In the recent times, modernisation of agriculture, development of irrigation and improvements made in socio-economic conditions have brought out a radical change in the scenario of agriculture in Andhra Pradesh. In the process of transformation of agriculture, the vital aspect which is to be looked very seriously is the level of agricultural productivity. In the studies of geography of agriculture, a study on the measurement of agricultural productivity is the most fascinating and pragmatic theme from the point of population explosion, decreasing man-land ratio and increasing demand for food resources. And also, the measurement of agricultural productivity is
considered to be the most important indicator to discern and describe the degree of development of people and areas where agriculture forms the crux of the regional economy.

In Andhra Pradesh where agriculture is the most predominant primary economic activity of the people, the measurement of agricultural productivity is of great significance to locate the areas of dynamism, transition and static nature in terms of agricultural performance. A study on agricultural productivity will certainly bring to lime light the regional disparities in agricultural development and also identify the agriculturally weaker areas. Ultimately, this type of study is one to guide and aid towards the applied aspects and work on the policies and strategies of agricultural planning. In view of profound practical significance, the present study on "Changing Patterns of Crop Productivity Levels and Regional Disparities in Andhra Pradesh" is designed and attempted here. It is hoped that this diagnostic study will help to evolve both prophylactic and curative measures ultimately to improve the agricultural economy of the State.

The present study region, Andhra Pradesh has diversified physico-socio-economic conditions to produce diversified landuse, cropping and crop productivity
patterns. It is obvious that the economy of Andhra Pradesh is agricultural and the cornerstone of its economic development lies in the development of agricultural economy. It is the only State in India where three important rivers flowing to build two major deltas (the Godavari and the Krishna) and one crypto delta (the Pennar). Among the four southern States, Andhra Pradesh is the only State which produces a surplus food off setting or making good of deficit food production in the other three States and forming itself as a buffer zone. The State has an enormous agricultural potential for developing a prosperous and opulent agriculture.

Objectives of the Study

In terms of agricultural productivity certain areas of Andhra Pradesh are quite prosperous while some other areas are deplorably poor. It is essential to make an attempt to identify the agriculturally weaker areas and find out the regional disparities in the per hectare output of crops and aggregate agricultural productivity levels. Such a study helps to gain insights into the problems and prospects of crop productivity levels and provides the basis for future planning and development.

In the present study, the spatio-temporal analysis of crop productivity is made at district level
for two points of time namely, 1971-74 and 1991-94.
The changing trends and growth rates are examined for
a period of 35 years.

**Geographical Profile of Andhra Pradesh**

Andhra Pradesh is one of the States located in
southern part of the country. With a geographical area
of 2,75,045 sq.km and a total population of 63,54,559,
it occupied fifth position in both the aspects in the
country. On the basis of physico-socio-economic condi­
tions and politico-historical antecedents, the State is
divided into three regions namely, the coastal plain,
Rayalaseema and Telangana. Administratively, it is
divided into 23 districts and 1104 mandals.

Agriculturally, the coastal plain is well suit­
able with vast plains, fertile alluvial soils, high rain­
fall and abundant water facilities. The plateau region
consists of Telangana and Rayalaseema formed with a long
belt of old peneplains which suffers with poor red soil
cover, low rainfall with frequent occurrences of drought
and scanty irrigation facilities. About one-third of the
geographical area of the State and one-fourth of its
population come under the shadow of drought.

The population density of the State is 240 persons
per sq.km. Higher densities of population are found in
Irrigation: Irrigation plays a dominant role in the modernisation of agriculture. Obviously the regional differences in the development irrigation will vividly bring out regional disparities in the levels of output of crops. In the country, Andhra Pradesh is the second largest State in the hectarage of canal irrigation. Within the State, canal irrigation is the predominant type of irrigation which accounted for 44.2 per cent of the total irrigated area in the State followed by well irrigation with 38.1 per cent and tank irrigation with 14 per cent. It is worthwhile to mention that the Coastal plain is very significant for canal irrigation while the plateau region is known for the development of well and tank irrigations. In the process of development of irrigation, canal irrigation in the river basin areas and well irrigation in the non-canal irrigated areas have achieved higher priority in their spatial spread. Paradoxically, the importance of tank irrigation has been reduced in all over the State and it is evident
from the fact that the proportion of tank irrigation has decreased from 29 per cent in 1973-74 to 14 per cent in 1993-94.

