

Evaluation of Some New Herbicide Formulations Alone or in Combination with Hand Weeding in Direct Sown Rainfed Lowland Rice

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In Orissa, the rice crop is predominantly rainfed during wet season and is direct seeded in dry condition in about 50% of the total area under shallow lowland. The crop faces the problem of highly competitive weeds mostly grasses at the early stages of crop growth. Later on, broad leaf and some other aquatic weeds tolerant to stagnant water condition dominate after submergence (Moorthy and Saha, 2003). Research results from various locations showed that herbicides alone did not provide effective control under such situation unless it is supplemented with hand weeding or some other cultural methods (Jena *et al.*, 2002). The present study was undertaken to find out the relative efficiency of different herbicides alone or in combination with hand weeding for controlling the weeds in direct seeded rice under rainfed shallow lowland.

A field experiment was carried out during the wet seasons of 2002 and 2003 at the Central Rice

Research Institute, Cuttack in an alluvial (Haplaquept) clay loam soil with pH 6.4 and organic carbon 0.57%. Ten treatments consisted of butachlor, pyrazosulfuron ethyl, pretilachlor, pyrazosulfuron ethyl+molininate applied alone and in combination of hand weeding (at 50 days after sowing) with weedy and hand weeded (20, 40 and 60 days after sowing) control were evaluated in a randomized block design with three replications. Herbicides were applied as spray at spray volume of 500 l ha⁻¹. Rice cv. 'Gayatri' was sown during the last week of May at 80 kg seed ha⁻¹. The crop was dibble-seeded adopting a spacing of 20 cm x 15 cm. All the other recommended agronomic and plant protection measures were adopted to raise the crop.

Echinochloa colona (11.8%), *Cyperus iria* (14.1%), *Fimbristylis miliacea* (7.4%), *Scirpus articulatus* (4.2%), *Panicum repens* (2.3%), *Leptochloa chinensis* (3.3%), *Sphenochlea zeylanica* (4.2%), *Ludwigia parviflora* (6.8%),

Table 1. Effect of treatments on weed and rice (Pooled data of two seasons)

Treatment	Dose (g ha ⁻¹)	Application time (DAS)	Weed density (No. m ⁻²)	Weed dry weight (g m ⁻²)	Panicles (No. m ⁻²)	Grain yield (t ha ⁻¹)
Butachlor	1000	3	6.0 (35)	80.0	244	4.06
Butachlor fb HW	1000	3 & 50	4.5 (20)	50.2	255	4.36
Pretilachlor	750	7	5.6 (31)	75.7	261	4.48
Pretilachlor fb HW	750	7 & 50	4.1 (17)	46.8	279	4.76
Pyrazosulfuron ethyl	20	7	4.8 (23)	54.7	267	4.53
Pyrazosulfuron ethyl fb HW	20	7 & 50	3.6 (13)	37.6	285	4.87
Pyrazosulfuron ethyl+molininate	1000	10	4.5 (20)	50.4	270	4.56
Pyrazosulfuron ethyl+molininate fb HW	1000	10 & 50	3.2 (10)	28	296	5.06
3 HW	-	20, 40 & 60	2.1 (4)	8.9	305	5.25
Weedy	-	-	12.6 (159)	190.3	197	3.12
LSD (P=0.05)	-	-	2.82	15.7	11.00	0.53

Figures in parentheses are the means of original values.

DAS-Days after sowing, HW-Hand weeding.

Aeschynomene indica (9.9%), *Limnophylla heterophylla* (3.8%), *Cleome viscosa* (4.7%), *Monochoria vaginalis* (6.6%) and *Melochia corchrifolia* (4.9%) were found in the experimental field. Broad leaf weeds (43.2%) dominated over sedges (32.6%) and grasses (24.2%).

Application of herbicides alone controlled the weeds effectively at early stages of rice growth and weed control efficiencies ranged from 58.0 to 73.5%. However, a supplementary hand weeding controlled the weeds substantially at later stages of rice growth as evidenced by comparatively less dry weight of weeds (Table 1). Thus, integration of herbicides with hand weeding at 50 days after sowing provided a broad spectrum weed control. Pyrazosulfuron ethyl+molinate had comparatively better weed control efficiency in comparison to butachlor, pyrazosulfuron ethyl and pretilachlor. Pre-emergence application of pyrazosulfuron ethyl+molinate at 1000

g ha⁻¹ supplemented with one hand weeding at 50 days after rice sowing maintained a lower crop-weed competition from the very commencement of the crop till maturity and registered the lowest weed dry matter 28.0 g m⁻² and weed density (3.2 m⁻²).

The highest grain yield (5.25 t ha⁻¹) was recorded in the plots weeded thrice which was at par with all these herbicide treatments supplemented with one hand weeding except in case of butachlor. The loss in grain yield due to unchecked weed competition was 41%.

REFERENCES

- Jena, S. N., S. Tripathy, S. K. Sarangi and S. Biswal, 2002. Integrated weed management in direct seeded rainfed lowland rice. *Indian J. Weed Sci.* **34** : 32-35.
- Moorthy, B. T. S. and Sanjoy Saha, 2003. Relative performance of herbicides alone and in combination with hand weeding in rainfed lowland direct-seeded rice. *Indian J. Weed Sci.* **35** : 268-270.