Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.3057

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (1):** 543-546 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Sequential Application of Herbicides on Weed Control in Soybean (*Glycine max*)

J. Vijay[1*], M. Mallareddy[2], K. Shekar[3], T. Prabhakar Reddy[4] and B. Padmaja[5]

[1]Department of Agronomy;

[2]Professor and Head, Department of Agronomy;

[3]Assistant Professor, Agronomy;

[4]Scientist, Soil Science and Agricultural Chemistry;

[5]Associate Professor, Agronomy. Professor Jayashankar Telangana State Agricultural University;

Agricultural college, Polasa, Jagtial – 505 529, Telangana State, India

*Corresponding Author E-mail: vijayjakkula86@gmail.com

Received: 30.05.2017 | Revised: 27.06.2017 | Accepted: 1.07.2017

ABSTRACT

A field experiment was conducted during rainy season (kharif) of 2015 at College Farm, Agricultural College, Polasa, Jagtial to find out the effectiveness of sequential application of herbicides in soybean (Glycine max (L.) Merril). Pre emergence of (PE) application of pendimethalin @ 2.5 l/ha followed by imazethapyr @ 75 g/ha at 20 DAS resulted in the lowest weed dry matter and maximum weed control efficiency followed by PE application of pendimethalin @ 2.5 l/ha followed by imazethapyr + imazamox @ 100 g/ha at 20 DAS. This treatment also recorded highest seed yield of soybean and also it was found to be economical with high B:C ratio.

Key words: *Herbicides, Pre-emergence, Post-emergence, Soybean, Weed management, Yield.*

INTRODUCTION

The soybean (*Glycine max* (L.) Merril) is mainly cultivated during *kharif* and is infested with various grassy, sedges and broad leaved weeds which emerge simultaneously with the crop plants and compete for essential nutrients, space and moisture causing substantial loss in crop yields (30-80%) depending upon the type of weed flora and weed density[4]. Kachroo *et al*[3], also reported the yield decline as high as 84% due to weeds. The incessant rains do not permit timely inter cultivation and manual control of weeds is also difficult on large scale on account of high cost and labour shortage during weeding peaks. Therefore, there is a need for alternative methods of reducing weed load during early crop growth period of soybean *i.e*., first 30-45 DAS[1]. The herbicides presently available are either pre-emergence (PE) or pre-plant incorporated (PPI) have a narrow spectrum weed control. The biology of some weeds that occur in soybean makes it difficult to achieve effective weed control with single application of herbicides; PPI or Pre or Post emergence[5].

Cite this article: Vijay, J., Mallareddy, M., Shekar, K., Reddy, T.P. and Padmaja, B., Effect of Sequential Application of Herbicides on Weed Control in Soybean (*Glycine max*), *Int. J. Pure App. Biosci.* **6(1):** 543-546 (2018). doi: http://dx.doi.org/10.18782/2320-7051.3057

Only few farmers are applying weedicides as post emergence spray at 25-30 DAS without pre-emergence application of herbicides in Northern Telangana Zone. Sequential application of herbicides i.e., pre followed by post will provide more consistent weed control than single application[7]. Therefore, the present investigation is planned to find out the bio-efficacy and economics of sequential application of herbicides in soybean.

MATERIAL AND METHODS

A field experiment was conducted during the rainy (*kharif*) season at 2015 at College Farm, Agricultural College, Polasa, Jagtial, on a sandy loamy soil, slightly alkaline in reaction, normal in EC (0.19), low in available N (183 kg/ha) and P_2O_5 (18 kg/ha) and medium in available K_2O (243 kg/ha) deficient in S (18 kg/ha) and Zn (0.5 ppm). The experiment was laid out in randomized block design with 3 replications. Soybean variety 'Asb-22' was sown in June at the seed rate of 62.5 kg seed/ha and harvested October 2015.

The experiment comprised 12 treatments, viz. weedy check (T_1), weed free (T_2), pre-emergence (PE) application of pendimethalin @ 2.5 l/ha (T_3) , PE application of metribuzin @ 0.5 kg/ha (T_4), PE application of chlorimuron-p-ethyl @ 35 g/ha (T_5), PE application of oxyfluorfen @ 0.1 kg/ha (T_6) , post-emergence (POE) application of imazethapyr + imazamox @ 100 g/ha at 20 DAS (T_7), PE application of pendimethalin @ 2.5 l/ha followed by (fb) imazethapyr + imazamox @ 100 g/ha at 20 DAS (T_8), PE application of metribuzin @ 0.5 kg/ha fb imazethapyr + imazamox @ 100 g/ha at 20 DAS (T_9), PE application of chlorimuron-p-ethyl @ 35 g/ha fb imazethapyr + imazamox @ 100 g/ha at 20 DAS (T_{10}), PE application of oxyfluorfen @ 0.1 kg/ha fb imazethapyr + imazamox @ 100 g/ha at 20 DAS (T_{11}), PE application of pendimethalin @ 2.5 l/ha fb imazethapyr @ 75 g/ha at 20 DAS (T_{12}). Recommended dose of 60 kg N, 60 kg P, 40 kg K, 20 kg S and 5 kg Zn was applied basal at the time of sowing. Seed was treated with Thiram @ 3 g/kg of seeds.

