



Short Communication

Effect of Coriandrum Oil on the RNA Levels in the Ovary of *Corcyra Cephalonica*

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Abstract

Corcyra cephalonica is a threat 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 Coriandrum oil. The RNA levels in the ovary increased gradually in the larvae, pupae and the adults of *Corcyra cephalonica*, whereas in the Coriandrum oil treated resultant larvae there was a prominent decrease in the protein content when compared with the controls.

Keywords: Coriandrum oil, *Corcyra cephalonica*, RNA, Ovary, Larvae, Pupae and Adult.

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 remolding of various tissues into adult. One is bound to take place involving synthesis and consumption of the macro molecules as well¹. The Fat body tissue plays a key role in storage proteins. Storage proteins increased during successive stages of development²⁻³.

RNA synthesis is a key biosynthetic pathway which operates actively during early larval development in holometabolous insects and is thought to be an important preparatory mechanism for active metabolic functions to be carried out later by different organs during late larval development⁴. The resultant increase in nuclear volume and RNA are proportional to the increase in cell size. The studies on various tissues / organs show that there is a relationship between cellular RNA synthesis and capacity of the cells for differentiation⁵. Mitosis is necessary for a cell to change from one developmental stage to another, presumably to a more mature stage, Coccinelled beetles, Mosquito⁶ show that during each larval moult cycle there is a definite temporal pattern of RNA synthesis in various tissues⁷⁻⁹. Coriandrum oil 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 repellents¹⁰⁻¹¹, Coriandrum oil induces morphological changes and biochemical changes¹². The RNA levels in the Ovary of *Corcyra cephalonica*, were studied in the Coriandrum oil 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 vulgare*) inside a glass container at $26\pm 1^{\circ}\text{C}$ temperature and $65\pm 5\%$ Relative humidity.

Coriander Essential Oil Extraction: Essential oil was extracted from the seed of coriander, coriander sativum L. of the family Apiaceae. The essential oil was extracted by steam distillation for 4-6 hours using a Clevenger type apparatus where 250g of seeds in 250 ml of water is subjected to hydrodistillation. The oil was separated dried over anhydrous sodium sulfate and stored in dark glass bottles at 4°C in the refrigerator until used. The isolated oil is a colorless or pale yellow liquid with a characteristic odor and taste of coriander. The larvae and adults were treated with the coriander essential oils prepared using ethyl alcohol (95%) as solvent. After suitable gap of time the insects were transformed into the diet. The treated larvae were observed daily to note the changes and the resulting abnormal intermediates were collected from the diet media. 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.¹³.

Results and Discussion

Statistical Analysis of the Data: The experimental data was analyzed statistically, mean and standard Deviation was calculated. The RNA level in the Ovary was estimated in the control of larval stages, pupa and Adult.

Larval stages: The RNA content in the ovaries of the control larvae was much less than in the fat body. The first day of the V instar (18 day old) larvae recorded a value of 0.460 ± 0.003 mg/gm weight of the tissue. On the 2nd day it showed 0.490 ± 0.082 mg/gm weight of the tissue. On the 3rd day the

RNA content further increased to 0.500 ± 0.033 mg/gm weight of the tissue (Figure-1).

Pupal stages: The RNA content in the ovaries of the freshly pupated pupa was 0.511 ± 0.034 mg/gm weight of the tissue. On the 2nd day the recorded value was 0.592 ± 0.039 mg/gm weight of the tissue of RNA was recorded. It further increased to 0.654 ± 0.043 mg/gm weight of the tissue on the 3rd day. The RNA content further increased from 0.692 ± 0.046 mg/g m weight of the tissue on the fourth day to 0.721 ± 0.048 mg/gm weight of the tissue on the 5th day (Figure-1).

Adult stage: The first day of the adult stage recorded a value of 0.850 ± 0.056 mg/gm weight of the tissue. The second day recorded a value of 1.420 ± 0.094 mg/gm weight of the tissue. The third day recorded a value of 0.982 ± 0.065 mg/gm weight of the tissue and 0.741 ± 0.049 mg/gm weight of the tissue on the fourth day (Figure-1).

Statistical Analysis of the Data: The experimental data was analyzed statistically, mean and standard Deviation was calculated. The RNA levels in the Ovary was estimated in the treated of larval, pupa and Adult.

Larval stage: The RNA content in the ovaries of the treated resultant V instar larvae showed a marked decrease when compared to the controls. The first day of the V instar larvae noted a value of 0.162 ± 0.010 mg/gm weight of the tissue. It changed from 0.171 ± 0.0114 mg/gm weight of the tissue on the 2nd day to 0.184 ± 0.012 mg/gm weight of the tissue on the 3rd day of the V instar larvae (Figure-1).

