Madras Agric. J., 100 (4-6): 377-379, June 2013
https://doi.org/10.29321/MAJ.10.001313

Performance of Rice Under Direct Seeding Using Drum Seeder During *Kharif* in Chittoor District of Andhra Pradesh

S. Sreenivasulu*, P. Bala Hussain Reddy and C. Manohar
RASS - Krishi Vigyan Kendra
Tirupati - 517 501

Sixty front line demonstrations were conducted on direct seeding in rice using 8 row drum seeder during *kharif* 2008 - 2010 consecutively for three years by RASS-Krishi Vigyan Kendra. Results of the demonstration revealed that the cost of cultivation was very low in direct seeded rice, Rs 25,160/- ha^{-1} than manually transplanted rice, Rs 31,422 ha^{-1}. An amount of Rs 6,262 ha^{-1} was saved by adopting direct seeding method in rice using drum seeder. Average benefit cost ratio was more in the case of drum seeding method (2.21) than manual method of transplanting (1.67).

Key words: Rice, direct seeding, drum seeder, front line demonstration, grain yield, gross and net returns.

Rice (*Oryza sativa* L) is the most important cereal food crop of India, which plays a key role in food security. In India, rice is grown in an area of 44.6m ha with a production of 109.5 million tonnes and the average productivity is 2.62 tonnes ha^{-1}. (Anonymous, 2005)

In Andhra Pradesh it is grown in area of 43.87 lakh ha with a production of 140.10 lakh tonnes and with an average productivity of 3.33 tonnes ha^{-1} (Cheralu, 2010). In Chittoor district during *kharif* season, rice crop is grown in an area of 17342 ha with a production of 0.59 lakh tonnes and the average yield is 3.45 tonnes ha^{-1} (Anon., 2012). Manual transplanting is the most popular method of crop establishment in rice growing areas in Chittoor district. It requires more number of labour and hence increases the cost of cultivation and also often results in delay in transplanting because of shortage of labour.

In addition to this, as rice requires more water per unit quantity of produce, there is a need to search for alternate methods to reduce water requirement without reduction in the productivity. Increasing water scarcity is becoming real threat to rice cultivation. Hence, water saving technology which also maintains soil health and sustainability as well as economically beneficial needs to be developed (Uphoff and Erick Fernandes, 2002).

Keeping these ideas in view, RASS – Krishi Vigyan Kendra, introduced direct seeding in rice during 2006 using 8-row drum seeder developed by TNAU, Coimbatore in Chittoor district and assessed its performance for three seasons. After proving this technology through assessment and owing to the encouraging results of the trials, front line demonstrations were conducted.

*Corresponding author email: nivassakamuri@rediffmail.com

Materials and Methods

Sixty front line demonstrations for three consecutive years (*kharif* 2008-2010) were conducted, to demonstrate the performance of rice under direct seeding method using drum seeder. The demonstrations were conducted in 34 ha covering 12 mandals of Chittoor district using popular variety ADT-37. Soil of the experimental area was sandy clay loam in texture with a pH ranging from 7.0 -8.3. Soils were low in available nitrogen (104 kg ha^{-1}), medium in phosphorus (12 kg ha^{-1}) and high in potassium (261 kg ha^{-1}) status. The electrical conductivity ranged from 0.4 – 1.3 dsm^{-1}. The 8-row drum seeder consists of 4 rotating drums with circular holes around at two edges. It was mounted on two wheels which were placed at both ends. On pulling the drum seeder, seeds are placed on the soil surface in eight rows at a distance of 20 cm between rows and at about 8 cm between plants. Pre germinated seeds (soaking for 24 hours in water followed by incubation for 24 hours) were filled in the drums and drum seeder was manually dragged on the field after draining the water to saturation.

In direct seeding method 37.5 kg ha^{-1} of seed was used. In transplanting 75 kg ha^{-1} of seed was used by the farmers and 30 days aged seedlings were transplanted manually without proper geometry.

