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INSECT PEST STUDIES ON SOYBEAN CROP IN KAMAREDDY DISTRICT OF

TELANGANA STATE.

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Abstract:

The present study was conducted during seasonal incidence of insect pests of soybean recorded from during Kharif 2013, 2014 and 2015. Soybean variety JS 335 is sown on third week of July ever year. The exemplication was located out in Randomized Black Design (RBD) with six treatment and three replications. Defoliators are most damaging insect pest of soybean. In the evaluation of plant products against defoliators of soybean Neemoil 5% @0.23 was effected against defoliators *S. litura and C. acuta* after first and second spray having 0.23 larval /mrl.

Key words: Botanical insecticides, Defoliator, Soybean.

Introduction

Soybean, Glycine max (L.) Merill belonging to family Leguminaceae, subfamily Papilionaceae is one of the important oilseed cash crops of India. Soybean also known as Golden Bean is the largest oilseed crop in the world accounting for more than 50% of the world oilseeds production. Above 80% of global soybean output is crushed worldwide to obtain oil and meal .it is now the second largest oilseed in India after ground nut. It grows in varied agro climate conditions. It has emerged as an important commercial crop in many countries and international trade of soybean is spread globally. The processed soybean is the largest source of protein feed and second largest source of vegetable oil in the world. Soybean ranks first in the world for production of edible oil. India ranks third in world in respect of area and

fifth in terms of production. It is an annual crop, fairly easy to grow, that produces more protein and oil per unit of land than almost any other crop.

Soybean is a unique crop with high nutritional value, thus it also known as "Miracle bean, Golden bean, and Crop of the planet ". It has provided 40% protein, well balanced in essential amino acids; 20% oil, rich in polyunsaturated fats specially. Omega 6 and Omega 5 fatty acids ; 6-7% total minerals ;5-6% crude fiber and 17-19% carbohydrates (Chauhan *and Joshi, 2005).*

It is a versatile food plant that, used in its various forms, is capable of supplying most nutrients. It can substitute for meat and to some extent for milk. It is a crop capable of reducing protein malnutrition. In addition, soybeans are a source of high value animal feed.

Soybean has luxuriant crop growth, soft and succulent foliage, unlimited source of food, space and shelter there by it invites many insect-pests. During the introduction of soybean in India in the early seventies, only about a dozen minor insect pests were recorded while in 1997, this number has swelled to an alarming figure of 270, besides 1 mite, 2 millipedes, 10 vertebrate and 1 snail pest (*Singh, 1999. Chaturvedi et al. (1998).*

The defoliators, S. litura and C. acuta are most damaging pest on soybean. The full-grown caterpillars are most voracious feeders and cause extensive damage by defoliation. Because of excessive and indiscriminate use of pesticide several problems like development of resistance in targeted species, resurgence of secondary pest, elimination of natural enemies and wild life, contamination of soil, water and food chain and wholesome pollution of environment (Asoken et al., 2000).

The defoliators, S. litura and C. acuta are serious pest on soybean regulatory activities against pests of agricultural importance *(Prakash and Rao, 1989, 2003)*. The current trends of modern society towards 'green consumerism' desiring fewer synthetic ingredients in food may favour plant-based products which are generally recognized as safe in eco-friendly management of plant pests as botanical pesticides *(Isman et al., 2006).*

Botanical pesticides are the important alternatives to minimize or replace the use of synthetic pesticides as they possess an array of properties including toxicity to the pest, repellency, anti-feedance, insect growth regulatory activities against pests of agricultural importance (Prakash and Rao,1989,2003).

The current trends of modern society towards ''green consumerism'' desiring fewer synthetic ingredients in food may favour plant-based products which are generally recognized as safe in eco-friendly management of plant pests as botanical pesticides (*Isman et al.,2006*).

