

Agricultural Development in Andhra Pradesh

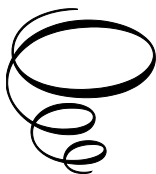
Agricultural Development in Andhra Pradesh:

*Temporal and Regional
Perspectives*

By

A. Amarendra Reddy, A. Suresh
and K. J. S. Satyasai

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FOREWORD

The undivided Andhra Pradesh state was reorganised into Andhra Pradesh and Telangana in the year 2014. As a result, only 13 of the districts of the composite state now constitute the newly formed state of Andhra Pradesh. This book is a result of one of the first attempts to analyse past trends in the agricultural sector across 13 districts of the nascent state and give directions for future agricultural and rural development policy in the state. Some of the districts that pioneered the seed-irrigation-fertiliser technology which ushered in Green Revolution in the country lie in Andhra Pradesh. Subsequently, they formed the rice bowl of the country. The state is also known for its diversity in the production of various horticultural crops. With the onset of the Green Revolution, yield turned out to be the major source of agricultural growth, although diversification towards horticultural crops also played a significant role in it. The recent changes in demand pattern for high value crops like fruits and vegetables, animal products like milk, meat, and fish, and processed agricultural produce, are supposed to be growth engines of future growth of the agricultural sector in the state. Coupled with globalisation of consumer preferences, the state has entered a period of Rainbow Revolution, covering various sub-sectors of agriculture. In the emerging scenario, livestock, fisheries, and the horticultural sector, have a critical role in propelling agricultural growth in the state.

The present book has examined various dimensions of agriculture in detail. This includes the trends in the cropped area, production, and yields, across the districts and the state. The book also identifies and delineates past sources of growth and future growth potential, with the perspective of a national objective of doubling farmers' income. It explicitly analyses the cost side of agricultural production, which aims at increasing cost-competitiveness and enhances total factor productivity of agricultural production.

The Andhra Pradesh state has three zones with specific agro-climatic characteristics. This study analyses the changes in all the three zones, viz., three districts of North Andhra (Srikakulam, Vizianagaram, Visakhapatnam), four districts of Rayalaseema (Kurnool, YSR Kadapa, Anantapur and Chittoor) and six districts of Coastal Andhra (West Godavari, East Godavari, Krishna, Guntur, Prakasham and Nellore). The book highlights

the backwardness of the North Coastal districts of Srikakulam and Vizianagaram in adopting HYV, and recommends special attention be paid to improving infrastructure. The book also underlines certain recent trends, such as the expansion of horticultural crops, and increased number of small ruminants, which underscore the need for differential policy interventions. The study provides several recommendations which would be useful in planning agricultural development strategies for the newly-carved-out Andhra Pradesh state.

Overall, the study is an important addition to the literature on understanding the evolution of the regional development of agriculture and rural development at the regional and district levels, and, hopefully, will stimulate more in-depth studies on rural and agricultural development at regional and sub-national levels.

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PREFACE

Andhra Pradesh is the seventh largest state among 28 states in India, situated in the South-East of the country, covering an area of 0.16 million km². It is the tenth-most populous state in the country, with a population of about 49 million inhabitants. It occupies the 7th position in terms of Gross State Domestic Product (GSDP), with ₹9.33 lakh crore (US\$130 billion), but ranked 16th in terms of GDP per capita, with ₹165,000 (US\$2,400) in the year 2018-19. Andhra Pradesh is one of the fastest growing economies in India, with double digit growth rates in the past few years. The state has also undertaken several institutional and administrative reforms to ease the hurdles in establishing enterprises and to attract capital. Consequently, Andhra Pradesh is ranked by the World Bank, in the year 2018, as the best state, with respect to the ease of doing business in the country.

