

Weed management in fenugreek (*Trigonella foenum-graecum*)

G. R. CHAUDHARY

All-India Co-ordinated Research Project on Spices, S.K.N. College of Agriculture,
Jobner, Rajasthan 303 329

Received: June 1998

ABSTRACT

An experiment was conducted during winter seasons of 1991–94 at Jobner, to study the effect of weed management on fenugreek (*Trigonella foenum-graecum* L.). The weed free treatment recorded the lowest weed dry weight and the highest weed control efficiency at all the stages of observation. Among rest of the treatments, the lowest weed dry weight and the highest weed control efficiency was obtained at 25 DAS with pre-plant incorporation of fluchloralin (1.25 kg/ha) at 50 DAS with pre-emergence application of pendimethalin (1.5 kg/ha) and at 75 DAS and at harvest with pre-emergence application of pendimethalin (1.0 kg/ha) supplemented with hand weeding once (50 DAS). All the weed control measures significantly increased mean number of branches and pods/plant (except metolachlor @ 1.0 kg/ha) and seed yield (except metolachlor @ 0.5 and 1.0 kg/ha) was obtained under weed free condition, whereas maximum mean seed yield of 16.15 q/ha and net return of Rs 14,304/ha with benefit : cost ratio of 3.79 were obtained with fluchloralin @ 0.75 kg/ha supplemented with hand weeding once, closely followed by hand weeding twice, weed free and oxyfluorfen @ 0.15 kg/ha supplemented with hand weeding once.

Key words : Fenugreek, Herbicides, Hand-weeding, Weed control, Seed yield

Fenugreek (*Trigonella foenum-graecum* L.) is one of the important spice crops. Rajasthan is the major producer of fenugreek with 80% of area and production. Weeds compete with fenugreek and reduce the seed yield up to 91% (Mail and Suwalka, 1987). Weeds offer maximum competition to fenugreek for essentials of growth at its early stage of 25 days

(Maliwal and Gupta, 1989). Though manual weeding is adopted for weed control in fenugreek it is generally not accomplished at critical period of crop-weed competition due to non-availability of labour. Keeping this in view the present study was undertaken to evolve an effective and economically viable method of weed control in fenugreek.

MATERIALS AND METHODS

The field experiment was conducted during winter seasons of 1991–94 at SKN College of Agriculture, Jobner (Rajasthan). The soil of the experimental site was loamy sand in texture with pH 8.0, organic carbon 0.18%, available nitrogen, phosphorus and potash 125, 18 and 147 kg/ha respectively. The treatments consisted of 2 levels of 4 herbicides (pre-plant incorporation of fluchloralin @ 0.75 and 1.25 kg/ha, pre-emergence application of oxyfluorfen @ 0.15 and 0.30 kg/ha, metolachlor @ 0.5

and 1.0 kg/ha and pendimethalin @ 1.0 and 1.5 kg/ha), combination of the lower dose of each herbicide with 1 hand weeding at 50 days after sowing (DAS), 1 hand weeding once at 25 DAS, 2 hand weedings at 25 and 50 DAS, weed free and unweeded control.

These 16 treatments were evaluated in randomized block design with 3 replications.

Fenugreek 'RMT 1' was sown in rows spaced at 30 cm on November 7, 20 and 7 during 1991–92, 1992–93 and 1993–94 respectively and harvested on 24, 19 and 23

Table 1. Effect of weed-control treatments on weed dry weight and weed-control efficiency in fenugreek (mean data of 3 years)