Materials and Methods

The field experiment work was conducted in the field experiment was laid out in randomized block design with six treatments, Neem leaf extract (2%) (3%) (5%), Karan oil @ (2%), (3%) (5%) Tabacco leaf extract @ (2%) (3%) (5%) Mahau oil @ (2%) (3%) (5%) Neem oil @ (2%), (3%) (5%) and including untreated control replicated two times. The crop was sown third week on July, 2013, 2014, and 2015. The experimental plot size of 10 m × 10 m. Defoliator pests Tobacco caterpillar and Green semilooper were observed as the major defoliator pests. The observations of these pests were recorded by counting the no. of larvae per meter row length. There were three replications and plots were selected following a Randomize complex Block Design. The recommended agronomic practices for raising the crop were maintained following the work of Mondal and Wahab (2001)

Observation on species of insect pests with their population per meter row length. plant was recorded from seedling to matured stage of the crop from randomly selected samples of the plants in meter row length each plot. The time of appearance of the pest were observed and recorded. The nature of the damage and feeding behavior of the insects were carefully observed and their photographs were taken in the crop fields. The recordings of data were included visual observation, hand nets, hand picking of insects from the standing crops during 7:00-10:00 a.m. and 4:00-6:00 p.m. at weekly intervals. Some insects were also collected by aspirators. Relative population of insect was counted as suggested by Biswas et al. (2001). The insects were preliminarily identified following Maxwell-Lefroy (1909), Borror et al (1975), Fletcher (1985), Nair (1986), Singh (1990) and Biswas (2008). The insects were graded as foliage feeder, stem feeders on the basis of their feeding behavior.

In this experiment, observations on the efficacy of treatments were recorded one day before the spray and after 3, 7, and 14 days of first and second spraying of plant products.

Defoliator pests

Tobacco caterpillar and Green semilooper were observed as the major defoliator pests. The observations of these pests were

recorded by counting the no. of larvae per meter row length.

Results and Discussion

Overall mean population of *S. litura after first spray -2013*

Mean larval population during spray I indicated that botanical insecticide i. e. Neem oil @ 2% 10 lit/ha recorded the minimum population of 8.75 larvae per meter row length and among the different plant products, Karanj oil @ 2% 10lit /ha recorded minimum larval population of9.5 with 10 larval/mrl, followed by Mahau oil @2% 10lit /ha recorded Minimum larval Population of10.5. Neem leaf extract @2% 10 lit /ha recorded minimum larval population 11 and it was maximum in Tobacco leaf extract @2% 11.75 larval /mrl.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products botanicals insecticide *i.e.,* Neem oil @2% 10lit/ha record the minimum population of 8.75 larva per meter row length and among the different plant products, Karanj oil @2% 01 lit /ha recorded minimum larval population with 9.5 larvae /mrl, followed by Mahau oil @2% 10.5 and maximum population in Neem leaf extract @2% 11. Tobacco leaf extracts @2% 11.75.

Reduction of S. litura population over control

Reduction was higher in Neem oil @ 2% 10lit/ha 8.75 treated crop. Among the plant products, followed by Karanj oil @2 % 9.5 L/mrl Mahau oil@ 2 % 10.5 L/mrl , Neem leaf extract @2 % 11 L/mrl It was lowest in Neem leaf extract @2 % treated plots and recorded only 11 .75 L/mrl reduction insect population.

Overall mean population of *S. litura after second spray -2013*

Mean larval population during population during first indicated that botanical insecticide i. e. Neem oil @ 2% 10 lit/ha recorded the minimum population of 6.5 larvae per meter row length and among the different plant products, Karanj oil @ 2% 10lit /ha recorded minimum larval population of 7.5 with 10 larval/mrl, followed by Mahau oil @2% 10lit /ha recorded Minimum larval Population of 8.25. Neem leaf extract @2% 10 lit /ha recorded minimum larval population 10.5 and it was maximum in Tobacco leaf extract @2% 11 larval /mrl.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products botanicals insecticide *i.e.,* Neem oil @2% 10lit/ha record the

minimum population of 6 .5 larva per meter row length and among the different plant products, Karanj oil @2% 01 lit /ha recorded minimum larval population with 7.5 larvae /mrl, followed by Mahau oil @2% 8.25 maximum population in Neem leaf extract @2% 10.5 and Tobacco leaf extract @2% 11.