The state predominantly depends on agriculture, which contributes 34% of GSDP and 55% of employment. The overwhelming dependence on agriculture to support the state's economy and the livelihoods of the people is evident from the fact that the share of agriculture in GSDP and employment in the state is higher than the national average. The state is historically known as the 'rice bowl' of India. However, during the past two decades, there has been a significant shift in consumer demand towards high-value crops (like fruits and vegetables), livestock products (like meat and fish), and processed food products. Hence, there is a need to modernise the agricultural sector by adoption of the latest technology and marketing strategies, to produce competitive products which are highly demanded in global markets. There is also a need for crop diversification, from relatively low-profit paddy fields, to high-value crops like cotton, chillies, fruits, and vegetables. Both the state and central governments are encouraging crop diversification through different schemes, but success has not been up to expectations, and varies significantly among the three regions of Andhra Pradesh, namely Coastal Andhra, Rayalaseema and North Coastal. For example, Coastal Andhra is rich in agricultural productivity with the largest area under canal irrigation, Rayalaseema is drought-prone, without much irrigation, while North Coastal is backward agriculturally, even though it is endowed with good rainfall and natural resources. There was some success in promoting crops like chickpea, cotton, and chillies, due to favourable price trends, coupled with the

adoption of high-yielding varieties and government support systems. Price signals and export opportunities have impacted significantly on crop and enterprise diversification in the state. For example, buoyed by export opportunities, shrimp aquaculture in the state has grown significantly over the years. There is also success in increasing farmer's income, through promoting allied activities like poultry and dairy. However, the spread is uneven across the districts of Andhra Pradesh. The regional diversity could be due to several factors, including the skewed development of infrastructure - including irrigation - transport facilities like rural roads, post-harvest processing facilities, differential access to services like credit and markets, and skills and entrepreneurship development.

Given the huge diversity among the districts in the state, there is a need to critically examine the diversity of the agricultural conditions at district level, to provide implementable policy suggestions for the development of agriculture, keeping in mind the local resource endowment and the agro-ecological situation. Given that the share of small and marginal farmers and tenant farmers in the state is higher than the all-India average, agricultural development policies need to be inclusive of these vulnerable sections of farming community.

This book is the result of an intensive study using district level agricultural development conducted for the Agricultural Commission, Government of Andhra Pradesh. The study covered different facets of agricultural development, at district level, in historical perspective, from the 1960s until 2018, and suggests future directions for developing location-specific strategies. The study presents the evolution of the agricultural sector, at district level, in a lucid form, without compromising the analytical rigour. The authors use both qualitative and quantitative tools to analyse the regional development of Andhra Pradesh state, with historical perspective spanning 50 years. The methodology used in the book can be widely applied to understand the national and sub-national level agricultural development with a regional perspective. The results are robust and lucid for anyone who is interested in agricultural development in Andhra Pradesh state, especially for academicians, economists, agriculturalists, and policymakers at both state and national level. It is also useful for development practitioners who wish to understand the linkages between different aspects of agricultural development at district level.

The study evolved region-specific strategies specially designed to promote farmers' incomes at district level. Farmers' distress is widely reported in several parts of the country, and in Andhra Pradesh. It is a serious concern for the Government, policymakers, and development practitioners alike, as it impinges on the livelihood of the farmers, the

growth of the economy, and the welfare of the society. There are several reasons attributed to the farmers' distress- small-holding size, tenancy, indebtedness, adverse terms of trade, frequent droughts, low investment, slow technological diffusion, and low profitability, etc., to mention a few. In this book, some of these issues are examined in detail, with suggested location-specific and feasible policy options. The book also deals with policies related to the promotion of public and private investments in agriculture, conditions for technology diffusion, crop diversification towards high value crops, wider penetration of agricultural finance and crop insurance, promotion of meat, milk, and fisheries sectors, and strategies for inclusive and location-specific programmes for inclusive growth. These findings can be replicable and scaled-out to other states and nations, under similar situations of agro-ecology and socio-economic conditions. We hope that the book will be useful to a wide range of stakeholders, including policymakers, economists, academicians, students, and bureaucrats, who are interested in agricultural development and policy.