Treatment	Weed dry weight (kg/ha)				Weed control efficiency (%)			
	25 DAS	50 DAS	75 DAS	A.H.	25 DAS	50 DAS	75 DAS	A.H.
Unweeded control	2.20	6.70	10.76	13.23				
Oxyfluorfen 0.15 kg/ha	0.57	2.73	5.41	5.98	74.1	59.3	49.7	54.8
Oxyfluorfen 0.30 kg/ha	0.33	1.53	3.77	4.69	85.0	77.2	65.0	64.6
Oxyfluorfen 0.15 kg/ha + HW	0.58	2.91	1.57	2.25	73.6	56.6	85.4	83.0
Fluchloralin 0.75 kg/ha	0.47	2.40	4.98	5.77	78.6	64.2	53.7	56.4
Fluchloralin 1.25 kg/ha	0.22	1.82	4.02	4.71	90.0	72.8	62.6	64.4
Fluchloralin 0.75 kg/ha + HW	0.52	2.14	1.41	2.22	7.4	68.8	86.9	83.2
Metolachlor 0.50 kg/ha	1.13	4.24	7.59	8.52	48.6	36.7	29.5	35.6
Metolachlor 1.00 kg/ha	0.81	2.87	5.89	7.11	63.2	57.2	45.3	46.3
Metolachlor 0.50 kg/ha + HW	1.15	3.91	1.75	2.75	47.7	41.6	83.7	79.2
Pendimethalin 1.00 kg/ha	0.38	1.98	4.19	4.73	82.7	70.4	61.1	64.2
Pendimethalin 1.50 kg/ha	0.29	0.93	1.83	3.49	86.8	86.1	83.0	73.6
Pendimethalin 1.00 kg/ha + HW	0.37	1.76	1.29	1.77	83.2	73.7	88.0	86.6
Hand-weeding once	2.16	1.23	3.41	4.83	1.8	81.6	68.3	63.5
Hand-weeding twice	2.01	1.29	1.55	2.86	8.6	80.7	85.6	78.4
Weed-free	0.00	0.00	0.00	0.58	100.0	100.0	100.0	95.6
CD (P = 0.05)	0.79	1.08	2.49	2.04				

DAS, Days after sowing; AH, at harvest; HW, hand-weeding

March in succeeding years. A uniform dose of 20 kg N and 40 kg P_2O_5 /ha was drilled at the time of sowing.

RESULTS AND DISCUSSION

Weed growth and weed control efficiency

The dominant weed species observed in the experimental plots included *Chenopodium murale*, *Heliotropium ellipticum* and others being *Chenopodium album*, *Melilotus indica* etc. All the weed control measures significantly reduced the weed dry weight compared to unweeded control at all the stages of observation. An exception to this was hand-weeding once and twice, wherein manual weeding was d1 ac-

cordingly after recording the weed dry weight at 25 and 50 DAS, thereby, both these treatments recorded weed dry weight at par with unweeded control at 25 DAS. The weed free plots were kept almost weed free allowing only 0.58 q/ha mean weed dry matter accumulation up to harvest stage. Among herbicidal treatments mean minimum weed dry weight and maximum weed control efficiency were recorded at 25 DAS with pre-plant incorporation of fluchloralin @ 1.25 kg/ha, at 50 DAS with pre-emergence application of pendimethalin @ 1.5 kg/ha and at 75 DAS and at harvest with pendimethalin @ 1.0 kg/ha supplemented with hand weeding once (Table 1). Pre-emergence application of

