

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

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Abstract

A field experiment was conducted during the rabi season at research farm of RVSKVV, College of Horticulture, Mandsaur (Madhya Pradesh) to study the response of fenugreek (*Trigonella foenum-graecum* L.) to different chemical weed control. Different treatments significantly influenced the growth, yield and quality attributes of fenugreek. Three hand weeding at 30, 45 and 60 DAS resulted in significantly higher seed and straw yield of fenugreek which was 57.01 and 25.47 per cent higher over weedy check, respectively. However, on the basis of B:C ratio and net profit, application of pendimethalin @ 1.0 kg a.i./ha applied as pre-emergence proved best treatment among herbicides and gave maximum net return of Rs. 59820.00/ha with B:C ratio of 4.32 and seed yield of 22.24 q/ha.

Key words : Chemical, fenugreek, weed control

Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is an annual seed spice crop. Both leaves and seeds of fenugreek are extensively used for spices and medicinal purposes. Numerous studies have been carried out to reveal the therapeutic potential of fenugreek in various pathological conditions such as diabetes mellitus, cancer, hypertension, cataract, gastric disorders and obesity (Rathore *et al.* 15). Its seed are aromatic and widely cultivated in the state of Madhya Pradesh for green vegetables as well as for seed purpose in the Malwa plateau, covering the districts of Mandsaur, Neemuch, Ratlam, Indore and Sehore. Hand weeding is a common method of weed control adopted by farmers but it is costly and time consuming method. The problem assumes added significance due to non-availability of adequate labour during peak period of operation. The research information regarding appropriate method of weed management in fenugreek under this zone is not available. Keeping all these in mind, an experiment was conducted to study the effect of weed control measures on the productivity and quality of fenugreek (*Trigonella foenum-graecum* L.).

Materials and methods

The experiment was undertaken at the Research Farm, College of Horticulture, Mandsaur, Madhya Pradesh during rabi season of 2009-10. Soil of experimental field was light black loamy in texture with 7.5 pH and 0.35 dS/m EC having low in available nitrogen (243.2 Kg ha⁻¹) and medium in available phosphorus (19.75 Kg ha⁻¹) and high

in available potassium (470.40 Kg ha⁻¹). The experiment was conducted in randomized block design replicated three times. The crop was sown on 14th October, 2009 and harvested on 11th March, 2010. The seeds were treated with *Trichoderma viridae* @ 5 g/kg seed and then sown at a depth of 5 cm in row spaced at 30 cm using 20 kg seed/ha of cultivar AFg-1. FYM @ 10 tones/ha was incorporated in the soil one month before sowing and a uniform dose of 30 kg N, 60 kg P₂O₅ and 40 kg K₂O/ha was applied basal. Total twelve treatments consisted of weedy check or control, hand weeding (one at 30 DAS, two at 30 and 45 DAS and three at 30, 45 and 60 DAS) and 2 levels of 4 herbicides (pre emergence application of pendimethalin @ 0.75 and 1.0 kg/ha, oxyflurofen @ 0.10 and 0.25 kg/ha, trifluralin @ 0.75 and 1.0 kg/ha and butachlor @ 0.75 and 1.0 kg/ha.). The application was done with the help of knap-sack sprayer. Total carbohydrate was estimated by Dubios *et al.* (4) and total protein was estimated by micro- Kjeldahl method (Sadashivam and Manickam, 16). The data on cost of production and net profit were calculated on the basis of prevailing market prices.

Results and discussion

Effect on growth, yield and quality of fenugreek

Application of herbicides or hand weeding treatments significantly influenced growth parameters of fenugreek viz. plant height, number of branches plant⁻¹, fresh weight plant⁻¹, dry weight plant⁻¹, days to flower initiation and days to 50% flowering recorded at different interval of crop

growth of fenugreek as compared to weed check (Table 1&2).

Among all the treatments tested, three hand weeding at 30,45 and 60 DAS produced highest grain yield of fenugreek (23.27 q/ha) which was 57.01 per cent higher than weedy check and it was statistically at par with the treatment of pendimethalin @ 1.0 kg a.i./ha applied as pre emergence and two hand weeding, respectively. Straw yield and biological yield were 25.5 and 32.8 per cent higher over weedy check. Application of pendimethalin @ 1.0 kg a.i./ha applied as pre emergence produced maximum seed yield (22.24 q/ha) among chemicals applied, which was 4.7, 29.0 and 22.9 per cent higher than oxyflurofen @ 0.25 kg a.i./ha applied as pre emergence, trifluralin @ 1.0 kg a.i./ha applied as pre emergence and butachlor @ 1.0 kg a.i./ha, respectively. There was 50.06 per cent higher seed yield with pendimethalin @ 1.0 kg a.i./ha when compared with weedy check.

