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Weed control in Indian mustard (*Brassica juncea*)

R. P. YADAV, U. K. SHRIVASTAVA AND S. C. DWIVEDI

Zonal Agricultural Research Station, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Morena, Madhya Pradesh 476 001

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ABSTRACT

A field experiment was conducted at Morena during winter seasons of 1995-96 and 1996-97 on mustard [*Brassica juncea* (L.)Czernj & Cosson]. Two hand-weedings at 20 and 40 days after sowing and application of metribuzin @ 0.175 kg ai/ha (P.E.) and isoproturon @ 0.75 kg ai/ha (P.P.) were observed to be at par with respect to minimizing weed density, increasing yield attributes and seed yield and fetching maximum additional net returns over rest of the treatments under study.

Key words : Indian mustard, Weed control, Yield, Net returns

Weeds cause enormous damage to the mustard crop and the magnitude of loss ranges from 30 to 50 % depending on the growth and persistence of weed population in standing crop (Gill *et al.*, 1984). Singh *et al.* (1989) studied the effect of different herbicides on control of weeds in mustard. Therefore, the present study was undertaken to find out appropriate source and level of herbicides for weed control in Indian mustard, which is an important winter oilseed crop of Chambal command area of Madhya Pradesh.

MATERIALS AND METHODS

A field experiment was conducted at Zonal Agricultural Research Station, Morena, during the winter seasons of 1995-96 and 1996-97. The soil was sandy loam in texture having low available N (141 kg/ha), medium P (12 kg/ha) and high K (245 kg/ha) with pH 7.5. Twelve treatments comprising cultural (weedy and weed free) and chemical weed control method (Table 1) were tested in randomized block design with 3 replications. Indian mustard 'Pusa Bold' was sown at 30 cm row distance on 20 October 1995 and 3 November 1996 and harvested on 2 March 1996 and 4 March 1997. An uniform fertilizer dose of 50 kg P_2O_5 and 20 kg K_2O/ha through single superphosphate and muriate of potash respectively was drilled at the time of sowing. Nitrogen @ 80 kg/ha through urea was applied in 2 equal splits, half at sowing and the remaining 30 days after sowing. The pre-planting and pre-emergence weedicides were applied 1 day before and after sowing respectively using a volume spray of 600 litres/ha.

Table 1. Weed parameters, yield, growth and yield attributes of mustard as influenced by weed control treatments (pooled over 2 years)

Treatment (Dose, kg ai/ha)	Weed population (m^2)	Weed dry matter (g)	Weed index (%)	Weed control efficiency (%)	No. of leaves/ plant at flowering stage	Plant height (cm)	Siliqua/ plant	Seed weight/ plant (g)	Additional return over control (Rs/ha)	Seed yield (q/ha)		
										A	B	Mean
Weedy check	302.1	198	58.8		38.8	158.5	128.5	6.8		8.4	8.7	8.5
Metolachlor (PE)-1.0	91.9	50	44.1	74.5	41.0	164.5	141.8	7.8	2,706	11.5	11.1	11.3
Oxyfluorfen (PP)-0.15	73.6	38	30.8	80.6	42.8	166.0	149.3	8.2	6,087	14.6	13.5	14.0
Pendimethalin (PE)-1.00	64.5	29	28.4	84.7	44.8	169.0	154.0	8.5	6,607	15.0	14.1	14.5
Isoproturon (PP)-0.75	18.3	12	6.8	93.7	45.0	175.8	163.1	9.7	12,565	19.2	18.8	19.0
Fluchloralin (PP)-1.00	27.5	22	21.0	88.3	47.2	169.5	156.5	8.3	8,476	16.6	15.6	16.1
Metribuzin (PE)-0.140	28.3	22	17.1	88.6	48.7	168.8	157.7	8.3	9,970	16.2	17.4	16.8
Metribuzin (PE)-0.175	16.0	22	5.8	94.6	51.7	179.5	167.5	10.2	12,696	19.3	18.9	19.1
Metribuzin (PE)-0.219	14.3	9	18.6	95.7	46.0	168.5	160.0	9.0	9,356	15.1	18.1	16.6
Isoproturon (PE)-0.75	27.5	8	13.7	88.4	46.5	173.8	134.0	8.8	10,357	17.6	17.6	17.6
Hand weeding at 25 DAS	44.9	13	21.0	93.4	46.3	173.6	156.2	8.8	9,463	16.5	15.6	16.1
Hand weeding at 20 + 40 DAS	6.5	3		98.9	53.5	182.1	170.2	11.2	13,585	20.9	19.7	20.3
CD (P = 0.05)	10.0	7			1.8	8.8	14.7	1.1		2.6	0.5	2.1

