Indian J. Weed Sci. **36** (1 & 2) : 50-53 (2004)

Bio-efficacy of Some New Herbicides against Weed in Transplanted Rice (*Oryza sativa* L.)

J. Shekhar, B. S. Mankotia and A. D. Bindra
CSK HPKV Rice and Wheat Research Centre, Malan-176 047 (H. P.), India

ABSTRACT

Pyrazosulfuron-ethyl at 25 g ha^{-1} applied 10 days after transplanting (DAT), tank mixed (3 DAT) or sequential application of butachlor 938 g ha^{-1} (3 DAT) and Almix at 4 g ha^{-1} (25 DAT) were identified as promising alternatives to the commonly used herbicide butachlor at 1.5 kg ha^{-1}.

INTRODUCTION

Rice (*Oryza sativa* L.) with an area of 81.5 thousand hectares is the third most important field crop after wheat (378.2 thousand ha) and maize (298.1 thousand ha) in Himachal Pradesh. Being grown during rainy season, rice is severely infested with a variety of weed flora. Weed management through traditional hand weeding is very difficult in this crop due to frequent rainfall coupled with water stagnation in transplanted rice culture. Butachlor has become quite popular with the rice farmers of the State. Continuous use of a single herbicide might lead to build up of resistance in certain weeds to the herbicide in due course of time as has already happened in case of continuous application of isoproturon in wheat. Hence, there is a need of identifying alternative herbicides to give options to the farmers. Of late, low dosage high efficacy herbicides and mixed/ sequential application of herbicides to control mixed weed flora have been found promising (Kurchania *et al.*, 2000; Moorthy, 2002). Keeping these in view, a field experiment was carried out to evaluate the bio-efficacy of new herbicides in transplanted rice.

MATERIALS AND METHODS

A field experiment was conducted at CSK HPKV Rice and Wheat Research Centre, Malan (960 m above mean sea level) during **kharif** 2001 and 2002. The treatments (Table 1) were tested in randomised block design with three replications. The soil of experimental field was silty clay loam in texture, acidic in reaction (pH 5.7) and medium in available nitrogen, phosphorus, potassium and organic carbon. About one month old seedlings (var. RP 2421) were transplanted at 20 cm x 10 cm spacing. Basal application of 45 kg N (through urea 46%), 40 kg P_2O_5 (through SSP 16 %) and 40 kg K_2O (through MOP 60%) were made at the time of last puddling and remaining 45 kg N was top dressed in two equal splits at tillering and panicle initiation stages. For tank mixing of butachlor and Almix, both the herbicides were dissolved in water separately and then butachlor solution was added into Almix solution and mixed thoroughly. The herbicides were applied with a knapsack sprayer with flat fan nozzle using 500 l water ha^{-1}. A total of 1625 and 1067 mm rainfall was recorded during 2001 and 2002 rice seasons (June to October), respectively.

RESULTS AND DISCUSSION

Effect on Weeds

The weeds in the experimental field consisted of *Echinochloa colona, Panicum dichotomiflorum, Digitaria sanguinalis, Ischaemum rugosum, Cyperus iria, C. difformis, Fimbristylis miliacea, Monochoria vaginalis, Ammania baccifera,*

Table 1. Effect of weed control treatments on population and dry matter of weeds

Treatment	Dosage (kg a.i. ha^{-1})	Stage of application (DAT)	Weed dry weight (g m^{-2})		Weed density (No. m^{-2})					
			2001	2002	2001			2002		
					Grasses	Sedges	BLW	Grasses	Sedges	BLW
Butachlor	1.5	5	15.8	31.5	2.03 (4)	4.35 (19)	4.60 (21)	4.82 (24)	4.28 (18)	7.20 (52)
Butachlor (MON 46996)	1.5	5	20.0	29.9	2.96 (9)	5.14 (27)	6.05 (37)	4.46 (24)	5.81 (13)	6.69 (45)
Fentrazamide	0.105	5	28.1	34.3	2.51 (7)	6.11 (38)	7.35 (55)	4.47 (20)	5.34 (29)	7.10 (50)
Fentrazamide	0.12	5	28.1	12.1	3.45 (12)	5.57 (31)	6.37 (41)	4.32 (19)	5.32 (29)	6.67 (45)
Pyrazosulfuron-ethyl	0.02	10	15.2	30.7	3.60 (13)	4.95 (25)	4.46 (20)	4.99 (25)	3.99 (16)	6.46 (44)
Pyrazosulfuron-ethyl	0.025	10	10.2	20.1	3.77 (14)	4.35 (19)	3.75 (14)	5.00 (25)	4.57 (21)	6.59 (43)
Almix+butachlor	0.004+0.938	3	19.0	11.8	3.13 (10)	4.29 (19)	4.69 (22)	4.47 (20)	3.05 (9)	5.40 (29)
Butachlor fb. Almix	0.938 fb 0.004	3 fb. 25	15.5	18.3	3.63 (13)	4.69 (22)	2.82 (8)	4.31 (19)	3.63 (13)	4.86 (24)
Weedings		20 & 40	25.0	51.7	3.48 (12)	4.92 (24)	7.30 (53)	3.24 (11)	4.67 (22)	6.61 (44)
Weedy			45.2	171.2	4.46 (20)	6.16 (38)	10.53 (111)	6.16 (38)	7.23 (58)	11.58 (134)
LSD (P=0.05)			7.1	8.4	0.97	0.76	0.91	0.65	0.57	1.21

