



International Journal of Advanced Chemistry Research

ISSN Print: 2664-6781
 ISSN Online: 2664-679X
 Impact Factor: RJIF 5.32
 IJACR 2022; 4(2): 199-202
www.chemistryjournals.net
 Received: 03-09-2022
 Accepted: 12-10-2022

Neshwary Kumar Sahu
 Department of Agronomy,
 Indira Gandhi Krishi
 Vishwavidyalaya, Raipur,
 Chhattisgarh, India

SN Khajanji
 Department of Agronomy,
 Indira Gandhi Krishi
 Vishwavidyalaya, Raipur,
 Chhattisgarh, India

R Lakpale
 Department of Agronomy,
 Indira Gandhi Krishi
 Vishwavidyalaya, Raipur,
 Chhattisgarh, India

Effect of new pre-mix herbicides molecules on yield attributing character and yield of soybean [*Glycine max* (L.) Merrill] in *vertisols*

Neshwary Kumar Sahu, SN Khajanji and R Lakpale

Abstract

The experiment "Effect of new pre-mix herbicides molecules on yield attributing character and yield of soybean [*Glycine max* (L.) Merrill] in *vertisols*" was carried out during *kharif* season of 2017 at Instructional Cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, with the objective to find out best pre-mix herbicide for growing soybean under the agro-climatic condition of Chhattisgarh. The soil in the experimental field was clayey (*Vertisols*) in texture, with low Nitrogen, medium phosphorus, and high potassium content.

The experiment was laid out in randomized block design (RBD) having the combination of eight treatments replicated thrice. The weed management practices selected for study were T₁ - Pendimethalin 30% EC+ Imazethapyr 2% SL premix @ 960 g a.i. ha⁻¹ as PE, T₂ - Sulfentrazone 48% F+ Clomazone 48 EC @ 725 g a.i. ha⁻¹ as PE, T₃- Diclosulam+ Pendimethalin 85% WG @ 102 g a.i. ha⁻¹ as PPI, T₄- Diclosulam+ Pendimethalin 85% WG @ 127.5 g a.i. ha⁻¹ as PPI, T₅- Imazethapyr 35% + Imazamox 35% WG @ 70 g a.i. ha⁻¹ as PoE, T₆ - Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE, T₇ – Pendimethalin @ 1000 g a.i. ha⁻¹ as PE and T₈ – control (weedy check).

The results of experiment on response of different pre-mix herbicides revealed that yield attributing characters viz., number of pods plant⁻¹, number of seeds pod⁻¹, seed yield, stover yield and harvest index were significantly higher under treatments Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆). Similarly, all these characters were also superior in treatment of Sulfentrazone 48% F+ Clomazone 48 EC @ 725 g ai ha⁻¹ as PE (T₂). Remarkable lowest values were obtained in weedy check.

Keywords: Soybean, *Glycine max* (L.) Merrill, *vertisols*

Introduction

Soybean [*Glycine max* (L.) Merrill] has a prominent place as the world's most important seed legume, which contributes 25 per cent to the global vegetable oil production, about two thirds of the world's protein concentrate for livestock feeding and is a valuable ingredient in formulated feeds for poultry and fish. Due to its various use, soybean is rightly called "Miracle Crop" of nature to mankind. It contains about 40-42 per cent high quality protein, 20-30 per cent carbohydrates, 20-22 per cent edible oil, 4.5 per cent minerals, 3.7 per cent fibre, 8.1 per cent water and large amount of phosphorus, high level of amino acids such as Lysine, Leucine, Lecithin and vitamins. It is well established fact that soybean is cheap source of protein and edible oil. It is a good source of isoflavones and therefore it helps in preventing heart diseases, cancer and HIVs (Kumar, 2007) ^[4].

Weeds are a major problem for soybeans grown during the rainy season. Weed competition in soybean at an early stage of crop growth is critical, causing yield losses ranging from 10% to 86% depending on weed infestation. The critical period for crop weed competition in soybean is reported to be the first 45 DAS. (Panneerselvam and Lourduraj, 2000) ^[10].

Single pesticide use is also ineffective since some weeds escape control due to their selectivity. Many soybean herbicides contain numerous herbicide active ingredients to control a wider range of weed species. Herbicides are also compounded to incorporate various herbicide modes of action in order to prevent or delay the growth of herbicide-resistant weeds. Knowing the amount of the individual herbicides in the pre-mix is useful for deciding if additional product should be applied to further improve weed control. Therefore, integrated weed management or herbicide mixture may broaden the window of weed management by broad-spectrum weed control (Bineet *et al.* 2001) ^[11].

