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Management of Soybean defoliators through chemical insecticides

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ABSTRACT

Soybean is a fascinating crop with innumerable of not only improving agriculture but also supporting industries. In the present investigation, attempts were made to study the relative efficacy of different insecticides against leaf defoliators. It was found that, defoliator (*Spodoptera litura* and Green semi looper) was significantly reduced in plots treated with Quinolphos 25 EC @ 1000 ml/ha followed by Endosulfan 35 EC @ 1000 ml/ha and Chlorantraniliprole (E2Y45) 20 SC @ 200 ml/ha which were at par with each other and the next superior treatments were lambdacyhalothrin 5 EC @ 300 ml/ha, Diflubenzuron 25 WP @ 400 ml/ha, Triazophos 40 EC @ 800 ml/ha and Indoxacarb 14.5 SL @ 500 ml/ha which were at par with each other. Highest yield was obtained from plots treated with lambdacyhalothrin 5 EC @ 300 ml/ha (2500 kg/ha) followed by Triazophos 40 EC @ 800 ml/ha (2451 kg/ha), diflubenzuron 25 WP @ 400 g ml/ha (2400 kg/ha), Indoxacarb 14.5 SL @ 500 ml/ha (1930 kg/ha) and others.

Key words: Soybean, defoliators, chemical insecticides.

Soybean was promoted in the 80's in India, to boost edible oil production in the country. Soybean is reported to be attacked by 273 species of insects and India, 20 insect pest species have been recorded infesting soybean crop (Singh and Singh,1990). Soybean is a unique crop with high nutritional value, providing 40% protein and 20% edible oil, besides minerals and vitamins. It is playing an important role in augmenting both the production of edible oil and protein simultaneously under the circumstances in which the shortage of these commodities are being by experienced by people. It also supports many industries; soybean oil is used as raw material in manufacturing of antibiotics, paints, varnishes, adhesive, lubricants, etc. Soybean meal is used as protein supplement in human diet, cattle and poultry feed (Khanzada *et.al*., 2013). In the present study an effort was therefore made to test the relative efficacy of different chemical insecticides against the defoliators in soybean.

MATERIALS AND METHODS

Field experiment was conducted during *kharif* seasons of 2011 at the farm of All India Co-ordinated Research Project on Soybean, Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra). All the recommended cultural and agronomical practices were carried out to raise a good crop. The experiment were laid out in Randomised Block Design (R.B.D.) replicated thrice with Gross plot size 4.00 m x 3.60 m and Net plot size 3.00 m x 3.00 m. The soybean variety MAUS-158 was sown at a spacing 45 cm x 5 cm.

TREATNENT DETAILS

T_1-Chlorantraniliprole 20 SC 40 g a.i./ha,
T_2 -Quinalphos 25EC 250 g a.i./ha,
T_3 -Lambda cyhalothrin 5 EC 15g a.i./ha,
T_4-Diflubenzuron 25 WP100 g a.i./ha,
T_5-Endosulfan 35 EC 350 g a.i/ha,
T_6 -Triazophos 40 EC 320 g a.i/ha,
T_7 -Indoxacarb 14.5 SL 72.5g a.i/ha, and
T_8 -Untreated control.

Statistical analysis

The per cent infestation of leaf miner were calculated and subjected to angular transformation. The average number of leaf miner larvae per plant were worked out and transferred by using Poisson formula $\sqrt{x + 0.5}$ before analysis. The data

pertaining to infestation, larval count, after their transformation, were statistically analysed by standard analysis of variance method (Panse and Sukhatme, 1967).

RESULTS AND DISCUSSION

First Spray

The effect of chemical insecticides on per cent infestation due to defoliator (*Spodoptera litura* and Green semilooper) 1 days before and 3, 7 and 10 days after first spraying is presented in Table 1 and graphically represented in Fig. 1. It was observed from Table 1 that there were no significant differences found amongst all treatments including control, one day before spraying. It was varied from 28.80 to 32.47. The data presented in Table 1 regarding the per cent infestation due to defoliator 3 days after spraying indicated that all the pesticidal treatments were significantly superior over untreated control (31.57%). However treatment (T_2 and T_5) recorded lowest per cent infestation. It was ranged 22.59 and 22.80 per cent followed by T_7 and T_1 which were at par with each other.

