

Effect of seed rate and weed control methods on yield of direct seeded rice (*Oryza sativa*)

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ABSTRACT

A field experiment consisting of four seed rates and five weed control methods in split plot design was conducted in direct seeded rice (*Oryza sativa* L.). The results revealed that optimum seed rate for DSR was 17.5 kg/ha and best weed control was achieved with PRE of pendimethalin @ 1.0 kg/ha fb POE bispyribac @ 25 g/ha + ready-mixchlorimuron + metsulfuron 4 g/ha at 30 DAS fb one HW 60 DAS.

Key words : Direct seeded rice, Seed rate, Weed control methods

Although, transplanting method of establishment is reported to be the best for higher productivity of rice, but looming water crisis, water-intensive nature of rice cultivation and escalating labour costs drive the search for alternative management methods to increase water productivity and profitability in rice cultivation. Direct seeded rice (DSR) has received much attention because of its low-input demand. However, weeds are a major limitation for the success of DSR (Rao *et al.*, 2007 and Singh *et al.*, 2007). The present study was undertaken to find out optimum seed rate and weed control for DSR.

A field experiment was conducted during the *kharif* season of 2011 at Chaudhary Charan Singh Haryana Agricultural University, Regional Research Station, Karnal. The soil of experimental plot was clay loam in texture, with pH 8.2 and 0.4% organic carbon (0.40). It was low in Alkaline permanaganate oxidizable available nitrogen (115 kg/ha), medium in Olsen's available phosphorus (9 kg/ha) and potassium (112 kg/ha). The experiment was laid out in split plot design with three replications.

The treatments comprised of four seed rates viz., 10, 17.5, 25 and 32.5 kg/ha which were assigned to main plots and five weed control methods viz., weedy check (WC), weed free (WF), pendimethalin 1.0 kg/ha pre-emergence (PRE) followed by (fb) bispyribac-sodium 25 g/ha + ready-mix chlorimuron-ethyl + metsulfuron-methyl 4 g/ha post-emergence (POE) at 30 days after sowing (DAS) fb one hand weeding (HW) 60 DAS (W3), pendimethalin 1.0 kg/ha PRE fb cyhalofop-butyl 200 g/ha POE 30 DAS fb ready-mixchlorimuron + metsulfuron 4 g/ha 35 DAS fb one HW 60 DAS (W₄) and pendimethalin 1.0 kg/ha PRE

fb fenoxaprop-P-ethyl 60 g/ha POE 30 DAS fb ready-mixchlorimuron + metsulfuron 4 g/ha 35 DAS fb one HW 60 DAS (W5) were allotted to sub-plots. Basmati rice 'CSR30' was seeded on 10th June 2011 under dry condition and in rows 20 cm apart using limit-plot seed drill. The recommended dose of fertilizers applied for rice was 60 kg N, 30 kg P₂O₅, 30 kg K₂O and 25 kg ZnSO₄/ha. The herbicides were sprayed at scheduled dates uniformly with knapsack sprayer fitted with flat fan nozzle delivering 500 l/ha water volume.

Yield attributes: Effective tillers/m² were the least with a seed rate of 10 kg/ha and increased significantly when the seed rate was increased to 17.5 kg/ha. However, a further increase in tillers/m² was recorded with a seed rate of 32.5 kg/ha. There was a significant decrease in panicle length of rice, when the seed rate was increased from 10 or 17.5 kg/ha to 32.5 kg/ha. Number of grains per panicle and 1,000-grain weight of rice were not affected by seed rate, but the number of unfilled spikelets increased with an increase in seed rate and was the most with the seed rate of 32.5 kg/ha. Similar results have been reported by Mahajan, (2010). As regards weed control methods, effective tillers, number of grains/spikelet and 1,000-grain weight were the highest in the weed free plot, which was at par with treatment W₃, and significantly superior to treatments W₄ and W₅; least values were recorded for weedy check. Unfilled panicles were the highest in weedy check, while the weed-free plot had the least unfilled spikelets (Table 1).

Grain and straw yield: Grain and straw yield was the lowest with the seed rate of 10 kg/ha, significantly lesser than all other higher seed rates. As would be expected, grain and straw yield of rice was the lowest in weedy

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Table 1. Effect of treatments on the effective tillers, yield attributing characters, weed control efficiency (WCE) and Seed and Straw yield of the crop.

Treatment	Effective Tillers/m ²	Panicle length (cm)	No. of grains/panicle	Unfilled spikelets/panicle	1,000-grain weight (g)	WCE	Grain yield (t/ha)	Straw yield (t/ha)
<i>Seed rate (kg/ha)</i>								
10	164.4	20.8	59.1	4.9	23.3	66.5	1.57	2.53
17.5	189.1	20.6	56.9	6.6	23.2	66.3	2.14	3.48
25	195.7	20.3	57.9	7.5	22.9	65.8	2.24	3.62
32.5	209.7	19.9	54.3	8.6	23.2	66.2	2.27	3.91
SEm±	6.0	0.2	1.3	0.2	0.1	0.2	0.045	0.06
CD (P=0.05)	21.5	0.5	NS	0.6	NS	NS	0.16	0.22
<i>Weed control</i>								
WC	10.7	13.3	30.7	8.1	20.1	0	0.28	0.45
WF	245.9	23.5	68.9	5.6	24.9	100.0	2.73	4.43
W3	239.6	22.4	65.7	6.9	24.3	81.9	2.63	4.41
W4	233.1	21.9	62.4	6.8	23.7	75.6	2.48	4.05
W5	219.3	20.9	57.3	7.0	22.6	73.4	2.16	3.59
SEm±	6.5	0.2	1.5	0.2	0.2	0.1	0.05	0.08
CD (P=0.05)	19.0	0.7	4.3	0.6	0.6	0.4	0.14	0.24

check plots. Among the weed control treatments weed free and W₃ were at par and significantly superior to W₄, which in turn was superior to W₅ (Table 1).

Weed control efficiency (WCE): Among the various herbicide treatments, the highest WCE was recorded with W₃, significantly superior to other two herbicide treatments (Table 1). This is in conformity with results of Mahajan and Timsina (2011).

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