The Authors

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The Authors

LIST OF ABBREVIATIONS

ANBC	Adjusted Net Bank Credit
AP	Andhra Pradesh
APGVB	Andhra Pradesh Grameena Vikas Bank
ATM	Automatic Teller Machine
BC	Banking Correspondent
BM	Bank Mitra
CACP	Commission for Agricultural Costs and Prices
CAGR	Compound Annual Growth Rate
CB	Commercial Bank
CCCS	Comprehensive Cost of Cultivation Scheme
C-D	Credit-Deposit
CESS	Centre for Economic and Social Studies
CGGB	Chaitanya Godavari Grameena Bank
CI	Cropping Intensity
CIFT	Central Institute of Fisheries Technology
CRIDA	Central Research Institute for Dry Land Agriculture
CV	Coefficient of Variation
DCCB	District Cooperative Credit Bank
DES	Directorate of Economics and Statistics
DLMC	District Level Monitoring Committee
FPC	Farmer Producer Companies
FPO	Farmer Producer Organisations
GCA	Gross Cropped Area
GDDP	Gross District Domestic Product
GSDP	Gross State Domestic Product
Ha	Hectares
HYV	High Yielding Varieties

IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICSSR	Indian Council of Social Science Research
IoI	Incidence of Indebtedness
JLG	Joint Liability Groups
KCC	Kisan Credit Cards
LEC	Loan Eligibility Cards
MFI	Micro Financing Institutions
NABARD	National Bank for Agriculture and Rural Development
NCA	Net Cropped Area
NHM	National Horticultural Mission
NSSO	National Sample Survey Office
PACS	Primary Agricultural Credit Societies
PMFBY	Prime Minister Fasal Bima Yojana
RBI	Reserve Bank of India
RIDF	Rural Infrastructure Development Fund
RRB	Regional Rural Bank
SGB	Sapthagiri Grameena Bank
SHGs	Self Help Groups
SLBC	State Level Bankers Committee
SLCCCI	State Level Co-ordination Committee on Crop Insurance
TE	Triennium Ending
TFP	Total Factor Productivity
VoP	Value of Production
WPI	Wholesale Price Index

CHAPTER 1

INTRODUCTION

1. Background and Objectives

The undivided Andhra Pradesh state was reorganised into Andhra Pradesh and Telangana in the year 2014. As a result, only 13 of the districts of the composite state now constitute the newly formed state of Andhra Pradesh (denoted as AP). The present study analyses the structural changes and trends in the agricultural sector of the 13 districts until 2014. The analysis points to the direction in which efforts should be made in the newly carved-out state to further the progress of its economy and agricultural sector. Within Andhra Pradesh lie the districts that pioneered seed-irrigation-fertiliser technology, which ushered in the Green Revolution in the country. They formed the rice bowl of the country. The state is also known for its diversity in the production of various horticultural crops. With the onset of the Green Revolution, yield turned out to be the major source of agricultural growth, although crop diversification towards horticultural crops (now, horticulture accounts for 40% of the total value of agricultural production) also played a significant role in agricultural growth. The recent structural changes, witnessed in the demand pattern for agricultural commodities, with an increase in the demand for high-value crops such as horticultural crops like fruits and vegetables, animal products like milk and meat, and also for fish, could also act as a trigger for agricultural growth. Thus, the horticulture and livestock sectors could also be important in accelerating agricultural growth. Hence, the status of both these sectors is also analysed here, to provide a holistic picture of the agricultural sector. In that respect, the present study is advancement on the earlier studies which covered only major food crops. The specific objectives of the study are:

- a. To portray the trends in domestic product across sectors and sub-sectors of Andhra Pradesh, and of its districts;

- b. To bring out the trends in the cropped areas across the districts;
- c. To analyse the trends in the area, value of production, and yield of different crops at state level, and across its principal regions and districts;
- d. To decompose the sources of agricultural growth across crops at state level;
- e. To delineate trends in input use, and infrastructure development across the districts;
- f. To arrive at crop-specific costs and returns for the Andhra Pradesh's farm sector; and
- g. To estimate the total factor productivity for different crops across the regions of the state.