The overall intensity of irrigation by all sources is calculated to 40 per cent to total cropped area in the State. High intensity of irrigation is found in the canal irrigated areas of coastal plain, northern Telangana districts and Chittoor district in Rayalaseema. Low intensities of irrigation are found in western part of the State. The intensity of irrigation has increased from 31.4 per cent in 1973-74 to 40 per cent in 1993-94. The increase in the intensity of irrigation is noticed in all the districts except Anantapur.

Landuse Pattern: The optimum utilisation of land resource and land management is of paramount important in fulfilling the dual objectives of economic and ecological development. In Andhra Pradesh the major landuse type is net area sown (37.7%) followed by forest cover (22.7%), current fallow land (10.4%), area under non-agricultural area (9%), barren land (7.6%), other fallow land (5.7%), culturable wasteland (2.8%), pasture land (2.8%), and land under miscellaneous tree crops (0.9%).

High proportion of net area sown is noticed in the Coastal plains and in western Rayalaseema region.
Between 1973-74 and 1993-94 the proportion of net area sown has decreased by 4.7 per cent which is mainly due to late arrival and failure of monsoons during the agricultural year 1993-94.

The distribution of forest cover is highly uneven in the State. The highest proportion of forest cover is found in Khammam district (47%), while the lowest in Nalgonda (6%). Higher concentrations of forest cover are noticed in northern portion of the State as well as in the Eastern Ghats portion. The concentration of forest cover has decreased by 0.3 per cent and it is more pronounced in the dense forest cover areas of northern Telangana.

The presence of significant fallow cover is found in western part of the State where rainfed farming is more significant. The proportion of current fallow land has increased by 3.9 per cent which is highly pronounced in the districts of Telangana region. The failure of the monsoon has caused for the increase of current fallow land in the rain-fed farming areas of the State.

The area under non-agricultural use is found extensive in coastal districts because of dense distribution of settlements, networks, irrigation projects and industrial establishments. The proportion of this land
use type has increased by 1.5 per cent. Many of the coastal districts are found with a significant proportion of increase in the area under non-agricultural use.

**Intensity of Cropping**: The ratio between gross area sown and net area sown is termed as intensity of cropping. In 1993-94 the intensity of cropping in the State accounted for 122.4 per cent. The coastal region has registered with the highest intensity of cropping (139.8%) followed by Telangana (115.1%), and Rayalaseema (109.1%). The high intensity of irrigation in the coastal region made the farming more intensive. The intensity of cropping has increased by 8.7 per cent.

**Crop Regions**: The crop regions are identified on the basis of relative ranking of crops i.e., first ranking crops, second ranking crops and third ranking crops. This type of study brings out the relative dominance of different crops in order of their importance. The study of crop regionalisation has revealed that there are 3 primary crop regions and 9 secondary and tertiary crop regions each in the State. Among the primary crop regions, paddy cultivation showed its overwhelming spatial dominance followed by groundnut and jowar. In the case of secondary and tertiary crop regions, both foodgrain and commercial crops were involved in making crop regions. On the whole
paddy, groundnut, pulses and grams and jowar are the major wide-spread crops involved in forming contiguous crop regions in the State. By all means i.e., as a first or second or third rank crop, paddy is grown in 20 districts and it is followed by pulses and grams in 12 districts, groundnut in 11 districts and jowar in 5 districts. In general, the regional character of agriculture is primarily foodgrain oriented and oilseed production is secondary.

**Crop Combinations** : The crop combinations are identified on the basis of Doi's method. In 1993-94, the crop combination for the State as a whole is paddy-groundnut-pulses-other food crops-jowar. At regional level, three-crop combination type (paddy, pulses and other odd crops) is identified in Coastal Andhra and two-crop combination (groundnut and paddy) type in Rayalaseema. While in Telangana, the crop combination is highly diversified found with six crops (paddy, jowar, pulses, cotton, groundnut and other food crops).

It is found that the cropping pattern is getting more specialised in Rayalaseema and coastal regions. Paddy in combination with pulses cultivation made the crop farming more specialised and stabilised in the deltaic areas and other canal irrigated areas. The increasing commercial nature and well suitability of groundnut farming
to semi-arid conditions made the groundnut farming more specialised in association with paddy and pulses in Rayalaseema region. Contrasting to this, the recent developments made in irrigation in most of Telangana region made the cropping pattern into more diversified with the cultivation of both foodgrain and commercial crops. It is interesting to state that in the process of crop transformation and competition existed between foodgrain and commercial crops, some of the inferior foodgrains especially the millets have lost their importance and gradually getting eliminated from the cropping patterns. In contrast to this, the high remunerative and commercial value crops like paddy, oilseeds, sugarcane, pulses, cotton and maize have been consolidating their spatial spread. The dynamic feature of the cropping pattern of the State is the shift from subsistence-foodgrain oriented crops to commercial oriented crops. As the process of change in cropping pattern is progressed, a greater degree of uniformity, stability and sustainability are brought about in the crop-based agricultural economy of the State.