Reduction was higher in Neem oil @ 3% 6.5 treated crop. Among the plant products, followed by Karanj oil @3% 7.5 L/mrl Mahau oil@ 3% 8.25 L/mrl, Neem leaf extract @3% 10.5 L/mrl It was lowest in Neem leaf extract @3% treated plots and recorded only 11 L/mrl reduction insect population.

Reduction of S. litura population over control

Efficacy of botanicals in the management of Tobacco caterpillar, Spodoptera litura-*2013*

S.No	Treatments	Dose	No. of larvae/ 10 plants during 1st Spray						No. of larvae/ 10 plants during 2nd Spray					
			Day Before Spray	Days after spray-I					Day Before Spray	Days after spray-II				
				3 Day	7 Day	14 Day	Mean	SD		3 Day	7 Day	14 Day	Mean	SD
1	Control (Untreated)	—	14	14 (3.872)	16(4.297)	16(3.931)	15	1.15	13	16(3.990)	18(4.374)	20(4.507)	16.75	2.99
2	Neem leaf extract	2%	13	13(3.638)	10(3.686)	8(3.087)	11	2.45	12	11(3.704)	10(3.286)	9(3.179)	10.5	1.29
3	Karanj Oil	2%	10	10(3.516)	9(2.993)	9(3.072)	9.5	0.96	8	10(3.549)	6(2.653)	6(2.638)	7.5	1.91
4	Tobacco leaf Extract	2%	14	14 (3.526)	11(3.343)	8(3.114)	11.75	2.87	12	123.528)	11(3.367)	9(3.133)	11	1.41
5	Mahau Oil	2%	11	11(3.769)	10(3.888)	10(2.988)	10.5	0.5	10	8(3.526)	8(3.020)	7(2.976)	8.25	1.26
6	Neem Oil	2%	10	9(3.308)	8(3.199)	8(2.195)	8.75	0.96	8	7 (3.020)	6(2.662)	5(2.632)	6.5	1.29
	C D			N/A	0.168	0.668				N/A	0.225	0.21		
	SE(M)			0.147	0.237	0.22				0.347	0.074	0.069		
	CV			8.181	9.413	14.337				13.811	4.593	4.341		

