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Short Communication

Chemical Weed Control in Greengram (*Phaseolus radiatus* L.) Grown in Transitional Plains of the Luni River Basin Area of Rajasthan

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Greengram (*Phaseolus radiatus* L.) is extensively grown in Pali, Jalor and Sirohi districts of Rajasthan because of its wide adaptability to agro-climatic conditions and high market value. Being a rainy season crop it is infested with many grass and dicot weeds which pose serious crop-weed competition. Up to 85% reduction in seed yield of greengram due to weeds has been observed. The conventional method of weed control is time consuming, expensive and laborious. It is desirable to use weedicides due to scarcity of human labor during the peak season (Jain *et al.*, 2000). Keeping these facts in view, the effects of chemical weed control measures on weed growth, yield and yield attributes of greengram were studied.

The field experiment was conducted during the rainy season (kharif) of 1998 at Sumerpur (Pali). The soil was sandy loam in texture with pH 8.1. It had low N (128.3 kg ha^{-1}), medium P (13.3 kg ha^{-1}) and high K (395.9 kg ha^{-1}). Five herbicides (two concentrations of each) along with weed free and weedy check (12 treatments) were evaluated (Table 1) in randomized block design, replicated thrice. Greengram K-851 was sown at 30 cm row-to-row spacing in 2nd week of July 1998 using 12 kg seed ha^{-1}. Before sowing, the seeds were inoculated with *Rhizobium* culture @ 150 g kg^{-1} seed. The crop received the recommended dose of 20 kg N and 40 kg P_2O_5 ha^{-1} at sowing. Weed control operations were done as per treatments. Herbicides were sprayed with flat fan nozzle using water @ 500 L ha^{-1}. Prophylactic measures were taken against insect and disease attack by spraying Dimecron (0.03%) and Dithane M 45 (0.2%) at peak flowering stage of crop growth.

The population and dry weight of weeds were recorded at 60 DAS with the help of 50 x 50 cm quadrat. The common weed species found in the field were *Cyperus iria*, *Digera arvensis* (L.), *Cynodon dactylon*, *Phyllanthus niruri* L., *Echnochloa crusgalli* (L.) Beauv., *Commelina bengalensis* L., *Acalypha indica* L., *Cyperus rotundus* L. The weed control efficiency (WCE) and weed competition index (WCI) were worked out by the formula suggested by Mani *et al.* (1973) and Gill and Kumar (1969), respectively.

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Table 1. Effect of weed control treatments on yield contributing characters, seed yield, weed population, weed dry matter, WCE and WCI of greengram

Treatments	Pods/ plant	Seeds/ pod	Seed yield (kg ha^{-1})	Net returns (Rs. ha^{-1})***	Weed population (m^2)	Weed dry weight (kg ha^{-1})	WCE (%)	WCI (%)
Alachlor 1.50 kg ha^{-1}*	20.0	9.3	680	6080	40	259	79.4	6.84
Alachlor 2.00 kg ha^{-1}*	24.3	10.5	730	6880	30	200	84.1	0.00
Pendimethalin 1.50 kg ha^{-1}*	18.4	8.0	593	4688	54	275	78.1	18.76
Pendimethalin 2.00 kg ha^{-1}*	21.3	9.8	690	6240	42	270	78.5	5.47
Metolachlor 0.75 kg ha^{-1}*	16.4	7.5	580	4480	49	315	74.9	20.54
Metolachlor 1.00 kg ha^{-1}*	18.3	8.9	676	6016	52	280	77.7	7.39
Trifluralin 0.75 kg ha^{-1}**	20.7	8.2	573	4368	42	240	80.9	21.50
Trifluralin 1.00 kg ha^{-1}**	24.5	9.9	726	6816	31	232	81.5	0.54
Fluchloralin 0.75 kg ha^{-1}**	20.3	7.3	566	4256	56	258	79.5	22.66
Fluchloralin 1.00 kg ha^{-1}**	18.4	8.5	646	5536	46	237	81.1	11.50
Weed-free check	26.9	11.7	730	5750	0.0	0.0	100.0	0.00
Weedy check	12.0	5.4	456	3096	149	1258	–	37.53
S.Em±	1.25	0.40	38	–	2.01	15.3	–	–
CD (P = 0.05)	3.61	1.18	118	–	6.02	45.4	–	–

* Pre-emergence; ** pre-plant incorp; and *** Sale price of greengram: Rs. 15.00 kg^{-1}; cost of cultivation (weed free plot): Rs. 5200 ha^{-1}.

