

Effect of weed control and fertilizer placement on weeds, yield components and seed yield of Indian mustard (*Brassica juncea*)

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ABSTRACT

A field experiment was conducted during winter (*rabi*) season of 1988–89 and 1989–90 at Jorhat, to find out effective method of weed control and fertilizer application to minimize weed interference for higher yield of Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson]. Wheel-hoeing twice at 20 and 40 days after seeding registered 50.3% weed-control efficiency and resulted in the highest seed yield (9.07 q/ha) by improving the yield components. This was on a par with 2 hand-weedings. Furrow placement of fertilizer significantly reduced the weed-biomass production by 17.1%, which resulted in a significant increase of 15.2% in crop yield over broadcasting method of fertilizer application.

Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson] is an important oilseed crop. Gill *et al.* (1984) reported 30% reduction in its seed yield due to weed competition. Weed competition for nutrients, moisture, solar energy and space is more serious in early stages, because this crop grows slowly during the first 4–8 weeks (AICRP-WC, 1987). However, the weeds grow at a faster rate and offer severe competition to crop plants for applied nutrients and thereby deprive the crop of adequate nutrients, resulting in lower fertilizer-use efficiency (Rana and Angiras, 1990). In these circumstances, effective weed management together by competent fertilizer application method can help realize the yield potential of Indian mustard. Therefore, it became imperative to undertake the present investigation.

MATERIALS AND METHODS

A field experiment was conducted during

winter (*rabi*) seasons of 1988–89 and 1989–90 at Assam Agricultural University, Jorhat, on sandy-loam soil having pH 6.0. The treatments tried in split-plot design with 4 replications, consisted of 2 fertilizer application methods as main plots and 8 weed-control measures as subplots. Details of the treatments are given in Table 1. 'Pusa Bold' variety of Indian mustard was sown @ 10 kg/ha during the first week of November maintaining 30 cm row-to-row spacing. The crop received the recommended dose of 40 kg N, 35 kg P₂O₅, 15 kg K₂O/ha and 7 kg borax/ha at sowing. On an average, the crop duration was 101 days. Observations on weeds and crop were made at harvest. Weed-count data were subjected to square-root transformation before statistical analysis.

RESULTS AND DISCUSSION

Weed flora

The major weed species of the experi-

mental field were: *Chenopodium album* L., *Polygonum hydropiper* L., *Amaranthus viridis* L., *Phyllanthus niruri* L., *Borreria hispida* (L.) K. Schum., and *Ageratum conyzoides* L. among broad-leaved weeds; *Cyperus iria* L., *Setaria glauca* (L.) Beauv. and *Eleusine indica* (L.) Gaertn. among narrow-leaved weeds.

Effect of weed-control

Weed population and their dry-matter accumulation were significantly reduced by different weed-control treatments in comparison to weedy check (Table 1). The minimum weed population and dry weight were recorded in plots hand-weeded twice. Similar results were reported by Rana and Angiras (1990). Except 1 hand-hoeing, all the other weed-control treatments were at

par with 2 hand-weedings in 1988–89, while only wheel-hoeing twice was at par with 2 hand-weedings in 1989–90 for weed population. Pooled analysis showed that 2 wheel hoeings or hand-hoeings or grubblings were as effective as 2 hand-weedings done at 20 and 40 days after seeding in reducing weed-biomass production. Obviously hand-weeding twice recorded the highest weed-control efficiency (51.7%), which was followed by 2 wheel-hoeings (50.3%) and 2 hand-hoeings (48.7%). However, hand-hoeing, wheel-hoeing and grubbing once at 25 days failed to attain the level of weed-control efficacy of 2 hand-weedings (Table 1). Tomar and Namdeo (1991) observed that weeding once at 30 days in Indian mustard was insufficient to control the weeds as effectively as 2 weedings.

Table 1. Weed count, weed dry matter and weed-control efficiency as influenced by different treatments in Indian mustard

Treatment	Weed count/m ²		Weed dry matter (g/m ²)			Weed-control efficiency (%)
	1988–89	1989–90	1988–89	1989–90	Pooled	
<i>Weed control</i>						
Weedy	6.2 (39.1)	9.2 (84.5)	32.5	66.0	49.3	
Hand-weeding (20, 40 DAS)	5.4 (32.3)	5.2 (27.3)	26.4	21.2	23.8	51.7
Hand-hoeing (25 DAS)	5.9 (35.4)	6.1 (37.6)	28.5	35.3	31.9	35.3
Hand-hoeing (20, 40 DAS)	5.5 (30.1)	6.2 (38.9)	23.3	27.3	25.3	48.7
Wheel-hoeing (25 DAS)	5.7 (33.0)	6.4 (40.9)	27.6	36.2	31.9	35.3
Wheel-hoeing (20, 40 DAS)	5.6 (31.4)	6.0 (36.0)	23.9	25.0	24.5	50.3
Grubbing (25 DAS) ^W	5.5 (30.1)	6.1 (36.8)	22.4	45.1	33.8	31.4
Grubbing (20, 40 DAS) ^W	5.4 (30.0)	6.2 (38.5)	17.3	39.0	28.2	42.8
CD (P = 0.05)	0.3	0.8	7.7	9.1	8.0	
<i>Fertilizer application method</i>						
Broadcasting	5.8 (33.1)	6.4 (42.5)	26.6	41.3	34.0	
Furrow placement	5.7 (32.4)	6.5 (42.6)	23.9	32.5	28.2	17.1
CD (P = 0.05)	NS	NS	NS	3.6	4.7	

