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Efficacy of pendimethalin in soybean (*Glycine max*)

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ABSTRACT

A field experiment was conducted during the rainy season of 1996 and 1997 to study the efficacy of pendimethalin in controlling weeds in 'JS 72-280' soybean [*Glycine max* (L.) Merr.]. Weed population and weed dry matter were lowest and weed-control efficiency was higher in weed-free treatment, followed by 2 hand-weedings and pendimethalin 5G@ 1.25 kg/ha. The highest seed yield was recorded with weed-free treatment which was at par with 2 hand-weedings and pendimethalin 30 EC @ 1 kg/ha.

Key words : Pendimethalin, Granular, Emulsified concentration

Soybean being an important crop of Madhya Pradesh, is infested by many grassy and dicot weeds which pose serious crop–weed competition especially during initial growth period and result in decline in its productivity. Chandel (1989) and Tiwari and Kurchania (1990) observed 59–85% reduction in the grain yield of soybean due to weeds.

It is generally sown with the onset of monsoon. As such at sowing time the availability of water for weedicide spray and other agricultural use is very much restricted, creating an obstacle in adoption of weedicide in emulsified form. Pendimethalin in emulsified form has broad spectrum for weed control. The study was therefore undertaken to estimate efficacy of pendimethalin in granular form compared to emulsified form of pendimethalin and granular form of alachlor for weed control in soybean.

MATERIALS AND METHODS

The field experiment was conducted during the rainy season (*kharif*) of 1996 and 1997 at Sehore, with 'JS 280' ('Durga') soybean. Soil was medium heavy black, clay loam texture, having pH 7.8 and 7.6, organic carbon 0.62 and 0.86%, available phosphorus 15.66 and 17.22 kg/ha, and available K 498 and 510 kg/ha in 1996 and 1997 respectively. Eight treatments consisting of pre-emergence (PE) application of pendimethalin @5 G 0.75 kg/ha, 1.0 kg/ha, 1.50 kg/ha; pendimethalin 30 EC 1.0 kg/ha; alachlor 2.50 kg/ha; weed-free; 2 hand-weedings; and weedy check

were laid out in randomized block design with 3 replications. The crop received the recommended dose of 20 kg N, 60 kg P_2O_5 and 20 kg K_2O/ha at sowing. Weed count data recorded at 50 days were subjected to square-root transformation ($\sqrt{x + 0.05}$) before statistical analysis.

RESULTS AND DISCUSSION

Dominant weeds

The most dominant weed species infesting soybean were : *Cyperus rotundus* L. (15.04%), *Caesulia axillaris* Roxb. (28.14%), *Digitaria sanguinalis* (L.) Scop. (12.16%), *Echinochloa colonum* Link. (18.77%) and *Corchorus* sp. (6.48%) recorded at 50 days.

Weed density

At 50 days the highest number of weeds was recorded in weedy check, which was significantly more than all other treatments, whereas the lowest number of weeds was recorded in weed-free treatment, followed by 2 hand-weedings (Table 1). Out of 5 herbicidal treatments, application of pendimethalin 1.25 kg/ha in granular form was more effective in reducing the weed population and was at par with application of alachlor 10 G 2.50 kg/ha. Singh and Chandel (1995) also reported response of

Table 1. Effect of weed-control treatments on weed density, weed dry weight, weed-control efficiency and weed-competition index at 50 days after sowing (mean data of 2 years)

Treatment	Weed density (m^2)	Weed dry weight (kg/ha)	Weed-control efficiency (%)	Weed-competition index
Pendimethalin 5 G 0.75 kg/ha PE	116.3 (10.8)	642.9 (7.8)	24.7	29.4
Pendimethalin 5 G 1.00 kg/ha PE	106.6 (10.3)	565.1 (7.38)	33.8	20.3
Pendimethalin 5 G 1.25 kg/ha PE	88.6 (9.4)	453.38 (6.70)	46.9	15.4
Alachlor 10 G 2.50 kg/ha PE	90.77 (9.5)	500.2 (6.98)	41.4	15.5
Pendimethalin 30 EC 1.00 kg/ha PE	95.2 (9.8)	534.9 (7.19)	37.3	10.7
Weed-free	14.27 (3.8)	142.9 (3.78)	83.3	
2 hand-weedings at 25, 40 DAS	38.5 (6.2)	217.3 (4.6)	74.5	4.3
Weedy (check)	204.9 (14.32)	853.4 (9.1)		43.3
CD (P = 0.05)	(0.82)	(0.78)		

G, Granular; PE, pre-emergence; EC, emulsified concentration; DAS, days after sowing
Figures in parentheses refer to $\sqrt{x+0.05}$ transformation

weeds to herbicides.

