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Comparative efficacy of *S*-metolachlor for weed control in soybean (*Glycine max*)

P.B. SHARMA AND R. UMAT

Krishi Vigyan Kendra, Jawaharlal Nehru Krishi Vishwavidyalaya Aron Guna, Madhya Pradesh

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ABSTRACT

A field experiment was conducted at the Zonal Agricultural Research Station, Powarkheda, Hoshangabad, Madhya Pradesh during the rainy seasons of 1999 and 2000, to evaluate bioefficacy of *S*-metolachlor for weed control in soybean. [*Glycine max* (L.) Merr.]. *S*-metolachlor @ 500 and 750 g/ha resulted in effective control of grassy weeds and *Commelina* sp. but it showed no effect on sedges and dicot weeds. However, among different herbicide tretments alachlor @ 2,000 g/ha and *S*-metolachlor @ 500 and 750 g/ha proved quite promising alternative to hand-weeding for weed control in soybean.

Key words : Soybean, *S*-metolachlor, Alachlor, Pendimethalin, Fluchloralin.

Multifarious weed menace is the most important factor responsible for lower seed yield of soybean [*Glycine max* (L.) Merill] in Madhya Pradesh. In this crop, yield reductions are noted to the extent of 30 to 87% (Tiwari and Kurchania, 1990; Sharma, 1990). Monocropping of soybean and weather conditions congenial for several weeds as well as inadequate weed-control measures are the major reasons for this situation. Severe infestation of insects in the weedy fields of soybean has become a common feature in the state. Though hand-weeding is the most efficient, it is not feasible on account of cost involved, area coverage and weather conditions. Under such a situation, use of weedicides is only the answer for this problem. Each herbicide has its own spectrum of weed control which leads to its efficacy and use in the field. A study was undertaken to evaluate tolerance of soybean to *S*-metolachlor and to judge the efficacy of *S*-metolachlor as a pre-emergence herbicide against different weed groups.

MATERIALS AND METHODS

The field experiment was conducted at Zonal Agricultural Research Station, Powarkheda, Hoshangabad, Madhya Pradesh, during the rainy seasons of 1999 and 2000. The soil was deep Vertisol, having low, medium and high available N, P_2O_5 and K_2O, respectively, with pH 7.6. There were 8 treatments, viz *S*-metolachlor 250, 500 and 750 g. a.i./ha fluchloralin; 1,200 g a.i./ha, alachlor 2,000 g a.i./ha, hand-weeding twice and untreated control. All the herbicides were applied as pre-emergence except fluchloralin (pre-plant incorporation) in aqueous solution @ 550 litres/ha. Hand-weeding was done at 20 and 40 days after sowing. The experiment was laid out in randomized block design with 3 replications. Soybean variety 'JL 90-41' was drilled in rows 30 cm apart, using 80 kg seed/ha, on 7 and 9 July during 1999 and 2000 respectively. The crop was given a fertilizer dose of 20, 60, 20 kg of N, P_2O_5, K_2O/ ha, respectively, during both the years. Regular observations were made to record the herbicidal effect on weeds and crop.

RESULTS AND DISCUSSION

Weeds

During 1999, the experimental field was infested by *Echinochloa crus-galli, Dinabra arabica, Digitaria sanguinalis, Cyperus rotundus, Commelina benghalensis, Euphorbia geniculata* and some other broad-leaf weeds.The grasses contributed 52% of the total weed intensity at 25 days stage. In 2000, *Caesulia axillaris* and *Acalypha indica* constituted major part (39%) of dicot weeds. The intensity of grassy weeds was significantly reduced under all of the treatments when compared to that under control (Table 1). Application of *S*-metolachlor @ 500 and 750 g/ha appeared consistently better than that @ 250 g/ha during both the years. Among different herbicide treatments, *S*-metolachlor at both of higher doses registered significant reduction in the intensity of *Commelina* sp. also. As regards the sedges and broad-leaf weeds excepting fluchloralin and pendimethalin against *Acalypha* sp. none of the herbicide treatments had significant effect on *Cyperus rotundus, Euphorbia geniculata, Acalypha indica, Caesulia axillaris* and other broad-leaf weeds.

All the treatments resulted in significant reduction in the biomass of grasses compared with the control (Table

1) *S*-metolachlor at 750 g/ha proved more effective than its lower doses. The biomass of *Cyperus rotundus* under *S*- metolachlor 750 g/ha - treated plots was found considerably lower than other herbicide treatments . In the visual observation also, this herbicide was found to have adverse effect on the growth of *Cyperus*. In reducing the biomass of *Commelina benghalensis*, *S*- metolochlor @ 750 and 500 g/ha proved quite efficient which were clsosely followed by alachlor 2,000, hand -weeding twice and *S*- metolachlor 250 g/ha; whereas fluchloralin and pendimethalin proved ineffective. None of the herbicides could have significiant influence on the biomass of *Euphorbia geniculata*, *Acalypha indica, Caesulia axillaris* and other broad- leaf weeds.