DAS, Days after seeding; ^Wgrubbing was done with grubber, a 3 tine-hoe designed by Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh 462 003

Figures in parentheses are original values

Table 2. Yield components and seed yield of Indian mustard as affected by different treatments

Treatment	Siliquaes/ plant		Siliqua length (cm)		Seeds/ siliqua		1,000-seed weight (g)		Seed yield (q/ha)	
	A	B	A	B	A	B	A	B	A	B
<i>Weed control</i>										
Weedy	112.0	100.9	4.0	4.1	14.0	13.9	4.72	4.83	5.84	6.05
Hand-weeding (20, 40 DAS)	134.00	115.8	6.0	6.1	21.8	16.5	5.07	5.83	8.59	9.35
Hand-hoeing (25 DAS)	117.8	107.9	4.9	4.9	17.0	14.7	4.86	5.15	8.26	7.43
Hand-hoeing (20, 40 DAS)	125.5	111.9	5.6	5.2	20.2	14.2	5.18	5.94	8.39	7.40
Wheel-hoeing (25 DAS)	122.6	110.6	4.8	5.0	18.3	15.6	5.08	4.25	7.44	8.33
Wheel-hoeing (20, 40 DAS)	132.0	114.7	6.1	6.2	22.5	17.3	5.31	5.65	8.81	9.32
Grubbing (25 DAS)	118.0	107.9	4.3	4.4	15.7	12.4	4.95	4.92	6.39	6.81
Grubbing (20, 40 DAS)	122.6	109.6	5.0	4.9	16.9	12.6	5.01	4.99	7.61	7.41
CD (P = 0.05)	9.8	NS	0.6	0.4	2.1	3.4	NS	NS	0.61	0.92
<i>Fertilizer application method</i>										
Broadcasting	121.0	107.8	4.9	5.0	17.9	14.8	4.96	5.25	6.96	7.37
Furrow placement	125.0	112.0	5.4	5.2	18.9	14.5	5.08	5.44	8.37	8.15
CD (P = 0.05)	3.1	NS	0.2	NS	0.5	NS	NS	NS	0.32	NS

DAS, Days after seeding; A, 1988-89; B, 1989-90

Wheel-hoeing twice being at par with 2 hand-weedings recorded significantly higher seed yield than all the other weed-control treatments (Table 2). This was due to more siliquae/plant, seeds/siliquea and siliquea length as a result of more conducive environment for crop growth ensured by efficient weed removal by these 2 treatments. Singh *et al.* (1989) reported improved efficacy of wheel-hoeing in combination with hand-weeding in increasing yield of Indian mustard. The remaining weed-control practices excluding grubbing once showed equal advantage for increased crop yield over weedy check. The lower siliquae/plant, siliquea length, seeds/siliquea and seed yield in plots weeded once at 25 days with wheel-hoe or hand-hoe or grubber might be attributed to poor weed-control.

Effect of fertilizer application method

In the first year of study, furrow placement accrued in significantly higher number of siliquae/plant, seeds/siliquea and siliquea length than broadcasting method of fertilizer application (Table 2). Pooled analysis showed a significant increase (15.2%) in crop yield due to fertilizer placement which significantly reduced the weed-dry matter production (Table 1). Less

availability of added nutrients to weeds than crop plants in furrow placement of fertilizers as compared to broadcasting might have resulted in poor weed growth and consequently higher yield and yield attributes. These findings corroborate the results of Singh (1992).

REFERENCES

- AICRPWC, Pusa. 1987. Weed management under varying management systems in mustard. (In) *Annual Report, 1986-87, All-India Co-ordinated Research Project on Weed Control*, Rajendra Agricultural University, Pusa, Bihar, pp. 59-61.
- Gill, H. S., Sandhu, K. S., Mehra, S. P. and Singh, T. 1984. Efficacy of some herbicides for control of weeds in Indian Mustard. *Indian Journal of Weed Science* 16 (7) : 171-175.
- Rana, M. C. and Angiras, N. N. 1990. Effect of weed-control methods and phosphorus levels on phosphorus uptake, phosphorus use efficiency and quality of Gobhi sarson (*Brassica napus* var. *oleracea*). *Indian Journal of Weed Science* 22 (1, 2) : 71-77.
- Singh, S. J., Sinha, K. K. and Mishra, S. S. 1989. Effect of herbicides on Indian mustard (*Brassica juncea* Coss.) in calcareous soil. *Indian Journal of Agronomy* 34 (4) : 494-495.
- Singh, S. S. 1992. Effect of fertilizer application and weed control on the yield of mustard (*Brassica juncea*). *Indian Journal of Agronomy* 37 (1) : 196-198.
- Tomar, S. S. and Namdeo, K. N. 1991. Studies on chemical weed control in mustard. *Indian Journal of Agronomy* 36 (1) : 118-121.