2. Methodology

Growth rates of output and inputs

The data employed in the study was collected from various statistical publications of the government. Mainly, season and crop reports of the Directorate of Economics and Statistics, and Statistical Abstract of Government of Andhra Pradesh have been used. The data analysis covers the period from 1963/65 to 2011/13. In order to even out sharp variations, triennial averages were used in the analysis. The data was analysed covering the triennial averages 1963/65 (pre-Green Revolution), 1971/73 (onset of the Green Revolution), 1981/83 (spread of the Green Revolution), 1991/1993 (maturing Green Revolution), 2001/03 (initial phase of liberalisation), and 2011/13 (post-liberalisation). The year 2013-14 was also included to give the status of agriculture on the eve of the formation of the new state. Unlike earlier studies (Bhalla and Singh 2012), this study covers all the crops, including cereals, pulses, oilseeds, fibre, spices, fruits and vegetables, fodder, and green manure crops, accounting for about 70% of the value of output. Recently, there is rapid growth in the area under fruits, vegetables, oil palm, spices, and other high value crops in the newly formed state. It is projected that the future growth of these crops will be higher than that of the traditional crops. Hence, it is necessary to pool the data on fruits, vegetables, and other high value crops, to cover the entire agriculture sector, as is done in this study.

The Andhra Pradesh state has three zones with specific agro-climatic characteristics. Therefore, this study analyses the changes in the three zones, viz., three districts of North Andhra (Srikakulam, Vizianagaram, Visakhapatnam), four districts of Rayalaseema (Kurnool, YSR Kadapa,

Anantapur and Chittoor), and six districts of Coastal Andhra (West Godavari, East Godavari, Krishna, Guntur, Prakasham and Nellore). All 13 districts were considered while analysing area, value of production, value productivity, and yield. However, data for some of the inputs were aggregated and presented for 12 districts. The data pertaining to the districts of Vizianagaram and Prakasham were apportioned to their parent districts (Vizianagaram into Srikakulam, and Visakhapatnam and Prakasham into Guntur, Kurnool, and Nellore), to facilitate comparison. The analysis was carried out comparing the triennium averages to minimise errors in the data and to counter yearly fluctuations in the selected variables. The trend growth rates/compound annual growth (CAGRs) were calculated to compare changes over the triennium averages. The value of production was calculated using constant prices (wholesale prices) of the year 2012-13. The change in value of production between two periods was decomposed into area, yield, and cropping pattern effects.

Decomposition of agricultural growth

Crop-specific value of production (VoP) was decomposed using the following formula. Here VoP is the value of production at constant prices in the year 2012-13; A is area; Y is yield; Δ represents change between two periods.

$$\Delta \text{VoP} = \Delta A \cdot Y + \Delta Y \cdot A + \Delta A \cdot \Delta Y$$

Total change in value of production = pure area effect + pure yield effect + mixed effect

In this method of decomposition, if area and yield increased, it would imply a positive mixed effect, and the pure yield effect must be smaller than the yield effect, as suggested by the Venegas - Ruttan (V-R) method. We used the Minhas-Vaidyanathan (M-V) method to decompose total change in the VoP of the crop sector between two periods into the area; effect, yield effect, cropping pattern effect, and interaction of change in cropping pattern and yield effects, at the state level. Minhas and Vaidyanathan (1965) employ a decomposition technique to analyse aggregate crop output growth by component elements. A group of crops was considered, and the growth of total crop output was decomposed into the contribution of (a) change in area, (b) change in yield, (c) change in cropping pattern, and (d) interaction between changes in cropping pattern and yield. Area effect shows the magnitude of the output increase that

would have taken place if there were no change in yield and cropping pattern. The yield effect is the effect of change in yield for a constant cropping pattern. The change in cropping pattern represents the effect of change in cropping pattern in the absence of any change in yield. Interaction term reflects the output change attributable to interaction between changes in yields and cropping pattern. The interaction term is essentially in the nature of a balancing entry. With this decomposition method, the relative importance of each element can be ascertained.

