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RESEARCH NOTE

Weed management in soybean (*Glycine max* L. Merrill) through Imazethapyr 10 SL herbicide

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A field experiment was conducted in RCBD at the Main Agricultural Research Station, UAS Dharwad on medium black soil during *kharif* 2016-17, comprising eight treatments *viz*., early post emergent (POE) application of Imazethapyr 10 % SL @ 75, 100, 125 and150 g a.i. ha^{-1}, Chlorimuron 25 % EC @ 37.5 g a.i. ha^{-1} and pre emergent (PE) application of Pendimethalin 30 % EC @ 1.5 kg ha^{-1}, weed free check and weedy check. At 60 days after sowing early POE of Imazethapyr 10 % SL @ 100 g a.i. ha^{-1} recorded lower total number of weeds m^{-2} (3.59), weed dry weight g m^{-2} (2.28) and good weed control efficiency (83.52 %). However, it was on par with the application of Chlorimuron 25 % EC @ 37.5 g a.i. ha^{-1} as early POE. Application of Imazethapyr 10 % SL @ 100 g a.i. ha^{-1} as early POE recorded higher soybean seed yield (18.08 q ha^{-1}), haulm yield (19.10 q ha^{-1}). Application of Imazethapyr 10 % SL @ 150 g a.i. ha^{-1} as early POE recorded significantly lower weed count, dry weight and highest weed control efficiency, yielded less due to the phytotoxicity on soybean crop.

Key words: Soybean, Imazethapyr, Weed count, Weed control effeciency

Soybean (*Glycine max* L. Merrill) is an introduced and commercially exploited crop in India. The crop is also called as "Golden Bean" or "Miracle crop" of the 21st century on account of its multiple uses. It has highest protein (40 %), oil (20 %), rich in lysine and vitamins A, B and D and also rich in mineral salts. One of the major reasons for the poor performance of soybean is inadequate and timely weed control measures. Weed infestation is becoming one of the major constraints in achieving potential yield. The crop is mainly cultivated during *kharif* conditions and is infested with various grassy, sedge and broad leaved weeds which emerge simultaneously with the crop plants and compete for essential nutrients, space and moisture causing substantial loss in yield (40-70 %) depending upon the nature, intensity and duration of infestation of weed flora and weed density (Aradhana Bali *et al.,* 2016). The crop-weed competition lies between 15-45 days after sowing. To avoid competition during the early growth stages, soybean field should be kept free from weeds for the first 30-40 days after sowing. Manual weeding although effective in reducing weed competition but it is not free from several limitations such as non availability of sufficient manpower during peak periods, high labour cost and time consuming. Hence, it necessitates search for early post emergence herbicides like Imazethapyr 10 % SL like for effective and economical control of weeds (Sangeetha *et al.*, 2012).

The experiment was replicated thrice in Randomized Complete Block Design at the Main Agricultural Research Station, Dharwad, during *kharif* 2016-17 to study the "Weed management in soybean through Imazethapyr 10 % SL herbicide". The treatments comprised of Imazethapyr 10 % SL @ 75, 100, 125 and 150 g a.i. ha^{-1} as early POE, Chlorimuron 25 % EC @ 37.5 g a.i. ha^{-1} as early POE, Pendimethalin 30 % EC @ 1.5 kg ha^{-1} as PE, weed free check and weedy check. The soil was medium deep black with pH 7.10. The available N, P_2O_5 and K_2O contents were 252.0, 32.5 and 292.8 kg ha^{-1}, respectively. The gross plot size was 7.2 × 5 m and net plot size was 6.6 × 4.8 m. Seeds were treated using *Rhizobium* and Phosphorus solubilizing bacteria @ 1250 g per hectare. Two seeds per hill were dibbled 5 cm deep in furrows at a spacing of 30 × 10 cm. N, P_2O_5 and K_2O (40: 80: 25 kg ha^{-1}) were applied as per recommendation along with gypsum @ 100 kg ha^{-1}. Pendimethalin 30 % EC @ 1.5 kg ha^{-1} was applied as per the treatments on the day of sowing. After 18 days of sowing early post emergence herbicides were applied as per the treatments. Observations were recorded with respect to weed dynamics at 60 days after sowing (DAS). The crop was harvested at its physiological maturity. The data was statistically analysed as per the procedure given by Gomez and Gomez (1983).

