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Research Article

ASSESSMENT THE EFFICACY AND ECONOMIC OF INSECTICIDES AND BIO-PESTICIDES AGAINST MAJOR INSECT PESTS OF OKRA (*Abelmoschus esculantous*)

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Abstract- Efficacy of insecticides and bio pesticides named Chloropyriphos (Dursban 20 EC), Triazophos (Hattrick 40 EC), Lambda cyhalothrin (Warrior 2.5% EC), Imidacloprid (Confidor 17.8 SL), Spinosad (Tracer 45 SC), Neem oil (Neemarin 0.1%), *Metarhizium anisopliae* (Vallabh *B. bassiana* 2X10^9 CFU), *Beauveria bassiana* (Vallabh *M. anisopliae* 2X10^9 CFU) were tested against insect pest complex on okra. The result reported that efficacy of spinosad @ 100 ml/ha treatment against shoot and fruit borer as it recorded fruit infestation and Imidacloprid@ 300 ml/ha against sucking pests of okra was found to be most effective treatment against all insecticides and bio-pesticides treatments. Highest fruit yield was recorded in spinosad @ 100 ml/ha (73.07q/ha) as compared to control (42.08 q/ha), highest net profit per hectare was registered in spinosad @ 100 ml/ha (Rs. 26123.75) with highest cast benefit ratio was registered in Imidacloprid @ 300 ml/ha (1:8.94).

Keywords- Okra, Insecticides, Bio-pesticides, Efficacy, Economic

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Introduction

Okra *(Abelmoschu sesculentus* L.) also known as ladyfinger belongs to family Malvaceae. It is generally and one of the common and popular grown throughout the world including India. India stands top in area and production. It is cultivated in an area of 3.58 lakh hectares with an annual production of 35.24 lakh tonnes and productivity of 9.8 tonnes/ha. The major okra growing states are Assam, Uttar Pradesh, Bihar, Orissa, West Bengal, Maharashtra, Andhra Pradesh and Karnataka [1]. Despite large area and quite a good number of cultivars, the supply of okra in Indian market is not matching to its demand. Lower productivity would be a major reason for such un-matching demand and supply. Among the various causes of low productivity of the okra, one of the most important factors is the damage inflicted by the insect pests. Okra crop is susceptible from early stage to maturity. There are 72 species of insects have been recorded on okra [2]. Among the wide array of insect pests infesting okra crop, the spotted bollworms are the most dreadful pests causing serious turn down of the produce, in terms of quality as well as of quantity [3], the sucking pests such as aphid, *A. gossypii* (Glover), leafhopper, *A. biguttula biguttula (*Ishida), and whitefly, *B. tabaci* (Gennadius), are reported to be quite serious during all stages of the crop growth [4]. Krishnaiah [5] reported about 40 to 56% losses in okra due to leafhopper. Aphids and leafhoppers are important pests in the early stage of the crop, which affect the plants, make them weak and reduce the yield. Failure to control them in the initial stages was reported to cause a yield loss to the tune of 54.04% [6]. For control of different insect-pests of okra different measures are adopted such as for seed treatment before planting could be effective or some cultural practices are adopted to prevent the damage the insect pests, but still no method has been devised to control these devastating insect. Although chemical, control yet has been most effective tool to control these insect pests [7].Through many non chemical control strategies are also advocated under IPM umbrella, still farmer rely on chemical insecticides. In this regard various insecticides were evaluated against aphids. The present study is based on the evaluation of efficacy of insecticide and bio pesticides.

