

Analysis of Inputs Use Pattern in Different Rice Based Cropping Systems in Nellore Distict of Andhra Pradesh

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ABSTRACT

One of the feasible ways of increasing the farm income and to withstand the sharp fluctuations in price structure and creating employment opportunities by cultivate the different cropping systems in limited farm land. Primary data have been collected from the sample rice farms with the help of pretested questionnaire through personal interview with respondent farmers. The results revealed that total human labour employment as whole in the cropping system-I, II and III were 242.56, 258.43 and 322.61 man days per hectare respectively. Human labour use was higher for cotton in cropping system-I compared to other crops. The bullock labour utilization was 3.48 cattle pair days per hectare in the cultivation of groundnut. Machine power for cropping system-I was 15.98, cropping system-II 21.49, cropping system-III 26.70 hours per hectare.

Key words: Cropping system, Fertilizers, Zinc, Rice, Greengram

INTRODUCTION

The future of Indian economy reveals round its agriculture and the Agriculture is now growing on Industrial footing. The 70 per cent of the population is directly or indirectly dependent on agriculture with 65 per cent population constituting the rural masses, it is a gigantic problem to infiltrate the modern technology of agriculture to for flung villages. The present trend of population growth is creating heavy pressure on agricultural land, specially on the face of fact that with the growth of industries and civilization everything is increasing expect agriculture land therefore, the alternative for boosting our economy rests, with increasing

productivity on whatever land is available. It is well known that India has reached the very last frontier in agriculture, there is no scope what so ever for bringing more area under cultivation. All the same, it is imprerative that, we increase agriculture production to meet the requirement of over multiplying population this could be possible only by increasing the productivity of the existing cultivable land.

Fertilizers are the materials used to increase or maintain the yield from these materials may be conveniently classified in to two main groups natural or organic fertilizers and artificial or chemical fertilizers.

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Chemical fertilizers are also divided into three principal groups according to the nutrient element they are designed to provide-nitrogen, phosphorus and potassium are principle nutrients. Grouped together as 'micro nutrients' or 'trace elements' because of the very small quantities needed by plants, other elements; include iron, manganese, copper, boron, molybdenum and zinc. Gypsum and limestone come under the category of soil amendments; their use in the underdeveloped countries of the world is negligible the absence of one or the other of these nutrients may decrease yields of the crops. All these materials, in greater or lesser proportions, may be thought of as plant nutrients part of the food all plants need if they are to grow and provide food for man or his livestock. Not all crops require the same amount of these materials, nor do all soil keep them. But, in general, for whatever purpose crops are being grown, they can be produced in greater quantity if fertilizers are used indeed, to achieve the high levels of productivity (which can be defined as production per unit of land, of manpower or money invested), the use of fertilizers are very essential. It is no coincidence that the countries in which farming is most highly developed and in which people are generally well fed are those that have the highest consumption of fertilizers. Each of the three principal fertilizers nitrogen-N, phosphoric acid-P₂O₅ and potash-K₂O play a different part in the development and growth of plant, the soil.

MATERIAL AND MEHODS

The study was carried out in Nellore (rural), thotapalligudur and pellakur mandals of Nellore district of Andhra Pradesh. Major rice based cropping systems identified in the study area were cropping system-I (paddy and cotton), cropping system-II (paddy-paddy-green gram), cropping system-III (paddy-paddy-groundnut) three mandals were selected based on high area production of paddy, a list of villages under rice based cropping systems was arranged. From each mandal two villages were selected. Total six villages were selected.

The selected villages were Eguvachavali and Chemmidipalem from Pellakur mandal, Kothavellanti and Sajjapuram from Nellore mandal, Mahalakshmi puram and Nelimatikandriga from Thotapalli gudur mandal. The list of all the farmers from the two selected villages of each manadal was obtained from their respective village records. From each of the selected village, 15 farmers were selected at random. Thus 30 farmers in each mandal constituted the sample of the study for the selected rice based cropping systems. The total number of farmers selected for the purpose of study was 90. The primary data were collected by the survey method through well designed quessinary for the agricultural year 2013-14. Secondary data were also used for the present study. For selection of sample, the secondary data pertaining to demographic features, area, cropping pattern, production and productivity of rice, cotton, groundnut and greengram crops other releated data were collected from the District Statistical Office of Nellore.