Weed dry weight

In general, the dry-matter weight of weeds increased with weed population. The highest dry matter of weeds was recorded under weedy check 50 days after sowing (Table 1). At 50 days, the lowest weed dry weight was found with weed-free treatment, followed by 2 hand-weedings, because of the weed removal. Out of the herbicides, pendimethalin 5 G @ 1.25 kg/ha resulted in the maximum reduction in dry matter of weeds and was at par with pendimethalin @ 1.0 kg/ha either applied as emulsion or granular form and alachlor 2.50 kg/ha.

Weed-control efficiency and weed-competition index

The highest weed-control efficiency was found in weed-free, followed by 2 hand-weedings and pendimethalin 5 G 1.25 kg/ha. The lowest weed-control efficiency was recorded with pendimethalin 5 G 0.75 k/ha.

Two hand-weedings recorded the less weed-competition index, followed by pendimethalin 30 EC @ 1.0 kg/ha. The highest weed competition was noted in weedy check. Ved Prakash *et al.* (1991) and Dubey *et al.* (1996) reported the weed-control practices increase the weed-control efficiency and lower the weed biomass and weed-competition index.

Yield attributes

The yield-contributing characters, viz. pods/plant, seeds/pod and seed index, were significantly affected by different weed-control treatments (Table 2). All the attributes recorded higher values with weed-

Table 2. Effect of weed-control treatments on yield attributes and yield of soybean

Treatment	Pods/plant		Seeds/pod		Seed index (g)		Seed yield (kg/ha)		
	1996	1997	1996	1997	1996	1997	1996	1997	Pooled
Pendimethalin 5 G 0.75 kg/ha PE	15.3	18.3	1.9	2.0	8.6	11.3	1,200	1,500	1,350
Pendimethalin 5 G 1.00 kg/ha PE	19.8	21.8	2.5	2.5	8.9	11.4	1,415	1,633	1,524
Pendimethalin 5 G 1.25 kg/ha PE	20.7	22.1	2.6	2.7	9.0	11.8	1,544	1,687	1,616
Alachlor 10 G 2.50 kg/ha PE	21.3	20.6	2.7	2.4	8.7	11.5	1,622	1,607	1,614
Pendimethalin 30 EC 1.00 kg/ha PE	21.0	25.1	2.5	2.9	9.0	12.4	1,544	1,867	1,706
Weed -free	24.5	30.4	2.9	3.0	9.6	13.2	1,689	2,133	1,911
2 hand weedings 25, 40 DAS	21.7	28.2	2.7	2.8	9.1	12.9	1,551	2,107	1,829
Weedy (Check)	11.1	15.3	1.3	1.5	8.1	10.5	967	1,200	1,084
CD (P = 0.05)	4.1	3.8	0.3	0.5	0.45	1.23	202	266	248

G Granular; PE, pre-emergence; EC, emulsified concentration; DAS, days after sowing

free treatment and were significantly more than that of weedy check. Angiras and Rana (1995) reported that weed-free environment helped for better plant development.

Grain yield

During both the years and in pooled analysis, the highest grain yield was recorded in weed-free treatment followed by 2 hand-weedings treatment. The result supports the findings of Sharma *et al.* (1991). Among the herbicides, on the basis of pooled data, pendimethalin 30 EC @ 1.0 kg/ha recorded significantly higher grain yield than weedy check and application of pendimethalin 5 G @ 0.75 kg/ha was on par with alachlor 10 G @ 2.50 kg/ha and other pendimethalin treatments.

REFERENCES

Angiras, N.N. and Rana, M.C. 1995. Dose and time of application of imazethapyr for weed control in soybean (*Glycine max*). *Indian Journal of Agronomy* **40** (1) : 59–63.

Chandel, A.S. 1989. Soybean productivity constraints in North-West plains. An Agronomist's view. (*in*) *World Soybean Research Conference* IV, pp. 672–676.

Dubey, M.P., Sharma, R.S. and Khare, J.P. 1996. Integrated weed management in soybean *(Glycine max). Indian Journal of Agronomy* **41** (1) : 69–73.

Sharma, R.K., Bangar, K.S., Kanare, G., Singh, O.P., Thakur, G.L. and Sharma, S.R. 1991. Effect of weed control on yield of soybean [*Glycine max.* (L.) Merr.]. *Indian Journal of Agronomy* **37** (2) : 372–373.

Singh, Manjeet and Chandel, A.S. 1995. Effect of weed control methods on soybean *(Glycine max.). Indian Journal of Agronomy* **40** (1) : 55–58.

Tiwari, J.P. and Kurchania, S.P. 1990. Survey and management of weeds in soybean (*Glycine max*) ecosystem in Madhya, Pradesh. *Indian Journal of Agricultural Sciences* **60** (10) : 672–676.

Ved Prakesh, Prasad, Kamta and Singh, Prem. 1991. Chemical weed control in soybean. *Indian Journal of Science* **23** (1, 2) : 29–31.