

RESEARCH ARTICLE

Mechanized system rice intensification (MSRI) in rice cultivation at Visakhapatnam district of Andhra Pradesh

■ K. Tejeswara Rao, P. B. Pradeep Kumar and E. Chandrayudu

SUMMARY

Paddy is major predominant crop during kharif in Visakhapatnam district of Andhra Pradesh, cultivated in an area of 102074 ha, out of total cropped area of 180164 ha with productivity of 2524 kg/ha. Farmers grow crop by adopting traditional method of paddy cultivation, use more seed rate, close spacing, late transplanting with over aged seedlings common phenomenon due to erratic rainfall Scarcity of labour and escalation in labour wages, reduction in labor efficiency are leading to low net returns. Organized On Farm Trials (OFTs) in farmer fields in two seasons *Kharif*, 2018 and *Kharif*, 2019. MSRI technology in paddy recorded 20.76% yield over normal transplanting method of paddy cultivation during both *Kharif* seasons. The results from the study showed that the farmers realized additional net income of Rs.15038 due to increased grain yield by 20.76% with reduction of cost of cultivation by Rs. 1150, it could be attributed to reduction in manual labour per ha and also increase in yield attributes.

Key Words : Mechanized system rice intensification (MSRI), Method of rice cultivation, OFTs, Yield and yield attributes, B:C ratio

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MEMBERS OF THE RESEARCH FORUM

Author to be contacted :

K. Tejeswara Rao, District Agricultural Advisory and Transfer of Technology, Centre-KVK (ANGRAU), Kondempudi, **Visakhapatnam (A.P.) India**

Email : tejaseniorscientist@gmail.com

Address of the Co-authors:

P.B. Pradeep Kumar and E. Chandrayudu, District Agricultural Advisory and Transfer of Technology, Centre-KVK (ANGRAU), Kondempudi, **Visakhapatnam (A.P.) India**

Rice area has been decreasing in state like Andhra Pradesh, although overall productivity is increasing, there is a slight decrease in compound growth rate in rice productivity at national level even though no scope for expansion of area of rice cultivation. The rice yields are plateau in irrigated ecosystem and rainfed situation with low productivity of 2.5 to 3.5 t ha⁻¹, it has become imperative to increase rice production per unit area per unit time to feed the teeming millions in

the new millennium. India has to produce 135-145 million tons by 2020 A.D. to feed the additional 350 million people (Anonymous, 2011). To do so, the productivity should be raised to 3.2 t ha⁻¹ a by 2020 AD from the present level of 2.05 t ha⁻¹ (The Hindu Survey of Indian Agriculture, 2006).

Visakhapatnam is one of major rice growing districts in Andhra Pradesh. Farmers grow rice in 1.02 lakh ha during *Kharif* and 2500 ha during *Rabi*. Cost of cultivation is increasing year by year several reasons *i.e.* social status, situational factors and input cost. At present cost of cultivation per hectare is between Rs. 50,000/- to Rs. 60,000/-. This is mainly due to escalation of labour wages and scarcity of labour in villages during agricultural season, labour requirement is very intense at the time of transplanting followed by increase in price of fertilizers (Yadav *et al.*, 2013).

To overcome all these crises wet transplanting with mechanized system rice intensification (MSRI) will reduce the labour requirement during transplanting season, technology is very simple, easy to adopt by the farmers and reduce cost of cultivation. Mechanized system rice intensification (MSRI) technology holds special significance at present day production system with regard to saving labour component by 10-20 per cent and increase productivity by 20-30 per cent. Mechanized system rice intensification (MSRI) technology, a new way of cultivation is gaining more attention of farmers in Visakhapatnam district. But the mechanized system rice intensification (MSRI) technology has its own implications to adopt such as right choice of field, irrigation facilities, varieties, land preparation, weed management and machinery available.

The prime concern of any programme related to agriculture is to enhance productivity and with reduced cost. In order to reduce cost of cultivation through DAATT Centre, took initiative to promote Mechanized System Rice Intensification (MSRI) technology in Visakhapatnam with the objectives of popularize the MSRI technology in Visakhapatnam district through on farm trials (OFTs) and front line demonstrations and

record yield in MSRI technology comparison with normal method to convince the farmer and to analyze economics of paddy cultivation at Visakhapatnam district.

MATERIAL AND METHODS

Mechanized system rice intensification (MSRI) technology with comparing normal method of cultivation executed on-farm trials (OFTs) during *Kharif*, 2018 and *Kharif*, 2019 at 10 locations in farmers fields. Selected farmer fields for conducting on farm trials (OFTs) with proper drainage facility and regulation of water. The varieties cultivated in paddy mechanized system rice intensification (MSRI) technology is MTU-1001 in both *Kharif*, 2018 and 2019. Observations were recorded on planting of crop in both mechanized system rice intensification (MSRI) technology and normal transplanting method data pertaining to crop stand with number of tillers per hill, incidence of pests and diseases if any at regular intervals followed by yield contributing parameters like effective tillers and number of grains per panicle. Yield per 5x5 m² was collected and calculated per hectare area. Means of yield attributes, yield and cost of cultivation were arrived for both mechanized system rice intensification (MSRI) technology and normal transplanting methods. Percentage yield increase over normal method was calculated and comparative analysis of cost benefit ratios per hectare was recorded.

