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RESEARCH ARTICLE :

Effect of planting methods on yield attributes and yield of pre released rice culture RDR 1140

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SUMMARY : A field experiment was conducted to evaluate new rice culture RDR 1140 for different methods of establishments during *Kharif* 2016 – 17 at Regional Sugarcane and Rice Research station, Rudrur, Nizamabad (district). It was laid out in split plot design *viz.*, new rice culture RDR 1140 and popular existing variety MTU 1010 as main plots and three planting methods – Broadcasting sprouted seed on puddled seedbed, Drum seeder planting (Wet) and Normal transplanting. No significant difference in grain yield was noticed for two varieties but planting methods significantly influenced grain yield. Normal transplanting method and Direct sowing with Drum seeder method recorded at par grain yield of 8426 kg ha^{-1} and 8195 kg ha^{-1}, respectively and it was significantly higher over Broad casting method with grain yield of 5120 kg ha^{-1}. Among two rice varieties RDR 1140 recorded yield advantage of 5.8% with two days early maturity in Drum seeder and 19% yield increase with three day early maturity in Normal method over existing popular variety MTU 1010.Hence RDR 110 can be recommended over existing variety MTU 1010 either through Normal transplanting method or Direct seeding with Drumseeder depending upon available resources with farmer.

KEY WORDS :
Varieties, Methods of planting, Grain yield

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BACKGROUND AND OBJECTIVES

Rice grows well in humid tropical regions with high temperature, plenty of rainfall and sunshine in heavy clay or clay loam soils. It is tolerant to a range of soils with pH from 4.5 to 8.5 and can be grown successfully on saline or sodic soils(Anonymous, 2002). Rice production is dependent on mainly climatic factors, but the most detrimental is availability of soil moisture. However, production and productivity of the crop is also determined by soil fertility, planting methods, and other biotic and a biotic factors which either directly or indirectly affect its growth and development. In irrigation commands, rice is largely grown by transplanting of seedlings under puddle conditions. However, transplanting takes about 250-300 man-hrs per hectare which is roughly 25 per cent of the total labour requirement of the crop (Chaudhary and Varshney, 2003). According to Rani and Jayakiran (2010) planting methods have an impact on the growth and yield of rice, besides to cost of cultivation and labor requirements, indicating that

transplanting desiring high cost. Transplanting ensures uniform plant stands and gives the rice crop a head start over emerging weeds. Further, seedlings are established even if the field is not leveled adequately and has variable water levels. Awan *et al*. (2011) suggested that direct seeding has good stand establishment, higher tillering and sometimes higher grain yield. Other advantages are stable growth, reduced transplanting shock but there is weed problem in direct seeding. The possibility of expanding the area under rice in the near future is limited. Therefore, this extra rice production has to come from a productivity gain. Planting techniques not only affect the profitability due to increased cost production; however, they also affect the yield and yield components of crops. Therefore, using suitable method of planting, it is possible to increase production, productivity and profitability of rice crop. Hence, food security and food self sufficiency of subsistence farming can be achieved. rice transplantation is usually performed by hired expensive labor, which is not specialized to maintain the required plant population to achieve higher productivity (Mann *et al*., 2007). To overcome this problem, direct seeding of rice seems only viable alternatives in rescuing farmers (Aslam *et al*., 2008). Availability of labour in time is yet another hurdle for timely transplanting which is main reason for planting over aged seedlings. In irrigation commands, rice is largely grown by transplanting of seedlings under puddle conditions. Further, in transplanting usually less number of hills are planted per unit area (25-35 hill/m^2) than recommended (50-60 hill/m^2) to complete the planting quickly resulting in reduced plant population and decreased yields. In such situation, direct seeding is helpful due to less labour and time requirement, low cost of cultivation due to skipping of nursery raising and transplanting, maintaining recommended plant population and also due to early crop maturity by 7-12 days (Subbaiah *et al.*, 2002 and Gill, 2008). Alternate methods of sowing are to be studied and suitable varieties for such methods are to be identified to answer above problems. Methods like broad casting on puddle seedbed or sowing with drum seeder are potential alternate methods eliminating nursery raising and subsequent transplanting rendering higher monetary returns. Hence, present study was taken upto evaluate promising rice culture RDR 1140 in comparison to check MTU 1010 for different methods of establishments.

