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EFFECT OF INSECTICIDES EVALUATED AGAINST *EARIAS* SPP. ON THE INCIDENCE OF *AMRASCA BIGUTTULA BIGUTTULA* AND *BEMISIA TABACI* IN OKRA

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ABSTRACT

Present study was conducted at the CCS Haryana Agricultural University, Hisar during kharif 2019 and 2020. Insecticides viz., chlorantraniliprole 18.5 SC, emamectin benzoate 5SG, lambda-cyhalothrin 5EC, pyridalyl 10EC, cypermethrin 25EC and quinalphos 25EC were applied thrice at recommended dose of 25, 6.75, 15, 50, 37 and 200 g a.i. ha^{-1}, respectively for the management of *Earias* spp. in okra. The effect of these insecticides on the incidence of *Amrasca biguttula biguttula* (Ishida) and *Bemisia tabaci* (Genn.) was also assessed. Results revealed that application of quinalphos caused maximum reduction (54%) in incidence of *A. biguttula biguttula* followed by chlorantraniliprole (43.40%) and lambdacyhalothrin (42.80%). In case of *B. tabaci*, application of chlorantraniliprole caused maximum reduction in incidence (44.74%) followed by lambdacyhalothrin (33.33%) and emamectin benzoate (28.16%).

Key words: *Abelmoschus esculentus*, *Earias* spp., *Amrasca biguttula biguttula*, *Bemisia tabaci,* chlorantraniliprole, emamectin benzoate, pyridalyl, lambda-cyhalothrin, cypermethrin, quinalphos

Okra, *Abelmoschus esculentus* (L.) Moench is a commercial vegetable crop grown in the tropical, subtropical and warm areas (Ghuge et al., 2020). In India, okra is grown in 5.31 lakh ha with productivity of 12.2 mt/ ha. In Haryana, while its productivity is 10.26 mt/ ha (Anonymous, 2022). The continuous growth of okra is congenial for the infestation of insect pests which is one of the major constraints in the production (Tripathi et al., 2011). As many as 72 insect-pests have been recorded on okra (Rao and Rajendra, 2002) of which *Amrasca biguttula biguttula* (Ishida), *Bemisia tabaci* (Genn.), *Helicoverpa armigera* (Hub.), *Earias vittella* (Fab.) and *E. insulana* (Boisd.) are the most important (Mane et al., 2010). Apart from *Earias* spp., sucking pests mainly *A. biguttula biguttula* and *B. tabaci* also cause considerable loss i.e., up to 56% (Hormchan et al., 2001) and 94% (Meenambigai et al., 2017), respectively. Besides this, whitefly transmits yellow vein mosaic also (Potai, 2018). For the management of these pests, farmers usually apply various insecticides and haphazard use of insecticides results in residues accumulation in vegetables (Ahlawat et al., 2019). To combat these, it is imperative to find out the chemicals which are effective against more than one target pest. Hence, the present study was conducted to assess the effect of commonly used insecticides for the management of *Earias* spp. on the incidence of *A. biguttula biguttula* and *B. tabaci* in okra.

MATERIALS AND METHODS

The present study was conducted at the CCS Haryana Agricultural University, Hisar during kharif 2019 and 2020. The experiment was conducted in a randomized block design (RBD) in a plot size of 5x4 m with seven treatments and each of which replicated thrice. Variety Hisar Naveen was sown with plant to plant and row to row spacing of 60 and 30 cm, respectively. All agronomic practices were followed as per the package of practices for vegetable crops, CCS Haryana Agricultural University, Hisar (Anonymous, 2020). For the management of *Earias* spp., insecticides viz., chlorantraniliprole 18.5 SC, emamectin benzoate 5 SG, lambda-cyhalothrin 5 EC, pyridalyl 10 EC, cypermethrin 25 EC and quinalphos 25 EC were applied thrice (15 days interval) at recommended dose of 25, 6.75, 15, 50, 37 and 200 g a.i. ha^{-1}, respectively. To assess the effect of these insecticides on sucking pests, incidence of of *A. biguttula biguttula* (nymph) and *B. tabaci* (adult) were recorded before spray and 1, 3, 7 and 14 days after each spray in each treatment on five randomly selected and tagged plants/ plot leaving the border rows. Counts were made from three leaves (one each from top, middle and bottom canopy) on each of the five plants/ plot. For comparison, mean of counts after each spray was taken into consideration. The data so obtained were analyzed by using OPSTAT software (Sheoran, 1998).

RESULTS AND DISCUSSION

Mean incidence of *A. biguttula biguttula* during kharif 2019 revealed that application of the tested insecticides caused significant reduction (Table 1); quinalphos resulted in significantly less incidence (6.59 nymphs/ 3 leaves) followed by chlorantraniliprole (7.69 nymphs/ 3 leaves) and lambdacyhalothrin (8.04 nymphs/ 3 leaves) which were on a par with each other. Almost similar trend was observed during kharif 2020. Pooled data also showed that appreciation of the insecticides decreased the incidence of *biguttula biguttula* significantly when compared to untreated check. *A. biguttula biguttula* in all the insecticidal treatments was significantly lower than that in untreated check (10.07 nymphs/ 3 leaves). Among all, application of quinalphos resulted in significantly lower population (4.66 nymphs/ 3 leaves) followed by chlorantraniliprole (5.70 nymphs/ 3 leaves) and lambda cyhalothrin (5.76 nymphs/ 3 leaves) which were on a par with each other. In terms of reduction in *A. biguttula biguttula* population over untreated check, it was maximum (53.72%) in treatment involving quinalphos followed by chlorantraniliprole (43.40%) and lambda-cyhalothrin (42.80%).

