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Relative Toxicity of Biopesticides Against Jassid, Shoot & Fruit Borer on Okra

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Abstract: Relative toxicity of biopesticides against Shoot & fruit borer The LC_{30} of biopesticides tested varied 0.049 to 0.865 per cent. Whereas LC_{50} varied from 0.496 to 7.226 per cent and the range of LC_{30} and LC_{50} values of biopesticides against jassid on okra was 0.021 to 0.440 per cent and 0.351 to 4.16 per cent, respectively.

Keywords: Shoot & fruit borer, Relative toxicity and LC_{50}

INTRODUCTION

In India, vegetables have occupied the prime position in human diet, as these are the cheaper source of carbohydrate, minerals, vitamins, proteins, dietary fibers besides having medicinal value and provide nutritional security to a predominately vegetarian population. Among different vegetables, okra, *Abelmoschus esculentus* (L.) Moench belonging to the family Malvaceae is an important annual vegetable, grown for its immature green non fibrous edible fruits in the tropical and sub-tropical regions of the world. It is commonly known as "Gumbo" as well as "Okra" in USA, lady's finger in England and "*Bhindi*" or "*Bhinda*" in India. It is probably originated in Ethiopian region of Africa, but is now widely grown in Sudan and Nigeria regions of the Africa besides being grown in other countries. Because of its high nutritive value and prolonged shelf life as compared to others, okra has captured a prominent position among export oriented vegetable crops. It has a vast potential as one of the foreign exchange earner crop and accounts for about 60 per cent of the total export of fresh vegetables (Varmudy, 2001).

Okra has its own importance, taste, flavour and nutritional values as human food. It has good nutritional value particularly high content of calcium and vitamin C (Anitha and Nandihalli, 2008). It is grown extensively in the tropical, subtropical and warm temperature regions of the world especially in India, U.S.A., Africa, Asia, Nigeria, Sudan, Iraq, Pakistan, Turkey, Australia, U.K. and other neighboring countries. India ranks first in area and production in the world. It is a major commercial vegetable cultivated all over India particularly in the states of Andhra Pradesh, West Bengal, Jharkhand, Orissa, Uttar Pradesh, Madhya Pradesh, Karnataka, Gujarat and Maharashtra. India occupies an area of 532.66 thousand hectares with a production of 6346.37 thousand tones and productivity of 11.9 MT/ha. (Anonymous, 2014).

One of the important limiting factors in the cultivation of okra is insect and mite pests. Many of the pests occurring on cotton are found to ravage okra crop. As high as 72 species of insects have been recorded on okra (SrinivasRao and Rajendran, 2003) of which, the sucking pests comprising of aphids (*Aphis gossypii* Glover), leafhopper (*Amrascabiguttulabiguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius) and mite (*Tetranychuscinnabarinus* Boisduval) causes significant damage to the crop. Krishnaiah (1980)

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reported about 40 to 56 per cent losses in okra due to leafhopper. There is a reduction of 49.8 and 45.1 per cent in height and number of leaves, respectively due to attack of leafhopper (Rawat and Sahu, 1973).

MATERIAL AND METHODS

The present investigations were carried out in laboratory of Department of Agril. Entomology, VNMKV, Parbhani to find out relative toxicity of some bio-pesticides against jassid and shoot and fruit borer.

Preparation of bio-pesticide solutions

Desired concentrations of the selected bio-pesticides were prepared in the laboratory using distilled water. The test insects jassids and fruit borer were exposed initially to a wider range of concentrations and on the basis of mortality recorded, a series of concentrations in narrow range were selected to which the jassids and fruit borer were again exposed. This procedure was repeated till mortality data ranging from 20 to 90 per cent. The treatments including control were replicated thrice and 10 jassids and 10 F_1 generation larvae of shoot and fruit borer were used for each replication.

Bioassay studies of jassid

Okra leaves with petiole intact and free from insect pests were collected from the field and washed thoroughly. Later they were dipped in a series of concentrations of each bio-pesticide and were dried for five minutes under fan. After that 10 jassids collected from sown plot,were carefully placed at the center of the treated leaf using a soft camel hair brush and placed in petri dish.For assessment of toxic effect, mortality counts were taken at 12 and 24 hours after the treatment.

Calculation of LC_{50} value was made as per the method suggested by (Finney 1971)

Bioassay studies of shoot & fruit borer

Field-collectedlarvae along with okra fruit/ shoot, were transported to the insect laboratory. The larvae were transferred into plastic container separately and allowed to pupate. Pupae were collected from plastic container and kept in separate jars for moth emergence. Later freshly emerged adults were kept in oviposition cage with cotton swab dipped in 50% honey solution for feeding the adults. Small pieces of okra fruit were kept in oviposition cage for egg laying. After egg laying, these pieces were removed and kept in plastic container. The larvae hatched were reared upto 3rd instar.

For LC_{50} studies the laboratory reared larvae were used for bio-assay.Okra healthy fruits free from insect pests were collected from the field and washed thoroughly.Later they were dipped in a series of concentrations of each bio-pesticidesand were dried for five minutes under fan. After that 10 larvae were carefully transferred on treated okra fruits by using a soft camel hair brush and placed in conical flask covered with a piece of muslin cloth and tied with a rubber band for each test concentration of bio-pesticide separately. A control was maintained with the larvae treated with distilled water alone andobservations on larval mortality were recorded at 24, 48, 72, 96 and 120 (HAT) hours after treatment. Mortality for each concentration of the bio-pesticide was corrected using Abbott's transformation (Abbott, 1925). The moribund insects were counted as dead.