Materials and Methods

The field experiment was carried out during K*harif* season 2013 and 2014 at Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250110 (U.P.). The experiment was laid out in Randomized Block Design (RBD) with three replications. There were total nine treatmentsi. e T_1- Chloropyriphos (Dursban 20 EC), T_2- Triazophos (Hattrick 40 EC), T_3- Lambda cyhalothrin (Warrior 2.5% EC), T_4 - Imidacloprid (Confidor 17.8 SL), T_5- Spinosad (Tracer 45 SC), T_6 - Neem oil (Neemarin 0.1%), T_7- *Metarrhizium anisopliae* (Vallabh *B. bassiana*2X10^9 CFU), T_8- *Beauveria bassiana* (Vallabh *M. anisopliae* 2X10^9 CFU) and T_9 - control. Row to row and plant to plant spacing was 60 cm and 30 cm, respectively. Under study the efficacy of insecticides and bio-pesticides all the treatment were applied as foliar spray using Knapsack sprayer. Three sprays were done during the experiment in the years 2013 and 2014. First spray at 42 days old crop, second and third spray after 15 days interval during the both years.

Method of Observation

Pre-treatment observation on okra pests were recorded one days before spraying, while post-treatment observation were taken three, seven and ten days after application of the treatment. Observation on okra shoot and fruit borer and sucking pests were recorded on five randomly selected plants per plots. Fruit infestation by shoot and fruit borer was assessed by counting the total number of damage and

Table-1 *Treatment details*

S. No.	Name of Treatment	Trade name and Formulation	Source	Symbol
1.	Chloropyriphos	Dursban 20 EC	Dow Agro Sciences India Pvt. Ltd.	T_1
2.	Triazophos	Hattrick40 EC	Rallis India Limited	T_2
3.	Lambdacyholothrin	Warrior 2.5% EC	Syngenta India Limited	T_3
4.	Neem oil	Neemarin 0.1%	GodrejAgrovet Ltd Mumbai	T_4
5.	Imidacloprid	Confidor 17.8 SL	Bayer Crop Sciences	T_5
6.	Spinosad	Tracer 45 SC	Dow Agro Sciences India Pvt. Ltd.	T_6
7.	*Metarrhiziumanisopliae*2X10^9 CFU	Vallabh *B. bassiana*	Biocontrol laboratory S.V.P.U.A&T Meerut	T_7
8.	*Beauveriabassiana*2X10^9 CFU	Vallabh *M. anisopliae*	Biocontrol laboratory S.V.P.U.A&T Meerut	T_8
9.	Control (Untreated)	-	-	T_9

healthy fruits at each picking per plots.

$$\text{Per cent Fruit infestation by number} = \frac{\text{Number of infested fruits}}{\text{Total number of fruits}} \times 100$$

Results and Discussion

Efficacy insecticides against major insect pests of okra:

1. **Whitefly**: On the basis of overall mean (mean of three spraying both year 2013 and 2014) all insecticides and bio-pesticides treatment significantly reduced the whitefly populations and registered higher fruit yield as compared to untreated control which is shown in [Fig-1].Imidacloprid 17.8 SL was found most effective and significantly better than all the treatment. Similar finding have been reported by Dhanalakshmi and Mallapur [8], Raghurama and Birah [9].

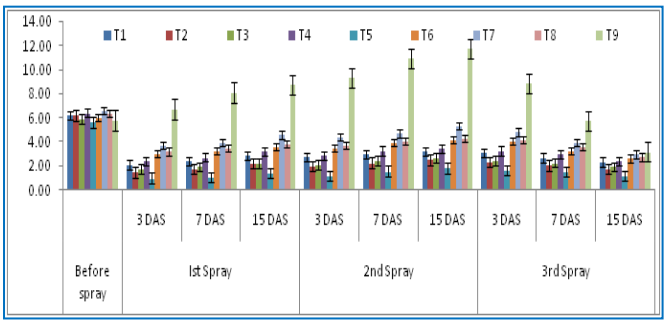

Fig-1 Effect of insecticides and bio-pesticides on whitefly population (*Bemisia tabaci* Gen.) (Pooled of two years)

2. **Leafhopper**: The result of present study showed that the treatment Imidacloprid 17.8 SL was found to be most effective and significantly better than all treatments but at par with the treatment Triazophos 40 EC [Fig-2] similar findings have been reported by Babu and Santharam [10] and Solangiand Lohar [11].