Tab. 1 Larval mortality rate after 2% spray

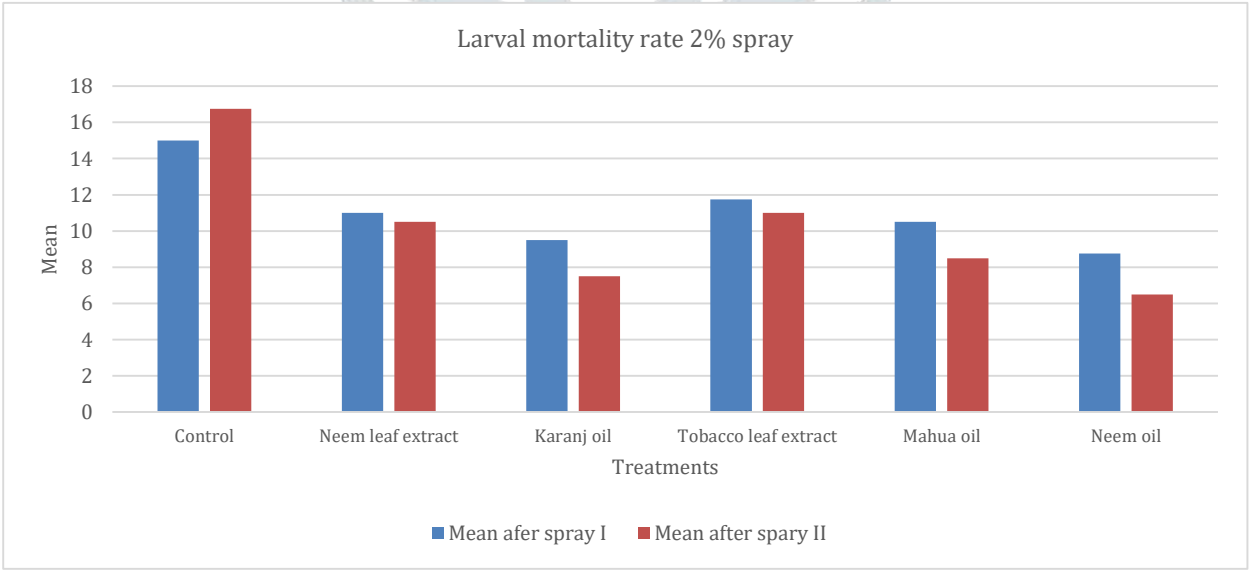

Fig 1 Larval mortality rate after 2% spray

Overall mean population of *S. litura after first spray-2014*

Mean larval population during population during first indicated that botanical insecticide i. e. Neem oil @ 3% 10 lit/ha recorded the minimum population of 6.25 larvae per meter row length and among the different plant products, Karanj oil @ 3% 10lit /ha recorded minimum larval population of 7.5 with 10 larval/mrl, followed by Mahau oil @3% 10lit /ha recorded Minimum larval Population of 8.25. Neem leaf extract @3% 10 lit /ha recorded minimum larval population 10.25 and it was maximum in Tobacco leaf extract @3% 11 larval /mrl.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products

plots and recorded only 11

reduction insect population.

Overall mean population of *S. litura after second spray -2014*

Mean larval population during population during first indicated that botanical insecticide i. e. Neem oil @ 3% 10 lit/ha recorded the minimum population of 6 larvae per meter row length and among the different plant products Karanj oil @ 3% 10lit /ha recorded minimum larval population with 7.75

Mahau oil @3% 8, Neem leaf extract @3% 9.75 and lowest in Neem leaf

botanicals insecticide *i.e.,* Neem oil @3% 10lit/ha record the minimum population of 6 .25 larva per meter row length and among the different plant products, Karanj oil @3% 10 lit /ha recorded minimum larval population with 7.5 larvae /mrl, followed by Mahau oil @3% 8.25 maximum population in Neem leaf extract @3% 10.25 and Tobacco leaf extract @3% 11.

Reduction of S. litura population over mean control

Reduction was higher in Neem oil @ 3% 10lit/ha 6.25 treated crop. Among the plant products, followed by Karanj oil @3% (82.18%), Mahau oil@ 3% 8.25, Neem leaf extract @3% 10.25 It was lowest in and Tobacco leaf extract @3% treated

larval/mrl, followed by Mahau oil @3% 10lit /ha recorded with 8 larval/mrl Neem leaf extract @3% 10 lit /ha 9.75 and it was maximum in Tobacco leaf extract @3% 10 larval /mrl.

Reduction of *S. litura* population over control

Reduction of *S. litura* population was higher in Neem oil @3%10 lit/ha 6 treated crop. Which was followed by Karanj oil @3 %,7.75

extract @ 3% Treated crop was recorded only 10 reductions in insect population.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products botanicals insecticide *i.e.,* Neem oil @3% 10lit/ha record the minimum population of 6 larva per meter row length and among the different plant products, Karanj oil @3% 01 lit /ha recorded minimum larval population with 7.75 larvae /mrl, followed by Mahau oil @3% 8 and maximum population Neem leaf extract @3% 9.75 and Tobacco leaf extract @3% 10.

