"Would you tell me, please, which way I ought to walk from here? That depends a good deal on where you want to get to."

---LEWIS CARROLL
2.1 INTRODUCTION

In a rather fundamental sense, agricultural progress is normally a prerequisite for industrial development. This is clearly the case in a closed economy where one of the most important pre-conditions of industrial expansion is the achievement of a rate of increase in agricultural productivity which exceeds the concurrent rate of increase in the demand for food. Rising agricultural productivity supports and sustains industrial development in several important ways. First, it permits agriculture to release part of its labour force for industrial employment while meeting the increasing food needs of the non-agricultural sector. Second, it raises agricultural incomes thereby creating the rural purchasing power needed to buy the new industrial goods and rural savings which may then be mobilized by direct or indirect means to finance industrial development. Finally, it enables agriculture to supply the major wage-good (food) of industrial workers at a price favourable to the profitability of new industry.¹

The first type of contribution of agriculture to economic growth of a nation is that constituted by growth of product within the sector itself. An increase in the net output of agriculture, in and of itself, represents a rise in the product of the country since the latter is the sum of the increase in the

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net products of the several sectors. This may be called the product contribution.

The third type of contribution by a sector to economic growth occurs when there is a transfer or loan of resources from one sector to others. Thus, if agriculture itself grows it makes a product contribution: if it trades with others, it renders a market contribution; if it transfers resources to other sectors, these resources being productive factors, it makes a factor contribution.2

According to Samuelson and Solow "If agriculture stagnates it will act as a break on industrial expansion and halt real growth".3 William Nicholls subscribes to this opinion of Samuelson and Solow and says, "The existence of substantial agricultural surplus is a pre-condition for industrial development".4 The literature on agricultural development and its determinants is quite extensive and it is very difficult if not impossible to undertake a comprehensive survey of the same. In what follows we propose to make a selective review of literature to provide a basis for our empirical investigation.

STUDIES ON AGRICULTURAL DEVELOPMENT IN GENERAL

2.2 WORLD DEVELOPMENT REPORT 1986

World Development Report5 deals with agriculture and economic growth in the context of developing countries. It
explains government policies that affect the national economy as a whole - for example, policies on exchange rates, trade regimes or government spending - influence the performance of the agricultural sectors. Within a country and throughout the interdependent economies of the world better policies are needed to improve the allocation of resources and raise real incomes. In agriculture using resources more efficiently would involve removing both the policy induced bias that generally discriminate against production and trade in developing countries and excessive subsidies that generate over production in industrial countries. In the wider economy, better resource allocation policies are needed to help developing countries adjust to changing external circumstances - a process which is essential for growth and to correct certain deep seated problems that have constrained economic growth in industrial countries.

The Report explores the connection between government policy and agriculture and emphasises the interdependence of agricultural policies in different parts of the world. Public policies in both developing and industrial countries greatly influence the growth of agriculture and of rural incomes. This influence often extends far beyond national frontiers. What is perhaps most surprising is the fact that it is the developing world which, on the whole, discriminates against its farmers,
eventhough they account for large shares of gross domestic product and export earnings. And it is the industrial countries which provide subsidies to agricultural production, eventhough, their farmers account for small shares of GDP and employment. The Report examines the potential gains to the world economy from removing these distortions and concludes with a discussion of the priorities for reform.

2.3 THE STATE OF FOOD AND AGRICULTURE : 1993

"The State of Food and Agriculture" 6 is FAO's annual report on recent developments affecting world agriculture. Included this year are facts and figures on the global agricultural situation, an analysis of the economic environment surrounding agriculture, an appraisal of the sector's future prospects; and a report on regional trends and policy developments as well as selected country performances.

The developing country review examines Ethiopia, Bangladesh, Sri Lanka, Mexico, Egypt and the Syrian Arab Republic. The developed country review reports on changes in policies in the OECD countries, particularly the EEC, the United States and Japan; and on Eastern and Central Europe, focussing on the Russian Federation, Bulgaria and Romania. Specific issues reviewed are food access and nutrition; the decline in agricultural commodity prices and exporter's earnings; forestry
in transitional economies; high sea fishing and coastal fisheries; and bio technology in agriculture.

The special chapter, water policies and agriculture, examines the problems behind agricultural development and water availability and use, assessing policy options for surface and ground water management.