RESULTS AND DISCUSSION

On-farm demonstrations on mechanized system rice intensification (MSRI) technology is conducted in two seasons during *Kharif*, 2018 and *Kharif*, 2019 in innovative farmer fields and yield attributes, yields were depicted in Tables (1 and 3). All yield attributes, during all the years were recorded better in MSRI technology than normal method (Table 1). During the two years of demonstrations and in all the locations with RGL 2537(Srikakulam sannalu) variety recorded the number of productive tillers per/Sq.mt and number of grains per panicle are 248 and 205 are more than normal practice

Table 1: Mean data on yield and yield attributes of front line demonstrations on paddy mechanized system rice intensification (MSRI) conducted during *Kharif*, 2018 and *Kharif*, 2019

Season	No. of Locations	No. of productive tillers/Sq.mt		No. of grains/panicle		Yield kg/ha		Percentage increase over check
		Demo	Check	Demo	Check	Demo	Check	
<i>Kharif</i> -2018	4	254	211	203	188	6975	5860	19.02
<i>Kharif</i> -2019	3	242	188	206	189	6537	5337	22.50
Average		248	200	205	189	6756	5859	20.76

200 and 189. The results were in conformity with the findings of Sreenivasulu and Bala (2014). Grain yield (Table 1) increase was achieved to a tune of 20.76 per cent in MSRI method (6756 kg ha⁻¹) over normal method of cultivation (5859 kg ha⁻¹). The paddy cultivation in MSRI technology is superior to normal conventional

method of transplanting of rice crop. Higher yield in MSRI technology is contributed by more number of productive tillers by supported by profuse root system resulted in more number of panicles. These results were in conformity with the findings of Vijaykumar *et al.* (2012) and Sheeja *et al.* (2012).

Table 2: Mean of comparative analysis of cost of cultivation including labour per hectare of paddy recorded during Kharif-2018 and Kharif-2019

Sr. No	Practice	Mechanized system rice intensification (MSRI)					Conventional transplantation method				
		Labour cost		Input cost		Total cost in Rs./ha	Labour cost		Input cost		Total cost in Rs./ha
		No	Cost	Input	Cost Rs.		No. of labour	Cost Rs./ha	Input	Cost Rs.	
1.	Nursery management	0	0	0	0	0	2 M preparation	600	FYM	500	1100
2.	Seed quantity and cost	0	0	40kg/ha@Rs. 30	1200	1200	0	0	75kg/ha@Rs. 30	2250	2250
3.	Land preparation of main field	10 M Puddling	6600	0	0	6600	8M & Puddling	5600	0	0	5600
4.	Nursery pulling and spreading	4M 2W	1700	0	0	1700	15M 3 W	4950	0	0	4950
5.	Transplanting/ sowing	10M 4W	4000	0	0	4000	25W	3750	0	0	3750
6.	Manures and fertilizers management /ha	8M	2400	DAP-125kg Urea 150kg Mop :85 kg	8000	10400	8M	2400	DAP-125kg Urea 150kg Mop :85 kg	8000	10400
7.	Weeding and herbicide Inter-cultivation	3M 20W	4000	Herbicides	2500	6500	1M 20W	3300	Herbicide	1000	4300
8.	Plant protection	2M 2W	1000	PP Chemicals	3500	4500	4M 4W	1800	Pp Chemicals	4500	6300
9.	Irrigation management	8 M	2400	0	0	2400	10M	3000	0	0	3000
10.	Harvesting	27 W	5400	0	0	5400	25 W	5000	0	0	5000
11.	Threshing, winnowing and bagging	16M 16W	8000	0	0	8000	16M 16W	8000	0	0	8000
	Total	61 M 71 W	35500		15200	50700	64M 93W	38400		16250	54650

M-Male F-Female

Table 3: Economics of the mechanized system rice intensification (MSRI) Vs normal transplantation method recorded during Kharif-2018 and Kharif, 2019

Sr. No.	Particulars	Mechanized system rice intensification (MSRI) method	Conventional transplantation method	Difference
1.	Grain yield kg/ha	6756	5599	1157
2.	Straw yield kg/ha	7567	6229	1338
3.	Grain value (Rs.14/kg)	94584	78379	16205
4.	Straw value (Rs.0.5/kg)	3784	3205	579
5.	Gross income Rs./ha	98368	87280	11087
6.	Total cost of cultivation Rs./ha	50700	54650	-3950
7.	Net income Rs./ha	47668	32630	15038
8.	C:B ratio	1.94	1.59	0.35

There is reduction in labour utilization (Table 2) is observed in mechanized system rice intensification (MSRI) *i.e.*, 3 man labour and 22 women labour when compared to normal method of transplanting method.

Additional grain yield and straw yield (Table 3) of 1157 kg ha⁻¹ and 1338 kg ha⁻¹ recorded in MSRI technology compared with normal practice of transplantation, this could be due to uniform plant population, good tillering capacity. Additional net income of Rs. 15038 ha⁻¹ received in MSRI technology with reduction of cost of cultivation of Rs.3950 ha⁻¹ realized over normal transplanting. The net income increased by Rs.15038 per hectare in MSRI technology. It was mainly due to the reduction in cost of sowing operation and transplanting operations. It was observed that the cost-benefit ratio was higher in MSRI method (1.94) when compared to conventional method (1.59). The similar result was reported by Manjunatha *et al.* (2009).

The results from the study showed that the farmers realized the Rs.15038 additional net income due to increased grain yield by 20.76 per cent with reduction of cost of cultivation by Rs. 3950/-, it could be attributed to reduction in manual labour of 3 man labour and 21 women labour and also increase in yield attributes and yield.

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