Reduction of S. litura population over control

Reduction was higher in Neem oil @ 3% 10lit/ha 6 treated crop. Among the plant products, followed by Karanj oil @3% 7.75, Mahau oil@ 3% 8, Neem leaf extract @3% 9.75. It was lowest in Tobacco leaf extract @3% treated plots and recorded only 10 reduction insect population.

efficacy of botanicals in the management of Tobacco caterpillar, Spodoptera litura -2014														
S.No	Treatments	Dose	No. of larvae/ 10 plants during 1st Spray						No. of larvae/ 10 plants during 2nd Spray					
			Day Before Spray	Days after spray					Day Before Spray	Days after spray				
				3 Day	7 Day	14 Day	Mean	SD		3 Day	7 Day	14 Day	Mean	SD
1	Control (Untreated)	–	10	12(3.570)	14(3.828)	16(4.105)	13	2.58	13	14(3.918)	16(4.070)	18(4.280)	15.25	2.22
2	Neem leaf extract	3%	12	11(3.449)	10(3.310)	8(3.063)	10.3	1.71	12	10(3.241)	8(2.951)	9(3.142)	9.75	1.71
3	Karanj Oil	3%	10	8(3.040)	7(2.818)	5(2.444)	7.5	2.08	9	8(2.951)	7(2.897)	7(2.800)	7.75	0.96
4	Tobacco leaf Extract	3%	13	12(3.549)	10(3.347)	9(3.142)	11	1.83	12	11(3.433)	9(3.004)	8(2.966)	10	1.83
5	Mahau Oil	3%	10	8(2.951)	8(2.916)	7(2.800)	8.25	1.26	10	8(2.939)	7(2.877)	7(2.827)	8	1.41
6	Neem Oil	3%	10	6(2.586)	5(2.853)	4(2.66)	6.25	2.63	11	7(2.804)	7(2.862)	6(2.571)	6	1.78
	C.D			0.325	0.535	0.283				0.357	0.307	0.4		
	SEM			0.107	0.176	0.093				0.117	0.101	0.131		
	C.V			6.697	11.072	6.259				7.299	6.481	8.484		

