | 384115 | 2230083 |
| Total | 950562 | 1104553 | 708349 | 540029 | 6577370 |

Source: Agricultural Statistics at a Glance - Andhra Pradesh, 2009-2010

The contribution of these 4 major rice producing districts was 56.40% of the total state procurement in 2004-05. It fell to 50.22% in 2009-10.

Agricultural prices and public investments

The limited responsiveness of the farmers to increase production and hence supply cannot be discussed without giving due acknowledgment to the role of public investment in promoting production and resolving the problems of financing it. Investments in most of the necessities for agricultural development, namely irrigation, water control and land improvement systems involve indivisibilities and economies of scale. Many of them also lead to the problems of externalities and spill-out effects. Investment in agricultural research cannot be privately appropriated and hence has to be undertaken by the government sector only. Other essential

components of agriculture namely transportation and electrification involve massive capital inputs and social overhead costs which have to be borne by the government sector, merely due to the sheer scale of investment required. These public sector investments relate the tale of the market demands and government willingness in the expansion and upkeep of this sector. However, the weak output effect of agricultural prices reflects either the non-responsiveness of such investment to prices or even a negative response.

In a well-functioning market system, market failures can be remedied by the systematic use of taxes and subsidies which work through the system. In reality, ensuring that socially profitable investments are undertaken is considerably more complex than this. The ease with which such investments can be decentralized through the market is affected by agrarian structure and associated conflicts among private agents and by pervasive market imperfections. Since many of these investments give rise to free rider problems, large transaction costs and disputes over the distribution of their benefits, market solutions will be infeasible or inefficient.^{xxix}

Agricultural prices and input and credit subsidies

Due to low farm incomes, the farmers often demand input and credit subsidies from the government. But weak fiscal capacity to sustain transfers large enough to reduce the income gap and continuing urban demands for low food prices create a policy dilemma, often tilting in favour of the urban, reinstating the ‘urban bias to agriculture’. The opportunity cost of subsidies (which are three times public investments in agriculture in India) is reduced public goods for growth and social services in rural areas. Increasing incomes from agriculture and the rural nonfarm economy must comprise of the overall solution.

An example of input subsidies is seed subsidies. The total seed subsidy given by Andhra Pradesh for 2009-10 is given in table 4.8.

Table 4.9 Seed Subsidy in Andhra Pradesh (for all crops) in 2009-10

| | Seeds Distributed (in lakh qtls) | Subsidy Value (in Crore Rs.) |
|--------|----------------------------------|------------------------------|
| Kharif | 9.34 | 162.20 |
| Rabi | 18.30 | 155.86 |

Source: Andhra Pradesh Socio Economic Survey, 2010-11.

Likewise, the table 4.10 provides a picture for crop loans disbursed for paddy in 2010-11.

Table 4.10 Crop Loan for Paddy in Andhra Pradesh, 2010-11

| | District | Phy. Units | Fin. Assistance |
|----|---------------|------------|-----------------|
| 1. | East Godavari | 4,19,000 | 1,67,600 |
| 2. | West Godavari | 4,50,000 | 1,66,500 |
| 3. | Krishna | 3,15,000 | 94,500 |
| 4. | Karimnagar | 3,45,000 | 1,02,120 |
| | Total | 36,78,312 | 10,86,341 |

Source: State Focus Paper, 2010-11, Andhra Pradesh, NABARD

Similarly, the government also provides subsidies fertilizer subsidies, extension facilities and other public initiative to aid the agricultural productivity and growth. The various schemes launched by the state government for the development of agriculture and to achieve a growth rate of 4% in this sector. However, various implementation problems thwart the success of these schemes.

5 Problems and Prospects of Rice Cultivation in Andhra Pradesh

For the purpose of this study, the two districts chosen for field work and data collection were West Godavari and Karimnagar. As already stated in chapter 1, these districts were chosen mainly because of their gigantic share in the total rice production of the state.

5.1 West Godavari

West Godavari District, as its name indicates, is a part of the Godavari Delta in Andhra Pradesh. It has fertile alluvial soil and has earned the sobriquet ‘the Rice Granary’ of the state. Paddy is the major crop grown in the district occupying 61% of the net sown area. The other major crops grown here are maize, sugarcane, groundnut, etc. It also excels in the production of horticultural crops like mangoes (10910 Ha), coconut (20504 ha), cashew (24633 ha), cocoa (9501 ha), etc.

