Crop Diversification in Tamil Nadu-A Temporal Analysis

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Introduction

Agriculture is an important sector in Tamil Nadu state economy. It contributed 13 per cent to the state income. Nearly 56 per cent of population in the state is depending on agriculture. It has the net cropped area of 5.12 million hectares and nearly 56 per cent of the area is irrigated by various irrigation sources. It has seven agro climatic zones which are suitable for various crops. Tamil Nadu stands first in productivity of sugarcane and third in groundnut in the country.

Crop diversification is helpful for sustainability of agriculture. Mono cropping affects soil health and creates biotic and abiotic stress to the soil. Introduction of green revolution in late 60's and early 70's to meet the food shortage in the country had adversely affected the cropping pattern in the country. Introduction of fertiliser responsive and high yielding varieties in rice and wheat had converted many states as a mono crop state. After attaining self sufficiency in foodgrain production central and State Government introduced many schemes to diversify cropping pattern to maintain food security. The crop composition further changed by the changes in prices, rainfall and labour availability. In this context, it is necessary to study the status crop diversification after forty years of green revolution. Hence, the objective of the study is to measure the crop diversification over the years in the State.

Methodology

a. Growth Rate Analysis

For the present study, area under major crops in the State for the last 48 years i.e. from 1960-61 to 2007-2008 has been collected from Government of Tamil Nadu publications (Government of Tamil Nadu, 1960-2000). Average area under each crop and share to the total cropped area for each crop were worked out for this study. Compound growth rates of area of these crops were estimated to assertion change in cropping pattern in the state. Exponential function of the following form was used to estimate the growth rate (Gujarati, 1992). It is defined as

$$Y_{it}=A_i (1+r_i)^t \quad \text{(1)}$$

Where,

Yit- Area of i th crop at time t (ha)

r - Compound growth rate of Y_i

A_i - Initial year Area of i th crop t - time in years

By taking natural logarithm of (1),

$$In\ Y_{it} = In\ A_i + t\ In\ (1+r_i) \quad \text{(2)}$$

Now letting

$$a_i = In\ A_i$$

$$\beta_i = In(1+r_i)$$

Equation (2) can be written as

$$In\ Y_{it} = a_i + \beta_i t \quad \text{(3)}$$

Adding the disturbance term to (3), it can be written as

$$In\ Y_{it} = a_i + \beta_i t + U_t$$

Y_{it} = Area of i th crop at time t (ha)

t = time in years

α. = constant term

β = regression co-efficient

This log linear function was fitted by using ordinary least square (OLS) method. The compound growth rate (r) was obtained using the formula.

$$r_i = (Antilog\ \beta_i - 1) \times 100$$

b. Herfindahl Index

Herfindahl index was used to study the extent of diversification in the state. Herfindahl index is defined as:

$$HI=\sum_{i=1}^{n} Pi^2$$

Pi = Proportion of area under i th crop

$Pi = Ai / \sum A_i$

In which Ai=Area under ith crop and $\sum_{i=1}^{n} Ai$ = Total cropped area

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The value of HI index varies between zero to one. It is one in case of perfect specialization and zero in case of perfect diversification.

Result and Discussion

Changes in share important crops

The changes in share of important crops in gross cropped area are presented in Table 1. Paddy has the highest share of nearly 32 per cent in gross cropped area followed by groundnut, sorghum and fruits and vegetable. Share of the major cereals has decreased over the years except maize in the state. The share of paddy has decreased from 32.5 per cent in 1980's to 31.5 in 2000-07. However, the share of maize has increased from 0.34 per cent in 1980's to 2.68 per cent in 2000's. The main reason could be the increase in demand of maize for animal feed in the state. Among the pulses, area under all crops has decreased except black gram and green gram. Share of black gram has increased from 2.64 per cent in 1980's to 4.13 per cent in 2000-07. Similarly, share of green gram has also increased from 1.21 per cent in 1980's to 2.31 per cent in 2000-07. Share of other major pulses like horse gram and Bengal gram has decreased nearly 50 per cent over the years. Share of chillies and onion has slightly improved over the years. Share of sugarcane has increased from 2.88 per cent to 5.13 per cent. The main reason could be the increase in the number of sugar mills and procurement price of sugarcane over the years. Share of fruits and vegetable has doubled in the study period. However, share of groundnut, gingelly and caster has decrease in the same period. In contrast, share of coconut has tripled in the study period. Share of cotton has decreased from 3.42 per cent in 1980-89 to 2.03 per cent in 2000-07.

It is clear from the above discussion that the share of major crops like paddy, groundnut and jowar has decreased over the years in the state. However, share of minor crops like maize, black gram, green gram, coconut and fruits and vegetable has increased over the years in the state. This shows that state is moving towards crop diversification rather than specialisation.

Area Growth of Important Crops

Compound growth rate of important crops is presented in Table 2. It is observed from the table that annual area growth rate of all cereals except maize has grown negatively in the state. Maize has grown 5.88, 10.35 and 17.81 per cent in 1980's, 1990's and 2000's respectively. Growth rate of maize is 10.71 per cent over the study period. Area under bajra, ragi and jowar has grown negatively in the study period. Among the pulses, Black gram and green gram have grown positively and the growth rate is constantly increasing over the decades. Growth of area under Bengal gram has turned positive in the recent years. Growth rate of sugarcane has increased 1.92 per cent in 80's to 3.25 per cent in 2000-07. Similarly, Area under fruits and vegetable has grown 2.4 percent, 3.87 per cent and 3.02 percent in 80's, 90's and 2000-07 respectively. In contrast, Area under gingelly has reduced 5.54 per cent in 2000-07. Similarly, Area under groundnut has decreased nearly 3 per cent in recent years. Area under coconut has increased positively over the years and it has grown 4.91 per cent over the years. But, the area under cotton has decreased in past two decades and area has reduced 5.58 percent in recent years.

Based on the area growth rates of crops in the state, it is evident that the crops are having the major shares like paddy, groundnut and jowar have grown negatively in the state. The crops are having the least share like maize, sugarcane, coconut and green gram have grown positively over the years. This gives further clear picture of crop diversification in the State.

Crop diversification in Tamil Nadu

Results of Crop diversification is presented in Table 3. The index value was 0.17 in 1960-69 and it was reduced to 0.13 in 2000-07. It is clear from the results that the crop diversification is taking place over the years in the State.

Conclusion

It is concluded from the study that the share of major crops like paddy, groundnut and jowar has decreased over the years in the state. However, share of minor crops like maize, black gram, green gram, coconut and fruits and vegetable increased over the years. This shows that state is moving towards crop diversification rather than specialisation. Based on the compound annual growth rate of area of crops, it is evident that major crops like paddy, groundnut and jowar have grown negatively and least share crops like maize, sugarcane, coconut and green gram have grown positively over the years. The crop diversification index value has reduced over the years. Hence, it is concluded from the study that crop diversification has been taking place in the state over the years.

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TABLE 1—SHARE OF IMPORTANT CROPS IN TAMIL NADU

(per cent)

S. No	Crops	1980-89	1990-99	2000-07	Over all 1980-07
1.	Paddy	32.54	31.98	31.50	32.06
2.	Jowar	10.08	6.47	5.66	7.59
3.	Bajra	4.58	2.92	1.76	3.23
4.	Ragi	2.79	2.03	1.87	2.27
5.	Maize	0.34	0.72	2.68	1.08
6.	Black Gram	2.64	3.29	4.13	3.27
7.	Green Gram	1.21	1.58	2.31	1.63
8.	Red Gram	1.31	1.34	0.76	1.18
9.	Horse Gram	2.15	1.47	1.25	1.67
10.	Bengal gram	0.12	0.12	0.11	0.12
11.	Chillies	1.00	1.06	1.15	1.06
12.	Turmeric	0.24	0.27	0.42	0.30
13.	Sugarcane	2.88	4.09	5.13	3.91
14.	Onion	0.31	0.38	0.47	0.38
15.	Fruits and Vegetables	4.56	6.47	9.57	6.57
16.	Gingelly	1.64	1.76	1.29	1.59
17.	Groundnut	13.64	14.58	10.15	13.09
18.	Coconut	2.16	3.48	6.09	3.66
19.	Cotton	3.42	3.55	2.03	3.11

TABLE 2—COMPOUND GROWTH RATE OF IMPORTANT CROPS IN TAMIL NADU

(per cent)

S.No	Crops	1980-89	1990-99	2000-07	Over all 1980-07
1.	Paddy	–2.53	1.06	–0.21	–0.82
2.	Jowar	–0.99	–4.92	–1.84	–3.83
3.	Bajra	–2.45	–6.13	–10.99	–5.92
4.	Ragi	–2.21	–4.61	–4.30	–2.97
5.	Maize	5.88	10.35	17.81	10.71
6.	Black Gram	0.92	2.10	1.13	1.81
7.	Green Gram	1.22	3.07	3.04	2.97
8.	Red Gram	5.43	–6.13	–10.82	–3.78
9.	Horse Gram	–4.80	–5.41	–10.22	–4.00
10.	Bengal Gram	–4.21	1.27	0.26	–1.03
11.	Chillies	–3.37	3.54	–3.31	0.08
12.	Turmeric	3.20	11.34	1.75	2.94
13.	Sugarcane	1.92	3.70	3.25	2.42
14.	Onion	1.12	3.02	0.82	1.67
15.	Fruits and Vegetables	2.40	3.87	3.02	3.33
16.	Gingelly	5.00	–4.76	–5.54	–1.91
17.	Groundnut	2.33	–3.77	–2.97	–2.19
18.	Coconut	5.19	6.12	2.36	4.91
19.	Cotton	2.99	–2.57	–5.58	–3.25

TABLE 3—CROP DIVERSIFICATION INDEX

S. No	Period	Herfindahl Index
1.	1960-69	0.1729
2.	1970-79	0.1646
3.	1980-89	0.1472
4.	1990-99	0.1414
5.	2000-07	0.1305

Labour Use, Farm Size and Productivity Relationship: An Empirical Evidence from Low Hill Zone of Himachal Pradesh

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Abstract

Human labour is an important input and most dynamic agent of production around which the entire production process moves, It dominates our agriculture as most activities are done by hand using traditional tools and implements, Its utilization varies with the size of farms, from crop to crop and place to place depending on the adopted cultural practices, Focusing, specifically, on some selected foodgrain crops which are extensively cultivated in the study area, in particular, the present paper examines the relationship between labour absorption on the one hand and grosses returns, farm size, crop operations on the other; and also the question of the labour productivity in agriculture. The major finding of this study is that at the existing level of technology, labour was employed beyond a point of maximum productivity and there diminishing returns are in operation; suggest that agriculture is not in a position to absorb more labour at the cost of labour productivity. Similarly, the relationship between size of holding and productivity has been the subject of study since the results of farm management investigation. The results obtained from the study pointed out that there exists an inverse relationship between the operational holding and productivity on maize crop, whereas, constant productivity relationship was observed on paddy and wheat crops. When all these, crops were taken together, inverse relationship between the two holds true, In respect of profitability, only small farmers are able to convert their output advantage into net profitability by taking all these crops together. The important policy implication of the analysis is that the consolidation of land holdings formulation and effective implementation of a developmant strategy and management of basic and economic holding in the study area will undoubtedly of primary importance to boost agricultural production, productivity and profitability thereby enhancing the productive employment and well-being of the farm families.

