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Performance of Direct Seeded Rice by using Seed cum Fertidrill in Vizianagaram District of Andhra Pradesh

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ABSTRACT: Manual transplanting is the most popular method of crop establishment in rice growing areas in Vizianagaram district; it requires more number of labour leads to increase in the cost of cultivation and results in delayed transplanting. Direct seeding with the help of seed drill avoids raising of nursery, pulling and transplanting due to which labour requirement is reduced. District Agricultural Advisory and Transfer of Technology Centre (DAATTC), Vizianagaram, conducted ten front line demonstrations for three consecutive years during *kharif* 2011-12, 2012-13 and 2013-14. The results revealed that direct seeded rice with ferticum seed drill recorded significantly more number of productive tillers hill^{-1} (11.10) and number of grains panicle^{-1} (136.7) than manual transplanting i.e. 9.87 and 129, respectively. The average grain yield in seed cum fertidrill method was 6.02 tonnes ha^{-1} as compared to 5.63 tonnes ha^{-1} in case of manual transplanting. The increase in grain yield of direct seeddrill sown rice was 6.9 percent compared to transplanted rice. The cost of cultivation was low (Rs. 30,369 ha^{-1}) in direct seeded with seeddrill method than manually transplanted rice (Rs.35,454 ha^{-1}). The average benefit cost ratio was more with ferticum seed drill (2.07) than manual transplanting(1.65).

Keywords: Benefit cost ratio, Direct seeded rice, Drum seeder, Front line demonstrations, Grain yield, Gross and Net returns.

1. Introduction

Rice (Oryza sativa L.) is considered as the "global grain". It is the major staple food crop in India. In rice production, India ranks second as it is grown in almost all the states of the country. In India rice is grown in an area of 43.86 million ha with a production of 104.80 million tones and with an average productivity of 2390 Kg ha^{-1} (Anonymous, 2015). In Andhra Pradesh, it is grown in an area of 18.29 lakh ha with a production of 69.08 lakh tonnes and an average productivity of 3777 Kg ha^{-1} (Anonymous, 2013). The transplanted rice crop was grown in an area of 1.25 lakh ha with a production of 5.5 lakh tonnes and an average yield of 4417 Kg ha^{-1} in Vizianagaram district (Hand Book of Statistics, Vizianagaram).

In kharif, raising dry nurseries and manual transplanting is the most common practice of rice cultivation in Vizianagaram district. Although manual transplanting is the effective means of rice

cultivation, it involves nursery bed preparation, raising of nursery up to one month, pulling of seedlings, transportation to main field and then transplanting. All these operations are laborious involving drudgery and timely availability of labour. Hence, the cost of cultivation of transplanted rice has become high. Further late onset of monsoons further delays planting. Nursery pulling and transplanting takes about 250-300 man hours ha^{-1} which is roughly 25 per cent of the total labour requirement of the crop (Ved Prakash and Varshney, 2003). In such situation, alternate methods of rice establishment are the only option to deal with labour scarsity. Direct dry seeding with seed drill offers low cost of cultivation due to skipping of nursery raising, pulling of seedlings and transplanting, and crop matured earlier by 7-12 days. (Subbaiah *et al.*, 2002, Gill, 2008). The productivity of direct seeded rice with seed drill was comparable with manually transplanted rice (Gangawar *et al.*, 2008).

DAATT Centre, Vizianagaram introduced direct dry seeding rice with seed drill method in Vizianagarm district during 2010 assessed its performances for two seasons. After confirming these technologies gave encouraging results, front line demonstrations were conducted during kharif season consecutively for three years from 2011-12 to 2013-14.

2. Material and Methods

The performance of direct seeded rice using seed drill was evaluated in ten front line demonstrations for three consecutive years during *kharif* 2011-12, 2012-13 and 2013-14.The demonstrations were conducted in 6 mandals of Vizianagaram District by using popular variety MTU 1001, a medium duration, blast resistant and coarse grain rice. The soil texture of the demonstrations area was sandy clay loam with a pH ranging from 7.13 to 7.92 with electrical conductivity ranging from 0.58 to 1.22 dSm^{-1}, low in available nitrogen (92 to 188 Kg ha^{-1}), medium to high in available phosphorus (28.6 to 52.3 Kg ha^{-1}) and medium in potassium potassium (142 to 238 Kg ha^{-1}).

