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Effect of Doses and Stages of Application of Isopropagyl on *Phalaris minor* in Wheat

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ABSTRACT

Isopropagyl applied at 20 days after sowing recorded 78 to 90% control of *Phalaris minor.* Isopropagyl at 125 and 150 g ha^{-1} provided better control of *Phalaris minor* than at lower rates. Grain yield of wheat increased with the successive increase in the doses of isopropagyl irrespective of stages of application.

INTRODUCTION

The continuous adoption of rice-wheat cropping system in the wheat growing regions of India has led to the problem of little seed canary grass *(Phalaris minor)* infestation in wheat crop, causing yield reduction to the level of 30-80% (Brar and Singh, 1997). The use of selective herbicides particularly isoproturon has played a prominent role in controlling *P. minor* effectively for more than one and a half decade. However, with the continuous use of isoproturon for a longer period, resistance in *P. minor* to isoproturon herbicide was developed in Haryana (Malik and Singh, 1993) and Punjab (Walia *et al.*, 1997). Considering the problem of resistance, three alternate herbicides, namely, sulfosulfuron, clodinafop, fenoxaprop-p-ethyl were recommended for the control of resistance *P. minor.* These herbicides are costly and there is a risk of development of cross resistance. Broadleaf weeds are not controlled by these herbicides (except sulfosulfuron which provides partial control of broadleaf weeds). Therefore, keeping the cross resistance problem in mind, a new herbicide isopropagyl 500 SC (JV 485) was tested against *P. minor* in wheat at different doses and stages of application. Isopropagyl belongs to Pyrazole-menzoate family, used as pre-emergence herbicide to provide effective control of many important grass weeds such as *Alopecurus myosuroides, Lolium* spp., *Poa annua* and *Phalaris* spp. Susceptible plant species quickly exhibit necrotic symptoms and die within days of emergence. JV 485 is taken up by the shoots of plants as they pass through the soil surface (Herbicides Hand Book, 1994).

MATERIALS AND METHODS

Field experiment was conducted at CCSHAU Regional Research Station, Karnal during **rabi** seasons of 2001-02 and 2002-03. The soil of the experimental field was sandy clay loam in texture having pH 8.1 and organic carbon 0.35%. Wheat cv. PBW-343 was sown on December 6, 2001; November 29, 2002 and harvested on April 28, 2002; April 28, 2003. Treatments consisted of four doses of isopropagyl (75, 100, 125 and 150 g ha^{-1}) applied at 3, 5 and 20 days after sowing (DAS) of wheat, sulfosulfuron at 25 g ha^{-1}, metribuzin at 210 g ha^{-1} applied at 35 DAS, weedy and weed-free checks (Table 1). The treatments were laid out in a plot size of 5.2 x 2.4 m in randomized block design and were replicated thrice. The herbicides were applied as spray using flat fan nozzle delivering 300 l ha^{-1} volume. Crop was raised according to package of practices of CCSHAU, Hisar.

RESULTS AND DISCUSSION

The presence of broadleaf weed was negligible. It was observed that the application of isopropagyl at 20 DAS recorded 78 to 90% control of *P. minor* as compared to 3 and 5 DAS applications in 2001-02 and 2002-03. Isopropagyl at 125 and 150 g ha^{-1} provided higher control of *P. minor* than at lower rates (Table 1).

Table 1. Effect of doses and stages of application of isopropagyl on *Phalaris minor* in wheat

