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Weed control in soybean (*Glycine max*): yield, economics and residue evaluation with oryzalin

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ABSTRACT

An experiment was conducted during 2006 revealed that among different weed control methods with oryzalin, application of oryzalin @ 3 Kg ha^{-1} along with HW at 30 DAS or application of oryzalin @ 4.5 Kg ha^{-1} along with HW at 30 DAS or hand weeding at 15 DAS and 30 DAS produced yield of seeds in soybean, Number of pods / plant and Number of seeds / pod which were statistically at par, but produced significantly better result than rest all other treatments-by reducing the weed population and their dry matter. In case of test weight all the treatments effects are non-significant. Now, maximum profitability (benefit: cost ratio) was obtained in the treatment where oryzalin @3 Kg ha^{-1} is applied along with hand weeding at 30 DAS. It was observed that with the increasing dose of oryzalin, persistence of oryzalin in soil also increased. In case of residue analysis, the residues of the herbicide were found in soil up to 30 days after spraying. The residues remains below detectable limit in all harvest samples i.e. plant, pods and field soil.

Key words: Economics, soybean, weed control, yield attribute, yield.

Now-a-days cultivation of soybean has got popularity in West Bengal. But its average productivity is still lower. One of the main reasons of poor yield of soybean is due to high weed infestation. Bhan (1994) also reported that 40-60% loss in grain yield in soybean was due to weeds. Weeding through mechanical as well as manual method is generally costly and time-consuming. So under this situation, chemical method may be very suitable. A promising selective herbicide of oryzalin 40% SC (dinitro aniline group) with different doses as alone or in combination with other was applied for chemical weed control in soybean.

MATERIALS AND METHODS

A field experiment was conducted at Experimental Research Field, Jaguli, BCKV, Mohanpur, West Bengal in gangetic alluvial (Entisol) and sandy-loam soil in the year of 2006, in Randomized Block Design replicated three times by taking 8 treatments (Table-1). Oryzalin is applied at 3-4 leaf stage of soybean plant in between the rows of soybean crop by using WFN 62-Flat Jet nozzle equipped with hood. Soybean cv. PK-327 was sown on 25th January, 2006 at 30 cm row spacing with a seed rate of 50 Kg ha^{-1} and harvested on 21st May, 2006. Basal doses of 30, 60 and 40 Kg ha^{-1} of N, P_2O_5 and K_2O respectively were applied at the time of sowing. Two irrigations (in seedling stage after application of herbicide at 12 DAS and in flowering stage at 60 DAS) were given on soybean crop. The residue analysis for oryzalin in different edible part of soybean as well as experimental field soil are done according to standard protocol.

RESULTS AND DISCUSSION

The experimental field was infested with various weed species, consisting of broad leaved, sedges and grasses. The infestation of broad leaved weeds was more than grasses and sedges. The important weeds in the experimental field were *Echinochloa colonum, Eleusine indica, Cynodon dactylon, Digitaria sanguinalis, Cyperus rotundus, Chenopodium album, Melilotus alba, Argimone maxicana, Portulaca oleracea, Euphorbia hitra, Trianthema monogyna* etc.

In case of total weed population m^{-2}, control treatment has shown significantly highest weed population m^{-2} (65.21) than all other treatments in this experiment (Table 1). Among the rest treatments, oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS, oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS and only two hand weeding at 15 and 30 DAS were statistically at par and showed their best efficiency in controlling weed population, though hand weeding at 15 and 30 DAS showed its best performance in this respect. In case of weed dry matter weight (g m^{-2}) similar trend as total weed population m^{-2} was observed.

Table 1. Effect of different weed control methods on weed, WCE, yield attributes, seed yield and economics of soybean