2.4 AGRICULTURAL GROWTH RATES

Dayal\textsuperscript{7} analyses the progress of agricultural output in different countries of the world over a decade or so. He calculates the growth rates of agricultural output during the period 52-53 and 62-63 for about 60 countries all over the world by fitting the semi-log least square trend. No attempt has, however, been made to give the reasons for inter-country differentials to growth rates. For a limited number of countries, the rates of growth of crops have been broken down into components, namely, those due to changes in farm land surface, double cropping changes in crop yields and improvements in the cropping pattern of the 57 countries. Four countries (Israel, Sudan, Mexico and Yugoslavia) had exceptionally "high" growth rates of more than 5 per cent per annum, Israel topping the list. Nine countries had "high" growth rates between 3.5 and 5 per cent. At the other end, nine countries had "very low" growth rates of below 1 per cent - three of them (Sweden, Algeria
and Uruguay) show even negative growth rates and eight countries had "low" growth rates of between 1 and 2 per cent. The remaining twenty seven countries having necessary data had an average growth rate varying between 2 and 3.5 per cent.

2.5 ECONOMICS OF GREEN REVOLUTION IN PAKISTAN

Khan\(^8\) examines the adoption of biological hydrological chemical technology and its income and employment effects found that the benefits from the Green Revolution have been unequally distributed between large and small farmers. While testing the hypothesis of widening/narrowing of income disparities between the large and small farms and between the progressive and backward areas, he established that these benefits have been considerably greater in the progressive district and the disparity between small and large farms is greater in the more backward areas.

2.6 AGRICULTURAL DEVELOPMENT IN THIRD WORLD

Eicher and Staatz\(^9\) explore different views about what has been learnt theoretically and empirically about the agricultural development processes since the early 1970

The overview by the editors of the volume on "Agricultural development ideas in historical perspectives" captures succinctly the evolution of thought leading to the recognition of primacy of
agriculture in the early stages of development. A distinctive contribution of this text of readings is the inclusion of two articles, one of political economy of rural development and the other on land reforms. Both these are written from the perspective of dependence theory and provide a meaningful and refreshing critique of the neo-classical and Schultzian models of agricultural development with considerable clarity.

The inclusion of articles on development experience of China and Africa in the concluding part of the text is thoughtful since Africa's inability to feed itself and vast amount of unused land and record levels of foreign aid presents a contrast to the impressive achievements of the People's Republic of China in agriculture and overall development.

2.7 ASIAN RICE IRRIGATION

James K. Boyce has surveyed the technological and institutional alternatives in Asian Rice Irrigation with a view to explaining the wide variations in the pace and character of irrigation development in the region. In much of Asian rice agriculture, irrigation acts as the 'leading input' or finding technological constraint upon increases in land productivity. Yet the pace of irrigation development in the region has been very uneven, with the percentage of net sown area irrigated ranging from only 3 per cent in Kampuchea to 76 per cent in Japan. At
the same time the character of irrigation development varies in a number of dimensions including scale, relative factor intensity, institutional arrangements and the degree of 'farmer controlledness' in addition to the usual hydrological and engineering criteria. Various factors may help explain these variations.

First, much of Asian rice irrigation requires action above the level of the individual farm and thus lies in the large intermediate terrain between the extremes of pure private goods and pure public goods. This intermediate terrain is inhospitable to the elegant but fragile axioms of conventional economic theory. The pursuit of individual self interest cannot be assumed to promote the public interest, the invisible hand loses its grip. Conflicts between individual and collective rationality are a common feature of irrigation development and Asian societies differ considerably in the success with which they have resolved them.

Second, the determinants of irrigation development considered population pressure, geography, agrarian structure, cultural factors, and the role of state are not independent variables, much less mutually exclusive ones. It is not the case that there are simply several causal factors at work, if all variables were quantifiable and measurable via a multiple regression procedure. Rather, the various determinants are
themselves interrelated; population pressure affects the agrarian structure, cultural factors affect the role of the State and vice-versa and so on. Moreover the relationship between these determinants and irrigation is not unilinear since irrigation in turn may profoundly influence each of them.

