

Weed Management in Soybean on Black Soils of Northern Transitional Track of Karnataka*

T. T. BANDIWADDAR AND C. J. ITNAL

Department of Agronomy,
University of Agricultural Sciences, Dharwad - 580 005

(Received : November, 1997)

Abstract: Field experiment conducted on black soils at the Main Research Station, University of Agricultural Sciences, Dharwad during *Kharif* 1996 to study the weed management in soybean (*Glycine max* (L.) Merrill) indicated that weedy check had the highest weed dry weight (20.95 kg/ha) with the lowest weed control efficiency and yield of soybean while, the highest weed control efficiency was observed with two intercultivations + two hand weedings followed by alachlor @ 2.0 Kg a.i./ha (86.45%). Weed free check recorded the highest seed yield (2220 Kg/ha) followed by two intercultivation + two hand weedings (2026 Kg/ha) consequent to the better yield attributes.

Introduction

One of the production constraint in achieving the high productivity of the soybean appears to be the competition of weeds in areas of assured rainfall in *Kharif*. Presence of weed lowers the yields of crop by competing with them for space, moisture, light, nutrient etc. Chandel (1989) observed 59-85 per cent reduction in the grain yield of soybean due to competition of weeds. In view of the area under soybean increasing at rapid rate in Karnataka and the competition due to weeds in *Kharif*, the present investigation was undertaken to find out the suitable weed control methods for *Kharif* grown Soybean in the transitional track of Dharwad under rainfed conditions.

Material and Methods

The field experiment was conducted during *Kharif* 1996 at the Main research station, University of Agricultural Sciences, Dharwad on black soils having a pH 7.7, organic carbon 0.58 per cent, available N 180.90 Kg ha⁻¹, available P₂O₅ 32.50 Kg ha⁻¹ and available K₂O 386.0 Kg ha⁻¹. The experiment was conducted in a randomised block design with three replications. The treatment details are presented in Table 1.

Soybean (Pusa-40) was sown on 22nd June 1996 using 75 Kg seeds/ha. Crop was fertilized with 25-37-25 Kg NPK per ha

respectively. Weed control operations were done as per the treatments. Periodical observations on weeds and soybean growth were recorded. Data on Seed dry weight showed high variation and hence the values of the weed dry weight were transformed using $\sqrt{x+0.5}$ as suggested by Singh *et al.* (1995). The results were statistically analysed as suggested by Sundararaj *et al.* (1972) and the results have been discussed at the probability level of 5 per cent.

Results and Discussion

The highest weed dry weight was found in a weedy check (20.95 Kg ha⁻¹) which was significantly higher than any of the treatments (Table 1). Two intercultivations + two hand weedings recorded the lowest weed dry weight (8.18 Kg ha⁻¹) due to effective removal of weeds at 30 and 45 DAS. Among the herbicide treatments, pre-emergence applications of alachlor @ 2.0 Kg a.i./ha exhibited the lowest weed dry weight (10.18 Kg/ha) followed by pendimethalin @ 1.0 Kg a.i./ha (11.55 Kg/ha) due to effective herbicide action.

The highest weed control efficiency (91.26%) was found in two intercultivations + two hand weedings (Table 1) which was significantly superior compared to herbicide treatments. Among the herbicides tested, pre-emergence application of the alachlor @ 2.0 Kg a.i./ha⁻¹

* Part of M.Sc.(Agri.) thesis submitted by the senior author to the University of Agricultural Sciences, Dharwad - 580 005

Table 1. Effect of weed control treatments on weed dry weight (Kg/ha), weed control efficiency (%) and grain yield of soybean at harvest

Sl. No.	Treatments	Weed dry weight	Weed control efficiency	Grain yield (kg/ha)
1.	Alachlor @2.0 kg a.i./ha (Pre-em)	10.18 (103.63)	86.45	1810
2.	Pendimethalin 30 EC @1.0 kg a.i./ha (Pre-em)	11.55 (133.40)	81.99	1720
3.	Fenoxaprop-p 9 EC @50 g a.i./ha (Post-em) at 20 DAS	19.58 (383.37)	49.75	1430
4.	Fenoxaprop-p 9 EC @70 g a.i./ha (Post-em) at 20 DAS	14.83 (219.92)	71.20	1510
5.	Propaquizofop 10 EC @50 g a.i./ha (Post-em) at 20 DAS	23.13 (534.99)	38.17	1418
6.	Propaquizofop 10 EC @70 g a.i./ha (Post-em) at 20 DAS	12.84 (164.86)	78.26	1503
7.	Anilophos @1.5 kg a.i./ha (Pre-em)	16.98 (288.32)	61.24	1558
8.	Imazethapyr @75 g a.i./ha (Post-em) at 20 DAS	19.09	52.19	1253
9.	Imazethapyr @100 g a.i./ha (post-em) at 20 DAS	16.48 (271.59)	64.34	1526
10.	Two intercultivations + two hand weedings at 30 and 45 DAS	8.18 (66.91)	91.26	2026
11.	Weed free check	0.71 (0.00)	100.00	2220
12.	Weedy check	20.95 (438.90)	—	814
S.E.m.±		1.988	1.524	12.040
C.D.at 5%		5.830	4.470	33.320

Pre-em = Pre-emergence

Post-em = Post-emergence

DAS - Days after sowing

Figures in paranthesis indicate original values.

showed the maximum weed control efficiency (86.45%) which was significantly superior to all the herbicide treatments while, it was the lowest in propaquizofop @50 g a.i./ha (38.17%). The similar results were also obtained by Nimje (1989)

and Gogulwar (1992).