Second spray

It was revealed that, there were no significant differences in per cent infestation 1 days before and after second spraying, amongst all treatments including control. The data presented in Table 2 about per cent infestation 3 days after second spraying exhibited that treatment (T_2) Quinalphos 25 EC @ 1000 ml/ha recorded lowest per cent of infestation (17.85%) followed by (T_5) Endosulfan 35 EC @ 1000 ml/ha (18.49%), (T_1) Chlorantraniliprole (E2Y45) 20 SC @ 200 ml/ha (19.94%) and (T_6) triazophos 40 EC @ 800 ml/ha (20.05%) which were at par with each other. The data on per cent infestation 7 days after second spraying revealed that the treatment with Quinalphos 25 EC @ 1000 ml/ha (17.85) was the most effective and significantly superior over all the rest of treatments. It was followed by Endosulfan 35 EC @ 1000 ml/ha, T_5, T_1, T_3 and T_4 which were at par with each other. All the insecticidal treatments were significantly superior over untreated control (17.65%). It was observed from Table 2 that, 10 days after all pesticidal treatments significantly superior over control (17.34%). Minimum infestation was observed in Quinalphos 25 EC @ 1000 ml/ha followed by Endosulfan 35 EC 1000 ml/ha and Chlorantraniliprole (E2Y45) 20 SC @ 200 ml/ha which were at par with each other. The next superior treatments were T_3, T_4, T_6 and T_7 which were at par with each other.

The results of the present investigation are in accordance with the findings of Taware *et al*. (2005) who reported that for control of soybean insect pest, tobacco caterpillar, quinalphos (1.5%), ethion (1.01 l), triazophos (0.08 l), endosulfan (1.5 l) and chlorpyriphos (1.5 l) were most effective and found that significant reduction in leaf damage. Ahirwar *et.al*. (2013) reported spinosad 45 EC is effective against soybean defoliators while Meena Patil *et.al*. (2014) reported chlorantraniliprole (30 g a.i./ha), methomyl (300 g a.i./ha) and spinosad (75 g a.i./ha) effective in protecting the soybean crop from the infestation of lepidopteron pests. Rambihari Ahirwar *et.al.* (2016) evaluated different chemicals against leaf defoliators of soybean and found that, Profenophos 50 EC @ 1250 ml/ha was most effective treatment followed by Triazophos 40 EC @ 625 ml/ha.

Yield

Highest yield was obtained from plots treated with lambdacyhalothrin 5 EC @ 300 ml/ha (2500 kg/ha) followed by Triazophos 40 EC @ 800 ml/ha (2451 kg/ha), diflubenzuron 25 WP @ 400 g ml/ha (2400 kg/ha), Indoxacarb 14.5 SL @ 500 ml/ha (1930 kg/ha), Endosulfan 35 EC @ 1000 ml/ha (1730 kg/ha), Chlorantraniliprole (E2Y45) @ 200 ml/ha (1670 kg/ha) and others. Virkar (2004) showed that highest yield was obtained from plots treated with chlorpyrifos 20 EC and triazophos 40 EC. Jogdand (2005) reported maximum yield in the plots treated with lambda cyhalothrin 5 EC and triazophos 40 EC @ 0.8 l/ha.

