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Evaluation of Botanicals and an Alkaloid on Jassids and Aphids of Okra (*Abelmoschus esculentus* L. (Moench))

D. Deepika[1*], T. Abdul Razak[2], K. Elanchezhiyan[3], M. I. Manivannan[4]
[1]PG Scholar
[2]Professor and Head, Department of Agricultural Entomology, AC & RI, Killikulam
[3]Assistant Professor, Department of Agricultural Entomology, AC & RI, Killikulam
[4]Assistant Professor, Department of Horticulture, AC & RI, Killikulam Vallanadu
Department of Agricultural Entomology, AC & RI, Killikulam, Thoothukudi, India
***Corresponding Author**: deepikabsc12@gmail.com; 8508470452

Abstract: ***The present study was undertaken in the farm of E- Block of Horticultural Department, Agricultural College and Research Institute, Killikulam, Tuticorin during rabi season of 2017–2018. The experiment was laid out in Randomized Block Design (RBD) with seven treatments and three replications. Okra is being attacked by both jassids and aphids throughout the crop period. The pre-treatment observations were recorded the day before application of the spray whereas the post treatment counts were recorded at 3, 7, 14 days after application of the treatments. The treatments were T1- Neem oil (3%), T2- NSKE (5%), T3- Turmeric crude extract (3.5%), T4- Garlic crude extract (5%), T5- Tomatine 1000 ppm, T6- Imidacloprid 17.8 SL (0.018%), T7- Control. Two applications of the spraying were done. The evaluation was done for the sucking pests viz., aphids and jassids. All the treatments showed significant effect over the control. The result revealed that the chemical imidacloprid @ 0.005% and NSKE (5%) were found on par with each other in reducing the pest population followed by neem oil (3%), garlic crude extract (5%), turmeric crude extract (3.5%) and tomatine at 1000 ppm.***

Keywords: Botanicals, tomatine, Aphids, Jassids.

1. Introduction

Okra is a warm season crop commercially cultivated year round mainly for their immature fruit, which is nutritionally balancing in our diet as such it, also satisfies the fiber requirement of the human body. The water content of okra is 89.6 gm. which provides succulency to the fruits. It is a good source of vitamins (A, B, C), proteins, minerals, and excellent source of iodine (Tomar and Singh, 2011). It is cultivated all over India with an area of 501 ha and production of 5783 mt (NHB 2016- 2017).

One of the major constraints in production of okra is its high vulnerability to many insect pests. Intensity of damages is high in this crop in comparison with other crops. Insecticides used reduces the pest load but increase the risk of residues, pest resurgence *viz.*, whitefly resistance to synthetic pyrethroids and caused damage to the environment. The sucking pest complex of okra consisting of aphids, jassids, whiteflies, thrips and mites causes 17.46% yield loss and failure to control them in initial stages was reported to cause 54.04% yield loss (Anitha and Nandhihalli, 2008). Nowadays botanicals are being used and

they show broad spectrum activity and have potential to become an alternative to the insecticides. Hence an attempt to study the different botanical extracts and a plant alkaloid (tomatine) has been made under field conditions and the results are discussed in this article.

2. Materials and Methods

The research trial was conducted at Horticultural Farm, in Agricultural College and Research Institute, Killikulam during October 2017. A randomized block design with seven treatments and three replications was laid out. The plot sizes were 10 m^2 and with the spacing of 45x30 cm. Okra seed variety of CoBh4 were sown in October, 2017. The spraying was done during early morning hours with high volume Knapsack sprayer. The treatments include T1- Neem oil 3%, T2- NSKE- 5%, T3- Turmeric crude extract 3.5%, T4- Garlic crude extract 5%, T5- Tomatine 1000 ppm, T6- Imidacloprid 17.8 SL 0.018%, and T7- Control.

For observation of aphids and jassids, ten plants were randomly selected and tagged in each plot. From the tagged plants the aphid and jassid population on three leaves per plant *i.e.*, each one leaf from the top, middle and bottom were recorded. The observation of the spraying was done one day before and 3, 7, 14 days after spraying. The data were subjected to square root transformation ($\sqrt{x+0.5}$) and analysed statistically.

3. Results and Discussion

3. 1. Jassids

Population of jassids at two different sprays revealed that the jassid population showed significantly maximum reduction in the NSKE treated plots (2.77 and 2.31 /3leaves) followed by garlic crude extract at five per (3.50 and 2.68/3leaves). Neem oil the next effective treatment followed by turmeric crude extract (3.5%) and tomatine at 1000 ppm and the population recorded were 5.95, 6.39 and 8.05/3leaves, in second spray 3.51, 4.17 and 4.39/3leaves respectively. Imidacloprid 17.8 SL at 0.018% recorded a minimum population of 2.51/ 3leaves. Untreated control recorded the highest population of jassids (Table.1).

3. 2. Aphids

The data recorded in different treatments showed that after first spraying significant reduction in aphid population. NSKE recorded an average population range of 3.25 aphids/3leaves. Garlic extract recorded population of 5.16 aphids/3leaves. Neem oil recorded an average of 6.51 aphids/3 leaves. Turmeric crude extract and tomatine were on par with each other showing the least effect with an average population of 8.14 and 9.43 aphids/3 leaves respectively. In second spray also utmost decrease in population range obtained in the insecticide treated plot and neem seed kernel extract (3.80 and 6.00 aphids/3

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leaves). Garlic and turmeric extract along with tomatine showed a least effect on the pest population (7.20, 14.90, 15.07/3 leaves) respectively (Table.2).

