J. Soils and Crops 30 (1) 81-83, June 2020

ISSN 0971-2836 (Print)
ISSN 2582-2756 (Online)
NAAS Rating - 4.46
Scientific Journal Impact Factor - 7.375

SUITABILITY OF HERBICIDES FOR WEED MANAGEMENT IN SOYBEAN

G. Vanisree[1], V. S. Khawale[2], N. D. Parlawar[3] and D. J. Jiotode[4]

ABSTRACT

An experiment was conducted at Agronomy Farm, College of agriculture, Nagpur during *kharif* 2018-19 to study the suitability of herbicides for weed management in soybean. The experiment was laid out in randomized block design(RBD) with eleven treatments and three replications. The study revealed that, all treatments were significantly superior over weedy check with all growth attributes and yield. Among all treatments, Weed free treatment recorded highest plant height, number of branches, leaf area plant^{-1}, plant dry matter plant^{-1} which resulted increasing seed yield, straw yield and B:C ratio followed by treatment with One hoeing+One weeding+Imazethapyr+Imazemox@70g a.i.ha^{-1}.Same treatment also recorded highest seed yield(21.00 q ha^{-1}),straw yield(34.00 q ha^{-1}), GMR(Rs.76,900/-) , GMR(Rs.45,940/-) and B:C ratio(2.48) which was significantly better over the rest of the treatments.

(Key words : herbicides, weed management, soybean)

INTRODUCTION

Soybean is one of the important commercial crops in many countries.It has highest protein 40 -42 per cent, 20 per cent oil and also very rich in vitamins, minerals, iron and essential amino acids, carbohydrates, saponins and isoflavonoids such as genistein and daidzein.

Isoflavones are non nutritive substances that posses health protective benefits. They have been associated with prevention and treatment of chronic diseases such as heart disease, cancer, diabetes and hypertension as well as other clinical pathologies.Soybean seeds contain many phenolic compounds such as chlorogenic acid, caffeic acid, ferulic acid and p- coumaric acid. These have antioxidants that are beneficial to human health (Kim *et al*., 2005).The weeds cause yield reductions to the extent of 20-77% depending upon the nature, intensity and duration of infestation (Kurchania *et al*., 2001). Higher production and productivity of crop depends up on the effective weed control management in soybean. So, crop – weed competition at critical stages is almost important for increasing the crop yields.

MATERIALS AND METHODS

An experiment was conducted at Agronomy Farm, College of agriculture, Nagpur during *kharif* of 2018-19. The experimental site was located at 21^{0}8' north latitude to79^{0}4' east longitude having an elevation of 321 m above MSL and has subtropical climate. The soil was clayey in texture and slightly alkaline reaction. It was high in available nitrogen (208.13 kg ha^{-1}), available phosphorus (11.16 kg ha^{-1}) and fairly rich in potash (305.45 kg ha^{-1}) with moderate organic carbon (0.50). The experiment was laid out in randomized block design with eleven treatments and replicated thrice. The treatments consisting of weedy check (T_1), weed free (T_2),One hoeing + One weeding (T_3), Propaquizafop @ 50 a.i ha^{-1}(T_4), Imazethapyr @ 75 g a.i ha^{-1} (T_5), Propaquizafop 50 g+Imazethapyr 75 g(T_6), Imazethapyr + Imazemox @ 70 g ha^{-1}(T_7), One hoeing + One weeding+Propaquizafop @50 g a.i ha^{-1}(T_8),One hoeing + One weeding+Imazethapyr 75 g a.i ha^{-1}(T_9), One hoeing + One weeding+Propaquizafop 50 g+Imazethapyr @75 g (T_{10}), One hoeing+One weeding+Imazethapyr+Imazemox @ 70 g ha^{-1}(T_{11}). Soybean variety NRC-37 was grown with spacing of 45 cm×5 cm. The crop was grown with recommended package of practices. The growth parameters viz., plant height (cm), leaf area plant^{-1}(dm^2), dry matter accumulation plant^{-1} (g) were recorded at 30,60,90 DAS and at harvest and yield and yield attributing parameters viz., number of pods plant^{-1}, seed weight plant^{-1} (g),test weight (g), seed yield (q ha^{-1}), straw yield (q ha^{-1}) were recorded at harvest.