Soybean growth and yield

There was no phytotoxic effect on soybean crop under any herbicidal treatment. Plant population, plant height, branches /plant and 100 seed weight under different treatments did not differ significantly (Table 2) Pods/plant were significantly affected by weed competition and the value was lowest under the control. Hand-weeding twice resulted in the maximum yield of 12.17 and 18.56 q/ha in the consequtive years on account of repeated removal of weeds. During 1999 the seed yield with *S*-metolachlor 500 (10.88 q/ha) *S*-metolachlor 750 (11.18 q/ha) and alachlor 2000 (11.69 q/ha) showed parity to that under hand-weeding twice, and significant superority to the control (8.54 q/ha). In the year 2000, except pendimethalin 1,000,

Table 1. Intensity (per m²) and dry matter accumulation (g/m²) of different weed species under different treatments at 25 DAS. (days after sowing)

Treatment (g a.i./ha)	Grass		Cyperus rotundus		*Commelina* spp.	*Euphorbia* geniculata	*Acalypha* indica	*Caesulia* axillaris	*Other borad* leaf weeds	
	1999	2000	1999	2000	1999	1999	2000	2000	1999	2000
Weedy check	89	100	36	21	25	12	25	89	09	49
	(57.1)	(41.4)	(8.9)	(14.2)	(9.7)	(7.2)	(5.7)	(12.7)	(8.4)	(14.4)
S- metolachlor 250	35	33	37	25	14	09	23	77	08	52
	(20.8)	(3.3)	(8.1)	(11.3)	(3.3)	(9.5)	(4.5)	(17.1)	(10.2)	(10.9)
S- metolachlor 500	17	22	32	20	04	18	21	68	08	54
	(11.0)	(1.1)	(5.1)	(12.0)	(0.8)	(10.6)	(3.4)	(24.9)	(10.9)	(10.8)
S- metolachlor 750	16	19	31	24	05	12	18	79	05	49
	(5.6)	(0.9)	(4.5)	(7.9)	(0.7)	(17.1)	(2.8)	(31.5)	(10.3)	(11.4)
Fluchloralin 1200	34	05	26	23	28	11	08	51	06	22
	(32.8)	(0.3)	(11.1)	(24.1)	(19.6)	(20.0)	(3.6)	(16.7)	(12.6)	(5.2)
Pendimethalin 1000	19	01	30	39	57	18	13	59	07	23
	(9.4)	(0.1)	(14.2)	(21.1)	(26.3)	(14.6)	(5.2)	(22.9)	(10.3)	(9.6)
Alachlor 2000	33	17	35	16	09	13	15	66	07	38
	(15.2)	(2.9)	(12.5)	(8.3)	(1.2)	(9.5)	(5.7)	(21.5)	(7.8)	(6.7)
Hand weeding	07	65	12	12	02	04	07	47	07	25
Twice	(9.7)	(0.2)	(2.9)	(1.5)	(1.8)	(2.7)	(0.3)	(0.3)	(4.7)	(1.9)
CD (P=0.05)	16.7	15	14.7	12	19.9	7.8	11	26	NS	16
	(10.1)	(19.6)	(NS)	(10.5)	(8.6)	(6.7)	(NS)	(NS)	(NS)	(3.9)

Figures in parentheses indicate dry-matter accumulation

Table 2. Plant stand, growth, yield attributes and seed yield of soybean under different treatments

Treatment g a.i./ha	Plant population (m²)		Plant height (cm)		Branches/ plant		Pods/ plant		100-seed weight (g)		Seed yield (q/ha)		Mean
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	
Weedy check	32	24	57	73	3.2	0.9	17	18	8.1	9.1	8.54	13.70	11.12
S- metolachlor 250	32	22	58	65	2.6	1.2	22	21	8.1	8.9	10.53	15.33	12.93
S- metolachlor 500	36	20	57	64	2.9	0.8	20	22	8.0	9.1	10.88	17.61	14.25
S- metolachlor 750	30	20	61	63	3.1	0.9	24	22	7.9	8.9	11.18	16.69	13.94
Fluchloralin 1200	30	20	60	67	3.1	1.5	23	25	7.9	9.5	9.33	17.87	13.60
Pendimethalin 1000	36	19	60	60	3.7	1.2	23	22	7.9	9.0	10.53	14.81	12.67
Alachlor 2000	33	23	59	60	3.1	1.3	24	21	7.9	9.3	11.69	16.83	14.26
Hand- weeding Twice	31	19	56	67	3.5	1.3	24	24	7.8	9.2	12.17	18.56	15.37
CD (P= 0.05)	NS	NS	NS	NS	NS	NS	3	4	NS	NS	1.47	2.23	

all the treatments yielded significantly more than the control (13.70 q/ha). Among herbicide treatments, fluchloralin 1,200 gave maximum yield of 17.87 q/ha which was closely followed by *S*-metolachlor 500 (17.61 q/ha), alachlor 2000 (16.83 q/ha) and *S*-metolachlor 750 (16.69 q/ha). All these treatments showed statistical parity to the hand-weeding twice for seed yield. The results are in conformity to that reported by Joshi and Billore (1997) and Jain *et al.,* (2000). However, among different herbicides the mean seed yields under alachlor 2000 (14.26 q/ha), *S*-metolachlor 500 (14.25 q/ha) and S- metolachlor 750 (13.94 q/ha) were considerably higher than others.

REFERENCES

Jain, V.K., Chauhan, Y.S., Bhargava, M.K. and Sharma, A.K. 2000. Chemical weed control in soybean (*Glycine max* L). *Indian Journal of Agronomy* **5** (1) : 153–157.

Joshi, O.P. and Billore, S.D. 1997. Chemical and cultural weed control in soybean. *Journal of Oilseeds Research.* **14** (2) : 321–323.

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

Sharma, P.B. 1990. Studies on the effect of cultural and chemical control methods of Kharif weeds in Tawa command area. Ph.D. Thesis. Dr. H.S. Gaur University Sagar. Madhya Pradesh.