I

Introduction

The population of our country is increasing at a rapid rate leading to decline in land-man ratio and expansionary demand for foodgrain production. In order to fulfill the growing demand, it has been argued that small farms are more efficient in producing most of the agricultural commodities, therefore, land distribution in favour of marginal and small farms is an attractive policy instrument for raising production, improving rural employment and quality of income distribution. No doubt, over the past few years in our country, substantial progress has been made in respect of the performance of agricultural system which relies more on abolition of intermediaries, ownership right, security of tenants and ceiling of land holdings. But in order to formulate the proper policy regarding land reforms, it is equally important to know the exact relationship between farm size and productivity in Indian farming. The debate on the possible relationship between farm size and productivity was stated by A.K. Sen (1962) in India and later on joined by Khusro, A.P. Rao, Rudra, Hanumanta Rao, O.R. Saini and others. Majority of the studies pointed out that there exists an inverse relationship between the farm size and productivity. The findings of Directorate of Economics and Statistics (1955), Khusro (1964), Krishna (1964), Sharma (1971), Bardhan (1973), Bhardwaj (1974), Sankhayan (1978), Saini (1979), Sekar (1994), Chattopadhyay and Sengupta (1997), and Sharma & Sharma (2000) are pioneering in this regard, though they offered different explanations in favour of inverse relationship. On the other hand, a few studies conducted by Singh & Patel (1973), Ghose (1979), Nagraja (1985) and Reddy (1993), showed that inverse relationship between the two has disappeared with the advent of new agricultural strategy which involved HYV seeds, chemical fertilizers, labour saving machinery, modern irrigation equipment etc. However, the studies made by Rao (1967), Rudra (1968), Rani (1971), Vaidya (1993) in case of wheat crop and Singh Bal (1994) indicated that productivity remains constant irrespective of the difference in holding size. In sum, the debate on this controversial issue continues to be a moot point in Indian agriculture.

The new agricultural strategy called the High Yielding Variety Programme (HYVP) introduced in the mid-sixties in our country has caused considerable changes in the trend of area, production and productivity. Though this strategy is confined to a few crops and not with the same vigour in all parts of the country, it favour large farm bias, however upto a limited extent. It is argued that new agricultural strategy has displaced the importance of family

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labour which was considered to be the main determinant of inverse relationship between farm size and productivity. The use of chemical fertilizers, HYV seeds, irrigation facilities along with other infrastructural facilities, process of liberalization, change in tenancy relations, replacement of share tenancy with fixed rent tenancy etc., have profound implication in favour of large farm bias.

Agriculture is the backbone of Indian economy as it provides direct employment to more than 60 per cent of the working population and contributes about one fourth of the Gross Domestic Product of our country. Agriculture is also the largest single industry and main occupation of the people of Himachal Pradesh as 70 per cent of the working population is directly or indirectly depends upon it and about 17 per cent of the gross state domestic product comes from this sector, yet the agriculture sector continues to occupy a significant place in the State economy and any fluctuation in the production of foodgrains/Fruits affect the economy. Such type of dominance of agricultural sector in the employment structure prompts ones' thoughts on the possibilities of absorption of additional labour force in this sector. Several studies [Rao (1976), Ishikawa (1978), Vaidyanathan (1978), Bardhan(1978), Alagh *et al.* (1978), Vyas and Mathai (1978), Pandey *et al.* (1981), Gupta (1981), Gowda *et al.* (1989), Lakshamananet *et al.* (1988)] have made it clear that agriculture sector has a latent capacity to absorb more labour. on the other hand the studies conducted by Singh *et al.* (1981) and Ninan (1984) have put forward the view that possibilities of more absorption of labour force in Indian agriculture is fully exhausted at the present level of technology. The studies conducted by Rathore *et al.* (1981), Verma (1981), Oberai and ahmed (1981), Lakshmanan et al. (1998), Singh (2000) etc., have suggested that labour use decline with the increase in farm size. On the other hand, Naidu *et al.* (1981) revealed that the inverse relation between the two not only disappeared but turned positive. Similarly, Singh *et al* (1981) noted that per acre labour input increase with an increase in the size of holding up to three hectares and after that it decline for all crops technologies. The same findings have been reported by Gupta (1981) and Ninan (1984) too. Therefore, it necessitates for the detailed study on the pattern and magnitude of labour use across farm sizes, crops and region to guide the planners about more absorption of labour force in agriculture. It is in this background, the present paper seeks to analyze the pattern and magnitude of human labour employment potential in selected foodgrain crops and the relationship between farm size and productivity with the following specific objectives :

(1) To study the impact of an increase in agricultural output on labour employment.

(2) To examine the relationship between farm size and labour use per unit of area and to know the pattern and magnitude of labour absorption across different crop operations.

(3) To find out the relationship between labour productivity and employment generation.

(4) To examine whether farm size is an important factor to determine farm productivity and profitability.

(5) To examine the relationship between farm size and productivity.

(6) To suggest remedies to increase foodgrains production, productivity and input utilization in the study area.

II

Data Source and Methodology

For the purpose of present study, the entire state was divided into three agro-climatic zones viz., low-hill, mid-hill and high-hill zones based on the height above the mean sea level. Out of which low-hill zone was purposively selected on account of similar agro-climatic conditions, having good production potential, fertile soil, good roads and communicational network and above all, major foodgrain crops are grown here. Besides, the agro-climatic conditions of the low-hill zone are congenial for the production of foodgrains crops, viz., Maize, Paddy and Wheat, whereas the mid-hill and high-hill zones, the agro-climatic conditions are congenial mostly for the production of horticultural and cash crops like, off-season vegetable, such as potato, cabbage, peas, cauliflower etc. With the help of random mechanism, two districts, Una and Bilaspur, have been selected out of which one block from each district, namely, Una and Ghumarwin respectively were drawn for the present empirical investigation. After that, three panchayats from each block and three villages from each panchayat, thus a total of 18 villages have been selected with the help of multi-stage random sampling. Farms from each selected village were arranged in the ascending order on account of their farm size namely, marginal, small and medium measuring less than 1.0, 1.0-2.0 and 2.0 and above hectares respectively. The data were collected by survey method with the help of pre-tested and well-structured schedule from 200 farms consisting of 98 marginal, 62 small and 40 medium selected randomly on the basis of probability proportional to the number of farms in each size class pertaining to the year 2004-05. Due to the non-availability of data on some minor crops such as pulses, mustard, gram etc. we have concentrated in our analysis only in major foodgrain crops viz., maize, paddy and wheat which are extensively grown in the study area and when all these crops were taken together. In order to meet out the objectives of present work, both linear and log-linear equations were fitted to the data. In addition to this, correlation coefficients have also been used to examine the relationship between labour productivity and

employment intensity. More specifically, the following types of regression equations were fitted to the data :

In order to achieve the objectives of present study we have fitted the following regression equations :

$H = a+b_1 Y$ .. ..(i)

$\text{Log } H = \log a + b_1 Y + U$ .....(ii)

$\text{Log } Y = \text{Log } a + b_1 \log X_1 + u$ .....(iii)

$\text{Log } H = \log a + b_1 \log X_1 + U$ .....(iv)

$\text{Log } M = \log a + b_1 \log X_1 + u$ .....(v)

$\text{Log BTC} = \log a + b_1 \log X_1 + U$ ..... (vi)

Where

H = Per hectare labour input in maize/paddy/wheat/all crops cultivation in standard mandays.

Y = Per hectare output of maize/paddy/wheat/all crops in '.

X_1 = Size of operational holding under respective crop (hectare)

M = Value of manure & fertilizer per hectare (')

BTC = Bullock labour & tractor charges per hectare (')

b_1 = Elasticity coefficient

u = error term

a = intercept term

In addition to this, the differences in the means of gross value productivity of different crops and mean inputs use between different categories of farm were tested with the help of appropriate statistical tools.

III

Rcsults and Discussion

In this section, we shall make an attempt to achieve the objectives of present study. But before going into the analysis of labour absorption, farm size and productivity relationships and its connection with pattern of resource use on farms, it would be appropriate to have an idea of the basic characteristics of the study area across different farm size groups. These characteristics are presented in Table 1 in terms of family size, standard mandays, literacy percentage, sex ratio, farm size, cropping intensity, average yield, per capita income, average propensity to consume etc. indicated that there are large variations across farm size groups.

TABLE 1—BASIC CHARACTERISTICS - SOME SELECTED INDICATORS

S. No.	Indicators	Size class			
		Marginal holding	Small holding	Medium holding	Overall holdings
1.	Family size	5.76	6.09	7.05	6.12
2.	Family work force (per cent)	67.07	69.57	64.18	67.18
3.	Total available mandays (per annum)	1146	1218	1365	1212
4.	Literacy percentage	68.31	69.57	81.20	70.12
	A. Male	79.13	74.16	86.09	77.58
	B. Female	57.83	63.90	75.57	62.01
5.	Sex ratio (at 100 males)	103	80	86	92
6.	Per capita income (')	14902.31	20174.49	22443.31	18266.76
7.	Average propensity to consume	0.77	0.61	0.63	0.68
8.	Farm size (ha.)	0.46	1.26	2.32	1.08
9.	Cropping intensity (per cent)	185.97	179.51	178.9	180.56
10.	Raio of hired labour to family labour	0.03	0.07	0.13	0.08
11.	Irrigation (per cent)	0.14	0.26	0.22	0.22
12.	Tractor (No./farm)	0.07	0.11	0.20	0.10
13.	Thresher (No./Farm)	0.07	0.22	0.30	0.16
	Average Yield (qtls/ha)				
	Maize	23.80	19.88	15.79	19.15
	Paddy	32.87	26.22	21.86	25.91
	Wheat	18.00	15.54	14.53	15.66
	All crops (Maize+Paddy+Wheat)	23.02	19.34	16.56	19.04

Source: Field Survey 2004-05

1. Labour Absorption and Output

To find out the quantum of labour required for a given increase in output, we have treated labour as a function of output here and the results of regression analysis are presented in Table 2. The results indicate that all the regression coefficient (linear as well as log-linear) in each crop and farm size are significant at 1 per cent level. The linear function indicates the requirement of additional mandays of labour for a given increase in output whereas log-linear function measures the employment elasticity with respect to output. The deviation from unity of all these elasticity coefficients with the help of 't' test shows that these coefficients are statistically less than unity indicates that a one per cent increase in output in each crop and holding size, leads to a less than proportionate increase in Labour input per hectare.

