

## Integrated weed management in fenugreek

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### ABSTRACT

Field experiments were conducted during *rabi* season in four consecutive years (2003-04 to 2006-07) to study the effect of integrated weed management practices on seed yield of fenugreek (*Trigonella foenum-graecum* L.). Results revealed that two hand weedings at 20 and 40 days after sowing (DAS) recorded minimum dry weight of both monocot and dicot weeds with the highest weed control efficiency (63.0%). Among the herbicides, pre planting and incorporation of fluchloralin 0.75 kg/ha + one hand weeding at 30 DAS was most effective in reducing the dry weight of both monocot and dicot weeds at harvesting. It had positive impact on yield attributes resulted in to the highest seed yield (1660 kg/ha) with net monetary returns of Rs 16904/ha and maximum weed control efficiency (54.5%). Pre-emergence application of pendimethalin 0.75 kg/ha + one hand weeding at 30 DAS and two hand weedings at 20 and 40 DAS were at par to former with regard to seed yields.

**Keywords:** Fenugreek, Seed yield, Fluchloralin, Pendimethalin, Oxyfluorfen

Fenugreek (*Trigonella foenum-graecum* L.), is an important condiment crop of north western part of country during winter season. Recent studies indicated that fenugreek seeds substantially contain the steroidal substance diosgenin which is used as a base material in the synthesis of sex hormone in oral contraceptives. Weeds have been identified as a serious drawback since they create biotic stress in realizing the genetic yield potential of this valuable crop. Weeds offered maximum competition up to 25-30 days of sowing in fenugreek resulting in drastic reduction in seed yield (Tripathi and Singh 1994). Therefore, the present investigation was under taken to find out the most effective weed control practice for fenugreek crop.

### MATERIALS AND METHODS

The field experiments were conducted for four consecutive winter (*rabi*) seasons from 2003-04- to 2006-07 at Agricultural Research Station, Beechwal, Bikaner (Rajasthan), situated in hyper arid partially irrigated western plain zone of Rajasthan. The soil of experimental site was sandy loam in texture, alkaline in reaction (pH 8.3) with low available N (84.76 kg/ha) and P (14.69 kg/ha) and medium in K (150 kg/ha). Twelve treatments comprising of cultural (one hand weeding and two hand weeding) and chemical weed control method with and without hand weeding including a weedy check were tested in a randomized block design with three replications. Fenugreek variety *RMT-1* was sown in second week of November during all the four seasons in rows 30 cm apart by using 15.0 kg seeds/ha. A uniform dose of 60.0 kg N and 40 kg P/ha was applied. Half of N +

full P was drilled at the time of sowing and remaining half N was applied at the time of first irrigation. Pre-plant incorporation and pre-emergence herbicides were applied one day before and after sowing, respectively using a Knapsack sprayer with a spray volume of 600 litres/ha. Weed dry weight was recorded by placing a quadrat of 0.25 m<sup>2</sup> at 3 random places in each plot and then weighed both monocot and dicot weeds separately after oven drying at 45 days after sowing and at harvesting. Harvesting and threshing of the crop after sun drying obtained seed yield. Net return was also worked out. Weed control efficiency was calculated as per the formula given below as suggested by Patil and Patil (1983).

$$\text{WCE (\%)} = \frac{\text{DMC} - \text{DMT}}{\text{DMC}} \times 100$$

where, DMC is dry-matter weight of weeds in the control plots and DMT dry-matter weight of weeds in treated plots.

The weed index was calculated as per formula suggested by Gill and Kumar (1969):

$$\text{WI (\%)} = \frac{X - Y}{X} \times 100$$

where, X is yield from weed free plots and Y is the yield from treated plots.

### RESULTS AND DISCUSSION

#### Weed flora

Many monocot and dicot weeds were observed in weedy check plot of the experimental fields. Bermuda grass [*Cynodon dactylon* (L.) Pers.], nut sedge (*Cyperus*

*rotundus* L.), and wild onion (*Asphodelus tenuifolius* Cav.) among the monocots and sweet clover (*Melilotus alba* Medikus), clover [*Melilotus indica* (L. All.), Pimpernel (*Anagallis arvensis* L.), morning glory (*Convolvulus arvensis* L.), golden duck (*Rumex dentatus* L.), lamb squarters (*Chenopodium album* L.) and goose foot (*Chenopodium murale* L.) among the dicots predominantly invaded the field.

