Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [1] 2017: 55-58

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804
NAAS Rating 4.95

FULL LENGTH ARTICLE **OPEN ACCESS**

Employment pattern and economic evaluation of Direct seeded and Transplanted rice cultivation in TBP command area of Karnataka

Manohar.Y*, Nirmala. B and Suhasini.K.***
*Department of Agricultural Economics, College of Agriculture, PJTSAU, Hyderabad.
** Scientist (SS), ICAR-IIRR, Hyderabad.

ABSTRACT
The study was conducted in 2016-17 in Koppal, Bellary and Raichur districts of Tungabhadra Project (TBP) command area of Karnataka with the objectives to study the employment pattern and compare the costs and returns for direct seeded rice (DSR) and transplanted methods of paddy cultivation. A total of 90 sample paddy growing farmers were selected by adopting purposive random sampling technique. The study revealed that, in comparison with transplanted rice (TPR), in DSR, there was decrease in costs by Rs.16429/ha with respect to input cost viz, nursery, seeds, fertilizers and PPC as well as labour operations. There was an additional net gain of Rs. 28226/ha under DSR over TPR method of rice cultivation. The human labour (in man days) used in transplanted rice (70.82 man days) is higher than that of direct seeded rice (60.87 man days). The machine labour required for sowing can be completely saved in TPR.
Key words: Rice, Direct seeded rie (DSR), Employment pattern, Economics, Karnataka

Received 18.07.2017 Revised 02.08.2017 Accepted 21.08. 2017

INTRODUCTION

Rice is the staple food crop in India and occupies highest area among the cereal crops. Worldwide, rice is grown on 161 million hectares, with an annual production of about 764 million tonnes of paddy (FAO, 2013). The possibility of expanding the area under rice in the near future is limited. Therefore, the extra rice production needed should be met from increase in productivity. The major challenge in rice production is to achieve the maximum yield with less water, labour, and chemicals, thereby ensuring long-term sustainability. Global population growth is expected to increase the demand for rice by 1.27 percent annually between 2000 and 2025. Asia dominates the world in rice production as it accounts for about 90 per cent of world's rice area and 92 per cent of production (FAO, 2013). Direct seeded rice in Asia occupies about 28.3 Mha which is approximately 21 per cent of the total rice area in the region (Toriyama, 2005). India has the largest area under rice crop (about 45 million ha.) and it occupies 23.3 per cent of gross cropped area of the country (Singh *et al*.,2016). The productivity and sustainability of rice-based systems are threatened because of inefficient use of inputs, increasing scarcity of resources, especially water and labour, changing climate, emerging energy crisis and rising fuel prices, the rising cost of cultivation and emerging socio-economic changes such as urbanization, migration of labour, preference for non-agricultural activities etc. (Ladha *et al.,* 2009). Efficient agronomic management and technological innovations are needed to address these issues. In India, transplanting is the mostly adopted method of rice establishment. However, depletion of water resources is forcing farmers to shift to Direct Seeded Rice (DSR). The method does not require raising and transplanting of seedlings (Kakumanu, 2011). The need to increase productivity against rising labour costs for transplanting has led to a considerable increase in direct seeding in recent decades, particularly in South and Southeast Asia (Johnson *et al.* 2003). The main motivating factor for shift in rice establishment method from transplanting to direct seeding in India is response to labour scarcity (Balasubramanian, 2002) and lack of technically feasible transplanters. Direct seeded rice under no/reduced tillage is an efficient resource conserving technology holding good promise in future. The water management for DSR can vary greatly from continuous flooding for most of the growing season to frequent alternate wetting and drying

(AWD), to less frequent AWD, to rainfed. The dry seeded rice is not continuously flooded, but is irrigated frequently to avoid yield loss. The soil water content of the root zone (~0-20 cm) is kept between saturation and field capacity much of the time (*IRRI, 2016*).

In Karnataka, DSR is becoming a popular rice cultivation practice among the farmers of command area of Tungabhadra (TBP) in Raichur, Koppal and Bellary districts of Karnataka. The tail end farmers do not get sufficient water at right time. Due to declining resources, farmers of tail end get water once in fortnight in Tungabhadra Project (TBP) command area and farmers are compelled to complete transplanting within this period which is not possible with limited labour, machinery etc. Under late onset of monsoon conditions and insufficient water in reservoir, canal water may become erratic and untimely leading to delayed transplanting (beyond August). To overcome these problems, Direct Seeded Rice method is widely adopted in this region. In this backdrop, the present study was conducted during 2016-17 in Raichur, Koppal and Bellary districts of Tungabhadra Project (TBP) command area of Karnataka with the objectives to study the employment pattern and compare the costs and returns for direct seeded rice (DSR) and transplanted (TPR) methods of paddy cultivation.

