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**Approach for Agricultural Development in  
Andhra Pradesh in the 12<sup>th</sup> Five Year Plan Period**

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# **Approach for Agricultural Development in Andhra Pradesh in the 12<sup>th</sup> Five Year Plan Period**

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## **Introduction**

The basic premise of this paper is to identify the sources of agriculture growth to achieve higher growth in the 12th plan period. At the same time, the higher growth should be faster, inclusive and sustainable in nature. The identification of sources of growth should be based on the rigorous inward-looking and outward-looking analysis. The outward-looking analysis is centered on the identification of sources of growth across the states in India. The inward-looking analysis is centered on the identification of sources of growth from within the state. This analysis should also spot the objective conditions in terms of institutional backup, technological support, structural character and budgetary allocations and programmes that have contributed to the performance of the sources of growth. Moreover, it should also mark the contributing subjective conditions, unique local conditions. The analysis has been organized as follows: the agriculture growth experience; the changing production structures; and identification of the drivers and barriers of the transformation of the production structures to achieve higher, faster, inclusive and sustainable growth.

## **Growth Process**

India witnessed a significant economic growth since 1980s and the increase is much faster during the last few years. The Indian economy is also sustaining such rapid growth and resulted noteworthy improvements in the lives of the people. However, such an impressive performance was not uniform across all sectors of the economy, all regions in the country and all sections of the society indicating that this growth is not inclusive. For instance, the real average annual growth rate of GDP from agriculture and allied sectors hovered between 2.5 to 3.7 per cent per year beginning with 1981-82 till nineties while it is consistently increasing beyond 6.5 per cent per year in the case of non-agriculture sector. In addition, the share of agriculture in the gross domestic product has seen declining continuously and steeply since 1980s. On the other hand, two thirds of the population is still dependent on agriculture and allied sectors for their livelihood which indicate that two thirds of the population have not benefited from the growth. Agriculture sector continues to be a failure to achieve the growth targets and it is true

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even in the case of 11th five year plan target of 4 per cent per year. Economic reforms exposed Indian agriculture to exploitative and volatile market forces, leading to steep decline in public investment, targeted credit, subsidized input supply, and extension. All this happened at a time when the vast majority of marginal and small farmers were venturing into agricultural practices of improved productivity with high risk and uncertainty which required increased state support systems (see Reddy 2007 for more details). The crisis in agriculture has many manifestations, of which suicides of farmers came as a rude jolt. The case of Andhra Pradesh is similar to that of all India scenarios in overall growth process except in the case of agriculture that too in the recent years.

### **Agricultural Growth and its Contribution to the Overall Growth in Andhra Pradesh and in Other States**

Andhra Pradesh is agriculturally an important state in the country. For instance, the state is first in maize production and second in cotton and sunflower and third in rice and pulses. It has huge prospects for horticultural crops. However, the state is not a homogenous entity in the endowments with vast tracts of dryland and these dryland areas could not keep pace with better endowed regions resulting vast regional variations in the state. The 61st round of National Sample Survey placed the state at eighth among the states both in the share of agriculture in GDP and in employment generation. The NSDP from agriculture per hectare in A P was moderate at Rs.37383/- in the triennium ending 2004-05 as against Rs. 70524/- in West Bengal. It improved to Rs. 56400/- in 2007-08 in A P compared to Rs.69000/- in W B. Per hectare amount of NSDP from agriculture in A P for the year 2007-08 is low compared to Kerala (Rs.74600/-), and Tamil Nadu (Rs.64200/-) southern counterparts of A P; and West Bengal (Rs.69000/-). Further, growth rate of agriculture during the decade of eighties was 2.1 per cent as against 3.1 per cent at all India level. The corresponding figures for nineties are 2.1 and 2.8 and the performance was even worse during 2000-01 to 2004-05 i.e. 0.9 and 1.9 respectively<sup>1</sup>. This clearly indicates that the performance of A P agriculture is low when compared to all India level. However, the performance of Andhra Pradesh agriculture during the last five years beginning from 2005-06 showed improvements with 6.12 per cent in 2005-06; 1.97 in 2006-07; 17.38 in 2007-08; 1.79 in 2008-09 and 1.09 in 2009-10. However, the advanced estimates show a growth of 8.39 per cent in 2010-11. The related figures at all India level up to 2009-10 are: 5.2; 3.7; 4.7; 1.6 and 0.2 respectively. Within the agriculture sector, there are wide fluctuations in the growth of agriculture and fishing during the period between 2005-06 and 2010-11 in

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<sup>1</sup> Growth rates are drawn/computed and the main sources of data are state reports and planning commission reports.

Andhra Pradesh. For instance, there is substantial growth in GSDP from agriculture (22.95%) and fishing (15.82%) in 2007-08(at 2004-05 prices) and there is negative growth in the subsequent years i.e. -0.68% in 2008-09 and -2.15% in 2009-10 in the case of agriculture and 1.79% and 3.4% and -0.35% respectively in the case of fisheries. Livestock within agriculture sector recorded substantial growth except in 2006-07 while forestry & logging showed a moderate improvement. Thus, it is clear that despite unequal regional endowments, there is ample scope for growth of agriculture sector in the state.

If we look at the contribution of agriculture sector to total GSDP, Andhra Pradesh is in fairly moderate position when compared to other states. The share of A P agriculture and allied sectors in total GSDP was 26.34 and 25.34 per cent for the years 2008-09 and 2009-10 respectively which is less than that of only three states i.e. Assam (27.94 and 27.64%), Punjab (33.16 and 34.14%) and U P (28.76 and 27.80%) and higher than at all India level (15.7 and 14.6%). Among the southern states, A P's contribution is more than 10 percentage points ahead in the specified years with regard to the contribution of agriculture and allied sector to the total GSDP. However, Punjab's contribution is 7 to 8 percentage points more than that of A P which is perhaps due to higher productivity and rich resource endowment. For instance, the share of rain-fed agriculture is around only 3% in Punjab as against 59% in A P. Similarly, in U P, the share of rain-fed agriculture is around 32 per cent. However, 86 per cent of Assam's agriculture is rain-fed; perhaps Assam may be receiving adequate and timely rainfall. We have seen a continuous decline in the share of agriculture and its allied sector in the total GSDP but the irony is the population depending on agriculture for their livelihood has not declined proportionately. For instance, between 1961 and 2004-05, there was a 34 percentage point decline in the share of agriculture in GDP; while the decline in the share of agriculture in employment was 19 percentage points only (see Dev 2008 for more details). Similar trend is observed in the subsequent years. Structural transformation in states like Kerala, Tamil Nadu, West Bengal and Punjab has yielded a higher share of agriculture in employment.

#### *Inter District variation in the Contribution of Agriculture to Overall Growth*

Given this background, A P should aim for higher contribution from agriculture sector to the total GSDP in the larger interest of the people for which there is need for identifying the different sources of agriculture growth and act accordingly. Broadly there are two main sources of growth in the crop production viz., one set of factors affects production through growth in use of area under various crops. Net sown area, rainfall, drought, floods, expansion of area under assured irrigation, cropping intensity, crop composition, bringing cultivable waste land under cultivation, and diversion of

cultivable land for nonagricultural purposes like rapid urbanization and industrial use are one set of main sources of growth in the crop production. The other set of factors that affect production are: changes in productivity which include technological changes embodied in factors of production like seeds, fertilizers, pesticides and machinery, cultural practices, technical efficiency of the farmers, quality/fertility of soil, and climatic conditions of the area. District wise analysis identifying the above factors wherever possible/feasible will provide thorough understanding to propose an action plan for increasing the overall agricultural production in the state. Before we move on to the crop production scenario, it is apt to know the districts whose contribution from agriculture and allied sectors to the total GDP is low and to identify the probable reasons for such a low performance. District wise contribution of agriculture sector to the GDDP and its share in to total GSDP of the state presented in the table below depict the following. For brevity, the analysis is confined to the years 1999-00 and 2007-08 and it revealed that 12 out of 22 districts (excluding Hyderabad) in the year 1999-00 and 10 out of 22 districts in the year 2007-08 have registered less than 4 per cent share of agriculture in GDP (Table-1 and Table-1a). Four districts in the year 1999-00 and 5 districts in the year 2007-08 have less than 3 per cent contribution from agriculture to GDDP. 10 out of 22 districts have contributed 3 to 4% from agriculture to the GDDP in both the periods. Thus laggard districts deserve much attention.

Table-1 Districts with Less Than 4% Contribution of Agriculture to GDDP at Current Prices

Year 1999-2000	Year 2007-08
Srikakulam (2.12); Adilabad (2.34); Vizianagaram (2.52); Nizamabad (2.90); Kadapa (3.04); Mahaboobnagar (3.13); Visakhapatnam (3.23); Medak (3.39); R R (3.44); Anantapur (3.67); Khammam (3.77); Warangal (3.79).	Vizianagaram (2.34); Srikakulam (2.39); Nizamabad (2.45); R R (2.52); Adilabad (2.75); Visakhapatnam (3.14); Kadapa (3.20); Warangal (3.38); Khammam (3.66); Medak (3.86).

On the other hand, Krishna, West Godavari, Guntur and East Godavari have contributed the highest share of around 9 per cent each in 1999-00 and continued highest record even in 2007-08 but around 7.5 per cent each. It gives an indication of possibility of achieving higher share from agriculture. There are about 7 districts which showed a mediocre share of above 4 per cent and there is a potential in these districts for attaining a higher share from agriculture. The analysis in the ensuing sections will throw some light on these initial findings. But one should be cautious in inferring the potential of agricultural growth based on the share of agriculture in GDDP.

**Table-1a: % Contribution of GDDP at Current Prices for the years 1999-2000 and 2007-08(P)**

Sl. No.	District	1999-2000				2007-08(P)			
		Agri. Sector	Industries Sector	Services Sector	GDDP	Agri. Sector	Industries Sector	Services Sector	GDDP
1	2	3	4	5	6	7	8	9	10
1	Srikakulam	2.12	2.06	2.40	2.24	2.39	1.83	2.27	2.18
2	Vizianagaram	2.52	1.20	2.18	2.05	2.34	1.55	2.06	1.99
3	Visakhapatnam	3.23	7.43	7.28	6.15	3.14	11.02	8.04	7.61
4	East Godavari	8.12	8.32	6.47	7.38	7.43	6.13	5.83	6.32
5	West Godavari	9.06	3.52	4.84	5.74	8.60	3.02	4.19	4.99
6	Krishna	9.02	4.13	6.56	6.69	7.38	5.03	6.53	6.34
7	Guntur	9.07	3.80	5.53	6.14	7.44	3.43	4.67	5.04
8	Prakasam	4.47	2.77	3.27	3.50	4.86	3.82	3.30	3.84
9	Nellore	4.45	3.02	3.27	3.55	4.54	2.79	2.97	3.32
10	Chittoor	4.65	3.63	4.19	4.19	4.28	3.59	3.79	3.86
11	Kadapa	3.04	3.27	2.78	2.97	3.20	6.52	3.77	4.38
12	Ananthapur	3.67	3.38	3.82	3.67	6.04	3.31	3.78	4.23
13	Kurnool	4.11	2.65	3.62	3.53	5.41	2.93	3.37	3.77
14	Mahaboobnagar	3.13	2.69	2.96	2.95	4.36	3.50	3.10	3.53
15	Ranga Reddy	3.44	8.99	5.64	5.80	2.52	9.78	6.96	6.60
16	Hyderabad	0.72	6.81	11.23	7.15	0.19	5.36	13.19	7.74
17	Medak	3.39	9.65	4.04	5.19	3.86	5.88	3.70	4.33
18	Nizamabad	2.90	2.26	2.31	2.47	2.45	2.17	2.23	2.27
19	Adilabad	2.34	3.01	2.74	2.69	2.75	2.77	2.61	2.69
20	Karimnagar	4.97	6.08	4.53	5.02	4.47	4.87	3.90	4.31
21	Warangal	3.79	2.48	3.39	3.29	3.38	2.89	3.11	3.12
22	Khammam	3.77	4.44	3.58	3.84	3.66	3.68	3.32	3.50
23	Nalgonda	4.01	4.42	3.39	3.81	5.30	4.13	3.32	4.05
	Andhra Pradesh	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

### **Structural Transformation and its Implications to Agriculture**

#### **Utilization of Land: Extent and Trends**

Land utilization is one of the prime factors in the overall development of agriculture. Of the total of geographical area of 275.04 lakh hectares in the state, the cultivable land (i.e. Net area sown, current fallows and other fallow lands) has gone up from 139.65 lakh hectares in 1955-56 to 150.2 lakh hectares in 2008-2009 which forms 51.9 per

cent and 54.6 per cent respectively of the total geographical area. However, net sown area has not shown any improvement during this period and in-fact area under current fallows and other fallows has gone up from 25.91 to 40.60 lakh hectares which represents about 40% of the net area sown. The analysis of trends in the land utilization in the state over a period of 5 decades will reveal more insights. Underutilized land includes current fallow (CF), other fallow (OF), cultivable waste (CW) and grazing and pastures lands. However, for the present purpose, we are confining ourselves to the first three categories only. The data on these three categories of land utilization (CF, OF and CW) have been examined for the past 5 decades, i.e., from 1960-61 to 2008-09<sup>2</sup>. The data indicates that the underutilization of land in Andhra Pradesh is more than that of the all India level (Table-2). The extent of underutilization in AP is hovering between 28 and 33 per cent of the cultivable land as against 21 per cent at the all India level during the period under consideration. A major chunk of this is due to current fallows. Regarding the other two categories (OF and CW), there has been a change in their relative shares after 1970. However, over the period, the proportion of underutilized land in Andhra Pradesh has recorded a marginal increase. The decline in the proportion of net sown area in AP during 1980s is mainly due to the rise (from 46 to 69 per cent) in the current and other fallow lands consequent to the recurring drought during the later part of 1980s. Conversely the proportion of area under cultivable waste has declined by 51 per cent during the same period and continued to decline even in the 1990s. This could be due to the increased cultivation of horticultural crops during the 1990s.