Human labour was calculated by actual days worked in the performance of different cultural operations in the cultivation of rice based cropping systems were recorded separately for male, female family and hired labour. Two women-days were converted into man equivalent days by assigning a ratio of 1.50 woman-days equivalent to one man-equivalent day. Human labour was quantified in terms of productive man work units (usually about 8 hours of productive work). Bullock labour included both owned and hired cattle power and was measured in terms of plough units of 6 hours.

RESULTS AND DISCUSSION

INPUT USE PATTERN IN DIFFERENT CROPPING SYSTEMS

HUMAN LABOUR UTILIZATION

An attempt is made to know the labour utilization pattern in three cropping systems followed in the study area. Human labour is one of the most important factors of production and also a major item of cost

structure influencing the cultivation of any crops. Successful completion of any farm operation requires some amount of human labour. The use of human labour depends on the type of enterprise and its scale of operation. Keeping this in view an attempt has been made to examine the magnitude and pattern of labour utilization by the crops in the selected cropping systems.

Table-1 shows that the total human labour requirement for kharif paddy and cotton in cropping system-I was 90.46 and 152.1 mandays per hectare respectively. While in cropping system-II the human labour requirement for kharif paddy, rabi paddy and green gram was 100.61, 109.09 and 48.73 mandays in that order. In the case of cropping system-III the human labour enclosed in different operations of kharif paddy, rabi paddy and groundnut was 105.97, 109.82 and 106.82 mandays respectively. The total human labour required for as a whole in three cropping systems i.e., cropping system-I, II and III was 242.56, 258.43 and 322.61 mandays per hectare respectively. It is noted from the above analysis that the human labour utilization in the cultivation of cotton in cropping system-I was higher than that of other crops in all the three cropping systems. Major labour absorbing operation in cotton was harvesting as more than 50 per cent of the total labour was used for this operation. Greengram in cropping system-II required least number of mandays of labour as greengram was cultivated in paddy fallows, greengram was sowing by broadcasting method it required less number of labour and any operations like land preparation, weeding, application of fertilizers was not followed. Also green gram required less amount of pesticide application, hence greengram required less number of human labour.

During kharif season the human labour employment is lesser compare to rabi season. The difference occurs due to the difference varieties of rice i.e., MTU1010 and BPT5204 were cultivated in kharif season and

rabi season respectively. The BPT5204 variety of paddy was susceptible to blast diseases and it required more number of pesticide application so the BPT5204 cultivated in rabi season is required more number of human labour utilization compare to MTU1010 cultivated in kharif season. Irrigated Groundnut in cropping system-III required more number of human labour for weeding and harvesting operations when compared to greengram in cropping system-II hence it is evident from the above analysis that cropping system-III provides more number of human labour employment when compared to other cropping systems in the study area.

CATTLE LABOUR AND MACHINE POWER UTILIZATION

It is evident from Table-1. That the cattle labour was used only in groundnut cultivation in cropping system-III. The total cattle labour used by the groundnut farmers was 3.48 cattle pair days per hectare for sowing operations. The results presented in Table-1 revealed that machine power use was 15.98, 21.49 and 26.70 hours per hectare in cropping system I, II and III respectively. Land preparation was the major machine labour absorbing operation in cultivation of any crop.

In cropping system-I only two crops are cultivating, hence less number of machine labour was required when compared to other cropping systems. There was no much variation in the machine power utilization between kharif paddy and rabi paddy in cropping system-II and III. The only difference in machine power utilization between cropping system-II and III was greengram in cropping system-II required no machine labour since greengram there is no land preparation just it is broadcasted in paddy fallows and groundnut in cropping system-III required machine labour for land preparation. Hence, machinery use was higher on cropping system-III compared to other cropping systems in the study area.

Table 1: Labour utilization pattern in three cropping systems

Particulars	Human labour (man days per hectare)	Cattle labour (cattle pairs days per hectare)	Machine labour (hour per hectare)
C. S I			
Paddy	90.46 (37.30)	-	9.73 (60.89)
Cotton	152.1 (62.70)	-	6.25 (39.11)
Total C. S I	242.56 (100)	-	15.98 (100)
C. S II			
Paddy(Kharif)	100.61 (38.93)	-	10.71 (49.84)
Paddy(Rabi)	109.09 (42.21)	-	10.78 (50.16)
Green gram	48.73 (18.86)	-	-
Total C. S II	258.43 (100)	-	21.49 (100)
C. S III			
Paddy (Kharif)	105.97 (32.85)	-	10.85 (39.20)
Paddy(Rabi)	109.82 (34.04)	-	10.85 (39.20)
Ground nut	106.82 (33.11)	3.48 (100)	5.98 (21.60)
Total C. S III	322.61 (100)	3.48 (100)	26.70 (100)

Figure Figures in parentheses indicate percentages to the total

MATERIAL INPUT UTILIZATION

Production of farm commodity not only requires resource services but also material inputs viz., seeds, manures, fertilizers, plant protection chemicals etc. Various material inputs used in three cropping systems-I, II and III respectively are presented in Table 2, 3 and 4.