Tab. 2 Larval mortality rate after 3% spray

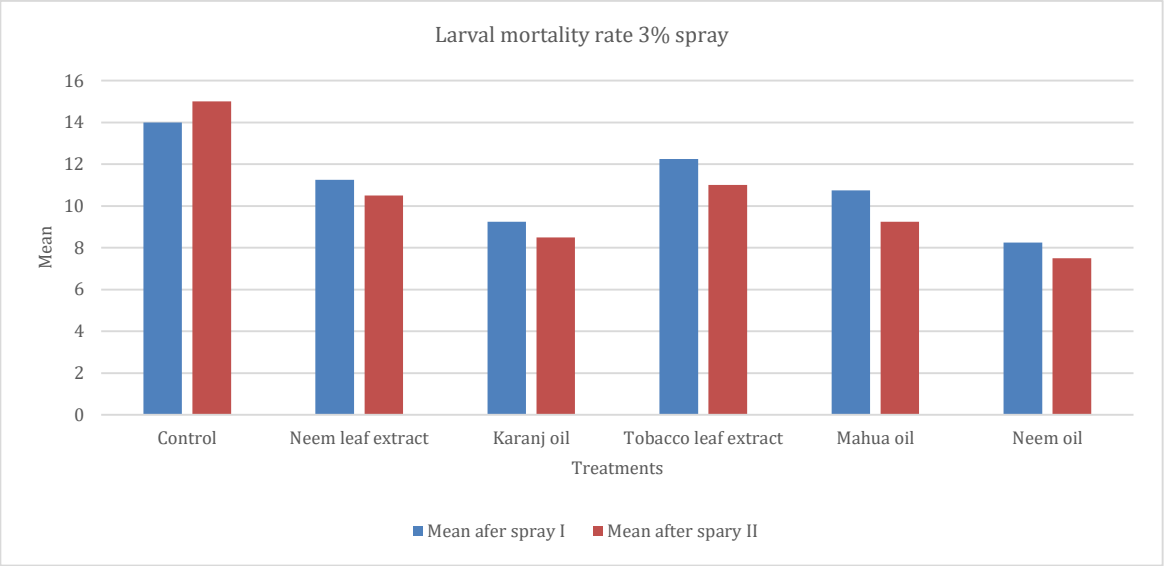

Fig 2 Larval mortality rate after 3 % spray

Overall mean population of *S. litura after first spray-2015*

Mean larval population during population during first indicated that botanical insecticide i. e. Neem oil @ 5% 10 lit/ha recorded the minimum population of 7 larvae per meter row length and among the different plant products, Karanj oil @ 5% 10lit /ha recorded minimum larval population with 8 larval/mrl, followed by Mahau oil @5% 10lit /ha recorded minimum Neem leaf extract @5% 10 lit /ha 10.25 and it was maximum in Neem leaf extract @5% 11.5 larval /mrl.

Reduction of *S. litura* population over control

Reduction of *S. litura* population was higher in Neem oil @5%10 lit/ha 7 treated crop. which was followed by Karanj oil @5 % 8, Mahau oil @5 9.25, Neem leaf extract @5% 10.25 and lowest in Tobacco leaf extract @ 5 % Treated crop was recorded only 11.5 reduction in insect population.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products botanicals insecticide *i.e.,* Neem oil @5% 10lit/ha record the minimum population of 7 larva per meter row length and among the different plant products, Karanj oil @5 % 10 lit /ha recorded minimum larval population with 8 larvae /mrl, followed by Mahau oil @5% 9.25 Neem leaf extract @5% 10.25 and maximum population in Tobacco leaf extract @5% 11.5.

Reduction of S. litura population over control

Reduction was higher in Neem oil @ 5% 10lit/ha 7 treated crop. Among the plant products, followed by Karanj oil @5% 8, Mahau oil@ 5% 9.25, Neem leaf extract @5% 10.25. It was lowest in Tobacco leaf extract @5% treated plots and recorded only 11.5 reduction insect populations.

Tobacco leaf extract @ 5% Treated crop was recorded only 10 reductions in insect population.

Over mean population of *S. litura*

Mean larval population during second spray indicated that plant products botanicals insecticide *i.e.,* Neem oil @5% 10lit/ha record the minimum population of 6 larva per meter row length and among the different plant products, Karanj oil @5% 10 lit /ha recorded minimum larval population with 7.5

Overall mean population of *S. litura after second spray-2015*

Mean larval population during population during first indicated that botanical insecticide i. e. Neem oil @ 5% 10 lit/ha recorded the minimum population of 6 larvae per meter row length and among the different plant products, Karanj oil @ 5% 10lit /ha recorded minimum larval population with 7.5 larval/mrl, followed by Mahau oil @5% 10lit /ha 8.25 Neem leaf extract @5% 10 lit /ha 9.75 and it was maximum in Tobacco leaf extract @5% 10 larval /mrl.

Reduction of *S. litura* population over control

Reduction of *S. litura* population was higher in Neem oil @5%10 lit/ha 6 treated crop. Which was followed by Karanj oil @5 % 7.5, Mahau oil @5% 8.25, Neem leaf extract @5% 9.75 and lowest in larvae /mrl, followed by Mahau oil @5% 8.25 maximum population in Neem leaf extract @5% 9.75 and Tobacco leaf extract @ 5% 10.

Reduction of S. litura population over control

Reduction was higher in Neem oil @ 5% 10lit/ha 6 treated crop. Among the plant products, followed by Karanj oil @5 % 7.5, Mahau oil@ 5% 8.25, Neemleaf extract @5% 9.75. It was lowest in Tobacco leaf extract @5% treated plots and recorded only 10 reduction insect populations.