Mean incidence of *B. tabaci* during kharif 2019 indicates that all the insecticidal treatments caused significant reduction when compared to untreated check. Among all, treatment involving lambdacyhalothrin registered significantly less incidence (0.53 adults/ 3 leaves) than that in rest of the treatments except chlorantraniliprole (0.55 adults/ 3 leaves), where it was on a par. However, during kharif 2020, chlorantraniliprole resulted in significantly less incidence (25.31 adults/ 3 leaves) than that in treatment involving lambda cyhalothrin (30.67 adults/ 3 leaves). Pooled data reveald that all the insecticidal treatments decreased the incidence of *B. tabaci* significantly when compared to untreated check (23.40 adults/ 3 leaves). Application of chlorantraniliprole resulted in significantly less incidence of whitefly (12.93 adults/ 3 leaves) followed by lambda cyhalothrin (15.60 adults/ 3 leaves) and emamectin benzoate (16.81 adults/ 3 leaves). If reduction in population of *B. tabaci* over untreated check is considered, it was maximum in treatment involving chlorantraniliprole (44.74%) followed by lambda-cyhalothrin (33.33%) and emamectin benzoate (28.16%) (Table 1).

Although, chlorantraniliprole has been recommended mainly against lepidopterous pests in various crops but it was found effective against sucking pests also in the present study and resulted in significant reduction in population in comparison to other treatments. These findings are supported by the report of Legocki et al. (2008) who reported that chlorantraniliprole exhibits activity against hemipteran species. The present results are more or less supported by the study conducted by Sathyan et al. (2016), where it was reported that chlorantraniliprole 18.5 SC and quinalphos 25 EC were on a par in decreasing population of jassid and whitefly.

Table 1. Effect of insecticides on population of *A. biguttula biguttula* and *B. tabaci* in okra

Treatment	Dose (g a.i. ha^{-1})	Mean population of *A. biguttula biguttula* (nymph/ 3 leaves)			Reduction over control (%)	Mean population of *B. tabaci* (adult/ 3 leaves)			Reduction over control (%)
		Kharif 2019	Kharif 2020	Pooled mean		Kharif 2019	Kharif 2020	Pooled mean	
Chlorantraniliprole 18.5 SC	25	7.69 (2.95)*	3.71 (2.17)	5.70 (2.59)	43.40	0.55 (1.25)	25.31 (5.13)	12.93 (3.73)	44.74
Emamectin benzoate 5 SG	6.75	10.40 (3.37)	4.29 (2.30)	7.34 (2.89)	27.11	0.72 (1.31)	32.90 (5.82)	16.81 (4.22)	28.16
Lambda-cyhalothrin 5 EC	15	8.04 (3.01)	3.48 (2.12)	5.76 (2.60)	42.80	0.53 (1.24)	30.67 (5.63)	15.60 (4.08)	33.33
Pyridalyl 10 EC	50	10.31 (3.36)	4.54 (2.35)	7.42 (2.90)	26.32	0.76 (1.33)	33.95 (5.91)	17.35 (4.28)	25.85
Cypermethrin 25 EC	37	9.80 (3.29)	3.78 (2.19)	6.79 (2.79)	32.57	0.76 (1.33)	37.09 (6.17)	18.92 (4.46)	19.15
Quinalphos 25 EC	200	6.59 (2.75)	2.73 (1.93)	4.66 (2.38)	53.72	0.67 (1.29)	33.40 (5.87)	17.04 (4.25)	27.18
Untreated check		12.32 (3.65)	7.81 (2.97)	10.07 (3.33)		1.31 (1.52)	45.49 (6.82)	23.40 (4.94)	
SE(m)+		0.05	0.02	0.03		0.01	0.03	0.02	
C.D. (p=0.05)		0.15	0.08	0.10		0.04	0.10	0.07	

*Figures in parentheses are square root transformed values

However, Kharade et al. (2018) reported that compared to quinalphos 25 EC, chlorantraniliprole 18.5 SC caused significant reduction in population of jassid and whitefly in brinjal. In another study, Potai et al. (2018) reported that chlorantraniliprole 18.5 SC reduced the sucking pest population significantly compared to cypermethrin 10 EC in okra. Rohit et al. (2020) reported that application of chlorantraniliprole 18.5 SC was best in decreasing the population of major sucking pests when compared to emamectin benzoate 5 SG. Further, Choudhary et al. (2021) also reported that emamectin benzoate 5 SG was moderately effective against sucking pests in Indian bean. In another study, chlorantraniliprole 18.5 SC was reported to be most effective against sucking pests in Indian bean causing more than 90% reduction in population of leafhopper and aphid while 88% reduction in whitefly population (Choudhary et al., 2022). Present findings are also in close proximity of Asif et al. (2016) who reported that application of lambda-cyhalothrin 2.5 EC resulted in significant reduction in whitefly and jassid population in cotton. Similarly, Lasheen et al. (2020) also reported that lambda-cyhalothrin was effective against *B. tabaci* and caused 92% reduction in population.