Finally, the process of technological change is not always smooth or elastic with respect to population pressure as evidenced by the underdevelopment of irrigation in much of contemporaty south and south-east Asia. The foregoing analysis suggests such underdevelopment is not accidental, but rather is the outcome of particular constellation of factors. In such a situation, it may be tempting to search for a magic wand of government policy which can at a stroke, surmount conflicts of individual interests and ensure efficient outcomes. Thus Wittfogel's vision of the oriental despotism of ancient times is reborn in the modern, technocratic version of irrigation development, in which rights and responsibilities are clearly demarcated by an impartial efficiency maximising state. The relative importance of bureaucratic versus market allocative mechanisms is here a secondary issue, what defines the technocratic approach is not its choice of instruments for social engineering, but rather its assumption as to who will make such choice and direct the development process. A comparative
analysis of Asian rice irrigation underscores the limitations of this version, and portents to the potential merits of alternative strategies based upon the democratisation of control over water resources.

2.8 ECONOMIC DEVELOPMENT IN THE THIRD WORLD

Michael Todaro's work draws our attention to several interesting facts and characteristics. As the 1980s draw to a close and the last decade of the 20th century ends the economies of many third world nations are in a precarious state uncertainty and economic turbulence permeate the global financial community. The great economic upheavals of the 1980s severe global recession, and a collapse in international commodity prices are a worsening. Third world debt crisis, and a steady erosion of living standards throughout much of sub-Saharan Africa and Latin America - present an enormous challenge for the world economy of the 1990s. While there has been a number of notable success cases, particularly in the newly industrializing countries around the Pacific Rim, for the majority of nations development efforts in the 1980s were put on hold.

These and other factors have combined to generate a sense of pessimism and sometimes even despair about the prospects for rapid economic and social development in the next decade. The global economic expansion of the 1960s and 1970s that enabled
many Third World Nations to record significant advances in their economic aggregates was not repeated in the 1980s and appears unlikely to be repeated in the 1990s. The implications for improving the material conditions of the world's poor - major theme of this book - are not very positive.

Turning to the literature on economic development, the 1980s also witnessed a significant shift in emphasis (primarily among some western economists and International development agencies like the World Bank) towards a more "free market" approach to development problems. The literature of the 1970s had emphasized issues of poverty and distribution within the context of a growing world economies that of the 1980s seemed to turn once again toward growth and efficiency within the context of a slower growing world economy. And yet within the Third World itself there were still calls for a restructuring of the domestic and international economies so that the many hundreds of millions of people struggling to survive can preserve some hope that their situation might change. These calls have assumed a new urgency. If any thing, the major problems of Third World Development identified and analyzed in previous editions of this book—poverty, inequality, unemployment, rural neglect, population increase, over urbanization, trade imbalances, public and private sector inefficiencies and so forth—have intensified.
2.9 TECHNOLOGICAL CHANGE

Hanumantha Rao\textsuperscript{12} has discussed the emerging pattern of income distribution in the process of agricultural growth in India which is characterized by technological changes such as the use of HYV of seeds, tractorization. The study reveals that technological changes as such, have contributed to the widening of income disparities between (i) different regions (ii) small and large farmers, and (iii) land owners on the one hand and tenants and agricultural labourers on the other. In absolute terms, however, the gains from technological change have been shared by all sections. He suggests that the biggest prospect for increasing output and generating employment in the next two to three decades (with wider application of known technology such as HYV of seeds and fertilizers) for improving the distribution of income horizontally as well as vertically lies in the public investment in irrigation and the exploitation of ground water.

2.10 SOURCE OF VARIATION IN AGRICULTURAL PRODUCTIVITY

Sudhin\textsuperscript{13} has reached the conclusion that the sources of variation in agricultural productivity were explained by the differences in the level of input use, region and the temporal situation. It was observed that 41.0 per cent of the variation
in output was explained by measured inputs. The decomposing of the large residuals into two components i.e., regional effects and temporal effects revealed that 95.0 per cent of the variations of the total disturbances were attributed to the region effects.

2.11 REGIONAL VARIATIONS IN PRODUCTIVITY

Raheja et al.\textsuperscript{14} have studied the regional variations in adoption of high yielding varieties and their productivity with the help of 'Sample surveys for assessment of high yielding varieties programme' during 1973-74 covering 88 districts spread over 15 states of the country, examining two major cereals viz., rice and wheat. For rice crop, it was observed that the extent of adoption of HYV in different regions had no direct bearing on their yield rate, but owing to lack of assured water supply and resource endowments of the cultivators, the regional variations were more marked compared to wheat.

