Studies on Cultural and Chemical Weed Control in Mustard

(Brassica campestris)

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ABSTRACT

The experiment was conducted during 1985-86 and 1986-87 at JNKVV, Zonal Agricultural Reserach Station, Morena (MP) to study the effect of cultural and chemical methods of weed control in raya. Results shows that two hand weedings 30 and 45 DAS and isoproturon 1 kg ha recorded significantly higher seed yield, less weed population and dry wed biomass as compared to other cultural and chemical herbicides and weedy check. The technical feasibility and economic viability of isoproturon 1 kg/ha proved its superiority.

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INTRODUCTION

In norhern India mustard is grown under irrigated conditions which also favours luxuriant growth of monocot and dicot weeds. Mustard unlike other crops seems to have poor competitive ability against weeds resulting in yield losses upto 25-80%. Weed control in mustard at the initial stage of crop growth is most important since crop weed competition is maximum at this stage. The use of weed management methods (cultural and chemical) should be technically effective and economically viable. Although various weed control measures have been suggested in the past (Bains *et al.*, 1971; Singh *et al.*, 1986). Their economics based on the marginal cost concept has not been reported so far, particularly in mustard. Therefore, the present investigation was carried out to study cultural and chemical methods of weed control in mustard.

MATERIALS AND METHODS

Field experiment was conducted during rabi season of 1985-86 and 1986-87 at JNKVV-Zonal Agricultural Reserach Station, Morena (MP). The soil was sandy loam with pH 7.8 EC 0.12 ds/m, organic carbon 0.69% and initial available N, P, K 185, 16 and 288 kg/ha, respectively. There were twelve treatments i.e. four cultural methods(weedy check, one hand weeding by khurpi at 30 DAS, one weeding by hand-hoe at 30 DAS, and two hand weeding by khurpi at 30 and 45 DAS) and six herbicides (methobenzthiazuron 1 kg a.i./ha, pendimithalin 0.75 kg and 1 kg a.i./ha, isoproturon 0.75 kg and 1 kg a.i./ha; metazuron and 2, 4-D, 1 kg a.i./ha each) 2, 4-D was applied in 1985-86 and metazuron was applied preemergence. The experiment was laid out in a randomized block design with four replications. Mustard variety pusa bold was sown in rows 30 cm apart using 6 kg seed/ha. Half of the N (40 kg/ha) alongwith 30 kg P_2O_5 and 20 kg K_2O were applied at sowing and remaining N (40 kg/ha) was top dressed at the time of irrigation applied at flower initiation stage. The crop was sown on 20 and 24 October and harvested on 27 and 28 February in the respective seasons. For economic analysis marginal cost concept and rate of return was used.

RESULTS AND DISCUSSION

(i) Weed studies

Important weed species recorded in experimental plot in the descending order of intensity were *Boerahavia diffusa, Cyperus rotundus, Chenopodium album, Trianthema, monogyna, Aphodelus tenuifolius, Melilotus indica* and *Convolvlus arvensis* of all the weed species, *Boerahavia diffusa* constituted more than 70% in 1986-87 due to which higher biomass of weeds was recorded even with lower density.

Weed population appreciably decreased with increase in frequency of cultural practices (two hand weedings) as compared to chemical methods during both the seasons. Two hand weedings at 30 and 45 DAS recorded significantly less weed population as compared to other cultural and herbicidal treatments (Table 1). Isoproturon one kg/ha gave excellent control of both grassy as well as broad leaf weeds. It was more effective against broad leaf weeds and *Asphodelus tenuifolius*. Pendimithalin only partial controlled the grassy as well as broad leaf weeds and failed to control *Asphodelus tenuifolius*. Metazuron and 2, 4-D were inferior to other cultural and chemical methods of weed control but superior to weedy check.

With corresponding increase in frequency of cultural practices, dry weed biomass decreased considerably (Table 1). Two hand weedings at 30 and 45 DAS produced significantly less dry weight of weeds as compared to other cultural and chemical treatments. All the herbicides were more or less equally effective on weeds. They were, however, inferior to cultural practices but superior to the weedy check. The unweeded check produced the highest dry weed biomass of 41.0 and 223. 3 g/m^2 in 85-86 and 1986-87, respectively.

(ii) Yield attributes and yield

Significantly higher pooled values of yield attributes viz., number of pods and their weight/plant (Table 2) were recorded under two hand weeding at 30 and 45 DAS and isoproturon 1 kg/ha. The favourable effect on these characters may be due to less weed competition for moisture and nutrients. There was a substantial increase in seed yield of mustard with increase in frequency of cultural practices (Table 2). The highest seed yield of 1993 kg/ha was recorded with two hand weedings at 30 and 45 DAS. Cumulative effect of cultural practices facilitated better growth and pod development, greater crop canopy with less weed competition and consequently higher seed yield. Isoproturon proved its superiority among all the herbicides. The lowest seed yield of 1510 kg/ha was recorded with unweeded check.