RESULTS AND DISCUSSION

PE application of pendimethalin @ 2.5 l/ha followed by imazethapyr @ 75g/ha 20 DAS proved better in minimising the total weed population and found significantly superior in alleviating total weed population than other weed management practices, followed by PE application of pendimethalin @ 2.5 l/ha followed by imazethapyr + imazamox @100 g/ha at 20 DAS. Dry matter accumulation of weeds increased with the increasing weed density as well as variation of weed species and their growth. The highest weed dry matter was obtained under weedy check at all stages of crop growth and the lowest in weed free plot. At all the time intervals of observations, use of pendimethalin @ 2.5 l/ha followed by imazethapyr @ 75 g/ha at 20 DAS resulted in the lowest weed dry weight (Table 1). It was significantly superior to rest of the treatments.

In general, weed control efficiency (WCE) increased gradually with the sequential application of herbicides up to 60 DAS and then reduced. With the lone application of PE herbicides (T_3, T_4, T_5 and T_6) it was reduced from 20 DAS to harvest (Table 1). At 20 DAS, maximum weed control efficiency was recorded with pendimethalin fb imazethapyr (T_{12}). It was closely followed by PE application of pendimethalin (T_3) and oxyfluorfen (T_6). The lowest was recorded with PoE application of imazethapyr + imazamox (T_7) because it did not receive any herbicide by 20 DAS. At 40 DAS, also highest WCE was recorded with pendimethalin fb imazethapyr (T_{12}) followed by pendimethalin fb imazethapyr + imazamox combination (T_8) and lone application of imazethapyr + imazamox (T_7) at 20 DAS. At 60 and 80 DAS, also the WCE was more in the treatments which received the post-emergence herbicides and it followed same trend to that observed at 40 DAS. The lower WCE with PE application of herbicides alone is due to germination of later flushes of weeds which could be controlled by the sequential application of early PoE herbicides in other treatments. At harvest also highest WCE was noticed with pendimethalin fb imazethapyr (T_{12}) followed

by oxyfluorfen with imazethapyr + imazamox combination (T_{11}). However, the WCE of all the treatments is generally less in the trial. The reason attributed is that the weather condition prevailed during the crop season was dry with high maximum and minimum temperatures. The crop was raised mainly on irrigation due to rainfall scarcity. The high soil temperatures coupled with high wind speed and low relative humidity prevailed might have hazened the degradation of herbicides which reduced their efficacy. The frequent irrigations might have been congenial for the germination of later flushes of weeds which was observed up to late growth stages of soybean in the present trial. Similar findings were reported by Pratap Singh *et al*[6]., and Vijayalaxmi *et al*[7].

Among herbicidal applications, significantly higher seed yield was obtained with PE application of pendimethalin followed by imazethapyr at 20 DAS. The lowest seed yield was recorded under weedy check. Tiwari and Kuruchania also reported that weed infestation in soybean field may reduce yield up to 77% depending on the intensity, nature and duration of weed competition. The increase in seed yield under pendimethalin @ 2.5 l/ha followed by imazethapyr @ 75 g/ha at 20 DAS was due to its effectiveness in controlling weeds and improvement in growth and development of crop and higher yield attributes of soybean crop[2]. The increase in yield attributes and yield under these treatments may be attributed to concomitant reduction in weed dry matter, which accounted for reduction in crop weed competition, and provided congenial environment to the crop for better reproductive potential.

Table 1: Effect of sequential application of herbicides on total weed dry-weight and weed control efficiency

