

Efficacy of Herbicides Against Weeds in Rainfed Soybean [*Glycine max* (L.) Merrill] under Vindhyan Plateau of Madhya Pradesh

S. S. Kushwah and M. D. Vyas

J N K V V R. A. K. College of Agriculture, Sehore (M. P.), India

ABSTRACT

Post-emergence application of imazethapyr at 75 g ha⁻¹ reduced the population of *Caesulia axillaris*, *Anotis monthulani* and *Aclypha indica* significantly as compared to all pre- and rest of the post-emergence herbicides under investigation. Quizalofop-ethyl 5 EC at 50 g ha⁻¹ was significantly effective against *Commelina benghalensis* and *Echinochloa colona*. The lowest weed biomass was recorded with two hand weeding 20 and 40 DAS followed by imazethapyr at 75 g ha⁻¹ and quizalofop-ethyl 5 EC at 50 g ha⁻¹. Two hand weeding (at 20 and 40 DAS) and imazethapyr at 75 g ha⁻¹ were most appropriate treatments in terms of reduction in total weed density and increase in soybean yield.

INTRODUCTION

Soybean has witnessed phenomenal growth in processing and trade in last few years in India and has revolutionized the rural economy and improved socio-economic status of the farmers. Being a rainy season crop, it suffers severely due to competition stress of weeds, which results in reduction of yield upto 77% (Tiwari and Kurchania, 1990). Weed management through manual weeding and hoeing, though effective, is not free from several limitations such as unavailability of adequate labourers during weeding peaks and difficulty in the use of mechanical weeders in heavy soils due to incessant rains. The only alternative, therefore, seems to be application of suitable herbicides, which could provide an effective control against weeds during critical phase of crop growth. Keeping in view the above, the present experiment was conducted to study the efficacy of various pre-emergence and post-emergence herbicides against weeds in soybean.

MATERIALS AND METHODS

A field experiment was conducted during rainy seasons of 2001 and 2002 at R. A. K. College of Agriculture, Sehore. The experiment was laid out in randomized block design with three replications and 14 treatments. Treatments constitute the various

doses of alachlor, metolachlor (two formulations), quizalofop-ethyl, quizalofop-p-tefuryl, imazamox, imazethapyr, hand weeding and weedy check (Table 1). Post-emergence herbicides viz., quizalofop-ethyl, quizalofop-p-tefuryl and imazamox are of different chemical molecules. Among pre-emergence herbicides, S-metolachlor belongs to Acetanilide group and available in market with the trade name of Dual Gold. It is primarily absorbed by soil clay and organic colloidal particles, therefore, it is not leached in most of the soils. Alachlor, metolachlor and S-metolachlor were applied just after sowing, whereas other herbicides were sprayed at 23 DAS, using flat jet nozzle at spray volume of 600 l ha⁻¹. The soil of the experimental site was clayey in texture and neutral in reaction (pH 7.50) with medium N (214.2 kg ha⁻¹), P (16.20 kg ha⁻¹) and K (290 kg ha⁻¹). Soybean variety JS 335 was sown in rows 45 cm on June 17 and 30 in 2001 and 2002, respectively. A uniform basal dose of N, P₂O₅ and K₂O at 20, 60 and 20 kg ha⁻¹ was applied at the time of sowing. The recommended package of practices was followed.

RESULTS AND DISCUSSION

Effect on Weeds

The weed flora of the experimental area prominently comprised *Caesulia axillaris*,

Table 1. Effect of treatments on weed density at 60 DAS stage in soybean (Pooled for two crop seasons)

