

Efficacy of dicamba alone and in combination with isoproturon on wheat (*Triticum aestivum*) and associated weeds

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ABSTRACT

Effect of dicamba alone and in combination with isoproturon on wheat (*Triticum aestivum* L. emend. Fiori & Paol.) and associated weeds was evaluated in a field experiment conducted during winter seasons of 1999–2000 and 2000–01. *Phalaris minor*, *Melilotus* sp., *Coronopus didymus* and *Medicago denticulata* were the major weeds in the experimental field. Post-emergence application of dicamba alone at 250, 500, 1,000 g/ha and in combination with isoproturon at 150+1,000, 200+1,000 and 250+1,000 g/ha as well as with 2,4-D at 125+500 g/ha provided excellent control of broad-leaved weeds. Dicamba had no effect on *P. minor* population. All the weed-control treatments significantly increased the grain yield of wheat over weedy check. Maximum grain yield of wheat (50 q/ha) was recorded under dicamba at 200 g/ha as tank-mix application with isoproturon at 1.0 kg/ha compared with the rest of the treatments except dicamba 250 g/ha as tank-mix application with isoproturon.

Key words : Dicamba. Isoproturon. Wheat, Weed density, Dry weight

Wheat (*Triticum aestivum*) is the second most important foodgrain crop in India next to rice. However, its yield can be reduced greatly due to the infestation of uncontrolled weeds (Upadhyay *et al.*, 2003). Therefore proper management of weeds is essential to get its higher yield. Several herbicide have been found effective and among them isoproturon is being used for the last 2 decades for weed control in wheat (Walia *et al.*, 1998), though it is not found excellent against all broad-leaf weeds (Panwar *et al.*, 1995). The broad-leaf weeds can, however, be controlled effectively with the application of 2,4-D, but change in the development of deformities is a major concern associated with its application (Balyan *et al.*, 1990). Application of dicamba alone has been found excellent against broad-leaf weeds, but it had less effect on narrow-leaf weeds (Singh *et al.*, 2003). Hence the present investigation was undertaken to study the response of dicamba alone and in combination with isoproturon on wheat and its associated weeds.

MATERIALS AND METHODS

A field experiment was conducted during winter seasons of 1999–2000 and 2000–01 at Crop Research Centre, GBPUAT, Pantnagar. The soil was silty clay-loam, medium in organic carbon (0.68%), available phosphorus (18 kg/ha) and available potassium (214 kg/ha), with pH 7.1. It involved 12 treatments with three replications, laid

out in randomized block design (Table 1). The treatments consisted of dicamba alone @ 125, 250, 500 and 1,000 g a.i./ha in combination with isoproturon @ 100+1000, 150+1,000, 200+1,000 and 250+1,000 g/ha and with 2,4-D at 125+500 g/ha. These were compared with isoproturon @ 1,000 g/ha, 2,4-D @ 500 g/ha and weedy check. Herbicides were sprayed at a spray volume of 600 litres/ha at 35 days after sowing wheat. Wheat 'UP 2382' was sown on 3 December 1999 and 15 December 2000 @ 100 kg seed/ha. Other general packages of practices were adopted to raise the crop.

RESULTS AND DISCUSSION

Effect of weeds

Major weeds in experimental field in the weedy plots were *Phalaris minor* (58.9%), *Melilotus* sp. (10.4%), *Coronopus didymus* (9.0%) and *Medicago denticulata* (5.0%). Other weeds (16.8%) noticed in the field were *Chenopodium album*, *Polygonum* spp., *Anagallis arvensis*, *Fumaria parviflora*, *Avena ludoviciana* and *Vicia sativa*. Dicamba @ 250 g/ha and at higher ratio was effective against broad-leaf weeds like *Melilotus* sp., *C. didymus* and *M. denticulata*. It had no effect on *P. minor* but could control it successfully in combination with isoproturon. Dicamba + isoproturon @ 150+1,000, 200+1,000 and 250+1,000 g/ha as well as dicamba + 2,4-D @ 125+500 g/ha provided excellent control of broad-

Table 1. Effect of dicamba alone and in combination with isoproturon on density and dry weight of weeds and weed-control efficiency in wheat (mean data of 2 years)

