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Influence of tank mixture of isoproturon and fluroxypyr on the control of weeds in wheat (*Triticum aestivum*)

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ABSTRACT

A 2-year field study conducted at Hisar during 1989–90 and 1990–91 indicated that fluroxypyr was more effective against wild pea (*Lathyrus aphaca* L.) than lambsquarter (*Chenopodium album* L.); while 2, 4-D and isoproturon were more effective against lambsquarter than wild pea. Tank mixture of fluroxypyr 0.20 kg/ha + isoproturon 0.75 kg/ha applied 30 days after sowing provided effective control of grasses and broad-leaf weeds in wheat (*Triticum aestivum* L. emend. Fiori & Paol.) and gave grain yield at par to that obtained in weed-free check.

Combinations of isoproturon and 2, 4-D have been recommended for complex weed flora in wheat (*Triticum aestivum* L. emend. Fiori & Paol.) (Malik *et al.*, 1989). The use of 2, 4-D is decreasing as it causes developmental deformities in many wheat varieties (Bhagwati, 1989). The combination of isoproturon and fluroxypyr may increase the spectrum of weed kill without any adverse effect on wheat. Hence present investigation was carried out to evaluate herbicide combinations against mixed population of grassy and broad-leaf weeds.

MATERIALS AND METHODS

A field experiment was conducted during the winter season in 1989 and 1990 at Hisar. The soil of the field was sandy loam (Typic Ustochrept) with pH 8.1 and organic matter content 0.4%. Fluroxypyr at 0.200, 0.250 and 0.300 kg/ha and as its tank mixture at 0.150 and 0.200 kg/ha with isoproturon at 0.750 kg/ha, 2, 4-D alone at 0.250, 0.375 and 0.500 kg/ha and each as tank mixture with isoproturon at 0.750 kg/ha, isoproturon alone at 0.750 and 1.00 kg/ha constituted 13 herbicidal treatments. These were compared with the 2 control—one completely unweeded and the other kept weed free in randomized block design with 3 replications. 2, 4-D sodium salt was used. All herbicides were applied at 30 days after sowing (DAS) with a knapsack sprayer using a volume of 650 litres water/ha. Wheat cv. 'WH 283' and 'WH 157' were sown on 15 and 17 November using a seed rate of 100 kg/ha 1989 and 1990 respectively. The field was infested with natural population of weed species, viz. wild pea (*Lathyrus aphaca* L.) and lambsquarter (*Chenopodium album* L.) in 1989; and lambsquater, wild canary grass (*Phalaris minor* Retz.) and wild oat (*Avena ludoviciana*) in 1990. The emergence of wheat was poor in 1990. Recommended package of practices was followed. In both

Table 1. Influence of tank mixture of isoproturon and fluroxypyr on weed population and total dry weight at 60 days after sowing

Treatment	Dose (kg/ha)	Weed population/m²					Dry weight (g/m²)		Grain yield (kg/ha)	
		1989–90		1990–91			1989–90	1990–91	1989–90	1990–91
		L. aphaca	*C. album*	*P. minor*	*A. ludoviciana*	*C. album*				
Fluroxypyr	0.200	11.3 (127)	10.4 (113)	6.1 (37)	3.3 (11)	7.5 (55)	39.9	65.7	4,942	2,371
Fluroxypyr	0.250	10.9 (119)	9.8 (96)	6.8 (45)	3.0 (9)	6.8 (45)	34.3	54.2	5,081	2,692
Fluroxypyr	0.300	9.7 (90)	8.8 (76)	6.7 (44)	3.2 (11)	6.2 (38)	32.4	36.7	5,387	2,816
Fluroxypyr + isoproturon	0.150 + 0.750	9.8 (98)	1.0 (0)	4.3 (18)	3.1 (9)	1.0 (0)	33.5	7.5	5,503	3,680
Fluroxypyr + isoproturon	0.200 + 0.750	7.6 (69)	1.0 (0)	3.8 (13)	3.1 (9)	1.0 (0)	10.9	5.1	5,498	4,174
2,4-D + isoproturon	0.250 + 0.570	11.8 (140)	1.0 (0)	4.4 (19)	2.9 (8)	1.0 (0)	27.7	21.5	5,137	3,260
2,4-D + isoproturon	0.750 + 0.750	10.8 (117)	1.0 (0)	4.2 (17)	2.5 (7)	1.0 (0)	24.4	19.3	5,363	3,680
2,4-D + isoproturon	0.500 + 0.750	10.8 (117)	1.0 (0)	4.2 (17)	2.5 (6)	1.0 (0)	21.6	14.7	5,387	3,804
2,4-D	0.250	14.7 (219)	5.4 (29)	7.1 (51)	3.8 (13)	4.7 (22)	44.3	30.1	4,942	2,618
2,4-D	0.375	14.2 (204)	5.0 (26)	6.8 (50)	3.7 (13)	3.6 (13)	33.0	26.9	5,192	2,692
2,4-D	0.500	13.7 (191)	4.7 (23)	7.2 (53)	3.3 (10)	2.5 (5)	30.7	24.5	5,248	2,816
Isoproturon	0.750	13.5 (190)	1.0 (0)	4.6 (21)	2.9 (8)	1.0 (0)	33.3	14.3	5,235	3,038
Isoproturon	1.000	12.6 (159)	1.0 (0)	3.5 (11)	2.2 (5)	1.0 (0)	23.2	11.0	5,276	3,260
Weedy check		15.5 (239)	12.8 (163)	7.4 (53)	4.2 (17)	11.3 (133)	102.9	152.7	3,443	1,852
Weed-free check		1.0 (0)	1.0 (0)	1.0 (0)	1.0 (0)	1.0 (0)	0.0	0.0	595	4,471
CD (P = 0.05)		2.6	2.0	1.6	0.9	1.3	23.2	23.7	5,576	811

