Indian Journal of Agronomy 47 (2) : 284–288 (June 2002)

Integrated weed management in fenugreek (*Trigonella foenum-graecum*)

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Received: September 2001

ABSTRACT

To evaluate to the performance of different herbicides and integrated weed control treatments in fenugreek (*Trigonella foenum-graecum* L.) field trial was conducted during the winter season of 1997–98 and 1999–2000. Hand-weeding, followed by pendimethalin 0.75 kg/ha gave maximum seed yield and it was statistically at par with 2 hand-weddings, pendimethalin 0.75 kg/ha + hand-weeding and fluchloralin 1.25 kg/ha, but was significantly better than all alone herbicides and the control. Weed population was maximum in the control and it decreased in all weed-control treatments. The number of seeds/pod and 1,000-seed weight improved in integrated weed-control treatments, hand-weeding and fluchloralin 1.25 kg/ha compared with the control.

Key words : Fenugreek, Weed management, Pendimethalin, Fluchloralin, Trifluralin, Hand-weeding

Fenugreek (*Trigonella foenum-graecum* L.) is a bitter spice but in appropriate quantify adds to taste. Fenugreek seed adds nutritive value to food as well as flavouring. It is an important constituent of curry powder and is used in pickles and food preparations. Due to its slow growing habits particularly during initial stages, it is highly infested with weeds which drastically reduce the seed yield. Mali *et al.* (1987) reported that weeds were found hurdle in fenugreek production. Mechanical removal of weeds is laborious, time-consuming and costly. Since meagre information is available on the comparative efficiency of different herbicides for weed control under Punjab conditions, the present investigation was initiated to find out the suitable herbicide for managing the weeds before critical period of crop-weed competition.

MATERIALS AND METHODS

The study was carried out at the Research Farm, Department of Agronomy, Punjab Agricultural University, Ludhiana, during the winter season of 1997–98 and 1999–2000. The soil was sandy loam, normal in pH and EC, low in organic carbon and available nitrogen (9.2 kg/ha), medium in available phosphorus (34.0 kg/ha) and potassium (154.0 kg/ha). The experiment comprising 12 treatments was

laid out in randomized block design with 4 replications. The treatments consisted of pre-emergence application of pendimethalin (0.60, 075 and 0.90 kg/ha), fluchloralin (0.75 and 1.25 kg/ha), trifluralin (0.50, 0.75 and 1.0 kg/ha), 2 integrated weed-control treatments (pendimethalin @ 0.75 kg/ha 30–35 days after sowing followed by hand-weeding, and hand-weeding followed by pendimethalin @ 0.75 kg/ha at 30–35 days after sowing), 2 hand weedings and weedy check. In hand-weeding (HW), 2 hoeings were given at 30–35 days and 50–55 days after sowing. Fenugreek was sown in the first week of November in lines 22.5 cm apart using 30 kg/ha seed of 'M 150'. Nitrogen @ 20 kg N/ha was applied 30–35 days after sowing. A uniform dose of 25 kg/ha each of P_2O_5 and K_2O was applied at sowing. The crop was harvested in the first week of May.

RESULTS AND DISCUSSION

Effect on crop

The effect of different weed-control treatments on seed yield of fenugreek was significant (Table 1). The maximum seed yield was obtained in integrated weed-control treatments and the differences in seed yield due to integrated weed-control treatments and hand-weedings were not significant, but all these treatments were significantly better than control. On the basis of pooled analysis, hand-weeding, followed by pendimethalin 0.75 kg/ha resulted in the maximum seed yield and it was statistically at par with 2 hand-weedings, pendimethalin 0.75 kg/ha, followed by hand-weeding and fluchloralin 1.25 kg/ha, but was significantly better than all herbicides alone and the control treatment. An increase of 73, 68, 62 and 48 % in seed yield was recorded with hand-

Table 1. Effect of different weed-control treatments on seed yield of fenugreek

Treatment	Time of application	Dose (kg/ha)	Seed yield (kg/ha)			Increase over control (%)
			1997–98	1999–2000	Pooled	
Pendimethalin	Pre-em.	0.60	813.6	558.8	686.2	1.3
Pendimethalin	Pre-em.	0.75	754.8	710.7	732.7	8.2
Pendimethalin	Pre-em.	0.90	732.5	626.6	679.5	-
Fluchloralin	Pre-em.	0.75	908.1	957.0	932.5	37.7
Fluchloralin	Pre-em.	1.25	961.7	1,048.0	1,004.9	48.4
Trifluralin	Pre-em.	0.50	931.2	963.0	947.1	39.9
Trifluralin	Pre-em.	0.75	818.0	997.7	907.9	34.1
Trifluralin	Pre-em.	1.00	889.7	1,005.7	947.7	39.9
Pendemethalin+hand-weeding	Post-em	0.75	1,004.4	1,189.0	1,096.7	61.9
HW + pendimethalin	Post-em	0.75	888.5	1,456.5	1,072.5	73.2
Hand-weeding			939.7	1,337.2	1,138.5	68.1
Control/unweeded			681.0	673.0	677.0	
CD (P=0.05)			131.0	337.0	222.5	