1. P. G. Student, Agronomy Section, College of Agriculture, Nagpur
2. Professor, Agronomy section, College of Agriculture, Nagpur
3. Head,Deptt. of Agronomy, Dr. P. D. K. V, Akola
4. Asstt. Professor of Agrometeorology,College of Agriculture, Nagpur

Table 1.Influence of weed control treatments on growth parameters, yield and economics

Treatment details	Plant height (cm)	Leaf area plant^{-1} (dm^2)	Dry matter plant^{-1}	No.of pods plant^{-1}	Seed Wt. plant^{-1}(g)	Test weight (g)	Seed yield (q ha^{-1})	Straw yield (qha^{-1})	H.I (%)	GMR (Rs. ha^{-1})	NMR (Rs. ha^{-1})	B:C ratio
T_1-Weedy check	37.65	7.56	14.60	31.25	9.80	11.56	11.25	18.25	38.13	41200	16770	1.68
T_2-Weed free check	51.76	11.26	22.50	52.50	18.20	15.54	22.50	35.05	39.09	82255	50625	2.60
T_3-One hoeing+One weeding	44.28	8.96	15.80	37.93	12.16	13.05	15.25	29.25	34.26	50175	22165	1.79
T_4-Propaquizafop@50a.i ha^{-1}	39.68	8.25	16.20	33.56	10.25	12.00	13.50	25	35.06	49750	22840	1.84
T_5-Imazethapyr@ 75 g a.i ha^{-1}	42.23	8.53	16.60	35.78	11.33	12.93	14.20	27.35	34.17	52435	25005	1.91
T_6-Propaquizafop50g+ Imazethapyr 75g	46.13	9.15	18.10	39.65	13.12	13.56	16.30	30.25	35.01	60075	32065	2.14
T_7-Imazethapyr+Imazemox@70 g ha^{-1}	47.53	9.45	18.60	41.60	13.80	13.92	17.05	31.50	35.11	62825	33475	2.14
T_8-(Onehoeing+One weeding) +Propaquizafop@50 a.i ha^{-1}	48.78	9.70	20.20	44.30	14.20	14.23	17.46	32.00	35.30	64310	34800	2.17
T_9-(Onehoeing+One weeding)+ Imazethapyr75g.a.i ha^{-1}	49.17	9.93	21.05	48.20	16.40	14.55	18.65	32.70	36.31	68545	38355	2.27
T_{10}-(Onehoeing+Oneweeding)+ (Propaquizafop50g+ Imazethapyr@75 g)	49.96	10.23	21.20	51.75	17.80	14.90	19.40	33.25	36.84	71225	40515	2.31
T_{11}-(Onehoeing+Oneweeding) + (Imazethapyr+Imazamox @70 g ha^{-1})	50.13	10.53	21.40	52.0	18.00	15.00	21.00	34.00	38.18	76900	45940	2.48
S E m(±)	2.41	0.62	1.22	2.83	0.94	0.82	1.13	1.97	-	859	859	-
C D at 5%	7.11	1.83	3.62	8.37	2.79	2.43	3.33	5.82	-	2535	2535	-

RESULTS AND DISCUSSION

Effect on growth parameters

Among all treatments, maximum plant height was recorded with weed free treatment (51.76 cm).Among herbicidal treatments One hoeing + One weeding + Imazethapyr+ Imazemox @70 g ha^{-1} recorded highest plant height (50.13 cm) which was at par with treatment One hoeing+One weeding+Imazethapyr 75 g a.i ha^{-1}, One hoeing+One weeding+Propaquizafop 50g+Imazethapyr @75 g, it might be due to minimum competition between crop and weeds.These results are in conformation with the findings of Kumar *et al.* (2018), who recorded that the application of propaquizafop 50 g + imazethapyr 100g ha^{-1} recorded highest plant height (82.2cm). Patel *et al.*(2018) also observed highest plant height at all stages of crop growth with treatment one hoeing at 15 DAS and two HW at 25 and 45 DAS and it was at par with treatments PE application of pendimethalin 38.7 per cent cs @ 677.25 g a.i.ha^{-1}fb 1 HW at 30 DAS, metribuzin @ 525 g a.i.ha^{-1}fb 1 HW at 30 DAS, metribuzin @ 525 g a.i. ha^{-1}fbimazethapyr + propaquizafop-ethyl @ (80+60) g a.i.ha^{-1}.

Among all treatments,highest leaf area plant $^{-1}$ obtained with weed free treatment(11.26 dm^2).Among herbicidal treatments One hoeing + One weeding + Imazethapyr + Imazemox @ 70 g ha^{-1}recorded highest leaf area plant^{-1} (10.53 dm^2).This might be due to the increased leaf area plant $^{-1}$ as a result of reduced weed population in these treatments causing favourable soil moisture and nutrient availability which helps rapid cell development.Patel *et al.*(2018) observed One hoeing at 15DAS and 2HW at 25DAS and 45 DAS recorded highest leaf area at all stages of crop growth and it was at par with PE application of pendimethalin 38.7 per cent cs @ 677.25 g a.iha^{-1}fb1 HW at 30 DAS, metribuzin @ 525 g a.i.ha^{-1}fb 1 HW at 30 DAS, metribuzin @525g a.i.ha^{-1}fbimazethapyr + propaquizafop-ethyl @ (80+60) g a.i.ha^{-1}.