2.12 GROWTH RATES IN AGRICULTURE

Rath\textsuperscript{15} examines the performance of agricultural production in India for a period of two and half decades i.e., from 55 to 78. He opined that his study will help to know the underlying factors responsible for such performance, and might permit broad judgement about the overall performance possibilities in the near
future. The exponential trends are worked out for the index numbers (with ending 69-70 as the base) of overall yield and output of major crops in India for the period 49-50 to 77-78. Attention was paid to infer growth rates in detail for the period 55-56 to 77-78 excluding the years 49-50 to 54-55. The entire period of 23 years from 55-56 to 77-78 has been divided into two from 55-56 to 63-65, and from 64-65 to 77-78 and treated the former and latter periods as pre and post Green Revolution periods respectively. According to him, the total agricultural production of India grew at an average rate of 2.48 per cent per annum during 55-56 to 77-78, if only peak years are considered, it is 2.59 per cent. The rate of growth was 2.95 per cent during the ten years ending with 64-65 to 77-78 (after dropping a few abnormal years).

2.13 REGIONAL IMBALANCES IN AGRICULTURE PRODUCTIVITY

Shafi16 has made an analysis in order to determine the relationship amongst a number of factors which may cause spatial variations in agricultural productivity. A series of nine independent input variables were selected viz., (i) area irrigated by canals (ii) irrigation by tube wells (iii) irrigation by other sources (iv) area under HYV (v) fertilizer consumption (vi) agricultural workers (per thousand hectares) (vii) animal power (viii) tractor power, and (ix) agricultural credit advanced
With the help of standard techniques, he constructed the productivity index for wheat crop as dependent variable. He fitted an equation of multiple regression to study the impact of the nine independent variables on productivity variation.

2.14 AGRICULTURAL DEVELOPMENT IN INDIA

Giriappa et al.\textsuperscript{17} analyse the value added in agriculture, the impact of new technology on agriculture and trends in crop pattern, area, production and yield of principal crops and the pattern of distribution of land between 1970-71 and 1976-77. The study notes that agroclimate is a major factor in crop yield variation and modern inputs have had mixed impact on the latter. Among the crops, the value-added by sugarcane was one of the highest per hectare, being Rs.4178 during 1962-65 and Rs.5142 during 1970-73, followed by tobacco, jute, rice, groundnut and wheat. The growth rate in food grains production which was estimated at 3 per cent per annum during 1950-53 to 1974-77 declined to 2.84 per cent during 1974-75 to 1981-82. Though the rate of growth is at more or less constant the rate of growth in yield has shown a decline from 1.9 to 1.74 per annum in the second period. The study concludes that owing to limited extension of modern inputs the growth of Indian agriculture is constrained. It suggests the need for speedily evolving and diffusing an alternative system of development so as to break the
productivity bottlenecks and to modernise the production process.

2.15 INSTABILITY IN FOODGRAIN PRODUCTION

Mahandra Dev\(^1\) studied the growth and instability in foodgrain production for the period 1960-61 to 1984-85 for 17 major states. The trends in instability was measured by a moving period approach. The factors causing to inter-state variations in growth and instability were closely analysed. For this, the entire period was divided into two sub-periods viz., pre-Green Revolution period (1960-61 to 1969-70) and Green Revolution period (1970-71 to 1985-86).

The growth rates differ from state to state for the period 1970-71 to 1984-85. Growth rate around 6 per cent was experienced in the states of Maharastra and Punjab. It exceeded 3 per cent in Uttar Pradesh, Haryana and Andhra Pradesh and in as many as twelve states it was less than 2.5 per cent. The growth rate was negative in Kerala and Tamil Nadu. For the entire period (1960-61 to 1984-85), the range of instability varied from 7.4 per cent in Kerala to as high as 32.2 per cent in Gujarat. The standard deviation was more than 20 per cent in five more states viz., Rajasthan, Maharashtra, Bihar, Orissa and Madhya Pradesh. It was around 20 per cent in three states viz., Haryana, Karnataka and Tamil Nadu. On the other hand, Kerala, Punjab, Assam, Andhra Pradesh and Jammu and Kashmir recorded less than 15 per cent standard deviation. Low rainfall and/or low
irrigated states registered relatively higher magnitude of instability than the other states.