Table 1. Effect of chemical insecticides on per cent infestation due to defoliator after first spray

Treatments	Average per cent infestation of leaves/plant (days after first spraying)			
	1 Day before	3 DAS	7 DAS	10 DAS
1. Chlorantraniliprole (E2Y45)	29.10 (32.62)	23.45 (28.95)	17.89 (25.01)	16.10 (23.64)
2. Quinalphos 25 EC	28.80 (32.30)	22.59 (28.36)	16.69 (24.10)	14.45 (22.33)
3. Lambda cyhalothrin 5 EC	29.60 (32.90)	29.72 (33.02)	17.95 (25.05)	16.65 (24.06)
4. Diflubenzuron 25 WP	30.10 (33.26)	29.97 (33.18)	18.05 (25.13)	16.22 (23.74)
5. Endosulfan 35 EC	28.97 (32.42)	22.80 (28.50)	17.35 (24.60)	15.65 (23.29)
6. Triazophos 40 EC	30.57 (33.51)	30.15 (33.29)	18.22 (25.26)	16.27 (23.77)
7. Indoxacarb 14.5 SL	29.25 (32.72)	23.52 (28.94)	17.75 (24.91)	16.32 (23.81)
8. Untreated	32.47 (34.67)	31.57 (34.17)	19.47 (26.17)	19.05 (25.87)
S.E. ±	0.21	0.78	0.31	0.53
C.D. at 0.05 %	N.S.	2.36	0.96	1.61

* Figure in parentheses are angular transformed values

Table 2.Effect of chemical insecticides on per cent infestation due to defoliator after second spray

Treatments	Average per cent infestation of leaves/plant (days after second spraying)			
	1 Day before	3 DAS	7 DAS	10 DAS
1. Chlorantraniliprole (E2Y45)	25.15 (30.08)	19.94 (26.51)	13.92 (21.89)	12.25 (20.04)
2. Quinalphos 25 EC	24.18 (29.43)	17.85 (24.98)	12.72 (20.85)	10.51 (18.91)
3. Lambda cyhalothrin 5 EC	26.66 (31.08)	20.72 (27.07)	14.15 (22.08)	12.59 (20.78)
4. Diflubenzuron 25 WP	26.97 (31.26)	21.05 (27.29)	14.78 (22.60)	13.01 (21.13)
5. Endosulfan 35 EC	24.83 (29.87)	18.49 (25.45)	13.14 (21.24)	11.56 (19.86)
6. Triazophos 40 EC	27.42 (31.56)	20.05 (26.58)	15.43 (23.09)	13.87 (21.85)
7. Indoxacarb 14.5 SL	27.91 (31.88)	20.33 (26.79)	15.67 (23.30)	14.05 (21.97)
8. Untreated	30.01 (33.20)	27.04 (31.32)	17.65 (24.82)	17.34 (24.59)
S.E. ±	0.77	0.56	0.67	0.53
C.D. at 0.05 %	N.S.	1.69	2.04	1.59