INPUT USE PATTERN IN CROPPING SYSTEM – I

It is seen from Table-2 that the seed rate was 79 kg per hectare in the cultivation of kharif paddy. On an average, 4.5 tonnes of farm yard manure was used. The application of N, P and K through chemical fertilizers was of the order of 115.25 kg, 62.67 kg and 53.93 kg per hectare respectively, and zinc was applied 55.33 kg per hectare. Plant protection chemicals were applied as preventive and

remedial measure against the attack of pests and diseases. The per hectare use of plant protection chemicals was 0.75 kgs of Beem, 0.90 kgs of Caldon, 0.63 liters of Plethora, 0.87 liters of Monocrotophos. Herbicides were applied as preventive and remedial measure against the attack of weeds. The per hectare use of herbicides was 1 liter of Pendimetholin. The seed rate was 3.25 kg per hectare in the cultivation of cotton. On an average, 5.30 tonnes of farm yard manure was used. The application of N, P and K through chemical fertilizers was of the order of 160.93 kg, 57.92 kg, and 71.07 kg per hectare respectively. Per hectare use of plant protection chemicals was 1.01 liters of Imidacloprid, 0.64 kgs of Thiomax, 1.41 liters of chimbrin, 0.50 kgs of Mancozeb.

Table 2: Material inputs used in cropping system- I

S. No.	Particulars	Units	Paddy	Cotton
1	Seeds	Kgs	79	3.25
2	FYM	Tonnes	4.5	5.30
3	Fertilizers			
i	N	Kgs	115.25	160.93
ii	P	Kgs	62.67	57.92
iii	K	Kgs	53.93	71.07
iv	Zn	Kgs	55.33	-
4	Plant protection chemicals			
i	Beem	Kgs	0.75	-
ii	Caldon	Kgs	0.90	-
iii	Plethora	Lit	0.63	-
iv	Monocrotophos	Lit	0.87	1.36
v	Pendimetholin	Lit	1	-
vi	Imidacloprid	Lit	-	1.01
vii	Thiomax	Kgs	-	0.64
viii	Chimbrin	Lit	-	1.41
ix	Mancozeb	Kgs	-	0.50

INPUT USE PATTERN IN CROPPING SYSTEM – II

It is seen from Table-3. For kharif paddy in cropping system II, the seed rate was 82.50 kg per hectare. On an average, 4.97 tonnes of farm yard manure was used. The application of N, P and K through chemical fertilizer was of the order of 105.25 kg, 64.88 kg and 78.09 kg per hectare respectively, and zinc was applied 81.31 kg per hectare. The per hectare use of plant protection chemicals was 1 kg of Beem, 0.90 kg of Caldon, 2.62 kg of Acephate, 1 liter of Monocrotophos. In the case of rabi paddy seed rate was 84.64 kg per hectare. On an average, 4.97 tonnes of farm yard manure

was used. The application of N, P and K through chemical fertilizer was of the order of 185.88 kg, 67.05 kg and 78.81 kg per hectare respectively, and zinc was applied 81.04 kg per hectare. Plant protection chemicals were applied as preventive and remedial measure against the attack of pest and disease. The per hectare use of plant protection chemicals was 0.90 kg of Caldon, 2.63 kg of Acephate, 0.91 liters of Monocrotophos and 0.75 liters of Plethora. In summer season green gram was cultivated after harvesting the paddy. The seed rate was 31.73 kg per hectare and plant protection chemicals was 0.5 lit of Larvin per hectare.

