Short communication

Indian Journal of Weed Science **45**(2): 140–142, 2013

Early post-emergence herbicides for weed control in soybean

C. Sangeetha*, C. Chinnusamy and N.K. Prabhakaran

Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu 641 003

Received: 20 February 2013; Revised: 31 May 2013

Key words: Early post-emergence, Economics, Soybean, Weed control efficiency, Yield

Soybean (*Glycine max* (L.) Merill) plays an important role in boosting oilseed production in the country. It stands second, among the nine oilseed crops, next only to groundnut in production in the country. It has outstanding nutritive value with 43% biological protein, 20% oil and is also very rich in vitamins, iron, mineral, salts and aminoacids. India is having soybean area of 9.52 million ha with a total production of 9.90 million tonnes and a productivity of 1.0 t/ha (DAC, Govt of India 2009). However, its productivity is low as compared to potential yield due to infestation of weeds. Weeds are the foremost biotic constraints in enhancing productivity of soybean and take yield toll ranging from 20 to 89% (Chhokar and Balyan 1999, Dubey 2002). Though the conventional method (hand weeding) of weed control is very effective, but due to high wages and non-availability of labour during the critical weeding period, the use of herbicides could be more effective and time saving. Therefore, this study was conducted on weed management in soybean grown in western zone of Tamil Nadu to find out agro-economic feasibility and its impact on grain yield.

A field experiment was carried out during *Kharif* seasons of 2009 at Agricultural Research Station, Bhavanisagar, Tamil Nadu. The soil was red sandy loam having pH 6.72, EC 0.18 dS/m, OC 0.55%, available N, P, K 230, 20, 268 kg/ha, respectively. The treatments comprised of imazethapyr 50, 75, 100 and 200 at g/ha as early post-emergence (EPOE) sprayed 15 days after sowing, oxyfluorfen 125 g/ha and pendimethalin 750 g/ha as pre-emergence (PE) were sprayed at 3 days after sowing, hand weedings at 25 and 45 days after sowing (DAS) and unweeded check (control) (T_8). All these treatments for comparison, except unweeded check were given with an earthing up at 45 DAS. The experiment was laid out in randomized block design with three replications. All the herbicides were applied by manually operated knapsack sprayer fitted with flat fan nozzle using spray volume of 500 l/ha. The density and dry weight of weeds were recorded at 30 and 60 DAS. Soybean variety '*CO (Soy) 3*' was sown in 30 cm wide rows. The crop was fertilized with 20 kg N + 80 kg P + 40 kg K/ha. Economics was worked out on the basis of prevailing market prices.

***Corresponding author:** chandrusan2007@gmail.com

Dactyloctenium aegyptium, Acrachne racemosa and *Bracharia reptans*, were the dominant grass weeds. *Cyperus rotundus* was the only sedge present. The predominant broad-leaved weeds were *Boerhavia diffusa, Digera arvensis, Parthenium hysterophorous* and *Trichodesma indicum.* The investigations carried out by Balusamy *et al*. (1996) at Coimbatore showed that *Trianthema portulacastrum, Amaranthus viridis, Parthenium hysterophorus, Echinochloa* sp. and *Cyperus* sp. were dominant weeds of soybean.

All the herbicidal treatments significantly reduced the weed density and weed dry weight over unweeded control (Table 1). Significantly lower dry weed weight was recorded with hand weeding on 25 and 45 DAS. Among the herbicides, EPOE imazethapyr at 100 g/ha and EPOE imazethapyr 200 g/ha recorded significantly lesser weed dry weight than other herbicides at both the stages. Similar results were reported by Chandel and Saxena (2001), where POE imazethapyr at 100 g/ha was found to be effective in controlling weeds at various stages. At 30 and 60 DAS, early post- emergence application of imazethapyr had more pronounced effect in reducing the weed density and weed dry weight as compared to oxyfluorfen 125 g/ha and pendimethalin 750 g/ha application. EPOE imazethapyr 200 g/ha or EPOE imazethapyr 100 g/ha was effective against both dicot and monocot weeds and were at par with two hand weedings. Better performance of imazethapyr in the present study appeared to be due to better control of broad-leaved weeds as well as grassy weeds. The weed control efficiency could be enhanced (77-91%) and (93-98%) due to higher dose of imazethapyr at 30 and 60 DAS, respectively.

Seed yield was significantly influenced by different weed control treatments. Among the treatments, EPOE imazethapyr 100 g/ha recorded significantly higher seed yield followed by EPOE imazethapyr at 200 g/ha which was on par with PE pendimethalin 750 g/ha and PE

Table 1. Effect of weed management on weed density, dry weight and weed control efficiency in soybean