Of these three categories, current fallows reflect the year-to-year rainfall variations with high inverse relationship. In other words, rainfall plays a dominant role in determining the extent of current fallow lands. Other fallows are the continuation of current fallow for more than one year and up to 5 years. The presence of other fallows may represent the soil-climatic characters, resource base, and profitability of farming and level of technology of the region. And cultivable waste is the land once cultivated but not cultivated in the last five years and is left out of cultivation mainly due to the resource constraints and economics of its cultivation. Therefore, current fallows can be left out as it depends mostly on year-to-year rainfall and also due to the reason that it is a part of the crop rotation system followed by the farmers. Even after taking out this component, the extent of underutilization is about 14 per cent, which is substantial in a land hungry, and poverty stricken country. Efforts have to be made to bring this land under plough to boost the agricultural production.

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<sup>2</sup> Data are mainly drawn from Statistical Abstracts and Season and Crops Reports of Andhra Pradesh.

Table-2 Extent and Trends in the Utilization of Land in Andhra Pradesh (000' hectares.)

State / Year (quinquennium ending)	Net area sown (NAS)	Current fallow (CF)	Other fallow (OF)	Culturable waste (CW)	Total culturable land	Per cent of area under -utilized
1	2	3	4	5	6	7
1960	11124 (70.5)	2020 (12.8)	854 (5.4)	1784 (11.3)	15782 (100)	29.5
1970	11227 (71.7)	2179 (13.9)	899 (5.7)	1344 (8.7)	15649 (100)	28.3
1990	10611 (66.80)	2976 (18.7)	1441 (9.0)	846 (5.3)	15874 (100)	33.0
2000	11220 (71.6)	2312 (14.7)	1417 (9.1)	728 (4.6)	15677 (100)	28.4
2007-08	10576 (68.4)	2719 (17.6)	1500 (9.7)	659 (4.3)	15454 (100)	31.6
2008-09	10958 (69.7)	2624 (16.7)	1488 (9.5)	650 (4.1)	15720 (100)	30.3

Source: Statistical Abstract of India and Seasons and Crops Report of Andhra Pradesh (for various years).

Figures in parentheses are percentage to column (6). Last two years reflect respective single year figures

#### Utilization of Land at the District Level within the State

Excluding Hyderabad, 22 districts of Andhra Pradesh are divided into drought prone and non-drought prone districts. Accordingly, eight of the 22 districts fall under drought prone category and the remaining under non-drought prone category<sup>3</sup>. The extent of underutilization of land is higher in the drought prone districts. Moreover, its magnitude has increased over the period in both the drought and non-drought districts, but the increase is higher in the non-drought prone districts. Further, the non-drought prone districts have shown a marginal increase till 1980s and a substantial decline in the 1990s. On the whole, the gap between the magnitude of under-utilization in the drought and non-drought prone districts has widened considerably over time<sup>4</sup>. This indicates

<sup>3</sup> The eight drought-prone districts include: Prakasam, Anantapur, Kadapa, Kurnool, Mahabubnagar, Medak, Nalgonda and Ranga Reddy.

<sup>4</sup> for more details including methodology see Reddy et.al 2005

that the drought prone regions, as in the case of green revolution, have remained beyond the purview of policy changes during the 1990s. In other words, these regions have not benefited much from the favorable terms of trade to agriculture sector had gained through policy initiatives. Earlier policies or technologies seem to be more biased in favour of resource rich regions or people. In the context of drought prone regions, water seems to be the crucial factor.

The district wise descriptive analysis did not provide any strong evidence regarding the importance of rainfall in determining underutilization of land, either in terms of total fallows or culturable wastes, though rainfall revealed a negative influence in most of the years. On the other hand, economic and technological factors seem to play a dominant role. For instance, in the irrigated areas, especially well irrigated, farmers tend to go for intensive cultivation. Similarly, extensive cultivation practices are followed by those farmers who grow more of subsistence crops than commercial crops. The technological factors like tractors and pump sets, which are closely related to development, lead to increased under-utilization. Small farmers seem to follow extensive cultivation practice when compared to large farmers. This strengthens the case for land distribution if the objective is to bring more area under cultivation. Rural literacy appears to be less effective in encouraging extensive cultivation, as it could be a close proxy to development.

#### **Emergence of Small farmer economy**

The landholding structure does influence the productivity enhancing investments that influence agricultural growth. The institutional changes, market process and mutation of ownership have together brought two remarkable changes in the landholding structure in the state overtime viz., increased proportion of small-marginal holdings accounting for 83 percent of the agricultural operators and with almost half the area under cultivation; and growing proportion of agricultural laborers. The agrarian economy in Andhra Pradesh as in the rest of India is diverse and built on regional variations<sup>5</sup>. There is a high degree of tenancy accounting for 50 to 60 percent of the cultivated area, in Coastal Andhra much of which is unregistered, without any regulation and with exploitative rents, resulting in deleterious effects on agricultural productivity and growth. On the other hand, even small-marginal farmers with relatively low access to irrigation facilities and no surpluses of their own have been getting into deep debt to augment investments in agriculture in the form of tapping groundwater resources especially in

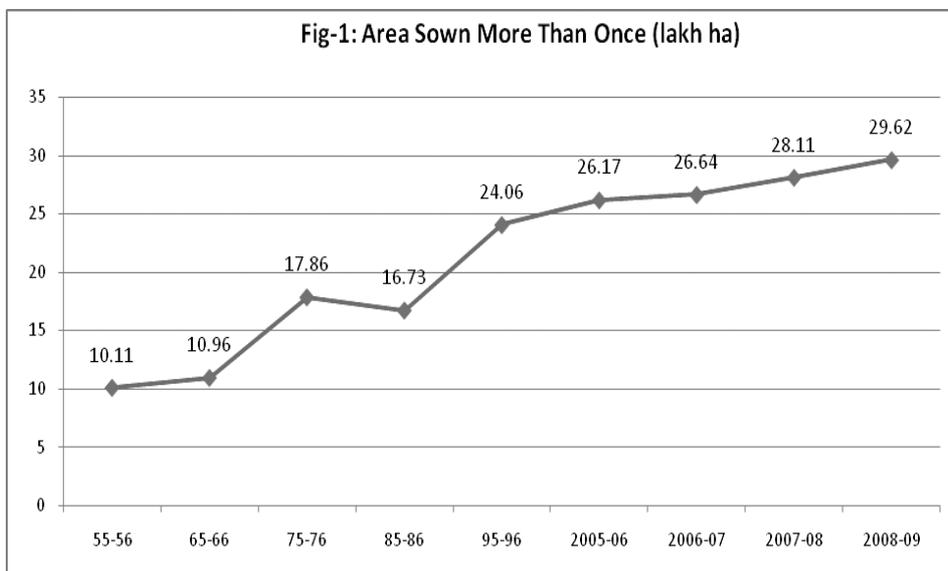
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<sup>5</sup> The state is divided into three regions, Coastal Andhra, Telangana and Rayalaseema based on historical administration and socio economic and cultural factors and agro climatically into five zones: North Coast, South Coast, North Telangana, South Telangana and Rayalaseema.

the regions of Telangana and Rayalaseema. Thus, whether in the resource poor dry regions or in the resource rich delta regions of the state, there has emerged a large proportion of "chronically disempowered" peasantry, also socially backward who lack the wherewithal and incentive to make the necessary productivity enhancing investments (see Reddy DN, 2007). There is a need for a policy to revitalize the disempowered peasantry.

### Crop Diversification and Productivity

As seen earlier, there has not been a significant improvement in the NSA and in-fact; there is a marginal decline in the net sown area (NSA) and the fallow land increased overtime in Andhra Pradesh. The NSA in coastal Andhra has increased marginally but there has been a decline in Rayalaseema and Telangana regions over the years. Area sown more than once has increased considerably from 10.11 lakh hectares in 1955-56 to 29.62 lakh hectares in 2008-09 - nearly 200 per cent over 1955-56 (see Fig-1) at the state level. It all happened due to increase in the net area irrigated area irrigated more than once (from 4.53 to 19.20 lakh ha) and thus the intensity of irrigation at the state level rose from 1.16 in 1955-56 to 1.40 in 2008-09. Cropping intensity is one of the indicators for assessing the efficiency of agriculture sector where availability of irrigation becomes an important factor for determining the cropping intensity.



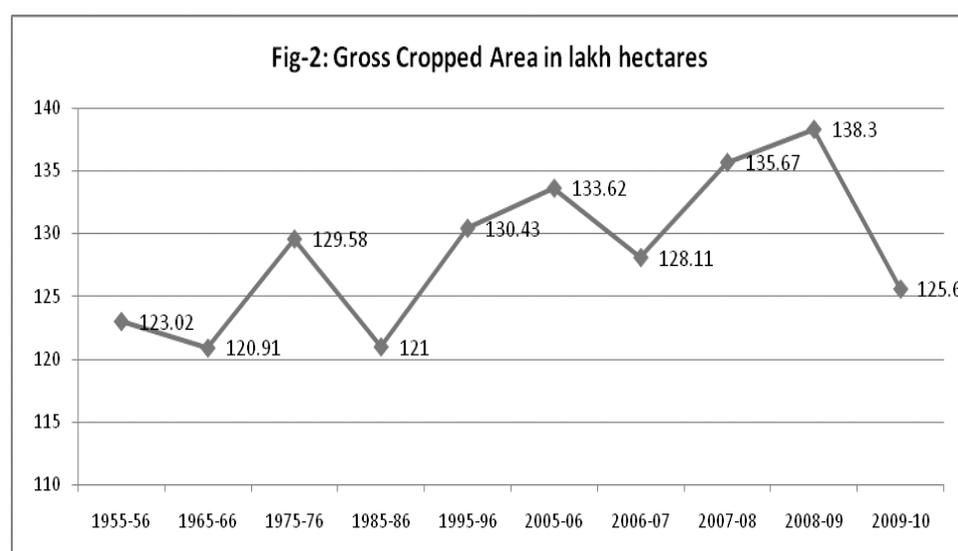
Cropping pattern is the proportion of gross cropped area covered under different crops in an agricultural year. It is mainly determined by the availability of irrigation, rainfall,

range of temperature and humidity and the nature of the soils. Gross cropped area of Andhra Pradesh had increased from 123.02 lakh hectares in 1955-56 to 125.60 lakh hectares in 2009-2010. There is a steep fall in the gross cropped area in the year 2009-10 i.e. from 138.3 lakh hectares in 2008-09 to 125.60 lakh hectares (see Fig-2). The data further show that there is a shift in cropping pattern from food crops to non-food crops. Though rice is the major food crop in the state, it is seen that the area under cereals and millets has decreased steeply while there is a substantial increase in the area under non-food crops. The major non-food crops shown an increase are: cotton, which has increased from 4.07 lakh hectares in 1955-56 to 14.0 lakh hectares in 2008-2009; groundnut - increased from 12.40 lakh hectares in 1955-56 to 17.7 lakh hectares in 2008-2009 and sunflower which was not grown in 1955-56 increased to 4.2 lakh hectares in 2008-2009 (Table-3).