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

Treatments	Branches/plant				Pods/plant			
	Y ₁	Y ₂	Y ₃	Mean	Y ₁	Y ₂	Y ₃	Mean
Unweeded control	4.5	3.1	4.8	4.1	20.1	7.7	18.7	15.5
Oxyfluorfen 0.15 kg/ha	5.8	4.3	5.6	5.2	24.1	18.1	29.3	23.8
Oxyfluorfen 0.30 kg/ha	5.8	4.3	5.6	5.2	24.1	18.0	29.3	23.8
Oxyfluorfen 0.15 kg/ha + HW	6.1	4.9	5.8	5.6	25.9	19.9	27.7	24.5
Fluchloralin 0.75 kg/ha	5.7	4.4	6.0	5.4	26.3	16.1	30.2	24.2
Fluchloralin 1.25 kg/ha	5.8	4.4	6.0	5.4	29.0	17.9	28.7	25.2
Fluchloralin 0.75 kg/ha + HW	6.0	4.9	6.3	5.7	26.3	19.5	33.3	26.4
Metolachlor 0.50 kg/ha	6.4	3.6	5.3	5.1	21.8	12.5	25.4	19.9
Metolachlor 1.00 kg/ha	4.1	4.2	5.5	4.6	16.3	15.0	26.2	19.2
Metolachlor 0.50 kg/ha + WH	6.5	4.9	6.3	5.9	27.0	17.3	32.5	25.6
Pendimethalin 1.00 kg/ha	6.0	4.9	5.9	5.6	31.2	17.9	30.3	26.5
Pendimethalin 1.1 50 kg/ha	5.5	5.1	6.0	5.5	23.6	19.2	32.8	25.2
Pendimethalin 1.00 kg/ha + HW	5.7	5.2	6.2	5.7	24.1	20.1	35.3	26.5
Hand weeding once	6.3	4.4	6.0	5.6	24.6	17.6	29.3	23.8
Hand weeding twice	6.6	5.1	6.3	6.0	29.9	19.5	33.2	27.5
Weed free	6.1	5.3	6.6	6.0	26.9	20.9	36.7	28.2
CD (P = 0.05)	1.2	1.2	0.8	0.9	2.9	4.1	7.7	3.9

Y₁, 1991-92; Y₂, 1992-93; Y₃, 1993-94

metolachlor @ 0.5 and 1.0 kg/ha proved least effective in controlling the weeds at all the stages of observation. Similar results were reported by Maliwal and Gupta (1989).

Crop growth and yield attributes

All the weed control measures except pre-emergence application of pendimethalin @ 1.5 kg/ha during 1991–92, metolachlor @ 0.5 kg/ha during 1992–93 and 1993–94 and its higher dose of 1.0 kg/ha during all the 3 years recorded significantly higher number of branches/plant compared to unweeded control (Table 2). Maximum mean number of branches/plant observed under hand weeding twice and weed free condition but the same were at par with

rest of the weed control measures except metolachlor @ 0.5 and 1.0 kg/ha. All the weed control measures significantly increased the number of pods/plant over unweeded control except metolachlor @ 0.5 and 1.0 kg/ha during 1991–92 and 1993–94. Maximum mean number of pods/plant observed under weed-free condition was at par with rest of the weed control measures except oxyfluorfen @ 0.15 kg, fluchloralin @ 0.75 kg, metolachlor @ 0.5 and 1.0 kg/ha and hand weeding once.

Seed and straw yield

All the weed-control measures recorded significantly higher seed yield of fenugreek over the unweeded control except metolachlor @ 1.0 kg and pendimethalin @

Table 3. Effect of weed-control treatments on straw and seed yields and economics of fenugreek

Treatment	Straw yield (q/ha) (mean)	Seed yield (q/ha)				Net return (Rs/ha) (mean)	Benefit : cost ratio
		1991–92	1992–93	1993–94	Mean		
Unweeded control	21.72	4.82	6.48	8.16	6.49	5,212	1.75
Oxy. 0.15 kg/ha	28.69	8.10	11.95	13.09	11.05	9,491	2.53
Oxy. 0.30 kg/ha	25.31	8.52	13.43	14.14	12.03	9,412	2.12
Oxy. 0.15 kg/ha+ HW	28.79	8.98	17.04	19.34	15.12	13,162	3.29
Fluch. 0.75 kg/ha	26.15	6.85	11.25	17.08	11.73	10,158	2.95
Fluch. 1.25 kg/ha	29.77	8.84	12.64	11.49	10.99	9,491	2.56
Fluch. 0.75 kg/ha+ HW	29.72	10.83	17.13	20.49	16.15	14,304	3.79
Meto. 0.50 kg/ha	26.41	6.58	9.54	10.70	8.94	7,558	2.17
Meto. 1.00 kg/ha+ HW	25.57	8.10	11.67	15.00	11.59	6,248	1.63
Pend. 1.00 kg/ha	24.87	5.93	13.75	16.32	12.00	9,948	2.61
Pend. 1.50 kg/ha	25.09	3.89	12.32	15.80	10.67	10,794	3.01
Pend. 1.00 kg/ha+ HW	28.48	8.06	14.21	16.56	12.94	8,820	2.29
Hand weeding once	28.89	9.17	14.35	14.97	12.83	11,167	2.85
Hand weeding twice	30.40	9.68	16.62	18.47	14.92	11,670	3.52
Weed free	30.54	9.86	17.87	16.32	14.68	13,507	3.71
CD (P = 0.05)	5.82	1.09	1.69	4.19	2.68	12,931	3.25

