SUMMARY AND CONCLUSIONS:

The present study reveals the level of Agricultural growth and development in Andhra Pradesh. Findings are relevant for a proper understanding of the agricultural growth pattern of Andhra Pradesh, an important agricultural state in India. The empirical findings reflect the realities of the agricultural situation of the state.
The growth patterns studied how the actual behaviour of agricultural economy, direction of growth, degree of growth and inbuilt instability. Such an empirical periodical evaluation of agriculture, a basic sector, which takes shape under different complex conditions of controllable and uncontrollable factors of nature, may be immense use not only for agronomists and agricultural economists and policy makers but also for those who actually participate in agriculture and to all concerned with it in general. These findings may be helpful to revise, reset and revitalize the developmental activities at different levels to accelerate agricultural growth.

However, these findings are based on quite a good number of implicit and explicit assumptions. The reliability of data, the validity of methodology skills of analysis and interpretative ability of the results - all have their impact on the findings. In addition to this, these empirical findings are time bound and tentative which may change with the changing times.

Agriculture, as we have seen, is the oldest, largest and the most important sector in the process of economic development. In most of the developing countries agriculture is the only major existing industry. Hence, most of
these countries have to depend much upon the development of agricultural sector for their economic development in order to meet the demand for food, to earn foreign exchange, for overhead investment and expansion of secondary industries, to meet the growing demand for employment and to raise cash incomes of rural people, to stimulate industrial expansion.

The historical experience of the most of the developed countries like England, United States of America, Russia, Canada, Japan, etc., reveals the importance of agriculture in the process of their economic development at the outset of industrial revolution. For overall growth of economy, proper balance between agriculture and industry is essential as these two industries are interdependent. Further, agriculture has to depend upon industry for machinery and agricultural implements and industry also has to depend upon agriculture for food and raw materials like Cotton, Jute, Oil seeds, etc. Hence, for a healthy and steady economic development of any nation, a proper balance between agriculture and other sectors must be maintained. Therefore, agricultural development becomes important for industrial, economic and overall general progress of any country.
Agricultural production and agricultural development are influenced by other factors such as extension of area and increase in productivity. As land supply is inelastic, improvement in production mainly depends upon increase in agricultural productivity. Agricultural productivity largely depends upon three factors:

1) Technological;
2) Economic; and
3) Institutional.

Technological change in agriculture may be defined as adoption of improved farm practices to achieve higher net returns. Irrigation, Fertilizers, Improved seeds, Pesticides, etc., mainly come under the category of technological changes which influence agricultural productivity largely. Improvement in farm technology has considerably raised agricultural productivity in U.S.A., Western European Countries, Taiwan and Japan.

Expansion of irrigation facilities extensively and intensively helps in raising agricultural productivity. Increased use of fertilizer is a major strategy for raising agricultural productivity. Chemical fertilizers subject to proper application and backed up by adequate irrigation facilities followed by technological know-how can add to more agricultural productivity.
Introduction of High Yielding Varieties, short duration crops and drought resistant crops are necessary requisites to raise agricultural production. Economic incentives like tax-concession, fixing a remunerative price and granting subsidies, etc., are essential to encourage farmers to increase production.

Institutional factors like land reforms, credit facilities, agricultural research and extension services can positively influence agricultural production in an enormous way and pave the path for agricultural development. Agricultural package programmes are highly useful in the development of agriculture. As already mentioned, factors like irrigation, High Yielding Variety of seeds, increasing supply of fertilizers, pesticides, short duration crops, multiple cropping, control of plant pests and diseases, soil conservation have a combined effect and simulations application of these factors is absolutely necessary for agricultural development.

Agricultural inputs control and command the performance and potentialities of different crops. Hence, an indepth study of major inputs is considered. In Andhra Pradesh, there are a good number of untapped input resources that will boost up the performance and growth potential.
Land is a primary factor in agriculture. The state has rich soil resource. Land under cultivation varies from year to year and fluctuations are mainly due to rainfall. During the period of study, the net area sown has positive trend. It is 12.90 lakh hectares in 1956-57 and 124.40 lakh hectares in 1983-84.

The respective growth rates of total geographical area, forests, land put to non-agricultural uses, other fallow lands, net area sown, total cropped area and area sown more than once increased by 0.02 per cent, 0.33 per cent, 1.36 per cent, 1.74 per cent, 1.03 per cent, 0.96 per cent and 2.10 per cent respectively. These growth rates are statistically significant.

Barren and unculturable land and miscellaneous tree crops and groves are not included in net area sown, culturable waste and permanent pastures have declining growth rates of 0.29 per cent, 0.21 per cent, 3.09 per cent and 1.38 per cent, which are statistically significant. Though, land is a basic factor in agriculture, its use and productivity is a function of other inputs.