Employing a moving period approach on a three year basis, the author reached the conclusion that instability varied from a high declining trend in Punjab to high increasing trend in Tamil Nadu. Seven states witnessed a declining trend while five states had rising trend. In others, there was an insignificant upward trend.

The author arrives at the conclusion that no positive association between growth and instability was clearly discernible. As compared to 60s, the growth rates have slowed down in 70s. Rainfall was the major contributory factor responsible for production variability. The states which have assured irrigation facilities showed relatively lower instability. The inter-state variations in growth and instability are said to be due to the variations in quality and quantity of irrigation.

2.16 INDIAN AGRICULTURAL DEVELOPMENT

Dantwala,19 with his incisive analytical insights and deeper understanding of the Indian agriculture, provides a balanced assessment of the strategy adopted since Independence and its consistency with the avowed objectives of the nation. He finds that "Agricultural strategy adopted by the policy makers was
concerned more with growth of production and marketable surplus than with the equity aspect of development".

On "Agrarian Structure and Agrarian Relations" Dantwala pleads for a more pragmatic approach to the problem. Analysing the NSS and agricultural census data he concludes that since the available surplus (land) will be inadequate and its distribution cannot conceivably reduce inequality significantly, other ways and means should be explored for reducing inequality. The most sensible way is to make the meagre assets (and skills) of the poor more productive. This would involve both positive and preventive action. The preventive action refers to plugging all openings through which the poor are exploited in security of tenure, moneylending, trade and bonded labour. But in the absence of alternatives available to the poor, such preventive action will not be very effective.

2.17 PATTERN LAND OWNERSHIP AND BACKWARDNESS

Kripa Shankar has made an attempt to examine not only the distribution of land and other assets among various size-group of farmers, but also the nature of relationship between the size farm, on one hand and intensity of land use, investment, farm productivity, marketed surplus as well as utilisation of surplus, on the other. The main findings of the study may be summarised as follows:
The patterns of distribution of land and other assets were highly skewed which had a negative impact on farm productivity. The intensities of cropping and input use were relatively higher on marginal and small farms and consequently there was an inverse relationship between farm size and productivity. "There was not much marked difference in the pattern of investments among the different categories of cultivators:. But, "marketed surplus increased with an increase in the size of holdings". However, a large part of the surplus that was generated by the rich farmers was being utilised by them in un-productive activities, like usury, purchase of jewellery and wasteful expenditures on marriage, death ceremony, etc.. Besides, "the increase in income that has resulted from initial gain in productivity and the avenues that it has opened by way of deriving interest income through usury and other rentier income make them indifferent to further raising the productivity of land".

Thus, unless there is radical redistribution of land or imposition of heavy taxation on the rural rich, various physical, financial and human resources are likely to remain underutilised thereby allowing for the persistent existence of poverty and backwardness.
2.18 RELATIVE PRICES AND MARKETED SURPLUS

Dharm Narain's pathbreaking impact of price movements on areas under selected crops in India, 1900-1939, was published in 1965. He investigates the empirical evidence for the 'perverse responses' of Indian farmers to economic stimuli and demolished widely held beliefs about the irrationality of the Indian farmer. In his later work he focussed on the response of marketed surpluses in agriculture to change in relative price, and to the related question of using the terms of trade between agricultural and non-agricultural products as an instrument of resources mobilisation form agriculture. The first evidence of this was theoretical paper published in 1957 (chapter 2), followed a few years later by a careful empirical investigation into the distribution of marketed surpluses (chapter 3), his later papers (chapter 4-6) draw on the empirical findings of this study.

In the 1970s Dharm Narain's attention turned to the study of agricultural growth and productivity. His analysis of the constraints faced by efforts to expand the production of rice (chapter 7) is highly relevant even today. Chapters 8-10 focus on the response within Indian agriculture to advance in seed-cum-fertilizer technology.

In the last essay (chapter 11), he considered distributional factors in the investigation of growth, and stressed the need for
encouraging labour intensive techniques as well as the importance of improved access to resources by small and marginal farmers.