Treatments	Total weed population m^{-2} [at harvest]	Weed dry weight (g m^{-2}) [at harvest]	Weed control efficiency (%)	No. of pods/ plant	No. of seeds/ pod	Test weight (100 seed weight) (g)	Seed yield (q ha^{-1})	Weed index	% increase yield over control	Benefit: cost ratio
Control	65.21	40.20	—	25.01	2.3	8.85	11.00	54.17	—	0.28:1
Oryzalin @1.5 Kg ha^{-1}	56.10	28.01	30.32	29.31	2.4	8.9	14.26	40.58	29.64	0.37:1
Oryzalin @3.0 Kg ha^{-1}	47.17	23.02	42.74	30.92	2.6	8.95	17.86	25.58	62.36	0.49:1
Oryzalin @4.5 Kg ha^{-1}	44.00	20.52	48.96	32.40	2.7	9.05	19.78	17.58	79.82	0.75:1
Oryzalin @1.5 Kg ha^{-1} +HW at 30 DAS	45.00	24.79	38.33	32.25	2.8	9.31	19.52	18.66	77.46	0.70:1
Oryzalin @3.0 Kg ha^{-1}+ HW at 30 DAS	35.21	18.01	55.19	35.22	2.98	9.12	22.01	8.29	100.09	0.80:1
Oryzalin @4.5 Kg ha^{-1}+ HW at 30 DAS	32.00	16.22	59.65	35.83	3.0	9.20	23.42	2.42	112.91	0.79:1
HW at 15 and 30 DAS	30.51	14.55	63.81	37.00	3.1	9.1	24.00	—	118.18	0.73:1
S.Em. (±)	**2.71**	**1.38**	—	**1.22**	**0.21**	**0.1**	**0.72**	—	—	—
LSD (P=0.05)	**8.27**	**4.29**	—	**3.82**	**0.61**	**NS**	**2.23**	—	—	—

HW - Hand Weeding, DAS - Days after Sowing, LSD - Least significant difference.

Maximum weed control efficiency (63.81%) was noticed in only hand weeding at 15 and 30 DAS (Table 1) followed by other treatments. Lowest weed control efficiency was recorded by the treatment oryzalin @1.5 Kg ha^{-1} (T_2). In case of number of pods / plant, control treatment (T_1) resulted significantly lowest number of pods/ plant (25.01) than all other treatments in this experiment. Treatments i.e. oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS, Oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS and only two hand weeding at 15 and 30 DAS were also statistically at par. Only hand weeding treatment resulted highest number of pods/ plant (37.00) than all other treatments in this experiment.

In case of number of seeds / pod, oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS, oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS and only two hand weeding at 15 and 30 DAS treatments were statistically at par but resulted significantly higher number of seeds / pod than control treatment. All the treatment effects were non-significant in case of test weight (100 seed weight) of soybean.

Seed yield and economics

In case of seed yield of soybean, (Table 1) control treatment showed significantly lowest seed yield (11.00 q ha^{-1}) than all other treatments in this experiment. oryzalin @3.0 Kg ha^{-1}, oryzalin @4.5 Kg ha^{-1}, oryzalin @1.5 Kg ha^{-1} along with hand weeding at 30 DAS treatments were statistically at par but resulted significantly lower seed yield than oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS, oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS and only two hand weeding at 15 and 30 DAS treatments. Here, oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS, oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS and only two hand weeding at 15 and 30 DAS treatments were also statistically at par. But, only hand weeding at 15 and 30 DAS treatment shown numerically highest seed yield (24 q ha^{-1}) in this experiment. Minimum weed index was found in oryzalin @4.5 Kg ha^{-1} along with hand weeding at 30 DAS treatment (2.42) followed by all other treatments.

Maximum percentage of increase in seed yield (Table 1) over control in this experiment was observed in hand weeding at 15 and 30 DAS treatment (118.18%) followed by oryzalin @ 4.5 Kg ha^{-1} along with hand weeding at 30 DAS and all other treatments.

Similar findings in this aspect was observed by Muniyappa *et al.* (1986).

In case of economic analysis (Table 1) of this experiment it had been observed that maximum profitability (benefit: cost ratio) was obtained in oryzalin @ 3 Kg ha^{-1} along with one hand weeding at 30 DAS treatment (0.80:1) followed by other treatments. Singh and Sharma (1990) also reported similar results.

Residue analysis

In case of residue analysis, the residues of the herbicide were found in soil up to 30 days after spraying. No residues were detected in harvested plant, pods and field soil samples, irrespective of any doses.

REFERENCES

Bhan, V.M., 1994. Weed management-A factor for sustainability in crop production. (In. *Proc. XII Nat. Symp. on Resource Management for Sustained Crop* Production), 25-28 February, 1992, Rasjasthan Agriculture University, Bikaner, pp. 209-16

Muniyappa, T.V., Ramchandra Prasad, T.V. and Krishnamurthy, K. 1986. Critical stage of crop weed competition and chemical weed control in Soybean. *Indian Weed Sci.* **18** : 34-38

Singh, Dheer and Sharma, K.C. 1990. Economics of soybean (*Glycine max* L. Merrill) cultivation under different methods of weed control. *Indian Weed Sci.* **22** : 7-11.