



INFLUENCE OF *Vitex negundo* ON THE MORPHOGENESIS OF *Corcyra cephalonica*

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Abstract- *Corcyra cephalonica* is a serious stored product pest. The IV and V Instar larvae of *Corcyra cephalonica* were treated with medicinal plant extract *Vitex negundo*. The *Vitex negundo* treated resultant *Corcyra cephalonica* showed varied morphogenetic deformities. The treated IV Instar larvae showed prolongation of the larval period. The surviving *Vitex negundo* treated resultant larvae moulted into V Instar larvae and exhibited moult disruption. Some of the IV Instar larvae were unable to moult into next Instar stage, however few developed into larval pupal intermediates. The treated V Instar larvae developed as adults with deformed wings and unable to fly and reproduce thus ruling out the possibility of further propagation of stored pest.

Keywords- moult disruption, larval-pupal intermediates.

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Introduction

For sustainability of agricultural production, the use of phosphorus and chlorinated insecticides pose problems, such as poisoning in man and other animals [9], pest resistance to pesticides [10]. About one third of the realizable global crop (worth rupees 6,000 crore) is estimated to be lost annually due to insect pests [5]. On account of the use of pesticides, the environment dictates a need for safe, effective and economical insecticides. Plant products which show diverse biological activities may be useful for this purpose. Plant materials with insecticidal properties have been used traditionally for generations throughout the world [3]. The rice-moth, *Corcyra cephalonica* is a notorious pest of stored cereals and cereal commodities in India as well as in other tropical and subtropical regions of the world. Its larval stages cause serious damage to rice, gram, sorghum, maize, groundnut, raisins, nutmeg, chocolates, milled products, etc. [1,2]. *Vitex negundo* is a small shrub or tree belonging to the family Verbenaceae. Leaves of this plant yield an essential oil used as a tonic and vermifuge and also in smoking for relief from catarrh and headaches. They

are also used as insect repellents [6,12]. *Vitex negundo* induces growth disruption and feeding inhibition in several insect species [7]. In this study, the influence of *Vitex negundo* on the Morphogenesis of *Corcyra cephalonica* was assessed.

Materials and methods

A rich standard culture of this insect was maintained in the laboratory on normal dietary medium composed of coarsely ground jowar (*Sorghum vulgar*) inside a glass container at $26\pm 1^{\circ}\text{C}$ temperature and $65\pm 5\%$ Relative humidity.

Preparation of crude leaf extract of VN

Fresh leaves of *Vitex negundo* were collected, shade dried for a week and pulverized. The material was cold extracted in different solvents of petroleum ether, methanol, diethyl ether and acetone separately at room temperature for 24 hrs and the extract was evaporated to dryness under reduced pressure. The extract was weighed, re-dissolved in a known volume of acetone for making different concentrations of the extract. Preliminary studies showed

that the methanol extract to be most effective among all the three solvents. Hence the follow up study were conducted using methanol extracts.

Freshly moulted IV and V instar larvae were treated on the abdominal region with 1µg/larva of VN dissolved in 2 µl of acetone with the help of Hamilton micro syringe. 50 larvae were treated each time and the experiments were replicated 5 times. Controls were treated with 2 µl of acetone. After treatments a suitable time gap of 5 minutes was given and they were transferred into diet. The treated larvae were observed daily to note the changes.

Results and Discussion

The IV and V Instar larvae of *Corcyra cephalonica* were treated with medicinal plant extract *Vitex negundo*. The *Vitex negundo* treated resultant *Corcyra cephalonica* showed varied morphogenetic deformities. The treated IV Instar larvae showed prolongation of the larval period. The surviving *Vitex negundo* treated resultant larvae moulted into V Instar larvae and exhibited moult disruption. Some of the IV Instar larvae were unable to moult into next Instar stage, However few developed into larval pupal intermediates (Fig.1 and 4). The treated V Instar larvae developed as adults with deformed wings and unable to fly and reproduce (Fig. 2 and 3).



Fig. 1- Larval- Pupal Intermediate



Fig. 2- Adult with deformed Wings



Fig. 3- Resultant adult with wrinkled wings and stumpy wings



Fig. 4- Larval - Pupal intermediate.

Discussion

The IV and V instar larvae of *Corcyra cephalonica* treated with *Vitex negundo* resulted in adults, which showed varied deformities (Fig. 3). The results of the experiments carried out on the larvae of *Corcyra cephalonica*; suggest that the morphogenetic changes observed are brought about by ecdysteroid deficiency [11]. A high pre-pupal juvenile hormone titre is necessary for successful pupation in lepidopteran insects [13], *Vitex negundo* disrupts the metamorphosis in *Corcyra cephalonica* [8].

The larvae treated with *Vitex negundo* resulted in larval pupal intermediates, and adults with varying degrees of wing deformities. They could not escape from the pupal case which resulted in potentially severe inhibition of flight [4].

Our study indicates that, sustainable protection of *Vitex negundo* against the stored product insect *Corcyra cephalonica* may be feasible using the botanical product in controlling the insect.

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