Out of the total geographical area of 7742 sq.km in the district, 61 % falls under the net sown area (475057 ha). The cropping intensity for the district is as high as 1.53%. The tropical climate and high temperature aids the production of rice crop in the district naturally. The normal rainfall for the district is 1153 mm annually. The district boasts of a well developed irrigation system. The table 5.1 shows the irrigation profile of the district.

Table 5.1 Irrigation Coverage

| Particulars | Area in Ha |
|--|-------------------|
| Total Area available for Irrigation (NIA+ Fallow) | 394946 |
| Irrigation Potential Created | 270989 |
| Net Irrigated Area (total area irrigated atleast once) | 374082 |
| Area irrigated by channels/canals | 363665 |
| Area irrigated by wells | 248558 |
| Area irrigated by tanks | 22725 |
| Area irrigated by other sources | 14715 |
| Gross area irrigated | 651000 |

Source: Potential Linked Credit Plan, 2011-12, West Godavari, NABARD

A majority of the population is engaged in agriculture and allied activities in the district. 57% of the population is directly engaged in agriculture working as farmers and agricultural labourers. However, the number of small and marginal farmers in the district is high, around 90 % of the total cultivators. The average size of the holdings is 2.2 acres, much lesser than the state average of 2.96 acres.

The main cropping patterns followed in paddy cultivation in the district are Paddy-Paddy, Paddy-Paddy – Pulse/Fodder in the wet land areas, paddy-pulse in the irrigated dry lands and paddy-fallow in the rainfed areas.

The table 5.2 gives a profile of the principal crops cultivated in the district.

Table 5.2 Major Crops: Area Production and Yield

| Sr no | Crops | Kharif (ha) | Total prod (in Mts) | Rabi (ha) | Total Yield (Kg/Ha) | Total prod (in Mts) | Total area (Ha) |
|-------|--------------|---------------|---------------------|---------------|---------------------|---------------------|-----------------|
| 1. | Food Crops | | | | | | |
| I | Paddy | 212887 | 689328 | 115690 | 3671 | 516903 | 328577 |
| Ii | Maize | 2213 | 16823 | 44669 | 9041 | 360166 | 46882 |
| Iii | Jowar | 30 | 68 | 542 | - | 2293 | 572 |
| 2. | Pulses | 6071 | - | 200 | - | - | 34079 |
| 3. | Oilseeds | 1354 | - | 10937 | - | - | 12292 |
| 4. | Others | 22851 | - | 31025 | - | - | 53876 |

From the given district profile, it can be comprehended that West Godavari is aided by natural and human resources to be one of the leading rice producers in the state. However, there are veritable gaps in infrastructure and support services. Out of the total seed requirement of 1.25 lakh quintals in the district, the APSSDC supplied only 31,000 qtls, while private dealers supplied 41,560 qtls and the farmers procured 52440 qtls. for themselves under the seed village scheme. The fertilizer use in the district was 2.29 lakh tonnes and 3.06 lakh tonnes in the kharif and Rabi seasons respectively of which the government sources only supplied 50% of the share. Due to the persistent efforts of the department the pesticide use is down to 14 tons only, which is procured through the private dealers entirely.

The agricultural dept. has been promoting the System of Rice Intensification (SRI) in the areas irrigated by wells and tanks. However, the area under SRI cultivation in the district was relatively meagre, predominantly due to assured irrigation systems.

The credit availability to the farmers for cultivation of rice was done at 7% rate of interest up to Rs. 3 lakh per borrower, with a 1% interest rebate for loans repaid within the due date. The banks are encouraging the use of Kisan Credit Cards by the farmers to ensure operational flexibility and smooth credit availability.

5.2 An Assessment of the Cultivation Practices in West Godavari

Given the diversity in the agronomic patterns followed in the cultivation of rice in West Godavari, the field level data collection from farmers include visits to two Mandals in the district with diametrically opposing conditions of cultivation.

