CHAPTER - VII

Summary and Suggestions
The importance of agriculture in the economic development of any country is borne out by the fact that it is the primary sector of the economy which provides the basic ingredients necessary for the existence of mankind and also provides most of the raw materials which when transformed into finished products serve as basic necessities of the human race. In addition to supplying food, agriculture must provide many of the raw materials for industry. However, agriculture is not only a supplier of goods for domestic and export needs, but also a supplier of production factors such as capital and labour. The importance of agriculture in India can be judged mainly from its contribution to national income and employment. Agriculture continues to be a major source of income and employment to a vast majority of (about 65 per cent) People in India. The agricultural sector in India supplies food to the fast-growing population and raw material to the manufacturing industry. The agricultural sector with surplus labour is in a position to supply manpower required for the industrial sector in urban areas. The agricultural sector creates demand for industrial products with the advent of the Green revolution; there has been a considerable increase in farm incomes in areas with relatively better irrigation facilities.

The second phase of green revolution (1980) appears to be the best period for Indian agriculture with significant acceleration in output growth
and reduction in regional inequalities because of the introduction of HYVs for other crops, spread of green revolution to eastern region and emphasis on water shed programs in dry areas. Since independence, considerable progress has been made in the sphere of agricultural development in the country in terms of increase in crop production and productivity, technological developments, and crop diversification.

Andhra Pradesh is an important agricultural state of the country. The state accounts for 8.34 per cent of the country’s geographical area, and for 7.37 per cent of the country’s population. Andhra Pradesh accounts for 7.42 per cent of the country’s net sown area and for 7.42 per cent of the country’s food-grain production. A larger proportion of labour force depends on agriculture in the state (62.3 %) as compared with that at the all-India level (56.2%). Similarly, the share of agriculture in the state’s Gross Sate Domestic Product (28.6%) is higher than the corresponding figure all-India level (24.0%). In fact, the state was known as the granary of South India till recently. Sustainable growth in agriculture sector is the “need of the hour” not only for the state of Andhra Pradesh but also for the country as a whole. The state’s economy continues to be predominantly agrarian. The share of state’s rural labour force employed in agriculture (main workers only) was a high as 81 per cent in 1991. Nearly, 58.72 per cent of the agriculture workers are laborers.
Technology and technical process have enabled man to utilize the human and natural resources rapidly and effectively so as to generate new products, process and organization system of comfortable living. The adoption of new technology by farmers among other things shows an effect in income. The quicker and the greater the raise in income resulting from the use of new technology, the greater is the profitability of its being adopted by cultivators. The Technological breakthrough in agriculture which witnessed the Nation during late sixties benefitted the farming community to a considerable extent. Agricultural technology refers to the knowledge used in improved agricultural productivity. It points out to the input-mix and changes that occur in it from time to time with a view to enhancing productivity at the reduced cost. Agricultural technology may be reflected in a given mix of men and machines, seeds and fertilizers, animal labour and management inputs. Further technological knowledge refers to the knowledge of using a technology. The use of new technology warrants new knowledge among the use of new technology reformed technology may remain idle, if the knowledge to use it, has not been developed simultaneously and diffused among the farmers. Obviously, spread of education and extension services are essential to let

In this chapter findings of growth, instability and supply response of selected food, oilseeds and commercial crops in three regions namely,
Rayalaseema, Coastal Andhra, Telangana and state as a whole are concluded with the help of the statistical stool and formulae.

In this connection the present research presented to study the growth, instability and supply (area) response of three major crops namely, paddy (food crop) groundnut (oilseeds crop) and sugarcane (commercial crop) in three regions of Andhra Pradesh and Andhra Pradesh state as a whole.

Brief region-wise findings of the selected crops were given below.

**Findings:**

**Growth and Instability in Selected Crops:**

The linear growth rate (LGR) is estimated and found as -1.3132, 0.8843, -0.3684 and 0.3636 per cents for area of paddy crop in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively.

Whereas for groundnut cropped area the linear growth rate is -0.273, -2.5039, -1.9684 and -0.8804 per cents in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively.

Similarly, 0.6655, 1.1677, 0.5250 and 1.5398 per cents in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively for sugarcane cropped area.
Likewise there is found the LGR as 2.506, 7732, 2.367 and 2.4732 per cents for the production of paddy crop in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively.

In accordance with the production of groundnut in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole are-2.1933, -3.7409, -2.5285 and -2.7166 per cents respectively.

