



Influence of Sowing Methods and Weed Control on Yield and Economics of Direct Seeded Rice under Konkan Region

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An experiment was conducted at the Agronomy farm, College of Agriculture, Dapoli, Dist. Ratnagiri during *Kharif* 2013. The field experiment was laid out in a split plot design. The main plot treatments comprised three sowing methods *viz.*, broadcasting (S_1), drilling (S_2) and drum seeding (S_3) and sub plot treatments comprised seven methods of weed management *viz.*, weedy control (W_1), weed free (W_2), pre-emergence spray of herbicide *oxadiargyl* @ 120 g ha⁻¹ (W_3), post-emergence spray of herbicide of *bispyribac sodium* @ 25 g ha⁻¹ (W_4), pre-emergence spray of herbicide *oxadiargyl* @ 120 g ha⁻¹ + one hoeing at 40 DAS (W_5), post-emergence spray of herbicide of *bispyribac sodium* @ 25 g ha⁻¹ + one hoeing at 40 DAS (W_6) and pre-emergence spray of herbicide *oxadiargyl* @ 120 g ha⁻¹ + post-emergence spray of herbicide of *bispyribac sodium* @ 25 g ha⁻¹ (W_7). The gross plot size of each treatment was 4.00 m x 2.70 m and net plot size 3.70 m x 2.25 m. The soil of the experimental plot was sandy clay loam in texture, acidic in pH and medium in organic carbon content. It was low in available nitrogen, medium in available phosphorus and potassium.

The experimental plot was ploughed with tractor and clod crushing was done by rotavator. The field was leveled with the help of wooden leveler and made ready for the layout. Sowing of rice was done on 6th June, 2013. In broadcasting method of sowing, seeds were uniformly broadcasted over the plot and covered with soil. In methods of drilling and drum seeding, rice seeds were sown by using drilling machine and drum seeder, respectively with 22.5 cm row spacing as per seed rate (70 kg ha⁻¹).

Herbicides *i.e.* *oxadiargyl* and *bispyribac sodium* were sprayed as pre-emergence and post-emergence, respectively followed by three hand weedings and one hoeing as per treatments. Other common package of practices was followed time to time. The gross income per hectare was calculated on the basis of price of grain and straw yields. The prevailing market prices for grain

and straw were considered. The cost of cultivation of crop under individual treatments was worked out by taking into account the cost.

Data furnished in Table 1 stipulated that, various sowing methods significantly influenced the grain and straw yield (t ha⁻¹) of rice. The sowing method S_2 recorded significantly higher grain yield (3.743 t ha⁻¹) and straw yield (4.832 t ha⁻¹) followed by treatment S_3 which were at par with each other, but found significantly superior over treatment S_1 . Treatment S_1 recorded significantly the lowest grain and straw yield (t ha⁻¹) than rest of the treatments.

The data depicted in Table 1 revealed that, among weed control methods treatment W_2 recorded higher grain yield (4.197 t ha⁻¹) and straw yield (5.426 t ha⁻¹) followed by treatment W_7 which were at par with each other but found significantly superior over rest of the treatments. This was followed by treatments W_6 , W_5 , W_4 and W_3 which were at par with each other but found significantly superior over treatment W_1 . The lowest grain and straw yield (t ha⁻¹) was recorded in treatment W_1 (Unweeded check). Similar results were reported by (Rawat *et al.*, 2012; Walia *et al.*, 2012).

The total cost, gross income, net returns and benefit cost ratio obtained from different treatments are presented in Table 1. The data revealed that cost of cultivation was higher under treatment S_2 (Rs. 43514.53 ha⁻¹) followed by treatment S_3 (Rs. 43420.08 ha⁻¹) which were at par with each other. However, treatment S_1 recorded the lowest cost of cultivation (Rs. 40428.42 ha⁻¹) over rest of the treatments. Gross income, net returns and benefit cost ratio obtained from different treatments followed the same trend.