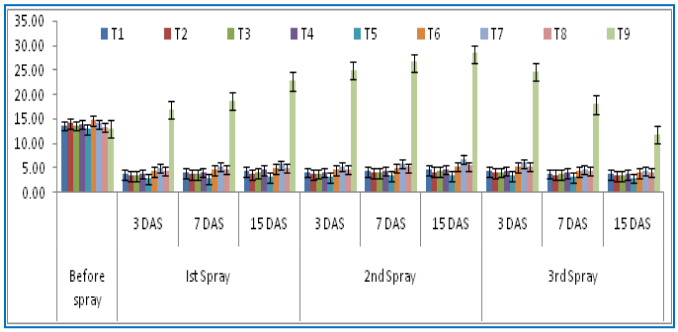

Fig-2 Effect of insecticides and bio-pesticides on Leafhopper population (*Amrasca biguttula biguttula* Ishida.) (Pooled of two years)

3. **Shoot and fruit borer**: The result of present study showed that the treatment Spinosad45 SC was found most effective and recorded lowest fruit damage and significantly better than all treatment but at par with Imidacloprid 17.8 SL, Lambda cyhalothrin 2.5% EC and Chloropyriphos 20 EC. The maximum percent fruit damage was recorded in control [Fig-3]. Similar finding have been reported by Shinde*et al.* [12] and Devi *et al.* [13] as Spinosad45 SC was the most effective in reducing the fruit damage by shoot and fruit damage of okra.

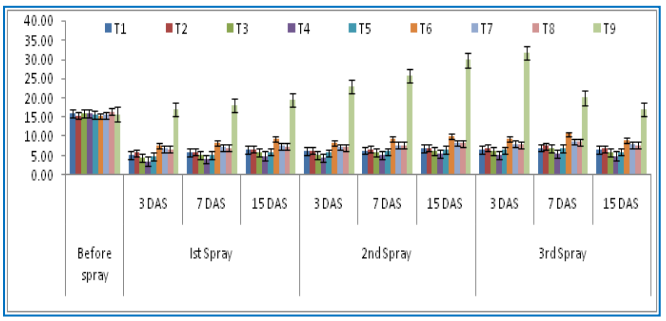

Fig-3 Effect of insecticides and bio-pesticides on fruit damage by shoot and fruit borer (*Earias vittella* Fab.)(Pooled of two years)

Economic of treatment

Fruit yield: In present study, Spinosad 45 SC recorded significantly higher healthy (73.07 q/ha) than other treatments, followed by Imidacloprid 17.8 SL (57.92 q/ha) Lambda cyhalothrin 2.5% EC (55.92 q/ha), Chloropyriphos 20 EC (55.01 q/ha), Triazophos 40 EC (52.96 q/ha), Neem oil 0.1% (47.30), *Beauveria bassiana* 2X10^9 CFU (45.86 q/ha), *Metarrhizium anisopliae* 2X10^9 CFU(45.37) which is shown in [Fig-4]. Similar finding have been reported by Kalyan *et al.* [14] and Devi *et al.* [13].

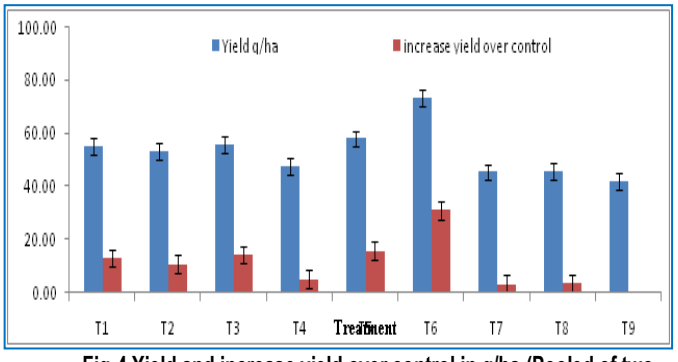

Fig-4 Yield and increase yield over control in q/ha (Pooled of two years)

Net profit: Among the different treatment, highest net profit per hectare was registered in Spinosad45 SC (Rs 26175/-) fallowed by Imidacloprid 17.8 SL (Rs 16018.75/-) Lambda cyhalothrin 2.5% EC (Rs 13980/-), Chloropyriphos 20 EC (Rs 11977.50/-), Triazophos 40 EC (Rs 8741.25/-), *Beauveria bassiana* 2X10^9 CFU (Rs 3037.50/-), *Metarrhizium anisopliae* 2X10^9 CFU (Rs 2722.25/-), Neem oil 0.1% (Rs 922.50/-).

