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Efficacy of Flufenacet and Metribuzin Against Weeds in Wheat

R. S. Malik, Ashok Yadav, R. K. Malik and S. S. Punia
Department of Agronomy
CCS Haryana Agricultural University, Hisar-125 004 (Haryana), India

ABSTRACT

Flufenacet at 200-500 g ha^{-1}, applied before or after first irrigation resulted in 40 to 69% and 44 to 72% control of grassy and broadleaf weeds, respectively. Metribuzin at 200 to 400 g ha^{-1} provided control of both grassy (75-90%) and broadleaf weeds (79-93%). Metribuzin beyond 300 g^{-1} was toxic to wheat. Sulfosulfuron resulted in higher grain yield due to very effective control of grassy (87-90%) and suppression of broadleaf weeds (35%), however, it was statistically at par with clodinafop at 60 g ha^{-1}, fenoxaprop at 120 g ha^{-1} and metribuzin at 200 and 300 g ha^{-1}.

INTRODUCTION

The reduction in grain yield of wheat due to unchecked growth of *Phalaris minor, Avena ludoviciana, Rumex retroflexus, Cirsium arvense* and *Chenopodium album* has been estimated to the extent of 25 to 60% and sometimes even more depending upon the intensity of weeds (Malik *et al.*, 1989). *A. ludoviciana* appears as the major grass weed alongwith broadleaf weeds in cropping systems other than rice-wheat (Gupta *et al.*, 1990; Balyan *et al.*, 1993).

Isoproturon, metribuzin, diclofopmethyl, tralkoxydim, 2,4-D, fluroxypyr, tribenuron-methyl and metsulfuron-methyl provide selective control of either grasses or broadleaf weeds (Gill *et al.*, 1981; Balyan and Panwar, 1998). But to control complex weed flora in wheat, there is a need to find out some new herbicide(s). Therefore, the present investigation was undertaken to study the efficacy of flufenacet and metribuzin in comparison to existing herbicides against complex weed flora in wheat.

MATERIALS AND METHODS

A field experiment was conducted at Research Farm of CCS Haryana Agricultural University, Hisar, India during 2002-03 and 2003-04. The soil of the experimental field was sandy loam in texture, low in organic matter and available N, medium in P_2O_5 and high in K_2O with slightly alkaline in reaction (pH 8.1). Wheat variety PBW 343 was sown under furrow irrigated raised bed system (FIRBS) keeping two rows on the top of bed on November 12 during 2002-03 and November 23 during 2003-04, and it was raised with all other recommended package of practices. Flufenacet at 200, 300 and 400 g ha^{-1} applied before first irrigation (BFI) and after first irrigation (AFI), flufenacet at 500 g ha^{-1} (AFI), metribuzin at 200, 300 and 400 g ha^{-1} (AFI), sulfosulfuron at 25 g ha^{-1}, clodinafop at 60 g ha^{-1} and fenoxaprop at 120 g ha^{-1} each applied AFI alongwith weedy and weed-free check (Table 1) were laid out in randomized block design replicated thrice. All the herbicides were sprayed at 35 DAS with knapsack sprayer fitted with flat fan nozzle using 625 l water/ha.

RESULTS AND DISCUSSION

The field was infested with grassy (65%) as well as broadleaf weeds (350%) during both the years. Among grassy weeds, *A. ludoviciana* was the major weed (80%) alongwith *P. minor* (20%). Whereas broadleaf weeds comprised mainly *C. album* (40%), *R. retroflexus* (15%), *Coronopus didymus* (20%), *Melilotus alba* (15%) and miscellaneous weeds (10%).

Table 1. Population and dry weight of weeds as affected by herbicide treatments

Herbicide	Dose ($g\ ha^{-1}$)	Stage of application	Population of weeds (No. m^{-2})				Dry weight of weeds ($g\ m^{-2}$)							
			90 DAS				60 DAS				90 DAS			
			Grassy weeds		Broadleaf weeds		Grassy weeds		Broadleaf weeds		Grassy weeds		Broadleaf weeds	
			2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Flufenacet	200	BFI	41	54	25	33	39.8	50.8	18.7	25.2	163.5	212.3	25.7	34.1
Flufenacet	300	BFI	32	43	21	28	32.0	41.6	15.7	21.5	140.2	189.7	22.1	29.3
Flufenacet	400	BFI	21	29	16	22	26.4	34.6	12.9	18.7	107.2	169.2	18.3	22.9
Flufenacet	200	AFI	36	48	24	31	35.6	45.2	18.4	23.7	149.3	204.1	24.9	30.7
Flufenacet	300	AFI	27	36	21	28	29.1	37.0	15.5	21.3	133.2	166.7	21.5	28.0
FIufenacet	400	AFI	18	25	14	19	23.4	32.9	12.6	17.9	102.1	137.8	18.0	21.4
Flufenacet	500	AFI	15	21	10	14	21.8	30.1	9.8	12.7	86.6	127.9	14.9	17.2
Metribuzin	200	AFI	12	16	9	13	21.9	28.7	4.1	6.8	66.6	86.8	8.8	12.6
Metribuzin	300	AFI	10	13	5	8	11.8	15.9	2.1	3.6	29.8	46.9	4.7	8.2
Metribuzin	400	AFI	7	9	3	6	10.9	13.1	1.3	2.9	27.6	38.7	3.4	6.9
Sulfosulfuron	25	AFI	13	19	33	43	11.9	17.5	16.3	20.5	35.0	35.5	31.5	39.8
Clodinafop	60	AFI	14	18	46	63	10.7	13.9	29.6	38.8	39.9	49.8	51.5	62.2
Fenoxaprop	120	AFI	13	17	51	60	11.6	15.2	32.0	36.4	39.9	52.0	50.9	59.5
Weedy check	-		91	117	49	61	73.2	91.8	31.8	37.9	277.6	353.3	49.6	61.4
Weed-free check	-		0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD (P=0.05)			4	6	4	5	3.8	5.2	L9	4.8	8.7	12.9	3.4	5.6