Corresponding Author:
Neshwary Kumar Sahu
 Department of Agronomy,
 Indira Gandhi Krishi
 Vishwavidyalaya, Raipur,
 Chhattisgarh, India

Malik *et al.* (2006) ^[13] suggested that sequential application of herbicides may provide consistent weed control than single application. Rao *et al.* (2010) ^[11] also reported that alone application of pendimethalin and among different combinations, imazethapyr + pendimethalin were found better in reduction of the dry matter accumulation of weeds with maximum seed yield. Kothawade *et al.* (2006) ^[3] revealed that the yield attributing characters *viz.*, number of pods plant⁻¹ (54.86), number of seeds pod⁻¹ (2.56), thousand seed weight (142.66 g), straw yield (31.26 q ha⁻¹), biological yield (62.10 q ha⁻¹) and seed yield (30.84 q ha⁻¹) were significantly highest in the weed free treatment at harvest. The decrease in seed yield (20.38 q ha⁻¹) and biological yield (43.04 q ha⁻¹) was noted in weedy check. Younesabadi *et al.* (2013) ^[12] at New Delhi observed that tank-mix pre-emergence application of pendimethalin 0.5 kg ha⁻¹ + imazethapyr 0.075 kg ha⁻¹ resulted in considerably higher seed yield over others treatments. Younesabadi *et al.* (2013) ^[12] at New Delhi observed that tank-mix pre-emergence application of pendimethalin 0.5 kg ha⁻¹ + imazethapyr 0.075 kg ha⁻¹ resulted in considerably higher seed yield over others treatments.

Materials and Methods

Field experiment was carried out during *kharif* season (June to October) of 2017 at Instructional cum Research Farm, IGKV, Raipur (C.G.). The climate of the location is sub-humid with hot summer and cold winter. The mean annual precipitation of the region is 1326 mm (based on 80 years mean), about 85% of rainfall is received during rainy season that is middle of June to September with occasional showers in winter and summer months. The weekly maximum temperature raises upto 46 °C during summer and minimum temperature drop down as low as 6 °C during winter season. The soil of experimental field was clayey in texture (*Vertisols*) with low N, high P and K content. Soybean variety JS 97-52 was sown on 1st, July 2017 at a spacing of 30 cm x 10 cm.

Experiment was laid out in randomized block design with eight treatments in three replications. The experiment composed of weed management practices *viz.* T₁ - Pendimethalin 30% EC+ Imazethapyr 2% SL premix @ 960 g ai ha⁻¹ as pre-emergence, T₂ - Sulfentrazone 48% F+ Clomazone 48 EC @ 725 g ai ha⁻¹ as pre-emergence, T₃ - Diclosulam+ Pendimethalin 85% WG @ 102 g ai ha⁻¹ as pre-plant incorporation, T₄ - Diclosulam+ Pendimethalin 85% WG @ 127.5 g ai ha⁻¹ as pre-plant incorporation, T₅ - Imazethapyr 35% + Imazamox 35%WG @ 70g ai ha⁻¹ as post emergence, T₆ - Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as post emergence, T₇ - Pendimethalin 30% EC @ 1000 g ai ha⁻¹ as pre-emergence and T₈ - Control (weedy check)

Results and Discussion

Effect on number of pods plant⁻¹

The experiment revealed that treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) proved to be best in enhancing number of pods plant⁻¹ however, it was found comparable to the treatment Sulfentrazone 48% F+ Clomazone 48% EC @ 725 g ai ha⁻¹ as PE (T₂). The minimum number of pods plant⁻¹ was observed under untreated control (T₈).

This result may be due to less competition during critical periods of crop growth and better weed suppression, which

allowed the crop to grow their potential by absorbing sufficient nutrients, light, moisture, and space, facilitating more translocation of photosynthates towards the reproductive parts, as well as the presence of favourable agro-climatic conditions due to weed removal, which resulted in a higher amount of pods plant⁻¹. Kumar *et al.* (2001) ^[5], Kothawade *et al.* (2006) ^[3] and Pal *et al.* (2013) ^[9] reported similar findings.

Effect on number of seeds pod⁻¹

The experiment reveals that spraying of different pre-mix herbicides show non-significant impact on this character. However, treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) having relatively higher number of seeds pod⁻¹ numerically and lowest in untreated control (T₈).