It is further ascribed that herbicides can control weeds as they emerge from soil to eliminate weed crop competition even at early growth stage of crop growth. But by hand weeding, weeds are removed after a period they have offered considerable competition to the crop. Thus, the cumulative influence of growth and yield attributes ultimately increased the seed yield of fenugreek. These results are in close conformity with the findings of Chaudhary (3), Gill *et al.* (6), Singh and Tripathi (17), Nandekar *et al.* (13), Kumar *et al.* (10), Kamboj *et al.* (9) and Meena and Mehta (12).

Significant improvement in nutrient contents in seed, protein content in seed, chlorophyll content in leaves, seed pigments, galactomannan and total carbohydrate in seed of fenugreek was recorded due to weed control measures (Table 3). The positive influence of treatments in above parameters in seeds seems to be due to increased availability of nutrients for longer period due to clean field conditions or weed free condition. Findings of several researchers (Baboo and Sharma, 1, Prajapati and Patel, 14, Bhunia *et al.*, 2, Mehriya *et al.*, 11) corroborate the results of present experiment and confirmed increasing tendency of quality of fenugreek due to weed control measures.

Effect on weeds

The major weed flora observed in experiment field was motha (*Cyperus rotundus* L.), sanji (*Melilotus indica*), bathu (*Chenopodium album*), hirankhuri (*Convolvulus arvensis*), doob (*Cynodon dactylon*). Weed control by any measures significantly reduced the weed population and the dry matter of weed at different growth stages of crops grown. The results of present experiment are in closing

confirmative with the findings of Jadhao *et al.* (7), Chaudhary (3), Verma *et al.* (19), Dungarwal *et al.* (5), Kamboj *et al.* (8), Kamboj *et al.* (9) and Tiwari *et al.* (18) and Meena and Mehta (12).

Economics

The data reveal that the maximum net income of Rs. 59820 /ha was obtained under the treatment pendimethalin @ 1.0 kg a.i./ha applied as pre emergence with a maximum B: C ratio of 4.32, which was closely followed by treatment of three hand weeding at 30, 45 and 60 DAS (Rs. 59515 /ha) with a B:C ratio of 3.71 and two hand weeding at 30 and 45 DAS (Rs. 59340/ha) with a B:C ratio of 3.93. While, minimum net profit of Rs.35340/ha was under weedy check (Table 5). Data presented in same table further reveal that among the herbicides applied, pendimethalin @ 1.0 kg a.i./ha applied as pre emergence resulted in the highest B: C ratio (4.32) which was closely followed by treatment of oxyflurofen @ 0.25 kg a.i./ha applied as pre emergence (4.15). Whereas, minimum benefit cost ratio (3.14) was obtained under the treatment of weedy check.

Conclusion

On the basis of present experiment, it may be concluded that three hand weeding at 30, 45 and 60 DAS results in realization of significantly higher seed and straw yield of fenugreek by 57.01 and 25.47 per cent over weedy check, respectively. However, on the basis of B:C ratio and net profit, application of pendimethalin @ 1.0 kg a.i./ha applied as pre-emergence proved best treatment among herbicides and gave maximum net return of Rs. 59820.00/ha with B:C ratio of 4.32 and seed yield of 22.24 q/ha.

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Table-1. Effect of weed control measures on growth attributes of fenugreek and weeds

Treatment	Plant height (cm)	Branch /plant	Dry weight (g/m row length)	Weed density (No/sq m) at 30 DAS	Dry weight of weeds (g/sq m)	Days to 50% flower	No of pod /plant	Pod length (cm)
Weedy check or control	99.00	5.40	233.33	47.00	79.84	56.0	47.0	12.15
One HW 30 DAS	105.93	6.27	238.33	47.34	72.73	53.3	60.4	13.57
Two HW 30 and 45 DAS	108.27	6.50	298.33	46.99	71.41	49.0	74.7	14.12
Three HW 30,45 and 60 DAS	108.80	6.60	315.00	46.67	72.82	49.3	77.0	14.97
Pendimethalin @ 0.75 kg a.i. /ha pre em	105.87	5.80	273.33	28.67	20.15	52.3	66.4	13.52
Pendimethalin @ 1.00 kg a.i. /ha pre em	108.27	6.33	297.33	18.67	15.91	50.3	73.7	13.89
Oxyflurofen @ 0.10 kg a.i. /ha pre em	104.33	5.73	251.00	35.33	22.96	52.6	64.3	13.30
Oxyflurofen @ 0.25 kg a.i. /ha pre em	105.93	6.27	293.33	29.34	19.79	51.3	71.0	13.73
Trifluralin @ 0.75 kg a.i. /ha pre em.	103.00	5.73	250.00	40.67	22.65	53.0	53.3	13.49
Trifluralin @1.00 kg a.i. /ha pre em.	103.93	5.80	257.67	38.01	22.91	52.6	56.0	13.24
Butachlor @ 0.75 kg a.i. /ha pre em.	103.60	5.80	258.67	36.99	26.75	53.0	55.7	13.06
Butachlor @ 1.00 kg a.i. /ha pre em.	104.43	5.87	274.33	33.34	24.99	52.3	61.0	13.11
C. D. at 5%	2.555	0.371	11.491	3.848	5.091	1.70	2.50	0.510