Cost benefit ratio: Among the different treatments, highest cost benefit ratio was registered in Imidacloprid 17.8 SL (1:8.94), followed by Lambda cyhalothrin 2.5% EC (1:8.79), Chloropyriphos 20 EC (1:4.64), Spinosad45 SC (1:2.98), *Beauveria bassiana* $2X10^9$ CFU (1:2.81), *Metarrhizium anisopliae* $2X10^9$ CFU (1:2.78), Triazophos 40 EC (1:2.49), Neem oil 0.1% (1:0.18).

Conclusion

It is clear from the data on the basis of fruit damage, yield levels, increase in yield and cost benefit ratio that all the treatments proved better than control at all time intervals after each sprays. Spinosad45 SC was found most effective treatment against *Earias vittella.* While, Imidacloprid 17.8 SL was most effective insecticide against whitefly and leafhoppers. Our findings are in agreement of previous workers, but we can give a schedule or need base application of insecticides to protect the crop against insect pests. Keeping the importance of okra crop, complete protection will be required against insect pests. Hence, it is suggested that a three spray schedule e.g. first spray of Imidacloprid 17.8 SL followed by second spray of Spinosad 45 SC ml/ha and third spray of Imidacloprid 17.8 SL could be given to effectively suppressed the insect pest population on okra crop, which could also safer to natural enemies and also decline the chances of development of resistance against insecticides. This could also give higher yield and low cost of protection and safer to environment.

Conflict of Interest: None declared

References

[1] Anonymous (2013) Indian Horticulture Database. National horticulture Board, Ministry of Agriculture, Krishi Bhawan, Government of India, New Delhi.
[2] Srinivasa R. and Rajendran R. (2003) *Pest Management and Economic Zoology,* 10, 131-136.
[3] Suman C.L., Wahi S.D. and Mohan N.J. (1984) *Indian journal of Entomology,* 45, 362-364.
[4] Channabasavanna G.P. (1981) Contributions to Acarology Society of India. Bangalore P. 256.
[5] Krishnaiah K. (1980) Proceeding of Workshop held from Sept, 19-30, 1977 at U.A.S., Bangalore, pp. 259-267.
[6] Chaudhary H. R. and Dadheech L. N. (1989) *Annals of Arid Zone,* 28 (2-3), 305-307
[7] Jech L.E. and Husman (1998) Proceeding of Beltwide cotton Conference San Diego, California, USA., 5-9 jan, 2, 1081-1083.
[8] Dhanalakshmi D. N. and Mallapur C.P. (2008) *Annals of Plant Protection Sciences,* 16(1), 29-32
[9] Raghuraman M. and Birah A. (2011) *Indian Journal of Entomology,* 73(1), 76-79.
[10] Babu K. R., Santharam G. (2002) *Annals of plant protection Sciences,* 10 (1), 971-980
[11] Solangi B.K. and Lohar M.K. (2007) *Asian Journal of Plant Sciences,* 6, 920-926.
[12] Shinde S.T., Shetgar S.S. and Badugujar A.G. (2011) *Journal of Entomological Research,* 35(2), 133-137.
[13] Devi L.L., Ghule T.M., Chatterjee M.L and Senapati A. K. (2014) *Environment & Ecology,* 33 (3), 1052—1054.
[14] Kalyan R.K., Saini D.P., Urmila, Jambhulkar P.P. and Pareek, A. (2012) *The Bioscan,* 7(4), 641-643.