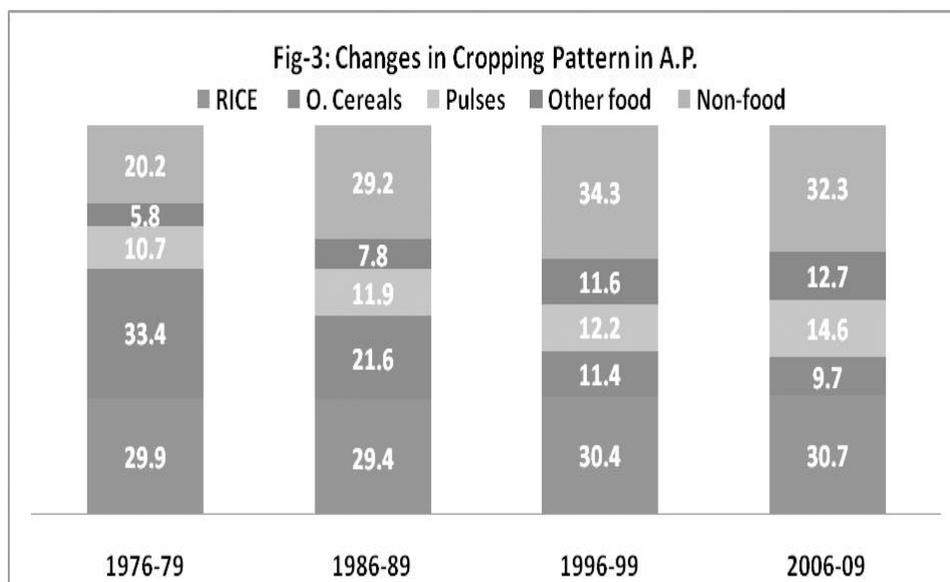
**Table-3: Share of Major Crops Grown in Andhra Pradesh During 2008-09**

Sl. No	Crop	Percentage in total gross cropped area	Percentage of area in gross irrigated area	Percentage of area irrigated under crop to total area cultivated under that crop
1	Rice	31.6	63.0	96.85
2	Groundnut	12.7	4.4	16.65
3	Cotton	10.1	3.8	18.23
4	Maize	6.1	6.3	49.41

Source: - Directorate of Economics and Statistics, Government of Andhra Pradesh



Rice is the principal crop cultivated in over 31.6 percent of the total cropped area of the state in the year 2008-09 and it is mostly grown as an irrigated crop. To be more specific, 97% of the total area under rice was irrigated and it accounts for 63% of the total irrigated area under all crops. Sugarcane is mostly irrigated but grown in limited area accounting for 2.3 per cent of total cropped area and 4.8% of gross irrigated area. Chillies is another important irrigated crop (83%) but its coverage is about 1.5 per cent of gross cropped area and 2.5 per cent of gross irrigated area. If we look at the figures of 2008-09, area under groundnut is 12.7 per cent, second most important crop in terms of area (after rice) followed by cotton (10.1%) and Maize (6.1%). All these four crops put together constitute 60.5 per cent of the total cropped area. Nearly half of the area under maize is grown as an irrigated crop. It accounts for 6.3 per cent in the gross irrigated area. In terms of growth of area of important crops such as maize; cotton; redgram; Bengalgram and sunflower during the period 1980 to 2008 clearly indicate a significant growth at 1% level. There is no significant improvement in the area under rice and groundnut. The increase in the area (but not significant) is seen even during the period 2004-08 with respect to rice, maize; groundnut; cotton and Bengalgram. Area under cereal crops shrunk drastically from 63% during 1976-79 to 45% in 2006-09 (Fig-3). Most of the decline in the area under foodgrains is due to the reduced acreage under 'other cereals' crops (coarse cereals like Jowar, Bajra, etc.). The share of the area under other cereal crops declined drastically from 33% to 10% in last thirty years. The share of area under rice, which is a major crop, has been stable at 30%. Share of area under pulses increased marginally from about 11% to 15% during the thirty years. Consequently, the share of the foodgrains declined from 75% during triennium 1976-79 to 55% during 2006-09. On the other hand, the share of other food crops (chillies, sugarcane, fruits and vegetables etc.) nearly doubled from 6% to 13% during this period. If we look the trend of cropped area, A P is gradually diversifying its crop production more in favour of high- value commodities such as fruits, vegetables, fisheries etc. Within the important crops, area under rice has increased from 25 lakh hectares in 1955-56 to 44 lakh hectares accounting for 176%; area under maize has increased from 25,000 hectares in 1955-56 to 4.21 lakh hectares in 2008-09. Similar trend is noticed in the case of pulses, groundnut and cotton. The increase in the area under maize cultivation can be attributed to the boom in the poultry sector. In all, by the end of 2008-09, 48.6 per cent of the cropped area was irrigated as against 26 per cent in 1955-56. Increased irrigation has led to an impressive growth in the agriculture sector in the state. The adaptation of improved varieties and fertilizer consumption has gone up along with irrigation development. Thus it is clearly established that these four crops (rice, groundnut, maize and cotton) accounting for more than 60 per cent in terms of area deserves much policy attention in increasing the volume as well as the value of outturn.

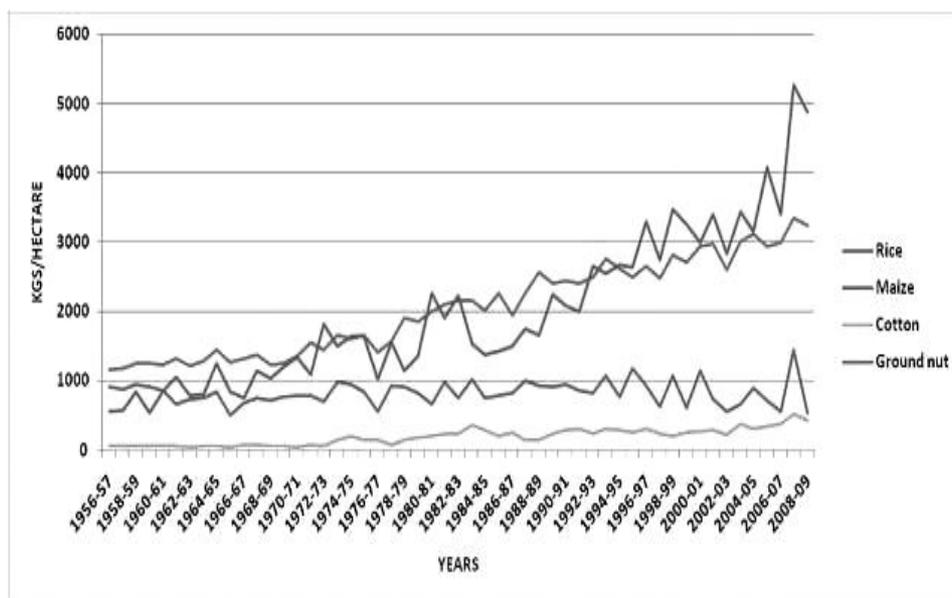


Historically, Andhra Pradesh witnessed considerable change in the cropping pattern since formation of state having implications to agricultural growth. As emphasized earlier, rice, groundnut and cotton emerged and remained, as the major crops in the state, together accounting for nearly 50 percent of the total cropped area. All regions, except North Coastal Andhra, experienced increase in the area under rice. While North and South Telangana experienced increase in area under cotton, for Rayalaseema it was area under groundnut. The growth in the area of rice during the period 1980-2008 show a significant decline (at 10%) in Rayalaseema region while the change is insignificant in other two regions. At the district level, the increase in the area under rice is highly significant in Warangal, Khammam and Karimnagar - all in Telangana region as against highly significant decline in Krishna and Chittoor districts. Similarly, there is a significant increase in the area under rice in Vizianagaram, Visakhapatnam, East Godavari and in-turn coastal region during the short period of 2004-08. A highly significant growth in the area of maize is observed in all the regions and in all the districts except in Nellore during the long term period of 1980-2008. It is true with Srikakulam, West Godavari, Guntur, Nellore, Kurnool, Chittoor and in Costal and Rayalaseema regions even in the short period of 2004-08. On the other hand, the area under groundnut showed a significant decline in all the regions except Rayalaseema which show a significant increase during 1980-2008. All the increase in Rayalaseema during 1980-08 came from Anantapur district which alone showed an increase as against all other districts in the state though the trend showed an increase but not significant in all the regions during 2004-08. Telangana region turned out be a cotton region in both the periods. Interestingly, there is a significant increase in the area of redgram, bengalgram

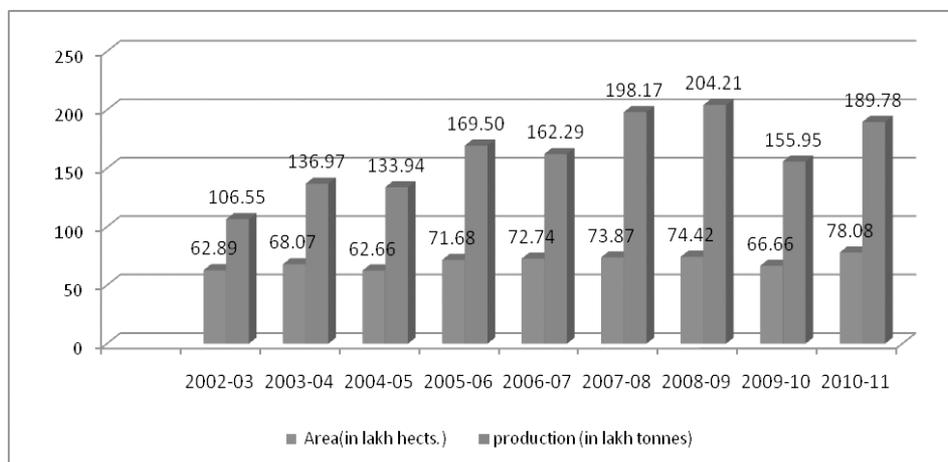
and also sunflower. Though overall area under cultivation has fallen, crop diversification has contributed to the agricultural growth.

However, in terms of changes in the yield there was a sluggish growth in rice yield, more so in AP than in other major rice-producing states in the country since early 1990s. Groundnut, a major oilseed crop in the state in both production and area, is mostly cultivated under rain-fed conditions and hence are vulnerable to vagaries of monsoon. It also resulted in a negative growth rate of yield; hence the levels of production have been highly volatile and showed a dismal performance in the nineties. Cotton was cultivated in the state under rain-fed conditions in certain dry regions; there was also spread of cultivation of hybrid varieties of cotton as an irrigated-dry crop, beginning with the late 1980s. In the early 2000s, the area under cotton declined, but there is a substantial increase in the rate of growth of productivity. The productivity of maize has also increased substantially especially during the last decade (Fig-4). There was a slow growth in rice yield after 1990s and showed some improvements only in the recent years. Though state as a whole recorded an increase in the growth of production of rice in recent years, it came mainly from the coastal region where area under rice increased. In the case of production of total foodgrains, the state witnessed a decline in 2009-10 and modestly increased in 2010-11 but not to the level of 2008-09 (Fig-5).

**Fig-4: Trends in the Crop Productivity in Andhra Pradesh**



**Fig-5: Trends in Area and Production of Foodgrains in Andhra Pradesh**



However significant increase in production of maize (both in long term and in short term) is contributed by both area and yield. As indicated earlier, groundnut experienced volatility both in the area and in production. Anantapur, a groundnut district, recorded a significant increase in area in both the periods though showed negative growth (though not significant) in production. There is a significant deceleration in the growth of yield of cotton in both Coastal and Rayalaseema districts and improvements in production driven by the increase in area. Though there is a significant increase in the area, production and productivity of redgram during the period of 1980-2008 but showed decline (but not significant) during 2004-08 and it is true, by and large, across all the districts in contrary to the bengalgram which showed a positive sign in production and productivity even in the short run (2004-08). Sunflower crop is emerging in the recent past in Coastal and Rayalaseema districts and also in some areas of Telangana region.