Agricultural labour is a creative agent. It is the worker that proves the worth of the land. In Andhra Pradesh about 72.9 per cent of the population depends on agriculture. Per worker agricultural productivity is low in India in general and in Andhra Pradesh in particular. However, it is
promising to note that though Andhra Pradesh is a smaller in size than some other states, its per worker yield is just above the national record ranking 12th in India. Agricultural work force is mostly unskilled and it is unemployed in off-seasons. Their earnings are lowest.

They are uneducated but have the native talent to improve agriculture, provided proper wage system is worked and implemented and training is given to modernise agriculture in the state.

The agricultural labour class is fast growing which is purely dependent on wage paid employment. But one thing worth mentioning is that cultivators are also growing. The number of agricultural labourers have increased with the passage of time. Rapid growth of population has resulted in the growth of agricultural labour because of low industrial development.

In Andhra Pradesh, the rise of agricultural labourers is maximum when compared to other states. For India it is only 25.16 per cent, but in Andhra Pradesh it is 36.66 per cent. The growth rate of total agricultural workers is 1.25 per cent during the period 1960-61 - 1983-84, for which data is available.
Irrigation plays an important role in agricultural development. Water is the essence of life on earth. Though, the irrigation programmes have long history in Andhra Pradesh planned development of irrigation facilities has taken place only during the last three decades. Irrigated area in 1956-57 was 2.81 million hectares and in 1983-84, it was 3.88 million hectares. This shows, inspite of many programmes taken up on large scale to provide irrigation facilities in the state, the additional area brought under irrigation is not very much impressive.

The respective growth rates of canal irrigation, tube well irrigation, other wells irrigation, other sources of irrigation and tank irrigation are 1.66 per cent, 17.54 per cent, 3.36 per cent, 0.28 per cent and 1.31 per cent, all are being statistically significant. However, there is a need to improve tank irrigation system as it also serves a 'water shed' and helps well irrigation.

Total cropped area and irrigated area are highly correlated. Total cropped area depends not only on irrigation, but also on rainfall. The marginal variations are due, mainly to rainfall variations. The growth rates of total cropped area and irrigated area are 0.96 per cent and 1.03 per cent which are statistically highly significant.
The coefficients of instability of cropped area and irrigated area are 0.144624 and 0.15002, which are low and similar is the case of coefficients of variation. There is not much of improvements in both cropped area and irrigated area though, the growth rates are significant.

Fertilizers play a key role in modernisation of agriculture. Along with the spread of the 'package deal' the use of chemical fertilizers has been increased.

Bank credits and fertilizer consumption established a positive relationship. Fertilizers usage has significant influence on the food grains production. Between 1962-63 and 1983-84, fertilizer application and food grains production have increased both in Andhra Pradesh and in India giving a response ratio of 1:16 and 1:19 respectively for every unit of nutrient applied.

The negative rate of growth is recorded in all nutrients during 1979-80. The main factor which affected fertilizer consumption during the year is wide spread drought in the state.

In Andhra Pradesh, fertilizer consumption has gone up from 1.0 lakh tonnes in 1962-63 to 7.2 lakh tonnes in
1983-84, whereas in India it is from 4.52 lakh tonnes to 77.20 lakh tonnes respectively. During this period the fertilizer consumption increase is only seven times in Andhra Pradesh, whereas it is seventeen times in India. The fertilizer growth rates are statistically significant. The increase in the fertilizer usage during the period of study in the state is 10.02 per cent and component-wise nitrogen, phosphate and potash, it works out to 9.5 per cent, 9.7 per cent and 19.19 per cent respectively.

Per capita consumption of power is very often used as a yard-stick for measuring the standard of living of the people.

Per capita consumption of power during 1959-60 to 1983-84, is increasing both at all India level and at the State level as well (Andhra Pradesh). There is a three and half times increase in power consumption at all India level and nine times at the State level (Andhra Pradesh). However, per capita consumption in Andhra Pradesh is always less than that of India upto 1983. During 1983-84, power consumption in Andhra Pradesh is highest than that of all India level. The compound growth rates of per capita power consumption both in Andhra Pradesh and in the country as a whole are of the order of 14.59 and 10.29 per cent and statistically significant.
Rural electrification, the key to village development has made tremendous progress in Andhra Pradesh. The compound growth rates of towns, village electrification and agricultural services connected during the period of study are of the order of 8.29 per cent and 17.39 per cent and statistically significant. The electricity consumers have been increased by 26 fold from 1.5 lakhs to 42.64 lakhs in 1984.