2.19 POLITICAL ECONOMY OF INDIAN AGRICULTURE

Ashok Rudra's book is a re-incarnation of his earlier volume 'Indian Agricultural Economics - myths and Realities' published in 1982. It is a re-incarnation and not a revision because while in some parts the text is the same with only some additional improvements, some other parts of the earlier book have been totally dropped and some new parts have been added.

As can be seen, the contents of the present volume are all concerned with the political economic aspects of Indian agriculture which justifies the title that has been chosen for this volume.

The arrangement of the parts in the present volume is more logical than in the previous volume and may be briefly explained. In part I a large number of theoretical problems about the functioning of the agrarian economy which have received a great deal of attention from economists in the country are dealt with. In part II the growth strategy of the Green Revolution and the welfare and sub-strategy are appended.

In part III descriptive and theoretical accounts of the institutions of wage labour and tenancy are presented. The place of these institutions in a mode of production framework for
Indian agriculture is dealt with as also the vexed question of whether to characterise Indian agriculture which differs substantially from the treatment that has commonly been made of this problem.

In part IV some results of researches to which he attaches a great deal of importance are presented. He claims that his results amount to certain discoveries about the way in which the agricultural economy of our country functions. These matters are rarely found in the literature.

2.20 YIELD LEVELS AND THEIR VARIABILITY

Joshi et al.\textsuperscript{23} have examined the changes in yields and their spatial variability over a period of time. The study is restricted to four major food crops viz., rice, wheat, jowar, and bajra. Coefficient of variation around trend line was used to measure the rate of instability.

The all-India mean yields of wheat showed higher growth associated with lower instability since mid 60's. The study identified certain states as best practice states for specific crops. For instance, Punjab for wheat and Tamil Nadu and Punjab for rice. However, rice yields variability increased over time across states. Slow growth in the adoption of the yield enhancing technologies for the coarse grains is mainly due to the competition from more lucrative crops. It is evident from the
analysis that higher growth is associated with higher fluctuations in the post 1965-66 period. The fluctuations in wheat have narrowed as against the widening variability in case of rice. In Punjab and Haryana, the wheat yields rose rapidly and inter-state yield differences have narrowed to some extent. Commercial crops replaced other traditional crops to a great extent, as the area under traditional crops experience competition from commercial crops.

AREA SPECIFIC STUDIES

2.21 REGIONAL VARIATIONS IN AGRICULTURAL DEVELOPMENT

Dandekar in the light of the papers submitted at the seminar on "Regional Variations in Agricultural Development and Productivity", has drawn the conclusion that the extent of irrigation and use of fertilizers might explain a good part of the existing variations in agricultural productivity. Besides these technological factors, the institutional factors such as land tenure and agricultural credit were deemed relevant determinants.

2.22 REGIONAL VARIATIONS IN EASTERN AND WESTERN U.P

Dhondyal has measured variations in agricultural development and productivity by selecting three representative districts from three regions of the Uttar Pradesh while assessing
the role of credit, intensive crop enterprises and the influence of irrigation water during 1962-63. He concluded that the capacity and willingness to borrow money for productive use is an important factor in accounting for regional differences in agricultural growth.

2.23 VARIATIONS IN AGRICULTURAL OUTPUT IN A.P.

Gopalakrishna and Rao, while studying the degree of variations in the value of agricultural output per acre and output per head in Andhra Pradesh, attempted a district-wise study to account for the causes of variations during 1959-60. The functional relationship between the value of output per acre and associated variables viz., percentage of irrigated area and percentage of area under foodgrains and fodder were studied. They have reached the conclusion that among the two input variables irrigation ought to be judged as an important factor affecting the value of output per acre, whose 't' value is significant at 5 per cent level and it is not significant with respect to the other variable.

2.24 INCOME, SAVING AND INVESTMENT IN PUNJAB AGRICULTURE

Sharma reports that the pattern of savings and investments in the Punjab irrigation structure formed the major investments in small holdings during the period 1966-67 to 1969-70 because they give high priority for increasing the intensity
of cropping and better water management to increase the output. On the medium holding, the emphasis shifted to the purchase and improvement of lands, and on large holdings, investment in farm machinery accounted for a large proportion of farm investment. It was pointed out that in other areas also, the first preference of the farmers was to reinvest the additional income in agriculture for production purposes. The second preference was for education. The third was for repairs to buildings. The fourth preference was investment for financial assets. The bank deposits were given a very low priority by the farmers.