The linear growth rate for the production of sugarcane crop is 3.4876, 3.1925, 1.084 and 3.6395 per cents in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh state as a whole.

In view of the yield of paddy crop the linear growth rate is 9.1576, 9.5673, 9.4006 and 9.3724 per cent in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh state as a whole respectively.

The LGR for the yield of groundnut crop is -3.6216, -2.0182, -2.9313 and -0.0146 per cent in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively.

Regarding to yield of the sugarcane the linear growth rate is 11.1542, 11.5688, 11.9755 and 11.5829 per cent in Rayalaseema, Coastal Andhra and Telangana regions and also in Andhra Pradesh as a whole respectively in the study period.
Supply Response in Paddy:

The effect of lagged price ($P_{t-1}$) on cropping area of ($A_t$) is negatively insignificant in all regions and Andhra Pradesh state a whole. Similarly, the dependent variable is negatively affected by lagged yield ($Y_{t-1}$) in Rayalaseema and Telangana regions. Contradictorily, in Coastal Andhra region and state as a whole is positively affected. But these both positive and negative effects are certainly insignificant. Whereas, the finding of coefficient of variation of preceding three years price ($CV_p$) is negative in all regions except in state. But only in Rayalaseema region is significant. The coefficient of variation of preceding three years price ($CV_y$) is negatively insignificant in Coastal Andhra region. But the effect of $CV_y$ is positive and insignificant in remaining regions and state as a whole.

Other than the rainfall ($R_t$) is also affecting the cropping area ($A_t$) of paddy in Rayalaseema, Telangana and state as a whole is positively affected. But only in Coastal Andhra region is negatively insignificant. The dependent variable is positively caused by the irrigated area ($I_t$) for a lot in Rayalaseema, Coastal Andhra regions and also in state as a whole, whereas in Telangana region is though positive it is insignificant. In continuation of the above variables, the consequence of the left out variables like new technology, HYV (dummy variable) on cropped area ($A_t$) of paddy is positively significant in Rayalaseema region except in remaining regions.
and state as a whole. The influence lagged area \((A_{t-1})\) on current year of cropped area of paddy positive in Rayalaseema, and Telangana regions and state except in Coastal Andhra region whereas only significant in Rayalaseema region in the study period.

There was found unique figures for multiple regressions coefficient \((R)\) in all regions and state as a whole. It shows that the combined effect of all independent variables on dependent variable is in unique form and tested by F-test statistic as significant at 5 percent probability level. Multiple correlation coefficients \((R^2)\) is also same with multiple regression coefficient in the study area. The values of the adjusted multiple correlation coefficients \((\bar{R}^2)\) are show as good as relation among the all independent variables and dependent variable in all regions and state except in Telangana region.

The effect of lagged price \((P_{t-1})\) on cropped area \((A_t)\) is positive in Coastal Andhra region and state as a whole. But in Rayalaseema and Telangana regions, it is shows negative effect on cropped area of paddy. The effect of lagged area \((A_{t-1})\) on cropped area \((A_t)\) is positive and significant in all regions and state as a whole in the study period. The combined effect of both independent variables on dependent variable is calculated by the multiple regressions coefficient \((R)\) and is positive in all
regions including state as a whole. It is tested by f-test statistic as significant at 95 percent of confidence.

**Supply Response in Groundnut:**

The effect of lagged price ($P_{t-1}$) on cropping area ($A_t$) is positively significant in Rayalaseema region and insignificant in state as a whole. Whereas, in Coastal Andhra region and as a whole the dependent variable is negatively and insignificantly affected by lagged price ($P_{t-1}$). Similarly, the dependent variable also negatively affected by lagged yield ($Y_{t-1}$) in all regions and state as a whole except in Rayalaseema region. But it is significant only in Coastal Andhra region. Whereas, the finding of coefficient of variation of preceding three years price ($CV_p$) is negative and insignificant in all regions except in Rayalaseema region. The coefficient of variation of preceding three years price ($CV_y$) is negatively and insignificant in all regions and state as a whole.

