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Weed Management in Summer and Kharif Season Blackgram [*Vigna mungo* (L.) Hepper]

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ABSTRACT

Field experiments conducted during summer seasons for four years (2002, 2003, 2004 and 2005) and during **kharif** seasons for three years (2002, 2003 and 2005) showed that unchecked weeds caused a reduction of 41.2 and 41.6% in blackgram yield during the two respective seasons. In summer season, pendimethalin 0.75 kg/ha, pendimethalin 0.45 kg/ha+hand weeding (HW) 25 days after sowing (DAS), fluchloralin 0.675 kg/ha, two HW 25 & 40 DAS and weedy check recorded weed dry matter of 4.87, 3.45, 5.87, 3.40 and 23.6 q/ha and grain yield of 11.47, 11.75, 10.72, 11.95 and 7.02 q/ha with net returns of Rs. 10033, 10035, 9401, 9330 and 4828/ha, respectively. In **kharif** season, the respective treatments had weed dry matter of 4.16, 4.26, 4.93, 2.90 and 20.9 q/ha and grain yield of 10.43, 10.76, 10.60, 11.76 and 6.86 q/ha with net returns of Rs. 8577, 8649, 9233, 9064 and 4604/ha.

Key words : Blackgram, weed competition, economics, fluchloralin, pendimethalin

INTRODUCTION

Blackgram [*Vigna mungo* (L.) Hepper] is an important pulse crop in India. It is grown during summer as well as **kharif** season. Frequent irrigations during summer season and monsoon rains during **kharif** season result in lot of weed population and weed growth in this crop. Unchecked weeds have been reported to cause a considerable reduction in the grain yield of blackgram, which in case of summer blackgram could be 46.0-53.0% (Vaishya *et al.,* 2003; Bhandari *et al.,* 2004; Kumar and Tewari, 2004a), whereas in **kharif** blackgram the losses could be 43.2-64.1% (Chand *et al.,* 2004; Rathi *et al.,* 2004). The critical period of crop-weed competition in case of summer blackgram is 10-40 days after sowing (Kumar and Tewari, 2004b) which in certain situations could be 25-35 days after sowing (Randhawa *et al.,* 2002). Therefore, removal of weeds at appropriate time using a suitable method is essential to obtain high yields of blackgram.

In blackgram, weeds could be controlled by hand weedings (Chand *et al.,* 2004). However, hand weeding is laborious, time consuming, costly and tedious. Moreover, many times labour is not available at the critical period of weed removal. Furthermore, weather conditions (rains) do not permit timely hand weeding due to wet field conditions. Delayed removal of weeds is not as effective in controlling weeds and obtaining higher yields as the timely removal of weeds. Under these conditions, use of herbicides offers an alternative for possible effective control of weeds. Therefore, in the present studies, effect of various herbicides was compared with hand weedings and untreated check for evaluating weed control efficacy obtaining high yields of blackgram grown during summer and **kharif** seasons.

MATERIALS AND METHODS

Field experiments were conducted in the summer seasons for four years (2002, 2003, 2004 and 2005) and in **kharif** seasons for three years (2002, 2003 and 2005) at the Punjab Agricultural University, Ludhiana to study the effect of various weed control treatments on weeds, grain yield of blackgram and the economics involved. Five treatments viz., (i) pendimethalin 0.75 kg/ha (pre-emergence), (ii) pendimethalin 0.45 kg/ha (pre-emergence)+hand weeding (HW) 25 days after sowing (DAS), (iii) fluchloralin 0.675 kg/ha (pre-plant incorporation), (iv) two HW 25 & 40 DAS and (v) weedy check were arranged in a randomized complete block design having three replications in 2002, 2003 and 2004 and four replications in 2005. Herbicides were sprayed with a knap sack sprayer fitted with a flat fan nozzle using 500 litres of water per hectare. Pendimethalin was applied either immediately after sowing or one day after

sowing, whereas fluchloralin was sprayed just prior to sowing. In case of hand weeding, weeding was done using a *khurpa*.