DAS = Days after sowing, PP = preplant application, PE = preemergence application, A = 1995-96, B = 1996-97

RESULTS AND DISCUSSION

Important weed species recorded in the experimental field in the descending order were *Asphodelus tenuifolius, Convolvulus arvensis, Anagalis arvensis, Chenopodium album* and *Euphorbia hirta.*

Effect on weed

All the treatments significantly reduced weed population compared with control (Table 1). The lowest weed-population was registered under the treatments, where 2 hand weedings received at 20 and 40 days after sowing, and it gave the highest weed control efficiency (98.9%). Pre-emergence application of metribuzin @ 0.219 and 0.175 kg ai/ha caused on an average 95.2% and 94.7% reduction in weed population respectively. This was at par with that of 2 hand weedings and pre-plant application of isoproturon @ 0.75 kg ai/ha. Application of metolachlor and pendimethalin as pre-emergence and oxyfluorfen as pre-plant did not show much promising results in reduction of weed density. Singh *et al.* (1989) also observed significant effect of pendimethalin in reduction of weed population as compared to hand weedings. Average (2 years) dry matter accumulation by weeds was minimum under 2 hand weedings (3 g/m^2) and was statistically at par with pre-emergence application of metribuzin @ 0.219 kg ai/ha during both the years (Table 1). The highest weed dry matter (198 g/m^2) was recorded under weedy check.

Effect on yield and yield attributes

The uncontrolled weeds affected the crop adversely. The crop produced less plant height, number of leaves and siliqua/plant. The seed weight/plant was also significantly less than in weed control or weed free treatments (Table 1). These ill-effects may be probably due to the competitive stress for available resources to be shared by the crop and weeds. Maximum values of yield attributing characters were recorded in 2 hand weedings, closely followed by metribuzin @ 0.175 and isoproturon @ 0.75 kg ai/ha as pre-plant and pre-emergence application respectively.

The seed yield of mustard was significantly increased owing to the effect of weed control treatments (Table 1). Two hand weedings and application of metribuzin @ 0.175 kg/ha (PE) and isoproturon @ 0.75 kg/ha (PP) were statistically at par with each other with respect to seed yield of mustard during both the years and significantly superior to rest of the treatments. Mahadevaswamy *et al.* (1994) reported higher yield of sugarcane with pre-emergence application of metribuzin, whereas the results of isoproturon in this study were in confirmity with Yadav *et al.* (1997). Effective control of weeds under these treatment minimized the losses caused by weed growth thereby leading to improvement in yield attributes and enhancement in crop yield. The higher dose of metribuzin (0.219 kg ai/ha), although effective in control of weeds but did not improve yield attributes and yield as compared to the dose of 0.175 kg ai/ha due to phytotoxic effect on the crop. Average over 2 years, uncontrolled weed reduced mustard yield by 57%.

Return

Additional returns over the control were maximum (Rs 13,585/ha) under 2 hand

weedings followed by pre-emergence application of metribuzin @ 0.175 kg ai/ha (Rs 12,696/ha) and pre-plant application of isoproturon @ 0.75 kg ai/ha (Rs 12,565/ha). It can thus be inferred that when labour is scare, metribuzin @ 0.175 kg ai/ha or isoproturon @ 0.75 kg ai/ha as pre-emergence or pre-plant respectively may be used for effective control of weeds in mustard.

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