TABLE 2—Relationship between Labour Input in Mandays (H) and Gross Value of Output (Y) in Result of Regression Analysis

Sl. No.	Size Class	N	Linear			Log-linear		
			Constant (a)	Coefficient (b_1)	R^2	Constant (log a)	Coefficient (b_1)	R^2
(1)	Maize crop							
	Marginal	89	25.65*	0.0035*	0.64	0.219*	0.389*	0.72
	Small	60	27.04*	0.0056*	0.56	–0.314NS	0.553*	0.65
	Medium	40	32.89*	0.0075*	0.74	–0.305NS	0.584*	0.78
(2)	Paddy crop							
	Marginal	63	25.35*	0.0030*	0.72	–0.073NS	0.459*	0.81
	Small	54	33.35*	0.0034*	0.86	–0.1 47NS	0.498*	0.88
	Medium	40	41.08*	0.0037*	0.86	–0.296*	0.552*	0.91
(3)	Wheat crop							
	Marginal	95	30.72*	0.0034*	0.75	0.262*	0.389*	0.77
	Small	61	56.17*	0.0020*	0.48	0.401*	0.370*	0.63
	Medium	40	95.47*	0.0011*	0.28	1.354*	0.167*	0.35
(4)	All crops (Maize + Paddy + Wheat)							
	Marginal	247	27.38*	0.0033*	0.72	0.415***	0.278*	0.09
	Small	175	44.33*	0.0027*	0.63	0.094NS	0.444*	0.74
	Medium	120	67.73*	0.0025*	0.49	0.278*	0.421*	0:67

*and***significant at 1 and 10 per cent level respectively, NS = Not Significant

However, a given increase in output leads to more employment potential with the increase in farm size in case of maize and paddy crop whereas, trend is reverse in case of wheat crop. When all these crops were taken together, the employment elasticity was found higher on small sized farms. The results of pooled analysis are presented separately to get an overall view of the annual labour absorption. The results are presented in table 3.

The table explores that every hundred rupees increase in output will require 0.76, 0.40, 0.31 and 0.36 additional mandays of labour for maize, paddy, wheat, and all crops respectively. The employment elasticity with respect to output is 0.60, 0.55, 0.45, and 0.50 for maize, paddy, wheat and all crops reveals that a one per cent increase in respective output of these crops would result in 0.60, 0.55, 0.45, and 0.50 per cent increase in mandays of labour for these crops respectively. The employment elasticities with respect to output were not only less than proportionate but also the deviation from unity was statistically significant at one per cent level in all the cases.

TABLE 3—Relationship between Labour Input in Mandays (H) and Gross Value of Output (Y) in : Result of Regression Analysis (Pooled)

S. No.	Crops	N	Linear			Log-linear		
			Constant (a)	Coefficient (b_1)	R^2	Constant (log a)	Coefficient (b1)	R^2
	Maize	189	17.65*	0.0076*	0.76	–0.468*	0.60 1*	0.80
	Paddy	157	26.61 *	0.0040*	0.83	–0.371 *	0.553*	0.86
	Wheat	16	40.04*	0.0031 *	0.67	0.0051NS	0.457*	0.80
	All crops	542	34.42*	0.0036*	0.67	–0.154*	0.508*	0.80

*significant at1per cent level, NS not significant.

It can also be observed from the table that the magnitude of labour absorption in wheat cultivation is lower than that in case of maize and paddy.

2. Input use and farm size

In the present work, Table 4 presents data pertaining to input use in selected crops cultivation among the different strata of farms. The table indicates that marginal farms used significantly higher amount of humun labour as compared to their large counterparts in each crop as well as when all the crops were taken together. The difference in the labour use between small and medium farms, however significant only in case of wheat crop cultivation. The inverse relationship between labour use and farm size can also be supported by the results of regression analysis. Table 5 revealed that all the coefficients are dominated by significantly negative signs in all the cases. It is indicative of the fact that inverse relationship between the labour use and farm size appeared to hold true not in the case of individual crop but also when all these crops were taken together. The higher labour intensity on lower size category may be due to availability of cheap family labour per unit of land, the situation arising from low opportunity cost of labour the fact is that they use less of hired-in labour as compared to their counterparts.

However, in respect bullock labour tractorization and manure and fertilizers, marginal farms used significantly higher amount of respective input factors as compared to their counterparts in each crop as well as when all the crops were taken together.

TABLE 4—INPUTS USE ON DIFFERENT CATEGORIES OF FARMS

S. No.	Crops	Marginal holding		Small holding		Medium holding		't'value for difference		
		Mean	Standard deviation	Medan	Standard deviation	Mean	Standard deviation	Marginal and small	Marginal and medium	Small and medium
	Inputs use in maize crop									
1.	Human labour (days/ha)	202.93	90.12	147.65	62.57	141.19	29.96	4.12*	4.20*	0.60
2.	Bullock labour and tractorization ('/hd)	3465.64	1306.02	2725.81	1060.92	2508.12	373.92	364*	4.87*	1.23
3.	Manure and fertilizer (/ha)	2728.41	1225.49	2001.86	936.50	1666.52	735.06	3.88*	5.07*	1.90****
	Inputs use in Paddy crop									
4.	Human labour (days/ha)	220.67	72.98	163.78	43.54	155.68	28.0	5.01*	5.37*	1.01
5.	Bullock labour and tractorization ('/ha)	3813.78	1281.96	3119.61	805.11	2595.21	861.42	3.43*	5.28*	3.02*
6.	Manure and fertilizer ('/ha)	2711.37	1351.95	1989.32	742.91	1924.65	802.54	3.54*	3.31*	0.40
	Inputs use in Wheat Crop									
7.	Human labour (days/ha)	139.89	73.17	108,77	18.88	97.06	17.15	3.24*	3.64*	3.15*
8.	Bullock lahour and tractorization ('/ha)	3106.78	1319.24	2648.15	569,12	2738.41	170.21	2.55*	188***	-0.96
9.	Manure and fertilizer (/ha)	2792.71	1061.56	1811.39	1012.04	1517.94	659.36	5.73*	7.02*	1.61
	Inputs use in All crop									
10.	Human labour (days/ha)	183.20	81.57	139.07	53.15	131.31	38.34	6.27*	6.61*	1.37
11.	Bullock labour and tractorization ('/ha)	3416.41	1367.75	2820.53	875,03	2613.91	572.49	5.07*	6.16*	2.27**
12.	Manure and fertilizer ('/ha)	2748.80	1195.72	1931.32	909.94	1703.03	747.74	7.61*	8.77*	2.29**

Source: Field Survey, 2004-05*, and ***significant 1, 5 and 10 per cent level respectively

The difference in the inputs use between small and medium farmers, however not significant in most of the cases in these crops but when all the crops were taken together, it was found significant (except human labour). The inverse relationship between farm size and inputs use can also be supported by the results of regression analysis.

TABLE 5—INPUT USE AND FARM SIZE: RESULTS OF REGRESSION ANALYSIS

Sl. No	Inputs /Crops	Maize			paddy			Wheat			All Crops		
		Log A	b_i (coefficient)	R^2	Log A	b_i (coefficient)	R^2	Log A	b_i (coefficient)	R^2	Log A	b_i (coefficient)	R^2
1.	Human labour (Man days)	2.042* (0,009)	–0.398* (0.013)	0.83	2,104* (0.01)	–0,344* (0,017)	0.73	1.997* (0.006)	–0.452* (0.013)	0.86	2,032* (0.005)	–0.421* (0.008)	0,82
2.	Bullock labour and tractorization	3,321* (0,016)	–0.294* (0.025)	0.42	3.406* (0,014)	–0.247* (0,024)	0.42	3.407* (0,012)	–0.0099 (0.024)	0.08	3.386* (0.008)	–0.209* (0.014)	0.28
3.	Manure and fertilizer	3.18* (0.034)	–0.202* (0.052)	0.07	3.186* (0.031)	–0.226* (0.052)	0.11	3.176* (0.021)	–0.332* (0.043)	0.24	3.180* (0.016)	–0.244* (0.027)	0.13

NOTE: Figures in the parentheses to standard error *Significant at 1 per cent level

Table 5 revealed that coefficient are dominated by significantly negative signs for all the respective factor inputs in each crop as well as when all the crops were taken together. It is indicative of the fact that farm size has negative impact on the use of inputs.

3. Labour use and crop operations

Labour is an important input entering the production process and hence the pattern and intensity of its use is of vital importance in agriculture activities from beginning to the end. The requirement of labour is also vary from crop depending on the specific cultivation. activities that needs to be done. Some crop operations are more labour intensive than others and hence influences the quantum of labour needed to cultivate various crops. Table 6 presents a comparative picture of human labour input in the cultivation of selected crops with respect to various crop operations.

It is evident from the table that per hectare utilization of human labour is maximum in paddy cultivation followed by maize and wheat. The higher labour requirement in paddy and maize crops is mainly due to that these are season-bound crop and hence during peak season farmers are obliged to use more of their family as well as hired labour to complete the various operations well in time without caring much of marginal contribution. When all these crops were taken together about 420 days are utilized in the cultivation of these crops out of which maximum share is appropriated by inter-culture (quite understandably) followed by land preparation and transporting. Transporting operations absorbs more employment due to the fragmented and scattered holdings thereby increase the distance between farmers' house and from plot to plot, thus putting more pressure on manual transport due to hilly area.

TABLE 6—PATTERN OF HUMAN LABOUR DAYS UTILIZATION

(Standard mandays per hectare) .

S. No.	Items	Crops			
		Maize	Paddy	Wheat	All crops
					(maize+paddy+wheat)
1.	Land preparation	16.13 (10.55)	17.35 (10.71)	19.47 (18.40)	52.95 (12.59)
2.	Sowing	12.44 (8.14)	14.16 (8.74)	12.10 (1.45)	38.71 (9.21)
3.	Hoeing/weeding/interculture	24.87 (16.27)	25.74 (15.89)	16.00 (15.12)	66.58 (15.84)
4.	Manuring/Fertilizers	11.73 (7.68)	10.53 (6.50)	7.97 (7.53)	30.23 (7.19)

TABLE 6—PATTERN OF HUMAN LABOUR DAYS UTILIZATION—*Contd.*

(Standard mandays per hectare) .