#### Weed dry matter

All the weed control treatments effectively suppressed both monocot and dicot weeds over weedy check (Table 1). At harvesting, the lowest dry matter of weeds (111 g/m<sup>2</sup>) was recorded with two hand weedings at 20 and 40 DAS, while the highest dry matter of weeds (300 g/m<sup>2</sup>) was found in weedy check. Among the herbicides, pre-plant incorporation of fluchloralin 1.0 kg/ha was next effective treatment after 2 hand weedings with obstruction of weeds (131 g/m<sup>2</sup>) being at par to

fluchloralin 0.75 kg/ha + one hand weeding at 30 DAS (142 g/m<sup>2</sup>). The weed dry matter was 149 g/m<sup>2</sup> with pre emergence application of pendimethalin 1.00 kg/ha followed by pendimethalin at 0.75 kg/ha + one hand weeding at 30 DAS (154 g/m<sup>2</sup>) and both were on par.

Weed-control efficiency (WCE) was maximum (63%) with two hand weedings at 20 and 40 DAS as it provided weed free situation during the critical period of crop-weed competition up to 60 days. Among the herbicides, pre plant incorporation of fluchloralin 1.0 kg/ha had the highest WCE (56.3%) followed by fluchloralin 0.75 kg/ha + one hand weeding at 30 DAS (53.0%). The WCE was minimum (30.0%) with pre emergence application of oxyfluorfen 0.15 kg/ha. The weed index value was maximum (56.5%) in weedy check, which indicated maximum reduction in seed yield due to the effect of weeds. All treatments associated with different cultural or herbicidal control measures alone or in

**Table 1. Effect of weed control practices on weed dry matter, weed index and weed control efficiency of fenugreek (mean for 4 years)**

Treatments	Weed dry matter (g/m <sup>2</sup> )						Weed index (%)	WCE (%)
	At 45 DAS			At harvesting				
	Monocot	Dicot	Total	Monocot	Dicot	Total		
T <sub>1</sub> Fluchloralin 0.75 kg/ha PPI	(21) 4.7	(27) 5.3	(48) 7.0	(90) 9.5	(97) 9.9	(187) 13.7	26.0	38.0
T <sub>2</sub> T <sub>1</sub> + HW 30 DAS	(9) (3.0)	(6) 2.6	(15) 4.0	(67) 8.2	(75) 8.7	(142) 11.9	2.0	53.0
T <sub>3</sub> Fluchloralin 1.00 kg/ha PPI	(15) 4.0	(17) 4.2	(32) 5.7	(59) 7.7	(72) 8.5	(131) 11.5	23.1	56.3
T <sub>4</sub> Pendimethalin 0.75 kg/ha PE	(21) 4.7	(24) 5.0	(45) 6.8	(95) 9.8	(93) 9.7	(188) 13.7	17.2	37.3
T <sub>5</sub> T <sub>4</sub> + HW 30 DAS	(7) 2.8	(8) 3.0	(15) 4.0	(73) 8.6	(81) 9.0	(154) 12.4	-	49.0
T <sub>6</sub> Pendimethalin 1.00 kg/ha PE	(14) 3.9	(18) 4.4	(32) 5.7	(65) 8.1	(84) 9.2	(149) 12.2	15.4	50.3
T <sub>7</sub> Oxyfluorfen 0.15 kg/ha PE	(22) 4.8	(25) 5.1	(47) 6.9	(101) 10.1	(110) 10.5	(211) 14.6	30.2	30.0
T <sub>8</sub> T <sub>7</sub> + HW 30 DAS	(8) 3.0	(10) 3.3	(18) 4.3	(67) 8.2	(91) 9.6	(158) 12.6	13.0	47.3
T <sub>9</sub> Oxyfluorfen 0.30 kg/ha PE	(16) 4.1	(19) 4.5	(35) 6.0	(70) 8.4	(87) 9.4	(157) 12.6	26.8	48.0
T <sub>10</sub> Weedy check	(26) 5.2	(28) 5.4	(54) 7.4	(114) 10.7	(186) 13.6	(300) 17.3	56.5	-
T <sub>11</sub> HW 30 DAS	(7) 2.8	(8) 3.0	(13) 3.1	(84) 9.2	(102) 10.1	(186) 13.6	14.2	38.0
T <sub>12</sub> HW 20 and 40 DAS	(14) 3.9	(23) 4.9	(37) 6.1	(55) 7.5	(60) 7.8	(111) 10.6	8.9	63.0
LSD (P=0.05)	-	-	1.4	-	-	2.6	-	-

Figures in parentheses are original values which were subjected to  $\sqrt{x+1}$  transformation, PE- Pre-emergence, HW- Hand weeding, PPI - Pre-planting and incorporation.

combination of both had lesser weed index values and one hand weeding at 30 DAS + fluchloralin 0.75 kg/ha resulted in to the minimum weed index (2.0%).