In the case of drum seeder method up to 15-20 days after seeding, the field was kept moist followed by alternate wetting and drying of soil up to panicle initiation stage. There after standing water up to 5cm depth was maintained till crop maturity.

For control of weeds pre emergence herbicide butachlor @ kg/ ha was used at 5 – 6 days after sowing. This was followed by running a cono weeder between the rows twice at an interval of ten days from 20th day on wards.

Results and Discussion

Yield attributes

The results revealed that direct seeding with drum seeder recorded more number of productive tillers hill^{-1} (12.9) and number of grains panicle^{-1} (129.3) than manual transplanting method (11.6 and 119.5, respectively). This might be due to prolonged tillering duration when compared to manually transplanted method, good aeration for root zone and weed removal by running cono weeder between the inter rows resulted in more number of productive tillers. Higher number of tillers and number of panicles hill^{-1} obtained by broadcasting and drum seeder methods than manual transplanting was reported by Manjunatha *et al.* (2009) and Veeresh *et al*. (2011).

Grain yield

The results indicated that sowing with drum seeder recorded higher grain yield over manual transplanting method in all the three consecutive years. (Table 1) The average grain yield in drum seeder method was 6.39 tonnes ha^{-1} as compared to 5.92 tonnes ha^{-1} in case of manual transplanting. An increase of 7% yield was recorded in drum seeder method when compared to manual method of transplanting.

Table 1. Comparison of drum seeder method with manual transplanting

Particulars	Manual transplanting method	Drum seeder method
Seed rate	75 kg ha^{-1}	25-37.5 kg ha^{-1}
Age of the seedlings	30 days	Pre-germinated seeds *were* used for sowing
Spacing	Without any geometry / Chikku method	20 cm x 8 cm
Weed control	Manual hand weeding	Recommended pre-emergence weedicides at 5-6 days after sowing followed by running cono weeder between the rows from 20 days after sowing at 10 days interval for 3-4 times.
Irrigation water	5 cm water level was maintained up to maturity from the day of transplanting	Intermittent wetting and drying of the field was followed up to panicle initiation stage and there after water level up to 5 cm is maintained till 10 days before harvest
Crop duration	No change	Reduced by 10 days

The higher grain yield in direct seeding might be due to avoidance of root injury and transplanting shock, quick tiller initiation leading to more productive tillers, thus, more number of grains per panicle which might have contributed to higher grain yield. Loosening of soil might have created better aeration at root zone by running cono weeder between rows thereby produced more number of effective tillers which lead to higher productivity. Higher grain yields obtained in broadcasting and direct seeding with drum seeder than transplanting was also earlier reported by Manjunatha *et al.* (2009). Higher grain yields under different direct seeding methods were also reported by Subbaiah *et al.* (2002), Sharma *et al.* (2004), Gill (2008) and Gangawar *et al.* (2008).

Table 2. Yield attributes, grain yield, gross returns and net returns as influenced by the drum seeder technology in comparison with manual transplanting

Particulars	2008		2009		2010		Average / Pooled	
	Manual	Drum seeder	Manual	Drum seeder	Manual	Drum seeder	Manual	Drum seeder
Number of productive tillers hill^{-1}	12.0	13.7	11.0	12.5	11.9	12.5	11.6	12.9
SE(d)	0.333		0.266		0.131		0.243	
CD at 5%	0.752		0.600		0.295		0.549	
Number of grains panicle^{-1}	125.0	134.8	112.5	120.4	121.0	132.8	119.5	129.3
SE(d)	4.508		2.743		2.259		3.136	
CD at 5%	NS		NS		NS		NS	
Yield tonnes ha^{-1}	6.08	6.64	5.73	6.10	5.97	6.43	5.92	6.39
SE(d)	0.273		0.130		0.139		0.180	
CD at 5%	NS		NS		NS		NS	
Cost of cultivation Rs ha^{-1}	28830	23780	33142	26062	32025	25638	31422	25610

*Cost of 75 Kg grain: Rs 500/-, Rs 700/- and Rs 800/- in 2008, 2009 and 2010, respectively.