Sl. No.	Items	Crops			
		Maize	Paddy	Wheat	All crops
					(maize+paddy+wheat)
5.	Looking after crops	9.69	4.46	1.07	15.22
		(6.34)	(2.75)	(1.01)	(3.62)
6.	Irrigation and spraying	1.09	3.65	1.00	5.74
		(0.71)	(2.25)	(0.94)	(1.36)
7.	Harvesting	13.32	19.60	17.00	49.92
		(8.71)	(12.10)	(16.07)	(11.87)
8.	Transporting	15.80	18.94	15.26	50.00
		(10.34)	(11.69)	(14.42)	(11.89)
9.	Threshing/Winnowing	24.84	22.39	3.71	50.97
		(16.25)	(13.82)	(3.50)	(12.12)
10.	Storing	14.08	15.05	5.95	35.08
		(9.21)	(9.29)	(5.62)	(8.34)
11.	Hired-in labour	13.78	13.22	8.63	35.63
		(9.02)	(8.16)	(8.15)	(8.47)
12.	Hired-out labour	5.02	3.24	2.47	10.73
		(3.28)	(2.00)	(2.33)	(2.55)
13.	Total mandays utilized	152.75	161.91	105.76	420.42
		(100.00)	(100.00)	(100.00)	(100.00)

NOTE : - Figures in parentheses are percentage to respective column total.

Harvesting, sowing and storing (in that order) are the other operations which are more labour intensive. As far as different crops are concerned, land preparation, inter-culture, harvesting and transporting are the more labour intensive operations in each crop whereas threshing and storing operations absorb less labour in wheat crop as compared to other crops.

4. Labour Productivity and Employment Generation

Labour productivity in agriculture is an important issue of labour use itself. Increasing labour productivity is of vital importance from the policy point of view to generate additional employment opportunities. Table 7 explores the data pertaining to average labour productivity in rupees per manday of labour employed. Average labour productivity increase with the increase in size of holding from marginal to small and then declines from small to medium not in the case of all crops but the individual crops also.

TABLE 7—AVERAGE LABOUR PRODUCTIVITY OF MAIZE, PADDY, WHEAT AND ALL CROPS VALUE OF OUTPUT IN RUPEES PER MANDAY

(Per manday)

S. No.	Crops	Marginal farmers	Small farmers	Medium farmers	Overall farmers
1.	Maize	85.21	99.93	88.70	89.92
2.	Paddy	137.58	155.87	141.83	144.08
3.	Wheat	141.76	159.07	156.06	149.75
4.	All Crops	119.75	137.76	126.29	127.01

Labour productivity is higher for wheat crop than that of maize and paddy in all size classes. But it does not mean that labour use efficiency in wheat crop is more than that of its counterparts. The fact is that the cultivation of wheat crop requires less quantum of labour unlike paddy and maize cultivation, however land productivity is much higher in case of paddy and maize crop than wheat crop and both these crops are labour intensive crops thereby pushing down the average labour productivity.

The correlation coefficients between labour input in mandays per hectare and average labour productivity per mandays were -0.62 (taking into account all the 189 observations), -0.52 (157 observations), -0.56 (196 observations) -0.51 (542 observations) in case of maize, paddy, wheat and all crops respectively. All these correlation coefficients are statistically significant at I per cent level, thus suggest that average labour productivity would increase significantly only if per hectare labour input were to decline. In other way, it can be concluded that at the present level of technology, labour is employed in agriculture beyond a point of maximum productivity and thereby diminishing returns are in operation.

5. Farm size and Productivity

The gross return of maize, paddy, wheat and all crops are given in Table 8. The data indicated that the gross returns from maize, paddy, wheat as well as all crops are significantly higher on marginal farms as compared to the small and medium farmers. Similarly, the gross returns were also higher on small farms as compared to medium farmers except in wheat crop.

TABLE 8—FARM SIZE AND GROSS OUTPUT OF DIFFERENT CROPS

Sl. No.	Crops	Marginal holding		Small holding		Medium holding		't' value for difference		
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Marginal and small	Marginal and medium	Small and medium
1.	Maize	16857.22	3697.54	15187.96	3373.98	12819.20	2407.74	2.34*	6.32*	4.84*
2.	Paddy	29107.25	10894.35	24381.53	5831.49	20623.25	5371.91	3.30*	4.57*	3.19*
3.	Wheat	18384.24	7323.27	16207.55	6531.38	14765.72	5488.88	1.89***	2.75*.	1.15
4.	All crops	20569.04	8988.57	18380.23	6728.62	16069.39	5685.41	2.72*.	5.00*.	5.99*

*and ***significant at 1 and 10 per cent level respectively

TABLE 9—FARM SIZE AND PRODUCTIVITY RELATIONSHIP: RESULTS OF REGRESSION ANALYSIS

S. No.	Crops	N	Loga (constant)	b_1	't' value of deviation from unity	R^2
1.	Maize	189	4.116	0.892* (0.021)	–5.14.	0.90
2.	Paddy	157	4.401	1.047 (0.039)	1.20	0.82
3.	Wheat	196	4.195	1.009 (0.036)	0.25	0.79
4	All crops	542	4.223	0.962*** (0.021)	–1.80	0.79

NOTE: Figures in parentheses are standard error.
*and*** significantly different from unity at 1 and 10 per cent level respectively.

To examine the effect of farm size on productivity of different crops, log-linea regression was done. The results of regression analysis (Table 9) showed the negative effect of farm size on productivity in case of maize and when all the crops were taken together, however the effect was positive in case of paddy and negative for wheat though insignificant.Thus, inverse relationship between farm size and productivity is a confirmed phenomenon the area under study.

6. Farm size and Profitability

In the present analysis, profitability is defined as the value of net returns which is obtained by deducting the total cost (all cash and kind expenses incurred on material inputs, rental value of owned land, rent on owned fixed capital, imputed value of owned family labour etc.) from the gross returns. Net returns are presented in Table 10.

TABLE 10—NET RETURNS

(per hectare)

Sl. No.	Crops	Farm Size			
		Marginal farmers	Small farmers	Medium farmers	Overall farmers
1.	Maize	(–)7382.61	(–) 2941. 98	(–)3534.17	(–) 4260.54
2.	Paddy	1884.93	5796.37	3375.69	4487.20
3.	Wheat	(–) 2144.84	780.05	44.93	(–) 115.02
4.	All Crops	(–) 7643.39	3634.44	(–) 114.24	111.64

It can be observed from the table that net returns in terms of R/ha are very low due to the poor resource base, inadequate knowledge and lack of motivation. Further, the cultivation of these crops gave a good amount of loss except paddy crop. As between the farms in different size classes, only small farmers are able to convert their output advantageously into net profit, however it is negative in respect of maize crop but the loss of amount is less than their countarparts. The negative returns on maize crop may be attributed to the low value of crop yield whereas, low yield rate was responsible for the same on wheat crop. The cultivation of paddy crop required good quality of muddy soil without any slope in the field. Therefore, farmers irrespective of any farm size category put better application of available resources for the cultivation of paddy crop, which is reflected in high yield rate as compared to maize and what crops. That is why, there are positive returns in paddy crop.

IV

Concluding Observations

To sum up, an increase in productivity will lead to a less than proportionate increase in the levels of labour use however the impact of increase of the productivity on labour absorption varies across crops and strata of holdings. Secondly, the inverse relationship between the per hectare labour use and size of holding was observed in each crop as well as when all these crop were treated together as confirmed from the results of regression analysis. However, the difference of labour use between the small and medium farms was significant only in case of wheat crop. The proportion of hired labour was founded to be directly related with the size of holding. Thirdly, crop operations like weeding/ inter-culture/holding, land preparation, transporting and harvesting were found to be more labour intensive operations in each crop. Similarly, in case of maize and paddy crops, labour absorption was much higher than wheat crop in each size class. Lastly, an increase in the labour absorption may be at the cost of labour productivity. As our result indicated that average labour productivity would rise only if per hectare labour input were to decline. The crux of the problem of increasing employment at the present level of technology without producing a decline in labour productivity is an important issue to be settled. The only way out for increasing both the productivity and employment is to upgrade the present level of technology.

Similarly, the inverse relationship between the farm size and productivity was observed in maize crop whereas, constant productivity relationship was observed in case of paddy and wheat crops. When all these crops were taken together, inverse relationship between the two holds true. The results further explored that marginal farms used higher amount of human labour, bullock labour and tractorization and manure & fertilizers as compared to higher farm size categories. The existing inverse relationship between farm size and productivity is mainly due to the higher input intensity on other farm size categories as compared to lower size category. The marginal farms use more amount of labour per unit of land because of availability of cheap family labour. The situation arising from low opportunity cost of labour, the fact is that they use less of hired in labour as compared to their large counterparts. Similarly, the intensity of bullock labour & tractorization was also found higher on smaller sized categories of farms due to willingness to get profit and higher availability of bullock labour per unit of land as compared to large farm size category. Further, land fertility was also higher on lower sized categories due to the higher availability of farmyard manure per unit of land for them. In other way, they have large number of cattle per hectare. The situation becomes worse for larger farm size category as there was no market for farmyard manure. However, the introduction of chemical fertilizers has eroded the importance of farmyard manure, yet it is equally required for retaining and enhancing the soil fertility along with balanced fertilizer (N+P+K). In broader terms, the results obtained from the study support the hypothesis of inverse relationship between farm size and productivity however, in respect of individua1 crops, the effect of farm size on productivity was size neutral in case of paddy and wheat crops. As far as the net return to farming is concerned, the marginal farmers are not able to convert their output advantages into higher net profits due to their higher total costs. In other way, the viability of marginal farmers in terms of net returns is not as strong as in the case of output. Similarly, medium farmers also not getting profits despite

their low cost, mainly due to the low yield rates. On the other hand, small farmers are not only getting positive returns but also minimizing the amount of loss on maize crop as compared to their counterparts. Therefore, in the light of declining net returns from farming, especially of marginal and medium farms, the viability of farming need to be improved It necessitates for the consolidation of land holding, management of basic and economic holding and introduction of an integrated development strategy encompassing both its production and marketing aspects to make the cultivation of these crops a competitive viz-a-viz profitable enterprise. For this, there is inevitable need to tone up, strengthen and modernize the extension network to transfer the production technology and technical know-how to the farmer in order to increase the risk bearing capacity. Besides, a multidimensional approach covering optimum farm plans, soil conservation, water harvesting animal raising, effective crop insurance scheme etc, was badly needed to increase productive employment in agriculture which is believe to be the key of accelerated development thereby the well-being of farm families. The emphasis should also be laid down on some areas such as efficient use of resources, delivery of critical inputs at the right time and place, flow of institutional credit, development of irrigation facilities, development of high yield variety seeds, programmes for stray-animals, effective policy related to women etc.