Among all treatments, highest dry matter plant^{-1} (22.50 g) recorded with weed free treatment. Among herbicidal treatments One hoeing + One weeding + Imazethapyr + Imazemox@ 70 g ha^{-1} recorded highest dry matter plant^{-1}(21.40 g), it might be due to the reduction of dry weight of weeds under these treatments created favourable microenvironment for growth and development of soybean and thus, increased dry matter plant^{-1}as compared to weedy check.Similar results reported by Patel *et al.* (2018). They observed that dry matter accumulation plant^{-1} was significantly higher in treatment one hoeing at 15 DAS and 2 HW at 25 and 45 DAS treatment over rest of treatments, except the PE application of treatment pendimethalin 38.7 per cent cs@ 677.25 g a.i. ha^{-1}fb 1 HW at 30 DAS, metribuzin @ 525 g a.i.ha^{-1} fb 1 HW at 30 DAS, metribuzin @ 525g.a.i.ha^{-1} fb imazethapyr + propaquizafop-ethyl @ (80+60) g a.i.ha^{-1}.

Yield

The study revealed that, weed free treatment recorded highest seed (22.50 q ha^{-1}) and straw yield (35.05 q ha^{-1}). Among herbicidal treatments One hoeing + One weeding + Imazethapyr + Imazemox@ 70 g ha^{-1}recorded highest seed and straw yields of 21.00q ha^{-1} and 34.00 q ha^{-1} respectively. This might be due to weed managed at critical period and early crop growth which resulted in higher production of photosynthates and finally improving yield attributing characters and ultimately higher seed yield. Similar results were reported by Meena *et al.*(2011). They observed that hand weeding twice at 20 and 40 DAS recorded significantly higher branches plant^{-1} (3.07), seed yield pod^{-1} (2.83g), seed yield (1075kg ha^{-1}) and straw yield (1709 kg ha^{-1}) followed by imazethapyr at 150 g ha^{-1} and 100 g ha^{-1}.Mishra *et al.* (2013) reported that application of odyssey + adjuvant recorded highest seed yield as compared to other treatments.

Economics

One hoeing + One weeding + Imazethapyr + Imazemox @ 70g ha^{-1}recorded highest NMR (45,940 Rs ha^{-1}), GMR (76,900 Rs ha^{-1}) and B:C ratio(2.48).The lowest NMR (16,770Rs ha^{-1}),GMR(41,200 Rs ha^{-1})and B:C ratio (1.68) recorded under weedy check. Similar results were reported by Prachand *et al.* (2015),who observed that application of imazethapyr 0.100 kg ha^{-1} + quizalofop-ethyl 0.075 kg ha^{-1} as postemergence recorded maximum gross return (Rs. 81,500) , net return (Rs. 56,269/-) and highest B:C ratio(3.23).

REFERENCES

Kim,H. K.,S. T.Kang,J. H. Cho,M. G. Choung and D. Y. Suh, 2005. Quntitative trait loci associated with oligosaccharide and sucrose contents in soybean(*Glycine max* L.) J. Plant. Biol.**48**:106-112.

Kumar,S., M. C.Rana, S. S. Rana and A. Sharma, 2018.Effect of propaquizafop alone and in mixture with other herbicides on weed dry weight and growth and yield of soybean.J.Crop and Weed.**14**(2):149-153.

Kurchania,S.P,G. S. Rathi ,S. Bhalla and R. Mathew, 2001.Bio-efficacy of post emergence herbicides for weed control in soybean. IndianJ. Weed.Sci.**33**(1&2):34-37.

Meena,D. S., B. Ram, C. Jadon and J. P. Tetarwal, 2011.Efficacy of imazethapyr onweed management in soybean. Indian J. Weed. Sci.**43**(3&4):169-171.

Mishra,P.,H. Singh,S. Babu and S. Pal,2013.Bio-efficacy of some early post-emergence herbicides in soybean*(Glycine max* L.).Ann.Agric.Res. NewSeries.**34**(1):81-87.

Patel,S., M. B. Dhonde, A. B. Kamble, 2018.Effect of integrated weed management on growth and yield of soybean. Int.J.Agric.Sci.**10**(10):6058-6062.

Prachand, S.,A. Kalhapure and K. J. Kubde, 2015.Weed management in soybean with pre and post emergence herbicides. Indian J. Weed.Sci.**47**(2):163-165.

Rec. on 20.01.2020 & Acc. on 30.01.2020