

## Integrated Weed Management in Soybean on Farmers Field

R. L. Rajput and S. S. Kushwah

J. N. K. V. V. Krishi Vigyan Kendra, Rajgarh, Biaora ( M. P.), India

### ABSTRACT

Two weedings done 20 and 30 days after sowing gave highest weed control efficiency (85.6%), highest seed yield (1860 kg ha<sup>-1</sup>) and highest net return (Rs. 8086 ha<sup>-1</sup>). This was followed by pre-emergence application of pendimethalin at 1.0 kg ha<sup>-1</sup> supplemented with one weeding at 30 days stage.

### INTRODUCTION

The control of weeds in early stage (upto 30 days) in soybean is very critical and if not done, the yield losses may reach upto 43% (Bhan *et al.*, 1974). The problem becomes more critical when farmers do not get their fields weeded at appropriate time due to manpower shortage or heavy rains. As a result, the yield levels of soybean in the region are comparatively low. Chemical weed control remains the only choice under such situations. However, quality herbicides are costly and at times not available. Therefore, integrated approach of cultural, mechanical and chemical methods of weed control may be more feasible. Keeping this in view, the present investigation was undertaken to determine the effective integrated weed management practice.

### MATERIALS AND METHODS

A field experiment was conducted during the rainy seasons of 1998, 1999, 2000 and 2001 at farmers' fields (8 locations every year) of the J. N. K. V. V. Krishi Vigyan Kendra adopted villages Barkheda and Chaundapura of Rajgarh district in the state of Madhya Pradesh. The soil was medium black to gravelled mixed medium black and was free from waterlogging conditions. Soil had 7.9-8.4 pH, 0.57-0.69% organic carbon, 175-270 kg available N ha<sup>-1</sup>, 11.5-12.80 kg available P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> and 310-390 kg K<sub>2</sub>O ha<sup>-1</sup>. Five treatments, comprising farmers' practices 1 Dora a narrow blade inter culture implement, two hand weedings (20 and 30 DAS),

two Dora/Kulpa operations (20 and 30 DAS), pre-emergence pendimethalin at 1.0 kg ha<sup>-1</sup> and use of pre-emergence pendimethalin at 1.0 kg ha<sup>-1</sup>+one hand weeding at 30 DAS were tested in randomized block design with eight locations (farmers field) in every year which were treated as separate replications. Soybean (JS 335) was sown during 2nd and 3rd week of July in 1998, 1999, 2000 and 2001 at seed rate of 80 kg ha<sup>-1</sup> in rows 30 cm apart by bullock drawn seed drill. The crop was given recommended amount of nutrients 20 kg N, 60 kg P and 20 kg K ha<sup>-1</sup>. Pendimethalin was sprayed at using flood jet nozzle just after sowing using 600 l water ha<sup>-1</sup>. The crop was harvested in second and third week of October in 1998, 1999, 2000 and 2001. Weed counts and their dry weight were recorded at the harvesting time.

### RESULTS AND DISCUSSION

#### Effect on Weeds

The major weed flora observed in the experimental plots were *Cyperus rotundus*, *Echinochloa crusgalli*, *Cynodon dactylon*, *Euphorbia* spp., *Commelina benghalensis*, *Corchorus* spp. and *Parthenium hysterophorus*.

All mechanical, chemical and cultural practices reduced the weed population significantly compared with farmers' practice (Table 1). The least weed biomass was recorded under two hand weedings at 20 and 30 DAS followed by pendimethalin at 1.0 kg ha<sup>-1</sup>+one hand weeding at 30 DAS. The lower dry weight of weeds and the