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AUTHOR CONTRIBUTION STATEMENT

BS, RK and AJ conceived and designed the research. BS conducted experiments and analyzed data BS, RK and AJ prepared the manuscript. All authors read and approved the manuscript.

CONFLICT OF INTEREST

The authors have no conflict of interest.

REFERENCES

Ahlawat S, Gulia S, Malik K, Rani S, Chauhan R. 2019. Persistence and decontamination studies of chlorantraniliprole in *Capsicum annum* using GC–MS/MS. Journal of Food Science and Technology 56(6): 2925-2931.

Anonymous 2022. Okra: area under cultivation. Ministry of Agriculture and Farmers Welfare, Government of India. https://www.indiastat.com.

Anonymous 2020. Package of practices for flower, fruit and vegetable crop production and preservation. Second Edition, Directorate of Extension Education, CCS Haryana Agricultural University, Hisar, India.

Asif M U, Muhammad R, Akbar W, Tofique M. 2016. Relative efficacy of some insecticides against the sucking insect pest complex of cotton. The Nucleus 53(2): 140-146.

Choudhary S, Choudhary S, Sharma M, Kumawat K C, Meena R K. 2022. Bioefficacy of novel insecticide molecules against sucking insect pests of Indian bean. The Pharma Innovation Journal Special Issue 11(5): 833-838.

Choudhary S, Rao A, Kumawat K C, Jat B L. 2021. Efficacy of insecticides and biopesticides against major sucking insect pests of Indian bean *Lablab purpureus* var. *typicus*. Indian Journal of Entomology 84(4): 798-803.

Ghuge D K, Gosalwad S S, Patil S K. 2020. Bio-efficacy of newer insecticides against fruit borers of okra. International Journal of Chemical Studies 8(1): 2606-2611.

Hormchan P, Wongpiyasatid A, Piyapuntawanon S. 2001. Observation of gamma irradiated cotton populations on trend of cotton leafhopper resistance using hopper burn index Kasetsart Journal of Natural Science 35: 386-391.

Kharade V G, Mutkule D S, Sakhare V M. 2018. Bio-efficacy of newer insecticides against sucking insect pests on brinjal (*Solanum melongena* L). Journal of Entomology and Zoology Studies 6(4): 162-166.

Lasheen S G, Sherif R M, Youssif M A I, Sallem H M. 2020. Effectiveness of some insecticides against *Bemisia tabaci* (Genn) infesting squash plants. Zagazig Journal of Agricultural Research 47(1): 79-86.

Legocki J, Polec I, Zelechowski K. 2008. Contemporary trends in development of active substances possessing the pesticidal properties: ryanodine-receptor targeting insecticides. Pesticides (3-4): 15-26.

Mane S A, Waghmare U M, Yadav G A. 2010. Bioefficacy and economics of some newer insecticides against fruit borer *Earias vittella* (Fab.) of okra. Pestology 34(5): 39-42.

Meenambigai C, Bhuvaneswari K, Mohan K, Sangavi R. 2017. Pesticides usage pattern of okra *Abelmoschus esculentus* (L) Moench in Tamil Nadu. Journal of Entomology and Zoology Studies 5(6): 1760-1765.

Potai A, Chandrakar G, Bhuarya N S. 2018. Effect of different doses of newer insecticides against sucking pests of okra. Journal of Pharmacognosy and Phytochemistry 7(3): 1177-1179.

Rao N S, Rajendran R. 2002. Joint action potential of neem with other plant extracts against the leaf hopper *Amrasca devastan* (Distant) on okra. Pest Management and Economic Zoology 10(2): 131-136.

Rohit S K, Painkra K L, Painkra G P, Bhagat P K. 2020. Evaluation of new promising pesticides for the management of sucking pests in winter okra crop. Journal of Entomology and Zoology Studies 8(5): 1176-1180.

Sathyan T, Murugesan N, Elanchezhyan K, Arockia Stephen Raj J, Ravi G. 2016. Efficacy of synthetic insecticides against sucking insect pests in cotton, *Gossypium hirsutum* L. International Journal of Entomology Research 1(1): 16-21.

Sheoran O P, Tonk D S, Kaushik L S, Hasija R C, Pannu R S. 1998. Statistical software package for agricultural research workers. Recent Advances in Information Theory Statistics & Computer Applications by D S Hooda & R C Hasija, Department of Mathematics & Statistics, CCS HAU, Hisar. pp. 139-143.

Tripathi K K, Govila O P, Warrier R, Ahujam V. 2011. Biology of *Abelmoschus esculentus* L (Okra). Series of Crop Specific Biology Documents, Department of Biotechnology, Ministry of Science & Technology & Ministry of Environment and Forest, Government of India. 35 pp.

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