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Effect of weed management in transplanted rice (*Oryza sativa* L.)

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Abstract

Rice (*Oryza sativa* L.) is the leading cereal of the world (Juraimi *et al.*, 2013), it feeds one third of the world population to whom it supplies almost two thirds of the food requirements. In India it is cultivated under various eco-systems, viz. transplanted, direct sown and rainfed situations. Weeds are the most important biological constraint to increasing yield. In rice, infestation of all types of monocot and dicot weed flora was observed. Hand weeding is most common practice to uproot weeds from rice field but scarcity and high wages of labour during make it uneconomic practice. Therefore, farmers need alternate weed management methodology and organic safer herbicides are one of the better substitutions of costly hand weeding. To overcome this problem On Farm Trial was conducted during 2015-16 & 2016-17 at different farmer's field of Surguja District in transplanted rice with four treatments. The treatments included Post emergence application of Bispyribac sodium 10% SC 25 g ha⁻¹ at 15-20 DAT, Post emergence application of Azimsulfuron 50% DF 35 g ha⁻¹ at 15-20 DAT, Unweeded Control and Weed Free plot, replicated five times. Result revealed that application of Bispyribac Sodium 10% SC @ 25 g a.i. ha⁻¹ gave significantly lowest weed density (16.8 & 16.5), lowest weed dry weight g/m² (2.4 & 2.1), lowest weed competition index (6.84 & 7.15), highest weed control efficiency (83 & 86%) and recorded highest rice yield (42.20-42.80 q/ha) during both the year.

Keywords: Bispyribac Sodium, Azimsulfuron, weed control efficiency, weed competition index, yield

Introduction

Rice is a major crop in the world, it feeds one third of the world population to whom it supplies almost two thirds of the food requirements. From an area of 42.13 million ha, India is producing about 40% of the world rice production. The diverse weed flora under transplanted conditions (grasses, sedges and broad-leaved weeds) can cause yield reduction up to 76% (Singh *et al.* 2004). In order to realize maximum benefit of applied monetary inputs, two to three hand weedings (HW) were most effective against all types of weeds in this crop (Halder and Patra, 2007). However, continuous rains during cropping season, scarcity and high wages of labour during weeding peaks particularly at early crop-weed competition make this operation difficult and uneconomic. Therefore, farmers need alternate weed management methodology and organic safer herbicides are one of the better substitutions of costly hand weeding. The goal of herbicide use is to kill or stunt weed infestation allowing the rice to grow and gain a competitive advantage. The chemical weed control method is becoming popular among the farmers because it is the most efficient means of reducing weeds competition with minimum labor cost. The present study was undertaken to study the effect of Weed Management in transplanted rice (*Oryza sativa* L.)

Materials and Methods

An on farm trial was conducted in transplanted rice with different location of Surguja district to study the effect of Weed Management in Transplanted Rice (*Oryza sativa* L.) at different farmers' field of Surguja Dist. during *Kharif season* 2015-16 and 2016-17. The soil of experimental field was Sandy to Sandy loam in texture, topographically Midland, low in available nitrogen and P₂O₅ and high in K₂O with acidic in reaction. The treatments included Post emergence application of Bispyribac sodium 10% SC 25 g ha⁻¹ at 15-20 DAT, Azimsulfuron 50% DF 35 g ha⁻¹ at 15-20 DAT, Unweeded Control and Weed Free plot, replicated five times. The herbicides as per the treatment schedule were applied by using 500 litres of water/ha with knapsack sprayer fitted with flat fan deflector nozzle. The Rice variety Bamleshwari was transplanted at a spacing of 20 x 10 cm. Crop was raised according to package of practices of the State Agriculture University IGKV, Raipur. Data on weed infestation were collected from each farmer's field at 45 DAT. The weeds inside each quadrat were uprooted, cleaned and separated species-wise.

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After drying, weight and weed control efficiency was calculated as per the method suggested by Mani *et al.* (1973). The yield attributes and grain yield of rice were recorded. Major weeds in the experimental plots were: *Echinochloa colonum*, *Echinochloa crusgalli* among grasses; *Cyperus rotundus*, *Cyperus difformis*, *Cyperus iria* among sedges; and *Eclipta alba* and *Ammenia baccifera* among broad-leaved weeds.

Results and Discussion

Effect on Weeds

Result revealed (Table no.1) that post emergence application of Bispyribac-sodium 25g ha⁻¹ at 15-20 DAT recorded significantly lowest weed density (16.8 &16.5), lowest weed dry weight g/m² (2.4 &2.1), lowest weed compition index (6.84 &7.15) and highest weed control efficiency (83 &86%) during both the year 2015-16 & 2016-17. This was due to the fact that Bispyribac-sodium inhibited the plant enzyme acetolactate synthase (ALS), which was involved in biosynthesis of the branched-chain amino acids. Without these amino acids, protein synthesis and growth are inhibited, ultimately causing plant death (WSSA2007).

Effect on crop

The result showed that (Table no.2) all herbicide treatments gave significantly higher number of panicles and panicle weight over the unweeded check due to less competition for moisture, light and nutrient uptake by the crop plants. Significantly higher number of panicle/m² (313-320) and higher no. of grain/panicle (128-133) were observed in plots treated with Bispyribac-sodium 25 g ha⁻¹ at 15-20 DAT during both the year. These results are in close conformity with those of Kumar and Sharma (2005) and Singh *et al.* (2005).

All the weed control treatments significantly reduced the weed growth as compared to weedy check, and thus recorded higher grain yield of rice. The crop yield and weed control efficiency were positively correlated. It was revealed that all the herbicides showed significant effects on grain yield. The highest rice yield was recorded from weed-free plot (45.30-46.10 q/ha), followed by Bispyribac sodium 25 g/ha at 15-20 DAT (42.20-42.80 q/ha) during both the year. These results are in close conformity with Hussain *et al.* (2008).

Table 1: Effect of weed management on weed growth in transplanted rice

Treatments	Weed Density (no./m ²)		Dry weight of weed (g/m ²)		Weed Competition Index (%)		Weed Control Efficiency (%)	
	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17
Bispyribac sodium 10% SC 25 g ha ⁻¹ at 15-20 DAT	16.8	16.5	2.4	2.1	6.84	7.15	83	86
Azimsulfuron 50% DF 35 g ha ⁻¹ at 15-20 DAT	27.6	27.3	4.1	3.8	13.02	13.04	71	75
Weed Free	-	-	-	-	-	-	-	-
Unweeded Control	57.5	59.4	14.5	15.3	21.85	22.55	-	-
CD	1.53	1.71	1.25	1.31	-	-	-	-
SEm	0.49	0.55	0.40	0.42	-	-	-	-

Table 2: Yield performance of transplanted rice as influenced by different treatments

Treatments	No. of panicles/m ²		No. of grain/panicles		Grain yield (q/ha)	
	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17
Bispyribac sodium 10% SC 25 g ha ⁻¹ at 15-20 DAT	313	320	128	133	42.20	42.80
Azimsulfuron 50% DF 35 g ha ⁻¹ at 15-20 DAT	242	246	114	119	39.40	40.10
Weed Free	384	394	145	151	45.30	46.10
Unweeded Control	171	172	89	94	35.40	35.70
CD	70.79	73.23	10.35	10.93	1.65	2.08
SEm	22.97	25.66	0.43	3.55	0.53	0.67

Conclusion

It was concluded that application of Bispyribac-sodium 25 g/ha at 15-20 DAT may be recommended in transplanted rice for controlling predominant weeds and to reduce the labour cost involved in manual hand weeding which is tedious, expensive and time-consuming, hence it cannot be practicable on a large scale.

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