In summer season, variety Mash 414 was sown on 14 April, 2 April, 6 April and 28 March in 2002, 2003, 2004 and 2005, respectively, in rows 22.5 cm apart using a seed rate of 50 kg/ha. In **kharif** season, variety Mash 338 was sown on 10 July, 10 July and 7 July in 2002, 2003 and 2005, respectively, in rows 30 cm apart using a seed rate of 20 kg/ha. The crop was raised as per the PAU recommendations (PAU, 2001).

Data on dry matter of weeds were recorded at harvest. Weed control efficiency (WCE) was calculated. Economics of different weed control treatments was also worked out by taking the selling price of blackgram as Rs. 1400/q.

RESULTS AND DISCUSSION

The major weed flora included *Trianthema portulacastrum, Eleusine aegyptiacum, Digitaria sanguinalis* and *Cyperus rotundus*. Pendimethalin at both the rates of application showed good control of *T. portulacastrum, E. aegyptiacum* and *D. sanguinalis*. Kumar and Tewari (2004a) reported very good control of *Trianthema monogyna* by pendimethalin as this herbicide does not allow the emergence and growth of weed seedlings because of reduced cell division and cell elongation. Fluchloralin was not very effective for the control of *T. portulacastrum*. *C. rotundus* remained uncontrolled with both the herbicides.

Weedy check had the highest weed dry matter, which, on an average, was 23.60 and 20.90 q/ha during summer and **kharif** season, respectively (Table 1). All other treatments were very effective in controlling weeds thereby resulting in significantly lower dry matter of weeds compared with the weedy check. Among these, the treatment of two HW 25 & 40 DAS recorded the lowest weed dry matter in summer as well as **kharif** season. The mean values show that two HW done 25 & 40 DAS had the highest weed control efficiency (85.01 and 84.89%) during both the seasons (Table 2), which was closely followed by pendimethalin 0.45 kg/ha+HW 25 DAS (84.81 and 78.28%) and pendimethalin 0.75 kg/ha (79.12 and 77.52%). Fluchloralin 0.675 kg/ha recorded lowest weed control efficiency. Bhandari *et al.* (2004) reported effective control of weeds with pendimethalin 1.0-2.0 kg/ha, fluchloralin 0.5-1.5 kg/ha and pendimethalin 1.0 kg/ha + HW 25 DAS.

Two HW done 25 & 40 DAS recorded the

Table 1. Effect of weed control treatments on weed dry matter at harvest in blackgram in summer and **kharif** seasons

Treatments	Dose (kg/ha)	Summer season					**Kharif** season			
		Weed dry matter (q/ha)					Weed dry matter (q/ha)			
		2002	2003	2004	2005	Mean	2002	2003	2005	Mean
Pendimethalin	0.750	5.6	3.6	3.5	6.8	4.87	4.1	3.4	5.0	4.16
Pendimethalin+HW 25 DAS	0.450	2.6	2.5	3.1	5.6	3.45	2.6	5.8	4.4	4.26
Fluchloralin	0.675	7.2	4.3	4.4	7.6	5.87	5.2	3.5	6.1	4.93
Two HW 25 & 40 DAS		2.6	2.6	3.2	5.2	3.40	2.0	2.8	3.9	2.90
Weedy check		31.2	18.4	22.8	22.2	23.60	10.7	28.3	23.7	20.90
LSD (P=0.05)		2.7	1.3	1.5	2.0		3.0	4.2	3.1	

Table 2. Weed control efficiency (%) as influenced by weed control treatments in blackgram in summer and **kharif** seasons

Treatments	Dose (kg/ha)	Summer season					**Kharif** season			
		Weed control efficiency (%)					Weed control efficiency (%)			
		2002	2003	2004	2005	Mean	2002	2003	2005	Mean
Pendimethalin	0.750	82.05	80.43	84.64	69.37	79.12	61.71	87.75	83.12	77.52
Pendimethalin+HW 25 DAS	0.450	91.66	86.41	86.40	74.77	84.81	75.09	79.52	80.25	78.28
Fluchloralin	0.675	76.92	76.63	80.70	65.76	75.00	50.92	87.46	74.17	70.85
Two HW 25 & 40 DAS		91.66	85.86	85.96	76.57	85.01	81.22	90.01	83.46	84.89