Treatment	Weed density (No./m ²) at 60 DAS					Total weed dry weight (g/m ²) at 60 DAS	Weed-control efficiency (%)
	<i>P. minor</i>	<i>Melilotus</i> sp.	<i>C. didymus</i>	<i>M. denticulata</i>	Total		
Dicamba @ 125 g/ha	238	25	14	9	5.71 (301)	5.22 (184.7)	27.6
Dicamba @ 250 g/ha	239	0	3	4	5.52 (249)	5.09 (162.2)	36.4
Dicamba @ 500 g/ha	232	0	0	0	5.46 (234)	4.99 (146.4)	42.6
Dicamba @ 1,000 g/ha	253	0	0	0	5.54 (253)	5.06 (156.3)	38.7
Isoproturon @ 1,000 g/ha	16	21	8	18	4.39 (80)	3.68 (38.7)	84.8
Dicamba @ 100 g/ha + isoproturon @ 1,000 g/ha	19	7	5	9	3.84 (45)	3.17 (22.9)	91.0
Dicamba @ 150 g/ha + isoproturon @ 1,000 g/ha	14	0	0	4	3.00 (19)	2.86 (16.4)	93.6
Dicamba @ 200 g/ha + isoproturon @ 1,000 g/ha	13	0	0	0	2.64 (13)	2.36 (9.55)	96.2
Dicamba @ 250 g/ha + isoproturon @ 1,000 g/ha	16	0	0	1	2.89 (17)	2.56 (12.0)	95.3
2,4-D @ 500 g/ha	274	5	0	9	5.69 (296)	5.15 (171.2)	32.8
Dicamba @ 125 g/ha + 2,4-D @ 500 g/ha	246	0	0	0	5.52 (249)	5.03 (151.8)	40.5
Weedy check	271	47	41	23	6.15 (472)	5.54 (255.0)	0.0
LSD (P=0.05)					0.26	0.23	

Figures in parentheses are original values

Table 2. Effect of dicamba alone and in combination with isoproturon on growth, yield attributes and grain yield of wheat (mean data of 2 years)

Treatment	Plant height at 60 DAS (cm)	Effective tillers/m ²	Grains/ear	1,000-grain weight (g)	Grain yield (q/ha)
Dicamba @ 125 g/ha	44.1	246	48.7	41.3	28.02
Dicamba @ 250 g/ha	43.5	279	49.6	41.8	30.31
Dicamba @ 500 g/ha	41.9	240	48.1	41.1	27.20
Dicamba @ 1,000 g/ha	42.0	197	46.2	40.7	23.79
Isoproturon @ 1,000 g/ha	41.0	318	54.4	43.6	43.22
Dicamba @ 100 g/ha + isoproturon @ 1,000 g/ha	40.6	334	54.7	43.9	45.11
Dicamba @ 150 g/ha + isoproturon @ 1,000 g/ha	40.2	358	56.0	44.3	47.46
Dicamba @ 200 g/ha + isoproturon @ 1,000 g/ha	39.9	380	56.9	44.7	50.00
Dicamba @ 250 g/ha + isoproturon @ 1,000 g/ha	39.6	367	55.8	44.9	47.98
2,4-D @ 500 g/ha	42.7	283	51.0	42.1	32.56
Dicamba @ 125 g/ha + 2,4-D @ 500 g/ha	42.3	270	50.3	41.7	30.65
Weedy check	43.8	159	44.1	40.3	20.18
LSD (P=0.05)	NS	31	1	NS	2.25

leaf weeds. Dicamba + isoproturon 100+1,000 g/ha closely followed the effect of rest of its doses. All the weed control treatments provided significantly lower density and dry weight of total weeds compared with the weedy check in total weed suppression. Dicamba + isoproturon 200+1,000 g/ha treatment gave the best result, being on a par with dicamba + isoproturon 250 + 1,000 g/ha, closely followed by dicamba + isoproturon 150 + 1,000 g/ha.

Effect on crop

All the weed-control treatments significantly increased

the grain yield of wheat compared with the weedy check. Application of dicamba at various doses as tank mixture with isoproturon at 1,000 g/ha significantly increased the grain yield of wheat compared with its application alone. It could be attributed to better weed-control efficiency and significantly higher number of effective tillers/m² as well as grains/ear under these treatments. Plant height at 60 days after sowing and 1,000-grain weight were not influenced by the treatments. Dicamba at 150 g/ha or higher doses as tank mixture with isoproturon 1,000 g/ha also produced significantly higher effective tillers, grains/ear and wheat-grain yield in comparison with isoproturon

alone or dicamba 100 g/ha as tank mixture with isoproturon 1,000 g/ha. Application of 2,4-D at 500 g/ha alone or in combination with dicamba 125 g/ha produced significantly less grain yield of wheat than dicamba at various doses as tank mixture with isoproturon or isoproturon alone. The highest grain yield of wheat was recorded under dicamba 200 g/ha as tank mixture with isoproturon 1000 g/ha compared with all the treatments except dicamba 250 g/ha as tank mixture with isoproturon.

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