2.25 REGIONAL VARIATIONS IN RICE PRODUCTION

Venkata Reddy studied the growth rates of rice with the linear equation $y = a + bx$ for Andhra pradesh state and its three regions for the period 1956-57 to 1970-71. He concluded that the favourable institutional factors, favourable adjustments of economic factors and application of science and technology are the important aspects influencing productivity. Very poor per cent of the area under improved seeds, poor fertilizers consumption, floods and lack of assured irrigation are the main reasons for low agricultural productivity in Rayalaseema and Telangana regions.

Linear growth rates of area, production and productivity of rice were 1.45, 2.61 and 1.01 per cent in Rayalaseema region.
during the period 1956-57 to 1970-71. This region leads the other two regions in respect of the growth rate of the area. In the case of production and productivity, the growth rates in Rayalaseema region are better than Coastal Andhra but lower than Telangana. Productivity growth was at a lower rate during the Green Revolution period than that of pre-Green Revolution period in all the three regions of Andhra Pradesh and also state as a whole.

Productivity contribution to rice output was higher during the pre-Green Revolution period while area contribution was a major factor for higher rice output during the Green Revolution period.

The co-efficient of variation (C.V) for area, output and yield was higher during the pre-green Revolution period than the Green Revolution period (7.71 vs 5.86, 21.53 vs 19.46 and 16.89 vs 11.67).

2.26 INTER-DISTRICT VARIATIONS IN PUNJAB AGRICULTURE

Johar, and Raikhy,29 have examined the factors accounting for inter-district variations in agricultural productivity in Punjab. They concluded that more than 70 per cent of the variations in productivity is explained by variations in the levels of irrigation, fertilizer consumption and high yielding varieties use.
Mahender Reddy analyzes district-wise and region-wise growth rates of area, yield and output of foodgrains and one commercial crop namely, groundnut in Andhra Pradesh. The main objective is to see whether the growth rate during post Green Revolution period 65-81 is significantly different from the pre-Green Revolution period 56-64.

Secondly, the study estimated whether the extent of fluctuations had increased or decreased after Green Revolution in Andhra Pradesh and in its three regions.

Thirdly, the study also attempts to find out whether there has been any reduction in the yield since the formation of the state. According to his study food production has increased from an average annual output of 6.35 million tonnes during 56-61 to 9.32 million tonnes during five year period covering 76-81. During this period the share of Andhra Pradesh in All India Production of Foodgrains has declined from 8.58 per cent to 7.65 per cent. Growth of output of foodgrains and total agricultural output in Andhra Pradesh was not commensurate with the growth of inputs. Fertilizer consumption in Andhra Pradesh is near the top in All India Fertilizer consumption, accounting for about twelve per cent of All India Fertilizer Consumption. The wells
nergised, power consumption tractors and credit disbursed have also increased more than ten fold during the quarter century.

2.28 ECONOMICS OF TRACTORISATION

Mander and Grewal's book used multiple regression analysis in estimating the contribution of various inputs: land, human labour, manures and fertilisers, irrigation, expenditure on tractor, and expenditure on other capital assets to agricultural output in tractor, and expenditure on other capital assets to agricultural output in tractor and non tractor farms and tested the significance of regression coefficients of various inputs and coefficient of multiple determination by t-tests at 0.1 level. The purpose of the analysis was to evaluate the rationale of resource use. The use of resources other than tractor was found to be rational. The investment on tractor was economically justified only on farms of 20 acres and above.