Other than the rainfall ($R_t$) is negatively affecting the cropping area ($A_t$) of groundnut in Rayalaseema and Coastal Andhra region. In Telangana and state as a whole it is positively affected. But it is significant only in Coastal Andhra region. The dependent variable is positively and significantly caused by the irrigated area ($I_t$) for a lot in Rayalaseema, Coastal Andhra regions, Telangana region and also in state as a whole. In continuation of the above independent variables, the consequence of the
left out variables like new technology, HYV (dummy variable) on cropped area \( (A_t) \) of groundnut is positively insignificant in Rayalaseema and Coastal Andhra regions. In remaining study area it is affected negatively and insignificantly. The influence of lagged area \( (A_{t-1}) \) on cropped area \( (A_t) \) of groundnut positive and significant in all regions and state as a whole.

There was found unique figures for multiple regressions coefficient \( (R) \) in all regions and state as a whole. It shows that the combined effect of all independent variables on dependent variable is in unique form and tested by F-test statistic as significant at 5 per cent probability level. Multiple correlation coefficients \( (R^2) \) are also same with multiple regression coefficient in the study area. The values of the adjusted multiple correlation coefficients \( (\bar{R}^2) \) are show as good as relation among the all independent variables and dependent variable in all regions and state except in Telangana region.

**Supply Response in Sugarcane:**

The effect of lagged price \( (P_{t-1}) \) on cropped area \( (A_t) \) is positive and insignificant whole study area. The effect of lagged area \( (A_{t-1}) \) on cropped area \( (A_t) \) is positive and significant in all regions and state as a whole in the study period. The combined effect of both independent variables on dependent variable is calculated by the multiple regressions coefficient \( (R) \)
and is positive in all regions including state as a whole. It is tested by f-test statistic as significant at 95 per cent level of confidence.

In continuation, the effect of lagged price \( P_{t-1} \) on cropping area of \( A_t \) is positive and insignificant in Rayalaseema region and Andhra Pradesh state a whole. But it is negatively insignificant in remaining study area. Similarly, the dependent variable is negatively affected by lagged yield \( Y_{t-1} \) in Coastal Andhra and Telangana regions and Andhra Pradesh state a whole. Contradictorily, in Rayalaseema region is positively affected. But these both positive and negative effects are certainly insignificant. Whereas, the finding of coefficient of variation of preceding three years price \( CV_p \) is negative in whole study area except Rayalaseema region. And this effect is measured as insignificant. The coefficient of variation of preceding three years price \( CV_y \) is positively insignificant in Rayalaseema and Coastal Andhra regions and Andhra Pradesh state a whole. But the effect of \( CV_y \) is negative and insignificant in Telangana region.

Other than the rainfall \( R_t \) is also negatively affecting the cropping area \( A_t \) of sugarcane in Rayalaseema region and state as a whole. But it is positively affecting in Coastal Andhra and Telangana regions. But these both positive and negative effects are certainly insignificant. The cropping area \( A_t \) of sugarcane (dependent variable) is positively caused by the
irrigated area (I_t) for a lot in whole study area and is insignificant in whole study area. In continuation of the above variables, the consequence of the left out variables like new technology, HYV (dummy variable) on cropped area (A_t) of sugarcane is positively insignificant in Rayalaseema and Coastal Andhra regions except in remaining region (Telangana region) and state as a whole. The influence of lagged area (A_{t-1}) on current year of cropped area (A_t) of sugarcane in Rayalaseema and Telangana regions is positive and insignificant. But in Coastal Andhra region and state as a whole it is negatively insignificant affected the cropped area (A_t) of sugarcane.

There was found unique figures for multiple regressions coefficient (R) in all regions and state as a whole. It shows that the combined effect of all independent variables on dependent variable is in unique form and tested by F-test statistic as significant at 5 per cent probability level. Multiple correlation coefficients (R^2) is also same with multiple regression coefficient in the study area. The values of the adjusted multiple correlation coefficients (\bar{R}^2) are show as good as relation among the all independent variables and dependent variable in all regions and state except in Telangana region.
Suggestions to Improve Cropping Area, Production and Productivity of Selected Crops.

Paddy:

Major constraints to rice production that India faces are land, water, labour and other inputs such as fertilizers, pesticides and insecticides, and even high quality germ plasma, without affecting the already degraded and stressed agricultural environment. The problems of flash floods, water logging/submergence due to poor drainage are very common in South India. Due to the non-availability of seeds farmers are using continuous of traditional varieties, lack of awareness of farmers about high yielding varieties is the major constraint. Low soil fertility due to soil erosion resulting in loss of plant nutrients and moisture. Low and imbalanced use of fertilizers, low use efficiency of applied fertilizers particularly in the North-Eastern and Eastern States.