Costs and returns, and total factor productivity growth

In addition to the district level data, unit level data of the cost of cultivation scheme from the year 2000 to 2010 was used to estimate the region-wide profitability and total factor productivity (TFP) growth of major crops. The TFP growth indicates that part of the growth not accounted for by the inputs. We have calculated the index numbers of output, input, and TFP, by using the Tornqvist Index, using TFIPI software (Coelli et al. 2005). The cost concepts, as propounded by the Commission for Agricultural Costs and Prices (CACP) (cost A2 plus family labour and cost C2) were used for arriving at profitability across different farm-size groups.

3. Data limitations

We have put every effort into collecting all the relevant published data from 1963-64 to 2013-14. However, the data have some limitations. While calculating VoP, main product alone was considered, and the value of by-products was not included. Another limitation was that the data on most of the fruits and vegetables (especially production and yields) was not available until late 1997. Wherever possible, we have imputed the yields based on the state average yields, district average yield of other fruits (mainly banana) for which data was available from 1963-65. In the case of vegetables, the full series data was available for onion, for each district. Wherever production data was not available, the area under each crop was multiplied with the imputed yield to calculate it. Since imputations were done only for the crops for which data was not available, and for minor crops with little area, the magnitude of error of estimation could not be large. Since we have covered almost all crops (crops covered under both crop-cutting experiments and other methods) there may be slight variation in estimates of production, especially for crops not included in the crop-cutting experiments. However, the use of three-year average figures may

increase the confidence level in these estimates. The estimates are, nevertheless, likely to lack statistical validity. Despite the above limitations, the study shows how the crop sector evolved in Andhra Pradesh since 1965, and acts as a piece of information for policy with reasonable accuracy. Note that there is a general improvement in the data quality from 1993 onwards. Hence, the data relating to TE 1993, TE 2003, and TE 2013 are more reliable and useful for policy purposes.

4. Choice of years

To study the changing structure of agricultural development and growth at district level, the triennium averages of area and output of crops have been considered for the early years of the 1960s, 1970s, 1980s, 1990s, 2000s, and 2010s. While the first triennium, 1963/65, represents the picture prevailing before the introduction of Green Revolution technology during the second half of the 1960s, the triennium 1971/73 captures the starting phase of seed-fertilizer-irrigation technology in irrigated districts like Krishna, and East and West Godavari districts. The third triennium, 1981/83, represents the further extension of new technology to rice, and its spread from irrigated districts to other districts. The triennium of 1991/93 captures the results of the maturing Green Revolution. By the early 1990s, the new technology had spread to other crops, mainly oilseeds, sorghum, and maize. The data for 2001/03 capture the impact of economic reforms and related changes in the agriculture sector, besides crop diversification towards high value crops. This period saw a decline in public investment in agriculture in the state, as well as at national level. The growth rate of agriculture decelerated during 1991/93 to 2001/03, compared with the immediate pre-reform period 1981/83 to 1991/93, both at state and district level. However, during 2003/13 there was faster growth, mainly driven by new technology, such as wider adoption of Bt cotton. During this period, there was an increase in the minimum support prices for pulses and oilseeds, which facilitated the spread of short duration chickpea and other high value crops. The relatively good monsoon during this period also contributed to the growth story. However, the third period also saw large instability in international prices for agricultural commodities, transmitting to the domestic economy. These years also witnessed greater instability in output and income, leading to widespread distress in some parts of the state.

5. Prices

In most of the analysis of growth performance, the basic data sources are the indices of agricultural prices constructed by the DES, Ministry of Agriculture. The present series of index numbers are at constant prices for the triennium ending 2004-05. While constructing the index numbers at state and district level, we have used the prices of the year 2012-13.