Treatment	Total weed density (no./m^2)		Total weed dry weight (kg/ha)		Weed control efficiency (%)	
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS
Iimazethapyr 50 g /ha EPOE	2.45 (278.7)	1.75 (55.7)	1.80 (61.7)	1.30 (18.4)	77.7	93.1
Imazethapyr 75 g /ha EPOE	2.34 (223.3)	1.70 (51.0)	1.72 (50.8)	1.19 (13.8)	81.6	94.8
Imazethapyr 100 g /ha EPOE	2.06 (114.6)	1.45(28.3)	1.54 (33.9)	1.02 (8.58)	87.7	96.8
Imazethapyr 200 g /ha EPOE	1.93 (85.0)	1.33 (1967)	1.40 (24.6)	0.85 (5.11)	91.1	98.1
Oxyfluorfen 125 g /ha PE	2.29 (191.3)	1.82 (65.67)	1.75 (55.3)	1.40 (16.4)	80.0	93.8
Pendimethalin 750 g/ha PE	2.19 (154.0)	1.82 (65.7)	1.71 (54.5)	1.18 (13.1)	80.3	94.4
HW on 25 and 45 DAS	1.54 (34.3)	2.24 (175.0)	1.72 (51.45)	2.30 (199.8)	81.4	53.5
Unweeded control	2.97 (925.3)	2.70 (506.3)	2.44 (276.3)	2.56 (369.4)	-	-
LSD (P=0.05)	0.18	0.22	0.16	0.22	NA	NA

Values in parentheses are original values; EPOE- Early post-emergence, PE- Pre-emergence, NA- Not analysed

Table 2. Effect of weed management on productivity and economics in soybean

Treatment	Seed yield (t/ha)	Stover yield (t/ha)	Cost of cultivation (x10^3₹/ha)	Gross returns (x10^3₹/ha)	Net returns (x10^3₹/ha)	B:C ratio
Imazethapyr 50 g/ha EPOE	1.39	2.24	15.37	28.04	12.66	1.82
Imazethapyr 75 g/ha EPOE	1.47	2.39	15.50	30.99	15.49	1.99
Imazethapyr 100 g/ha EPOE	1.64	2.67	15.62	34.65	19.03	2.21
Imazethapyr 200 g/ha EPOE	1.51	2.85	16.12	34.10	17.98	2.14
Oxyfluorfen 125 g/ha PE	1.30	2.49	15.28	29.03	13.74	1.89
Pendimethalin 750 g/ha PE	1.48	2.25	15.90	31.23	15.33	1.96
HW on 25 and 45 DAS	1.23	2.03	17.12	26.65	9.57	1.56
Unweeded control	0.83	1.47	13.62	19.62	5.99	1.43
LSD (P=0.05)	0.09	0.09	NA	NA	NA	NA

oxyfluorfen 125 g/ha. The results are in corroboration with the findings of Kushwah and Vyas (2006) who have observed that the application of imazethapyr has increased the seed yield of soybean. However, EPOE imazethapyr 200 g/ha had phytotoxicity effect on soybean at initial stages causing stunted growth and chlorosis and get recovered after one or two irrigation.

EPOE imazethapyr at 100 g/ha recorded the highest gross return (₹ 34,654), net returns (₹ 19029) and B:C ratio (2.21) (Table 2.). As the cost of the treatment was lower with EPOE application of imazethapyr at 100 g/ha than hand weeding, it registered the additional return followed by EPOE application of imazethapyr 200 g/ha. The increased additional income realized with these two treatments might be due to higher seed yield obtained due to the treatment efficiency which would have reduced the competition between weeds and crop for water and nutrients. Similar results were reported by Kumar and Das (2008) by application of imazethapyr which had better control over weeds and acquired highest benefit cost ratio and net returns.

Thus, herbicidal weed management using early post-emergence imazethapyr at 100 g/ha followed by earthing up on 45 DAS might be the best method to control majority of weeds, obtaining higher productivity of soybean with better economic returns.

SUMMARY

A field experiment was conducted during *Kharif* 2009 to evaluate the economic feasibility of weed management practices in soybean (*Glycine max*) grown in red loamy soils of western zone of Tamil Nadu. Early post- emergence (EPOE) application of imazethapyr reduced the density and dry biomass of broad-leaved weeds as well as grasses significantly as compared to pre-emergence herbicide under study. The lowest weed density and biomass were recorded with hand weedings twice on 30 days after sowing (DAS) followed by imazethapyr at 200 and 100 g/ha. Imazethapyr at 100 g/ha was found to be the economic method of weed management by giving higher net returns with grain yield.

REFERENCES

Balusamy M, Ravichandran VC and Balasubramaniam N. 1996. Herbicide selectivity and weed control in soybean. *Madras Agricultural Journal* **83**(8): 523-524.

Chandel AS and Saxena SC. 2001. Effect of some new post-emergence herbicides on weed parameters and seed yield of soybean (*Glycine max*). *Indian Journal of Agronomy* **46**(2): 332-338.

Chhokar RS and Balyan RS. 1999. Competition and control of weeds in soybean. *Soybean Abstract* **22**: 71.

DAC (Department of Agriculture and Co-operation), Govt of India, 2009. www.tn.gov.in

Dubey MP. 2002. Bio-efficacy and phytotoxicity evaluation of anilophos (5G and 30 EC) and metalachlor (50 EC) in soybean [*Glycine max* (L.) Merrill]. *Indian Journal of Weed Science* **34**: 53-54.

Kumar M and Das TK. 2008. Integrated weed management for system productivity and economics in soybean (*Glycine max*)–wheat (*Triticum aestivum*) system. *Indian Journal of Agronomy* **53**(3): 189–194.

Kushwah SS and Vyas MD. 2006. Efficacy of herbicides against weeds in rainfed soybean (*Glycine max* (L.) Merrill) under Vindhyan plateau of Madhya Pradesh. *Indian Journal of Weed Science* **38**(1&2): 62-64.