Biolife 2(1):261-264
AN INTERNATIONAL QUARTERLY JOURNAL OF BIOLOGY & LIFE SCIENCES
ISSN (online): 2320-4257
www.biolifejournals.com
BIOLIFE ORIGINAL ARTICLE

VITEX NEGUNDO INDUCED PROTEIN CHANGES IN THE OVARY OF *CORCYRA CEPHALONICA*

M. Madhavi[1*] and S. Sabita Raja[2]

[1,2]Department Zoology, Nizam College, Osmania University, Hyderabad-500 001, Andhra Pradesh, India

E-mail: prsmadhavi@gmail.com

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 ovary increased gradually in the larvae, pupae and the adults of *C. cephalonica*, whereas in the *V. negundo* treated resultant larvae there was a prominent decrease in the protein content when compared with the controls.

Key words : *Vitex negundo, Corcyra cephalonica,* ovary, larvae, pupae

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 (Venugopal and Dinesh Kumar 1997). The Fat body tissue plays a key role in storage proteins. Storage proteins increased during successive stages of development (Kanost *et al.*, 1990; Rajathi *et al.* 2010). Proteins are synthesized in the fat body and released into the haemolymph to be incorporated later into various organ including ovaries (Vallae1993).

V.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. (Dharmasri *et al*., 2003; Umamaheswari *et al.*, 2007). *V. negundo* induces morphological changes and biochemical changes (Ignacimuthu, 1998 and Jayadev. D. J and Viveka Vardhani. V, 2013.). The Fat body protein content of *C. cephalonica*, were studied in the *V.negundo* treated instars.

MATERIAL 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±1^{0}C temperature and 65±5% Relative humidity.

Preparation of crude leaf extract of *VN:*
Fresh leaves of *V.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 of Lowry *et al* 1951.

Statistical Analysis:
The experimental data was analyzed statistically, mean and standard Deviation was calculated. The ovarian proteins were estimated in the control of V instar larva, pupa and Adult.

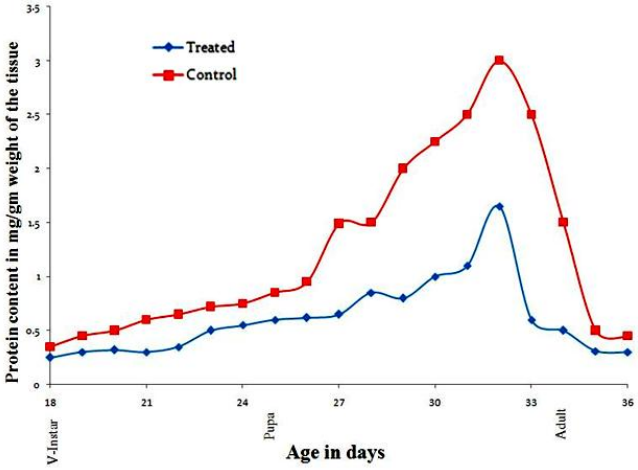
RESULTS

Larval stage:
The protein content in the ovary of the V instar on the last day was 0.22±0.016mg of protein/gm weight of the tissue (Fligure-1).

Pupa:
A steady increase in the protein content of the ovary was observed. The 1st day recorded a value of 0.253±0.019 mg of protein/gm weight of the tissue. It increased to 0.82±0.04mg/gm weight of the tissue on the 5th day of the pupa. It further increased and the last day of the pupa recorded a value of 1.96±0.11mg/gm weight of the tissue (Fligure-1).

Adult:
The ovarian protein content on the second day of the adult emergence was 2.53±0.112mg of protein/gm weight of the tissue. It showed a steady decrease. The protein content in the ovary decreased to 0.5±0.03mg of protein /gm weight of the tissue on the 4th day. It further decreased and the value recorded was 0.15± 0.009mg of protein/gm weight of the 5th day (Fligure-1).

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



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

Larval stage:
A decrease in protein content of the ovary was observed in the *Vitex negundo* treated resultant insects. The protein content of the ovary was 0.163±0.005mg/gm weight of the tissue on the last day of the V. instar, when compared to 0.22±0.016mg/gm weight of the tissue in the control larva (Fligure-1).

Pupa:
The protein content in the ovary showed a value of 0.168±0.006mg/gm weight of the tissue on the 1st day. It steadily increased. The value observed on the 4th day was 0.2±0.1mg/gm weight of the tissue. It showed further increase and the recorded value was 0.35±0.02mg/gm weight of the tissue on the 7th day (Fligure-1).