Pupal period: The RNA content increased to 0.190 ± 0.012 mg/gm weight of the tissue on the 1st day of the pupal period. The RNA content increased further to 0.192 ± 0.012 mg/gm weight of the tissue on the 2nd day of the pupal period. On the 3rd, 4th, 5th days the RNA content recorded was 0.198 ± 0.012 mg/gm weight of the tissue, 0.203 ± 0.013 mg/gm weight of the tissue, 0.216 ± 0.014 mg/gm weight of the tissue respectively (Figure-1).

Adult: The first day of the treated adult recorded a RNA level of 0.218 ± 0.014 mg/ gm weight of the tissue in the ovaries. The second and third day recorded values were 0.210 ± 0.014 mg/gm weight of the tissue and 0.028 ± 0.012 mg/gm weight of the tissue respectively (Figure-1).

Discussions: *Corcyra cephalonica* were treated with Coriandrum oil treated resultants showed a decline in the RNA content of the Ovary compared to the control larvae. The increase in the RNA content of the ovaries coincided with increase in protein content during larval, pupal and adult development in the control insects. The increased amounts of RNA in the ovaries of the controls are probably associated with mitosis of ovarian tissues during maturation of ovaries showed that RNA synthesis is correlated with increased ecdysteroid titres¹⁴.

Coriandrum oil acts antagonistic to that of 20- hydroxyecdysone at the target site epidermis, inhibiting ecdysis¹⁵⁻¹⁶. This may be due to the fact that Coriandrum oil inhibits mitosis thus inducing degeneration of cells, preventing growth, resulting in reduced levels of RNA in the tissues of the treated resultant *Corcyra cephalonica*¹⁷⁻¹⁸.

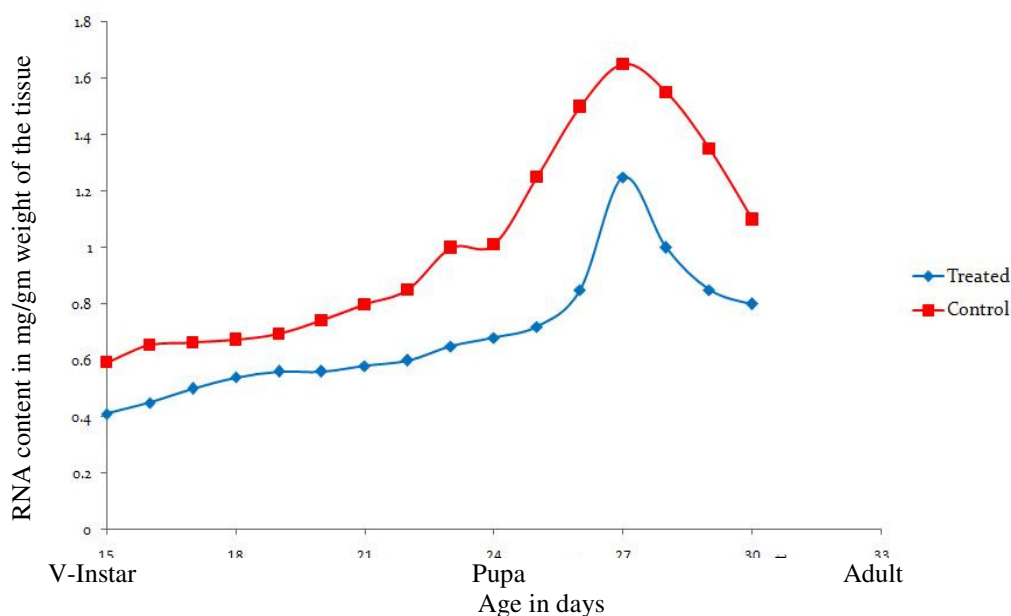


Figure-1

Quantitative changes in the RNA content of the ovaries of the control and Coriandrum oil treated V instar resultant insects during the development of *Corcyra cephalonica*

Conclusion

The current study revealed that, in the Coriandrum oil treated insects, the cells of the ovary were smaller than the control larvae. The remnants of the ovary cells dispersed through the haemolymph. Hence building material for further tissue synthesis was unavailable and the ovary which depends on the fat body proteins for growth, degenerated, showing abnormally reduced amounts of RNA. The morphological observation and biochemical analysis of RNA, confirm the fact that Coriandrum oil deranges the development of *Corcyra cephalonica* by interfering with the hormonal milieu.

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