The weed population and weed dry matter were significantly suppressed by 119 m^{-2} and 1058 kg ha^{-1} with Alachlor pre-emergence (@ 2.00 kg ha^{-1}), respectively, over weedy check. Pre-plant incorporation of Fluchloralin @ 1.00 and 0.75 kg ha^{-1} also suppressed the weed dry matter significantly over weedy check, while fluchloralin at 1 kg ha^{-1} recorded significantly lower weed population as compared to flucloralin at 0.75 kg ha^{-1}.

Among different weedicides and their doses tried the maximum WCI (84.1%) was observed with Alachlor pre-emergence @ 2.0 kg ha^{-1}, closely followed by Trifluralin pre-plant incorporation @ 1.00 kg ha^{-1} (81.1%). When the dose of Alachlor was reduced from 2.0 to 1.5 kg ha^{-1}, the WCE was reduced by 4.70%. The extent of reduction in WCE was only 0.6% when the dose of Trifluralin was reduced from 1.00 to 0.75 kg ha^{-1}. In soybean, Jain *et al.* (2000) reported that two hand weedings, resulted in maximum WCE closely followed by Alachlor @ 1.00 and 1.50 kg ha^{-1}, Pendimethalin and Fluchloralin. Alachlor and Trifluralin not oly effectively controlled the weeds, but WCE was also high.

All herbicidal treatments gave higher number of pods/plant, seeds/pod and seed yield (Table 1). However, the maximum yield attributing traits were recorded in weed-free check and the lowest in weedy check. The maximum seed yield (730 kg ha^{-1}) and net returns (Rs. 6880 ha^{-1}) were recorded with Alachlor pre-emergence @ 2.00 kg ha^{-1}, closely followed by Trifluralin pre-plant incorporation @ 1.00 kg ha^{-1} and Pendimethalin pre-emergence @ 2.00 kg ha^{-1}. The lowest yield (456 kg ha^{-1}) was registered under unweeded check, which was poorer than Alachlor pre-emergence @ 2.00 kg ha^{-1}, Trifluralin pre-plant incorporation @ 1.00 kg ha^{-1} and Pendimethalin pre-emergence @ 2.00 kg ha^{-1} by 274, 270 and 234 kg ha^{-1}, respectively. Effectiveness of Alachlor and Pendimethalin in controlling weeds of greengram and other pulse crops has been reported by many workers (Jain *et al.*, 2000; Balyan *et al.*, 1988). The higher yield under weed-free check and Alachlor treatment may be attributed to lower dry matter accumulation by weeds and significant decrease in their population, which in turn increased the yield attributes and economic yield. The WCI under weed free check and Alachlor pre-emergence @ 2.00 kg ha^{-1} was nil and in Trifluralin (1.00 kg ha^{-1}) pre-plant incorporation, it was only 0.54%. Reduction in dose of Alachlor and Pendimethalin from 2.00 to 1.50 kg ha^{-1} in increased the WCI by 6.84 and 13.29%, respectively. Similarly when the doses of Metolachlor, Trifluralin and Fluchloralin were reduced from 1.00 to 0.75 kg ha^{-1}, the WCI increased by 13.15, 20.96 and 11.16%, respectively. It shows that weeds were not controlled effectively at lower doses of weedicides which ultimately resulted in lower yields and increase in weed dry matter.

It is concluded that application of Alachlor pre-emergence @ 2.00 kg ha^{-1} is the best and pre-plant incorporation of Trifluralin @ 1.00 kg ha^{-1} is the next best to check weed growth in greengram.

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