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RESEARCH ARTICLE

ALLIUM SATIVUM INDUCED PROTEIN CHANGES IN THE OVARY OF CORCYRA CEPHALONICA.

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Abstract

Corcyra cephalonica is a Serious pest to agricultural crop produces infesting cereals, and many other food products, thus causing heavy damage to the food stuffs and useless for human consumption. Hence an attempt was made to control the stored products pest by using medicinal plant extract *Allium sativum*. The protein content in the ovary increased gradually in the larvae, pupae and the adults of *C. cephalonica*, whereas in the *Allium sativum* treated resultant larvae there was a prominent decrease in the protein content when compared with the controls.

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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 (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 (Vallae 1993).

Garlic (*Allium sativum* Linn.), is used as a common spice, condiment, flavoring and folk medicine. Medicinal properties of garlic have attracted the attention of plant physiologists and chemists. Garlic is a perennial plant and currently the biggest selling herb on the face of the planet. The work is investigated in the real bioactive constituents of garlic (Amagase, H. 2006). The ovarian protein content of *C. cephalonica*, were studied in the *Allium sativum* treated instars.

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 bulb extract of *Allium Sativum* (AS)

Fresh bulbs of A.Sativum were 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

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

Results:-

Ovarian Proteins:-

Estimation in the control insect:-

Larval stage

The protein content in the ovary of the V instar on the last day was 0.22 ± 0.016 mg/gm weight of the tissue (Graph 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/gm weight of the tissue. It increased to 0.82 ± 0.04 mg/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 2.96 ± 0.112 mg/gm weight of the tissue (Graph 1).

Adult

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

Estimation of ovarian protein in the larvae of *Corcyra cephalonica* treated with crude bulb extract of *Allium sativum*.

Estimation of ovarian proteins:-

Larval stage

The last day of the V instar recorded a value of 0.2 ± 0.005 mg/gm weight of the tissue (Graph 1).

Pupa

The 2nd day of the pupa recorded a value of 0.169 ± 0.005 mg/gm weight of the tissue. There was steady increase in the ovarian protein content. The value recorded on the 4th day was 0.179 ± 0.010 mg/gm weight of the tissue which was less compared to the control value of 0.82 ± 0.04 mg/gm weight of the tissue. The last day of the pupa showed a value of 0.43 ± 0.02 mg/gm weight of the tissue (Graph 1).

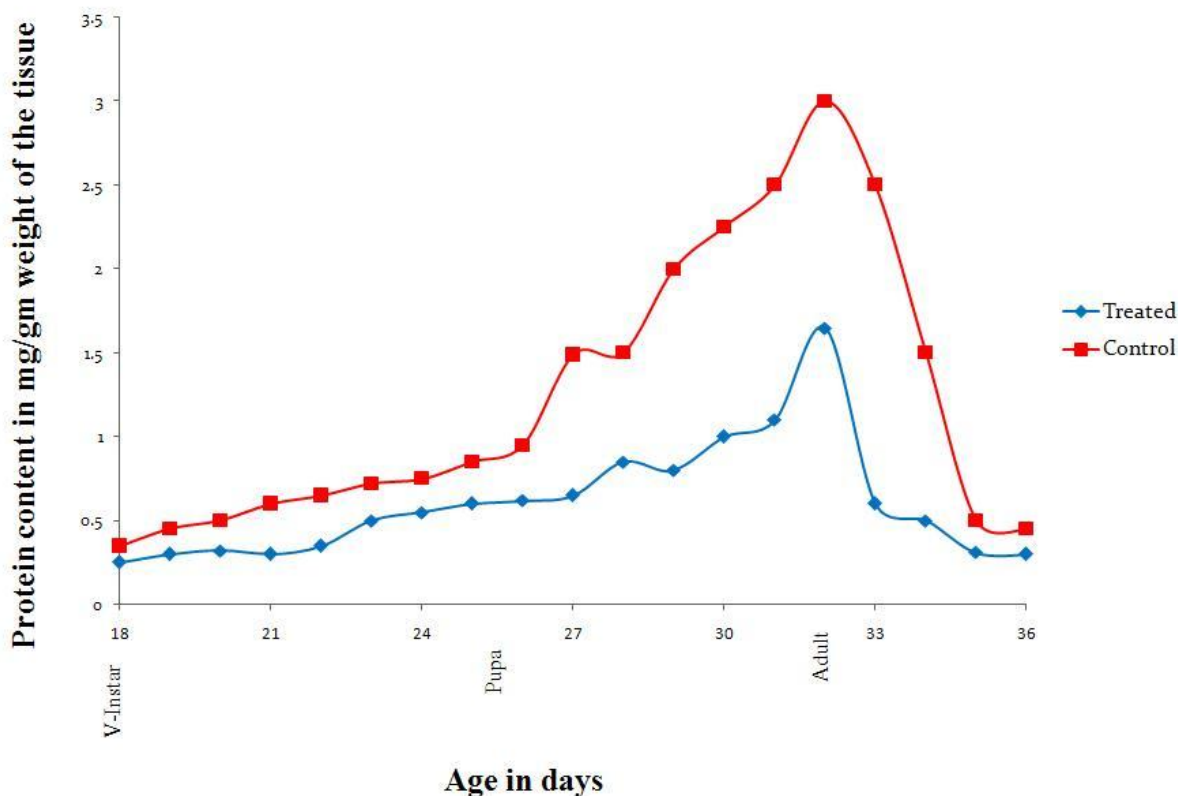
Adult

The protein content of the ovary on the 3rd day was 0.16 ± 0.016 mg/gm weight of the tissue. It decreased steadily and the 4th day recorded a value of 0.114 ± 0.012 mg/gm weight of the tissue, on the 5th day, the protein content of the ovary was 0.09 ± 0.009 mg/gm weight of the tissue (Graph 1).

Discussion:-

C. cephalonica IV and V instar larva were treated with crude bulb extract of *A. sativum* treated resultants showed a decline in the protein content when compared to the control larvae. This may be due to the *A. sativum* 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 (Anitha *et al.*, 2000; Banks and Malacolin, 1994) 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

A. sativum 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.



Graph.1: Quantitative changes in the protein content of the ovaries of the V instar, pupa and Adult of the control insect and crude bulb extract of *Allium sativum* treated V instar insect during the development of *Corcyra cephalonica*.

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