Sowing of paddy seed was done using National seed cum ferti drill model NFSD. The machine was operated by 45 HP tractor. The machine was made of mild steel (MS) angle iron of size 60x60x8 mm with square cross section. Spacing between two furrow openers was 20 cm having 11 furrows. The seed and fertiliseer box of seed cum ferti drill was made by using mild seel sheet. The U shaped seed box frame if fabricated from MS sheet and its front side was filled with 11 inclined plates in separate boxes. The U shaped seed box size was 18x25cm and depth of seed in the box is 18cm. each inclined plate was having 24 U shaped cell constructed around its periphery t uniform distances. The drive of the inclined cell plate was given by the main drive

shaft through the bevel gear set. The trapezoidal shaped fertilizer boxes with cross section (top width 21.5cm, bottom width 11 cm, depth 19.5cm and length of box 240mm) are made from20 gauge bklack sheet. The fertilizer metering mechanism force feed cum gravity type was fitted in the fertilizer box. The agitating gears are provided on shaft just at top of holes for feeding the fertilizer towards holes given at bottom of fertilizer box. The machine was adjusted for a seed rate of 30kg ha-1. The average spacing between the seeds with inclined plate type seed cum ferti drill was 4 - 5 cm. depth of sowing was recorded was 5 to 6 cm. the average speed of operation of tractor was for sowing of paddy seeds was 4.0 km h-1. The effective field capacity of the drill was 0.55 ha h-1. Along with seeding basal fertilizer dose of 1/3rd Nitrogen, full dose of phosphorous and potassium were applied through the same machine. Remaining nitrogen of two splits was broadcasted at tillering and panicle initiation stages.

The sowing of paddy seed was done at optimum moisture. Next day of sowing Pendimethalin (STOMP) was sprayed @2.5 Lha-1. After emergence of seedlings, the field was kept moist followed by alternate wetting and drying of soil till panicle initiation stage and 5cm depth of water was maintained up to ten days before crop maturity. One hand weeding was taken up at 30 days after sowing followed by conoweeding at 40 DAS for effective control of weeds and pulvarisign soil between rows. In the case of manual method of transplanting existing package of practices were being adopted by the farmers with the same variety MTU1001. The economics of planting methods viz., cost of cultivation, gross and net income in INR was computed. The benefit cost ratio was calculated by considering input costs and output prices prevailing at the time of harvest. The significance of treatment effect was tested with help of t test at 5% level of significance (Panse and Sukhatme, 1978).

3. Results and Discussion

Yield attributes

The results of onfarm demonstrations revealed that direct seeded rice with seed drill recorded significantly more number of productive tillers hill^{-1} (11.10) and number of grains panicle^{-1} (136.7) than manual transplanting i.e. 9.87 and 129, respectively (Table.1). This might be due to lack of transplanting shock and early seedling vigour resulted in more number of tillers. Further mechanical weeding with cono weeder between the inter rows leads to loosening of the soil, better aeration root proliferation and reduction

of weed competition which inturn recorded more number of tillers and panicles per unit area. Higher productive tillers obtained by seed cum fertidrill methods than manual transplanting was also reported by Manjunatha *et al.* (2009) and Veeresh *et al*. (2011). The number of productive tillers per hill increased 12.46 percent in seed cum fertidrill than manual transplanting.