(iii) Economic studies

Influence of weed management on yield and economics of mustard indicated that among the treatments, two hand weedings gave maximum yield and additional return over control closely followed by isoproturon 1 kg/ha (Table 2). The weed control efficiency of two hand weedings and isoproturon 1 kg/ha were 76.9 and 61.3 per cent, respectively.

After considering the marginal cost and percentage range of return with the technical feasibility and economical viability of treatments, isoproturon 1 kg/ha was the best competetive as compared to two hand weedings due to low marginal cost on higher percentage rate of return per kg of grain production. Similar results, were also reported by Dhondyal (1990).

Though some chemical herbicides show lowest marginal cost but weed control efficiency and percentage rate of return were not found economically competetive (Table 2). Therefore, isoproturon 1 kg/ha can be recommended as preemergence herbicides for the mustard for controling the weeds most economically.

TABLE 1

Effect of different herbicides treatments on biomass/plant, pods/plant, density of weeds, biomass of weeds during the years 1985-86 and 1986-87.

Treatments	Biomass (g)/plant		No. of pods/plant		Density of weeds (No./m^2)		Biomass of weeds (g/m^2)	
	1985-86	1986-87	1985-86	1986-87	1985-86	1986-87	1985-86	1986-87
No weeding	43.3	42.6 (42.9)	148	193 (170.5)	52.0	42.8 (47.4)	41.0	223.3 (132.2)
One hand weeding (hoe)	52.6	47.8 (50.2)	194	202 (198.0)	41.0	31.3 (36.2)	11.5	126.7 (69.1)
One hand weeding (Khurpi)	53.4	48.6 (51.0)	217	203 (210.0)	24.2	21.3 (22.8)	8.8	73.3 (41.0)
Two hand weedings (30 to 45 DAS)	59.9	57.5 (58.7)	257	203 (230.0)	14.7	11.5 (13.1)	6.7	66.7 (36.7)
Methabenzthiazuron 1 kg a.i. / ha	49.7	43.3 (46.5)	178	189 (183.5)	37.0	32.5 (34.8)	14.7	190.0 (102.3)
Pendimithalin 0.75 kg a. i. /ha	48.9	46.8 (47.8)	167	178 (172.5)	39.2	32.8 (36.0)	20.9	166.7 (93.8)
Pendimithalin 1 kg a.i./ha	51.9	52.3 (52.1)	171	185 (178.0)	34.0	24.0 (29.0)	15.9	153.3 (84.6)
Isoproturon 0.75 kg a.i./ha	52.6	52.0 (52.3)	197	185 (191.0)	28.0	28.0 (28.0)	15.2	133.3 (74.2)
Isoproturon 1 kg a.i./ha	59.6	53.5 (56.6)	226	198 (212.0)	20.2	15.5 (17.8)	13.4	100.0 (56.7)
Metaxuron 1 kg a.i./ha	--	46.2	--	192.0	--	39.8	--	133.3
2.4-D Na salt 1 kg a.i./ha	52.9	--	195	--	44.5	--	24.0	--
CD at 5%	0.61	6.55 (3.53)	17.05	15.09 (12.68)	1.16	1.24 (0.84)	4.94	5.14 (30.37)

Figure in parentheis shows pooled value of two years.

TABLE 2

Effect of different herbicides on yield, economics and weed control efficiency in mustard during both the years 1985-86 and 1986-87.

Treatments	Seed yield (kg/ha)		Weed control efficiency		Pooled over two yeras		Rate of return (%)
	85-86	86-87	85-86	86-87	Additional yield/return over control	Matrginal cost (Rs/kg)	
No weeding	1704	1316 (1510)	---	---	---	----	----
One hand weeding (hoe)	2225	1487 (1856)	71.95	43.26 (57.6)	346 (2595)	1.87	75
One hand weeding (khurpi)	2197	1553 (1875)	28.5	67.17 (72.8)	365 (2738)	0.95	86
Two hand weeding (30 and 45 DAS)	2320	1667 (1993)	83.65	70.12 (76.9)	483.5 (3626)	1.86	98
Methabenzthiozuron 1 kg a.i./ha	1960	1420 (1690)	64.14	14.91 (39.5)	180.5 (1350)	1.35	44
Pendimithalin 0.75 lit. a.i./ha	1960	1430 (1695)	49.02	25.35 (37.2)	185.0 (1338)	0.93	65
Pendimithalin 1 lit. a.i./ha	2007	1534 (1770)	61.22	31.34 (46.3)	260.5 (1950)	0.81	46
Isoproturon 0.75 kg a.i./ha	2083	1458 (1770)	62.93	40.30 (51.6)	260.0 (1950)	1.27	99
Isproturon 1 kg a.i./ha	2272	1600 (1936)	67.32	35.35 (61.37)	426.0 (3195)	0.99	62
Metoxuron 1 kg a.i./ha	---	1581	----	40.30	---	---	---
2,4-D Na salt 1 kg a.i./ha	2083	----	41.46	----	---	---	---
C D at 5%	363.37	188.44 (191.20)	---	----	---	---	---

Figures in parenthesis shows pooled yield, average weed control efficiency and additional returns.

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