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Possibilities and Constraints in Increasing Pulses Production in Andhra Pradesh and the Impact of National Food Security Mission on Pulses*

Executive Summary

Pulses production has received the attention of government and public in recent years, in response to soaring consumer prices. Global shortages in pigeon pea (Tur dal production have occurred in recent years. Prices of Tur dal increased nearly four fold during the last five years (2005-09). Price of Tur dal, which used to be Rs. 24-32/kg during 2005, had increased to Rs.l00/kg in December 2009. Demand is rising with increase in population as well as rise in purchasing power of the rural people due to NREGS, ADWDR etc. The area under pulses started declining even in the pre High Yield Varieties (HYV) era. Pulses did not get its due share even in respect of increases in irrigation. The crop has failed to keep pace with the demand of population.

Need for the Study :

Nearly 23 million hectares of pulses crops have been raised in India producing 1.4 million tonnes of pulses grains. The pulses sector in India at present is characterized by short supply, high prices and high dependence on imports. India is the largest producer and consumer of pulses in the World accounting for about 25 per cent of their global production, 27 per cent of their global consumption and about 33 per cent of World's area under pulses. However, production performance of pulses in India has remained stagnant.

When prices are rising, it is logical that there is an incentive for farmers to produce more of these crops to earn higher incomes. Productivity of pulses in India has stagnated at 622kg/ha compared to yield of 1908kg/ha in Canada/USA due to the vagaries of monsoon, problem in the availability of good quality approved HYV seeds, low seed replacement rate etc.

National Food Security Mission (NFSM) :

The National Food Security Mission (NFSM) was launched in the state from Rabi 2007-08 after the state level Executive Committee decision, with the objective of increasing production and productivity of Rice and Pulses on a sustainable basis to ensure food crops security. The approach is to bridge the yield gap in respect of these crops through dissemination of improved technologies and farm management practices. It is envisaged to focus on districts which have high potential but relatively low level of productivity performance at present. Under the Mission there are series of program intervention efforts to reach resource poor farmers and continuous monitoring of various activities.

Objectives :

To

(1) Analyze returns from cultivation of pulses vis-a-vis competing crops

(2) Analyze the other major problems and prospects for pulse cultivation

(3) Assess the impact, if any, of NFSM pulses.

Methodology :

For the survey of primary data Prakasam district under NFSM and Ranga reddy district outside NFSM are selected. Ervaguda village from Sankarampally mandal is selected from Ranga reddy district and from Prakasam district Veerannapalem is selected from Parachur mandaI. From each village 50 farmers comprising small, marginal, SC/ST, Women farmers are selected using PPS sampling.

Using secondary data growth trends of pulses and major competing crops since 1990 are calculated on the aspects of area, production, yield, and irrigated area, area under improved varieties, prices and procurement. Time series data on pulses are collected from the "Season and Crop Reports" and "Statistical Abstracts of A.P. published by the Directorate of Economics and Statistics, Government of Andhra Pradesh. The reference period for the study is 2006-07 to 2008-09.

Growth Trends of Pulses in A. P. :

In A.P., there is a stable growth trend for Bengal gram and Red gram during the study period. It is unbalanced for Green gram and Black gram in Coastal Andhra and Rayalaseema, while Telangana shows strong growth trend during 1990-08. The Horse gram and 'Other Pulses' show declining trend across A.P. The Rabi fallows of irrigated districts viz East and West Godavari, Krishna and Guntur are the best for pulses growth as a third crop, though there is commercial crops are cultivated, provided suitable seed variety and manual labour saving devices (suitable mechanization in cultivation) to the farmers in this area. The whole picture of ''Total Pulses' appear bleak in Coastal

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Andhra compared to Rayalaseema and Telangana. It is much appropriate to implement the required policies across Coastal Andhra particularly, for Green gram and Black gram.

Profile of sample Area and Farmers :

Prakasam :

Prakasam district is one among the 14 districts selected under National Food Security Mission (NFSM) under Pulses Programme. Rice is the major crop in the district accounting for 19.78 per cent in gross cropped area followed by Bengal gram (14.10 per cent) Tobacco (12.31 per cent). Red gram (10.29 per cent) Cotton (6.14 per cent) and Sunflower (6.02 per cent). Bengal gram is cultivated in 94000 ha forming 15 per cent of state's area under the crop. Similarly 15 per cent of area i.e., 68000 ha. under, Red gram in the state is in Prakasam district. Notably, forty eight per cent of the area under Tobacco crop in the state is in Prakasam district. An area of 677 ha of pulses crop is under irrigation though there is no irrigation for Red gram and Bengal gram.

Ranga Reddy :

Ranga Reddy district is selected for the study as it is not covered under NFSM pulses but has a predominant pulses crop—Red gram. The Principal crops in the district are paddy, Jowar, Maize, Cotton, Castor, Pulses and Vegetables. Red gram with a cropped area of 33000 ha (14.82 per cent in GCA) is the leader in the un-irrigated land followed by Maize with 30000 ha (13.36 per cent) and Jowar with 24000 ha. (10.51 per cent). Rice is cultivated in 32000 ha (14.29 per cent) in the irrigated land. About 33000 tonnes of Red gram, nearly 7.45 per cent of the state's production, comes from Ranga Reddy district.

Cropping Pattern :

Bengal gram is the leading crop in Prakasam district with 77.38 ha. It is followed by Tobacco and Paddy with 23.31 ha. and 10.93 ha. respectively. Red gram is cultivated in 3.91 hectares. The others are Jowar and fodder crops. While Paddy is cultivated in exclusively irrigated area, Bengal gram is raised in unirrigated land, that too in the Rabi season. The major crops in Kharif season are Tobacco and Rice being cultivated in 23.91 (48.66 percent) 10.93 ha. (22.43 per cent) respectively. Other crops are Jowar, Red gram (20.89 per cent) and some vegetable crops. Rice is the most preferred crop among the marginal farmers with 89.01 per cent of their cropped area under its cultivation. Tobacco found favour in the other size groups. On the overall, I Tobacco leads by 48.66 percent followed by Rice with 22.43 percent and other crops like Jowar and Vegetables. Red gram is being cultivated by medium and small farmers with 22.15 percent and 6.31 percent of land allocated for the crop.

In Rabi season farmers in the sample grow only Bengal gram in Prakasam district. The area under this crop is generally left fallow in Kharif season so that the yield would be better. Maize is the leading crop being grown in 45.12 ha followed by Pulses crop Red gram with 28.28 hectares. These two crops account for 44.53 per cent and 27.88 per cent respectively in the net cropped area. Another food crop, Rice is grown in 10.93 hectares covering 10.79 per cent to total kharif crop being grown by the sample farmer. Cotton is grown in 14.20 hectares accounting for 14.01 per cent of the net cropped area. In all the size groups Maize was given priority as far as cropped area is concerned. Bengal gram is the only crop raised in Rabi season in Maize fallows. There is not much variation in area under the crop. Total area is 5.60 hectares.

Pulses Crops :

Out of the total cropped area under Pulses in district 95.19 per cent is occupied by Bengal gram while the rest is under Red gram. Marginal and Large farmers are exclusively cultivating Bengal gram among the sample households in this district. About 14.82 per cent of medium farmers and 3.11 per cent of small farmers are also growing Red gram.

Red gram, the major crop, is raised in 28.28 hectares accounting for 83.47 per cent of the cropped area under Pulses. Though this crop is normally raised as a mixed crop with Jowar and Maize. It is also raised as mono crop. Bengal gram, sown mainly in kharif fallows accounts for 16.53 per cent of the area under pulses. This practice is more popular among marginal farmers with 29.47 per cent followed by large farmer group (16.00 per cent) and small (14.58 per cent).

ECONOMICS OF PULSES CULTIVATION

NFSM District - Prakasam :

Bengal gram :

Bengal gram is exclusively cultivated in the rabi season and area under the crop is mostly left fallow in kharif. Large scale seed distribution was taken up in the district on 50 per cent subsidy. The crop seems to be not popular among marginal farmers as it was discontinued in 2007-08 and 2008-09. Its area is more or less stable in large farmer group while it shows oscillation in small and medium farmers' group. Gross returns per hectare have shown an increasing trend over farm size groups ranging from Rs. 40363 in marginal group to Rs. 54,006 in large farmer group. Overall per hectare gross return is Rs. 47178 among the sample farmers.

Tobacco :

Tobacco is the main commercial crop of the region and widely cultivated among the sample households. For the Triennium Ending (TE) 2006-09 about 23.71 hectares are under Tobacco cultivation. The cropped area is stable in large and medium farmers and oscillation is there among marginal and small farmers. While area under the crop remained the same for marginal farmers in the study period,

it increased in all the other three groups, i.e., for small, medium and large farmers in 2008-09. Gross returns per hectare ranges from Rs. 41184 for marginal farmer group to Rs. 78,107 hectare for farmers in the medium group. At the same time small size group farmers are realizing higher net income, i.e., 36.64 per cent of the gross income with a relatively low percentage of 63.36 of paid out costs. For marginal farmers the percentage of paid out costs in the gross income is 78 per cent resulting in low net income at 22 per cent. On the overall, farmers of Tobacco crop get Rs. 68281 gross income per hectare out of which 64.98 per cent goes as paid out costs.

Non-NFSM Ranga Reddy District :

Red gram :

Red gram is the major pulse crop in the District cultivated in kharif season. It is traditionally raised as mixed crop with food crops like Maize and Jowar. In the recent past it is also raised as mono crop. The cropped area under Red gram is stable in the study period 2006-09 for all groups. Gross return per hectare for the crop varied from Rs. 27,890 to Rs. 42,411. Though gross returns are high at Rs. 42,411 in medium size group it received lower percentage of net returns as their paid out costs are high at 41. 72 per cent in the gross. Large farmer size group incurred lowest paid out costs at 33.68 per cent and received highest net returns i.e., 66.83 per cent of gross income. On the whole the gross returns received on the crop are Rs. 31,165 out of which 62.57 per cent is the net income. The larger farmer group is able to sell more at the market and reported that 91.49 per cent of the gross value is for sale. The acceleration trend is there for gross returns per ha to all size groups and vice-versa for paid-out costs to all farmer groups during 2006-09. Therefore, the Red gram cultivation has led to increasing trend for Net returns per ha/per Qtl for whole study period. The paid-out costs are very less to large farmers followed by marginal farmers and consequently these groups have better edge in net returns.