Adult:
The protein content of the ovary on the 1st day of the adult was 0.38±0.02mg/gm weight of the

tissue. It increased to 0.4±0.02mg/gm weight of the tissue on the 2nd day. It decreased steadily. The 4th day recorded a value of 0.12±0.011mg/gm weight of the tissue and the 5th day observed value was 0.098±0.009mg/gm weight of the tissue (Fligure-1).

DISCUSSION

C. cephalonica V instar larva were treated with crude leaf extract of *V. negundo* treated resultants showed a decline in the protein content when compared to the control larvae. This may be due to the *V.negundo* functioning as a molting hormone analogue. As such it may interfere with neuroendocrine control of molting hormone synthesis. The protein content in the ovary of *C. 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 ovary 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 (Achaiah, 2013; Anitha *et al.,* 2000; Banks and Malacoln, 1994; Jayadev. D. J and Viveka Vardhani. V, 2013) there was a gradual decline in the protein content of the treated resultant *C. cephalonica* during the course of development.

The disturbance in the hormonal imbalance inhibited protein synthesis in the ovary these results are in concurrence with that of the Raja *et al. (*1986). Administration of *V.negundo* controlled the stored product pest *C. cephalonica* by influencing the moulting hormone. Thus, raising hope for its practical application in the stored grain pest management.

REFERENCES

1. **Achaiah N.** 2013. Study on free amino acid levels in *Raillietina Tetragona* (molin, 1858). Biolife. 1(3), 96-98.

2. **Anitha, H.R., Raja, S.S., Renuka, S. and Manjula, C.,** 2000. Effect of precocene-II on the protein changes in the haemolymph, fat body and Ovaries of *Chilo partellus*, during ontogenesis. Convergence, 2(1): 18-23.

3. **Banks, G.A., Malacoln, G.A.,** 1994. Temporal pattern of RNA and Protein synthesis in the ovary of *Aedes aegypti*. J. Insects Physiol., 22: 299-397.

4. **Dharmasri, M. G., Jayakody, J.R.A.C. and Galhena, G.,** 2003. Anti-inflammatory and analgesic activities of mature fresh leaves of *Vitex negundo*. J. Ethnopharmacol., 87: 199-202.

5. **Kanost, M.R., Dawooga, J.K., Ryan, R.O, Husden M.D., Zeilger, R.,** 1990. Insect haemolymph proteins. Insect Physiol., 22: 299-397.

6. **Ignacimuthu, S.,** 1998. Nature's ecofriendly arsenal of pesticides. Curr. Sci., 74: 1037.

7. **Jayadev. D. J and Viveka Vardhani. V**. 2013. An entomological study on *Anopheles stephensi, Culex quinquefasciatus* and *Aedes aegypti* fauna potentiality in the urban area of Autonagar, Vijayawada (Krishna district, Andhra Pradesh). Biolife. 1(4):251-260.

8. **Lowry, O.H., Rosebrough,, J..J., Farr, A.L., Randall, R.J.,** 1951. Protein measurement with the folin phenol reagent. J. Biol. Chem., 193: 263-275.

9. **Umamaheshwari, M., Ashok Kumar, K and Somasundaram, A.,** 2007. Xanthine oxidase inhibitory activity of some Indian medical plants. J. Ethnopharmacol. 109(3): 547-551.

10. **Raja, S.S., Thakur, B., Kishen, R., and Kaur, A.** 1986. Selective accumulation of haemolymph proteins by fat body during larval pupal transformation of *Chilo partellus*. Entomol. Bohemoslov., 154:205-208.

11. **Rajathi. A., Pandiaajan J., Krishnan,M**., 2010. Effect of RH-2485 on the

development, metamorphosis and synthesis of major proteins in female silkworm *Bombyx mori*. Biologia, 65(5): 903-913.

12. **Vallae, D.,** 1993. Vitellogenesis in insects and other groups A review, Membr Inst. Oswald, Cruz, 88: 1-26.

13. **Venugopal, K.J., Dinesh Kumar**, 1997. Electrophoretic studies on the development profiles of protein in Haemolymph, Fat body and ovary of red cotton bug, *Dysdercus Koenigii*. Entomon 22: 185-191.

DOI: https://dx.doi.org/10.5281/zenodo.7196934
Received: 1 January 2014;
Accepted; 20 February 2014;
Available online : 2 March 2014