METHODOLOGY

The present study was conducted in Koppal, Bellary and Raichur districts in TBP command area of Karnataka in 2016-17. The primary data required for the study was obtained from the sampled farmers by interview method through a pre-tested questionnaire. A total of 90 sample paddy growing farmers were selected by adopting purposive random sampling technique. Tabular and functional analysis were employed to arrive at valid results and conclusions.

RESULTS AND DISCUSSION

Socio-economic profile of sample farmers

Data was collected using structured schedule to understand the socio-economic status of sample farmers in the study area. The average age of the farmers in the study area was 44.43 years and the average age of farmers practicing DSR and TPR was 46.42 and 42.44 years respectively.

Majority of the sample farmers (54.45%) in the study area on an average completed college level education and it was 51.11% and 57.78% for farmers practicing DSR and TPR respectively. None of the sample farmers were illiterate. Majority of the farm families fall under joint type (67.78 %) and it was 75.56% and 60% for farmers practicing DSR and TPR respectively. The average size of the family in the study area was six, and it was six and five for farmers practicing DSR and TPR respectively. The average operational size of land holding in the study area was 2.71 ha. Highest operational size of land holding was found among the farmers practicing DSR with 3.21 ha and for farmers practicing TPR it was 2.21 ha which depicts that the farmers with larger landholding are likely to adopt a technology earlier. On an average, 65.55% of the sample farmers in the study area had extension contacts. (Table 1).

Table 1. Socio-economic profile of sample farmers

Sl.No	Particulars	DSR (n=45)	TR (n=45)	Average (n=90)
1	Average age of farmers (in years)	46.42	42.44	44.43
2	Education (average in %)			
	a) Illiterate	-	-	-
	b) Primary	-	-	-
	c) Mid-school	2 (4.44)	-	4.44
	d) High-school	20 (44.44)	19 (42.22)	43.33
	e) College	23 (51.11)	26 (57.78)	54.45
3	Family type (average in %)			
	a) Joint	34 (75.56)	27 (60)	67.78
	b) Nuclear	11 (24.44)	18 (40)	32.22
4	Average family size (No.)	6.356	5.44	5.9
5	Average size of operational land (in ha)			
	a) Owned			
	b) Leased-in	3.008	1.94	2.474
	Total	0.202	0.27	0.236
		3.21	2.21	2.71
6	Experience in cultivating rice (in years)	18.4	15.33	16.87
7	Experience in Practising DSR (in years)	2.356	-	-
8	Extension contacts (average in %)	31 (68.89)	28 (62.22)	65.55

Note: Figures in parentheses indicates percentage (%) of total.

Estimation of net gain /loss under direct seeded rice:

To assess the net gain or loss in DSR over TPR method of cultivation, partial budgeting technique was made use of and the results are presented in Table 2. The results indicate that on debit side, there was increase in cost by Rs.4575/ha with respect to material costs i,e FYM and labour operations *viz*, application of FYM, hand weeding, mechanical weeding and transport, and decrease in returns was nil. On the credit side there was decrease in costs by Rs.16429/ha with respect to material cost *viz,* nursery, seeds, fertilizers and PPC as well as labour operations like preparatory tillage, transplanting and application of fertilizers and PPC. There was increase in returns by Rs.16372/ha. Thus there was a net gain of Rs. 28226/ha under DSR over TPR method of cultivation. The results were compliant with the findings of Romana (2014) who showed that additional returns generated in DSR was more when compared to that of transplanted method of cultivation.

Table 2. Partial budgeting of farms with DSR and TPR in TBP command area

	Debit	Rs./ha		Credit	Rs./ha
A	Increase in costs		C	Decrease in costs	
	1. FYM	927.77		1. Nursery cost	1391.68
	2. Application of FYM	108.2		2. Seeds	1171.45
	3. Hand weeding			3. Chemical fertilizers	3300.28
	4. Mechanical weeding	2925		4. Plant protection	2313.9
	5. Transport/marketing	186.1		chemicals	
	6. Miscellaneous			5. Irrigation	336.1
		333.37		6. Preparatory tillage	4122.25
				7. Transplanting/sowing	3452.4
		94.45		8. Application of fertilizers	266.38
				9. Application of PPC	63.5
	Sub-total			10. Harvesting/bagging	11.08
				Sub-total	16429.02
		4574.89			
B	Reduced costs	0	D	Added returns	16371.8
	Total (A+B)	4574.89		Total (C+D)	32800.82

Net profit = [(C+D) – (A+B)] =(32800.82 – 4574.89) = Rs.28225.93/-

Employment pattern under DSR and TPR in TBP command area

The results of employment pattern in DSR and TPR are presented in Table 3. The human labour (in man days) used in transplanted rice (70.82 man days) is higher than that of direct seeded rice (60.87 man days). In direct seeded rice, the human labour required for transplanting can be completely saved. The application of fertilizers and manures on an average accounted for 8.13 man days in DSR as against 9.1 man days in case of TPR. The man days required for application of PPC was higher in TPR than that of DSR. Hand weeding accounted for more man days in case of DSR (32.6 man days) as against TPR (13.24 man days). The human labour employed for irrigation was higher in TPR (7.7) than that of DSR (6.2). Overall, transplanted method of cultivation required more labour or generated more employment in all the operational activities except for hand weeding which is credited to DSR method of cultivation.