Treatment	Dose (g a. i. ha^{-1})	Application stages (DAS)	Weed density (No. m^{-2})		Dry weight (g m^{-2})	
			2001-02	2002-03	2001-02	2002-03
Isopropagyl	75	3	4.8 (22)	5.7 (31)	56.2	22.8
Isopropagyl	100	3	4.6 (20)	4.1 (16)	54.0	18.0
Isopropagyl	125	3	4.1 (16)	3.8 (13)	35.6	17.8
Isopropagyl	150	3	3.1 (8)	2.3 (4)	12.8	11.0
Isopropagyl	75	5	5.1 (25)	4.7 (21)	55.8	18.8
Isopropagyl	100	5	4.9 (23)	3.6 (12)	54.6	17.3
Isopropagyl	125	5	4.1 (16)	3.3 (10)	35.0	10.8
Isopropagyl	150	5	4.0 (15)	2.2 (4)	32.2	5.7
Isopropagyl	75	20	3.1 (9)	3.6 (12)	7.3	11.8
Isopropagyl	100	20	2.9 (7)	2.6 (6)	6.8	5.9
Isopropagyl	125	20	2.6 (6)	2.5 (5)	5.1	5.2
Isopropagyl	150	20	2.3 (4)	2.2 (4)	3.8	3.3
Sulfosulfuron	25	35	2.1 (4)	2.0 (3)	8.7	1.8
Metribuzin	210	35	2.5 (5)	2.6 (6)	12.6	4.2
Weedy	-	-	11 (122)	7.3 (53)	182.8	38.8
Weed-free	-	-	1.0 (00)	1.0 (00)	0.5	0.0
LSD (P=0.05)			1.5	0.5	13.8	3.1

Transformed values $\sqrt{X+1}$. Original values are given in parentheses.

There was non-significant difference in the plant height and wheat spike length with the application of isopropagyl from 75 to 125 g ha^{-1} irrespective of stages of application. The values of plant height and spike length recorded with the application of isopropagyl at 150 g ha^{-1} 20 DAS were significantly higher than weedy plots and at par with the values obtained with sulfosulfuron and metribuzin as compared to its 3 and 5 DAS application. Plant height and spike length were relatively lower with metribuzin application than sulfosulfuron. In general, the number of tillers and grain yield were increased with the successive increase in the dose of isopropagyl (75 to 150 g ha^{-1}) at 3, 5 and 20 DAS (Table 2). The number of tillers and grain yield of wheat were significantly higher with the application of isopropagyl at 150 g ha^{-1} applied at 20 DAS than its other doses and stages of application and weedy plot and were at par with sulfosulfuron. The number of tillers and grain yield obtained with the application of metribuzin were significantly less than sulfosulfuron and isopropagyl at 150 g ha^{-1}. It may be because of some phytotoxic effect of metribuzin on the wheat crop.

Table 2. Effect of doses and stages of application of isopropagyl on yield and yield attributes of wheat crop

Treatment	Dose (g a. i. ha^{-1})	Application stage (DAS)	Plant height (cm)		Spike length (cm)		Spikes (No. m^{-2})		Yield (kg ha^{-1})	
			2001-02	2002-03	2001-02	2002-03	2001-02	2002-03	2001-02	2002-03
Isopropagyl	75	3	85.3	85.6	9.5	9.5	430	460	4916	5431
Isopropagyl	100	3	85.9	86.8	9.6	9.7	430	405	4932	5746
Isopropagyl	125	3	86.2	86.3	9.8	9.7	450	465	5000	5795
Isopropagyl	150	3	86.8	87.4	9.8	9.9	465	465	5240	5936
Isopropagyl	75	5	85.5	85.4	9.3	9.4	430	470	4920	5214
Isopropagyl	100	5	86.7	86.9	9.5	9.6	435	460	4924	5396
Isopropagyl	125	5	86.9	87.1	9.7	9.8	445	445	4986	5660
Isopropagyl	150	5	88.6	89.9	9.8	10.1	450	465	5000	5874
Isopropagyl	75	20	86.9	86.2	9.6	9.5	435	430	5365	5350
Isopropagyl	100	20	87.1	86.9	9.9	9.8	440	420	5678	5682
Isopropagyl	125	20	87.2	87.4	9.8	9.9	490	500	5723	5761
Isopropagyl	150	20	89.9	90.4	10.4	10.2	470	460	5996	6008
Sulfosulfuron	25	35	91.1	90.5	9.9	10.2	470	470	5289	6091
Metribuzin	210	35	88.6	89.5	9.7	10.1	445	415	4886	5835
Weedy	-	-	86.8	86.3	9.3	9.5	315	410	3990	4820
Weed-free	-	-	91.5	91.1	10.1	10.2	475	470	5320	6126
LSD (P=0.05)			2.2	2.4	0.5	0.5	45	25	216	198

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