Among different herbicide treatments, Imazethapyr 10 SL @ 100 g a.i. ha^{-1} as early POE recorded the lower total number of weeds m^{-2} area (3.59) and it was on par with Chlorimuron 25 EC @ 37.5 g a.i. ha^{-1} as early POE (3.74). Among different herbicide treatments, Imazethapyr 10 SL @ 100 g a.i. ha^{-1} as early POE recorded lower weed dry weight (2.28 g m^{-2}) as compared to other treatments. However, it was on par with Chlorimuron 25 EC @ 37.5 g a.i. ha^{-1} as early POE (2.41 g m^{-2}). Similarly, with respect to weed control efficiency, Imazethapyr 10 SL @ 100 g a.i. ha^{-1} as early POE recorded higher weed control efficiency (83.52 %) as compared to other treatments (Table 1). However, it was on par with Chlorimuron 25 EC @ 37.5 g a.i. ha^{-1} as early POE and Pendimethalin 30 EC @ 1.5 kg a.i. ha^{-1} as PE (83.71 and 83.67 %, respectively). Upadhyay *et al* (2012) reported that significantly higher weed control efficiency (81.82 %) and seed yield (2.9 t ha^{-1}) was observed under Odyssey (mixture of imazethapyr + imazamox) + adjuvant (87.5 g + 1000 ml/ha). Whereas, Vijayalaxmi (2012) reported that sequential application of Oxyfluorfen 0.1 kg ha^{-1} fb Imazethapyr 75 g ha^{-1} or Diclosulam 22 g ha^{-1} fb Imazethapyr 75 g ha^{-1} recorded significantly higher seed yield. Application of Imazethapyr 10 SL at higher doses (125 and 150 g a.i. ha^{-1}) found very effective in controlling and suppressing the growth and development of grasses, broad leaved weeds and sedges associated with soybean, however, exerted phytotoxicity effect on soybean crop. Sangeetha *et al.* (2012) also observed that Imazethapyr @ 200 g/ha decreased the dry weight accumulation of all weeds significantly followed by Imazethapyr @ 100 g/ha. Due to phototoxic effect at 200 g/ha during initial stages yield and yield attributes get reduced.

Soybean seed yield also followed the similar trend in the present investigation as that of weed control efficiency. Significantly higher seed yield (18.08 q ha^{-1}) was recorded with the Imazethapyr 10 SL @ 100 g a.i. ha^{-1} as early POE compared to other treatments. However, it was on par with

Table 1. Total number of weeds, weed dry matter, weed control efficiency at 60 days after sowing and yield of soybean as influenced by Imazethapyr 10 % SL at different dosages as early post emergence

Treatments	Total number of weeds m^{-2}	Weed dry matter (g m^{-2})	Weed control efficiency (%)	Seed yield (q ha^{-1})	Haulm yield (q ha^{-1})
Imazethapyr 10 % SL @ 75 g a.i. ha^{-1} as early POE	4.32 (17.67)	2.75 (6.58)	73.60	14.52	15.83
Imazethapyr 10 % SL @ 100 g a.i. ha^{-1} as early POE	3.59 (12.00)	2.28 (4.21)	83.52	18.08	19.10
Imazethapyr 10 % SL @ 125 g a.i. ha^{-1} as early POE	3.36 (10.33)	2.06 (3.25)	86.98	15.73	16.84
Imazethapyr 10 % SL @ 150 g a.i. ha^{-1} as early POE	2.89 (7.33)	1.99 (2.95)	88.51	15.53	16.44
Chlorimuron 25 % EC @ 37.5 g a.i. ha^{-1} as early POE	3.74 (13.00)	2.41 (4.85)	80.54	17.50	18.65
Pendimethalin 30 % EC @ 1.5 kg a.i. ha^{-1} as PE	3.98 (15.00)	2.43 (4.95)	80.80	16.82	17.61
Weed free check	2.00 (3.00)	1.23 (0.51)	98.05	21.12	22.36
Weedy check	6.08 (36.00)	5.16 (25.68)	-	10.42	11.42
S.Em.±	0.15	0.12	2.03	0.76	0.89
C.D. at 5 %	0.46	0.36	6.17	2.30	2.69

POE: Post Emergence, PE: Pre Emergence, DAS: Days after sowing, * Figures indicate square root transformed values $\sqrt{x+1}$

Chlorimuron 25 EC @ 37.5 g a.i. ha^{-1} as early POE and Pendimethalin 30 EC @ 1.5 kg a.i. ha^{-1} as PE (17.50 and 16.82 q ha^{-1}, respectively) and significantly lower seed yield recorded in Imazethapyr 10 SL @ 150 g a.i. ha^{-1} as early POE and Imazethapyr 10 SL @ 75 g a.i. ha^{-1} as early POE (15.53 and 14.52 q ha^{-1}, respectively). Haulm yield also followed the similar trend (Table 1). The investigation revealed that application of Imazethapyr 10 SL @ 100 g a.i. ha^{-1} as early post emergent proved effective against weeds in soybean ecosystem to achieve higher seed yield without any phytotoxicity effect on soybean.

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