To sum up, evidence shows that there are three distinct phases in the performance of agricultural sector in Andhra Pradesh. The first phase covering 25 years from 1955-56 recorded a high growth rate hovering around 3.5 per cent per annum. Deceleration started in the second phase i.e. eighties though the growth rate was respectable at 2.66 per cent, in addition to the fact that it was significantly higher than population growth (Subramanyam et al 2006). Perhaps, the spread of HYV technology across the regions and all classes of farmers brought convergence with respect to productivity during this phase, resulting in maintaining a respectable growth rate (Reddy, PP 1997). However, during the period of nineties to 2004-05, the performance of agriculture witnessed a steep fall in the growth rate i.e. 0.34 per cent per annum. The deceleration was not very high till 2001 maintaining a growth rate of 2.4 per cent per annum, but the rate of

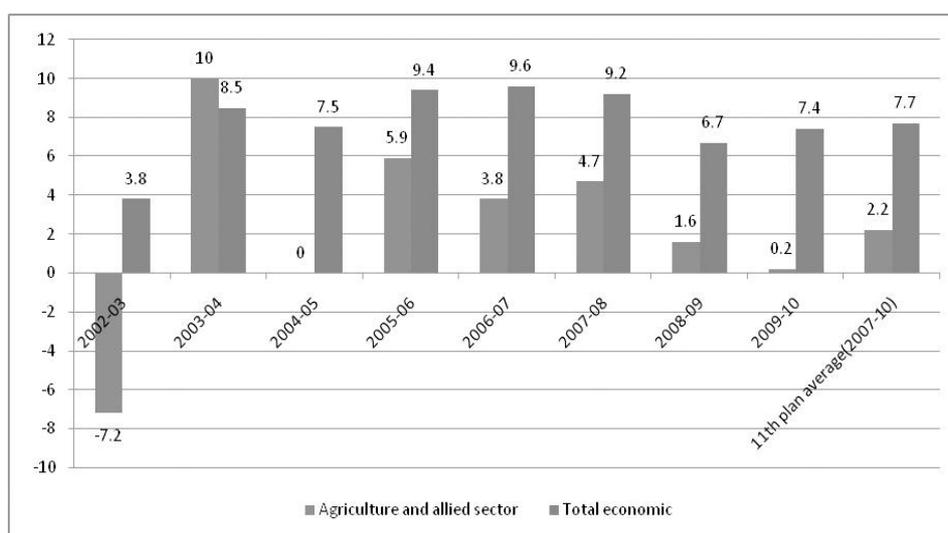
decline was very steep after 2001 though it was statistically insignificant. The crisis which started in the nineties became serious in the subsequent years and showed signs of improvement after 2004-05. The pertinent question arises is: which crops contributed for the deceleration of growth rate and the resultant crisis? The rate of growth of yield in rice which performed well in 1970s and 80s fell to 0.36 per cent during the period 1991-92 to 2004-05 and recovered after 2004-05 recording the production of 117.04 lakh tonnes in 2005-06 and increased to 142.41 tonnes in 2008-09, while other cereals like jowar, bajra, ragi exhibited dismal performance. On the other hand, the growth rate of maize picked up in nineties and continued to increase in the present decade registering the production of 14.86 lakh tonnes in 2002-03 to 41.52 lakh tonnes in 2008-09 and 26.65 lakh tonnes in 2009-10. Bengalgram is the only crop among grams showed a positive performance. Pulses too recorded positive growth. The most important crop i.e. groundnut, occupying second position in terms of cropped area and accounting for a major share in Rayalaseema region, showed a dismal performance in the nineties (-5.64\*\* per cent) and continued fluctuations in the present decade. Similarly, cotton another important crop in terms of gross cropped area of the State showed a steep deceleration in the growth rate of production during the period 1991-92 to 2004-05 and recovered thereafter registering an increase in production from 21.90 lakh bales in 2004-05 to 35.69 lakh bales in 2008-09 and 28.83 lakh bales in 2009-10. Thus, the deceleration in the growth rate of crops like rice, groundnut and cotton contributed for the overall poor performance of agriculture starting from the nineties to first half of the present decade. Despite the poor performance of agriculture in the state, the workers dependent on agriculture has not declined significantly as stated earlier highlighting the significance of sector and the gravity of the crisis in the sector. The net result is high rural indebtedness in the state. The NSSO data (2003) and CESS field surveys in the later part of the present decade indicate that the incidence of indebtedness among rural households in AP is as high as above 80 per cent as against 48.6 per cent at the national level highlighting the severity of the crisis faced in the state. Further, nearly three fourths of outstanding loan for small and marginal farmers in the state is from informal sources like traders and moneylenders who charge exorbitant rates of interest. On the other hand, most of the formal loans are for mere book adjustments and loans for production purposes are taken from private sources.

### **Strategies for Growth of Crop Sector in 12th Plan**

The entire gamut of discussions on the historical trends in the growth of crop sector should give us lead to estimate the growth prospects in 12th five plan. It is clearly observed that high economic growth and agricultural growth in the state are going

together (Fig-6). The 11th plan projections clearly indicate a fairly respectable economic growth despite two agriculturally bad years. With the rich experience in these fluctuations, we should aim to achieve a fairly good target in the agricultural production in the 12th plan. Then which are the possible areas to focus for higher growth prospects? Broadly there are two main sources of growth in the crop production viz., one set of factors affects production through growth and use of area under various crops. The other set of factors affect production are: changes in productivity which include technological changes embodied in factors of production like seeds, fertilizers, pesticides and machinery, cultural practices, technical efficiency of the farmers, quality/fertility of soil, and climatic conditions of the area. District wise analysis identifying the above factors wherever possible/feasible will give a thorough understanding to propose an action plan for increasing the overall agricultural production in the state.

**Fig-6: Trends in Growth of Agriculture Sector and Total Economy**



#### a. Underutilization of Land

Net sown area has not shown any significant improvement and in-fact area under current fallow and other fallows has gone up from 25.91 to 40.60 lakh hectares which represents about 40% of the net area sown. The extent of under-utilisation in AP is hovering between 28 and 33 per cent of the cultivable land as against 21 per cent at the all India level. Current fallows can be left out as it depends mostly on year-to-year rainfall and also due to the reason that it is a part of the crop rotation system followed by the farmers. Even after taking out this component, the extent of under utilization is about 14 percent, which is substantial in a land hungry, and poverty stricken country. Efforts

have to be made to bring this land under plough to boost the agricultural production. The extent of underutilization is higher in the drought prone districts viz.,Prakasam, Anantapur, Kadapa, Kurnool, Mahabubnagar, Medak, Nalgonda and Ranga Reddy and its magnitude has increased over the period. The district wise analysis did not provide any strong evidence regarding the importance of rainfall in determining underutilization of land, and on the other hand, economic and technological factors seem to play a dominant role. Evidence clearly showed that intensive cultivation lead to more underutilization. Small farmers seem to follow extensive cultivation practice when compared to large farmers. This strengthens the case for land distribution if the objective is to bring more area under cultivation. It is therefore necessary to bring the underutilized cultivable land in to cultivation with appropriate technology and growing crops suitable to the agro-climatic conditions of the districts especially in the above said drought prone districts to enhance the agricultural production. The suggestions of expert group on agricultural indebtedness are worth mentioning. The NREGP can be linked to the development of wastelands, and arrest land degradation in marginal lands. The group further opined that agricultural growth is determined by both expansion of gross cropped area and improvement in yields. It has to be driven home that land is scarce and its utilization is far from satisfactory.

#### **Emergence of Small farmer economy**

The institutional changes, market process and mutation of ownership have together brought two remarkable changes in the landholding structure in the state overtime viz., increased proportion of small-marginal holdings accounting for 83 per cent of the agricultural operators and with almost half the area under cultivation; and growing proportion of agricultural labourers. As Dev rightly pointed out, small and uneconomic holdings are at the root of many difficulties in the way of agricultural development and farmers' incomes. This has been re-established from the studies of CESS and field studies clearly indicated that per unit cost of cultivation is always high in the case of small and marginal farmers and the returns are much lower compared to the medium and large farmers. The state has experiences in cooperative farming and the example is Deccan Development Society in Medak district and the NGO used many existing government schemes to help the poor women farmers and the cultivation is done jointly. Contract farming is also expected to overcome the inherent disadvantages of small farming in terms of technology transfer, assured market, price support and crop diversification to high value crops. But there is a need for a system in place to safe guard the interest of the small farmers. Andhra Pradesh has rich experience in organising the poor through SHGs and their federations. Small farmers are to be encouraged to form

groups and register to get the benefits as institution like SHG model. In this system government should act as facilitator and all the decisions are taken by the farmers as group which would facilitate to improve their skills with markets, formal institutions etc. With the collective approach, there is likelihood of higher production at lower cost.

#### **b. Tenancy Reforms**

There is a consensus that agriculture need to grow at 4 per cent per annum and the growth should be pro-poor. To achieve the contemplated growth, there is a need for crop diversification, rise in the cropping intensity and yields and it would require additional investment. As expert group rightly pointed out tenancy reforms are necessary to improve security of tenure and in-turn strengthen the position of marginal farmers. Efficient lease markets may solve to some extent the problem of fragmentation of land holdings and make a large number of land operations viable. With the secured tenancy, capital investment can take place in improving the quality of land and in turn production. Recent orders of the Government of AP on tenant farmers are a welcome step i.e. issuing loan eligibility cards to the tenant farmers to access institutional loans for cultivation. Data show that during 2010-11, 2.67 lakh tenant farmers were enrolled and out of which 95,360 were extended credit of Rs. 190.08 crores.

#### **c. Accessing the existing government programmes**

Under aegis of rural development department, horticulture is promoted utilizing the NREGS for small and marginal farmers belonging to BPL families from 2007-08. It is 100% subsidy programme including drip installation and maintenance of plantation for 3 years. The plantation of mango, sweet orange, sapota, and cashew are given priority. With the installation of drip irrigation, farmers could get returns through inter crop till the horticulture plantation reaches commercial age. In the year 2008-09, 2.13 lakh acres are taken up for plantation (see annual report of dept of rural development, AP). In addition to this, with the help of NREGS, development of assigned land is being taken in big way. An extent of 10.12 lakh acres of land belonging to SC/ST/BPL families lying fallow has been developed. Land leveling, silt application, clearance of bushes, deep ploughing are some of the activities that can be undertaken with the existing NREGS. Majority of the districts have been benefited under this scheme. Rainfed agriculture which is experiencing environmental degradation, the proposed National Rainfed Areas Authority is a welcome step.

#### **d. Rising dependence on markets and alternate approach**

Use of modern inputs like improved seeds, fertilizers and pesticides, is high in Andhra Pradesh, compared to the rest of India. Purchased inputs form the dominant part of the

total inputs used indicating increased dependency on the markets for the inputs (Galab and Reddy, 2007). Though this is true across all the agro ecological zones<sup>6</sup> and class of farmers, farmers across zones interact differently with the input markets. Inputs are procured broadly in two different ways - cash as well as credit. A majority of the farmers irrespective of the zone and the class or social category of farmers purchase inputs by cash. However the percentage of farmers procuring inputs on cash is relatively low in the cotton zone (northern Telangana) which has implications on cost of production as interest rate varies across sources of borrowing. Besides the disbursal of formal credit varies across regions, it is more pronounced in south Coastal Andhra and Rayalaseema. According to a survey of farmers' situation across agro ecological zones, farmers from 90 per cent of the villages in cotton zone revealed that new loans sanctioned by formal institutions are in the form of book adjustments to repay the old loans. Similarly, farmers from 75 percent villages surveyed in groundnut zone and 66 per cent of villages in paddy zone reported book adjustments. This process of 'book adjustment' has not facilitated the farmers with formal credit to invest on working capital, besides also leading to accumulation of old loans from the formal institutions as new loans. As a result the farmers were forced to contract high cost credit from informal sources. Though dependency on informal credit institutions is a common phenomenon across the zones, this is more so in Rayalaseema and northern Telangana. This reveals that the backward regions with commercialized agriculture depend more on informal credit institutions. This unequal pattern of credit disbursal has been accelerated in the context of credit policy, which resulted in lower volumes of credit flows into the rural areas. Similarly credit access to marginal and small farmers, is less across all zones (Galab and Reddy, 2007). Credit from informal sources forces them to sell off produce at un-remunerative prices. It is also evident from the studies that the private lenders collect interest equivalent to one year period at the time of advancing the loan even though the farmers repay the loans before stipulated period. On the other hand in the case of procurement of inputs through credit large proportion of farmers resorted to output-linked credit purchases thereby resulting in higher input costs and lower output price (Galab and Reddy, 2007). Thus the structural changes taking place in agriculture have resulted in large number of disempowered farmers cultivating high value non-food crops with increased capital and current investment and lesser support from formal institutions. In this process the resource poor farmers particularly in dry land areas became the most vulnerable. To overcome this, state has to intervene actively and support the formation of farmer based

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<sup>6</sup> Andhra Pradesh is classified into five agro ecological zones the North Coastal, South Coastal, North Telangana, South Telangana and Rayalaseema.

institutions for collective action and also to support these institutions to negotiate with markets. This nurturing collective institution of farmers will solve many underlying problems with small farming. Collective procurement and marketing interventions under Indira Kranthi Patham (IKP) have boosted the confidence on institutions. For instance, volume of collective marketing started in the year 2001-02 with 622 tonnes has increased to 592998 tonnes in 2008-09 and in terms of cash it is 0.75 crores and 492.12 crores respectively. These efforts should be replicated to enhance the agricultural growth and returns to farmers.