Modernisation of agriculture involves money to purchase commercial inputs and the prices of these inputs maintain an increasing trend. The prices of fertilizers, power changes and wages have been more than doubled during the period of study. Agricultural produce is not properly priced in proportion with the inputs. Naturally rural peasants have to depend on credits. The well planned co-operative credit system to help the rural poor is not sound in practice and is not able to meet the demands of the farmers even though the credit facilities are provided on an increasing scale.

The credit advanced to a farmer serves as a capital to purchase costly inputs to modernise agriculture. The fragile frame work of agriculture in the state can be strengthened by sound financing system. Not only co-operative banks but also commercial banks must help the farmer to transform this tradition bound agriculture into commercial enterprise.
The growth rates of agricultural credits are highly significant. The increase in the total credits during the period of study in the state is 15.47 per cent and unit-wise multipurpose co-operatives, primary agricultural credits, it works out to 10.22 per cent, 25.91 per cent respectively.

Food grains production has increased from 58.61 lakh tonnes in 1956-57 to 118.31 lakh tonnes in 1983-84 and productivity has increased from 0.5938 tonnes to 1.2867 tonnes in the same period. The production and productivity have doubled during the period of study. The annual compound growth rate of production is 2.10 per cent and that of productivity is 2.28 per cent. The growth rates of production and productivity are highly significant. This is an indication that the progress achieved in food grains production is largely due to productivity increase.

The variation and instability are small in area relative to production and productivity. Productivity exhibits greater variation and instability than production. It is expected because it is the productivity that is making strides and hence more variation and instability is associated with it due to wild fluctuations in weather and change in the technology transformation.
Total cereals exhibit increasing trend in area, production and productivity. The respective growth rates of area, production and productivity are 0.14 per cent, 2.20 per cent and 3.65 per cent respectively. The instability coefficients of area, production and productivity are 0.008965, 0.025965 and 6.005347 respectively. It is the instability in productivity, that is to be checked in order to have steady increase in cereals production.

Among cereals, rice is the major crop in Andhra Pradesh. Trends in the expansions of area for rice followed by more production and productivity are very much on the increasing side. During the period of study production and productivity are doubled. The growth rates of area, production and productivity are 0.85 per cent, 2.96 per cent and 2.09 per cent respectively, all being statistically significant. This is a clear indication that during the period of study from 1956-57 to 1983-84, there is a significant improvement in rice cultivation and in particular productivity increase is very much impressive and it can mainly be attributed to the introduction of High Yielding Varieties and modernization of rice cultivation. The instability in productivity is more relative to other two factors. The future of rice cultivation and progress depends more on productivity which implies
that it is the intensive cultivation that is to be given more importance.

Jowar is mainly a major dry crop. The growth rates of production and productivity are 0.07 per cent, and 0.29 per cent respectively. The instability in area is least; it is more in productivity. Bajra production and productivity have positive growth rates of order of 0.06 per cent and 0.95 per cent, but area has a negative growth rate of 1.00 per cent. The growth rates of area and productivity are statistically significant.

For maize, the respective growth rates of area, production and productivity are 2.37 per cent, 6.40 per cent and 4.35 per cent respectively. The growth rates are highly significant. New technology has a significant impact in maize. Between 1956-57 and 1983-84, the increase in productivity of ragi is appreciable. Area and production have negative growth rates of order of 1.11 per cent and 0.22 per cent, but productivity has registered positive growth rate of 0.91 per cent. All the growth rates of ragi are statistically significant. The instability coefficients of area, production and productivity of ragi are 0.086294, 0.147779 and 0.460751 respectively. It is
the instability in productivity that is to be checked in order to have steady increase in ragi production.

Until recently wheat is a minor crop in Andhra Pradesh. It is picking up rapidly and is grown mostly in the areas where new irrigational facilities are provided. Wheat production has shown a positive growth rate of 4.88 per cent. But, area has declined over the years and therefore, it registers a negative growth rate of 0.63 per cent. However, productivity has registered a positive growth rate of 6.00 per cent. The growth rates of production and productivity are statistically significant. It is the new technology that is mainly responsible for spectacular change that has been taken place in wheat production. From this, we can also infer that Andhra Pradesh has good potential for wheat cultivation.

