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Effect of different herbicides on the grain yield of transtranted *Kharif* rice (*Oryza sativa L.*)

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ABSTRACT

The result of a field experiment revealed that the application of almix @ 15 g a.i ha^{-1} + 2, 4-DEE @500 g a.i ha^{-1} effectively controlled weed population and their biomass and showed better performance than other chemical control measures. This would enhance grain yield (5.8 t ha^{-1}) by 84.1 % over unweeded check and was at par with hand weeding (5.9 t ha^{-1}). Highest harvest index was recorded with hand weeding and was at par with herbicidal treatment almix + 2, 4-DEE 15+500 g a.i. ha^{-1}.

Key words: Chemical weed control, transplanted *kharif* rice.

Rice is an important food crop India. Inspite of its wide cultivation, the the average yield is rather low due to weed competition which reduces the yield of rice from 25 to 53%. Weeds are predominant at initial 15-45 days after transplanting (Subhaiah and Sreedevi, 2000). For many years, a number of herbicides like butachlor, thiobencarb and anilofos are being applied as pre-emergence for effective control of weeds. These herbicides provide effective control of grassy weeds only and the other weed flora, particularly of sedges and broad-leaved group left uncontrolled and as a results crop growth and yield is affected. Application of these herbicides at high doses continuously insist the problems of environmental pollution, resistance in weeds and shift of weed flora (Kathiresan, 2001). Considering these facts in view the present investigation was conducted with almix, metsulfuron methyl and chlorimuron ethyl which can be effective for both type of weeds and their application rate is quite low.

MATERIAL AND METHODS

The experiment was conducted during the rainy season of 2001and 2002 at Research farm of Institute of Agricultural Science, Banaras Hindu University, Varanasi to find the efficacy of low doses herbicides on different weed flora in transplanted rice. The soil of the experimental site was sandy clay loam having pH 7.3, organic carbon 0.44% and available N, P_2O_5 and K_2O 205, 14.9 and 232.8 kg ha^{-1}, respectively. The experiment comprising 16 treatments, viz. metsulfuron methyl (MSM) (4, 6 and 8 g a.i ha^{-1}), chlorimuron ethyl (CME) (10, 15, and 20 g a.i ha^{-1}), almix (15, 20 and 25 g a.i ha^{-1}), MSM + 2, 4-DEE (4 + 500 g a.i ha^{-1}), CME + 2, 4-DEE (10 + 500 g a.i ha^{-1}), almix + 2, 4-DEE (15 +500g a.i ha^{-1}), anilofos (400 g a.i ha^{-1}) and anilofos +2, 4-DEE (400 + 500 g a.i ha^{-1}) along with hand weeding (20, 40 and 60 DAT) and weedy check. The experiment was laid out in randomised block design with three replication. Variety Sarju 52 was chosen for experimentation. One third of the recommended dose of N (40 kg ha^{-1}) and full dose P_2O_5 and K_2O (60 kg ha^{-1}) were applied before transplanting and remaining amount of N was top dressed in two equal splits half at active tillering and half at panicle initiation stage. Herbicides were applied as pre-emergence 8 DAT using 500 litre water ha^{-1}. The data on total weed population and weed biomass were taken at 90 DAT with the help of random quadrat (0.5 m × 0.5 m) at two places and then converted into per square meter. Data on various parameters were statistically analyzed.

RESULTS AND DISCUSSION

The most dominant weed found in the experimental field were *Echinochloa crusgalli*, *Echinochloa colonum*, *Cynodon dactylon*, *Cyperus rotundus*, *Cyperus difformis*, *Fimbristylis milliaceae*, *Amaranthus viridis*, *Ludwigia parviflora* and *Ammania baccifera*. All the weed controll treatments reduced total weeds density significantly over weedy check (Table 1). Almix + 2, 4-DEE (15+500 g a.i ha^{-1}) was found superior to other measures in reducing the total weed number by 77.4 to 81.5% as compared to weedy check in 2001 and 2002. Metsulfuron methyl and chlorimuron ethyl at lower doses, recorded the highest density of total weeds among the herbicides due to

Table 1 Effect of treatments on weed number weed dry weight and on weed control efficiency

Treatment	Dose (g ai ha^{-1})	Weed number (no m^{-2})		Weed dry weight (gm^{-2})		Weed control efficiency (%)	
		2001	2002	2001	2002	2001	2002
Unweeded	-	14.51[a] (210.34)[b]	15.22 (230.99)	10.43 (108.26)	10.77 (115.41)	-	-
Hand weeding (20,40 & 60)	-	5.37 (28.33)	5.52 (30.00)	4.47 (19.47)	4.62 (20.84)	82.00	81.94
MSM	4	11.03 (121.34)	11.57 (133.33)	7.22 (51.63)	7.46 (55.16)	52.30	52.20
MSM	6	10.46 (109.00)	10.95 (119.33)	6.70 (44.50)	7.05 (49.23)	55.20	57.34
MSM	8	9.90 (97.67)	10.43 (108.34)	6.28 (38.97)	6.53 (42.20)	64.00	63.43
CME	10	10.60 (112.00)	11.26 (126.33)	6.93 (47.63)	7.32 (53.09)	56.00	53.99
CME	15	9.77 (95.00)	10.19 (103.33)	6.39 (40.37)	6.67 (44.00)	62.71	61.87
CME	20	9.60 (91.66)	9.68 (93.33)	6.03 (35.90)	6.25 (38.57)	66.83	66.58
Almix	15	10.68 (113.67)	11.21 (125.34)	6.50 (41.64)	6.77 (45.34)	61.53	60.71
Almix	20	8.67 (74.67)	8.85 (78.00)	5.38 (28.54)	5.75 (32.57)	73.63	71.77
Almix	25	7.27 (52.00)	7.31 (53.01)	4.86 (23.23)	5.05 (25.10)	78.57	78.25
MSM+2,4 DEE	4+500	9.87 (97.00)	10.48 (109.33)	6.23 (38.33)	6.69 (44.34)	64.58	61.58
CME+2,4-DEE	10+500	9.41 (88.00)	9.82 (96.03)	5.55 (30.33)	6.17 (37.60)	71.98	67.42
Almix+2,4DEE	15+500	6.56 (42.66)	7.22 (51.67)	4.52 (19.97)	5.15 (26.04)	81.55	77.43
Anilofos	500	9.90 (97.67)	10.42 (108.00)	6.16 (37.47)	6.52 (42.07)	65.38	63.54
Anilofos +2,4 - DEE	400+500	8.72 (75.67)	9.63 (92.00)	5.59 (30.80)	6.04 (36.00)	71.54	68.80
CD (P= 0.05)		0.41	0.36	0.27	0.36	-	-