2.29 GROWTH, STABILITY AND EQUITY IN THE AGRARIAN SECTOR

Parthsarathi examines the trends in the Agrarian Economy of Andhra Pradesh and shows that despite the declining contribution of agriculture and altered sectors to the state income, the agrarian sector continues to be dominant. There has been hardly any decline in the dependence on agriculture in percentage terms. In absolute terms, in the two decades between
1961 and 1981, agriculture had to support an addition of 57 lakh workers. With a declining share of agriculture in the total state income together with a constant share in the total population, per capita income from agriculture tended to show a decline relative to per capita income in the non-agricultural sector. The ratio of per capita income in the agricultural sector to the corresponding income in the non-agricultural sector at constant prices in 1970-71 showed a continuous decline over the decade from 0.76 in 1960-61 to 0.42. A comparison of the ratios at constant and current prices show that the relative decline of the per capita incomes within the agricultural sector is more due to growing dependence on agriculture in the context of poor rates of growth rather than due to deterioration in terms of agriculture. What is disturbing is that in absolute terms per capita income from agriculture shows a decline in 1980-81 as compared to 1960-61 at 1970-71 prices. Even taking the best year in the early 1980s, i.e., 1981-82 per capita income within the agrarian sector showed hardly an increase of six per cent as compared to 1960-61. It is against such a background that issues of growth, stability and equity in the agrarian sector will be the dominant concerns of research and policy for years to come.

2.30 AGRICULTURAL DEVELOPMENT IN HIMACHAL PRADESH

Swarup and Sikker used exponential equation for
calculating compound growth rates of area under cultivation, production and productivity for important crops keeping 1966-67 as the base year in order to assess trends in area, production and productivity.

The agricultural production is determined by three factors, viz., area, yield and cropping pattern. In order to determine the relative contribution of each component total production an additive model was used for this component analysis.

2.31 VARIATIONS IN AGRICULTURAL OUTPUT

Narender et al.34 analysed the spatio-temporal variations in agricultural output in Andhra Pradesh and factors that had influenced growth during the period 1956 to 1981. The entire period was divided into four sub-periods, i.e., 1956-59 to 1962-65, 1962-65 to 1966-69, 1966-69 to 1972-75 and 1972-75 to 1978-81. The computations were done for the overall period using modified version of 'Decomposition Model' as developed by Minhas and Vaidyanathan (1965) and modified by Sharma (1975). Constant price weights were assigned to different crops which accounted for 90 per cent of the total cropped area.

The compound annual growth rate for Andhra Pradesh was 10.4 per cent for overall period. The growth rate was highest (14.57 per cent) during the second period (1962-65 to 1966-69), which subsequently declined to 4.79 per cent during third period and to
1.39 per cent during last period. Growth rate for the overall period was 10.4 per cent.

Regarding component contribution, area had negative contribution in all the periods, excepting the first sub-period. Even during the overall period area contributed negatively (-21.25 per cent). Yield contribution amounted to 73.81 per cent during the first period, 88.87 in the second period, 107.45 in the third period and 60.96 in the fourth. During the overall period, the yield contribution was 63.32 per cent. Cropping pattern too contributed significantly along with the yield. Growth of yield overtook the growth in area in a big way in Andhra Pradesh. High output growth rate was attributed to the cultivation of high value crops like sugarcane, chillies, groundnut, cotton and tobacco.

2.32 LEVELS OF AGRICULTURAL PRODUCTION IN VISHAKAPATNAM DISTRICT

Ramana et al. analyse two factors influencing the levels of yields of different crops and show differences in yields among the villages in Zone I and Zone II. Thus the analysis underlines the importance of strong infrastructural support for the spread of HYVs and adoption of the dry farming techniques in agriculture.

Popularisation and dissemination of knowledge about water management techniques which are area specific and culture
specific are urgently needed. Many of the farmers have expressed the view that the assistance from the extension agencies is inadequate and unsatisfactory. Government has to take up effective steps in this regard both qualitatively and quantitatively.

There is an urgent need of tapping ground water resources by the government and making it a responsibility of the government to provide water to fields just like municipalities are made responsible for providing water facilities to the urban population and urban enterprises. Government has to sponsor agro-based industries and make the enterprises relating to dairy, piggery, poultry as economically viable for the farm households.

The institutional aspect of the study viz., credit suggests the need for orienting rural institutions to the specific requirements of small, marginal farmers even in situations where technical and environmental condition favour the adoption of new techniques of agricultural production to improve the yield levels. The role of Grameena Bank is commended by the cultivators.

The requirements of growth with equity demand orientation of institutional credit agencies to the needs of small and marginal farmers to make the potential linkages between agricultural growth and non-agricultural growth more effective through policies promoting overall rural development.
REFERENCES