1.5 kg/ha (1991–92) and fluchloralin @ 1.25 kg/ha (1993–94) and metolachlor @ 0.5 and 1.0 kg/ha (1993–94) and on mean basis). Maximum seed yield of 10.83 and 20.49 q/ha obtained with fluchloralin @ 0.75 kg/ha supplemented with hand weeding once during 1991–92 and 1993–94 respectively was at par with weed free treatment during both the years and oxyfluorfen @ 0.15 kg and pendimethalin @ 1.0 kg/ha both supplemented with hand weeding once, fluchloralin @ 0.75 kg and pendimethalin @ 1.0 kg/ha and hand weeding twice during 1993–94. Weed free treatment recorded maximum seed yield of 17.87 q/ha in 1992–93, which was at par with hand weeding twice, oxyfluorfen @ 0.15 kg and fluchloralin @ 0.75 kg/ha both supplemented with hand-weeding once. Pre-plant application of fluchloralin @ 0.75 kg/ha supplemented with hand-weeding once gave maximum mean seed yield of 16.15 q/ha which was significantly higher over rest of the treatments except oxyfluorfen @ 0.15 kg/ha supplemented with hand weeding once, hand weeding twice and weed free treatment. Higher seed yield under these treatments was obtained obviously due to better weed control efficiency. However, metolachlor @ 1.0 kg and pendimethalin @ 1.5 kg/ha showed phytotoxic effect on crop plants. Maximum mean straw yield of 30.54 q/ha obtained under weed free condition was signifi-

cantly higher over unweeded control and metolachlor @ 1.0 kg/ha (Table 3). The results confirm the findings of Maliwal and Gupta (1989) and Mandam and Maiti (1994).

Economics

Maximum net return of Rs 14,304 and benefit : cost ratio of 3.79 were obtained under fluchloralin @ 0.75 kg/ha supplemented with hand weeding on mean basis (Table 4). Thus, it may be concluded that maximum fenugreek seed yield, net return and benefit : cost ratio could be obtained with pre-plant incorporation of fluchloralin @ 0.75 kg/ha supplemented with 1 hand weeding at 50 DAS, followed by hand weeding twice, weed free condition and oxyfluorfen @ 0.15 kg/ha supplemented with 1 hand-weeding (50 DAS).

REFERENCES

- Mali, A.L. and Suwalka, S.N. 1987. Studies on weed management in fenugreek (*Trigllla foenum-graecum* L.). *Indian Journal of Agronomy* 32 (2) : 188–189.
- Maliwal, P.L. and Gupta, O.P. 1989. Study on the effect of four herbicides with and without applied phosphorus on weed control and seed yield of fenugreek (*Trigllla foenum-graecum* L.). *Tropical Pest Management* 35 (3) : 307–310.
- Mandam, A.R. and Maiti, R.G. 1994. Efficacy of different herbicides for weed control in fenugreek (*Trigllla foenum-graecum* L.). *Environment and Ecology* 12 (1) : 138–142.