Treatment	Total weed dry weight (g/m^2)					Weed control efficiency (%)				
	20 DAS	40 DAS	60 DAS	80 DAS	Harvest	20 DAS	40 DAS	60 DAS	80 DAS	Harvest
T_1-Weedy check	20.20	50.57	81.17	98.33	115.53	-	-	-	-	-
T_2-Weed free	0.00	0.00	0.00	0.00	0.00	100	100	100	100	100
T_3-PE application of Pendimethalin @ 2.5 l ha^{-1}	9.87	28.50	55.40	68.90	83.17	51.38	43.64	31.74	29.92	28.01
T_4-PE application of Metribuzin @ 0.5 kg ha^{-1}	11.43	31.20	58.40	70.83	84.77	43.41	38.30	28.05	27.96	26.62
T_5-PE application of Chlorimuron -p-ethyl @ 35 g ha^{-1}	11.47	33.33	60.23	73.80	88.00	43.21	34.34	25.79	24.94	23.82
T_6-PE application of Oxyfluorfen @ 0.1 kg ha^{-1}	10.00	28.83	50.10	69.77	81.10	50.49	42.98	38.27	28.56	25.47
T_7-Post-emergence application of Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	17.53	23.83	39.67	52.77	65.20	13.21	52.87	51.12	46.33	43.47
T_8-PE appli. of Pendi. @ 2.5 l ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	10.13	22.53	29.23	44.00	57.33	49.85	55.77	63.98	55.25	50.37
T_9-PE application of Metribuzin @ 0.5 kg ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	10.20	26.57	38.60	49.90	58.03	49.50	47.45	52.44	49.25	48.90
T_{10}-PE application of Chlor.-p- ethyl @ 35 g ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	10.63	28.60	36.90	47.60	59.37	47.37	43.44	54.53	51.59	48.61
T_{11}-PE appli. of Oxy. @ 0.1 kg ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	11.53	24.20	34.57	45.90	53.70	42.92	52.14	57.41	55.35	53.51
T_{12}-PE application of Pendi. @ 2.5 l ha^{-1} fb Imazethapyr @ 75 g ha^{-1} at 20 DAS (Farmer's practice)	9.57	19.10	27.07	39.67	50.63	52.62	62.23	66.65	59.66	56.17
SEm±	0.10	0.21	0.22	0.27	0.28	-	-	-	-	-
CD (P=0.05)	0.30	0.63	0.66	0.81	0.83	-	-	-	-	-

Table 2: Effect of sequential application of herbicides on yield and B:C ratio of soybean

Treatment	Seed yield (kg/ha)	Haulm yield (kg/ha)	B:C ratio
T_1-Weedy check	809	1171	1.35
T_2-Weed free	1755	1972	0.32
T_3-PE application of Pendimethalin @ 2.5 l ha^{-1}	1250	1472	0.89
T_4-PE application of Metribuzin @ 0.5 kg ha^{-1}	1198	1504	0.88
T_5-PE application of Chlorimuron -p-ethyl @ 35 g ha^{-1}	1217	1450	0.89
T_6-PE application of Oxyfluorfen @ 0.1 kg ha^{-1}	1244	1443	0.92
T_7-Post-emergence application of Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	1455	1680	1.12
T_8-PE appli. of Pendi. @ 2.5 l ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	1591	1800	1.17
T_9-PE application of Metribuzin @ 0.5 kg ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	1470	1790	1.07
T_{10}-PE application of Chlor.-p- ethyl @ 35 g ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	1465	1751	1.04
T_{11}-PE appli. of Oxy. @ 0.1 kg ha^{-1} fb Imazethapyr + Imazamox @ 100 g ha^{-1} at 20 DAS	1509	1808	1.09
T_{12}-PE application of Pendi. @ 2.5 l ha^{-1} fb Imazethapyr @ 75 g ha^{-1} at 20 DAS (Farmer's practice)	1641	1853	1.37
SEm±	64.10	81.64	-
CD (P=0.05)	188.01	239.45	-

DAS, Days after sowing; PE, Pre-emergence

CONCLUSION

Based on the study, it is concluded that sequential application of pendimethalin @ 2.5 l/ha followed by either imazethapyr @ 75 g ha^{-1} or imazethapyr + imazamox @ 100 g ha^{-1} at 20 DAS is effective and economical weed management practice in soybean.

REFERENCES

1. Chhokar, R.S., Balyan, R.S. and Pahuja, S.S., The critical period of weed competition in soybean. *Indian Journal of Weed Science*, **27(3&4):** 197-200 (1995).
2. Jha, A.K. and Mounika Soni, Weed management by different herbicides in soybean. *Indian Journal of weed science*, **45(4):** 250-252 (2013).
3. Kachroo, R.S., Sing, R.M. and Tiwari, J.P., Herbicide weed control in soybean. *Journal of Oilseeds Research*, **22(6):** 47-50 (2003).
4. Kuruchania, S.P., Rathi, G.S., Bhalla, S. and Mathew, R., Bio-efficacy of post emergence herbicides for weed control in soybean. *Indian Journal of Weed Science* **33(1&2):** 34-37 (2000).
5. Meena, D.S., Ram, B., Jadon, C. and Tetarwal, J.P., Efficacy of imazethapyr on weed management in soybean. *Indian Journal of Weed Science* **43(3&4):** 169-171 (2011).
6. Pratap Singh, V., Singh, S.P., Kumar, A., Neeta tripathi, and Nainwal, R.C., Efficacy of haloxyfop a post emergence herbicide on weeds and yield of soybean. *Indian Journal of Weed Science*, **42(3&4):** 83-86 (2010).
7. Vijayalaxmi, G.S., Hiremath, S.M., Hosmath, J.A., Patil and Doddamani, M.B., Sequential application of pre and post emergence herbicides in soybean (*Glycine max* L.). *Karnataka Journal of Agricultural Sciences*, **25(2):** 262-263 (2012).