

Performance of Herbicides and Cultivars under Zero Till Situations of Rainfed Lowland Rice Eco-system

U. P. Singh, R. K. Singh, Y. Singh and R. P. Singh

Department of Agronomy
Institute of Agricultural Sciences
Banaras Hindu University, Varanasi-221 005 (U. P.), India

Rice production in rainfed lowland is constraint with non-availability of suitable cultivars, puddling at right time and infestation of weeds. Puddling of soil and manual transplanting are labour intensive and require a lot of water and power at critical peak season. Continued puddling of fields for rice destroys soil physical properties and negatively affects yields of puddled rice and succeeding crops (Singh and Singh, 2001; Hobbs, 2003). Hence, aerobic seeding of rice with zero till drill is considered as an alternative crop establishment system over transplanting in puddled condition for overcoming these problems. The crop is more susceptible to severe weed competition at initial stage due to its slow growth in this system and loss in grain yield goes upto 73% (Kolhe and Tripathi, 1998). Continuous use of butachlor in rice may result in weed shift or resistance problem. Thus, the use of new herbicides can be a better alternative to reduce the weed infestation, minimize weed shift and also to avoid resistance problem. Therefore, the present investigation was carried out to assess the performance of cyhalofop-butyl, metsulfuron-methyl+chlorimuron-ethyl and different cultivars under direct dry seeded zero till lowland rice situation.

A field experiment was conducted during wet season, 2002 at the Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. The soil was sandy clay loam in texture with neutral soil pH, medium in nitrogen, phosphorus and rich in potassium. The trial was laid out in split-plot design with three replications having four cultivars (Jallahri, Rajshree, Sarla and Bhudeo) in main-plots and five weed control

measures [weedy check, two hand weedings at 25 and 50 DAS, anilofos at 0.4 kg+2, 4-D at 0.5 kg ha⁻¹, cyhalofop-butyl at 100 g ha⁻¹ and metsulfuron-methyl+chlorimuron-ethyl (1+1 g ha⁻¹) in sub-plots. Anilofos was applied at 5 DAS 2, 4-D and metsulfuron-methyl+chlorimuron-ethyl at 25 DAS and cyhalofop-butyl at 15 DAS. Nitrogen (80 kg ha⁻¹) in the form of diammonium phosphate and urea were applied in three splits, 1/3rd as basal, 1/2 at active tillering and remaining 1/3rd at panicle initiation stage, while phosphorus (40 kg P₂O₅ ha⁻¹) was given through DAP with zero-till drill. Potassium at 40 kg K₂O ha⁻¹ through muriate of potash was applied as basal. Crop was sown directly with zero till drill on July 7, 2002 using the seed rate of 60 kg ha⁻¹ and harvested in the last week of November. The depth of water was 25-30 cm during mid August to September.

Major weed flora of the experimental field consisted of *Cyperus iria* L., *C. difformis* L., *Echinochloa crusgalli* (L.) Beav, *E. colona* (L.) Link, *Marsilea minuta* L., *Nymphaea nouchal* Burn and *Paspalum distichum* L. Cultivars under test did not show any significant effect on weed density and dry weight. All the weed control measures significantly decreased weed density and dry weight of weeds over weedy check (Table 1). The pre-emergence application of anilofos at 0.4 kg ha⁻¹ followed by 2, 4-D at 0.5 kg ha⁻¹ as post-emergence proved its superiority in controlling weeds over cyhalofop-butyl and metsulfuron+chlorimuron and was at par with two manual weedings (25 and 50 DAS).

The cultivar Rajshree recorded maximum grain yield of 2.87 t ha⁻¹ which was at par with Bhudeo

Table 1. Effect of weed control treatments and cultivars on weeds and rice

Treatment	Weed density (No. m ⁻²) 60 DAS	Weed dry weight (g m ⁻²) 60 DAS	Panicles (No. m ⁻²)	Panicle length (cm)	Grains panicle ⁻¹	Test weight (g)	Grain yield (t ha ⁻¹)	Harvest index
Cultivars								
Jallahri	8.4 (71)	29.7	214.3	22.8	85.2	31.4	2.42	20.8
Rajshree	7.7 (68)	26.6	222.8	26.8	156.4	24.1	2.87	27.7
Sarla	8.3 (72)	28.1	215.1	23.0	126.5	27.4	2.06	24.9
Bhudeo	7.9 (70)	28.0	207.0	24.7	105.6	23.7	2.80	28.1
LSD (P=0.05)	NS	NS	11.7	3.7	26.2	4.4	0.68	5.9
Weed control								
Weedy	13.8 (170)	70.8	205.5	25.3	108.9	24.9	1.60	22.7
Two hand weedings	4.6 (17)	4.66	223.3	24.3	142.2	25.6	2.16	28.9
Anilofox+2, 4-D (0.4 kg+0.5 kg ha ⁻¹)	5.3 (31)	11.3	215.2	23.9	118.6	23.6	2.07	26.8
Cyhalofop-butyl (100 g ha ⁻¹)	8.6 (76)	30.4	214.8	24.0	108.3	27.8	1.99	23.4
Metsulfuron+ chlorimuron-ethyl (1+1 g ha ⁻¹)	7.7 (59)	24.1	215.3	24.2	114.1	27.7	1.91	24.3
LSD (P=0.05)	1.5	7.7	14.2	NS	25.2	2.7	0.46	5.5

Original values are given in parentheses. Data on weed density were transformed $\sqrt{X+0.5}$.

NS–Not Significant, DAS–Days after sowing.

and Jallahri and these varieties had significantly higher yield over Sarla. Higher yields of these varieties were due to higher yield attributes and comparatively lower weed infestation. The highest number of panicles, panicle length and grains panicle⁻¹ were associated with Rajshree, while Jallahri recorded maximum test weight. Amongst the weed control measures, highest grain yield of 2.16 t ha⁻¹ was obtained with two manual weedings (25 and 50 DAS) followed by anilofos at 0.4 kg+2, 4-D at 0.5 kg ha⁻¹, cyhalofop-butyl at 100 g ha⁻¹ and metsulfuron+chlorimuron (2 g ha⁻¹) (Table 1). However, performance of hand weeding twice and anilofos+2, 4-D was statistically at par to each other in respect to grain yield but was significantly superior to weedy check. These treatments recorded

higher growth and yield attributes as compared to weedy check.

REFERENCES

- Hobbs, P. R. 2003. Alternatives to puddling and manual weeding. In : Addressing Resource Conservation Issues in Rice-Wheat System of South Asia–A Resource Book. Rice-Wheat Consortium for the Indo-Gangetic Plains. International Maize and Wheat Improvement Centre, New Delhi, India. pp. 129-135.
- Kolhe, S. S. and R. S. Tripathi, 1998. Integrated weed management in direct seeded rice. *Indian J. Weed Sci.* 30 : 51-53.
- Singh, U. P. and R. P. Singh, 2001. Effect of weed management, fertility and cultivars on weed growth and yield of rainfed lowland submergence prone-rice. *Indian J. Weed Sci.* 33 : 124-126.