Dwarka Tirumala:

Rice cultivation in the villages of Venkatkrishna Puram and Tirumallapuram in Dwarka Tirumala Mandal, an upland area, was mainly done in Kharif season, predominantly relying on wells and rainfall as a source of water supply. The main cropping pattern followed here was Paddy-Cotton, Paddy-Horticulture or Horticulture-Horticulture. The size of the land holding varied from lowest of 2 acres to the highest of 10 acre.

From the ten farmers questioned in the Mandal, 3 farmers (30%) of them had given up rice cultivation moving towards cultivation of horticultural crops and oilseeds. The principal crops, other than rice, are palm-oil, lemons, cocoa, etc. The decreasing profitability of rice farming, the increasing input costs and procurement problems formed a majority of the farmers' grievances. These also formed some of the major reasons for diversification. The rice farmers reported an average yield of 25 bags (1875 Kgs) during the kharif season, which is considerably lower than the district yield.

A sample of 10 farmers cannot effectively be generalised to understand the problems and prospects of cultivation in the Mandal. Despite the given limitations, general observations point towards the potential for increasing rice yields. Most of the farming activities were done using human and bullock labour. This leaves a wide scope for farm mechanisation, to increase productivity and profitability of cultivation. Increasing mechanisations implicitly brings with it the problems of capital formation or financing of the machinery, for which advancing of bank loans to willing and enterprising farmers is suggested. The geographical conditions of the Mandal make it ideal for using SRI cultivation, however, on questioning, the farmers reported of not knowing about the new methods of cultivation.

Many of the farmers reported subsistence farming, rather than viewing rice cultivation as a commercial activity. Of the ten farmers, only four farmers use hired labour for cultivation of rice. The farmers, who produced for sale, reported the problems of low yields cutting into the

profitability of farming. They also reported problems in selling off their produce, traders not delivering the MSP for rice, etc.

The dynamics of rice cultivation process here, hence, leaves a lot of scope for improvement of rice cultivation methods. It is possible to increase productivity and farm incomes through commercialisation of the crop, increased government support, extension facilities and credit facilitating. As the lead bank NABARD certainly has immense role to play in this regards for financing of levelling of the upland areas for cultivation, providing revised scale of financing for farmers adopting SRI process to encourage the farmers in adopting the new methods

Achanta:

Achanta Mandal is situated on the banks of river Godavari and has one of the highest productivity of rice in the districts. The villages visited in this Mandal were Pandita Villuru, Achanta Vemevard and a total sample of 10 farmers was collected. The farm size varied from 2.5 acres of the smallest farmer to 11 acres for the biggest farmer interviewed. The main cropping pattern followed here was paddy-paddy-fallow, paddy-paddy-pulses, paddy-groundnuts, etc. No inter-cropping was done with paddy, except for coconuts being planted on the bunds.

The productivity reported by the farmers in this Mandal was quite high, nearly 2625 kgs in Kharif and 3375 kgs in Rabi. Although the productivity is quite above the state average, the farmers here reported problems about increasing costs of cultivation and diminishing margins from rice cultivation. The main problem plaguing the farmers here were labour problems, deteriorating soil health, spurious seeds and procurement problems. Cultivation in this area is mostly labour based, particularly due to unfeasibility of using machinery in this area due to geographical constrains. The main varieties grown in this region are Swarna (MTU 7029) and MTU 1061 during kharif and MTU 1010 and MTU 1001 for Rabi.

The farmers here need governmental intervention in various forms to ease the difficulties of the farmers and enhance investment and enterprise among them. Investment is needed in innovative machinery to suit the local needs to lower labour dependence and uncertainly, assured off-take of grains. As this was one of the core Green Revolution areas, it has begun to feel the brunt of the ill effects of prolonged and heavy use of fertilizers in excess quantities, usage of pesticides, lowering soil fertility levels and salination. NABARD, hence, has

important role in extending more credit to farmers to take up land development activities and increase returns from rice cultivation.

5.3 Karimnagar

Karimnagar is one of the most progressive districts with respect to rice production in the Telangana region. It is one of the burgeoning rice producing districts in the state. Out of the total geographical area of the state of 11823000 ha, 469786 ha was the net cropped area. The district has a high cropping intensity of 2. Out of this, rice is cultivated in 41% of the gross cropped area in the district.

The table 5.3 gives an estimate of area, production and productivity of rice in Karimnagar from 2006-07 to 2008-09.

