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Vitex negundo Induced Protein Changes in the Fat Body of *Corcyra cephalonica*

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ABSTRACT

Corcyra cephalonica is a menace to agricultural crop produces infesting cereals, and many other food products, hence an attempt was made to control the stored products pest by using medicinal plant extract *Vitex negundo*. The protein content in the fat body increased gradually in the larvae, pupae and the adults of *Corcyra cephalonica*, whereas in the *Vitex negundo* treated resultant larvae there was a prominent decrease in the protein content when compared with the controls.

Keywords: *Vitex negundo* , *Corcyra cephalonica*, fat body, larvae & pupae

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INTRODUCTION

Proteins are the first biological factors making their manifestation during development. During metamorphosis of an insect, process like destruction of certain larval tissue and rejuvenation and remoulding of various tissues into adult. One is bound to take place involving synthesis and consumption of the macro molecules as well [1]. The Fat body tissue play a key role in storage proteins. Storage proteins increased during successive stages of development [2-4]. Proteins are synthesized in the fat body and released into the haemolymph to be incorporated later into various organ including ovaries [5].

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. [6,7]. *Vitex negundo* induces morphological changes and biochemical changes [8]. The Fat body protein content of *Corcyra cephalonica*, were studied in the *Vitex negundo* treated instars.

EXPERIMENTAL SECTION

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±1^{0}C temperature and 65±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 24hrs 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 2µl 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 2µl 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. Fat body is dissected and rinsed free of haemolymph with Ringers solution. 10% homogenate was prepared for the estimation of proteins and the protein was estimated by the method [9].

RESULTS AND DISCUSSIONS

Statistical Analysis of the Data

The experimental data was analyzed statistically, mean and standard Deviation was calculated. The fat body proteins was estimated in the control of IV instar larva, V instar larva, pupa and Adult

IV instar larva

In the 1st day, the IV instar larva recorded a value of 1.02 ± 0.025 mg/gm weight of the tissue. It increased to 1.572 ±0.03 mg/gm weight of the tissue on the 4th day. There was a steady increase and the value recorded on the 7th day of the IV instar was 2.011± 0.035 mg/gm weight of the tissue.

V instar

The 1st day of the V instar showed a value of 2.109±0.035 mg/gm weight of the tissue. The protein content in the fat body increased steadily and it was 3.113±0.039 mg/gm weight of tissue on the 5th day and 3.911 ± 0.043 mg/gm weight of the tissue on the 8th day. It increased to 4.0642±0.047mg/gm weight of the tissue on the 10th day of the larva.

Pupa

The value recorded on the 1st day was 4.245± 0.049 mg/gm weight of the tissue. It decreased to 4.0625±0.0514 mg/gm weight of the tissue on the 3rd day of the pupa. A steady decrease was noted and the values recorded were 2.042± 0.034 mg/gm weight of the tissue on the 6th day and 1.929+- 0.031 mg/gm weight of the tissue on the 7th day.

Adult

The adults showed a value of 0.915± 0.028 mg/gm weight of the tissue on the 1st day. It decreased to 0.621±0.026 mg/gm weight of the tissue on the 3rd day and the value recorded on the 5th day was 0.341±0.023 mg/gm weight of the tissue.

Statistical Analysis of the Data

The experimental data was analyzed statistically, mean and standard Deviation was calculated. The fat body proteins was estimated in the treated of IV instar larva, V instar larva, pupa and Adult.

IV instar larva treated with crude leaf extract of *Vitex negundo*

The recorded value on the 2nd day of the IV instar showed 1.03± 0.024 mg/gm weight of the tissue of proteins in the fat body. It increased to 1.06±0.0252mg/gm weight of the tissue on the 4th day as against 1.572± 0.0252 mg/gm weight of the tissue in the control.

There was a steady increase and the value showed 1.11±0.0258 mg/gm weight of the tissue on the 7th day, which is less than the control value.

V instar

The value recorded on the 1st day of the V instar was 1.124±0.0258 mg/gm weight of the tissue. It increased to 1.182±0.0262mg/gm weight of the tissue on the 5th day and 1.34±0.0268 mg/gm weight of the tissue on the 8th day. The protein content in the fat body

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recorded on the 10th day 1.385±0.0272 mg/gm weight of the tissue which is much less than the control value of 4.0642±0.047 mg/gm weight of the tissue.