Table 1. Effect of weed control treatments on weeds in soybean

Treatment	Weed population (No. m <sup>-2</sup> )			Weed dry matter (g m <sup>-2</sup> )			Pooled
	1998	1999	2000	1998	1999	2000	
Farmers' practices, one Dora (control)	42	44	40	41	42	85	84
Two hand weedings (20 and 30 DAS)	18	23	16	19	19	12	12
Two intercultures by Dora (20 and 30 DAS)	34	38	32	34	34	73	73
Pendimethalin at 1.0 kg ha <sup>-1</sup>	27	31	25	27	27	34	35
Pendimethalin at 1.0 kg ha <sup>-1</sup> +one hand weeding at 30 DAS	22	25	19	23	22	21	22
LSD (P=0.05)	3	4	3	4	3	2	2

211

Table 2. Effect of treatments on soybean and economics

Treatment	1000-seed weight (g)			Pooled	Seed yield (kg ha <sup>-1</sup> )			Pooled	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net profit (Rs./ha)	Benefit: cost ratio	
	1998	1999	2000		1998	1999	2000						
Farmer's practices (one Dora)	96.0	86.7	88.1	87.4	89.6	2141	1241	1030	1054	1356.2	8290	5272	0.63
Two hand weedings (20 and 30 DAS)	98.7	98.0	95.7	96.8	97.3	3850	2025	1270	1286	1857.8	10492	8086	0.77
Two intercultures by Dora (20 and 30 DAS)	95.5	95.2	90.3	91.4	93.1	2150	1516	1050	1120	1459.0	8493	6097	0.72
Pendimethalin at 1.0 kg ha <sup>-1</sup>	99.7	99.0	92.4	95.2	96.6	2333	1550	1130	1150	1540.8	8743	6665	0.76
Pendimethalin at 1.0 kg ha <sup>-1</sup> +one hand weeding at 30 DAS	97.8	96.7	93.4	95.4	95.8	2633	1791	1140	1152	1679.0	9468	7322	0.77
LSD (P=0.05)	1.12	1.48	1.61	1.82	1.10	0.58	1.38	1.28	1.25	1.21	-	-	-

higher weed control efficiency were also recorded in two hand weeding (20 and 30 DAS) followed by pendimethalin+1 hand weeding treatment. The superior performance of two hand weeding could be attributed to the reduced weed-crop competition in the initial stage and removal of late emerged weeds by supplemental hand weeding at 30 days.

### Effect on Crop

The lower yield levels during 1999, 2000 and 2001 than in 1998, may be due to more moisture stress at the time of flowering and pod formation stage. Lower temperature in 1999, 2000 and 2001 during pod development stage may also be responsible for reduction in seed yield.

All the weed control methods showed significant increase in yield and its attributes during all the years (Table 2) as compared to farmers' practices. The highest seed yield, pods plant<sup>-1</sup> and 1000-seed weight were observed under two hand weeding at 20 and 30 DAS followed by pendimethalin at 1.0 kg ha<sup>-1</sup>+one hand weeding at 30 DAS (Table 2), owing to more pods/plant and 1000-seed weight. Use of pendimethalin at 1.0 kg ha<sup>-1</sup> and two inter culture operations with *Dora*

(narrow blade implement) also significantly increased seed yield and yield attributes over farmers' practice (1 *Dora* at 30 DAS). The lowest seed yield of soybean was recorded under farmers' practice. Mishra and Kashwaha (1992) also reported similar results.

The highest net return was observed under two hand weeding at 20 and 30 DAS followed by pendimethalin at 1.0 kg ha<sup>-1</sup>+ one hand weeding at 30 DAS as compared to farmers' practices. The benefit cost ratio was also higher, which may be because of low weed dry weight and higher weed control efficiency.

Considering the seed yield and net return due to weed control methods, pre-emergence application of pendimethalin at 1.0 kg ha<sup>-1</sup> followed by one hand weeding at 30 days after sowing was the most profitable for controlling the weeds in soybean.

### REFERENCES

- Bhan, V. M., Megh Singh and R. A. Maurya, 1974. Studies on the requirement of weed-free maintenance in soybean. *Indian J. Weed Sci.* 6 : 12-16.
- Mishra, M. K. and H. S. Kashwaha, 1992. Effect on weed control methods in soybean on farmer's field. *Agric. Sci. Digest* 12 : 7-8.