6. Main findings and policy implications

1. In the past decade (2005 to 2014), growth of GSDP was 7.1% per annum, with agricultural and allied sector growth at 4.2%, growth of service sector at 8.8%, and industry at 6.6%. In the year 2014-15, the share of the agricultural sector in GSDP was 23%, while the share of services was 56%, and the remaining 21% was contributed by industry. The crop sector contributed only 11.4% of GSDP, followed by livestock (5.5%), fisheries (5.4%), and forestry (1%). The cropped area was almost stagnant after the 1960s, however, the value of agricultural production increased from 15.8 thousand crore to 47.8 thousand crore between 1965 and 2013. The value of production per hectare increased from Rs.19,973 to Rs.61,915 between 1965 and 2013. There was a significant expansion in the use of fertilizers, pump sets, and tractors, in all the districts.
2. The area under high yielding varieties reached saturation in commercial crops like maize and cotton, yet some districts are lagging in the adoption of high yielding varieties of paddy, sorghum, and groundnut.
3. Of the total increase in VoP in agriculture in the state since the 1960s, yield contributed 80%. The remaining 20% was contributed by cropping pattern change, and the interaction of cropping pattern and yield.
4. The increase in areas under fruits, vegetables, chickpea, and cotton, also contributed to agricultural growth.
5. The three northern districts of Andhra Pradesh (Srikakulam, Vizianagaram, and Visakhapatnam) deserve special attention. There is a need to improve infrastructure, including irrigation, and to develop input and output markets. In these districts, there is also a need to strengthen agricultural research and extension, to take advantage of soil, rainwater, and climatic conditions.
6. In the four Rayalaseema districts (Anantapur, YSR Kadapa, Kurnool, and Chittoor), availability of water is a main constraint. To eliminate

the water constraint, there is a need to propagate micro-irrigation and introduce the effective implementation and development of watershed programmes. Early completion of the ongoing irrigation projects is required, with special attention paid to the development of location-specific agriculture.

7. Encouragement to diversify towards high value crops, like fruits, vegetables, palm oil, chillies, and other spices, to increase the VoP to maximise profitability per hectare, is necessary.
8. Pulses (especially gram, urad, and moong) and oilseeds (sunflower) have the potential to increase farmers' income under rain-fed conditions, especially in rice fallows.
9. There is a need to introduce special schemes for the wider adoption of high yielding varieties of groundnut in the districts of Rayalaseema.
10. Srikakulam, Vizianagaram, and Visakhapatnam districts are lagging in the adoption of HYVs and other inputs. Hence, special emphasis is required, and incentives must be provided to increase modern input use to enhance crop yields.
11. The analysis has indicated that horticultural growth is significant in improving farm productivity. The growth in value productivity is faster in horticulture compared to field crops. Therefore, with a view to enhancing farm income, the horticultural sector needs to be paid more attention.
12. There is high growth of small ruminants, particularly sheep, in the state. The momentum acquired by the state with respect to livestock growth needs to be continued. The farmers need to be provided with adequate credit facilities to start new livestock enterprises.
13. Conservation of natural resources is critical for the rapid growth of Andhra Pradesh's agriculture. Moisture availability is the most critical factor that determines the variation in farm productivity. Therefore, every effort should be made to promote water conservation. A watershed approach needs to be promoted earnestly.
14. Irrigation development in the state is spearheaded by well irrigation. Excessive construction of wells is leading to unsustainability. Resource-poor farmers fail in the scenario of competitive deepening of wells, which is capital-intensive. This is leading to issues of inequality in accessing irrigation water. Therefore, cultivation of water-intensive crops in those regions with severe limitation of water needs to be discouraged. Appropriate regional crop planning, taking into consideration the resource constraints, is the need of the hour.
15. Micro-irrigation helps to use irrigation water more efficiently. Given the high priority accorded by the central government in the promotion

of drip and sprinkler irrigation, the state needs to accord top priority in popularising it. This would help in the growth of the horticulture sector as well.

16. The availability of quality inputs, notably seeds and fertiliser at appropriate times, is critical in ensuring agricultural growth in the state. Therefore, steps need to be taken to promote timely availability of inputs to the farmers.
17. In the context of climate variability, often resulting in drought conditions, farmers need to be provided with adequate crop insurance. The experience suggests that the absence of timely disbursement of insurance claims discourages farmers from its adoption. Therefore, the existing insurance schemes need to be made farmer-friendly, and tuned to the requirements of the farmers.