Table 5.3: Area, Production and Productivity of Rice

| | 2006-07 | | 2007-08 | | 2008-09 | |
|-------------------------|---------|------|---------|------|---------|------|
| | Kharif | Rabi | Kharif | Rabi | Kharif | Rabi |
| Area ('000ha) | 167 | 167 | 130 | 152 | 160 | 176 |
| Production ('000 tons) | 521 | 549 | 441 | 545 | 543 | 633 |
| Productivity (kg/ha) | 3125 | 3289 | 3391 | 3586 | 3386 | 3605 |

Source: Handbook of Statistics, Karimnagar, 2009

Most of Karimnagar is irrigated by wells and tube wells. The major irrigation project here is Sri Ram Sagar Project, with an ayacut of 166397 ha. The table 5.4 describes the irrigation potential of the district.

Table 5.4 Irrigation Profile (2008-09)

| Particulars | Area in Ha |
|--|-------------------|
| Net Irrigated Area (total area irrigated atleast once) | 392572 |
| Area irrigated by channels/canals | 56720 |
| Area irrigated by wells | 470800 |
| Area irrigated by tanks | 43540 |
| Area irrigated by other sources | 2223 |
| Gross area irrigated | 573283 |

Source: Handbook of Statistics, Karimnagar, 2009

Paddy is generally grown in both kharif and rabi season, under irrigated conditions. The table 5.5 shows the irrigated area under paddy in both kharif and rabi.

Table 5.5 Irrigation for Paddy

| | Kharif | Rabi |
|------------------------|--------|--------|
| Area irrigated (Paddy) | 160406 | 175551 |

Source: Potential Linked Credit Plan, Karimnagar, 2011-12.

Agriculture in the district is done in modern methods using machinery and implements for better productivity and output. Karimnagar is one of the pioneering districts in the production of paddy, maize, cotton, red gram, green gram, groundnut and turmeric. It is also the leader in the country regarding commercial seeds production. The main cropping patterns followed with regards to paddy are Paddy- Paddy, Paddy-Maize, Paddy-Groundnut,

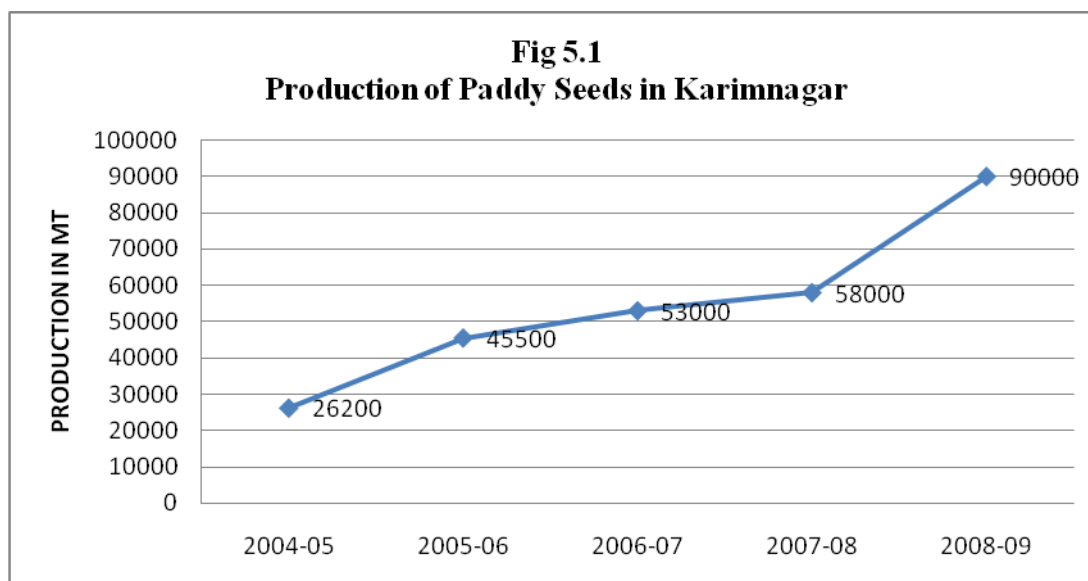
The table 5.6 gives an estimate of the areas under paddy.

