

Evaluation of rice establishment techniques in Jharkhand plateau

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ABSTRACT

Evaluation of rice establishment technique was studied with promising genotypes of rice at Darisai, Jharkhand, during wet season 2007 and 2008. The significantly maximum grain yield (5.17 t ha⁻¹) was recorded under SRI method, transplanting 10 days old seedling. Variety Naveen and variety Lalat produced statistically equal yield, i.e., 4.77 t ha⁻¹ and 4.34 t ha⁻¹ respectively. Significantly maximum benefit: cost ratio was obtained under SRI method (2.61), where as among varieties it was maximum grain yield obtained from Naveen (2.44) followed by Lalat (2.22).

Rice is the staple food for nearly three billion people, its demand continues to grow to feed burgeoning population (Carriger and Vallee, 2007). Conventional method of rice growing with local low productive variety is one of the constraints in rice production in most of the places. Therefore, a study was conducted to evaluate influence of the rice establishment methods on grain yield.

A field experiment was carried out at Darisai, Jharkhand, during wet season of 2007 and 2008. The soil was silt loam in texture with pH 6.2. The available N, available P and K 250.45, 16.62 and 135.19 kg ha⁻¹, respectively. The experiment was laid out in split plot design, consisting of three establishment methods viz, modified SRI, conventional and plastic drum seeding in main plot and three genotypes viz, Naveen, IR-64 and Lalat in sub plot and was replicated thrice. In modified SRI method 10 days old seedlings were transplanted at a spacing of 25 cm x 25 cm, by keeping 1 seedling hill⁻¹, whereas in conventional method 21 days old seedlings were used at a spacing of 20 cm X 10 cm, with 2 seedlings hill⁻¹. In plastic drum seeding, pre-germinated seeds were sown at 20 cm row spacing. Recommended dose of fertilizer was 80:40:40 kg N, P₂O₅ and K₂O ha⁻¹, respectively was applied through urea, single super phosphate and muriate of potash. Half of the fertilizer N, full dose of P and K were applied as basal. Remaining half of N was applied in two equal splits once at tillering and rest at panicle initiation stage. The yield attributing parameters and yield of the crop were recorded after physiological maturity.

All the yield attributing characters, except 1000 grain weight were found to differ significantly under different establishment techniques (Table 1). The highest values of growth and yield attributes were with SRI followed by conventional method. Pooled data revealed that the plants in modified SRI method were taller by 4.05 cm and 12.89 cm than conventional method and drum seeding method, respectively. Vijayakumar *et al.*, (2006) also reported taller plants with younger seedlings than plants growth under conventional method. The younger seedlings in SRI when carefully transplanted by keeping the roots straight might have encouraged vigorous and deeper root system which in turn resulted into more vigorous and taller plants. Besides, for the control of weeds, use of conoweeder might improved aeration as well as organic manure by incorporating weeds in soil, as has been emphasized by different proponents of SRI (uphoff, 2003), resulting in increased crop vigour in the present study.

The number of hills in conventional method were 50 m⁻², whereas these were almost one third (16 m⁻²) due to wider spacing under SRI and 90 m⁻² under drum seeding method. Therefore, significantly maximum number of panicles m⁻² were under conventional method of cultivation (345.78). The panicle size and grains per panicle were more in SRI (26.50cm and 171.11) and were statistically same with conventional method (25.53 cm and 158.67). Similar findings were observed by Sharma and Masand (2008).

Significantly more grain yield was recorded under SRI (5.178 t ha⁻¹) than in conventional or drum seeding method and it was increased to the extent of

Table 1. Effect of rice establishment method and rice genotypes on plant height, yield attributes and yield (Pooled data).

Treatments	Plant height (cm)	Panicles m ⁻²	Panicle length (cm)	Grains panicle ⁻¹	1000 seed weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)	Harvest index (%)
SRI	109.6	254.1	26.50	171.11	21.02	5.18	8.82	37.0
Convention	105.6	345.8	25.53	158.67	20.92	4.32	7.43	36.9
Drum seeds	96.7	296.4	25.03	130.56	20.17	3.57	6.20	36.7
CD(P=0.05)	7.6	25.1	1.104	23.88	NS	0.13	0.38	NS
Naveen	122.5	314.9	26.64	222.67	21.47	4.77	8.41	36.1
IR64	99.0	285.0	25.10	98.56	20.27	3.94	6.59	37.4
Lalat	90.4	296.4	25.32	139.11	20.38	4.34	7.44	37.0
CD(P=0.05)	5.3	NS	0.46	22.03	0.60	0.54	0.88	NS

20 and 45.16 percent over conventional and drum seeding method, respectively. Better performance of SRI was also recorded by Sekhar *et al.* (2009). Taller plants made the crop to record significantly more straw yield (8.82 t ha⁻¹) under SRI than under conventional (7.43 t ha⁻¹) and drum seeding method (6.2 t ha⁻¹). Harvest index was not influenced by establishment methods.

The higher grain and straw yield under SRI resulted significantly higher mean gross return (Rs. 32886.67), net return (Rs. 19150.67) and benefit cost ratio (2.39) (Table 2). The cost of cultivation under SRI was the lowest. Reddy *et al.*, (2006) also reported lower cost of cultivation under SRI. The seed rate under SRI (5 kg⁻¹) is one eighth when compared with conventional method (40 kg⁻¹) and one sixteenth with drum seeding method (80 kg⁻¹).

Among three varieties plant height was significantly more with Naveen (122.48 cm). The highest number of panicles m⁻² was also with Naveen. The panicle size (26.64 cm), grains per panicle (222.67) and 1000 seed weight (21.47 gm) were significantly higher with variety Naveen than Lalat and IR-64.

Table 2. Economic analysis of different establishment method and varieties of rice (pooled data)

Treatments	Cost of cultivation (Rs. ha ⁻¹)	Gross Return (Rs. ha ⁻¹)	Net Return (Rs. ha ⁻¹)	Benefit Cost ratio
SRI	13736	32886.67	19150.67	2.39
Conventional	15573	27445.72	11872.72	1.76
Drum seeds	13780	21855.56	8075.56	0.68
SEm(±)	-	273.32	273.32	0.02
CD(P=0.05)	-	1072.84	1072.84	0.09
Naveen	14363	30060.17	15697.17	1.76
IR 64	14363	24727.78	10364.78	1.46
Lalat	14363	27400.00	13037.00	1.62
CD(P=0.05)	-	3256.55	3256.55	0.17

Grain yield was statistically similar with varieties Naveen and Lalat, which was 20.94 and 10.14 percent, respectively more than IR-64. Straw yield was also maximum with variety Naveen. Harvest index was not affected significantly by varieties. Pooled data on economics revealed that varieties Naveen and Lalat has statistically similar gross return, net return and benefit cost ratio, respectively. Thus, varieties Naveen and Lalat under SRI can increase the productivity and profitability of transplanted rice in the plateau region of Jharkhand.

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