Grain yield

The results indicated that direct seeded rice with seed cum fertidrill recorded significantly higher grain yield over manual transplanting in all the three consecutive years (Table.1). The average grain yield in seed cum fertidrill method was 6.02 tonnes ha^{-1} as compared to 5.63 tonnes ha^{-1} in case of manual transplanting. The higher grain yield in direct seeded rice might be due to more number of productive tillers per unit area and higher stature of filled grains per panicle owing to better translocation of photosynthates from source to sink. Higher grain yields obtained in broadcasting method and direct seeded rice with drum seeder than transplanting was also reported by Manjunatha *et al.* (2009). The grain yield of seed cum fertidrill rice was increased about seven percent compared to transplanted rice.

Economics

The present study revealed that the cost of cultivation was low in seed cum fertidrill method of rice cultivation (Rs. 30,369 ha^{-1}) than manually transplanted rice Rs.35,454 ha^{-1}). An amount of Rs. 5,085 ha^{-1} can be saved by adopting direct seeded rice with ferticum seed drill. It is mainly due to ease in operation without raising of nursery, pulling and transport of seedlings to main field for transplanting. Similar findings were also reported by Senthilkumar and Kasthuri Thilagam (2012).

Gross and net returns were significantly more in direct seeded rice compared to manual transplanting. Sowing of paddy seed with seed cum fertidrill fetched higher gross and net returns of Rs.62,866 and Rs.32,497 than manual transplanting of Rs.58,726 and Rs.23272 ha^{-1} respectively. The data from three consecutive seasons shows that the average benefit cost ratio was higher in direct sowing rice with ferticum seed drill (2.07) than manual transplanting (1.65). This might be due to low cost of cultivation and increased grain yield in direct sowing rice than transplanting.

These results are in conformity with those of Manjunatha *et al.* (2009) and Gangawar *et al.* (2008). Labour intensive and costly method of transplanting in rice could be substituted by direct sowing with seed drill without sacrifice in productivity, if effective water control is possible (John Kutty *et al*, 2002).

4. Conclusion

By the present front line demonstrations it could be concluded that by adopting direct sowing rice with seed cum fertidrill, it is possible to achieve more higher growth and gain yield and net returns in sandy clay loam soils of Vizianagaram district during kharif season.

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Table 1. Yield attributes, grain yield, gross returns and net returns as influenced by the Direct seeded rice with drum seeder and manual transplanting.

Year	Particulars	Number of productive tillers hill^{-1}	Number of grains panicle^{-1}	Yield t $_{ha^{-1}}$	Cost of cultivation ha^{-1}	Gross returns $_{ha^{-1}}$	Net returns ha^{-1}	Benefit Cost Ratio
2011	Manual transplanting method	9.13	138	5.36	34090	50920	16830	1.49
	Seed drill method	10.47	142	5.59	28593	53105	24512	1.86
	S.E (m)	0.177	2.422	0.103	631.29	239.76	865.51	0.13
	CD (P=0.05)	0.369	NS	NS	1865.92	708.67	2558.2	0.327
2012	Manual transplanting method	8.66	119	5.85	35860	62888	27028	1.75
	Seed drill method	9.54	130	6.27	29925	67403	37478	2.25
	S.E (m)	0.191	3.551	0.148	840.33	602.68	1274.64	0.064
	CD (P=0.05)	0.399	9.868	0.309	2483.79	1781.34	3767.47	0.188
2013	Manual transplanting method	11.80	130	5.67	36412	62370	25958	1.71
	Seed drill method	13.30	138	6.19	32588	68090	35502	2.09
	S.E (m)	0.219	1.752	0.179	763.44	587.03	1250.93	0.055
	CD (P=0.05)	0.457	3.661	0.374	2256.52	1735.11	3697.38	0.163
Average	Manual transplanting method	9.87	129.00	5.63	35454	58726	23272	1.65
	Seed drill method	11.10	136.67	6.02	30369	62866	32497	2.07
	S.E (m)CD	0.195	3.008	0.158	745.02	476.49	1130.36	0.092
	(P=0.05)	0.408	NS	0.313	2187.07	1408.37	3341.01	0.216

Price of 75 Kg grain: ¹ 950/-, ¹ 1075/- and ¹ 1100/- in 2011, 2012, and 2013 respectively.

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