Table 2. Effect of weed control measures on yield and economics of fenugreek

Treatment	No of seed /pod	Test weight (g)	Seed yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)	Harvest index (%)	Net income (Rs/ha)	Benefit cost ratio
Weedy check or control	12.2	16.33	14.82	48.59	63.41	23.41	35340	3.14
One HW 30 DAS	14.9	18.23	18.61	55.93	74.54	24.59	46605	3.52
Two HW 30 and 45 DAS	17.4	19.10	22.82	58.35	81.17	27.56	59340	3.93
Three HW 30,45 and 60 DAS	17.7	19.27	23.27	60.97	84.24	27.73	59515	3.71
Pendimethalin @ 0.75 kg a.i. /ha pre em.	16.1	18.33	18.60	55.77	74.37	25.24	40202	3.25
Pendimethalin @ 1.00 kg a.i. /ha pre em.	17.2	18.93	22.24	58.15	80.39	27.53	59820	4.32
Oxyflurofen @ 0.10 kg a.i. /ha pre em.	15.0	17.93	17.69	55.67	73.36	23.55	44278	3.51
Oxyflurofen @ 0.25 kg a.i. /ha pre em.	16.8	18.37	21.23	57.42	78.65	26.41	56415	4.15
Trifluralin @ 0.75 kg a.i. /ha pre em.	14.2	17.60	16.32	53.22	69.53	22.59	39290	3.20
Trifluralin @1.00 kg a.i. /ha pre em.	14.9	17.97	17.04	55.67	72.71	22.43	41710	3.33
Butachlor @ 0.75 kg a.i. /ha pre em.	15.8	18.20	17.20	55.39	72.59	23.50	42677	3.41
Butachlor @ 1.00 kg a.i. /ha pre em.	16.3	18.57	18.09	57.29	75.38	24.17	45560	3.58
C. D. at 5%	1.03	0.730	1.404	4.232	3.889	1.687		

Table 3. Effect of weed control measures on nutrient contents and quality attributes of fenugreek

Treatment	Chlorophyll content (mg/g)			Nutrient content in seed (%)			Protein content (%)	Seed pigment (mg/g)	Galactan (%)	Total carbohydrate (%)	Nutrient uptake by weeds (Kg/ha)		
	30 DAS	60 DAS	90 DAS	N	P	K					N	P	K
	Weedy check or control	1.07	1.31	1.20	2.72	0.39					0.50	17.44	1.14
One HW 30 DAS	1.19	1.54	1.46	2.95	0.44	0.54	18.61	1.57	19.83	59.50	18.60	10.17	24.17
Two HW 30 and 45 DAS	1.26	1.65	1.56	3.04	0.47	0.56	18.85	1.80	20.46	61.38	9.60	9.50	9.93
Three HW 30,45 and 60 DAS	1.29	1.69	1.58	3.07	0.48	0.58	19.30	1.87	20.50	61.51	9.23	9.23	8.27
Pendimethalin @ 0.75 kg a.i. /ha pre em.	1.20	1.46	1.40	2.87	0.44	0.53	17.95	1.66	19.54	58.61	18.00	4.93	14.13
Pendimethalin @ 1.00 kg a.i. /ha pre em.	1.24	1.60	1.55	2.92	0.46	0.55	18.25	1.71	20.38	61.15	7.07	3.00	7.20
Oxyflurofen @ 0.10 kg a.i. /ha pre em.	1.21	1.47	1.38	2.82	0.42	0.52	17.64	1.72	19.06	57.19	19.17	6.50	25.13
Oxyflurofen @ 0.25 kg a.i. /ha pre em.	1.23	1.58	1.50	2.85	0.45	0.54	17.83	1.65	19.87	58.91	8.53	3.13	8.13
Trifluralin @ 0.75 kg a.i. /ha pre em.	1.10	1.48	1.36	2.85	0.41	0.52	17.75	1.57	19.25	57.75	22.20	7.77	24.87
Trifluralin @ 1.00 kg a.i. /ha pre em.	1.18	1.46	1.36	2.88	0.43	0.52	18.13	1.58	19.64	59.60	12.20	3.73	12.70
Butachlor @ 0.75 kg a.i. /ha pre em.	1.17	1.49	1.39	2.86	0.43	0.53	17.87	1.66	19.26	57.78	20.77	7.37	25.37
Butachlor @ 1.00 kg a.i. /ha pre em.	1.21	1.57	1.47	2.90	0.45	0.54	18.30	1.66	19.83	58.58	10.63	3.60	12.80
C. D. at 5%	0.081	0.055	0.036	0.168	0.024	0.026	1.045	0.042	0.04	0.127	1.550	0.687	1.051

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