Treatment S_2 recorded more gross returns (Rs. 56454.70 ha⁻¹), net returns (Rs. 12940.17 ha⁻¹) and benefit to cost ratio (1.29) followed by treatment S_3 (Rs. 54162.26 ha⁻¹, Rs. 10742.18 ha⁻¹ and 1.24, respectively). However, treatment S_1 recorded lowest

Table 1. Influence of sowing methods and weed control methods on yield and economics of rice

Treatments	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)	Total cost (Rs. ha ⁻¹)	Gross income (Rs. ha ⁻¹)	Net income (Rs. ha ⁻¹)	B: C ratio
Sowing methods						
S ₁ : Broadcasting	2.994	3.845	40428.42	45108.43	4680.01	1.09
S ₂ : Drilling	3.743	4.832	43514.53	56454.70	12940.17	1.29
S ₃ : Drum seeding	3.588	4.657	43420.08	54162.26	10742.18	1.24
S.E.m. ±,	1.03	1.03	535.80	1676.43	1205.28	-
C.D. at 5%	4.05	4.05	2103.82	6582.50	4732.52	-
Weed control methods						
W ₁ : Unweeded check	2.074	2.688	36389.89	31294.47	-5095.42	0.85
W ₂ : Weed free (H. W. at 20, 40, 60 DAS)	4.197	5.426	50182.44	63311.35	13128.91	1.26
W ₃ : PE Oxadiargyl @ 120 g ha ⁻¹	3.186	4.027	38936.70	47875.66	8938.95	1.22
W ₄ : PoE Bispyribac sodium @ 25 g ha ⁻¹	3.348	4.285	40760.62	50417.53	9656.91	1.23
W ₅ : PE Oxadiargyl @ 120 g ha ⁻¹ + One hoeing (40 DAS)	3.52	4.576	42579.96	53150.74	10570.78	1.24
W ₆ : PoE Bispyribac sodium @ 25 g ha ⁻¹ + One hoeing (40 DAS)	3.662	4.805	43286.72	55386.79	12100.07	1.28
W ₇ : PE Oxadiargyl @ 120 g ha ⁻¹ + PoE Bispyribac sodium @ 25 g ha ⁻¹	4.105	5.307	45044.07	61922.73	16878.66	1.37
S.E.m ±	1.42	2.53	803.98	2370.00	1919.12	-
C.D. at 5%	4.08	7.26	2305.94	6797.52	5504.33	-
Interaction effects						
S.E.m ±	2.70	4.90	1495.42	4479.31	3517.95	-
C.D. at 5%	-	-	-	-	-	-
General mean	34.41	44.44	42454.34	51908.47	9454.12	1.20

*Selling Price (1) Rice Grain 1310 Rs q⁻¹ (2) Rice Straw 200 Rs q⁻¹ (II) Rate of Herbicide (1) Oxadiargyl 7500 Rs kg⁻¹ (2) Bispyribac sodium 7950 Rs lit⁻¹

gross returns (Rs. 45108.43 ha⁻¹), net returns (Rs. 4680.0 ha⁻¹) and benefit to cost ratio (1.09) than rest of the treatments. These results are in agreement with the results reported by (Rao *et al.*, 2013; Singh, 2008).

Data presented in Table 1 implies the value of total cost cultivation, gross income, net returns and benefit cost ratio were significantly influenced by different weed control methods. The treatment W₂ recorded significantly more total cost of cultivation (Rs. 50182.44 ha⁻¹) and gross returns (Rs. 63311.35 ha⁻¹) followed by treatments W₇, W₅, W₄ and W₃. Treatment W₁ recorded the lowest value of total cost (Rs. 36389.89 ha⁻¹) and gross returns (Rs. 31294.47 ha⁻¹) over rest of the treatments. Net return was found maximum with the treatment W₇ (Rs. 16878.66 ha⁻¹) followed by treatments W₂ (Rs. 13128.91 ha⁻¹), W₆ (Rs. 12100.07 ha⁻¹), W₅ (Rs. 10570.78 ha⁻¹),

W₄ (Rs. 9656.91 ha⁻¹) and W₃ (Rs. 8938.95 ha⁻¹). The lowest net returns recorded under W₁ (Rs. -5095.42 ha⁻¹) over rest of the treatments. The treatment W₇ recorded the highest B: C ratio (1.37) followed by treatment W₆ (1.28) and W₂ (1.26), W₅ (1.24), W₄ (1.23), W₃ (1.22) and W₁ (0.85). Treatment W₁ recorded lowest B: C ratio. Similar results were also reported by Ramana *et al.* (2007) and Yadav and Singh (2006).

On the basis of present investigation, it can be concluded that direct seeded rice should be sown by drilling method with hand weeding thrice (at 20, 40 and 60 DAS) for obtaining higher grain and straw yield. However under the scarcity of labour, application of pre (*oxadiargyl @ 120 g ha⁻¹*) and post emergence (*bispyribac sodium @ 25 g ha⁻¹*) herbicide for drilled rice is recommended for higher net returns.

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