BFI–Before first irrigation (20 DAS).

AFI–After first irrigation (35 DAS).

Table 2. Weed control efficiency and grain yield of wheat as influenced by herbicidal treatments

Herbicide	Dose ($g\ ha^{-1}$)	Stage of application	Weed control efficiency at 90 DAS				Spikes ($No.\ m^{-2}$)		Grain yield ($kg\ ha^{-1}$)	
			Grassy weeds		Broadleaf weeds					
			2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Flufenacet	200	BFI	41	40	48	44	96	87	3352	3241
Flufenacet	300	BFI	49	46	55	52	98	91	3896	3591
Flufenacet	400	BFI	61	52	63	63	101	96	4067	3848
Flufenacet	200	AFI	46	42	50	50	97	87	3413	3262
Flufenacet	300	AFI	52	53	57	54	99	90	3918	3652
Flufenacet	400	AFI	63	62	64	65	101	97	4111	3989
Flufenacet	500	AFI	69	64	70	72	103	101	4127	4098
Metribuzin	200	AFI	76	75	82	79	106	103	4364	4259
Metribuzin	300	AFI	89	87	90	87	108	105	4425	4299
Metribuzin	400	AFI	90	89	93	89	102	99	4138	4048
Sulfosulfuron	25	AFI	87	90	36	35	112	120	4624	4557
Clodinafop	60	AFI	86	86	0	0	111	106	4570	4410
Fenoxaprop	120	AFI	85	85	0	0	110	105	4494	4365
Weedy check	-		0	0	0	0	84	79	2463	2118
Weed-free check	-		100	100	100	100	132	128	5127	4993
LSD (P=0.05)							4	6	457	314

BFI–Before first irrigation (20 DAS).

AFI–After first irrigation (35 DAS).

Effect on Weeds

Flufenacet and metribuzin at all doses, and sulfosulfuron reduced the density and dry weight of grassy as well as broadleaf weeds significantly as compared to weedy check (Table 1). However, effect of metribuzin was more pronounced against both the types of weeds in respect of density of weeds at 90 DAS, and dry weight at 60 as well as 90 DAS. Metribuzin at 300 g ha^{-1} reduced the density of grassy weeds at 90 DAS statistically similar to sulfosulfuron at 25 g ha^{-1}, clodinafop at 60 g ha^{-1} and fenoxaprop at 120 g ha^{-1} during both the years, but it was more effective than flufenacet and sulfosulfuron against broadleaf weeds. Sulfosulfuron provided 87-90% control of grassy weeds and 35-36% control of broadleaf weeds. Clodinafop and fenoxaprop were effective (85-86%) only against grassy weeds (Table 2). Flufenacet at 200 to 500 g ha^{-1} applied before or after first irrigation could provide weed control efficiency only upto 40 to 69% and 44 to 72% against grassy and broadleaf weeds, respectively (Table 2).

Effect on Crop

All the herbicidal treatments resulted in significantly more number of spikes and grain yield when compared to weedy check, however, none of them could produce spikes and yield levels statistically similar to weed-free check during both the years (Table 2). Among different herbicidal treatments, sulfosulfuron provided maximum grain yield during both the years; however, it was statistically at par with clodinafop at 60 g ha^{-1}, fenoxaprop at 120 g ha^{-1} and metribuzin at 200 and 300 g ha^{-1} (Table 2). Lower yields in fenoxaprop and clodinafop treated plots than in sulfosulfuron were because of no control of broadleaf weeds. Wheat spikes and yield levels in the plots treated with flufenacet were inferior to sulfosulfuron due to poor weed control efficiency. Metribuzin at 400 g ha^{-1} though provided very effective control of complex weed flora (89-93%) but it produced significantly less number of spikes and grain yield of wheat compared to its application at 300 g ha^{-1}, sulfosulfuron, clodinafop and fenoxaprop. Phytotoxicity of metribuzin at 400 g ha^{-1} in wheat has been earlier reported by Balyan *et al* (1997). Weeds growing throughout the crop season reduced the grain yield of wheat to the extent of 51.9 and 57.6% during 2002-03 and 2003-04, respectively.

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