Effect on number of seeds plant⁻¹

The experiment revealed that treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) was significantly superior to rest of the treatments in enhancing number of seeds plant⁻¹, which was found at par with Sulfentrazone 48% F+ Clomazone 48% EC @ 725 g ai ha⁻¹ as PE (T₂), Diclosulam+ Pendimethalin 85% WG @ 127.5 g ai ha⁻¹ as PPI (T₄) and Imazethapyr 35% + Imazamox 35% WG @ 70 g ai ha⁻¹ as PE (T₅). Under the Untreated control (T₈), the minimum number of seeds plant⁻¹ was observed.

Effect on 100-seed weight

In this experiment, non-significant variation on 100-seed weight of soybean was observed, however maximum and minimum hundred seed weight was recorded under treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) and untreated control (T₈), respectively.

Effect on Seed yield (kg ha⁻¹)

The experiment showed that there was a significant difference recorded due to use of different pre-mix herbicides. The ultimate result of various physiological, biochemical, and phonological processes occurring in the plant system is seed yield. The maximum seed yield was recorded under treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) which was significantly higher than rest of the treatments. The capacity of plants to produce seed yield is determined not only by the size of their photosynthetic systems, their efficiency, and the length of time they are active, but also by the translocation of dry matter into economic sinks. The total yield is a cumulative function of the yield components. Higher seed yield under treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) was due to weed control during the critical period and early crop growth, higher dry matter production, high growth in terms of leaf area, which resulted in higher production of photosynthesis, which acts as a source, and greater translocation of food materials to the reproductive parts, which resulted in superiority of yield attributing characters and ultimately high yield. Lower weed population and greater weed control efficiency resulted in increased grain yield. In contrast, poor plant growth and development of yield-attributing characters in weedy check may be due to a lack of moisture, nutrients, space, and light availability

during flowering and pod development, which negatively influenced seed yield. The lower seed yield under weedy control could be associated with the high weed interference.

Effect on Stover yield (kg ha⁻¹)

The experiment results indicated that significantly maximum stover yield 3421 kg ha⁻¹, was observed in treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) which was found at par with Sulfentrazone 48% F+ Clomazone 48% EC @ 725 g ai ha⁻¹ as PE (T₂). The lowest stover yield was recorded under untreated control (T₈).

The higher stover yield in the above treatments could be related to lesser weeds during the early crop growth period, as well as higher yield attributes and pod yield, which result in higher stover yield. While in the untreated control, a

reverse trend was observed, resulting in the lowest stover yield under this treatment. Dhane *et al.* (2009)^[2] and Pal *et al.* (2013)^[9] are reported similar results.

Effect on Harvest index (%)

The experiment result showed that the treatment of Propaquizafop 2.5% + Imazethapyr 3.75% SL @ 50+75 g ai ha⁻¹ as PoE (T₆) gave the maximum harvest index to rest of the treatments, followed by Pendimethalin 30% EC @ 1000 g ai ha⁻¹ as PE (T₇), Imazethapyr 35% + Imazamox 35% WG @ 70 g ai ha⁻¹ as PoE (T₅), Sulfentrazone 48% F+ Clomazone 48% EC @ 725 g ai ha⁻¹ as PE (T₂), Diclosulam+ Pendimethalin 85% WG @ 127.5 g ai ha⁻¹ as PPI (T₄) and Diclosulam+ Pendimethalin 85% WG @ 102 g ai ha⁻¹ as PPI (T₃). The lowest harvest index was found in under untreated control (T₈).

Table 1: Yield attributing characters of soybean as affected by weed management practices

Treatment	Dose (g ai ha ⁻¹)	Pod plant ⁻¹ (No.)	Seed pod ⁻¹ (No.)	Seed plant ⁻¹ (No.)	100 seed weight (g)
T ₁ : Pendimethalin 30% EC+ Imazethapyr 2% SL premix	960 g	67.93	2.67	183.00	10.68
T ₂ : Sulfentrazone 48% F+ Clomazone 48% EC	725 g	79.20	2.80	209.40	10.91
T ₃ : Diclosulam+ Pendimethalin 85% WG	102 g	71.93	2.80	195.47	10.27
T ₄ : Diclosulam+ Pendimethalin 85% WG	127.5 g	73.97	2.80	204.33	10.65
T ₅ : Imazethapyr 35% + Imazamox 35% WG	70 g	68.93	2.73	196.73	10.48
T ₆ : Propaquizafop 2.5% + Imazethapyr 3.75% SL	50+75 g	81.27	2.90	213.33	11.32
T ₇ : Pendimethalin 30% EC	1000 g	63.40	2.70	169.40	10.15
T ₈ : Control (weedy check)		55.80	2.63	156.33	9.70
SEm ±		0.97	0.05	5.84	0.38
CD (P=0.05)		2.94	NS	17.72	NS