1. Need area and production stabilizing policies, which having greater impact on groundnut crop in Rayalaseema and paddy in Coastal Andhra region and production stabilizing policies in Andhra Pradesh state as a whole.

2. To improve location specific technology through research, development and extension efforts and also ensured input supply mechanism.
3. It is possible that most of the fluctuations are due to price and payment policies. This is an area that needs to be investigated.

4. There is scope to raise the area under these food and commercial crops by enhancing or offering the more prices and providing better irrigation and marketing facilities to its producers.

5. To get best results in production and productivity by enhancing the consumption of bio-fertilizers.

6. Supporting price policies should provide a favourable environment for promoting the production of these three commercial crops and government policies should provide a favourable environment for promoting the commercial sector.

7. This study suggests that, introduction of crop rotation and adoption of new technology to the growers for rapid growth of commercial crops as remedial measures.

8. The growth concept can be better utilized in the location-specific and crop specific research schemes and in the growth oriented development programs.
9. The introduction of new seed-irrigation-fertilizer technology supported by remunerative pricing policy encouraged the farmers to put more and more area under these two crops.

10. Favourable government policies should provide promoting the food crop sector. The policy areas may cover such aspects as incentives, subsidies, minimization of exploitation of the farmers by the middleman, wholehearted participation of the industrial sector, discouragement of hoarding and speculation, regulation of imports in terms of quantity and time, procurement prices, removal of transport bottlenecks, buffer stocking and exports. We have to make breakthrough in technological and organizational fronts to make the food crop sector an efficient one.

11. Adequate number of improved/high yielding varieties may be evolved for rain fed eco-system, which constitutes nearly 60% of the cultivated rice area.

12. Rice area in Eastern region is 59% of total area but productivity is very poor. Hence, suitable technology and varieties may be developed for this state so that productivity could be increased.

13. Major research thrusts should be for ecologically handicapped rain fed areas to increase productivity. In fact, adoption/transfer of
improved production technology seems to be on slow pace in rain fed areas; therefore, a special programme is needed to be launched in such areas to motivate the farmers to adopt improved technology.

14. In rain fed eco-system, farmers are using much less fertilizers per unit cropped area; hence a awareness is required to be created among the farming community about balance use of fertilizers to increase their productivity.

15. Improved technology is generally adopted for irrigated rice. Even in the predominantly irrigated parts of the country, full potential of high yielding varieties is not realized. There are bright prospects for tapping considerable portion of untapped remaining potential.

16. All eastern states are having good ground water potential and they are utilizing hardly 5 to 35% of their potential. If infrastructure facilities are created for exploration/exploitation of their ground water potential for irrigation and its efficient utilization, this will help to increase the production and productivity of rice in eastern states.

17. Root development has been well recognized as an important factor for upland/dry condition crops. Therefore, deeper roots are
desirable for upland rice because soil moisture increases with depth of the soil profile and a variety with deep roots can reach and use soil moisture at a greater depth resulting in high productivity.

18. Upland rice needs fertilization more than low land rice. In fact, nitrogen and phosphorus both play an important role in its growth and yield. Phosphorus is more vital in upland rice culture than in lowland rice culture, because applied phosphorus in upland rice is less easily available under aerobic and acidic condition and partly because of high phosphorus fixation in upland soils. Therefore, utmost care should be taken while fertilizing upland rice fields. Correct dose and timely application of fertilizers always results in higher productivity.

19. Due to drought and erratic rainfall, rice cultivation in uplands is always found risky and uncertain. Varietal improvement still remains the major strategy for increasing productivity in upland areas. Therefore, scientists are required to take up this matter seriously so that the low productivity of upland rice can be improved to a greater extent.

20. A proper research programme is required to be carried out for improving physiological efficiency of the plant for better
photosynthesis efficiency and translocation so as to reduce sterility under low light intensity, thereby increasing productivity.

21. Cultivation of hybrid rice is required to be popularized among the farmers in suitable areas so that production & productivity can be increased.

22. Productivity levels of rice rely largely on technology diffusion, as technological constraints are still in existence in many rice growing areas.

23. Extension of rice cultivation to heavy black soils and marginal lands at an alarming rate leads to degradation of soil/water and depletion of ground water resources. Besides, excessive pumping of ground water also deteriorates ground water quality considerably. Such adverse effect has been found in Punjab, Haryana & Karnataka. Therefore, such issues may be dealt judiciously and carefully in order to avoid soil and water degradation.