### Effect on crop

All the weed-control measures had significantly positive impact on growth characters, yield attributes and seed yield of fenugreek over weedy check (Table 2). The significantly lowest values of plant height (42.5 cm), branches/plant (4.5), pod length (6.8 cm), pods/plant (16.0), seeds /pod (13.0) and seed yield (735 kg/ha) were recorded under weedy check, while preemergence pendimethalin at 0.75 kg/ha + one hand weeding at 30 DAS produced maximum seed yield (1690 kg/ha) was at

par to pre plant incorporation of fluchloralin 0.75 kg/ha + one hand weeding 30 DAS (1660 kg/ha) and two hand weedings at 20 and 40 DAS (1540 kg/ha) mainly due to superiority in all growth parameters and yield attributes. The later treatments had less weed infestation during crop-weed competition peak which favoured to better utilization of available resources *viz.*, nutrient, light, water and space (Dungerwal *et al.* 2002). The pre-planting and incorporation of fluchloralin 0.75kg/ha + one hand weeding at 30 DAS fetched higher net monetary returns (Rs 16904/ha) closely followed by pre-emergence application of pendimethalin 0.75kg/ha + one hand weeding at 30 DAS (Rs 16684/ha) and these treatments were more remunerative than the rest.

**Table 2. Effect of weed control practices on growth, yield attributes, yields and net monetary returns of fenugreek (Mean for 4 years)**

Treatments	Growth			Yield attributes				Yield (kg/ha)		Mean NMR (Rs/ha)
	Plants/m <sup>2</sup>	Plant height (cm)	Branches /plant	Pod length (cm)	Pods /plant	Seeds /pod	Test weight (g)	Seed	Stover	
T <sub>1</sub> Fluchloralin 0.75 kg/ha PPI	32	43.6	4.8	7.8	18	14.0	12.05	1250	1370	13484
T <sub>2</sub> T <sub>1</sub> + HW 30 DAS	32	45.7	6.0	8.9	19	14.2	12.06	1660	1720	16904
T <sub>3</sub> Fluchloralin 1.00 kg/ha PPI	32	43.6	4.7	8.7	19	14.1	12.00	1300	1610	15302
T <sub>4</sub> Pendimethalin 0.75 kg/ha PE	32	43.6	4.8	8.9	18	14.2	12.03	1400	1960	14215
T <sub>5</sub> T <sub>4</sub> + HW 30 DAS	32	45.8	5.9	8.9	19	14.1	12.04	1690	2300	16684
T <sub>6</sub> Pendimethalin 1.00 kg/ha PE	32	43.6	4.7	8.8	19	14.0	12.00	1430	1770	15885
T <sub>7</sub> Oxyfluorfenn 0.15 kg/ha	32	43.5	4.8	8.7	19	14.1	12.01	1180	1520	14305
T <sub>8</sub> T <sub>7</sub> + OHW 30 DAS	32	45.6	5.8	8.9	19	14.1	12.00	1470	2040	11500
T <sub>9</sub> Oxyfluorfenn 0.30 kg/ha PE	32	43.5	4.7	8.7	19	14.0	12.02	1220	1630	13344
T <sub>10</sub> Weedy check	32	42.5	4.5	6.8	16	13.0	11.98	735	1100	6730
T <sub>11</sub> HW 30 DAS	32	45.7	5.8	8.9	19	14.2	12.02	1450	2230	14920
T <sub>12</sub> HW 20 and 40 DAS	32	46.7	6.2	8.9	19	14.2	12.02	1540	2090	11525
LSD (P=0.05)	NS	1.2	0.5	0.7	1	0.2	NS	180	317	-

PPI - Pre-planting and incorporation, PE - Pre-emergence, HW- Hand weeding, NMR- Net monetary returns, NS - Not significant, DAS - Days after sowing

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