Economic analysis (Table 1)

The cost of cultivation was very low in direct seeded rice (Rs. 25,160 ha^{-1}) than manually transplanted rice (Rs. 31,422 ha^{-1}). An amount of Rs. 6,262 ha^{-1} was saved by adopting direct seeding method in rice by using drum seeder. It was mainly due to ease in operation without raising of nursery, pulling and transport of seedlings to main field for transplanting.

The data also revealed that, gross returns were more in case of direct seeding when compared to manual method of transplanting. Drum seeder method fetched higher average gross returns of Rs. 56,600 ha^{-1} than manual method of Rs. 52,526 ha^{-1}.

Similarly, average net returns ha^{-1} was high in case of drumseeder method (Rs. 30990) than manual transplanting method of rice cultivation (Rs. 21104). More gross returns, net returns and low cost of cultivation in direct seeded rice with drum seeder were reported by Manjunatha *et al.* (2009). Gill (2008) and Gangawar *et al.* (2008) also reported that higher net returns were obtained under direct seeded rice.

The average benefit cost ratio was higher in case of drum seeding method (2.21) than manual method of transplanting (1.67). Hugar *et al.* (2009) also reported that benefit cost ratio was more in SRI, direct seeding method than zero tillage method, manual method of transplanting and transplanter method.

Conclusion

It can be concluded that by adopting direct seeding in rice using drum seeder, more productive tillers m^{-2}, more grains per panicle, higher gain yield, higher gross and net returns could be obtained when compared to manual method of transplanting.

References

Anonymous. 2005. Annual Report, International Rice Research Institute, Philippines, pp 74-78.

Anonymous. 2012. Hand book of Statistics. Chittoor district – 2011: p - 66

Cheralu, C. 2010. Status Paper on Rice in Andhra Pradesh. Retrieved on February 8, 2013 from www.rkmp.co.in/sites/default/files/ris/rice-state-wise/Rice State Wise Andhra Pradesh_0.pdf.

Gangawar, K.S., Tomar, O.K. and Pandey, D.K. 2008. Productivity and economics of transplanted and direct seeded rice (*Oryza sativa*) – based cropping systems in Indo-Gangetic plains. *Indian J. Agric. Sci.,* **78**: 655-658.

Gill, M.S. 2008. Productivity of direct seeded rice (*Oryza sativa*) under varying seed rates, weed control and irrigation levels. *Indian J. Agric. Sci.,* **78**: 766-770.

Hugar, A.Y., Chandrappa, H., Jayadeva, H.M., Sathish, A. and Mallikharjun, G.B. 2009. Comparative performance of different rice establishment methods in Bhadra command area. *Karnataka J. Agric. Sci.,* **22**: 992-994.

Manjunatha, M. V., Masthana Reddy, B. G., and Joshi, V. R., 2009, Performance of rice (Oryza sativa) under different methods of establishment in Tungabhadra canal command, Karnataka. *Karnataka J. Agric. Sci.,* **22**: 1151-1152.

Sharma, R.P., Pathak, S.K., Haque, M. and Raman, K. R. 2004. Diversification of rice based cropping system for sustainable production in South Bihar alluvial plains. *Indian J. Agron.,* **41**: 218-222.

Subbaiah, S.V., Krishnaiah, K. and Balasubramanian, V. 2002. Evaluation of drum seeder in puddled rice. Agrl. Mecgh. Asia, Africa, Latin America, **33**: 23-26.

Uphoff, N. and Erick Fernandes, 2002. System of Rice Intensification gains momentum. LEISA, India, pp.22-27.

Veeresh, Desai, B.K., Vishwanatha, S., Anilkumar, S.N., Satyanarayana Rao and Halepyati, A.S. 2011. Growth and yield of Rice (*Oryza sativa L.*) varieties as influenced by different methods of planting under aerobic method of cultivation. *Research J. Agric. Sci.,* **2**: 298-300.

Received: October 8, 2012; Accepted: February 25, 2013