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Integrated Weed Management in Direct Seeded Dry Sown Rice in Lateritic Belt of West Bengal

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In West Bengal, weed infestation is maximum under rainfed upland direct seeded rice culture. Early emergence of weeds alongwith crop seedlings and their rapid growth due to intermittent rains result in severe crop-weed competition. Among the various reasons for low productivity, weeds alone are reported to cause 50-60% reduction in grain yield (Muthukrishan *et al.*, 1996). Research results showed that due to infestation of mixed weed population, herbicides alone do not solve the purpose of weed control satisfactorily in direct seeded rice culture unless it is supplemented with manual weeding or cultural methods. With this perspective, the present experiment was conducted in **kharif** 2002 and 2003 at the Institute of Agricultural Farm, Visva-Bharati, Sriniketan with 10 treatments including chemical, mechanical and cultural methods of weed management in three replications. The treatments were rice-cowpea (fodder) intercropping (2 : 1) followed by mechanical weeding at 35 days after sowing (DAS) after harvest of intercrop (T_1), T_1+butachlor at 1 kg ha^{-1} (T_2) rice-blackgram intercropping (2 : 1) followed by mechanical weeding at 25 DAS (T_3), rice-sesbania (green manuring crop) intercropping (2 : 1) and incorporation in the soil with mechanical weeding at 35 DAS (T_4), T_4 fb fenoxaprop-ethyl at 60 g ha^{-1} at two weeks after sowing (WAS) fb 2, 4-D at 0.5 kg ha^{-1} at 4 WAS + mechanical weeding at 45 DAS (T_5), butanil (trade product) at 4 l ha^{-1} followed by mechanical weeding at 35 DAS (T_6), mechanical weeding (25 and 45 DAS) (T_7), farmers' practice (hand weeding at 25 and 45 DAS) (T_8), recommended practice (butachlor at 1 kg ha^{-1} fb HW at 30 DAS) (T_9) and weedy check (T_{10}). In intercropping system, the rice seed was sown in paired row with a spacing of 15 cm (rice to rice) and 30 cm (rice to intercrops). In case of sole rice, 22.5 cm row spacing was maintained. Rice cv. IR 36 was sown with a seed rate of 120 kg ha^{-1}.

Digitaria sanguinalis, Ludwigia parviflora and *Cyperus iria* were the predominant weed species at initial stage and *Spilanthes acmella* came into competition at the later stage of crop growth.

Among three intercroppings, rice-sesbania intercropping with fenoxaprop at 60 g ha^{-1} at 2 WAS+2, 4-D at 0.5 kg at 4 WAS+mechanical weeding was more effective in reducing weed population as compared to other intercropping treatments and it was at par with rice-cowpea (fodder) intercropping (2 : 1) followed by mechanical weeding at 35 DAS after harvest of intercrop+butachlor at 1 kg ha^{-1}. Butanil at 4 l ha^{-1} fb mechanical weeding at 35 DAS was most effective in reducing weed population and weed dry matter production and it was statistically at par with butachlor at 1 kg ha^{-1} fb hand weeding 30 DAS, rice-cowpea (fodder) intercropping (2 : 1) followed by mechanical weeding at 35 DAS after harvest of intercrop+butachlor at 1 kg ha^{-1} and rice-sesbania (green manuring) intercropping (2 : 1) and mechanical weeding at 35 DAS+fenoxaprop at 60 g ha^{-1} at 2 WAS+2, 4-D at 0.5 kg ha^{-1} at 4 WAS+mechanical weeding (Table 1).

Weed infestation in direct seeded rice reduced the grain yield of rice by 69.5 and 78.8% over the best treatment butanil (trade product) at 4 l ha^{-1} followed by mechanical weeding at 35 DAS in 2002 and 2003, respectively. Butanil at 4 l ha^{-1} integrated with mechanical weeding at 35 DAS recorded the highest yield of rice (3383 and 3583 kg ha^{-1} in 2002 and 2003, respectively) and was at par with intercropping sesbania in rice+fenoxaprop at 60 g ha^{-1} at 15 DAS+2, 4-D 45 DAS (3317 and 3442 kg ha^{-1}) and recommended practice (Table 1).

Table 1. Effect of treatments on weeds and grain yield of direct seeded dry sown rice

Treatment	Weed population (No. m^{-2}) 60 DAS		Weed dry matter ($g\ m^{-2}$) 60 DAS		Grain yield ($kg\ ha^{-1}$)		Mean
	2002	2003	2002	2003	2002	2003	
T_1–Rice-cowpea (fodder) intercropping (2 : 1)+ mechanical weeding at 35 DAS after harvest of cowpea	86	82	22.0	22.5	2183	2092	2167
T_2–T_1+butachlor 1.0 kg ha^{-1}	35	41	5.8	5.6	3050	3075	3062
T_3–Rice–blackgram intercropping (2 : 1)+mechanical weeding at 25 DAS	93	96	23.5	21.8	2367	2233	2300
T_4–Rice-sesbania (green manuring) intercropping (2 : 1) with mechanical weeding at 35 DAS	68	65	16.7	15.1	2450	2467	2458
T_5–T_4+fenoxaprop 60 g ha^{-1} at 2 WAS+2, 4-D at 0.5 kg ha^{-1} at 4 WAS+mechanical weeding	34	32	3.4	3.9	3317	3442	3379
T_6–Butanil at 4 l ha^{-1} fb mechanical weeding at 35 DAS	26	25	3.2	3.2	3383	3583	3483
T_7–Mechancial weeding (25 and 45 DAS)	59	56	12.0	10.2	2750	2617	2683
T_8–Farmers' practice (HW 25 and 45 DAS)	41	42	3.4	2.0	3133	3067	3100
T_9–Recommended practice (Butachlor at 1.0 kg ha^{-1} fb HW 30 DAS)	35	33	4.2	3.2	3250	3217	3233
T_{10}–Weedy check	256	271	97.9	100.2	1033	1058	1045
LSD (P=0.05)	8.9	11.7	3.0	1.8	5.01	1.14	

REFERENCE

Muthukrishan, P., M. N. Budhar, K. Ponnuswamy and P. Santhi, 1996. Studies on weed management in direct sown rice under puddle conditions. *Indian J. Weed Sci.* **28** : 214-215.