Table 5.6 Area under Paddy, yield and Productivity

| Crop | Total Area (Ha) | Under HYVs | Area under Hybrids (Ha) | Total Yield (Kg/Ha) | Total prod (in lakh Mts) |
|--------------|-----------------|---------------|-------------------------|---------------------|--------------------------|
| Paddy | 344762 | 327530 | 17232 | 3749 | 12.92 |

Source: Potential Linked Credit Plan, Karimnagar, 2011-12.

The figure 5.1 gives a picture of the paddy seed production from the district reinstating its role as the biggest producer of seeds, which has grown exponentially in the recent years.

Fig 5.1 Production of Paddy Seeds in Karimnagar

Governmental support in terms of fertilizer subsidies and free electricity supply is another major reason for the increasing production from the district. The per capita energy

consumption for agriculture stands at a high average of 3669 W. The total connected load is 814826 KWh accomodating 306200 connecction, hence a subsidy amounting to Rs 22627 Lakh in 2008-09.

The high levels of mechanised farming have made rice cultivation highly competitive and remunerative than many other regions of the state where cultivation process depends on human labour. 61% of the total population is directly involved in agriculture as cultivators and labourers. The average wage for a male labourer is Rs. 100 for male and Rs. 80 for women.

The total quantity of rice in the regulated markets in Karimnagar stands at 14370971 qtls with a value of Rs. 90592.06 lakh.

The scale of finance as determined by the District level technical committee (DLTC) is given in table 5.7.

Table 5.7 Scale of Finance

| Crop | CADA/Non CADA* | Amount per Acre (Rs) |
|-----------|----------------|----------------------|
| Paddy | CADA | 11000-11,500 |
| Paddy | Non CADA | 11500-12000 |
| SRI Paddy | | 10500-11000 |

*: CADA- Command Area Development Agency

Source: Potential Linked Credit Plan, Karimnagar, 2011-12

5.4 Karimnagar-An assessment of cultivation practices

The two villages visited in Karimnagar were Goopalpur and Durshed in Karimnagar Mandal with a total sample of 20 farmers being interviewed.

The study attempted to incorporate farmers with different land holding sizes, from 20 gunthas to 18 acres. The problems in cultivation varied extensively with the land-holding patterns. From the sample selected, 2 farmers fell in the marginal category (with land holding less than 1 acre size), while 8 farmers had a land holding between 1-2.5 acres. 3 farmers were in the medium size category and 7 were large farmers with holdings above 5 acres of land.

The main varieties cultivated were MTU 1010 and BPT during kharif and MTU 1001 during Rabi. The levels of fertilizer and pesticide use however remain very high in the region, leading to problems in soil health and declining fertility. The productivity of the small

farmers was found to be greater than the small farmers. The small and medium farmers reported an average yield of 25 bags per acre (1875 kgs) while the large framers reported a productivity rate of 20 bags (1500 kgs).

Major problems of most farmers were timely availability of inputs for cultivation. Small farmers complained about non availability of fertilizers and seeds at the appropriate times, and their black marketing. The increasing costs of production formed another reason for concern for the farmers in both the categories. The issue of marketing and selling of the produce poses a threat to the incomes of farmers. Most of the farmers took their produce directly to the market yard for sale, where they face difficulties and long periods of wait and unseasonal rains added to their burdens. It is hence advisable that farmers be given facilities to store their grains or governmental intervention direct procurement from the farms is suggested.

The role of NABARD, as a direct reliever of the predicaments can be brought about in various ways. With regards to credit financing, farmers opting for new methods of cultivation may require bank support along with agricultural extension activities working in synchronization to provide for a single window clearing system for the farmers. Financing for land development activities and farm mechanisation can be encouraged through incentives like relaxations in interest rates, increasing the period of repayment, etc.

6 Conclusions and Observations

6.1 Need for Second Green Revolution

Indian Agriculture has undergone various stages since independence. Technology transfers and public policy have been the prime determinants of growth rate of agriculture. The post liberalization era has seen massive shifts in the terms of trade against agriculture. While production from agriculture has been increasing, Indian farmers are being increasingly marginalised. India has earned the status of a country with large grain reserves with government, highlighting the co-existence of ‘Grain Mountains and hungry millions.’