Another innovative marketing is through Rythu bazaars, and these farmers' markets have to be replicated so that farmers would get major share in the consumer price. ICRISAT study on Rythu bazaars clearly established that producer is getting 83 to 90 per cent in the consumer price. Establishment of low cost cold storage units in these bazaars' would help the producers to store unsold produce for the following day.

#### **f) Productivity and Prospects for Higher Production**

We have assessed earlier the changes in the cropping pattern, crop wise changes in production and productivity over a period of time at the state as well district level. Our present analysis, other studies and interactions with departmental officials and notes/reports prepared by the department have all revealed that the following crops have the potential to contribute substantially to the GSDP. In addition to these crops, high value crops like fruits and vegetables can also contribute considerably. The potential crops are: i) Rice, ii) Groundnut and other oilseeds, iii) Cotton, iv) Sugarcane, v) Pulses and vi) Maize besides high value crops. Now the objective is to explore the possibilities of achieving higher production of the above mentioned potential crops. The main thrust in this sub section is to identify crop wise potential yield at the state level and to assess which are the districts lagging behind and to what extent this potential can be achieved. The potential yield considered in this analysis is: i) state average yield of the crop and ii) district level highest yield<sup>7</sup>. We try to compare these two with the average yields of the lagging districts and try to link with the average use of fertilizers by the respective districts to establish whether these districts are using less quantum of this input. We are aware that yield depend upon many factors but there is a consensus in the literature that yields can be improved in those areas where per hectare use of fertilizer is below normal level. Crop wise analysis is given below.

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<sup>7</sup> We deliberately avoided yield obtained by the best farmer as potential yield as it impracticable for general assumption

## Rice

The table given below gives a picture on the yield gap in the rice production. We derived this basing on the total yield (i.e. kharif and rabi).

State normal yield per hectare in kgs (average of 5 years ending 2008-09)	3125
Highest yield at district level per ha in kgs (average of 5 years ending 2008-09)	3633
Number of districts below normal yield at state level	13
Yield gap (highest district average - state normal) in kgs/ha	508

Table above indicate that there is a yield gap of 508 kgs per hectare if we compare normal yield in the district which got highest yield and state normal yield. It means that there is a possibility in other 21 districts to obtain yield on par with this district. If we assume that this is possible, then one can easily derive by multiplying the area in the rest of 21 districts (3658000 ha) with the district level highest yield (3633kgs/ha) and deducting the respective district normal production to arrive at potential production. But we are assuming here similar conditions in all the districts as the rice is an irrigated crop. But as said earlier, yield is dependent on many factors including managerial capacity of the farmer and very importantly on agro-climatic conditions. Even within the agro-climatic zone i.e. south coastal Andhra where Nellore district falls (which recorded highest yield), there is a yield gap of 400 kgs/ha (incomparision to Krishna, a low performing district in south coast) and it works out to 12.4% in terms of percentage. Only two districts from Telangana region are almost on par with Krishna district and the performance in the rest of the districts is much lower. Within north coastal zone (comprising Srikakulam, Vizianagaram and Visakhapatnam); there is a large yield gap of 585 kgs/ha between Srikakulam (2345 kgs) and Visakhapatnam (1760 kgs), a low performing district in the entire state. Similarly, within Rayalaseema region, there is a yield gap of 768 kgs/ha (between Kurnool and Kadapa - the highest and least performing districts within the region). Thus the strategy for higher production should be decentralized keeping the other factors of production in mind.

If we relate the normal yield in the district with that of fertilizer use per hectare in the respective districts<sup>8</sup>, the results clearly indicate the positive relationship between the

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<sup>8</sup> We derived the fertilizer use per ha by dividing the total NPK use in the district by gross cropped area of the district and the figures are triennial average ending 2008-09. However, one should note the data constraint that fertilizer use available at the district level may not be exclusively used for growing rice crop

yield and NPK use. For instance, Nellore and West Godavari recorded highest rice yields and the per hectare use of fertilizer is 293 kgs in Nellore and 350 kgs in West Godavari whereas Visakhapatnam, Vizianagaram, Adilabad and Srikakulam in that order recorded lowest normal yields (1760, 2289, 2297, and 2345 kgs respectively) and also less fertilizer use per hectare (84, 94, 121 and 107 kgs in that order). It is clear that there is a direct relationship between fertilizer use and productivity. Thus, one of the strategies to achieve higher production is more judicious application of fertilizer especially in those districts which are consuming less fertilizer per hectare. The other strategy is following the best practices suggested by the department of agriculture which including selection of suitable seed varieties, growing green manure crops, following optimum plant population, and need based plant protection measures. Another strategy that could be feasible is the promotion and scaling-up of SRI cultivation. On-farm demonstrations by the ANGRAU reveal that SRI performed well with all the existing high yielding varieties (HYVs); 21 to 30 per cent higher yields; lesser use of chemical fertilizers; gross income grew by 28 per cent and net income increased by 40 - 60 per cent and relatively less prone to pest and disease. CESS field study in Anantapur during 2004-05 on SRI cultivation did reveal 28 per cent increase in yield and 32 per cent increase in net returns to the farmer. A P agricultural department notes suggest strategy for up-scaling which include active campaign, intensive training to farmers and extension staff and massive publicity. In addition to this markers and weeders are to be supplied at 50 per cent subsidy to SRI growers as an incentive. Similarly a study conducted in Andhra Pradesh and Tamil Nadu in the year 2008 also positive about SRI cultivation stating that it required only around one fifths of seed rate compared to normal paddy, yields are uniformly higher across all farm sizes, water saving varied from 16-49 per cent in A P and 22-38 per cent in Tamil Nadu, increased net returns and the per quintal cost of cultivation was less by Rs.100/- compared to normal paddy (Barah et al (2008). These are some of the crop specific strategies to upscale the production of rice in the state.

### **Groundnut**

Groundnut an important oilseeds crop occupies second place in the state in terms of area after rice. Though the crop is grown in 21 out of 22 districts, its coverage is mainly based in Rayalaseema region and the crop in the state is mostly rain-fed crop (83%). For instance, if we examine the normal area of five year average ending 2008-09, 82 per cent of the total groundnut crop area is grown in Rayalaseema region and 49 per cent of the total groundnut production is from Anantapur district only. With these details, we would analyze the prospects of higher growth.

State normal yield per hectare in kgs (average of 5 years ending 2008-09)	849
District level highest normal yield per ha in kgs (average of 5 years ending 2008-09)	2503
Number of districts achieved below normal yield at state level	2
Yield gap (highest district normal - state normal) in kgs/ha	1654

Table reveals that there is a yield gap of 1654 kgs/ha if we compare the highest achieved district and state normal yield. Only two districts i.e. Kadapa and Anantapur - both in Rayalaseema fell short of below state average normal yield. Anantapur district has dubious distinction i.e. first in terms of area under this crop and also stood last in the yield per hectare recording 543 kgs/ha - much lower to the normal yield. However, one should be careful in the comparative analysis as the crop is grown under irrigated conditions in some or part of the district(s). It also depends on humidity levels. Given these limitations, we can compare the yield level within the agro-climatic zones and also compare with the contiguous districts. We should also keep in mind the area coverage of this crop in the particular district. For example, the area coverage in Mahaboobnagar, is 89 thousand hectares and the average yield is 1360 kgs/ha and in adjoining district i.e. Kurnool, the crop is grown in 229 thousand hectares and the average yield is 1017 kgs/ha. However, the yield gap in these two districts is 343 kgs/ha and one can assume this as immediate potential. Within Rayalaseema region there is a yield gap of 508 kgs (i.e. 1051 kgs in Chittoor and 543 kgs in Anantapur) which can be presumed as immediate potential. This gives a hope that groundnut production can be increased by firstly setting the targets at zonal level, neighboring districts, and then at the state level. One or two irrigations will boost the per hectare production. In addition to the addressing of these gaps following good package of practices will also enhance the productivity.

Sunflower is another important oilseeds crop emerging in the state. Like groundnut though it is grown in majority of the districts, reasonable coverage of area is in few districts i.e. Kurnool, Anantapur, Kadapa, Prakasam, Mahaboobnagar, and Nizamabad in that order. Though state normal yield is 768 kgs/ha, Anantapur recorded lowest yield of 482 kgs/ha (a gap of 286 kgs) - 59 per cent lower than normal yields. Similarly, in Kurnool, a district with highest in area coverage (172 thousand ha), there is a yield gap of 102 kgs/ha; but if we compare with neighboring district Prakasam (1149 kgs), the yield gap between these two districts is 483 kgs (73% lower). Since, sunflower oil is treated as premium oil within the edible oils, one can expect huge market and in view of substantial yield gap between the districts and even between neighboring districts, there is a considerable potential in achieving higher growth.

### **Cotton**

Cotton is an important commercial crop grown in the state and is third most important crop as per area after rice and groundnut. The area under cotton hovered around 11.5 hectares in present decade, production and yield per hectare shown improvements especially after 2004-05. Though the presence of crop is noticed in all the districts, significant presence is noticed only in Adilabad, Warangal, Guntur, Karimnagar, Khammam, Nalgonda, Mahaboobnagar and Kurnool. In all, three fourths of cotton area is grown in Telangana region. For assessing the yield potential, comparison is made with the neighboring districts provided considerable area is grown in these neighboring districts. For instance, normal yield (average of 5 years) in Guntur is 607 kgs/ha (highest in the state), and the average yield in the neighboring districts such as Khammam (419 kgs/ha), Nalgonda (302 kgs/ha) and Krishna (490 kgs/ha) is low compared to the normal yield of Guntur. Thus it is not unwieldy to project per hectare yield in these districts on par with Guntur district. Normal area of cotton in these districts put together accounted for 262 thousand hectares and if we project with the normal yield of neighboring district - Guntur, the expected production would be to the extent of  $262000 \times 607$  and this is much higher than the existing level. Discussions with senior agricultural scientists reveal that growing of cotton is not preferable in the red soils and is risky but the crop is grown in 61 thousand hectares in Mahaboobnagar district which is mostly red soil. Thus vigorous extension with incentive and disincentive mechanism has to be deployed besides following a set of cultivation practices to enhance the cotton production.

### **Sugarcane**

Like groundnut and cotton, sugarcane is another crop grown in all the districts of the state but the area concentration is limited to few districts. The increase in the yield per hectare is minimal and the normal yield is hovering around 78880 kgs per hectare and it is mainly due to low yields in Visakha and Vizianagaram districts which recorded little above 55100 kgs each. In all the other major sugarcane producing districts, the yield per hectare is higher than the state normal. The variation in yields in major producing districts varied from 96771 kgs (Nellore, the highest) and five out of 10 districts recorded over 85000 kgs. Though all the three districts from north coastal Andhra fall under major producing districts, yield per hectare in Srikakulam is 75286 kgs while in other two north coastal districts, it was 20000 kgs less than Srikakulam. Keeping production conditions in mind and also other factors, the production in these two districts can be brought to the level of Srikakulam and the potential is estimated to the tune of  $60000 \text{ hectares} \times 20000 \text{ kgs}$ .

### **Pulses**

One fourth of the global production of pulses is from India and A P is one among the five largest pulses producer states in the country. Present production in the country is not keeping with the demand and hence, we are importing huge quantities by incurring around 5700 crores. Research has also not made any dent in the improvement of varieties suitable to all soils i.e. drought tolerant varieties. Pulses in the state are mainly sown under rain-fed areas (over 98%) and are suffering heavily from soil moisture stress/drought. Though pulses put together occupy nearly 13 per cent of the cropped area, but the quantity produced is not sufficient to the requirement. Redgram, Blackgram, Greengram and Bengalgram are the important crops under pulses grown in the state. There is an improvement in the yields over a period of time but with wide fluctuations. For instance, the normal yield of redgram at the state level is 520 kgs/ha while Guntur district recorded highest normal yield of 919 kgs/ha; while it is 563; 548 and 523 kgs/ha in neighboring districts i.e. Khammam, Krishna and Prakasam respectively. There is a huge gap between the actual yield and potential yield. Similarly, there is a huge difference between other neighboring districts i.e. Mahaboobnagar (456) and Ranagareddy (682 kgs). Thus there is a vast potential for increasing redgram production. Similarly, there is a scope for enhancement in the production of greengram within the agro-climatic regions though the yield per hectare is not varying across districts as observed in the case of redgram. Krishna district is leading in the normal area coverage of blackgram (117 thousand hectares) and also in the normal yield at the state level (863 kgs/ha). There is a large gap in the yield per hectare between the neighboring districts and also between agro-climatic zones. Given the large gap in the yields, there is a vast potential to boost the production of blackgram. Normal yield per hectare of bengalgram in the state is almost double than the all India level normal yield. Vast gap in the yields within the zone and between neighboring districts indicate a huge potential for enhancing the production of pulses.

