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Weed management in soybean with post emergence herbicides

Soybean occupies a vital place in Indian agriculture as an oilseed crop of the 20th century. Being a rainy season crop, it has high yielding capacity but weed infestation is one of the major constraints in the cultivation of soybean. If weed are not controlled during critical period of weed crop competition, there is reduction in the yield of soybean from 35 to 50 per cent depending upon the weed flora and density. Tewari *et al.* (1991) suggested that soybean yield can be enhanced by almost 50% by adopting timely chemical weeding. ostly farmers are using pre-plant incorporated or pre emergence herbicides for weed control in soybean, but their efficacy is reduced due to variation in climatic and edaphic factors. Therefore, need was felt to explore the possibility of post emergence herbicides for effective control of weed. Guriqbal Singh *et al.* (2014) reported that post emergence application Imazethapyr was very effective in controlling weeds in lentil. Keeping in view the damage caused by the weeds in the soybean fields, present study "Evaluation of Imazethapyr 10% SL against weeds in soybean" was carried out to evaluate the best method of weed elimination in soybean field using chemical weeding techniques.

A field experiment was conducted during *kharif,* 2013 and 2014 at the Agricultural Research Station, Gadhinglaj Dist. Kolhapur (M.S.) which is geographically situated in sub montane zone of Maharashtra. It is situated between 16^0 13'N latitude, 74^0 21' E longitude and at an altitude of about 640.24 m above msl. Average rainfall of this station is 930 mm in 70 rainy days. The experimental site was medium to deep black and clayey in texture, low to medium in organic carbon (0.64 %), low in available nitrogen (210.20 kg ha^{-1}), medium in available phosphorus (20.83 kg ha^{-1}) and higher in available potash (474.87 kg ha^{-1}) and pH 7.5. The field experiment was laid out in a Randomized Block Design with seven treatments replicated thrice and soybean variety "Phule Kalyani" was used for the study. The treatment are post emergence application of Imazethapyr 10% SL 750 ml/ha, Imazethapyr 10% SL 1000 ml/ha, Imazethapyr 10% SL 1250 ml/ha, Quizalofop-ethyl 5% EC 1000 ml/ha, Pendimethalin 30% EC 3300ml/ha, hand weeding and unweeded control. The soybean was sown on 45 x 5 cm spacing. The gross and net plot size were 4.50 x 3.60 m^2 and 3.6 x 3.20 m^2, respectively.

The dominant grassy weed species observed in experiment field were *Echinochloa colonum, Cyperus difformis, Echinochloa crusgalli, Euphorbia hirta, Digera arvensis and Commelina benghalensis.* Population of different weeds and its dry matter observed at 30 and 45DAA were significantly affected by application of various post emergence herbicides. At 30 DAA significantly lower weed population and its dry matter was recorded in Imazethapyr 10% SL 1250 ml/ha which was at par with those of Imazethapyr 10% SL 1000 ml/ha. However, from among the chemical weed control methods significantly higher weed population and its dry matter was recorded in Quizalofop-ethyl 5% EC 1000 ml/ha.

At 45 DAA significantly lower weed population was recorded in Imazethapyr 10% SL 1250 ml/ha which was followed by Imazethapyr 10% SL 1000 ml/ha. However, significantly higher weed population and its dry matter was recorded in Quizalofop-ethyl 5% EC 1000 ml/ha and Pendimethalin 30% EC 3300 ml/ha. At 45 DAA significantly lower dry matter was recorded in Imazethapyr 10% SL 1250 ml/ha which was at par with Imazethapyr 10% SL 1000 ml/ha. However, significantly higher dry matter of weeds was recorded in Quizalofop-ethyl 5% EC 1000 ml/ha. Kelly *et al.* (1998) reported that imazethapyr as post emergence effectively control weeds in soybean. Similar views were endorsed by Dheer Singh *et al.* (2014) and Mahendra Singh *et al.* (2013).

At 30 and 45 DAA higher weed control efficiency was calculated in Imazethapyr 10% SL 1250 ml/ha which was followed by Imazethapyr 10% SL *1*000 ml/ha. However, lower weed control efficiency was calculated in Quizalofop-ethyl 5% EC 1000 ml/ha and Pendimethalin 30% EC 3300 ml/ha. This might be due to Imazethapyr 10% SL is very effective in controlling and suppressing the growth and development of monocot and dicot weeds associated with soybean. Our findings is in accordance with those of Guriqbal Singh *et al.* (2014).