[a]Logarithmic transformed values.

[b]Number in parenthesis, indicate original values.

Table 2 Effect of treatments on grain, straw yield and harvest index

Treatment	Dose (g ai ha^{-1})	Grain yield (t ha^{-1})			Straw yield (t ha^{-1})			Harvest index (%)	
		2001	2002	Mean	2001	2002	Mean	2001	2002
Unweeded	-	3.2	3.1	3.1	4.3	4.1	4.2	43.17	42.61
Hand weeding (20,40 & 60)	-	6.0	5.8	5.9	7.3	7.2	7.3	45.10	44.88
MSM	4	3.6	3.5	3.6	4.8	4.6	4.7	4.3	4.3
MSM	6	4.3	4.1	4.2	5.5	5.4	5.5	43.73	42.90
MSM	8	4.6	4.5	4.5	6.2	5.9	6.1	42.70	42.64
CME	10	3.9	3.8	3.9	5.4	5.3	5.3	41.80	41.56
CME	15	4.3	4.2	4.2	5.7	5.6	5.7	43.00	42.75
CME	20	4.8	4.7	4.8	6.2	5.9	6.1	43.75	44.02
Almix	15	4.1	3.9	3.9	5.6	5.6	5.6	41.96	41.31
Almix	20	5.4	5.3	5.3	6.6	6.5	6.6	44.68	44.87
Almix	20	5.4	5.3	5.3	6.6	6.5	6.6	44.68	44.87
MSM+2,4 DEE	20	5.4	5.3	5.3	6.6	6.5	6.6	44.68	44.87
CME+2,4-DEE	10+500	5.2	5.1	5.1	6.5	6.3	6.4	44.46	44.65
Almix+2,4DEE	15+500	5.9	5.7	5.8	7.2	7.0	7.1	45.11	44.90
Anilofos	500	4.6	4.3	4.4	5.9	5.6	5.7	44.03	43.36
Anilofos +2,4 -DEE	400+500	5.3	5.1	5.3	6.5	6.3	6.5	45.01	44.78
CD (P= 0.05)		0.10	0.12	0.12	0.19	0.27	0.20	0.97	1.21

poor efficacy on grasses and sedges. This corroborate the finding of Mukherjee and Bhattacharya (1999). Weed control measures registered a significant reduction in weed dry matter over weedy check throughout the crop growth. Hand weeding recorded the lowest dry matter of weeds probably due effective control of the first flush of weeds from 20 to 40 days and second flush of weeds from 40 days onwards. Almix +2, 4-DEE (15+500 g ai ha^{-1}) among the herbicides reduced dry weight of weed significantly by 81.8 and 77.4 % compared to weedy check in 2001 and 2002, respectively. It remained at par with almix (25 g ai ha^{-1}). Higher WCE was recorded with almix + 2, 4 DEE (15 + 500 g ai ha^{-1}) this was followed by almix 25 g ai ha^{-1} (78.19 and 78.23%).

In general, the application of herbicides resulted in a significant higher grain and straw yield over unweeded check (Table 2). Among herbicidal treatments, maximum grain yield 5.8 t ha^{-1} was obtained with of almix + 2, 4 -DEE (15+500 g ai ha^{-1}), which was on par with hand weeding. Straw yield followed the same trends as grain yield. The harvest index was highest with almix + 2, 4 DEE (15+500 g ai ha^{-1}) and it was at par with hand weeding. In India, herbicide usage is increasing because of the high labor requirement for hand weeding (50 labor days ha^{-1} × Rs. 50) and scarcity of labor, during peak periods of weeding. Also, herbicides are available locally at a cheaper cost. Hence, it could be concluded that almix + 2, 4 DEE (15+500 g ai ha^{-1}) could be applied as pre-emergence at 8 DAT for better WCE and higher grain yield in transplanted rice.

REFERENCES

Kathiresan, R.M. (2001). Sustainability of weed management practices in rice-black gram cropping system. Lead paper and Abstr. of first Biennial Conf. in the New Millennium as Eco-friendly Weed Management options for Sustainable Agriculture, UAS, Banglore. p 79.

Mukherjee, P.K., Bhattacharya, S.P. (1999). Comparative study of bioefficacy between new generation micro herbicide and traditional voluminous herbicides on transplanted rice culture. *Annals of Agric Res.* 20(4), 509-511.

Subhaiah, S.V., Sreedevi, B. (2000). Efficacy of herbicides mixtures in weed control in direct seeded rice under puddled condition. *Indian Journal of Science.* 32, 199-200.