

Integrated weed management in rainfed direct-seeded upland rice (*Oryza sativa*)

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Heavy weed infestation often experienced by upland rice (*Oryza sativa* L.) sometimes results in total failure of the crop. Farmers growing upland rice normally adopt manual and mechanical measures to minimize weed competition. However, success of these methods mostly depends on the soil-moisture condition prevailing at the time of their application, but weeding is seldom possible at the critical period. Similarly, pre-emergence application of herbicides alone fails to reduce weed competition during the critical period. Therefore, an experiment was conducted during the summer 1988 on sandy-loam soil to study integrated weed management in rainfed, direct-seeded upland rice at Biswanath Chariali.

A split-plot design with 2 varieties ('Rongadoria', a local and 'Rasi', a modern variety) and 2 methods of seed-bed preparation (conventional and stale) in main plots and 5 weed-control treatments in subplots replicated 3 times, was adopted. The stale seed-bed was prepared by ploughing the land once with bullock-drawn mouldboard plough, followed by poor tiller to bring fine tilth. Weeds were sprayed with paraquat @ 2.0 kg/ha 30 days after. In conventional method, land preparation was adjusted to obtain a fine tilth 7 days after paraquat application in stale seed-bed. A dose of N, P₂O₅ and K₂O @ 40, 20 and 20

kg/ha for 'Rasi' and 20, 10 and 10 kg/ha for 'Rongadoria' was used.

'Rongadoria' with quick early growth competed well with the weeds compared with 'Rasi' (Table 1). Singh and Reddy (1980) and CRRI, Cuttack (1993) reported efficacy of tall or semi-tall rice varieties in suppressing weeds. The stale seed-bed suppressed the weeds better than the conventional method and allowed the crop to gain height. Treatment T₄ was most effective in reducing weed-dry weight, followed by T₂ (Table 1). This indicated that repeated hand-weeding following pre-emergence herbicide application effectively reduced weed competition in upland rice. Better competing ability of 'Rongadoria' with the weeds helped it to produce higher grain yield than 'Rasi'. The stale seed-bed rendered the crop a partially weed-free environment at the early crop-growth period, resulting significantly higher grain yield than conventional method. Treatments T₄ and T₂ were superior to rest of the treatments for the grain yield. Higher yields associated with these treatments were due to effective weed control through them.

The economics of various treatment combinations showed that the return per rupee investment for 'Rongadoria' grown in stale seed-bed with 3 hand-weddings was almost similar to that growing in stale seed-bed with pre-emergence application of

Table 1. Weed-dry weight, plant height and yield as influenced by variety, seed-bed-preparation method and weed-control treatment

Treatment	Weed-dry weight (g/m ²)	Plant height at 30 DAS (cm)	Grain yield (q/ha)
<i>Variety</i>			
'Rongadoria' (V ₁)	8.92 (78.57)*	69.45	13.30
'Rasi' (V ₂)	9.78 (94.65)	52.54	12.64
CD (P = 0.05)	0.62	4.89	0.59
<i>Seed-bed preparation</i>			
Conventional (M ₁)	10.43 (107.78)	54.28	11.74
Stale (M ₂)	8.28 (67.56)	67.71	14.21
CD (P = 0.05)	0.62	4.89	0.59
<i>Weed-control treatment</i>			
Butachlor @ 1.5 kg/ha (T ₁)	12.79 (162.58)	63.60	7.70
Butachlor @ 1.5 kg/ha + hand-weeding 30 DAS (T ₂)	7.56 (56.15)	61.08	17.55
Butachlor 1.5 kg/ha + upland weeder 30 DAS (T ₃)	11.30 (126.69)	60.93	10.49
Hand weeding 15, 30 and 45 DAS (T ₄)	5.91 (33.93)	61.10	19.69
Check (1 hand-weeding 30 DAS (T ₅))	9.20 (83.64)	58.25	9.45
CD (P = 0.05)	0.99	NS	0.86

Original values are in parentheses
DAS, Days after sowing

Table 2. Grain yield, labour requirements and return/rupee investment for best 4 treatment combinations

Treatment	Grain yield (q/ha)	Labour hr/ ha	Return/rupee invested (Rs)
V ₁ M ₂ T ₂	17.47	280	1.80
V ₁ M ₂ T ₄	22.50	940	1.87
V ₂ M ₂ T ₂	19.67	326	1.72
V ₂ M ₂ T ₄	21.23	830	1.74

Details of treatments are given in Table 1

butachlor @ 1.5 kg/ha, followed by hand-weeding at 30 days. Similar was the trend for

'Rasi'. This was mainly because of reduced labour hours required for weeding in the later treatment (Table 2).

REFERENCES

- CRRI, Cuttack. 1983. Integrated weed management for direct seeded rice under upland situation (*kharij*). (In) *Annual Report 1983. Central Rice Research Institute, Cuttack*.
- Singh, R. P. and Reddy, B. G. 1980. Effect of methods of weed control on performance of rice varieties. *Abstracts of Papers, Annual Research Conference, Indian Society of Weed Science*.