Plant height and dry matter per plant of soybean were significantly influenced by different treatments of weed control. Significantly higher plant height and dry matter per plant of soybean were recorded in Imazethapyr 10% SL 1250 ml/ha which was at par with Imazethapyr 10% SL 1000 ml/ha. This

Table 1. Effect of different herbicides treatments on weed population, weed dry matter and weed control efficiency

Treatment	Dose ml / ha	Weed population (m^{-2})		Weed dry matter (m^{-2})		Weed control efficiency (%)	
		30 DAA	45DAA	30 DAA	45 DAA	30 DAA	45 DAA
Imazethapyr 10% SL	750	25.45 (5.09)	35.34 (5.99)	4.84 (2.31)	9.19 (3.11)	80.43	75.60
Imazethapyr 10% SL	1000	21.11 (4.65)	27.34 (5.28)	4.01 (2.12)	7.11 (2.76)	83.77	81.12
Imazethapyr 10% SL	1250	15.22 (3.96)	20.47 (4.58)	2.89 (1.84)	5.32 (2.41)	88.30	85.86
Quizalofop-ethyl 5% EC	1000	49.97 (7.10)	64.50 (8.06)	9.49 (3.16)	16.77 (4.16)	61.58	55.46
Pendimethalin 30% EC	3300	33.46 (5.83)	51.00 (7.18)	6.36 (2.62)	13.26 (3.71)	74.28	64.78
Hand weeding	-	0.00(0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	100.00	100.00
Control	-	130.07 (11.43)	144.81 (12.05)	24.71 (5.02)	37.65 (6.18)	0.00	0.00
S.Em±		0.03	0.07	0.10	0.15	-	-
C.D. at 5%		0.90	0.22	0.31	0.45	-	-

Note: * square root transformed values

Table 2. Growth, yield attributes and yield of soybean as influenced by different herbicides treatments

Treatment	Dose ml / ha	Plant height(cm)	Number of branches	Dry matter per plant (g)	Number of pods per plant	Seed weight per plant (g)	Test weight (g)	Seed yield (q /ha) (q/ha)	Straw yield
Imazethapyr 10% SL	750	62.85.3	20.2	28.510.3	11.6	23.429.6			
Imazethapyr 10% SL	1000	65.3	5.7	21.9	31.4	11.6	12.8	26.1	32.4
Imazethapyr 10% SL	1250	67.4	5.9	22.7	33.6	12.4	13.1	27.5	33.9
Quizalofop-ethyl 5% EC	1000	62.4	5.3	19.6	28.4	9.5	11.5	23.5	28.4
Pendimethalin 30% EC	3300	61.2	5.3	19.4	27.9	9.1	11.1	21.3	26.1
Hand weeding	-	69.1	6.2	23.6	35.6	13.1	13.8	29.3	35.4
Control	-	59.4	5.2	17.5	23.0	8.3	10.4	17.6	23.3
S.Em±		0.83	0.54	0.48	1.20	0.42	0.35	0.72	0.91
C.D. at 5%		2.58	NS	1.61	3.42	1.28	1.12	2.25	2.72

might be due to the decreased competition of weed with crop for space, water, air, nutrients and sunlight because of their effectiveness as a result of application of post emergence herbicides. The number of branches per plant were not influenced significantly due to various weed control treatments.

The yield contributing characters like number of pods per plant, seed weight per plant, test weight and seed and straw yields of soybean significantly influenced due to various post emergence herbicide treatments. All yield contributing characters and seed and straw yields were significantly higher in Imazethapyr 10% SL 1250 ml/ha which was at par with Imazethapyr 10 % SL 1000 ml/ha. However, lower seed and straw yields were recorded in Quizalofop-ethyl 5% EC 1000 ml/ha and Pendimethalin 30% EC 3300 ml/ha. These findings are in close conformity with Dheer Singh *et al.* (2014) and Mahendra Singh *et al.* (2013). The improved yield attributes and yields under these treatments might be due to effective in controlling and suppressing the growth and development of weed flora as evidenced by less number of weeds, which might have maintained high soil fertility status and moisture content by means of less removal of plant nutrients and moisture through weeds.

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