In nutshell, keeping in mind the conservation, increasing and retaining the soil fertility, the researchers suggested traditional crop rotation in Krishna - Godavari zone, such as paddy followed by pulses and also going for short duration third crop - pulses, instead of over exploiting the natural resources including water. This would enrich the soil fertility and the farmer will also get competitive net returns per unit of land in view of changes in poverty, in dietary habits and attractive prices for pulses.

### **Maize**

Maize is another important crop grown in all the 22 districts of the state and nearly 50 per cent of the area is under irrigated condition. However, considerable coverage of the

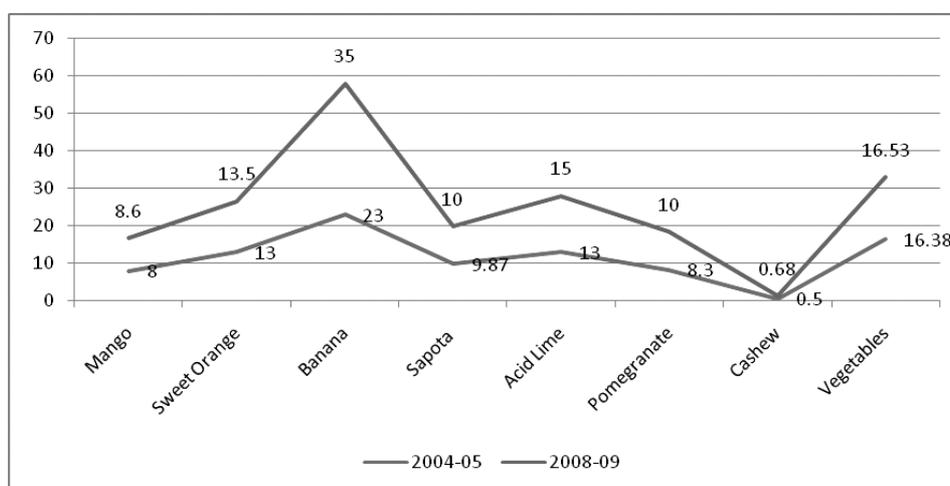
crop confined in 13 districts - 8 in Telangana, 3 in south Coastal and one each in north Coastal and in Rayalaseema. In a span of a decade, area under the crop and also production of the crop has doubled. Yield per hectare of maize in rabi season is almost double than that in kharif season in all the important districts where maize is produced. Perhaps irrigation has a direct positive relation to the yield per hectare. Thus irrigation is one of the prime potential for enhancing the production. Within these major producing districts, Guntur with an extent (normal) of 50 thousand ha recorded a highest yield of 8986 kgs/ha while Mahaboobnagar with coverage of 116 thousand ha has recorded lowest normal yield of 2394 kgs. It is to be noted that almost all the area in Guntur is in rabi season and it is kharif season in Mahaboobnagar. However, there is a large variation in the yield per hectare grown in the same season - whether khari or rabi, among the districts within the agro-climatic zones and between neighboring districts, giving rise to a huge hope for enhancing the production. This enhancement may further boost up if followed the prescribed package of practices in the cultivation.

**g) Prospects in Horticulture Sector (high value crops)**

Having seen the agriculture growth prospects in terms of bringing underutilized land under plough, crop diversification and yield potential in different crops, it is apt to assess the potential of horticulture crops as the crop diversification dealt earlier and existing literature gave us a hint that state is diversifying to high value crops i.e. horticulture crops. National Horticulture Mission has identified the state as having potential to increase exports of major horticulture crops and vegetables. If we look at the area under horticulture crops in the state as a whole, it has increased from 3.7 lakh hectares in 1982 to 16.5 lakh hectares in 2005-06 and to 19.8 lakh hectares in 2008-09. The area thus increased 4.38 folds i.e.438% over 1982. The area in 2009-10 remained more or less at the level of 2008-09. Of the horticultural crops, fresh fruits occupy 47 per cent; plantation crops 19 per cent; vegetables and tubers 16 per cent; spices 15 per cent and the rest by the flowers and medicinal plants. The coverage of horticultural crops is meager in northern Telangana zone (7% to the cropped area) while it is widely spread in all other areas in the state ranging from 20 to 35 per cent in the cropped area. Within the horticultural crops, mango is present in all the areas of the state. Of the total value of agricultural produce in the state, mango, chillies, banana and citrus together constitute little over one fifths of the total value highlighting the importance of horticultural produce and in-turn to the GSDP. NHB data base (2007-08) clearly indicates that the state leads in production of mango, citrus, papaya, tomato and spices at the all India level, stood second in production of fruits and third in flowers. 28 per cent of mango production in India; 40 per cent of citrus and 42 per cent of papaya and 15 per cent of tomato production in India is produced from Andhra Pradesh<sup>9</sup>. Similarly,

A P contributes 30 per cent of production of spices, 17 per cent of fruits and 14 per cent of flowers in the all India production. What led to this substantial jump in the area as well as production? Agro-climatic conditions, enthusiasm of farmers, large net work of both private and public seed agencies and nurseries, and focus of the government might have resulted in the enhancement both in area and production. The departmental sources also indicate increasing tendency in the productivity of horticulture crops in 2004-05 and 2008-09 (see Fig-7). All these indicate bright prospects for high value crops in the state.

**Fig-7:Productivity of Important Horticulture Crops in A P (in M.Tons/ha)**



The district level analysis reveals that the area under horticultural crops especially fruit crops has picked up in the areas where irrigation potential is less and labour scarcity. Our field experience also coincides with this view. For instance, the area under fruit crops has picked up in the present decade in Mahaboobnagar, Nalgonda, Anantapur, and Prakasam. State's policy of promoting horticulture as a measure of risk management also helped in the area expansion. Within the fruits, mango crop occupies an important place and 10 districts of the state occupied 80 per cent of the state's area of about 4 lakh hectares. Adilabad followed by Warangal and Mahaboobnagar recorded highest growth in area under mango. Krishna followed by Chittoor and Khammam evidenced highest share in the mango production. There is a substantial increase in the area of orange in Nalgonda, Mahaboobnagar and Nellore and nearly 40 per cent of orange production in the state is from Nalgonda district. Godavari delta districts garnered highest share in Banana both in area and in production. Interestingly, Kurnool followed by Adilabad and East Godavari had a higher share both in the area and in production of vegetables.

<sup>9</sup> Utilized the data from the ppt of department of horticulture, Government of AP

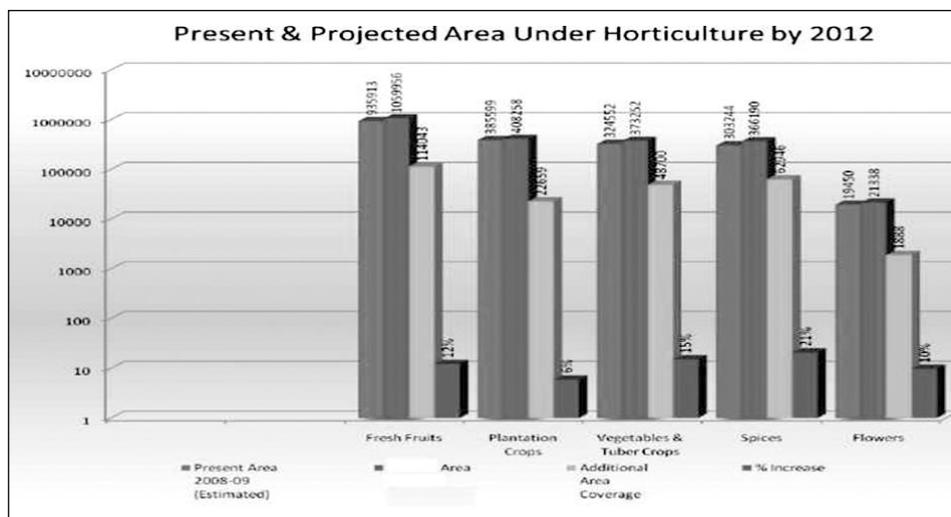
### **Prospects for higher growth**

The analysis and existing literature indicates bright prospects for horticulture (high value) crops. A P is having vast extents of dry/rainfed/underutilized lands and these lands are suitable to grow high value crops. We have already assessed the productivity trends and it gave us a hope for further enhancement. For instance, productivity of mango at the state level is 8.6 MTs per hectare while maximum productivity is in Uttar Pradesh with 12.20 MTs/ha. However, the department estimated a reasonable target of 9.0 MTs/ha. Similar targets are set for other crops and the details are available with the department. The projected area and the targets set are given in the figure below. Within the horticulture crops, cashew, mango, guava and pomegranate crops have huge potential to increase the productivity. In addition, state is gifted with vast tribal belts and as a tribal development programme, these belts can be transformed in to organic clusters to increase production. Efforts of SERP through IKP are evidence to this. State's promotion of horticulture crops with schemes like NHM, micro irrigation projects has benefited the farm sector to a large extent and such support should continue especially in the drought prone areas and also for small and marginal farmers. Establishment of post harvest facilities more so in mango dominated places by APEDA as this crop has export potential. Wide spread marketing outlets may also encourage the farmers of assured market for their produce. There is a need for modification of APMC act excluding horticulture and perishables towards better marketing environment besides amending essential commodities act.

### **Challenges in the higher growth of high value crops**

Despite having high prospects for the horticulture crops, it is not free from bottlenecks. For instance, most of the horticulture area is in dry land areas, unpredictable monsoon and also power supply has become a hurdle in the area expansion as well as improvements in productivity. In addition, substandard plant material, inadequate post harvest management and marketing facilities, weak extension system, wide spread small holdings not so strong cooperative ethos are the main hurdles in the growth of these crops. Our field experience and interactions with farmers with mango growers reveal that the farmers are not getting right price for their produce and the buyers (including pulp and juice industries) controlling the price and thereby farmers are deprived of reasonable returns. There should be price regulating mechanism and the prices should be fixed before the crop harvest. Same is the case with the tomato crop. Wide spread cold storage units to store the perishable produce till the farmer gets right price will result substantial growth in the rural economy. Private sector has to be involved in the establishment of cold storage units in the markets and the involvement of growers' federation in these activities may go a long way.

Projected Area Under Horticulture By 2012 - Through Convergence Approach - RKVY, NHM, NREGS, Watershed & CLDP



#### h) Irrigation

Irrigation is the important input for agricultural growth and having positive relation with the yield per hectare. Figure-8 below indicate increase in the net area as well as gross area irrigated. Net area irrigated increased from 42.28 lakh hectares in 1990-93 to 46.39 lakh hectares in 2006-09, an increase of 4.11 lakh hectares. All the increase is due to expansion of ground water irrigation which is highly susceptible to the monsoon. The distribution of irrigation by source substantiates the inference (Fig-9). Shrinking of tank irrigation followed by canal irrigation is clearly observed. District wise analysis in the figure show that Waranagal, Chittoor, Rangareddy, and Medak do not have canal irrigation facilities and well is the major irrigation source in these districts (Fig-10). In brief, AP is moving towards risky agriculture. There is need to conserve water and also reasonable and long standing returns to investment and explore the possibility of diverting the canal sources in the neighboring districts to at least fill the tanks. ICRISAT study shows that water use efficiency in agriculture is about 35-40%. It could be enhanced substantially by using integrated water resource management approach. Further, rainwater use efficiency can be substantially improved in dryland of the SAT to harness the potential of rainfed agriculture through supplementary irrigation. Micro irrigation and the government support for growing horticulture crops has to be further stepped up as it helps the un-irrigated land and underutilized land in to cultivation. Small and marginal farmers will benefit more with this scheme.