There is an urgent need for a Second Green Revolution in India. The main focus of such a revolution should be primarily on correction of the negative externalities of the Green Revolution. Dr. Swaminathan stresses the need for an ‘Evergreen Revolution’ in India. The major distinctions in the new revolution are explained in the table 6.1^{xxx}.

Table 6.1 Green Revolution v/s Evergreen Revolution

| GREEN REVOLUTION | EVERGREEN REVOLUTION |
|---|--|
| Commodity-centred increase in productivity. | <ul style="list-style-type: none">• Increasing productivity in perpetuity without associated ecological harm.• Farming system based agronomy. |
| Change in plant architecture, and harvest index. | Organic Agriculture: cultivation without any use of chemical inputs like mineral fertilizers and chemical pesticides. |
| Change in the physiological rhythm – insensitive to environmental concerns. | Green Agriculture: cultivation with the help of integrated pest management, integrated nutrient supply and integrated natural resource management systems. |

Andhra Pradesh, hence, needs a Correctional Revolution to ameliorate the externalities of the Green Revolution. This can be brought about by the combined efforts of the agricultural departments, NABARD and allied banking structures, NGOs and farmers.

6.2 Andhra Rice Production and NFSM

Rice is the most important crop which plays a critical role in the food security status of our country. Concerned with the slow growth in Agriculture and allied sectors, the National

Development Council (NDC) adopted a resolution to launch a NATIONAL FOOD SECURITY MISSION (NFSM) on RICE, WHEAT and PULSES in 2007. Andhra Pradesh is seen as a major source base for procurement given the eminent position it occupies in rice production. The mission seeks to exploit the potential production increases in rice by bridging production gaps. A main feature of the NFSM is that it has focussed on the poor yielding districts of Andhra Pradesh, thus ensuring its capacity building and narrowing the inter-district dichotomies. The main districts chosen for NFSM are Adilabad, Guntur, Khammam, Krishna, Mahabubnagar, Medak, Nalgonda, Nellore, Srikakulam, Vishakhapatnam and Vizianagaram.

6.3 Problems and prospects of rice cultivation in Andhra Pradesh

The Rice Bowl of Andhra is prone to numerous problems of cultivation and agrarian distress. The main problems plaguing these areas have been systematically discussed in Ch. 4 and Ch. 5. Rice cultivators have to face the twin burdens of increasing costs of production and decreasing profitability from rice cultivation. The policy decisions taken at the state and central level have to be cautiously implemented so as to not adversely affect farm incomes and profitability. Central government schemes like National Rural Employment Guarantee Scheme (NREGS) and National Horticultural Mission have direct impacts on the decisions of rice farmers.

The role of rice cultivators has to be redefined so that they comprise the tool of development and also the beneficiaries. It has to be ensured that present agrarian crisis is redeemed to pave way for improved technology, extended credit support, governmental extension services and improved agronomical practices. There is a need to ensure financial inclusion through the banking system. The State has to assume responsibility towards improving the credit absorptive capacity of the farmers and to support the banking system by creating favourable environment for expanding and deepening of financial services. The role of NABARD as a premiere institution in rural banking and development assistor need to be strengthened through increasing the reach of timely credit delivery at appropriate rates of interest, increased assistance to small and marginal farmers at diverse rates of interests, investing in rural technology improvement and put in place a control mechanism for integrating the commercial banks in servicing the rural areas.

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^{xvi} The Ricardian Comparative Advantage Theory postulates that two regions(states in this context), engaged in trade, generate the greatest welfare when each state exports products whose comparative costs are lower at home than abroad and imports goods whose comparative costs are lower abroad than at home. With Reference to this

context, Andhra Pradesh should rather concentrate on increased production of Rice as it has got comparative advantage in its production, than seek to develop products in which it does not have comparative advantage.

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^{xviii} The term entitlements was probably best explained by Amartya Sen, who states in his path breaking book 'Poverty and Famines' that 'entitlements are what one can claim ownership to.' For him 'entitlements' are of 4 basic types which manifest various ownership relations- trade based entitlements, production based entitlements, own labour based entitlements and Inheritance or transfer based entitlements. The concept of 'entitlement' was fundamental in revolutionizing the Measure of Development and Growth through the initiation of the paradigm of Human Development Index, that measures the growth of nations based on the expansion of entitlements of its citizens.

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