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EFFICACY OF BOTANICALS AND INSECTICIDE MIXTURE ON THIRD INSTAR LARVAE OF *TRILOCHA VARIANS*

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ABSTRACT

***Ficus benjamina* is often known as weeping fig, planted in tropical and subtropical areas and the leaf eating caterpillar *Trilocha varians* is its major pest since 2019. This study evaluates two botanicals *Azadirachta indica* and *Euclyptus globulus*, alone and in combination with insecticides against this pest. The results showed that larval mortality was maximum when combined application of botanical and insecticide was given. Among tested botanicals, *A. indica* showed more toxicity than *E. globulus*. Combined applications of *A. indica* with insecticide gave 10.01, 16.63 and 21.22% mortality after 24, 48, and 72 hr of post treatment, respectively; while 6.45, 10.75 and 15.84% mortality was recorded after 24, 48 and 72 hr of combine application of *E. globulus* with insecticide. In all these evaluations, mortality increased with the time.**

Key words: *Trilocha varians*, Pakistan, *Ficus benjamina, Azadirachta indica, Eucalyptus globulus*, insecticides, mortality, dose, time, lambda-cyhalothrin

Ficus benjamina, often known as the "weeping fig," is most important *Ficus* sp. planted along sides the road and has medical importance; parts of plants used for the treatment of several diseases such as cancer, ulcer and many others (Mousa et al., 1994; Rajavel and Shanthi, 2007). Many insect pests attack this ornamental plant in Pakistan. The most commonly observed ones include-whitefly, thrips, and leaf eating caterpillar, and of these the latter *Trilocha varians* is the most destructive especially in *F. bejamina* and *F. virens* (Zolotuhin and Witt, 2009; Udayagiri, 2006; Ramzan et al., 2019a). This pest is distributed in Pakistan, India, China, Indonesia, Malaysia, Nepal, Sri Lanka, Taiwan, Thailand, Java, Japan and Philippines (Gurule, 2013; Chuenban et al., 2017; Ramzan et al., 2020; Naeem-Ullah et al., 2020). The larva defoliate the plant (Ramzan et al., 2021 a,b). There is no proper management strategy developed for this newly emerging pest. Ecofriendly and cost effective method is the use of botanicals alone and in combination with insecticides. The present study evaluates two botanicals namely *Azadirachta indica* and *Euclyptus globulus* along with insecticide lambda-cyhalothrin.

MATERIALS AND METHODS

The larvae of *T. varians* were collected from an unsprayed *Ficus* sp. at Multan in 2019 and reared in the laboratory. The rearing method of Ramzan et al. (2019b) and Mansoor et al. (2022) was used. The insecticide, Proclaim (lambdacyhalothrin) was obtained from market and used @ 150 µl with botanicals (*Azadirachta indica* and *Eucalyptus globulus*) obtained from University of Agriculture, Faisalabad. Different concentrations of botanicals were made by mixing thoroughly with water for 5-10 min as recommended by manufacturer. There were three treatments, 1%, 2% and 3% of each botanical with three replications alone and in 150 µl insecticide combination. The experiment was conducted by using randomized complete block design (RCBD). Different plants were selected and a branch of each selected plant sprayed with chemicals with sprayer; after applying one chemical, sprayer was washed with flowing water to remove the residues of applying chemical. The third instar larvae were selected from maintained culture, shifted on treated branches with forceps after 10 min of application. The whole branch containing larvae was covered with mesh sleeves to avoid the escape of larvae. Mortality data of each replication and treated larvae were noted after 24, 48 and 72 hr. The larvae without any movement were treated as dead. Data were statistically analyzed using SPSS and means compared by Tukeys' Honest significance test.

RESULTS AND DISCUSSION

The study revealed that neem was found more toxic than *Euclyptus*, and combination of neem with insecticide was more toxic- maximum mortality was observed on 72 day while lowest was on 24 hr of treatment; neem with insecticide gave 10.01, 16.63 and 21.22% mortalities after 24, 48, and 72 hr of treatment, respectively. It was observed that alone use of neem given 9.50%, 7.25% and 4.45% mortalities after 72, 48 and 24 hr of treatment, respectively. The neem was found more effective against larvae of *T. varians* after 72 hr at 2% concentration while after 24 hr at 3% concentration. The alone application of *Eucalyptus* resulted in 2.37, 4.75, 6.87% mortality, after 24, 48 and 72 hr, respectively.The combination of *Eucalyptus* with insecticide was thus found best; highest (15.84%) mortality was observed at 72 hr while lowest (0.75%) on 24 hr in combine application of *Eucalyptus* and insecticide. Thus, in the present study, both botanicals were found toxic to *T. varians* larvae, and neem was found more toxic, and toxicity of botanicals increased in combination with insecticide (Table 1). The botanicals such as *Ocimum sancutum*, *Parthenium hysterophorus* and *A. indica* had been tested against mulberry insect pests (Naik et al., 2013). The mixture of insecticides and botanicals can thus prove more effective. Different methods have been adopted like contact method, leaf dip method and direct food intake method to check the chemicals toxicity (Park et al., 2007). The applications of botanicals alone or in combination with insecticides can prove effective and have potential against larvae of pests.

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Table 1. Toxicity of botanicals/ insecticide mixture on 3rd instar larvae of *T. varians*

S. No.	Concentration	% mortality		
		24 hr	48 hr	72 hr
		Mean± SE	Mean± SE	Mean± SE
A. indica alone				
1	1%	0.75± 0.75b	3.42± 3.42a	8.24± 7.24b
2	2%	1.08± 1.08b	5.76± 5.76a	9.50± 9.57a
3	3%	4.45± 4.45a	7.25± 7.25a	9.09± 9.10ab
4	Control	0.13± 0.13b	0.31± 0.31b	0.22± 0.22c
	C.V	49.79	27.06	10.73
E. globulus alone				
1	1%	2.37± 2.37a	4.75± 4.75a	6.87± 6.87a
2	2%	1.87± 1.87a	3.75± 4.25a	5.66± 5.37ab
3	3%	1.37± 1.37a	4.23± 3.75a	6.37± 6.66ab
4	Control	1.70± 1.70b	1.91± 1.91a	1.37± 1.37b
	C.V	60.86	39.29	23.66
Azadirachta indica+ lambda-cyhalothrin				
1	1%	2.00± 2.00a	6.00± 6.00ab	9.75± 9.75a
2	2%	1.50± 1.50a	1.00± 1.00b	7.75± 6.75ab
3	3%	10.01± 1.00a	16.63± 6.50	21.22± 8.75ab
4	Control	0.50± 0.50a	2.83± 2.83ab	3.08± 3.08b
	C.V	61.97	27.20	22.47
E. globulus+ lambda-cyhalothrin				
		Mean± SE	Mean± SE	Mean± SE
1	1%	0.75± 0.75b	3.61± 3.61b	6.07± 6.07b
2	2%	1.08± 1.08b	5.94± 5.94ab	7.73± 7.73ab
3	3%	6.45± 4.45a	10.75± 8.75a	15.84± 9.75a
4	Control	0.10± 0.13b	0.062± 0.06c	0.31± 0.31
	C.V	49.79	24.24	12.86

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AUTHOR CONTRIBUTION STATEMENT

All authors have equal contribution.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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