Cotton :

Cotton is cultivated in 14.20 hectares accounting for 14 per cent of the total cropped area by sample farmers. Area under the crop did not undergo any change in the study period in all the size groups. Though the returns are not comparable with pulses where hike in prices is seen, farmers feel that the crop is dependable as its returns are not that susceptible to weather and pests. Gross returns per hectare varied from Rs. 9,320 in large size group to Rs. 10,827 in the small size group. Lowest of Rs. 8,135/ha is reported in medium group. Percentage of net returns in gross returns is the highest in marginal group at 32.56 and the lowest in medium group at 25.41. When the sample is considered as a whole gross returns per hectare is reported as Rs. 9,832 out of which 71.00 per cent has gone out as costs resulting in net return of 29.00 per cent (Table 4.6). Paid-out costs as a percentage in gross returns declined from year to year in the study period in all farm size groups. In the same manner, as a consequence as well, net returns have consistently increased in the same period over all size groups.

Bengal gram :

Bengal gram occupies second place in pulse crops in Rangareddy district. It is mostly raised in Maize fallows in Rabi season. Area under the crop is stable over the period across all farm size groups. Gross returns per hectare varied from Rs. 18,251 in small size group to Rs. 21,458 in marginal group. Overall TE average is Rs. 19,491. About 45.95 per cent of this is paid out costs leaving a margin of 54.05 per cent as net income on the whole. The percentage of paid out costs is high in large farmer group at 54.32. On the contrary marginal farmer size group is receiving a high income at 58.94 per cent. This could be attributed to higher participation of family labour in farming which would in turn out the paid out costs. Consistent increase in net income is observed only in medium farmer group in the study period. Marginal farmers are keeping more of the produce for seed and home consumption thereby having lower percentage of market surplus at 64.51. Medium farmers report the highest market surplus percentage of 89.46. The overall market surplus ratio is 79.92.

Profitability of Pulses vis-a-vis other crops :

In Prakasam (NFSM) district only paddy is raised in Irrigated lands. While Tobacco is raised in un-irrigated lands in kharif season, Bengal gram is raised in Rabi season. Bengal gram is the only crop raised in that land as it is left fallow in kharif season. Naturally yields in this district are high and net returns on the crop surpasses Tobacco and Paddy. But the investment on Tobacco is much higher about 154 per cent, than the Bengal gram. Even when compared with paddy the farmers are realizing 84 per cent higher net income on Bengal gram. In Ranga reddy district, which is selected as non-NFSM district in the reference year, Red gram is the principal pulse crop. Thanks for the spike in prices it outstripped the other crops like Rice, Cotton, Maize and even secondary pulse crop Bengal gram in net income. The profit on the Red gram is 294.70 per cent more than Maize, 239.86 per cent more than Cotton and 76.28 per cent more than Rice.

Technology adoption and marketing :

NFSM District - Prakasam :

Seed :

Improved varieties of seeds are widely popular among the sample households. Agriculture department is also supplying Bengal gram seed varieties like Annegiri and Laxmi on 50 per cent subsidy under NFSM—Pulses programme. All the sample farmers, irrespective of their land holding size, are cultivating improved varieties of Bengal gram. The awareness and acceptance is 100 per

cent. While the marginal farmers are cultivating improved varieties of Bengal gram in 13.76 hectares, the large farmers have 29.14 hectares under the same category. Overall 86.32 hectares of sample farmers are under improved varieties of Bengal gram, which means 100 per cent adoption of new technology.

To reap full benefits of the improved varieties, the recommended cultivation practices are to be followed by the farmers. When delved in to this aspect it was found that sowing practices were followed by 40 per cent of sample farmers, 28 per cent followed seed practices while other 16 per cent did not follow any. About 20 per cent of marginal farmers and an equal percentage of medium farmers did not follow any recommended practices. Though the penetration of improved varieties of seeds in pulses crops is 100 per cent problems that are still bothering the farmer community are enumerated. About 60 per cent of medium farmers and 50 per cent of large farmers feel that yield levels of the improved varieties are not up to the expectations. The same opinion is conveyed by 30 per cent of the overall groups.

Pest resistance :

When it comes to pest resistance 40 per cent in medium group and 25 per cent each in marginal and large group expressed that improved varieties did not perform well. 22 per cent of overall sample concurred with that opinion. Though 50 per cent subsidy is given on seed under NFSM 35 per cent of the reported households under marginal group felt the cost of the seed is still high and must be brought down. Another 20 per cent of overall sample, who reported problems, said the seed though available is not supplied on time. About 60 per cent in medium group and 50 per cent in large group felt that yield performance is lower than expected. As the time of sowing is very crucial, 71 per cent of the overall sample farmers have asked for timely availability of seed at low prices of genuine seed.

Marketing :

In Prakasam district, where NFSM programme is being implemented, farmers are not utilizing the regulated market for pulses. They are not convinced of fair price for their crop after incurring transport costs and an arduous wait at the yard. Once the produce is taken to the yard they feel that they are at the mercy of the unscrupulous traders as they can not wait there indefinitely for a good price. Instead they are selling the pulses at their own home to a Commission agent at their chosen time. If the market prices are low some of the farmers who can wait are choosing to stock their crop at a cold storage in near by mandal head quarters. This practice has become more common in recent years as it helps in retaining the colour of the produce. Another advantage they are citing is that the stock at the storage can be pledged to a bank for a loan to tide over any immediate financial needs. When the prices go up they can dispose off the stock from the cold storage to a commission agent and pay the bank loan if any. In Prakasam district all the marketable surplus is sold through commission agents only. Regulated markets. There is no market intervention by government agencies like NAFED in the region. Among the size groups large farmers, who can wait for a better price, received the higher price of Rs. 2,999 followed by medium farmers with Rs. 2,706. The marginal farmers who can not wait for long for better price got the lowest price of Rs. 2,357.

Non-NFSM - District—Ranga Reddy : Seed varieties :

Adoption of HYV seed is 100 per cent in the size groups of medium and large farmers. About 85 per cent of area under Red gram of small farmers and 91 per cent of land of marginal farmers are under HYV pulses. On the whole the adoption rate of HYV seed is 95 per cent among the sample farmers. But agricultural officials assert that there is no traditional variety being cultivated now. Farmers are well aware of seed varieties under HYV.

Recommended Practices :

Recommended sowing practices were followed by 70 per cent of medium farmers and 50 per cent of small and large farmers. Half of the large farmer group, 20 per cent each of medium farmers and marginal farmers are following good seed practices. Other recommended practices like proper doses of fertilizers, weeding and plant protection measures are being followed by 25 per cent of large farmers and 20 per cent of medium farmers. On the whole 42 per cent are adopting sowing practices, 22 per cent are following seed practices and another 14 per cent are implementing other practices like fertilizer and pesticide application. But at the end, quite a proportion of 44 per cent are not following any recommended practices.

Farmers are asked whether they had any problems or apprehensions with HYVs and to suggest some solutions. More prominent among the problems are lower yields as reported by 43 per cent of sample farmers. Small farmers (69 per cent) followed by marginal farmers .(60 per cent) are more vocal in expressing their opinion. Majority of marginal farmers, 75 per cent, followed by small farmers, 38 per cent, felt that the seeds are very expensive. Fifty per cent of marginal farmers, 25 per cent of small farmers and 20 per cent of medium farmers share the view that HYVs also need higher doses of fertilizers and pesticides. Availability of seed is not a big issue with the farmers. Only 10 per cent felt that the seeds are not available on time. When asked to suggest solutions for pulses crop improvement 80 per cent of marginal farmers said that they need cheaper seeds or subsidy on prices. This view was shared by'38 per cent of small farmers and 20 per cent of medium farmers. About 20 per cent of sample farmers felt that the quality of seed must be monitored by agricultural officials.

Marketing :

Large farmers seem to be more equipped in dealing with market forces as they realize higher prices, Rs. 4,369 per quintal, for their crop. Another reason for this is their ability to wait for better price. The marginal farmers, on the other hand could realize only Rs. 4,134 per quintal. The medium and small farmers could get only Rs. 4,266 and Rs. 4,254 respectively.

Farmer's Perceptions :

Pest problems :

Farmers reported considerable loss due to pod borer and wilt to Bengal gram and Red gram in NFSM and Non-NFSM districts Damage due to pod borer is reported by 46 per cent of Bengal gram cultivators in NFSM district and 60 per cent of Red gram cultivators of Non-NFSM district. Estimated crop loss is 18 per cent in Bengal gram and 22 per cent in Red gram. Wilt is also reported to be causing damage 32 per cent of Bengal gram farmers with a crop loss of 15 per cent. Red gram crop in Non-NFSM district also suffered a loss of 15 per cent affecting 42 per cent of farmers.

Reasons for growing pulses :

The reasons enlisted are—traditional habit, home consumption, the inferior quality of land and profitability. While all farmers across size groups expressed the need of pulses for consumption at home, 50 per cent in large farmer group, 31 per cent in small group 20 per cent each in medium and marginal farmers group felt that the unsuitability due to inferior quality of land to raise other crops made them take up pulses cultivation. In NFSM - Prakasam district, all the farmers in large, medium groups, 75 per cent in marginal and 63 per cent in small groups have said that they could get some cash for domestic expenditure by raising pulses. All the farmers in Ranga Reddy district (Non-NFSM), who raise Red gram, have responded that they need the crop for home consumption. Similarly all of them have said that the inferior quality of land also prompted them to go for the crop. Profitability was the motive for 90 per cent of marginal, small and 75 per cent of large farmers expressed the same.

Limitations in area expansion :

Few questions were directed at the sample farmers to find out the reasons for low area under pulses crops. In NFSM district problem of pests is the leading factor as expressed by 77 per cent of farmers followed by low profitability (56 per cent) and instability of prices or yield (47 per cent). About 29 per cent have also said that marketing problem is also a hurdle. In Non-NFSM district where Red gram is cultivated, majority of farmers (83 per cent) are bothered about low yields followed by pest problem (69 per cent), instability of prices and yield (68 per cent), low profitability (36 per cent) and marketing problems (18 per cent). In NFSM district 50 per cent of pulses farmers in large group, 21 per cent in medium group, 18 per cent in marginal group followed by 14 per cent of small farmers are willing to expand the area under pulses if assured market is provided and competitive prices offered. In similar pattern 75 per cent of large farmers, 15 per cent of medium farmers have shown interest in area expansion in the scenario of assured market. Similar views are shared by 12 per cent of small farmers and 5 per cent of marginal farmers in non-NFSM district.