Table 3: Material inputs used in cropping system- II

S. No	Particulars	Units	Paddy (Kharif)	Paddy (Rabi)	Green gram
1	Seeds	Kgs	82.50	84.64	31.73
2	FYM	Tonnes	4.97	4.97	-
3	Fertilizers				
i	N	Kgs	105.25	185.88	-
ii	P	Kgs	64.88	67.05	-
iii	K	Kgs	78.09	78.81	-
iv	Zn	Kgs	81.04	81.31	-
4	Plant protection chemicals				
i	Beem	Kgs	1	-	-
ii	Caldon	Kgs	0.90	0.90	-
iii	Acephate	Kgs	2.62	2.63	-
iv	Monocrotophos	Lit	1	0.91	-
v	Plethora	Lit	-	0.75	-
vi	Larvin	Lit	-	-	0.5

INPUT USE PATTERN IN CROPPING SYSTEM – III

It is seen from Table-4. That seed rate for kharif paddy was 77.60 kg per hectare. On an average, 4.82 tonnes of farm yard manure was used. The application of N, P and K through chemical fertilizer was of the order of 107.94 kg, 61.98 kg and 71.89 kg per hectare respectively, and zinc was applied 64.38 kg per hectare. The per hectare use of plant protection chemicals was 0.81 kg of Beem, 0.91 kg of Caldon, 2.38 kg of Fire, 1.50 liter of Monocrotophos. Herbicides were applied as preventive and remedial measure against the attack of weeds. The per hectare use of herbicides was 3.80 liter of Pendimetholin. In the case of rabi paddy seed rate was 77.59 kg per hectare. On an average, 4.82 tonnes of farm yard manure was used. The application of N, P and K through chemical fertilizer was of the order of 209.20 kg, 68.65 kg and 80.05 kg

per hectare respectively, and zinc was applied 64.38 kg per hectare. Plant protection chemicals were applied as preventive and remedial measure against the attack of pest and disease. The per hectare use of plant protection chemicals was 1.04 kg of Caldon, 2.50 kg of fire, 1.75 liters of Monocrotophos and 0.81 kg of Beem. The seed rate was 175.65 per hectare in the cultivation of summer groundnut. The application of N, P, Ca and S through chemical fertilizers was of the order of 162.37 kg, 95.52 kg, 53.32 kg, and 27.91 kg per hectare respectively. Plant protection chemicals were applied as preventive and remedial measure against the attack of pest and diseases. The per hectare use of plant protection chemicals was 0.85 liters of monocrotophos, 0.25 kg of Mancozeb and 8.8 kgs of Phorate granules. The pendimetholin was applied 3.78 lit for preventing the weeds in the paddy field.

Table 4: Material inputs used in cropping system- III

S. No	Particulars	Units	Paddy (Kharif)	Paddy (Rabi)	Groundnut
1	Seeds	Kgs	77.60	77.59	175.65
2	FYM	Tonnes	4.82	4.82	-
3	Fertilizers				
i	N	Kgs	107.94	209.20	162.37
ii	P	Kgs	61.98	68.65	95.52
iii	K	Kgs	71.89	80.05	-
iv	Zn	Kgs	64.38	64.38	-
v	Ca	Kgs	-	-	53.32
vi	S	Kgs	-	-	27.91
4	Plant protection chemicals				
i	Beem	Kgs	0.81	0.81	-
ii	Caldon	Kgs	0.91	1.04	-
iii	Fire	Kgs	2.38	2.50	-
iv	Monocrotophos	Lit	1.50	1.75	0.85
vi	Pendimetholin	Lit	3.80	-	3.78
vii	Mancozeb	Kgs	-	-	0.25
viii	Phorate	Kgs	-	-	8.8

SUMMARY AND CONCLUSION

One of the feasible ways of increasing the farm income and to withstand the sharp fluctuations in price structure and creating employment opportunities by cultivate the different cropping systems in farm. Fertilizer is a crucial input to increase the yield of the crops. Now a day's chemical fertilizers are the

most common and ready input being popular among the farmer's due to the better response in the crop production. The analysis showed that The total human labour employment as whole in the cropping system-I, II and III were 242.56, 258.43 and 322.61 mandays per hectare respectively. Human labour use was higher for cotton in cropping system-I

compared to other crops. The bullock labour utilization was 3.48 cattle pair days per hectare in the cultivation of groundnut. Machine power for cropping system-I was 15.98, cropping system-II 21.49, cropping system-III 26.70 hours per hectare. Policies for increasing cultivation are Labour is generally in short supply in present production particularly in the rural areas, there should be an increase in the farm wages so as to adequately compensate for the farm labour that were engaged on farm cultivations. This, if done, will motivate other prospective workers to participate in farm operations²; It was observed that the dominant farming operations in the study area were harvesting of crops like cotton and groundnut and application of agrochemicals. To fully achieve these tasks, young and dynamic farmers should be encouraged to participate in production. The c³ there should be an enabling environment that will encourage the participation of both the private and public sectors in farm production. If this is done, more credit facilities and farm labour will be made available to the farmers. At the end, the farmers will cover more land areas, their farm income levels will increase and their socio-economic life will improve.

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