24. More number of cold tolerant high yielding varieties are required to be developed and popularized for different altitudes of hill regions.
25. Leguminous crops may be included in the cropping system in order to improve the soil fertility.

26. Saline, alkaline and acidic soils may be reclaimed by application of soil ameliorants.

27. Use of Bio-fertilizers such as Blue Green Algae, Azospirilleum, Azotobacter and Azolla may be encouraged among the farmers for supply of nitrogenous nutrient and their by reducing the cost of chemical nitrogenous fertilizers.

28. The line sowing in upland rice areas through suitable seeding devices is required to be made popularized for desired plant population. This will facilitate to control weeds and also to carry out intercultural operations.

29. To encourage the Integrated Pest Management approach for effective control of pests and diseases by emphasizing the need based application of pesticides.

30. Strong extension network for effective transfer of latest technologies, improvement of credit and market facilities and crop insurance are required for rained lowland ecology.
31. Sustainability from both ecological and economic point of view is important aspects for increasing rice productivity in different ecosystems.

32. Existing development activities are appeared to be inadequate for dissemination of advance/improved production technology among the farmers to increase productivity of rice in different rice growing regions of the country. Therefore developmental activities are required to be strengthened suitably achieving sustainable growth in rice productivity and production.

33. Another green revolution should be needed towards accelerate production and yield of food crops in the state.

34. Abolish role of mediators at the time of selling crops by farmers.
35. Provide interest-free loans to farmers at cropping time sufficiently.
36. Provide guaranteed crop-insurance for all type of crops overall the state.

**Groundnut:**

1. As farmers work under several socio-economic constraints, which are likely to become their primary concerns before they are prepared for any changes to their current management practices, introduction of new technologies entail certain conditions for adoption. Technologies that are labour intensive or that have
higher financial implications to the farmer or are more input intensive are less likely to be accepted.

2. Providing incentives to farmers, health concerns, building up of consumer demands for aflatoxin-free groundnuts, trader responsiveness and appropriate action research for technical change should be the operational focus of interventions. Research institutions, government agencies, marketing agencies, consumer groups, NGOs, farmers groups and lobbies should be organized into becoming joint stakeholders and collaboratively evolve strategies that will address the problem of aflatoxin contamination at a systemic level. Farmers have to be made stakeholders and become accountable to and are the beneficiaries/partners of an aflatoxin free groundnut crop production system.

3. The small and marginal farmers do not have the same opportunities and bargaining capacity as the rich. Blanket recommendations for all the groups may in fact adversely affect the poor while benefiting the rich. It is extremely important to take care that interventions do not leave the poor worse off while making the rich better off. Similarly, perceptions of men and women involved in crop production activities need to be ascertained for optimizing the validation of technologies and interventions based on their experiences.
4. Favourable government policies should provide promoting the oil seeds crop sector. The policy areas may cover such aspects as incentives, subsidies, minimization of exploitation of the farmers by the middleman, wholehearted participation of the industrial sector, discouragement of hoarding and speculation, regulation of imports in terms of quantity and time, procurement prices, removal of transport bottlenecks, buffer stocking and exports. We have to make breakthrough in technological and organizational fronts to make the oil seeds crop sector an efficient one.

**Sugarcane:**

The sugar-cane crops faced with number of problems, viz., irrigation, facilities available, fertilizers, labour. Generally, higher prices are expected to result in a larger cultivation of area under sugar-cane. If this were to be true, why have agricultural prices in India and other less developed countries too failed to enthuse the production sufficiently? Have agricultural prices no impact on agricultural growth which is the essential pre-requisite for economic development of less developed countries.

1. Incentives by way of enhanced prices for sugarcane crop will go a long way in increasing sugar production. The farmers will get adequate remuneration for their toil.
2. Irrigation facilities need to be improved in the rain-fed areas where it is essential in affecting sugar-cane acreage. The increased facilities might induce the farmers to increase acreage.

3. Improved technological innovations will boost the sugar-cane production. Hence, the Government should explore ways to make available the same to the farmers.

4. A holistic approach is needed to understand the problems of farmers growing sugar-cane. Other factors than price like, high yielding variety seeds pesticides, fertilizers, are equally important in attaining the targeted level of sugar-cane production.

5. While framing the agricultural policy, the government needs to keep in mind that the food crop, non-food crop differentiation should not be allowed to be left to the fate of the farmers. The Government should follow a balanced course.