The results are in conformity with the findings of Vijayalakshmi et al. (1997) who reported that ginger extract as natural pesticide, alone and in combination with other plant products like chilli, garlic and cow urine as effective plant products against H. armiger

Lakshmanan (2001) also reported that the garlic bulb extracts alone or in combination with other plant extracts were effective in managing the several lepidopteran pests viz., Eariasvitella, Chilopartellus (Swinhoe), Corcyra Cephalonia Staint, Helicoverpaarmigera and Spodoptera litura.

Choudhary and Shrivastava (2007) reported that application of neem seed kernel extract (NSKE) at 5% + neem leaf extract (NLE) at 10% reduced the maximum larval population.

efficacy of botanicals in the management of Tobacco caterpillar, Spodoptera litura -2014														
S.No	Treatments	Dose	No. of larvae/ 10 plants during 1st Spray						No. of larvae/ 10 plants during 2nd Spray					
			Day Before Spray	Days after spray					Day Before Spray	Days after spray				
				3 Day	7 Day	14 Day	Mean	SD		3 Day	7 Day	14 Day	Mean	SD
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	C.D			0.325	0.535	0.283				0.357	0.307	0.4		
	SEM			0.107	0.176	0.093				0.117	0.101	0.131		
	C.V			6.697	11.072	6.259				7.299	6.481	8.484		

Tab. 3 Larval mortality rate after 5% spray

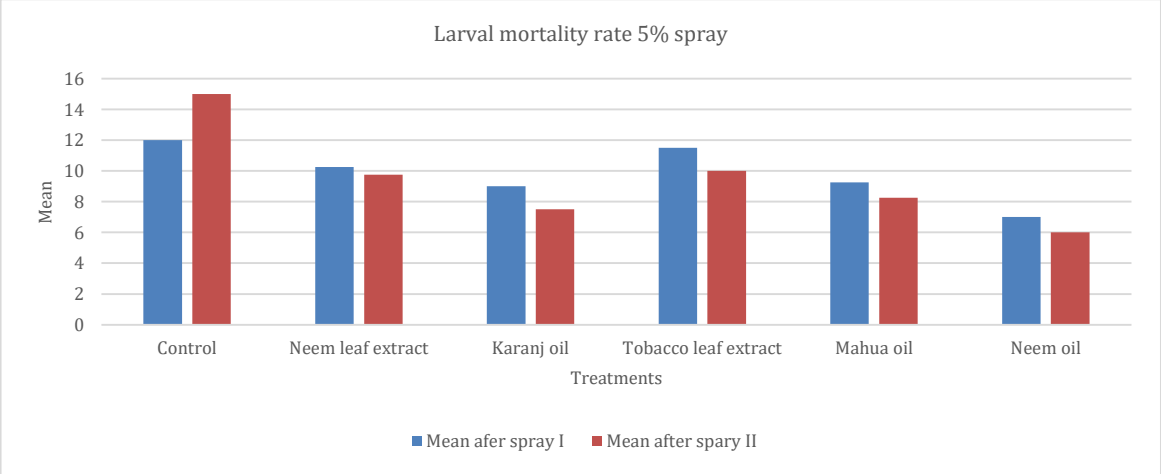

Fig 3 Larval mortality rate after 5% spray

Conclusion

All growth character was significantly affected by application of botanical extract uses as treatment. The botanical treatments are Neem oil @ 2% 3% 5% Karanj oil @2% 3% 5%, Mahau oil @ 2%3% 5%, Neem leaf Extract @2% 3% 5%, and Tobacco leaf Extract oil@ 2% 3% 5% performed as the treatments.

Through present findings it is concluded that soybean crop is heavily infested by various insect pests during its different growth stages like vegetative, flowering and pod stages. As maximum population of tobacco caterpillar, green semilooper infests its vegetative stage hence it must be botanicals Controlled at, while tobacco cater pillar was maximum at flowering and pod stages so controlled measures must be applied during these stages.

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