Major problems that are plaguing the cultivators of pulses are low yields, lack of improved varieties and lack of irrigation in some areas. Low yield is the major problem according to 64 per cent of farmers in NFSM area. This is even a bit higher in Non-NFSM area (72 per cent). High Pest incidence is reported by 14 per cent in NFSM area and by 16 per cent in Non-NFSM area. Low market price is bothering 6 per cent of farmers in NFSM area and 8 per cent in Non-NFSM area. About 6 per cent of NFSM farmers and 4 per cent of Non-NFSM farmers feel that the seed they use is not of improved variety or of spurious quality. Suggestions are sought to increase area under pulses. Assured marketing through government procurement agencies with minimum support price seems to be the main concern of 90 per cent of Bengal gram farmers in NFSM district. Another 88 per cent of farmers have voiced that reasonable market price must be maintained to encourage pulses farmers. Same view is also shared by 72 per cent of Non-NFSM farmers of Red gram. Pest resistant varieties are the need of the hour according to 36 per cent of Non-NFSM farmers and 14 per cent of NFSM farmers. About 6 per cent in NFSM area and 4 per cent in Non-NFSM area have suggested that high yielding varieties of certified seed must be readily made available on time.

Implementation of NFSM—Pulses :

Distribution of Certified Seed :

Recognizing the use of certified seed as the basic step to realize higher yields, a major chunk of the funds are allocated and utilized under NFSM. During 2007-08 Rabi season, when the NFSM pulses was first launched there was 100 per cent achievement all across the pulses growing districts. A total of Rs. 1,060 lakhs was spent on certified seed distribution for the Rabi season. In the next year, 2008-09, though district-wise breakup was not available, 280 per cent achievement was shown over the target and an amount of Rs. 3,269 lakhs was expended. This amount was increased by 11 per cent and reached to Rs. 3,720 in the next year, i.e., 2009-10.

Integrated Nutrient Management :

Under this programme Lime/Gypsum is supplied to the farmers at 50 per cent subsidy with a limit of Rs. 750 per hectare. Zinc is also supplied similarly at 50 per cent cost with a limit of Rs. 500 per ha. In the first year, 2007-08 the programme was sluggish and implemented only in

Srikakulam, East Godavari, Nizamabad and Adilabad. Except in Nizamabad where the financial achievement was only 74 per cent, in all other districts it was a success with 100 per cent achievement In the next year, i.e., 2008-09 the achievements under this head are not so impressive. Except in Nizamabad, where it was 254 per cent, in the other eight districts the program was not satisfactory. In the remaining 5 districts the performance was less than 50 per cent. In many of the districts there is a mismatch between physical and financial achievements and the later being lower than the former. In 2009-10 the figures show a uniform 100 per cent achievement all across the districts.

Supply of SSP :

The supply of (SSP) is reported to have been done only in the first year. A complete performance was recorded in Srikakulam, Krishna and Ananthapur while it was only 50 per cent in Nizamabad. Prakasam has shown 14 per cent achievement. In all other districts there was no supply. The total amount spent was 33 lakhs.

Integrated Pest Management :

In 2007-08 Rs. 187.5 lakhs were spent under the programme and achieved a 100 per cent performance in all the districts. In the later years, i.e., 2008-09 though the expenditure increased to Rs. 401 lakhs its performance registered not so impressive pattern. In half of the districts the financial performance is more than 80 per cent The programme was not implemented in Srikakulam district. In 2009-10 Prakasam, Nizamabad and Mahaboobnagar districts recorded 100 per cent performance in Pest Management programme.

Sprayers :

Sprayers were supplied as part of the Pest Management Programme at Rs. 3,000 subsidy. In the first year Rs. 314 lakhs were spent on distribution of sprayers but district-wise breakup of expenditure was not available. In 2008-09 no funds were allocated for the scheme. However in the next year, i.e., in 2009-10 only 75 lakhs were spent for the scheme. Except Prakasam where the performance was 73 per cent, others have registered 9 to 34 per cent achievement only.

Sprinkler Sets :

For effective water management Sprinkler sets were supplied to the farmers at 50 per cent subsidy of the cost limited to Rs. 7,500 per. hectare. The scheme was a success in Nizamabad. Nalgonda and Adilabad in 2007-08. Khammam registered 59 per cent achievement. Seven districts Srikakulam, East Godavari, Krishna, Kurnool, Kadapa, Mahaboobnagar and Warangal did not receive any funds under this scheme in the same year. Guntur, Prakasam and Ananthapur performed poorly at 7 and 14 per cent achievement. Overall, only 11 lakhs were spent in 2007-08. Srikakulam, Nalgonda and Adilabad were the major beneficiaries in 2008-09 under the scheme. Eight districts did not receive any funds under this scheme. Total expenditure was 31 lakhs in the year. This has gone up to 104 lakhs in 2009-10. Guntur, Mahaboobnagar and Warangal which did not get enough allocation earlier got benefited in this year. Srikakulam, Guntur, Nizamabad have achieved 100 per cent of the targets while Khammam and Adilabad outperformed at 138 and 316 per cent respectively.

Diesel Pump sets :

Distribution of Diesel pump sets was taken up in 2009-10 to bring more area under irrigation and to boost the yields. An amount of Rs. 674 lakhs was spent in the state. Except Ananthapur and Kadapa all 12 remaining districts were brought under the programme. East Godavari and Prakasam were the major beneficiaries by receiving 214 and 143 lakhs respectively. About 6 districts performed extremely well by registering 300 to 800 per cent achievement in the financial target in the year. The others have also done well with 100 to 200 per cent.

Vermi-Compost Units :

To encourage organic farming vermi-compost units are encouraged in all the pulses growing districts by spending 200 lakhs. Each unit was given Rs. 20,000 for establishing and maintenance. All the districts were benefited under the scheme and recorded 100 per cent financial achievement in 2009-10. Vermi hatcheries were sanctioned at a cost of 30 lakhs by providing financial help of Rs. 75,000 per unit to enthusiastic farmers. Even this programme was extended to all districts and they in turn have fully utilized the funds.

Seed Drills :

In support of farm mechanization seed drills and Rotovators were also distributed under NFSM programme in 2009-10. Ananthapur, Mahaboobnagar, Kadapa, and Kurnool districts received these machinery at a total cost of 27 lakhs. Ananthapur has recorded 470 per cent financial achievement while Guntur failed at 2 per cent.

Rotavators :

Nizamabad, Mahaboobnagar, Kadapa and Ananthapur districts were given priority under the programme. It was also successfully implemented in Ananthapur district. An amount of Rs. 8 Lakhs was incurred under this head in 2009-10.

Impact of NFSM Pulses:

All the cultivators irrespective of their size group are aware of NFSM Pulses program as the program is noticed by 100 per cent awareness.

Seed Supply :

Seed is distributed to all farmers in the sample on 50 per cent subsidy. Everyone, irrespective of land holding is benefited under the scheme. Some demonstration farms

were also developed to showcase the effective crop management. Training was also imparted in seed treatment and crop husbandry to 58 per cent of marginal farmers in the sample NFSM—Pulses program found favour with all the small farmers as everyone was benefited by the seed distribution programme.

Benefits accrued :

Among the other benefits that the sample farmers of NFSM programme reported are higher yields, reduced pest problem and knowledge of crop husbandry. Majority, 70 per cent of marginal farmers and the same percentage of medium farmers have reported that they were benefited through higher yields. Even in small and large farmer group more than half of them expressed the same. Overall 66 per cent got higher yields. About 70 per cent of medium farmers, 56 per cent of small and 50 per cent of marginal farmers expressed that pest problem was considerably reduced. On the whole 54 per cent opined the same. Eighty per cent of medium farmers responded by saying that they are enriched by the crop management practices demonstrated by the NFSM programme. However, this feeling was shared by only 30 per cent of marginal farmers and 25 per cent of large farmers. Overall 36 per cent of farmers concurred with them.

Production also increased in Bengal gram due to NFSM Programme. Highest growth is observed in medium group farmers at 68.10 per cent followed by 35.04 per cent in large farmer group and 26.38 per cent in marginal group. The lowest per cent of 12.44 is recorded in small size group farmers. On the whole an increase of 34.33 per cent is observed in production post NFSM programme. There is positive attitude towards NFSM pulses programme. All of the sample farmers are enriched by the demonstration and training programmes. Distribution of certified seed at 50 per cent subsidy is very beneficial as higher yields are reported by majority of the farmers. Pest problem are also considerably reduced due to IPM and crop management practices. Farmers in all size groups have reported increase in pulses production after NFSM. This growth is even higher in medium and large size groups.

Constraints in Pulses Development :

Pulses crop is mostly given low priority and usually grown in rain fed, moisture stress areas and marginal and sub-marginal lands in terms of soil quality, lack of irrigation etc. Though it is a energy rich crop it is raised in conditions of energy starvation. Although Tur dal Board recommends seed replacement every 3 years, farmers continue to use seeds grown in the farm year after year. Seed management, a crucial element for growth in productivity had witnessed serious problems in the recent past as it is not improving seed production. The role of public sector in seed production is minimal. High fluctuations in prices of pulses indicating high risk seems to have turned the farmers away from its cultivation. Low harvest prices continuing up to market season is one of the reasons for the low expansion of acreage under pulses cultivation.

Policy Implications :

(1) Technology Access :

Every one concedes with the application of latest technical know-how across fields. In this study it is found that farmers received information regarding "Certified seed availability and the pest control practices" from neighbours (90 per cent). There is need that the department is to arrange the sources authentically regarding technology adoption practices and the reliable access to the farmer community. The farmer community lacks dynamism in practicing the recommended doses or methods, since they are not well-versed with the practices recommended. The supply of equipment in question (sprayers) is to be channelized at the required and reliable level to reach the farmer in-time and with out prejudice.

(2) Nutrient Management :

It is seen that the good level of yields are realized by the application of potassium, nitrogen and phosphorous as expressed by the farmers. This can be supplemented by Rhizobium culture. But these practices are to be across fields in sowing season by the extension staff followed by post-sowing advice and methods to be practiced by the cultivators.

(3) Marketing Intervention :

The government intervention in market is sought at certain level. During the harvest season, the low price existence is to be given redress through the cold-storage arrangement by the department or by permitting the private to start cold storage at large scale. Further, post-harvest prices should reach the farmers, since the middlemen are sharing the lot of price. The prevailing market price is to be well known to farmers with the initiation of marketing department, provided some stipulations are laid against middlemen to avoid low price fixation in their sales.