highest grain yield in all the years except in 2003 (Table 3) when pendimethalin 0.45 kg/ha+HW 25 DAS produced highest grain yield. On the basis of mean data, two HW 25 & 40 DAS recorded the highest (11.95 and 11.76 q/ha) grain yield in summer and **kharif** seasons, which was followed by pendimethalin 0.45 kg/ha+HW 25 DAS (11.75 and 10.76 q/ha). Pendimethalin 0.5 kg/ha+HW 30 DAS provided effective control of weeds and high grain yield of **kharif** season blackgram (Rathi *et al.,* 2004). In **kharif** blackgram, two HW done 20 and 40 DAS provided as high grain yield as the weed-free treatment (Chand *et al.,* 2004). Pendimethalin 1.0-2.0 kg, pendimethalin 1 kg/ha+HW 25 DAS and fluchloralin 0.5-1.5 kg/ha have been reported to provide quite good grain yield of summer blackgram (Bhandari *et al.,* 2004). Similar results have also been reported by Vaishya *et al.* (2003).

As compared to two HW 25 & 40 DAS, the unchecked weeds caused, on an average, 41.2 and 41.6% reduction in grain yield during summer and **kharif** seasons, respectively. Similar grain yield losses due to weeds have been reported by other researchers in summer blackgram (Bhandari *et al.,* 2004) and **kharif** blackgram (Chand *et al.,* 2003; Chand *et al.,* 2004).

Gross returns were the highest in case of 2 HW 25 & 40 DAS during both the seasons (Table 4). Net returns were the highest with pendimethalin 0.45 kg/ha + HW 25 DAS, closely followed by pendimethalin 0.75 kg/ha in summer season and with fluchloralin 0.675 kg/ha in **kharif** season. Weedy check though involved the lowest cost of cultivation yet it provided the lowest net returns.

Table 3. Effect of weed control treatments on the grain yield of blackgram in summer and **kharif** seasons

Treatments	Dose (kg/ha)	Summer season					**Kharif** season			
		Grain yield (q/ha)					Grain yield (q/ha)			
		2002	2003	2004	2005	Mean	2002	2003	2005	Mean
Pendimethalin	0.750	9.0	12.2	11.0	13.7	11.47	9.0	10.6	11.7	10.43
Pendimethalin+HW 25 DAS	0.450	9.8	12.7	11.3	13.2	11.75	11.1	9.2	12.0	10.76
Fluchloralin	0.675	7.7	11.7	10.7	12.8	10.72	10.6	10.2	11.0	10.60
Two HW 25+40 DAS		9.9	12.3	11.9	13.7	11.95	12.3	10.5	12.5	11.76
Weedy check		6.7	5,2	6.1	10.1	7.02	9.4	4.0	7.2	6.86
LSD (P=0.05)		1.1	1.4	1.5	1.7		NS	0.9	1.0	

NS–Not Significant.

Table 4. Economics of different weed control treatments in blackgram in summer and **kharif** seasons

Treatments	Dose (kg/ha)	Rate (Rs./l or per person)	Cost of cultivation (Rs./ha)	Summer season			**Kharif** season		
				Average grain yield (q/ha)*	Gross returns (Rs./ha)**	Net returns (Rs./ha)	Average grain yield (q/ha)***	Gross returns (Rs./ha)**	Net returns (Rs./ha)
(1)	(2)	(3)	(4)	(5)	(6)	(6-4)	(7)	(8)	(8-4)
Pendimethalin	0.750	410	6025	11.47	16058	10033	10.43	14602	8577
Pendimethalin+HW 25 DAS	0.450	410/80	6415	11.75	16450	10035	10.76	15064	8649
Fluchloralin	0.675	405	5607	10.72	15008	9401	10.60	14840	9233
Two HW 25 & 40 DAS		80	7400	11.95	16730	9330	11.76	16464	9064
Weedy check		-	5000	7.02	9828	4828	6.86	9604	4604

*Average grain yield of 2002, 2003, 2004 and 2005.
**Selling price of blackgram @ Rs. 1400/q.
***Average grain yield of 2002, 2003 and 2005.

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