Changing Spatial Pattern of Crop Yield Levels

In the process of transformation of agriculture, the present policy of modernisation of agriculture is to
be great extent linked up with the increase of per hectare output of several crops on one hand and on the other removal of disparity in productivity levels between the crops and between the areas. A study of this type i.e., changing spatial patterns, growth rates and trends in the yield levels of crops and the yield gaps between the areas and the crops helps to identify the low productivity crops and agriculturally the weaker. Such a study provides a rational basis for future strategy in evolving agricultural policy for minimising the regional disparities in agricultural development. The analysis of changing spatial patterns, growth rates and trends in the per hectare yield levels, area and production of 23 crops cultivating in the State has revealed the following conclusions:

1. Among the foodgrain crops paddy, maize, blackgram, redgram, greengram and bengalgram have gained a significant spatial spread due to intensive cultivation, higher per hectare returns and more market value of these crops. In contrast to this, all the millet crops and inferior gram crops have been losing their spatial ground and also identity in the cropping pattern of the State. Some of the inferior millets have been gradually eliminating from the cropping pattern in the process crop transformation. The reasons for the dwindling trend of these crops may perhaps be due to declining preference as chief foodgrains in the diet of the people of Andhra Pradesh and also heavy
2. Among the commercial crops groundnut, cotton, chillies and sugarcane have achieved better performances and extended their spatial extent very significantly. The increasing commercial value of these crops, feasibility of market, high per hectare monetary returns and mostly the suitability of these crops to both irrigated and unirrigated areas and low rainfall zones have effectively and combinedly prompted the farmers to go for commercial nature of farming.

3. All the crops except sugarcane have registered an increase in the per hectare yield levels but in varied proportions.

4. All the irrigated and intensive cultivated crops like paddy, sugarcane, tobacco, cotton, blackgram, ragi, maize, bengalgram and groundnut crops are found with higher yield patterns than other millets and gram crops.

5. An impressive progress and encouraging per hectare yield levels are brought in some of the important crops like paddy, cotton, maize, tobacco, chillies, jowar and bengalgram.

6. The strategy of Green Revolution has led to the emergence of paddy cultivation and put it in a univalled place in the practices and performances of agriculture in the State. The new-seed technology has also brought some significant positive changes in the performance of cotton, groundnut, maize, chillies, tobacco and sugarcane crops. All the rainfed crops
were also witnessed with some positive progress in their per hectare yield levels, however, these crops are heavily suffering from striking fluctuations and disturbances.

7. The changing trend of the per hectare yield level of irrigated crops is found as dynamic, healthy, stable and developed in nature while the changing trend of per hectare yield of rainfed crops is though positive and dynamic but not healthy, stable and developed.

8. Out of the three regions, the Coastal Andhra is found with high yield patterns, growth rates and healthy dynamic trends with little fluctuations in many of the crops. In contrast to this, Telangana region is found with low per hectare yield levels of many crops but with high growth rates and positive trends. A significant progress has been made in the improvement of per hectare yields from very poor to low and to moderate and high levels. However, the dynamic trends of the per hectare yields of many crops in Telangana region have been suffering from disturbances which reveals the unhealthy and instability in agricultural development. Though the Rayalaseema region found with low to moderate yield levels but suffering greatly with yearly fluctuations.

9. In general, the inter-district and inter-regional disparities in the spatial distribution of the per hectare yields of many crops are high but however in declining trend. The inter-district variations in yield levels are less significant in the case of irrigated crops, while the variations are profound in the rainfed crops.
Patterns and Prospects of Agricultural Productivity

The aggregate agricultural productivity is measured in terms of money-values coefficients for which the production of 24 crops are chosen. On the basis of per hectare monetary output, five productivity patterns are established. Pattern of high and very high agricultural productivity is found in central and southern coastal plains as well as Chittoor district in Rayalaseema. Spatially, this one formed into a large contiguous productivity region which is the most prosperous and dynamic in terms of agricultural development. A moderate agricultural productivity pattern is noticed in Nizamabad, Karimnagar, Warangal and Khammam districts of northern Telangana region. The recent developments made in irrigation brought about a radical change in agriculture transforming from traditional subsistence to modern semi-commercial nature of farming in this region. Low and very low agricultural productivity patterns are found in 11 districts, of them, three districts (Srikakulam, Vizianagaram and Visakhapatnam) are located in north Coastal Andhra, three districts (Kurnool, Cuddapah and Anantapur) in Rayalaseema and five districts (Mahabubnagar, Ranga Reddy, Adilabad, Nalgonda and Medak) are located in Telangana. It may be stated that these areas are
considered as agriculturally backward and weaker areas. Here, the environmental factors are still to be considered as barrier to agricultural development.