Table 2: Seed yield, stover yield and harvest index of soybean as affected by weed management practices

Treatment	Dose (g ai ha ⁻¹)	Seed yield (kg ha ⁻¹)	Stover yield (kg ha ⁻¹)	Harvest index (%)
T ₁ : Pendimethalin 30% EC+ Imazethapyr 2% SL premix	960 g	2044	2739	42.75
T ₂ : Sulfentrazone 48% F+ Clomazone 48% EC	725 g	2608	3362	43.70
T ₃ : Diclosulam+ Pendimethalin 85% WG	102 g	2194	2853	43.48
T ₄ : Diclosulam+ Pendimethalin 85% WG	127.5 g	2214	2952	42.87
T ₅ : Imazethapyr 35% + Imazamox 35% WG	70 g	2095	2674	43.94
T ₆ : Propaquizafop 2.5% + Imazethapyr 3.75% SL	50+75 g	2846	3421	45.42
T ₇ : Pendimethalin 30% EC	1000 g	1944	2463	44.10
T ₈ : Control (weedy check)		1639	2223	41.69
S.Em ±		19.53	55.17	1.51
CD (P=0.05)		59.25	167.34	1.99

References

- Bineet M, Andani G, Mohammed TA. Herbicide mixture in agriculture: A Review. In: Proceeding of Biennial Conference, Indian Society of Weed Science. pp. 236, held at Bangalore, 2001.
- Dhane JB, Jawale SM, Shaikh AA, Dalavi ND, Dalavi PN. Effect of integrated weed management on yield and economics of soybean (*Glycine max* L. Merrill). Journal of Maharashtra Agricultural University. 2009;34(2):141-143.
- Kothawade TK, Sinare BT, Shete BT, Londhe TB. Effect of different herbicides on growth and yield of soybean. Annals of Plant Physiology. 2006;20(1):59-61.
- Kumar A. A study of consumer attitudes and acceptability of soy food in Ludhiana. MBA research project report, Department of Business Management, Punjab Agricultural University, Ludhiana, Punjab. 2007.
- Kumar P, Baghel RS, Singh SP. Weed management in soybean (*Glycine max* (L.) Merrill). Progressive Agriculture. 2001;1(1):38-41.
- Bisht S, Upadhyaya M. *Glycine max* (L.) Merr. A traditional crop of Kumaun Himalaya and ethnobotanical perspectives. Int. J Agric. Food Sci. 2020;2(2):11-13. DOI: 10.33545/2664844X.2020.v2.i2a.36
- Meena DS, Meena BL, Patidar BK, Jadon C. Bioefficacy of pendimethalin 30% EC + imazethapyr 2% SL premix against weeds of soybean. International Journal of Science, Environment and Technology. 2018;7(4):1236-1241.
- Meena DS, Ram B, Jadon C, Tetarwa JP. Efficacy of imazethapyr on weed management in soybean. Indian Journal of Weed Science. 2011;43(3&4):169-171.
- Pal D, Bera S, Ghosh RK. Influence of herbicides on soybean yield, soil microflora and urease enzyme activity. Indian Journal of Weed Science. 2013;32(3&4):135-139.

10. Panneerselvam S, Lourduraj AC. Weed sapectrum and effect of crop weed competition in soybean [*Glycine max* (L.) merrill]- A Review. Agricultural Reviews. 2000;21(2):121-124.
11. Rao AS, Subba Rao G, Ratnam M. Bio-efficacy of sand mix application of pre-emergence herbicides alone and in sequence with imazethapyr on weed control in relay crop of blackgram. Pakistan Jorrnal of Weed Science and Research. 2010;16 (3):279-285.
12. Younesabadi M, Das TK, Sharma AR. Effect of tillage and tank mix herbicide application on weed management in soybean (*Glycine max* L.). Indian Journal of Agronomy. 2013;58(3):372-378.
13. Malik RS, Ashok Yadav, Malik RK. Integrated weed management in soybean. Indian Journal of Weed Science. 2006;38(1&2):65-68.