Total pulses annual growth rates of area, production and productivity are 0.29 per cent, 2.33 per cent and 2.02 per cent respectively. The growth rates of area, production and productivity are statistically significant. The increase in area is small and this may be due to additional land brought under cultivation.
Bengal gram and horse gram have negative growth rates in area, whereas green gram, black gram and red gram have positive growth rates. Mainly pulses are grown as rainfed crops or mixed crops and whenever there are additional irrigational facilities, the land under pulses is put to wet crops cultivation and hence, there is a declining trend in area under certain pulses. As a result of declining trend in area the production growth rates of bengal gram and horse gram are negative. It is the productivity that has positive significant growth rates. The positive growth rate compensates for decline in area and the production registers a positive trend in the case of red gram, black gram and horse gram.

In oil seeds group, groundnut crop occupies a very prominent place. The growth rates of area production and productivity are 1.62 per cent, 2.15 per cent and 0.50 per cent respectively. Though the growth rates of area and production are significant, productivity has not significant growth rate. Groundnut is mainly a dry crop which depends upon timely rain. The vagaries of rain play a significant role on the output and consequently productivity.

Linseed has negative growth rates of production and productivity, whereas area has registered positive growth rates. The growth rates of production and productivity are
statistically significant. Castor, mainly a rainfed crop has negative growth rate in area (0.19 per cent), but has positive growth rates in production (0.09 per cent) and productivity (0.28 per cent). All these are not statistically significant.

Sesamum has negative growth rates of production, area and productivity are 2.47 per cent, 1.80 per cent and 0.67 per cent respectively. The growth rates are statistically significant.

Rape and mustard have negative growth rates of 3.00 per cent and 1.55 per cent for area and production. However, productivity has a positive growth rate of 0.59 per cent. Only the growth rate of area is statistically significant. Productivity has positive growth rate but not significant. The growth rates of area, production and productivity of safflower are positive and statistically significant.

Niger seed has negative growth rates of area and production and they are of the order of 1.01 per cent and 0.90 per cent respectively. However, productivity has a positive growth rate of 0.15 per cent. These growth rates are statistically significant. Coconut has registered
positive growth rates of area, production and productivity, i.e., 1.10 per cent, 0.56 per cent, and 1.52 per cent respectively. The growth rates of area and production are statistically significant.

Among commercial crops, sugarcane, cotton and tobacco are the major crops. The growth rates of area and production of sugarcane are positive and significant, whereas productivity has negative growth rate. The coefficient of instability in production and productivity are relatively less. The instability in area is 0.536325 and small compared to other crops, namely cotton and tobacco. Though, there are number of sugarcane research centres in the country it is surprising that there is no increase in the productivity in the state. This important commercial crop must be given adequate attention from the point of view of research and new innovations.

Tobacco has the positive growth rates of area, production and productivity. These growth rates are not significant. There seems to be not much of High Yielding Varieties impact even though there are tobacco research centres in the state.

Cotton, another major commercial crop has positive growth rates of area, production and productivity and they
are of the order of 1.14, 6.18 and 6.51 per cent respectively. These growth rates are statistically significant. New HYV seeds have tremendous impact on productivity increase. It is largely a rainfed crop in Andhra Pradesh.

Onion crop has negative growth rates of production and productivity, i.e., 1.58 per cent and 1.63 per cent respectively. Area has positive growth rate of 0.05 per cent. Growth rates of production and productivity are statistically significant.

Chillies production and productivity have increased from 1.44 lakh tonnes to 1.80 lakh tonnes and 0.6404 tonnes to 1.1180 tonnes respectively. During the period of study productivity is doubled. All the growth rates are positive and significant. Turmeric crop has positive growth rates for area, production and productivity. The growth rates of area and production are statistically significant.

For total cereals the coefficients of variation of area, production and productivity are 4.89, 10.30 and 18.60 per cent respectively. Among the cereals, the coefficients of variation of area, production and productivity of rice are least and that of wheat are maximum. For all crops productivity has highest coefficient of variation, when compared to area and production. This may be due to accelerated change in productivity.
Among all the crops, the coefficients of variation for area and production of rice are the least; and productivity of Bengal gram has the least coefficient of variation.

Coconut area and production have least coefficients of instability and productivity of sugarcane has the least coefficient of instability. Sugarcane area has the highest coefficient of instability. Cotton production and productivity have highest coefficients of instability.

The coefficients of instability closely follow the coefficients of variation in most of the crops. The magnitude of instability in productivity is more than in production and area for many crops. The instability in productivity is to be checked and regulated, such that, steady growth can be attained. This can be achieved by technology and sustained new innovations and assured irrigation facilities.

If we consider total agricultural output, yield per unit of credit and fertilizer have been decreasing. This may be due to inappropriate application of fertilizers and and improper use of agricultural credits. However, yield per unit of worker is increasing. The same pattern is maintained for food grains, cereals, pulses, oil seeds and
commercial crops. This shows that during the period of study, the net effects of fertilizer and credit on agricultural production are decreasing. The growth rates of yield per unit of credit, fertilizer are negative and statistically significant. However, the yields per worker are positive and significant.