Treatment	Dose (g ha ⁻¹)	Weed density (No. m ⁻²)						
		<i>C. axillaris</i>	<i>C. benghalensis</i>	<i>E. colona</i>	<i>C. species</i>	<i>D. sanguinalis</i>	<i>A. monthulani</i>	
Alachlor 50 EC	2000	25	10	6	10	5	7	5
Metolachlor 50 EC	1000	27	11	6	11	5	7	6
S-metolachlor 90 EC	500	34	7	2	10	8	6	5
S-metolachlor 90 EC	750	29	7	2	9	6	5	4
Quizalofop-ethyl 5%	38	33	8	2	10	4	6	3
Quizalofop-ethyl 5%	50	27	6	3	8	3	5	3
Quizalofop-p-tefuryl 4%	50	31	8	7	11	7	6	7
Quizalofop-p-tefuryl 4%	60	28	7	6	8	6	5	6
Imazamox 70%	40	13	10	16	10	10	7	5
Imazamox 70%	60	16	12	16	8	10	4	4
Imazethapyr 10%	75	8	7	3	4	5	2	3
One hand weeding at 20 DAS	-	5	5	2	3	3	1	2
Two hand weedings at 20 and 40 DAS	-	1	3	1	1	1	1	0
Weedy	-	65	31	40	35	36	12	9
LSD (P=0.05)	-	4	2	2	1	2	1	1

Table 2. Effect of treatments on total weed density, weed biomass and grain yield of soybean (Pooled for two crop seasons)

Treatment	Dose (g ha ⁻¹)	Total density (No. m ⁻²)	Weed biomass (g m ⁻²)	Soybean grain yield (kg ha ⁻¹)
Alachlor 50 EC	2000	82	38.2	1140
Metolachlor 50 EC	1000	89	53.8	950
S-metolachlor 90 EC	500	94	54.9	970
S-metolachlor 90 EC	750	77	47.7	1120
Quizalofop-ethyl 5%	38	83	59.1	1050
Quizalofop-ethyl 5%	50	62	45.5	1170
Quizalofop-p-tefuryl 4%	50	92	72.1	1100
Quizalofop-p-tefuryl 4%	60	79	69.4	1120
Imazamox 70%	40	89	72.9	1070
Imazamox 70%	60	82	61.0	1130
Imazethapyr 10%	75	40	25.4	1250
One hand weeding at 20 DAS	-	36	8.5	1200
Two hand weedings at 20 and 40 DAS	-	12	5.8	1330
Weedy	-	269	157.7	860
LSD (P=0.05)		18	5.2	94

Echinochloa colona, *Cyperus iria*, *Cyperus rotundus*, *Commelina benghalensis*, *Digitaria sanguinalis* and *Acalypha indica* constituting, on an average, 24.6, 15.2, 13.5, 13.0, 11.8 and 4.8% of total weed flora, respectively (Table 1). The infestation of narrow-leaved weeds and sedges was more than that of broad-leaved weeds. Maximum weed infestation was observed in weedy check. At 60 DAS two hand weedings recorded significantly lowest density of all prominent weeds (Table 1).

Imazethapyr at 75 g ha⁻¹ was effective against both monocot and dicot weeds and was at par with one hand weeding done at 20 DAS, however, it was more effective against grassy weeds. Quizalofop-ethyl, quizalofop-p-tefuryl and imazamox were effective only against monocot weeds and less effective on broadleaf weeds. Quizalofop-ethyl 5 EC at 50 g ha⁻¹ was most effective against grassy weeds (Table 1).

Two hand weedings recorded significantly less weed population than all other treatments followed by one hand weeding. Among the herbicides, post-emergence application of imazethapyr at 75 g ha⁻¹ and quizalofop-ethyl 5 EC at 50 g ha⁻¹ significantly lowered total weed density than other herbicidal treatments.

Significantly lowest dry weed biomass was recorded with two hand weedings. Among herbicides, imazethapyr at 75 g ha⁻¹ gave significantly less weed biomass than other herbicides (Table 2).

Effect on Crop

Two hand weedings at 20 and 40 DAS significantly increased the yield of soybean by 54.6% over weedy check due to lower weed competition and almost weed-free environment received by the soybean crop. Among the herbicides post-emergence application of imazethapyr at 75 g ha⁻¹ and quizalifop-ethyl 5 EC at 50 g ha⁻¹ enhanced the grain yield by 45.3 and 36.0%, respectively, over the weedy check. Also the post-emergence application of imazethapyr at 75 g ha⁻¹ was statistically at par with one and two hand weedings.

REFERENCE

- Tiwari, J. P. and S. P. Kurchania, 1990. Survey and management of weeds in soybean (*Glycine max*) ecosystem in Madhya Pradesh. *Indian J. agric. Sci.* **60** : 672- 676.