Weed free check exhibited the highest grain yield of 2220 Kg ha⁻¹, while, lowest grain yield was recorded in weedy check (814.0 Kg/ha) (Table 1). Among the treatments, the highest

grain yield (2026 Kg ha⁻¹) was noticed in the treatment of two intercultivations + two hand weedings which was significantly superior than herbicide treatments. Among the herbicide treatments, alachlor (pre-em.) @2.0 Kg a.i./ha recorded the higher grain yield of 1810 Kg ha⁻¹ which was significantly superior to other herbicides tested. Similar results were also

reported by Porwal *et al.* (1990).

The maximum uptake of nutrients by crop was observed in weed free check (180.30, 30.49 and 143.33 Kg N, P and K per ha respectively) while, least uptake was found in weedy check (81.40, 13.47 and 63.60 Kg N, P and K per ha, respectively) (Table 2). Among the weed control

Table 2. Effect of nutrient uptake by soybean and weeds at harvest

Sl. No.	Treatments	Nutrient uptake by soybean (kg/ha)			Nutrient uptake by weeds (kg/ha)		
		N	P	K	N	P	K
1.	Alachlor @2.0 kg a.i./ha (Pre-em)	156.01	26.10	123.08	1.58	0.10	1.24
2.	Pendimethalin 30 EC @1.0 kg a.i./ha (Pre-em)	151.56	25.08	118.33	2.04	0.13	1.58
3.	Fenoxaprop-p 9 EC @50 g a.i./ha (Post-em) at 20 DAS	129.86	21.55	101.66	5.74	0.38	4.59
4.	Fenoxaprop-p 9 EC @70 g a.i./ha (Post-em) at 20 DAS	135.88	22.29	105.16	3.29	0.21	2.63
5.	Propaquizofop 10 EC @50 g a.i./ha (Post-em) at 20 DAS	131.70	21.82	102.95	7.07	0.47	5.66
6.	Propaquizofop 10 EC @70 g a.i./ha (Post-em) at 20 DAS	131.83	19.47	102.83	2.49	0.16	1.99
7.	Anilophos @1.5 kg a.i./ha (Pre-em)	117.60	19.47	91.87	4.08	0.29	3.45
8.	Imazethapyr @75 g a.i./ha (Post-em) at 20 DAS	112.10	18.73	87.58	5.48	0.36	4.36
9.	Imazethapyr @100 g a.i./ha (post-em) at 20 DAS	133.33	22.07	104.16	4.09	0.27	3.27
10.	Two intercultivations + two hand weedings at 30 and 45 DAS	159.30	26.94	127.53	0.99	0.09	0.79
11.	Weed free check	180.30	30.49	143.33			
12.	Weedy check	81.40	13.47	63.60	11.43	0.76	9.15
	S.E.m.±	4.285	0.7221	3.561	0.203	0.013	0.160
	C.D. at 5%	12.566	2.114	10.442	0.596	0.040	0.468

Pre-em = Pre-emergence
DAS = Days after sowing

Post-em = Post-emergence

treatments, cultural method consisting of two intercultivations + two hand weedings showed higher uptake of nutrients by the crop (159.52, 26.94 and 127.53 Kg N, P and K per ha respectively) followed by pre-emergent applications of alachlor @2.0 Kg a.i./ha (156.01, 26.10 and 123.08 Kg N, P and K per ha respectively) while, lowest uptake was found in treatments receiving post-emergent herbicides. the results are in agreement with that of Guvarsheney (1989) where weeding at 40 days after sowing saved 100.6, 3.8 and 81.9 Kg N, P and K per ha, respectively in comparison with weedy check whereas, alachlor (3.0 Kg ha⁻¹) saved 189.5 Kg N, 6.1 Kg P and 142.2 Kg K per ha as a result of effective weed control.

The highest nutrient uptake by weeds was noticed in weedy check (11.43, 0.76 and 9.15 Kg N, P and K per ha respectively) which was significantly higher than all the treatments

(Table 2). The lowest uptake of nutrients by weeds was observed in the treatment of the two intercultivations + two hand weedings (0.99, 0.99 and 0.79 Kg N, P and K per ha respectively). This was due to the lower weed population and lowest weed dry weight. Among the herbicide treatments, alachlor @2.0 Kg a.i./ha⁻¹ recorded the lowest uptake of nutrients by the weeds 1.58, 0.10 and 1.24 Kg N, P and K per ha respectively followed by pendimethalin @1.0 Kg a.i. ha⁻¹.

The perusal of the data indicated that keeping the lands weed free throughout the crop growth recorded the highest grain yield but this may not be practicable. Hence, cheaper methods of weed control consisting of two intercultivations and two hand weedings appear to be feasible followed by pre-emergence application of alachlor @2.0 Kg a.i. ha⁻¹ or pre-emergence application of pendimethalin @1.0 Kg a.i. ha⁻¹.

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