The machine labour used in DSR (14.96 hrs) was slightly lower than that of TPR (15.43 hrs). The machine labour used for preparatory tillage was 8.1 hrs and 11.21 hrs for DSR and TPR respectively. This is because; the puddling operation is restricted only for transplanted rice. The machine labour used in DSR for sowing and weeding was 2.45 hrs and 0.24 hr respectively. The machine labour required for sowing can be completely saved in TPR. Harvesting and transport accounted for 2.47 hrs and 1.7 hrs respectively for both the practices. Overall there was 14.05 per cent saving in human labour man days and 3.05 per cent saving in machine hours due to the fact that labour for transplanting in DSR is obviated.

CONCLUSION

Due to the continuous depletion of the water resources, increasing fuel charges and labour scarcity, there is an urgent need to popularize the DSR technology to conserve resources like water, fuel and labor and to enhance the profitability of rice farmers. Awareness need to be created among the farmers about the correct dosage and time of application of herbicides to prevent environmental hazards and also to reduce the cost on herbicides. A cooperative society with a cluster of villages for ensuring the availability of agri-

inputs, laser land leveler, zero till machine, LCC, cono weeder, drum seeder at reasonable costs needs to be strengthened.

Table 3. Employment pattern under DSR and TR in TBP command area (Per ha)

Sl.no	Particulars	DSR	TR
1	Human labour (man days)		
	a) Nursery and Transplanting	-	26.45
	b) Application of fertilizers and manures	8.13	9.1
	c) Application of PPC		
	d) Hand weeding	13.9	14.33
	e) Irrigation	32.6	13.24
	Total	6.24	7.7
		60.87	**70.82**
2	Machine labour (machine hours)		
	a) Preparatory tillage	8.1	11.21
	b) Sowing	2.45	-
	c) Weeding	0.24	-
	d) Harvesting	2.47	2.47
	e) Transport	1.7	1.75
	Total	**14.96**	**15.43**

REFERENCES

1. Latika Devi, Y., Singh, J and Kamal, V. 2013. Dynamics of labour demand and its determinants in Punjab agriculture. *Agricultural Economics Research Review.* 26 (2): 267-274.
2. Nirmala, B., Amtul waris and Muthuraman. 2016. Direct seeded rice: An impact analysis in Tungabhadra command area of Karnataka. *Indian Research Journal of Extension Education.* 16 (2): 51-54.
3. Prashanth J ., Hiremath G.M., Patil Suresh S., 2014. Is Direct Seeded Rice a Panacea for Improving the Water-use Efficiency in Paddy Cultivation? *Agricultural Economics Research Review.* 27(2): 187-187.
4. Raghavendra, B.M and Singh, Y.V. 2015. Direct wet drum seeded rice an emerging resource saving technology for rice crop establishment. *Indian Farming*. 65 (1).
5. Rakesh, C., Guru Prem., Kumar Amit., Jat, H.S and Kumar, A.Y. 2016. Comparative study on productivity and profitability of rice under different crop establishment methods in Ambala, Haryana. *Progressive Agriculture.* 16 (2): 183-189.
6. Ramesh, K. 1990. An assessment of the production credit gap on paddy farms. *Agricultural Banker.*13: 29-39.
7. Romana G.S.,2014. Direct seeded rice versus normal transplanted rice: An Economic Comparsion. *Indian Journal of Economics and Development.* 10(2) : 117-122.
8. Singh Narinderpal., Kaur Gurpreet and Pujara Mandeep Kumar.2016. Role of Direct Sown Rice Technology for Conservation of Water Resources in Punjab-A Case Study of Amritsar District. *Indian Journal of Economics and Development.* 12(1a) : 531-536.
9. Vinay, M., Umesh Kumar., Parkash, V.L and Kumari, S. 2016. Impact of direct seeded rice on economics of paddy crop in Haryana. *International Journal of Agricultural Sciences.*8 (62): 3525-3528.

CITATION OF THIS ARTICLE

Manohar.Y, Nirmala. B and Suhasini.K.Employment pattern and economic evaluation of Direct seeded and Transplanted rice cultivation in TBP command area of Karnataka. Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue 1, 2017: 55-58