RESOURCES AND METHODS

Field experiment was conducted in Split Plot Design with varieties in main plot and methods of planting in subplots during *Kharif* 2017 at Regional Sugarcane and Rice Research station, Rudrur, Nizamabad (district). Varieties (Factor A) were V1 pre realeased rice culture RDR 110 and V2 most cultivated variety of the district MTU 1010. Methods of planting (Factor B) were M1 Broadcasting sprouted seed on puddle seedbed M2 Direct sowing with Drum seeder (Wet) and M3Normal transplanting method. All the recommended package of practices were followed from sowing to harvesting and observations were recorded on yield attributes and yield to evaluate the treatment effects.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Grain yield and yield attributes :

Analysis of data showed that the effect of variety on 1000 grain weight and panicle length were significant at level of 0.05% (Table 1). The effect on other yield attributes and grain yield was not significant. The effect of planting methods on plant height, effective tillers per hill, 1000 grain weight, number of grains per panicle and grain yield was significant. Interaction effect of variety and planting method was significant for plant height and number of grains per panicle. The effect of variety on grain yield showed that RDR 1140 recorded higher yield 7426 kg/ha^{-1} over MTU 1010 7068 kgha^{-1} but was not significant. RDR 1140 recorded significantly higher 1000 grain weight (28.23 g) over MTU 1010 (25.78 g) where as MTU 1010 recorded significantly higher panicle length (22.56 cm) over RDR 1140 (21.28 cm). Total effect of variety on measured yield attributes showed RDR 1140 superior in most of the traits. The effect of planting methods revealed that Drum seeder method of planting was most effective over other methods for most of yield attributes. This method of planting had higher effect on number of effective tillers/hill (10.13), length of panicle (22.56 cm), number of grains per panicle (119.67).Higher number of effective tillers with drumseeder technology may be attributed to closer spacing of sprouted seeds which increased number of plants per unit area. Xiang

et al. (1999) also reported similar results. Normal method also recorded at par (9.03) effective tillers/hill due to efficient utilization of nutrients at active tillering stage and availability of sufficient amount of light, water etc. in a comparatively larger net area for off shoot production (Awan *et al*., 2011). Sasaki *et al.* (1999) also recorded maximum number of tillers per unit area, which wasnegatively correlated with plant density. The minimum number of tillers recorded in Broadcasting method was probably due to higher number of seeds and the increased germination percentages, which increased. competition for nutrients and as a result plants could not utilize all available resources.

Higher number of grains per panicle with Drumseeder method may be attributed to better root development which produced lengthy panicles with higher number of grains. Nourbakshiah (2000) also reported similar results. But higher grain yield of 8426 kgha^{-1} was obtained with Normal method of transplanting which may be attributed to maintenance of optimum plant population with this method. Drum seeder method recorded yield of 8195 kg ha^{-1} Anyhow difference in yield between these two methods was not significant. Broadcasting method has lowest effect on grain yield 5120 kg/ha^{-1} which may be attributed to uneven spacing and placement of seeds at variable depth and poor anchorage effecting growth

Table 1 : Effect of methods of establishment on yield attributing characters and yield