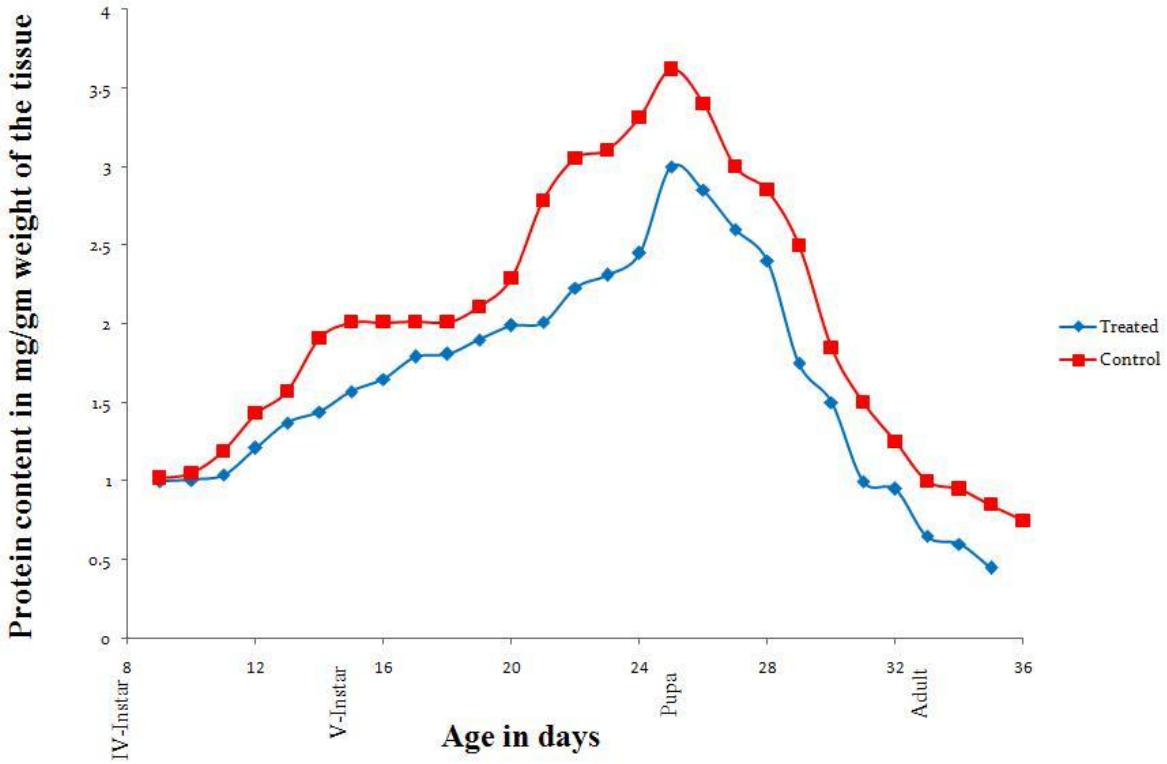
Pupa

The recorded value on the 1st day was 1.572±0.0275 mg/gm weight of the tissue. A steady decrease in protein content was noted. It was 1.112±0.022 mg/gm weight of the tissue on the 4th day and 0.987±0.021mg/gm weight of the tissue on the 6th day. It further decreased to 0.811±0.02 mg/gm weight of the tissue on the last day of the pupal stage.

Adult

It showed a value of 0.516±0.021 mg/gm weight of the tissue on the 1st day. It decreased to 0.217±0.019 mg/gm weight of the tissue on the 3rd day. The value recorded on the last day was 0.082±0.015mg/gm weight of the tissue (Figure 1).

Figure-1: Quantitative changes in the protein content of the fat body of the IV, V instars, pupa and adult of the control insect and crude leaf extract of *Vitex negundo* treated IV instar insect during the development of *Corcyra cephalonica*.



Corcyra cephalonica IV instar larva were treated with crude leaf extract of *Vitex negundo* treated resultants showed a decline in the protein content when compared to the control larvae. This may be due to the *Vitex negundo* functioning as a molting hormone analogue. As such it may interfere with neuroendocrine control of molting hormone synthesis. The protein content in the fat body of *Corcyra cephalonica* exhibited a steady increase and the increase was markedly accelerated during the pre-pupal stage of

development on the contrary, the protein concentration of the haemolymph increased gradually during larval development and reaches its highest value in the last instar larvae but decline during the pre-pupal and early pupal stages of development . Our results are in correlation with those of [9-11] there was a gradual decline in the protein content of the treated resultant *Corcyra cephalonica* during the couse of development. The disturbance in the hormonal imbalance inhibited protein synthesis in the fat body these results are in concurrence with that of the [3].

CONCLUSIONS

Administration of *Vitex negundo* controlled the stored product pest *Corcyra cephalonica* by influencing the moulting hormone. The protein content in the fat body increased gradually in the larvae, pupae and the adults of *Corcyra cephalonica*, whereas in the *Vitex negundo* treated resultant larvae there was a prominent decrease in the protein content when compared with the controls. Thus, raising hope for its practical application in the stored grain pest management.

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