DAS, Days after sowing

* Actual weed counts are in parentheses, transformed $\sqrt{X+1}$

the years irrigation at 21 DAS was applied with canal water. Weed population (No./m^2) and dry weight (g/m^2) at 60 DAS were recorded with the help of 0.50 m x 0.50 m random guadrat.

Effect on weeds

In 1989, fluroxypyr was more effective against *Lathyrus aphaca* than isoproturon or 2, 4-D. Combination of fluroxypyr and isoproturon at both doses provided better control of *Lathyrus aphaca* than combination of 2, 4-D and isoproturon (Table 1). However, the population of *Chenopodium album* in fluroxypyr alone was significantly higher than in other treatments during both the years. Among the herbicides, isoproturon was most effective for the control of *Chenopodium album*. The new herbicide fluroxypyr could not prove to be an effective weed killer against *C. album*. Combination of 2, 4-D or fluroxypyr with isoproturon could not show any added advantage in controlling the *C. album*. Panwar *et al.* (1990) reported poor control of *C. album* by fluroxypyr. During second year efficacy of these herbicides was also studied against *Phalaris minor* and *Avena ludoviciana*. Application of isoproturon alone had significant effect on these weeds and effective control was observed under isoproturon at 0.750 and 1.00 kg/ha (Table 1). However, fluroxypyr or 2, 4-D alone was not effective against the grassy weeds; moreover, addition of these herbicides with isoproturon also had no beneficial effect compared with isoproturon alone.

Population of weeds alone dose not give good assessment about the efficacy of any herbicide but dry-matter accumulation by weeds is a better parameter for studying the effectiveness of herbicides used alone or in combination. The herbicides applied alone or in combination were effective in controlling weeds and significantly lower dry weight was recorded in all weed-control treatments comparison with weedy check. Since the field was infested with complex weed flora the combination of herbicides killing different types of weeds was most effective and minimum dry weight was recorded with the combination of fluroxypyr + isoproturon at 0.200 and 0.750 kg/ha.

Effect on crop

The grain yield of wheat was higher during 1989–90 than that during 1990–91 due to the fact that during the first year crop was infested with broad-leaf weeds only, whereas during the second year crop was infested by complex weed flora having grassy and broad-leaf weeds, and higher dry-matter accumulation by weeds was recorded during this year than the first year. Besides, crop was poor due to lesser germination in the second year. During 1989–90 all the weed-control treatments except fluroxypyr at 0.200 kg/ha gave grain yield of wheat at par with weed-free check. Application of fluroxypyr, isoproturon, 2, 4-D alone or in combination produced grain yield at par to each other. This indicates that under the conditions of field infested with broad-leaf weeds like *Lathyrus aphaca* and *Chenopodium album*, alone application of any of these herbicide can be used for better grain yield of wheat crop. During the second year combination of fluroxypyr + isoproturon at 0.200 + 0.750 kg/ha gave significantly higher grain yield of wheat than application of isoproturon of fluroxypyr of 2, 4-D alone. This was due to presence of complex weed flora in the field. However, combination of isoproturon with 2, 4-D had not additive effect.

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