(4) Management of Cultivation :

As the farmers expressed, the mixed cropping for Red gram is to be followed in other areas. This reduces the costs of pest control to the farmers. Pest Management in pulses cultivation is very important and well accepted norm/ practice. The in-time completion of these practices are to be done and these should be guided by the extension staff.

(5) Distribution/Availability of Inputs :

It is observed the scarcity of certified seed across the study district. Therefore, the high amount of certified seed is to be distributed. Some information brochures/ pamphlets in Telugu regarding the latest input use is to be distributed to the farmers. The sources of durable and reliable pesticides are to be informed to the farmers. The good pesticide brands are to be made available to farmers. The bulletins or some brochures may be handy to the farmers regarding input prices or the prices of produce of the area in question.

D. Commodity Reviews

(i) Foodgrains

During the month of February 2012 the Wholesale Prices of foodgrains displayed a falling trend. Wholesale Price Index (Base 2004-05=100) of foodgrains and pulses fall by 0.11 per cent and 1.32 per cent but Cereals rose by 0.17 per cent over the previous month.

ALL INDIA INDEX NUMBER OF WHOLESALE PRICES

(Base : 2004-2005=100)

Commodity	Weight (%)	WPI for the Month of February 2012	WPI for the Month of January 2012	WPI A year ago	Percentage change during	
					A month	A year
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice	1.793	173.0	172.9	170.4	0.06	1.53
Wheat	1.116	169.7	169.1	177.1	0.35	–4.18
Jowar	0.096	250.8	259.4	213.0	–3.32	17.75
Bajra	0.115	199.9	200.1	176.5	–0.10	13.26
Maize	0.217	213.8	210.1	183.1	1.76	16.77
Barley	0.017	188.8	182.7	187.5	3.34	0.69
Ragi	0.019	216.1	207.1	181.4	4.35	19.13
Cereals	3.373	178.0	177.7	175.0	0.17	1.71
Pulses	0.717	208.7	211.5	193.4	–1.32	7.91
Foodgrains	4.09	183.4	183.6	178.2	–0.11	2.92

Source : Office of the Economic Adviser, M/O Commerce and Industry.

Behaviour of Wholesale Prices

The following Table indicates the State wise trend of Wholesale Prices of Cereals during the month of February, 2012.

Commodity	Main Trend	Rising	Falling	Mixed	Steady
Rice	Mixed	Jharkhand	Delhi West Bengal	Kerala Haryana Karnataka Uttar Pradesh	Assam Tamil Nadu Gujarat
Wheat	Mixed	Karnataka	Maharashtra	Gujarat Haryana Uttar Pradesh Rajasthan	Jharkhand Delhi
Jowar	Mixed	Gujarat U.P.	Karnataka Tamil Nadu	Rajasthan A.P. Maharashtra	Delhi
Bajra	Mixed	A.P. Delhi	Karnataka Haryana Tamil Nadu	Maharashtra Rajasthan Gujarat	
Maize	Mixed	A.P. U.P. Jharkhand Gujarat	Gujarat	Haryana Uttar Pradesh Rajasthan	Karnataka M. pradesh

Procurement of Rice

4540 thousand tonnes of Rice (including paddy converted into rice) was procured during February 2012, as against 3974 thousand tonnes of Rice (including paddy converted into rice) procured during February 2011.The total procurement of Rice in the current marketing season i.e 2011-2012, upto 29.02.2012 stood at 25898 thousand tonnes, as against 22777 thousand tonnes of rice procured, during the corresponding period of last year. The details are given in the following table.

PROCUREMENT OF RICE

(in thousand tonnes)

State	Marketing Season 2011-12 (up to 29-02-12)		Corresponding Period of last Year (2010-11)		Marketing Year (October-September) 2010-11		2009-10	
	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh	3872	14.95	3227	14.17	9610	28.10	7555	23.58
Chhatisgarh	4074	15.73	3479	15.27	3743	10.95	3357	10.48
Haryana	1974	7.62	1657	7.27	1687	4.93	1819	5.68
Maharashtra	129	0.50	154	0.68	308	0.90	229	0.71
Punjab	7731	29.85	8634	37.91	8635	25.25	9275	28.95
Tamil Nadu	986	3.81	757	3.32	1543	4.51	1241	3.87
Uttar Pradesh	2673	10.32	1884	8.27	2554	7.47	2901	9.06
Uttarakhand	258	1.00	271	1.19	422	1.23	375	1.17
Others	4201	16.22	2714	11.92	5695	16.65	5282	16.49
Total	**25898**	**100.00**	**22777**	**100.00**	**34197**	**100.00**	**32034**	**100.00**

Source: Department of Food and Public Distribution.

Procurement of Wheat

The total procurement of wheat in the current marketing season i.e 2011-2012 upto Aug, 2011 is 28144 thousand tonnes against a total of 22462 thousand tonnes of wheat procured during last year. The details are given in the following table.

PROCUREMENT OF WHEAT

(in thousand tonnes)

State	Marketing Season 2011-12 (up to 1-08-2011)		Corresponding Period of last Year (2010-11)		Marketing Year (April-March) 2010-11		2009-10	
	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total	Procure-ment	Percentage to Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Haryana	6891	24.48	6347	28.26	6347	28.19	5237	23.08
Madhya Pradesh	4894	17.39	3538	15.75	3539	15.72	2410	10.62
Punjab	10957	38.93	10166	45.26	10209	45.35	9941	43.81
Rajasthan	1302	4.63	476	2.12	476	2.11	935	4.12
Uttar Pradesh	3460	12.29	1645	7.32	1645	7.31	3137	13.83
Others	640	2.27	290	1.29	298	1.32	1029	4.54
Total	**28144**	**100.00**	**22462**	**100.00**	**22514**	**100.00**	**22689**	**100.00**

Source : Department of Food and Public Distribution.

(ii) Commercial Crops

Oil Seeds and Edible Oils

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 164.3 in February, 2012 showing a rise of 0.7 per cent and 9.4 per cent over the previous month and over the previous year.

The Wholesale Price Index (WPI) of all individual oilseeds showed a mixed trend. The WPI of Rape and Mustard (1.2 per cent), Copra (7.6 per cent) and Niger Seed (5.3 per cent) decreased over the previous month. However, the WPI Groundnut seed (3.3 per cent), Cottonseed (1.4 per cent), Gingelly seed (4.6 per cent), Sunflower seed (0.2 per cent) and Soyabean (1.3 per cent) increased over the previous month. However, the WPI of Safflower seed remained unchanged over the previous month. The Wholesale Price Index (WPI) of Edible Oils as a group stood 139.2 in February, 2012 showing a decline of 0.1 per cent over the previous month. However, it increased by 7.6 per cent over the previous year. The WPI of Cottonseed Oil (1.0 per cent), Mustard Oil (0.5 per cent), Soyabean Oil (0.6 per cent), Sunflower Oil (1.3 per cent) and Gingelly Oil (0.4 per cent) decreased compared to the previous month, However, the WPI of Groundnut Oil (2.0 per cent) and Copra oil (0.6 per cent) increased over the previous month.

Fruits and Vegetable

The Wholesale Price Index (WPI) of Fruits and Vegetable as a group stood at 165.6 in February, 2012 showing a rise of 2.5 per cent and 4.6 per cent over the previous month and over the previous year.

Potato

The Wholesale Price Index (WPI) of Potato stood at 105.9 in February, 2012 showing an increase of 7.1 per cent over the previous month. However, it decreased by 2.2 per cent over the previous year

Onion

The Wholesale Price Index (WPI) of Onion stood 134.2 in February, 2012 showing a fall of 11.3 per cent and 48.5 per cent over the previous month and over the previous year.

Condiments and Spices

The Wholesale Price Index (WPI) of Condiments and Spices (Group) stood at 214.1 in February, 2012 showing a fall of 5.3 per cent and 20.1 per cent over the previous month and year respectively. The Wholesale Price Index of Black Pepper and Turmeric increased by 0.1 per cent and 1.9 per cent over the previous month. However, the WPI of Chillies (Dry) decreased by 5.6 per cent over the previous month.

Raw Cotton

The Wholesale Price Index (WPI) of Raw Cotton stood at 199.2 in February, 2012 showing a fall of 2.5 per cent and 32.3 per cent over the previous month and over the previous year respectively

Raw Jute

The Wholesale Price Index (WPI) of Raw Jute stood at 223.2 in February, 2012 showing an increase of 8.5 per cent over the previous month. However, it decreased by 3.6 per cent over the previous year.

WHOLESALE PRICE INDEX OF COMMERCIAL CROPS FOR THE MONTH OF FEBRUARY, 2012

(Base Year : 2004-05=100)

Commodity	Latest	Month	Year	Percentage Variation over the	
	Feb., 2012	Jan., 2012	Feb., 2011	Month	Year
Oil Seeds	164.3	163.2	150.2	0.7	9.4
Groundnut Seed	214.0	207.1	156.9	3.3	36.4
Rape and Mustard Seed	162.7	164.6	136.9	–1.2	18.8
Cotton Seed	142.1	140.2	134.9	1.4	5.3
Copra (Coconut)	97.1	105.1	121.9	–7.6	–20.3
Gingelly Seed (Sesamum)	230.3	220.2	247.4	4.6	–6.9
Niger Seed	167.7	177.1	142.2	–5.3	17.9
Safflower (Kardi Seed)	130.9	130.9	148.0	0.0	–11.6
Sunflower	160.7	160.4	173.9	0.2	–7.6
Soyabean	150.8	148.8	140.0	1.3	7.7
Edible Oils	139.2	139.4	129.4	–0.1	7.6
Groundnut Oil	172.6	169.2	144.7	2.0	19.3
Cotton Seed Oil	149.3	150.8	137.6	–1.0	8.5
Mustard and Rapeseed Oil	144.9	145.6	122.3	–0.5	18.5
Soyabean Oil	150.7	151.6	141.1	–0.6	6.8
Copra Oil	121.1	120.4	109.6	0.6	10.5
Sunflower Oil	133.6	135.3	128.3	–1.3	4.1
Gingelly Oil	151.4	152.0	141.0	–0.4	7.4
Fruits and Vegetables	165.6	161.5	158.3	2.5	4.6
Potato	105.9	98.9	108.3	7.1	–2.2
Onion	134.2	151.3	260.6	–11.3	–48.5
Condiments and Spices	214.1	226.0	267.8	–5.3	–20.1
Black Pepper	425.2	424.9	290.9	0.1	46.2
Chillies (Dry)	251.4	266.2	271.6	–5.6	–7.4
Turmeric	164.7	161.6	404.2	1.9	–59.3
Raw Cotton	199.2	204.4	294.4	–2.5	–32.3
Raw Jute	223.2	205.8	231.6	8.5	–3.6