Treatments	Plant height (cm)	No. of effective tillers per hill	No. of panicles per m^2	1000 grain weight.	Panicle length (cm)	No. of grains per panicle	Grain yield (Kg ha^{-1})
Factor A (Paddy varieties)							
V_1(RDR 1140)	109.51	8.77	347.22	28.23	21.28	100.36	7426
V_2(MTU 1010)	99.02	8.57	326.44	25.78	22.56	106.11	7068
S.E.±	1.82	0.22	23.96	0.12	0.09	3.60	330.13
C.D. (P=0.05)	NS	NS	NS	0.77	0.63	NS	NS
Factor B (Methods of establishment)							
Broad casting method	107.33	6.87	417.16	29.10	21.78	94.78	5120
Drum seeder method	101.21	10.13	298.50	26.55	22.14	119.67	8195
Normal method	104.27	9.03	294.83	25.37	21.83	95.25	8426
S.E.±	0.44	0.40	41.50	0.39	0.35	5.21	364.04
C.D. (P=0.05)	1.44	1.33	NS	1.27	NS	17.27	1206
Interaction (v x M)	11.94	NS	NS	NS	NS	29.22	NS

NS=Non-significant

Table 2 : Effect of methods of establishment on growth and duration

Treatments	Grain yield			% increase over MTU 1010	Days to maturity	
	RDR 1140	MTU 1010	Mean (methods)		RDR 1140	MTU 1010
Broadcasting method	4685.25	5555.33	5120.33	_	107	107
Drum seeder method	8426.00	7963.25	8194.66	5.8	109	111
Normal method	9166.66	7685.33	8426.00	19.27	119	122
Mean (varieties)	7426	7068				
C.D. (P=0.05)	Varieties		Methods		Interaction	
	NS		1205.62		NS	

NS=Non-significant

Table 3 : Mean Comparison for the interaction effect of varieties and planting methods on yield and yield attributes

	Plant height(cm)	Effective tillers/hill	No. of Panicles/m^2	Panicle length (cm)	Grains / Panicle	Grain yield kg/ha	1000 grain weight (g)
V_1M_1	109.60	6.93	454.00	20.56	81.90	4685.33	30.20
V_1M_2	109.43	10.67	295.66	21.96	110.00	8426.00	28.43
V_1M_3	109.52	9.33	292.00	21.33	109.16	9166.66	26.06
V_2M_1	105.67	6.80	380.33	23.00	107.66	5555.34	28.00
V_2M_2	92.98	10.20	301.33	22.33	129.33	7963.42	24.66
V_2M_3	99.03	8.73	297.66	22.40	81.33	7685.14	24.67

V1 RDR 110 V2 MTU 1010

M1 Broad casting on puddle seed bed M2 Direct seeding with Drum seeder M3 Normal transplanting.

of plants.

Growth and duration :

Different methods of planting effected growth and duration. Normal planting method recorded longest duration 119 days for RDR 1140 and 122 days for MTU 1010.Where as in Drumseeder method duration was reduced to 109 days RDR 1140 and 111 days for MTU 1010. Among varieties RDR 1140 recorded two days early maturity in Drum seeder and three day early maturity in Normal method over MTU1010. Growth duration of the crop was considerably reduced in direct seeded rice might be due to the absence of transplanting shock. The longer days to flowering and maturity in Normal transplanting could be due to longer period required for crop establishments compared to other methods.

Mean comparison of interaction effect :

Mean comparison of interaction effect of factors on the grain yield showed that highest yield of 9166.7 kg/ha was obtained with RDR-1140 in Normal method of planting and least yield of 4685.3 kg/ha was recorded with RDR-1140 in Broadcasting method. MTU 1010 recorded higher yield in Direct sowing with drum seeder 7963.42 kg/ha but it was far lower than yield 8426 kg/ha obtained in same method with RDR1140.

Conclusion :

From the above study it can concluded that RDR 1140 recorded yield advantage of 5.8% with two days early maturity in Drum seeder and 19% yield increase with three day early maturity in Normal method over existing popular variety MTU 1010.Hence RDR 110 can be recommended over existing variety MTU 1010 either through Normal method or Direct seeding with Drumseeder depending upon available resources with farmer.When rainfall at planting time is highly variable direct seeding may help reduce the production risk.

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