The average per hectare agricultural output has increased from ₹. 4687/- in 1971-74 to ₹. 8647/- in 1991-94 and thus showing a net increase of ₹. 3960/-. An increase in per hectare agricultural output is registered in all districts of the State. However, the maximum increase is found in Coastal Andhra followed by Telangana and Rayalaseema regions. Obviously, the modernisation of agriculture has brought about a radical changes in the improvement of productivity levels in all over the State, but particularly in the districts of Coastal Andhra and other irrigated districts of northern Telangana and eastern Rayalaseema. Paradoxically, still there are many areas in the plateau region suffering with low productivity levels. Here, several decades' efforts have not been made any permanent and sustainable measures to overcome the drought impacts on agriculture. As a result, the disparities in productivity levels have further accentuated and created an unhealthy agricultural atmosphere in western part of the State.
Conclusion

At the outset, it may be stated that the State of Andhra Pradesh has made an impressive progress in agricultural development. However, it is a truism that the development made in agriculture is not uniform either in all the areas or in all the crops. The strategy of Green Revolution and modernisation of agriculture have brought about a radical changes in the practices and performances of agriculture but created a wide-gap in the productivity levels between irrigated and unirrigated crops and also in between wet farming and dry farming areas. As a result, the yield levels of irrigated crops are high and the growth rates in their yield levels are healthy, progressive and well dynamic. In contrast to this, the yield levels of many rainfed crops are low with little growth rates but suffering from disturbed yield patterns. Among the crops, paddy has claimed an unrivalled place in crop productivity patterns and relegating all other crops to a position of poor secondary importance. Among the areas, the irrigated shields became more productive, healthy and dynamic in terms of agricultural development. While the drought prone areas remained to become more stagnant, blighted and vulnerable in the race of agricultural growth and became weaker and unhealthy zones in terms of agricultural development.
It is ironical to state that agriculturally the weaker area of western Andhra Pradesh which perhaps to be the drought prone region is endowed with vast agricultural land resource but witnessed with vulnerable and delicate land use pattern. Here, the agricultural land use system is found with striking fluctuations and disturbed patterns which led to unhealthy and unstabilised agricultural character. Advances made in irrigation have touched only the fringe of the problem, but the monsoon is still a powerful factor to be reckoned within all calculations of agricultural planning. Hence, maximum priority is to be given for stable and sustainable development of agriculture in drought prone areas. It is possible to bring stability and sustainability in agriculture through effective implementation of modern agro-technologies like (i) dry farming technology, (ii) suitable cropping patterns, crop rotations and multiple cropping systems, (iii) soil and water management methods, (iv) conjunctive utilisation of surface and sub-surface water resources and (v) modern irrigation technology. In drought-prone areas where there is a little scope for major irrigation projects, the maximum priority should be given to minor irrigation and water-shed management, through which the ground water potential and soil moisture regime can be improved. In this regard it may be noted that the problems
of rainfed agriculture are not ones which can be overcome by mere technological solutions but require lasting farmers' awareness and outlook and institutional involvement and assistance.

The present cropping system in the State is in the transitional stage shifting from foodgrain to commercial farming which is indeed an encouraging and progressing agricultural trend. But what is more required to encourage the present transformation of agriculture is (i) to stabilise the yield patterns in the rainfed commercial crops like oil-seeds, pulses and fibre crops, (ii) to provide favourable infrastructural and institutional setup, (iii) to facilitate feasible and compatible marketing and (iv) to ensure encouraging price policy for the agricultural produce. Certainly with the favourable agro-geographic conditions and institutional help, commercial agriculture has a significant momentum in Andhra Pradesh.

To achieve the task of all-round development and prosperity of agriculture in Andhra Pradesh, two essential objectives namely, (i) efficiency and (ii) diversification should guide the application of the available agro-technologies. Optimum use of land, soil and water and other resources for suitable and sustainable
cropping systems according to their potentials and limitations is of paramount importance through scientific resource management planning and monitoring. If all the possible agro-technologies and institutional involvement operate positively on one hand and on the other peasant community works and interacts favourably in weaker areas of agriculture, still the Andhra Pradesh State has an immense agricultural potential for further development into a healthy, dynamic and developed agricultural State in the country.