India ranks first in area with respect to a number of crops, but in no case it has first rank in yield per hectare. In India, Andhra Pradesh has prominent place with respect to area under cultivation of different crops. It has first place in tobacco, second place in groundnut, third place in jowar and safflower, fourth rank in niger seed, fifth rank in red gram, sixth rank in rice, seventh rank in wheat, sesame and sugarcane, eighth rank in linseed and cotton, and tenth rank in green gram. However, the position of state as regards yield per hectare is poor. In productivity state has first place in niger seed, second place in tobacco, fourth place in safflower and sugarcane, fifth place in rice and groundnut, sixth place in cotton, seventh place in jowar, wheat, sesame and redgram, thirteenth place in linseed and seventeenth place in green gram. Thus, the position of the state on agricultural map of India reveals that there is scope for both extensive and intensive cultivation.
During the period of study though, there is a overall progress in agriculture in Andhra Pradesh, the significant point to note is the increase in productivity. Except in few cases it is the productivity increase that has helped the growth of production of agricultural commodities. The past agricultural performance and future of agriculture in the state is largely a function of productivity increase. As extensive cultivation approach may not yield good dividends, it is the intensive cultivation that is to be given incentive which helps to increase per hectare yield.

For the case study, a village, Cheemalapenta in Cuddapah district is selected. The case study refers to the agricultural year 1985-86. Agriculture is the mainstay of the people, providing livelihood for about 90 per cent of the working population of the village and another 10 per cent depends on business. For the study 100 sample households are selected using stratified random sampling. There are four strate marginal farmers, small farmers, other farmers and agricultural labourers.

The economic progress of village depends on the rate of work participation and quality of labour. The work force participation and employment depend on the economic
status, position of land and other assets. Out of total population 71.17 per cent is engaged in agriculture and allied activities and remaining 28.83 per cent belongs to the category of non-agricultural workers. About 72.01 per cent of small farmers participate in the work allowed by marginal farmers 70 per cent, other farmers 38.04 per cent. However, 82.62 per cent of labourers participate in agriculture 31.29 per cent of marginal farmers, 37.50 per cent small farmers, 38.04 per cent other farmers, and 2.11 per cent agricultural labourers participate in the work as family labour. 40.81 per cent, 32.50 per cent and 80.50 per cent of marginal farmers, small farmers and agricultural labourers are employed as hired labour respectively.

The economic resources of marginal farmers are not sound enough to improve irrigation facilities, further, they do not entirely depend on their own land for their livelihood and they work in other's fields for wages at leisure times.

Cropping pattern depends on the soils, nature of monsoons and irrigation facilities. If rains are sufficient in a year, the dry land is used for groundnut cropping in Kharif season. There exists double cropping practice in the village.
Cost of cultivation varies from crop to crop and between the categories. Onion has the highest and jowar has the lowest cost of cultivation.

Gross income and net income also vary from crop to crop among different categories. Food grain crops are cultivated mainly for household consumption and the surplus is disposed in the market or by barter system.

Extension services and market facilities play an important role in agricultural development. Extension services are useful to educate farmers towards day-to-day developments in agriculture. During the period of study, many facilities are provided by the Government.

Regarding agricultural extension services, 79 per cent of marginal farmers, 88 per cent of small farmers and 81 per cent of other farmers have utilised these services. Out of sixty households, thirteen marginal farmers, ten small farmers and two other farmers are not at all using the services of Block Development Officer.

Fifteen marginal farmers, twenty eight small farmers and sixteen other farmers have utilised the services of the veterinary officer. Fifteen marginal, eight small and six of other farmers have not at all utilised the services of revenue inspector.
The existing loan facilities and market facilities are used to the maximum by the large farmers who are grouped under others. The small and marginal farmers are not able to utilise the facilities made available to the peasant community.

There exists an association between the category of the farmer and availing the market facilities. There is an association between the category of the farmer and the loan facilities utilised.

To sum up, agriculture has become the engine of economic growth. In Andhra Pradesh during the period of about quarter century, the agricultural growth is significant. The developmental activities have accelerated the growth process.

There is a spectacular change in the food grain production due to package programmes. It is the productivity increase that helped the growth. However, in the case of commercial crops like cotton, groundnut, sugarcane and tobacco, the impact of research is not very significant. The extension services provided by different agencies are not fully utilised by the marginal and small farmers. If the hidden potentialities are properly tapped then the state of Andhra Pradesh will occupy a pride of place on the agricultural map of India.