* Figure in parentheses are angular transformed values

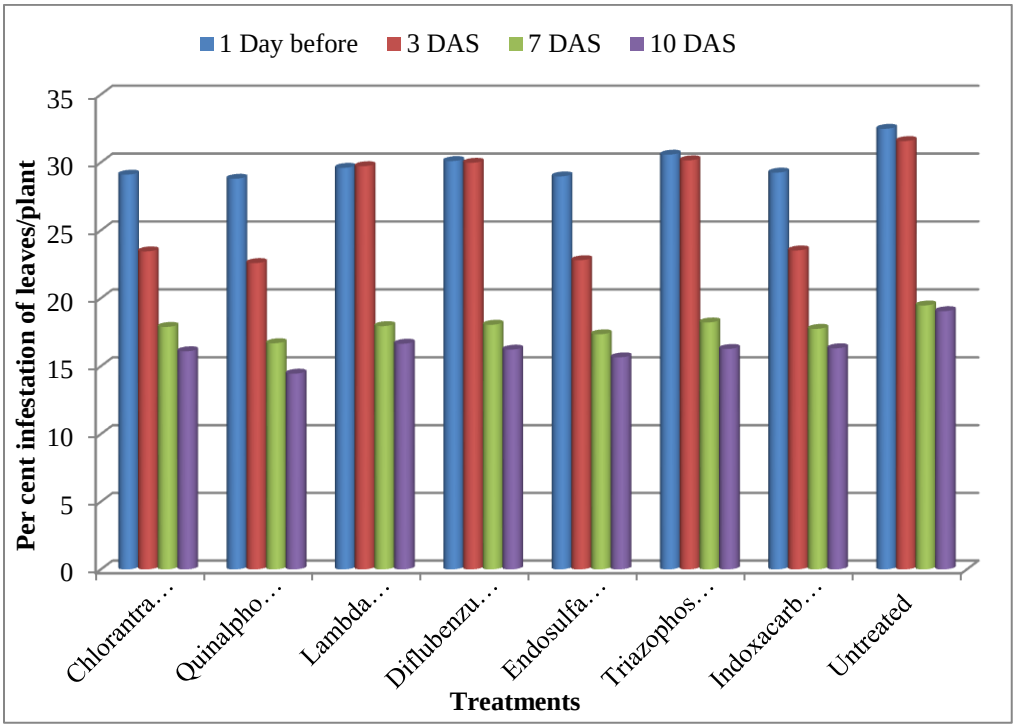

Fig 1. Effect of chemical insecticides on per cent infestation due to defoliator after first spray.

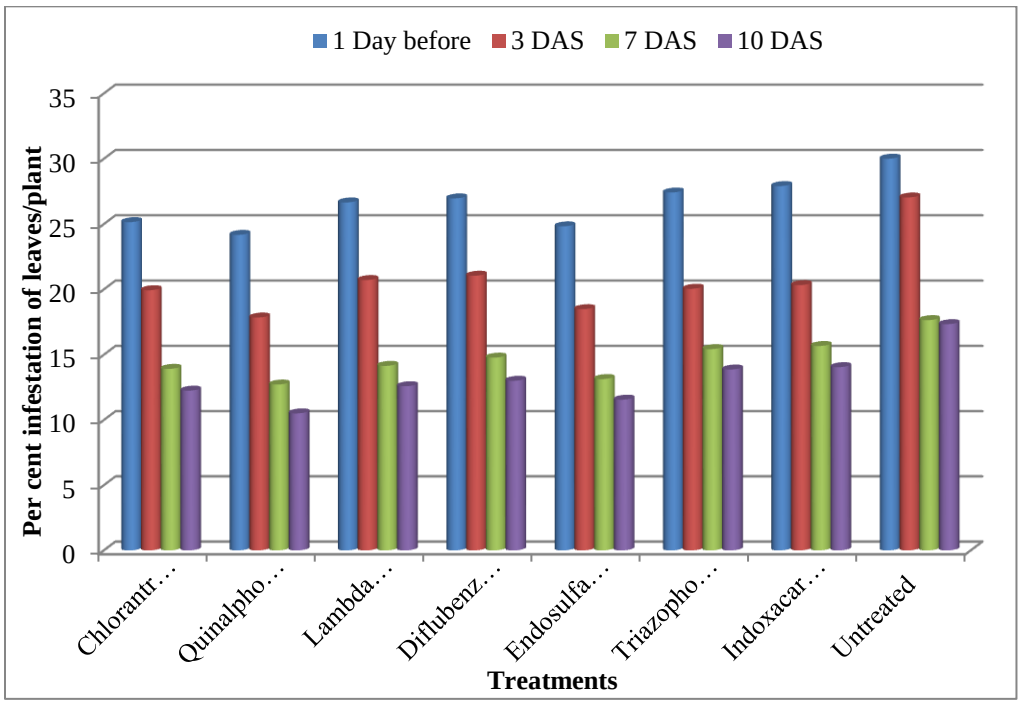

Fig 2. Effect of chemical insecticides on per cent infestation due to defoliator after second spray.

Rambihari Ahirwar *et.al.* (2016) reported the maximum yield was found with the treatment of Profenophos 50 EC @ 1250 ml/ha followed by Triazophos 40 EC @ 625 ml/ha.

CONCLUSION

Quinolphos 25 EC @ 1000 ml/ha was effective in reducing the incidence of defoliator in soybean. Lambdacyhalothrin 5 EC @ 300 ml/ha recorded the highest yield of 2500 kg/ha whereas untreated control recorded only 1280 kg/ha.

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