

## Influence of Herbicides on Fodder Yield and Quality of Persian Clover

U. S. Tiwana, K. P. Puri, U. S. Walia and Dharam Paul

Department of Agronomy and Agrometeorology  
Punjab Agricultural University, Ludhiana-141 004 (Punjab), India

### ABSTRACT

The dry matter of weeds was reduced significantly by pre-plant incorporation of fluchloralin at 0.67, 0.90 and 1.12 kg ha<sup>-1</sup> and pre-emergence application of butachlor at 1.0, 1.5 and 2.0 kg ha<sup>-1</sup> over weedy check. Fluchloralin was effective only against *Poa annua*, while butachlor controlled *Cichorium intybus*. Whereas *Rumex dentatus* and *Lepidium sativum* were not controlled by any of the herbicides. Pre-emergence application of pendimethalin, though controlled the weeds but was toxic to the crop. The weed control efficiency with two hand weedings and fluchloralin at 1.12 kg ha<sup>-1</sup> was 71.6 and 70.5%, respectively. The fodder yield of Persian clover increased significantly with two hand weedings (30 and 45 days after sowing), fluchloralin at 0.67 kg ha<sup>-1</sup> and butachlor at 1.00 kg ha<sup>-1</sup> over weedy check. All the weed management treatments improved the crude protein content of Persian clover over weedy check.

### INTRODUCTION

Persian clover (*Trifolium resupinatum*), commonly known as *shaftal*, is gaining popularity in Punjab due to its resistance to stem rot disease to which berseem is susceptible. It is highly nutritious, palatable and is relished by all the animals. It supplies green fodder from November to mid-May in 4-5 cuttings. Its leaves are broader in size than berseem and lucerne which cause smothering effect on the weeds. But the initial growth of the crop is very slow and the weed infestation offers severe competition resulting in low fodder yield and poor quality. Weeds decrease the acceptability of the fodder and also pose problems in harvesting of the crop (Walia, 2003). Since very little work has been reported on the weed control of Persian clover, therefore, the present study was undertaken to evaluate the effective and safe weed management technology.

### MATERIALS AND METHODS

The field experiment was conducted during winter seasons of 2002-03 to 2004-05 to study the effect of herbicides on weeds, fodder yield and

quality of Persian clover. The experimental site was loamy sand in texture, low in available nitrogen and medium in available phosphorus and potassium with pH 8.0. The 12 treatments (Table 1) replicated three times were laid out in a randomized block design. Treatments consisted of fluchloralin (Basalin 45 EC) at 0.67, 0.90 and 1.12 kg ha<sup>-1</sup> was incorporated in soil before sowing, pendimethalin (Stomp 30 EC) and butachlor (Machette 50 EC) each at 1.0, 1.5 and 2.0 kg ha<sup>-1</sup> as pre-emergence (within 2-3 days of sowing), one hand weeding done 30 days after sowing, two hand weedings done 30 and 45 days after sowing and unweeded check. Herbicides were sprayed as spray volume of 500 l ha<sup>-1</sup>. The variety Shaftal 69 was sown in the first week of October during 2002-03 and 2003-04 and in third week of October during 2004-05 by *kera* method at a row spacing of 30 cm using 10 kg seed ha<sup>-1</sup>. During 2002-03 and 2003-04, five cuttings and during 2004-05, four cuttings of fodder were taken. The other cultural practices were uniformly applied to all the treatments.

### RESULTS AND DISCUSSION

#### Effect on Weeds

The major weed flora consisted of *Poa*

*annua* (21.8%), *Cichorium intybus* (18.3%), *Lepidium sativum* (36.2%), *Rumex dentatus* (11.2%) and *Trianthema portulacastrum* (9.7%). The weed infestation was very severe during the first cutting of the fodder. Later on the crop established and broader leaves of the crop had smothering effect on the weeds. The dry matter of weeds was suppressed significantly by all the treatments (Table 1). Fluchloralin was effective only against *P. annua* weed, while butachlor controlled *C. intybus* weed. Whereas *R. dentatus* and *L. sativum* were not controlled by any of the herbicides. Pendimethalin, though controlled the weeds in the first cutting but was toxic to the crop and more space was available for the establishment of weeds resulting in more weeds in the later cuttings. The weed control efficiency was highest with pendimethalin at 1.5 kg ha<sup>-1</sup> followed by pendimethalin at 1.25 kg ha<sup>-1</sup>, two hand weedings (30 and 45 days after sowing) and fluchloralin at 1.12 kg ha<sup>-1</sup>. Tiwana *et al.* (1985) also reported successful control of *P. annua* in Egyptian clover with fluchloralin. The weed control efficiency was highest with pendimethalin but it had toxic effect

on the crop (Table 1). The weed control efficiency with two hand weedings and fluchloralin at 1.12 kg ha<sup>-1</sup> was 71.6 and 70.5%, respectively.

### Effect on Fodder Yield

The green fodder and dry matter yields of Persian clover (Table 2) increased significantly with two hand weedings (30 and 45 DAS), fluchloralin at 0.67 kg ha<sup>-1</sup> and butachlor at 1.00 kg ha<sup>-1</sup> over weedy check. The differences among different doses of herbicides and hand weeding treatments were non-significant. Pendimethalin at all the doses, fluchloralin at 0.90 and 1.12 kg ha<sup>-1</sup> and butachlor at 2.0 kg ha<sup>-1</sup> though controlled the weeds but had toxic effect on the crop. The higher fodder yield with hand weedings, fluchloralin at 0.67 kg ha<sup>-1</sup> and butachlor at 1.00 kg ha<sup>-1</sup> was due to reduced weed competition favouring better utilization of available resources by the crop. Kumar *et al.* (2003) observed that fluchloralin at 1.12 kg ha<sup>-1</sup> gave significantly higher green fodder and dry matter yield of berseem than other treatments and closely followed by fluchloralin at 0.67 kg ha<sup>-1</sup>.