Table 2. Effect of weed-control treatments on yield attributes of fenugreek

Treatment	Time of application	Dose (kg/ha)	Plant height (cm)			Pod-bearing shoots/0.5 m²			Seeds/pod		1,000-seed weight (g)	
			1997–98	1999–2000	Mean	1997–98	1999–2000	Mean	1997–98	1999–2000	1997–98	1999–2000
Pendimethalin	Pre-em.	0.60	79.7	85.4	82.6	45.0	36.8	40.9	11.9	16.5	8.33	10.42
Pendimethalin	Pre-em.	0.75	72.0	84.6	78.3	39.7	40.1	39.9	13.7	14.0	9.20	11.74
Pendimethalin	Pre-em.	0.90	75.7	83.4	79.6	41.8	39.9	40.8	11.7	15.1	10.42	10.63
Fluchloralin	Pre-em.	0.75	80.7	76.3	78.5	44.5	45.8	45.1	11.8	16.3	9.37	11.57
Fluchloralin	Pre-em.	1.25	74.5	79.7	77.1	40.5	43.5	42.0	12.4	16.7	10.89	11.80
Trifluralin	Pre-em.	0.50	78.3	85.8	82.0	43.1	45.4	44.2	11.5	15.0	8.84	13.87
Trifluralin	Pre-em.	0.75	78.0	87.1	82.6	42.1	39.9	41.0	13.3	16.0	8.89	13.70
Trifluralin	Pre-em.	1.00	80.3	89.6	85.0	44.0	44.4	44.2	11.1	17.2	10.97	12.22
Pendemethalin+ hand weeding	Post-em	0.75	72.5	84.6	78.5	41.7	50.5	46.1	12.1	16.4	9.93	12.97
HW + pendimethalin	Post-em	0.75	76.4	84.8	80.6	40.0	48.2	44.1	11.9	17.0	10.10	12.65
Hand-weeding (HW)			82.5	81.5	82.0	42.2	47.8	45.0	12.6	15.7	9.15	12.46
Control/unweeded			81.9	89.0	84.4	35.8	35.7	35.7	10.5	15.3	8.86	11.57
CD (P=0.05)			10.2	8.7	6.4	3.0	NS		1.4	NS	NS	2.13

weeding, pendimethalin 0.75 kg/ha + hand weeding, hand weeding + pendimethalin 0.75 kg/ha, and fluchloralin 1.25 kg/ha over control respectively. The higher seed yield of fenugreek under these treatments might be due to timely and effective control of weeds, as evident from the decreased weed population (Table 3) which had favourable effect on yield- attributing characters, viz. plant height, number of pod-bearing shoots, seeds/pod and 1,000-seed weight (Table 2). Maliwal (1987) reported that fluchloralin and pendimethalin could be used successfully to control weed in fenugreek.

The pod-bearing shoots were minimum in the control plots and it improved significantly in all weed-control treatments during 1997-98. Similar trend was observed during 1999-2000, though the differences were not significant. Pod and 1,000-seed weight improved in integrated weed-control treatments, fluchloralin 1.25 kg/ha and hand-weeding compared with the control, though the differences were significant in seeds/pod during 1997-98 only (Table 2).

Effect on weeds

The weed species infesting the experimental field comprised *Trigonella polycerata, Medicago denticulata, Lepidium sativa* and *Phalaris minor* constituting 61, 15, 8 and 3 %, respectively, of total weed population during 1997–98. However, during 1999–2000, the predominant weed species were *Phalaris minor, Rumex deptatus, Lepidium sativa* and *Trigonella polycerata* representing 38, 21, 20 and 16%, respectively, of total weed population.

On the basis of pooled analysis the maximum weed population was recorded in weedy check plots and weed population

Table 3. Effect of different weed-control treatments on weed population and dry weight of weeds

Treatment	Time of application	Dose (kg/ha)	Weed population/m²			Weed-control efficiency	Weed dry weight (kg/ha)	
			1997–98	1999–2000	Mean		1997–98	1999–2000
Pendimethalin	Pre-em.	0.60	74.1	52.8	63.4	11.6	2,267	3,700
Pendimethalin	Pre-em.	0.75	77.8	58.3	68.0	5.2	2,185	4,544
Pendimethalin	Pre-em.	0.90	59.2	55.6	57.4	20.1	1,285	3,850
Fluchloralin	Pre-em.	0.75	70.3	52.8	61.5	13.6	2,593	4,592
Fluchloralin	Pre-em.	1.25	83.3	55.6	69.4	3.2	1,889	4,131
Trifluralin	Pre-em.	0.50	74.1	55.6	64.8	8.9	2,237	4,881
Trifluralin	Pre-em.	0.75	86.1	55.6	70.8	1.4	2,192	5,917
Trifluralin	Pre-em.	1.00	77.8	63.9	70.8	1.4	2,200	5,191
Pendemethalin+ hand weeding	Post-em	0.75	61.3	46.7	54.0	24.7	2,207	6,228
HW + pendimethalin	Post-em.	0.75	66.7	38.9	52.8	26.5	2,607	4,125
Hand-weeding	-	-	40.8	471.7	41.2	42.6	2,326	5,458
Control/unweeded	-	-	85.2	58.3	71.8		2,607	5,458
CD (P=0.05)			NS	NS	17.3		872	NS

decreased in all weed-control treatments compared with the control (Table 3). Weed population decreased significantly in integrated weed-control treatments and hand-weeding compared with the control. The application of herbicide alone did not affect the population of weeds. The pre-emergence application of applied herbicides alone might have failed to reduce the weed population because of degradation of applied herbicides at that time when observations were recorded (at harvest). The weed-control efficiency was maximum (42%) under hand-weeding and it was followed by integrated weed-control treatments (24 26%)

The differences in weed biomass at harvest due to different treatments were significant during 1997-98 (Table 3). The dry matter of weeds in integrated weed-control treatments, fluchloralin 1.25 kg/ha and hand-weeding was statistically same. The overall higher dry-matter accumulation might be due to the reason that *Phalaris minor* was most predominant weed during 1999-2000.

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