Studies showed that plant extracts played a significant role in reducing the sucking pest population (Moniach *et al.*, 2011). In the present investigations, garlic extracts showed next effect to neem and this was supplemented by the work carried out by Asare- Bediako *et al.* 2014. Lectin a component present in garlic interacts with the proteins of insect midgut causes food identification which leads to physiological problems and leads to death. It also acts as a juvenile hormone inhibitor and causes premature death of insects (Upadhyay and Singh, 2012). Dhanalakshmi *et al.* (20011) found that fresh Garlic Chilli Kerosene GCK (0.5%) was the most effective in reducing the sucking pest population in okra.

4. Conclusion

Even though pesticide usage provides higher yield these days, use of botanicals and plant extracts is environmentally safe and harmless to the human beings and is an eco-friendly conventional method of crop protection.

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Table. 1. Efficacy of botanicals and alkaloids against jassids on okra

Treatments	No. of jassids/ 3leaves									
	I spray					II spray				
	DBS	3 DAS	7 DAS	14 DAS	Mean	DBS	3 DAS	7 DAS	14 DAS	Mean
T1	9.30 (2.91)	5.87^{c} (2.24)	6.37^{c} (2.39)	5.60^{c} (2.17)	5.95	6.27 (2.71)	2.73^{c} (1.39)	3.50^{c} (1.52)	4.30^{c} (1.62)	3.51
T2	8.97 (2.83)	2.77^{b} (1.48)	3.10^{ab} (1.57)	2.43^{a} (1.35)	2.77	5.90 (2.84)	1.60^{b} (0.69)	2.27^{b} (0.84)	3.07^{ab} (0.97)	2.31
T3	9.57 (2.97)	6.33^{c} (2.42)	6.63^{cd} (2.48)	6.20^{c} (2.39)	6.39	5.97 (2.91)	3.53^{d} (1.81)	4.20^{cd} (1.93)	4.77^{c} (2.03)	4.17
T4	8.83 (2.87)	3.47^{b} (1.69)	3.80^{b} (1.77)	3.23^{b} (1.63)	3.50	6.03 (2.74)	1.93^{b} (1.05)	2.70^{b} (1.15	3.40^{b} (1.25)	2.68
T5	9.73 (3.02)	8.00^{d} (2.74)	8.37^{d} (2.83)	7.77^{d} (2.69)	8.05	5.97 (2.90)	3.70^{d} (2.08)	4.37^{d} (2.23)	5.10^{c} (2.35)	4.39
T6	9.33 (2.94)	2.43^{a} (1.25)	2.90^{a} (1.44)	2.20^{a} (1.19)	2.51	6.03 (2.79)	0.77^{a} (0.57)	1.47^{a} (0.76)	2.50^{a} (0.86)	1.58
T7	10.63 (3.15)	11.37^{e} (3.29)	11.60^{e} (3.33)	11.10^{e} (3.24)	11.36	7.10 (2.83)	6.90^{e} (2.80)	6.87^{e} (2.83)	7.03^{d} (2.85)	6.93
SEd	0.02	0.99	0.12	0.11	-	0.12	0.15	0.13	0.14	-
CD (0.05)	0.04	2.16	0.27	0.23	-	0.27	0.32	0.28	0.30	-

DBS – Day before spraying, DAS- Day after spraying; Figures in parenthesis represents square root transformed values.

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Table. 2. Efficacy of botanicals and alkaloids against aphids on okra

Treatments	No. of aphids/ 3leaves									
	I spray					II spray				
	DBS	3 DAS	7 DAS	14 DAS	Mean	DBS	3 DAS	7 DAS	14 DAS	Mean
T1	11.10 (2.71)	5.57^{c} (1.39)	6.53^{c} (1.52)	7.43^{c} (1.62)	6.51	15.07 (2.87)	7.33^{c} (1.75)	8.53^{b} (1.90)	9.50^{b} (2.01)	8.45
T2	11.97 (2.84)	2.40^{a} (0.69)	3.13^{a} (0.84)	4.23^{ab} (0.97)	3.25	15.03 (3.11)	4.20^{b} (1.23)	4.90^{a} (1.33)	5.87^{a} (1.45)	4.99
T3	11.83 (2.91)	7.17^{d} (1.81)	8.17^{d} (1.93)	9.07^{d} (2.03)	8.14	15.97 (3.03)	10.60^{d} (2.35)	11.40^{c} (2.44)	12.33^{c} (2.53)	11.44
T4	11.67 (2.74)	4.30^{b} (1.05)	5.17^{b} (1.15)	6.00^{b} (1.25)	5.16	14.33 (3.09	4.60^{b} (1.22)	5.37^{a} (1.32)	6.13^{a} (1.42)	5.37
T5	12.33 (2.90)	8.33^{d} (2.08)	9.50^{e} (2.23)	10.47^{e} (2.35)	9.43	14.50 (2.71)	10.37^{d} (2.15)	11.33^{c} (2.26)	12.10^{c} (2.35)	11.27
T6	11.47 (2.79)	1.93^{a} (0.57)	3.00^{a} (0.76)	3.73^{a} (0.86)	2.89	15.83 (3.02)	2.60^{a} (0.93)	3.30^{a} (1.04)	4.07^{a} (1.16)	3.32
T7	12.80 (2.83)	13.00^{e} (2.80)	12.80^{f} (2.83)	13.00^{f} (2.85)	12.93	16.70 (2.94)	17.70^{e} (2.94)	18.07^{e} (3.07)	18.07^{d} (3.07)	17.95
SEd	0.12	0.14	0.13	0.14	-	0.15	0.13	0.14	0.14	-
CD (0.05)	0.35	0.30	0.28	0.30	-	0.35	0.29	0.29	0.31	-

DBS – Day before spraying, DAS- Day after spraying; Figures in parenthesis represents square root transformed values.