Fig-8: Changes in the Irrigated Area in Andhra Pradesh

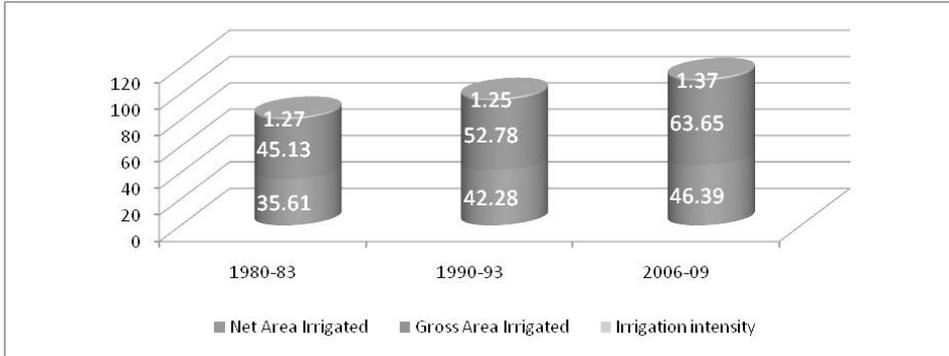


Fig-9: Distribution of Irrigation by Source in A P

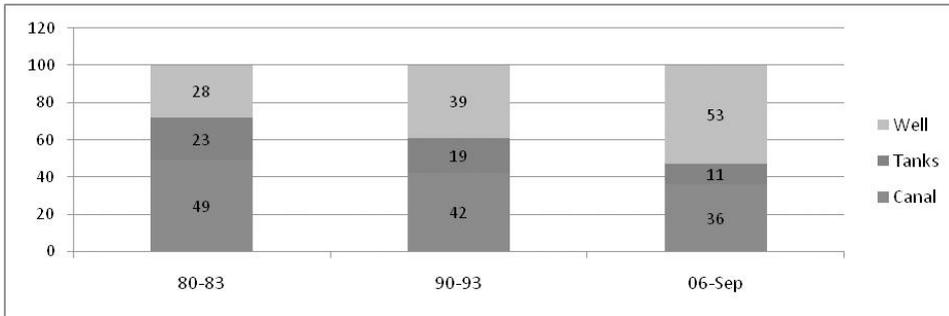
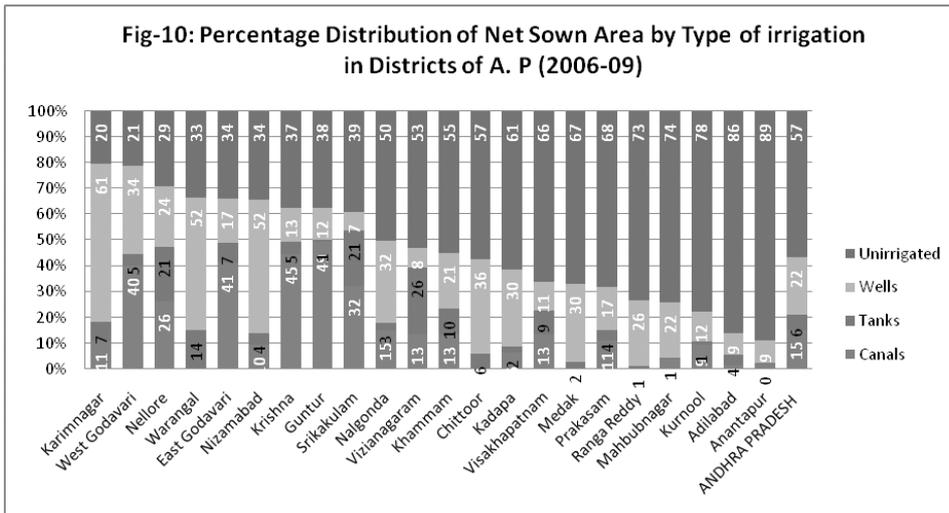


Fig-10: Percentage Distribution of Net Sown Area by Type of irrigation in Districts of A. P (2006-09)



**i) Judicious use of Fertilizers**

Irrigation and fertilizers are very important inputs to enhance production. However, judicious use of chemical fertilizers is much more important for sustainable agriculture. The recommended NPK ratio for balanced and judicious use of chemical fertilizers is 4:2:1. In Andhra Pradesh in spite of increase in consumption of NPK, the ratio is maintained as indicated below (Table-4 and 4a). At the state level, the figures are looking good but at the district level one can observe wide variation. At the all India level, per hectare consumption of fertilizers is high in our state (252 kgs/ha in 2009-10) and is surpassing Punjab.

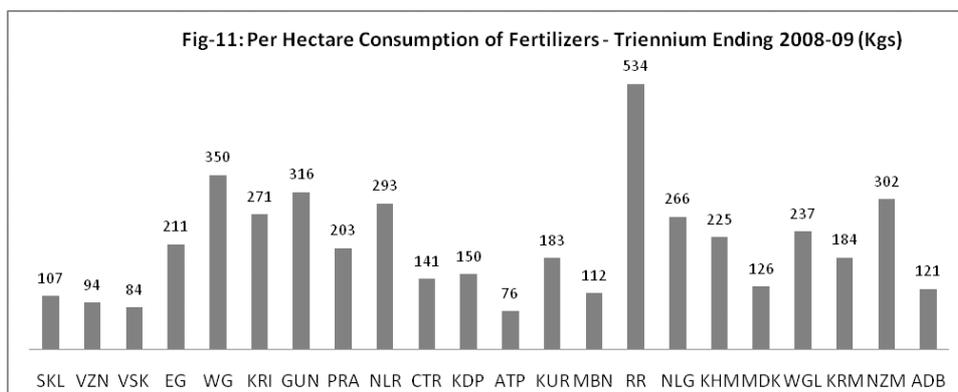
**Table-4: Consumption of NPK -RATIO in Andhra Pradesh**

Year	N	P	K
2007-08	4	2	1
2008-09	3.4	2	1
2009-10	4	2	1

**Table-4a: Per Hectare Consumption of Fertilizers in 2009-10**

State	Per ha consumption of N.P.K. (Kgs / ha)
All India	147
Andhra Pradesh	252
Punjab	239
Tamilnadu	208
Haryana	210

District wise consumption of fertilizers reveals that in 9 out of 22 districts, per hectare use is 150 kgs and below which clearly indicate wide disparities between districts in the fertilizer use (Fig-11). Similarly equal number of districts i.e. 9 out of 22 are using 225 kgs/ha and above and our earlier analysis on yield has shown that fertilizer use has direct and positive relation with yield per hectare. Thus there is a need for more extension as well as training to the farmers in the judicious use of fertilizers. Electronic media may be used for wide publicity to educate farmers on the balanced use of fertilizers. Further, the studies showed that the improvement in the distribution density of fertilizer sale point also facilitates the increase in fertilizer consumption (Hemasundari 2011) and hence efforts should be made for increasing the sale points in those districts where per hectare consumption is low.



**j) Micro nutrients**

Micronutrient deficiency in Andhra Pradesh soils has emerged as one of the major constraints to crop productivity while Zinc, Sulphur, Iron and Manganese deficient areas are vast, copper deficiency areas are also observed in the state. ICRISAT study on micronutrients in APRLP watershed clearly indicated substantial gain in the yields of maize, greengram, castor, and groundnut. The percentage of increase over control crop (non-micro nutrients) is 79, 51, 61, and 28 per cent respectively of these crops. The same study also showed diagrammatically the economic gains per hectare and increased net profit per hectare due to micronutrients (see figure below and Fig-12). Thus, little care will result substantial gains to the farmers and in-turn to the agricultural growth. There is a need for replication of these practices at the farmer level with planned training and extension services.

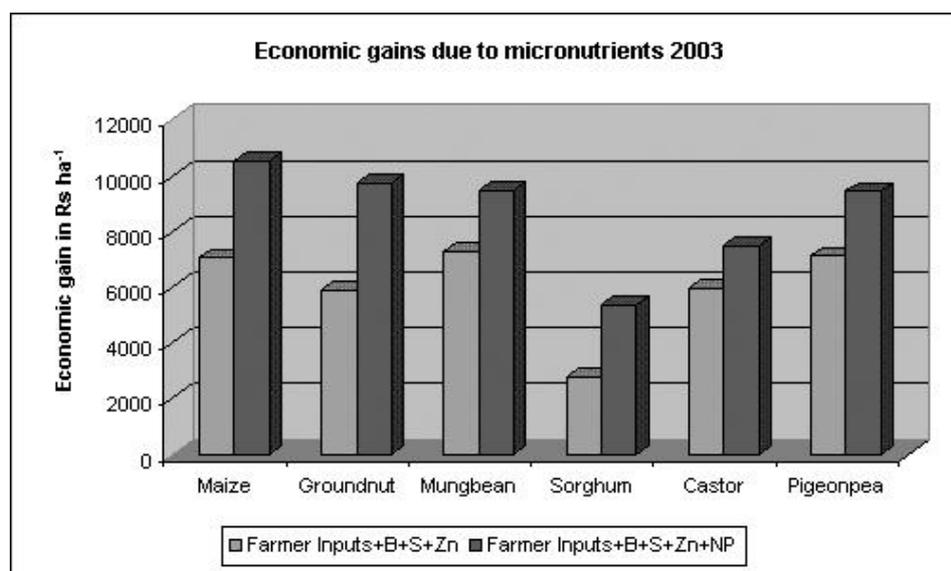
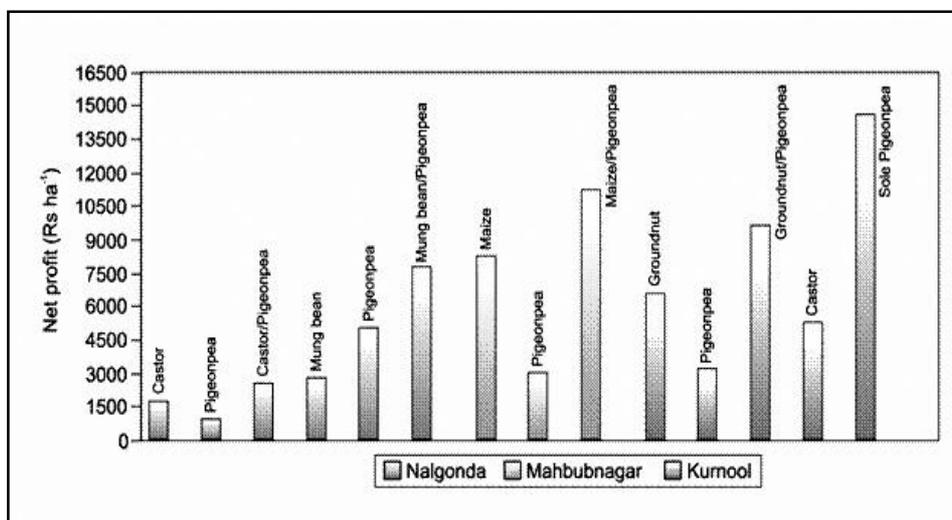


Fig-12: Increased Farmers' income in selected watersheds due to Micronutrients in 2002



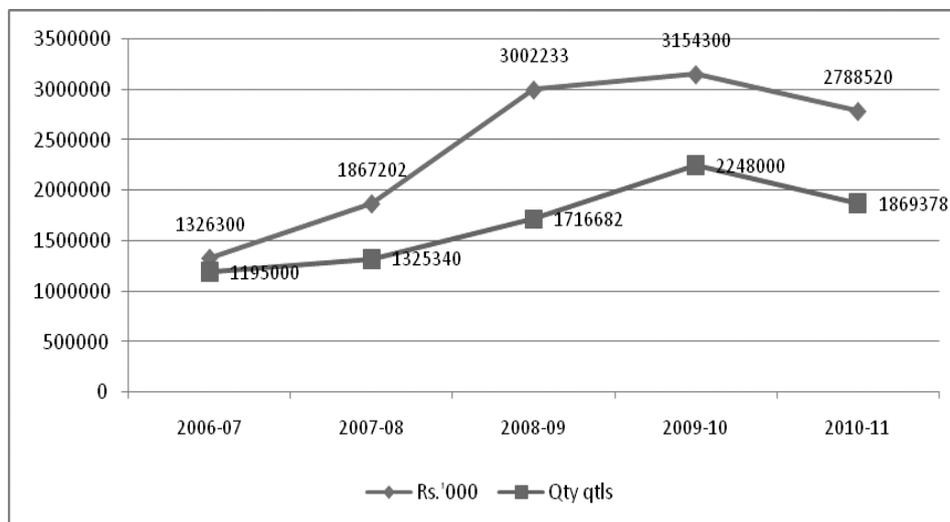
#### k) Seed Management

Like irrigation, fertilizer, and micronutrients, seed is the critical input in enhancing the agricultural production. Quality seeds appropriate to the agro-climatic zones, timely availability, at affordable prices and in sufficient quantities are important to boost the production. All this is essential as we have scarce resource of land and increasing the productivity of existing land is the prime target. The state has an advantage of having huge institutional framework for seed production both in public and private sector. Subsidy seed distribution both in terms of quantity and amount in the state is shown in the diagram (Fig-13). The increasing trend indicates the adaptability of farmers to the improved seeds. District wise distribution of seeds show that drought prone districts have been benefited more. However, in order to achieve higher growth in agricultural production, there shall be continuous efforts to enhance seed replacement rate of various crops. However, there is enough literature and reports on the spurious seeds especially cotton and other commercial crops which caused heavy loss of investment to the farmers. Though there are stringent laws, farmers need enough awareness on these issues.