Statistical analysis

The corrected mortality of the test insects was calculated using Abbott`s (1925) formula:

$$\text{Test mortality}(\%) = \frac{\text{Test mortality}(\%) - \text{control mortality}(\%)}{100 - \text{control mortality}(\%)} \times 100$$

The data were further analysed by probit analysis for calculating LC_{50} values. The relative toxicity of different bio-pesticides was calculated by taking LC_{50} value.

RESULTS AND DISCUSSION

Jassid

The data presented in table 1 revealed that the range of LC_{30} and LC_{50} values of biopesticides against jassid on okra was 0.021 to 0.440 per cent and 0.351 to 4.16 per cent, respectively. The LC_{30} value of *Beauveriabassiana, Verticiliumlecanii, Metarhizium+Beauveria,* Neem oil and Dashparni ark was 0.141, 0.106, 0.440, 0.021 and 0.229, while LC_{50} was 2.644, 1.984, 4.16, 0.351 and 2.245 per cent, respectively.

Table 1: Relative toxicity of biopesticides against jassid *Amrasca biguttula biguttula* **on okra**

Insecticides	*LC_{30} (%)*	*Fiducial limit*	*LC_{50} (%)*	*Fiducial limit*	*HeterogenWeity*	
					X^2	*DF*
Beauveria bassiana	0.141	0.018-0.680	2.644	0.554-25.164	4.03	3
Verticiliumlecanii	0.106	0.013-0.510	1.984	0.416-18.873	4.12	3
Metarhizium+Beauveria	0.440	0.083-1.614	4.16	1.143-24.262	1.79	3
Neem oil	0.021	0.002-0.095	0.351	0.079-2.027	2.70	3
Dashparni ark	0.229	0.040-0.826	2.245	0.617-10.755	2.43	3

Ramanuj Vishwakarma *et al.,* (2013) studied that Both *S. nuxvomica* and *P. erosus* were used @ 2.5 ml, 3.0 ml and 4.0 ml/lit. of water and *B. bassiana* and *M. anisopliae* were used @ 2.0 g, 2.5 g and 3.0 g/lit. of water, while, Imidacloprid was used 0.25 ml, 0.50 ml and 0.75 ml/lit. of water. The mean per cent mortality was recorded in a range between 3.17 to 46.12 due to exposure of bees to different concentrations of all the bio-products for 72 hours, while it was 67.07% to 79.11% when exposed to different concentrations of Imidacloprid for 48 hours, thereby proving Imidacloprid to be more toxic to *A. mellifera* as compared to other bio-products tested. Hence, the order of efficacy, based on the results achieved under laboratory conditions was found to be Imidacloprid 17.8 SL >*M. anisopliae*> *B. bassiana* > *P. erosus*> *S. nuxvomica.*

Shoot & fruit borer

The relative toxicity of different biopesticides against shoot & fruit borer on okra are presented in Table 2. The LC_{30} of biopesticides tested varied 0.049 to 0.865 per cent. Whereas LC_{50} varied from 0.496 to 7.226 per cent. The LC_{30} value of *Beauveriabassiana*, *Metarhizium+Beauveria,* Neem oil and Dashparni ark was 0.137, 0.865, 0.049 and 0.795 per cent, while LC_{50} value was 1.613, 5.200 0.496 and 7.226 per cent, respectively.

Table 2: Relative toxicity of biopesticides against Shoot & fruit borer *Eariasvitella* **on okra**

Insecticides	*LC_{30} (%)*	*Fiducial limit*	*LC_{50} (%)*	*Fiducial limit*	***Heterogeneity***	
					X^2	***DF***
Beauveria bassiana	0.137	0.022-0.532	1.613	0.415-8.355	2.15	3
Metarhizium+Beauveria	0.865	0.191-2.597	5.200	1.713-20.734	1.58	3
Neem oil	0.049	0.008-0.178	0.496	0.134-2.276	1.67	3
Dashparni ark	0.795	0.156-2.989	7.226	2.004-42.839	2.58	3

References

Abbott, W. S., (1925) A method of computing the effectiveness of an insecticide. *J. Econ. Entomol.*, 18: 265-272.

Anonymous (2014).Indian Horticulture database.

Anitha, K.R. and Nandihalli, B.S. (2008).Seasonal incidence of sucking pests in okra ecosystem. *Karnataka J. Agric. Sci.*, **21**(1): 137-138.

Chaudhary, H. R and Dadheech, L. N. (1989).Incidence of insects attacking okra and the avoidable losses caused by them.*Ann. Arid Zone*, 28(3-4): 305-307.

Finney, D.J. (1971). Probit analysis Cambridge University Press, Cambridge, pp.318.

Krishnaiah, K. (1980). Methodology for assessing crop losses due topests of vegetable and assessment of crop losses due topests and diseases in: Proc. of Workshop held from Sept, 19-30, 1977 at U.A.S., Bangalore, pp. 259-267.

Rawat, R. R. and Sahu, H. R., (1973).Estimation of losses in growth and yield of okra due to *Empoascadevastans* Dist. (Cicadellidae) and *Earias*spp. *Indian J. Entomol.*, 35(3): 252-254.

Srinivasa, R. and Rajendran, R. (2003). Joint action potential of neemwith other plant extracts against the leaf hopper *Amrascadevastance* (Distant) on okra. *Pest Mange.Econ. Zool.*, **10**:131-136.

Varmudy, V. (2001).Marketing of vegetable in India. Daya Publishing House, New Delhi- 110 035, pp. 72.