Table 1. Effect of treatments on weeds at the first cutting of Persian clover

Treatment	Dose (kg ha <sup>-1</sup> )	Weed density (No. m <sup>-2</sup> )				Weeds dry weight (g m <sup>-2</sup> )				Weed control efficiency (%)
		2002-03	2003-04	2004-05	Mean	2002-03	2003-04	2004-05	Mean	
Weedy	-	241	237	351	276	10.74	45.75	12.76	23.08	-
Hand weeding	-	172	155	171	166	8.02	24.25	5.72	12.66	45.2
30 DAS										
Hand weedings	-	134	85	123	114	5.43	10.02	4.22	6.56	71.6
30 & 45 DAS										
Pendimethalin	1.00	300	133	68	167	5.93	20.43	3.92	10.09	56.3
Pendimethalin	1.25	300	83	28	137	4.68	7.50	2.60	4.93	78.7
Pendimethalin	1.50	296	78	24	133	2.45	3.25	1.39	2.36	89.8
Fluchloralin	0.67	180	192	174	182	7.49	11.52	6.45	8.49	63.2
Fluchloralin	0.90	167	176	142	162	7.77	10.43	5.43	7.88	65.9
Fluchloralin	1.12	139	160	120	140	5.89	9.87	4.69	6.82	70.5
Butachlor	1.00	190	225	274	230	8.70	38.64	8.13	18.50	19.8
Butachlor	1.50	169	146	181	165	5.57	22.04	7.24	12.62	45.3
Butachlor	2.00	143	120	264	176	8.17	20.46	6.55	11.73	49.2
LSD (P=0.05)		38.7	24.0	27.4	25.1	1.25	3.51	0.79	1.74	-

DAS-Days after sowing.

Table 2. Effect of treatments on Persian clover

Treatment	Dose (kg ha <sup>-1</sup> )	Total fodder yield (t ha <sup>-1</sup> )				Shoots (No. m <sup>-1</sup> )				Crude protein (%) at 1st cut
		2002-03	2003-04	2004-05	Mean	2002-03	2003-04	2004-05	Mean	
Weedy	-	47.4 (7.0)	497 (7.1)	532 (6.2)	501 (6.8)	130	178	165	157	22.6
Hand weeding	-	54.5 (8.0)	614 (8.7)	588 (7.8)	582 (8.2)	143	195	173	170	23.6
30 DAS										
Hand weeding	-	62.0 (9.2)	674 (9.0)	683 (9.8)	659 (9.4)	152	208	180	180	24.0
30 & 45 DAS										
Pendimethalin	1.00	58.1 (8.7)	27.7 (4.0)	33.6 (4.1)	39.0 (5.68)	105	191	102	133	24.8
Pendimethalin	1.25	55.6 (8.5)	24.9 (3.4)	26.5 (2.5)	35.6 (4.8)	84	175	110	121	25.3
Pendimethalin	1.50	54.6 (8.3)	20.7 (2.9)	17.3 (1.6)	30.9 (4.3)	83	146	80	103	25.6
Fluchloralin	0.67	75.1 (10.7)	51.0 (7.1)	72.4 (8.8)	66.2 (8.9)	160	225	177	188	24.5
Fluchloralin	0.90	75.4 (10.9)	59.5 (8.0)	62.7 (6.6)	65.9 (8.5)	152	230	138	173	23.6
Fluchloralin	1.12	77.1 (11.0)	66.9 (8.9)	49.1 (5.4)	64.4 (8.5)	149	222	139	170	23.8
Butachlor	1.00	73.0 (10.8)	57.1 (7.3)	66.3 (6.8)	65.5 (8.3)	150	208	187	182	23.3
Butachlor	1.50	74.6 (10.8)	68.3 (8.7)	63.2 (6.8)	68.7 (8.8)	146	209	196	184	23.7
Butachlor	2.00	72.1 (10.8)	57.1 (7.4)	59.3 (6.6)	62.9 (8.3)	140	205	167	171	23.9
LSD (P=0.05)		11.95 (1.41)	7.98 (0.94)	10.77 (1.07)	8.32 (1.05)	9.6	15.5	11.0	18.9	-

Figures in parentheses are dry matter yield of Persian clover. DAS=Days after sowing.

### Effect on Fodder Quality

The crude protein content increased from 22.6% in weedy check to 23.3-25.6% with weed management treatments (Table 2). The highest crude protein content (25.6%) was recorded due to pendimethalin at 1.5 kg ha<sup>-1</sup> followed by its application at 1.25 and 1.00 kg ha<sup>-1</sup>, butachlor at 2.00 kg ha<sup>-1</sup>, fluchloralin at 0.67 kg ha<sup>-1</sup> and two hand weedings. Weeds utilize 1/3 to 1/2 of applied nitrogen depending upon their type, species and intensity (Walia, 2003). The higher crude protein content in berseem has also been reported by Tiwana *et al.* (2002) with the application of herbicides and hand weeding treatments.

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