#### Farm mechanization

Mechanization is another important factor in achieving higher growth. It is important particularly in the context of new methods of cultivation, judicious application of inputs through implements, timeliness of farm operations in the context of scarcity of human and animal labour particularly after NREGS, unexpected monsoon and reduction in

Fig-13: Year Wise Subsidy Seed Distribution in Andhra Pradesh



drudgery to farmers. For instance, weeders in the case of SRI cultivation, paddy harvesters, seeders, tractors, levelers, sprayers are few to mention which are very useful in the agricultural production. As indicated earlier, wide spread small holdings in the state has become an obstacle for mechanization and hence, growers federation in line with the women self help group model with full backup of institutional finance may go a long way, not only in the reduction of per unit cost of cultivation and also in enhancing the overall agricultural production. Hence, continuous research in the innovation of agricultural machinery and implements suitable to our conditions is very much essential in the present context.

#### Community Managed Sustainable Agriculture (CMSA)

Considering serious problems associated with the continued and or excess use of chemical pesticides and fertilizers, Indira Kranthi Patham (IKP) under SERP decided to upscale the NPM into wider regions with community participation and dissemination of knowledge through self help groups and its federations. As per the annual report of the department of rural development, 13.81 lakh acres with 3.18 lakh farmers across 3171 villages in 18 districts of the state have been covered in 2008-09. These NPM activities are undertaken in convergence with NREGS, Total Financial Inclusion, NEDCAP, Soil Forestry, Departments of Agriculture, Horticulture and National Centre for Organic Farming and Health and Nutrition. Important benefits noticed with CMSA are: reduction in hospitalization due to pesticide poisoning; reduced cost of cultivation; reclaiming of mortgaged lands; increase in land lease by small and marginal farmers;

increased cooperation with large farmers thereby savings in the procurement of inputs and arresting of migration; and increase in the productivity of crops. SERP has planned to scale up these activities to 100 lakh acres by 2013-14.

### **Insurance**

National Agricultural Insurance Scheme (NAIS) was introduced in the state from Kharif of 2000. The objectives of the NAIS are to insulate farmers from financial losses and to restore their credit eligibility in the event of crop loss, to stabilize farm incomes during the disasters and thereby encourage farmers to adopt new technology and improved farming practices. During Kharif 2008, the NAIS covered 20 crops. While crop insurance is compulsory for all the farmers taking credit from formal sources, for non-loanee small and marginal farmers a subsidy of 10% is offered on premium. Under crop insurance scheme, a mandal is usually taken as unit for insuring a crop. In order to provide more benefits to the small and marginal farmers the Government of Andhra Pradesh has launched 'village as insurance unit' scheme. Under this scheme village is taken as the unit and therefore is likely to benefit more farmers compared to when mandal is the insurance unit. The scheme was initially launched in kharif 2005 in five districts on a pilot basis and it was extended to all the districts in 2008. One major crop is covered in each district - paddy in 13 districts, Groundnut in 4 districts, Maize in 4 districts and Soyabean in one district. Other crops are insured keeping 'mandal as insurance unit'. The percentage gross cropped area under crop insurance has been increasing gradually from 20% in 2000-01 to 29% in 2007-08. The number of farmers participating in the scheme increased from 20 lakhs in 200-01 to 26 lakhs in 2004-05, but declined to 24 lakhs in 2007-08. During adverse years significant numbers of insured farmers have benefited. In 2002-03, a drought year, the NAIS has benefitted 38% of the insured farmers.

AP's contribution to total foodgrains production in the country was 20.4 MT out of 230 MT at the all-India level in 2008-09. This amounts to a share of 8.9% as against population share of 7.2%. If we take averages of area and production for 2004-09, Rice crop accounts for about 55% of the foodgrain area and 70% of the total foodgrain production in the State

### **Credit**

Total agricultural credit disbursed by banks through their annual credit in 2008-09 was Rs. 19,338 crores, of which Rs. 16,469 crores was towards crop loans and Rs. 2869 crores was towards term loans (Table-5). During the tenth plan, the credit flow towards agriculture was Rs. 13,779 crores at an average of Rs. 11,000 per hectare of cropped

area. During the first two years of the eleventh plan it increased to Rs. 20,994 crores or Rs 15,342 per hectare of cropped area. Indebtedness among farming community is a problem in the state. What is of serious concern is the dominance of informal sources in agricultural credit. Inadequate expansion of formal credit facilities coupled with poor access forced farmers, especially small, marginal and tenant farmers to borrow from informal agencies. In order to improve the credit access to these disadvantaged groups 2.38 lakh RytuMithra Groups (RMG) were formed. The RMGs work on the lines of Self Help Groups (SHG). The RMGs facilitate not only credit linkages but also serve as conduit for technology transfer and provide market information. As a pilot, in 2008-09, 8428 RMGs have facilitated credit linkages to the tune of 175 crores, which also benefited 8238 tenet farmers. However, disbursal of formal credit varies across regions; it is more pronounced in south Coastal Andhra and Rayalaseema. According to a survey of farmers' situation across agro ecological zones, farmers from 90 per cent of the villages in cotton zone revealed that new loans sanctioned by formal institutions are in the form of book adjustments to repay the old loans. Similarly, farmers from 75 per cent villages surveyed in groundnut zone and 66 per cent of villages in paddy zone reported book adjustments. This process of 'book adjustment' has not facilitated the farmers with formal credit to invest on working capital, besides also leading to accumulation of old loans from the formal institutions as new loans. As a result the farmers were forced to contract high cost credit from informal sources. Though dependency on informal credit institutions is a common phenomenon across the zones, this is more so in Rayalaseema and northern Telangana. This reveals that the backward regions with commercialized agriculture depend more on informal credit institutions. This unequal pattern of credit disbursal has been accelerated in the context of credit policy, which resulted in lower volumes of credit flows into the rural areas. Similarly credit access to marginal and small farmers, is less across all zones (Galab and Reddy, 2007). Credit from informal sources forces them to sell off produce at un-remunerative prices. It is also evident from the studies that the private lenders collect interest equivalent to one year period at the time of advancing the loan even though the farmers repay the loans before stipulated period.

Through credit incentive scheme, A P Government have released an amount of Rs.1619 crores under debt waiver and adjusted to the accounts of the farmers in 2008-09. In kharif season 2010, state government has announced 7 per cent interest waiver to all the affected mandals in 16 districts due to natural calamities.

**Table-5: Agricultural Credit in Andhra Pradesh**

Year	Agricultural Credit (Rs. Crores)		
	Term loans	Crop loans	All loans
1997 -98	752	3009	3761
1998-99	826	3502	4328
1999-2000	870	4288	5158
2000-01	686	4184	4870
2001-02	1161	6124	7285
2002-03	2325	8600	10925
2003-04	1117	7902	9019
2004-05	3336	10285	13621
2005-06	2674	13306	15980
2006-07	8047	11297	19344
2007 -08	5350	17300	22650
2008-09	2869	16469	19338

**Export Potential**

Export of agricultural commodities is yet another important factor in the contribution of agricultural growth. Processing and agro-based industries will stimulate the agricultural exports. In other words, rural infrastructure with abundant cold storage facilities and conducive government policies will stimulate agricultural exports. Available data indicate that pulses, groundnut and rice are having demand from other countries. Of these commodities, rice occupies lion share followed by groundnut and pulses. South Asian, East Asian and Gulf countries need these commodities and we are exporting these commodities. It is heartening to note that all the three commodities are the major crops grown in the state of Andhra Pradesh. There is a need for research to invent short duration varieties in pulses and we should also encourage farmers in Krishna - Godavari zone to revert back to old cropping pattern i.e. paddy - pulses and third crop also pulses which would give competitive net returns to the farmers. Similarly, groundnut crop also has to be encouraged in the dry irrigated areas. Price incentive may boost in the growth of production of these crops. Thus the state has great potential for exporting these commodities and should initiate corrective steps not only in the crop production front but also in the marketing of these commodities and with the central government.

**Contract Farming/Growers Federation to reduce cost of cultivation**

With the emergence of small and marginal farmers constituting around 83 per cent, cost of cultivation per unit of land has increased substantially as they have to individually procure different inputs and sell their produce in the market. Modernization of

agriculture and capital intensive agriculture is not viable in the small holdings. Hence, growers' federation/contract farming is best suitable to achieve higher agricultural growth in the state. Existing research on contract farming shows that contract farmers are better off because they are able to save a considerable proportion of the costs of cultivation and in-turn earn more profits (See Gulati et al). Mutual trust and confidence in the farm-firm relationship is the driving point in the contract arrangement. Given the difficulties and farmer-land affiliation, growers' federation may work as an alternative wherever it is difficult to ground contract farming. In either case, a regulatory mechanism to safeguard the interests of the small and marginal farmers is a pre-requisite for success of these arrangements.

### **Price Support and Terms of trade**

Despite CACP announcing support prices for nearly two dozen commodities, procurement is confined in the state to a few crops, mainly rice and to some extent maize. Though the government interventions have been successful in improving the food security especially staple food, it also encouraged farmers to use modern inputs and adopt other new technology measures to achieve higher production. Along with there is a need for the development of market infrastructure and its regulation to control the exploitative practices by the traders. In addition, there is a need for procurement or regulatory mechanism to see that the prices announced for other commodities will prevail so that farmers will have some sort of assured returns and need not be at the mercy of traders.

### **Extension**

Analysis indicated that there is a large gap in the yields within agro-climatic zone and also between neighboring districts and this is mainly due to failure of extension. The existing Training and Visit (T and V) system of extension is top-down in its approach and there is little participation by the farmers. One of the main ingredients of research is extension through the results are disseminated to the farmers and with the total failure of extension; the fruits of research cannot reach poor farmers. This will boost the involvement of private traders to exploit the illiterate farmers in the guise of extension and promote their own substandard inputs. Government should give top priority to strengthen the extension system. The NSSO survey indicates that only 6 per cent are aware of WTO; and only 29 per cent are aware of MSP despite having a huge SHG structure in the state. Efforts should be made to link the extension services with that of SHG federations in the state for wider farm level involvement. The goal is to make extension more market driven; public-private partnership in extension has to be done in a pro-active way.

## **Conclusion**

The performance of agriculture in Andhra Pradesh during the years beginning from 2005-06 showed moderate improvements compared with all India level. Within the agriculture sector in the state, there is substantial growth in GSDP from agriculture and fishing though not sustained same level of growth continuously. The analysis clearly pointed out inter-district variations in the growth showing large scope for development. Similar is the case with the Livestock sector and forestry & logging. Turning to the crop agriculture, the extent of underutilization of land is about 14 per cent in the state, and much more in some of the districts which is substantial in a land hungry, and poverty stricken country. MGNREGS can be linked to the development of these lands, and arrest land degradation in marginal lands. It is clear from the analysis that despite unequal regional endowments, there is ample scope for growth of agriculture sector in the state. Andhra Pradesh has rich experience in organising the poor through SHGs and their federations. Small farmers are to be encouraged to form groups and register to get the benefits such as SHGs. Group farming is expected to overcome the inherent disadvantages of small farming in terms of technology transfer, assured market, price support and crop diversification to high value crops. Further, the tenancy reforms in the state paved the way for secured tenancy, and with this security, capital investment taking place in improving the quality of land and in turn production. Hence such efforts have to be continued and strengthened by plugging the loopholes if any. Rythu bazaars, have to be replicated to facilitate the farmers getting major share in the consumer price besides establishing low cost cold storage units in these bazaars' which would help the producers to store unsold produce for the following day.

A P is having vast extents of dry/rainfed/underutilized lands and these lands are suitable to grow high value crops such as cashew, mango, guava and pomegranate which have huge potential to increase the productivity. In addition, state is gifted with vast tribal belts and as a tribal development programme, these belts can be transformed in to organic clusters to increase production. Along with this, micro irrigation has to be strengthened for sustenance of horticulture and other crops. Wide spread marketing outlets and price regulating mechanism in place may encourage the farmers of assured market for their produce. There is a need for modification of APMC act excluding horticulture and perishables towards better marketing environment besides amending essential commodities act. Judicious use of fertilizers, use of micronutrients, timely access to quality seeds, continuous efforts to enhance seed replacement rate, access to innovative small farmer friendly agricultural implements such as weeders, harvesters, seeders, tractors, levelers, sprayers etc, use of NPM, wide spread crop insurance, timely

access to formal credit, and agricultural research and extension will go a long way in enhancing the agricultural production in a sustainable way.

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