DAT–Days after transplanting, BLW–Broadleaf weeds, fb–followed by.
Figures in parentheses correspond to the original values of the count.

Table 2. Effect of weed control treatments on yield attributes and yield of rice

Treatment	Dosage (kg a. i. ha^{-1})	Stage of application (DAT)	Panicles (No. m^{-2})			Panicle weight (g)		Grain yield (t ha^{-1})			
			2001	2002	Mean	2001	2002	2001	2002	Mean	Increase over weedy (%)
Butachlor	1.5	5	297	280	288	2.06	2.14	4.26	4.28	4.27	25.6
Butachlor (MON 46996)	1.5	5	304	295	299	2.02	2.12	4.09	3.92	4.00	17.6
Fentrazamide	0.105	5	242	297	270	2.04	2.16	3.93	4.26	4.09	20.3
Fentrazamide	0.12	5	280	289	284	2.26	2.15	3.93	4.15	4.04	18.8
Pyrazosulfuron-ethyl	0.02	10	295	324	210	2.09	2.07	4.09	4.18	4.14	21.8
Pyrazosulfuron-ethyl	0.025	10	303	325	314	2.03	2.12	4.41	4.49	4.45	30.9
Almix+butachlor	0.004+0.938	3	290	348	319	1.96	2.15	4.46	4.11	4.28	25.9
Butachlor fb. Almix	0.938 fb. 0.004	3 fb 25	331	369	350	2.07	2.06	4.62	4.20	4.41	29.7
Weedings		20 & 40	266	302	284	2.16	2.18	3.91	4.22	4.06	19.4
Weedy			282	293	288	1.99	1.84	3.30	3.49	3.40	-
LSD (P=0.05)			48	NS		NS	NS	0.60	0.43	0.52	

NS–Not Significant.

Commelina benghalensis and Bonnaya *veronicaefolia.*

Significant reduction in the density and dry weight of weeds was brought by different treatments (Table 1). Application of pyrazosulfuron-ethyl (25 g ha^{-1}), sequential application of butachlor (938 g ha^{-1}) fb. Almix (4 g ha^{-1}), and butachlor (1.5 kg ha^{-1}) during both the years and of butachlor+Almix (938+4 g ha^{-1}) during 2002 recorded significantly less dry weight of weeds as compared to two hand weedings done at 20 and 40 DAT. Both of these former treatments were equally effective in controlling the grassy weeds. Population of *M. vaginalis, A. baccifera, C. benghalensis* and *B. veronicaefolia* (BLW) was significantly lowered by the sequential application of butachlor and Almix (938 and 4 g ha^{-1}) as compared to butachlor (1.5 kg ha^{-1}).

Effect on Crop

Number of panicles m^{-2} was statistically similar in case of butachlor (1.5 kg ha^{-1}), pyrazosulfuron-ethyl (25 g ha^{-1}), tank mixed or sequential application of butachlor (938 g ha^{-1}) and Almix (4 g ha^{-1}). Lower values of panicle weight as well as of grain yield were recorded in weedy check, whereas significant increases in yield ranging from 17 to 31% were brought about by different weed control treatments (Table 2). Pyrazosulfuron-ethyl at 20 or 25 g ha^{-1}, tank mixed or sequential application of butachlor (938 g ha^{-1}) and Almix (4 g ha^{-1}), and the butachlor recorded statistically equal grain yields. Pyrazosulfuron-ethyl (25 g ha^{-1}), sequential application of butachlor and Almix, tank mixed application of butachlor and Almix, and butachlor increased yields by 30.9, 29.7, 25.9 and 25.6%, respectively, over weedy check. Results are in conformity with those of Moorthy (2002).

REFERENCES

Kurchania, S. P., C. S. Bhalla and N. R. Paradkar, 2000. Bio-efficacy of metsulfuron-methyl and 2, 4-D combination for broadleaf weed control in wheat. *Indian J. Weed Sci.* **32** : 67-69.

Moorthy, B. T. S. 2002. Evaluation of pyrazosulfuron-ethyl alone and in combination with molinate for controlling weeds in rainfed direct seeded lowland rice. *Indian J. Weed Sci.* **34** : 285-286.