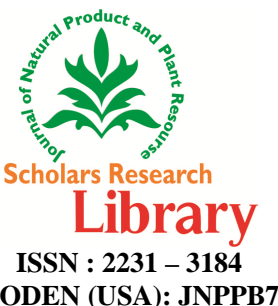




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*J. Nat. Prod. Plant Resour.*, 2013, 3 (1):74-77  
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### Effect of Malathion on Biochemical Alterations in *Corcyra cephalonica*

Mohammad Ismail Ansari, Nisar G. Patel and Prakash T. Wankhedkar

*P. G. & Research Center, Deptt. Of Zoology, Pratap College Amalner, Dist. Jalgaon (M.S.)  
India.*

#### ABSTRACT

The present work is carried out to observe the biochemical effect of Malathion on the glucose, glycogen and protein levels in the larvae of rice moth. The objective was to examine the changes in carbohydrate (glucose & glycogen) and protein contents. The larvae were released on treated as well as normal dietary medium. After 24hrs 50% mortality was found at 8ppm dose level. Then 1/5<sup>th</sup> of LC<sub>50</sub> concentration were mixed with dietary medium and allowed larvae to feed for 168hrs, the surviving larvae were taken for estimation of glucose, glycogen and protein. The result shows carbohydrate contents (glucose & glycogen) were found to be normal in the larvae fed on normal diet while pesticidal treatment caused an overall decrease where as the protein content has been found to be increased after pesticidal treatment. Later on all remaining larvae were transferred to normal dietary medium, after 168hrs the recovery changes were noted.

**Keywords:** *Corcyra cephalonica*, glucose, glycogen, protein, pesticide, Malathion.

#### INTRODUCTION

The rice moth *Corcyra cephalonica* (Stainton) (Lepidoptera-Pyralidae) is an important stored grain pest in Asia & South America [1]. The only recognized species of this genus is *cephalonica*. [2] made the first record of *Corcyra cephalonica*. Its larval stages causes serious damage to rice, gram, sorghum, maize, ground nut, cotton seeds, peanuts, linseeds, raisins, nutmeg, chocolates, biscuits, wheat, coffee, cocoa, beans and milled products [3-7].

According to an FAO study, 13 million tons of grain lost due to insects or 100 million tons failure to store properly [8].

Influence of certain organochlorines, organophosphates and synthetic pyrethroids has also been reported against the ontogeny as well as larval biochemistry of this pest [9-19].

In the present study, Malathion has been selected as one of the organophosphate to control the stored cereal pest rice moth *Corcyra cephalonica*. Hence, as an objective of such program the present work has been designed and conducted to investigate the effect of Malathion on some biochemical aspects of *Corcyra cephalonica*.

#### MATERIALS AND METHODS

##### Rearing of larvae:

The larvae of rice-moth *C. cephalonica* were used in the present study. Already contaminated or damaged stored food grains by *C. cephalonica* were collected from Dhule Dist. and were reared in the laboratory conditions. The standard culture of this insect was maintained in the laboratory on normal dietary medium composed of coarsely ground jowar (*Sorghum vulgare*) mixed with 5% (w/w) yeast powder at 26±1<sup>o</sup>C and 93±5% relative humidity

(R.H.). Young *Corcyra* larvae hatched out from the egg within 3-4 days and fed on the grains by webbing. The larval period lasted about 20-25 days and pupation took place inside the web itself, moths start emerging after 35-40 days.

A commercial Malathion (Hindustan Insecticide Ltd.) with empirical formula of  $C_{10}H_{19}O_6PS_2$  was used for this study. Stock solution was prepared by dissolving a measured amount in solvent and then desired concentrations were made. Then the dietary medium mixed and treated separately with 9 different dose levels of stock solution and one control group. The larvae of *C. cephalonica* were transferred to these dietary medium in different petridishes and allowed to feed. Each petridish consisted of 20 larvae, after 24hrs of time interval the dead & live larvae were recorded.  $LC_{50}$  value was found at 8ppm dose levels of Malathion.  $1/5^{th}$  concentration of the  $LC_{50}$  value was mixed with the dietary medium allowed larvae to feed for 168hrs. After 168hrs lived larvae were taken from petridish for estimation of glucose & glycogen by DNSA method and protein by Biurette method. Remaining lived larvae were transferred to normal dietary medium for recovery. After 168hrs the changes in glucose, glycogen and protein contents were estimated by same procedure as described above.

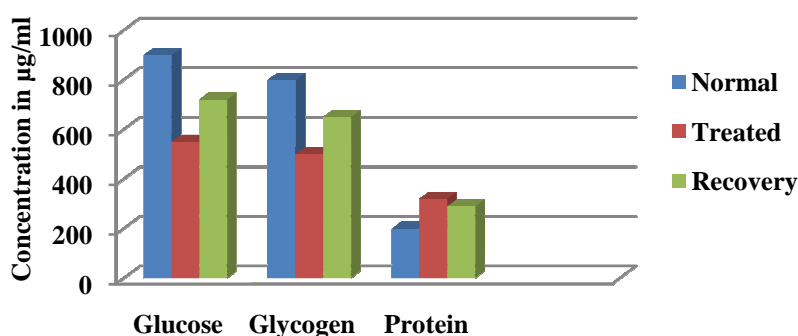
DNSA reagent was prepared just before use, went through the procedure and took reading at 540nm of normal (control), treated and recovery samples. Similarly proteins were estimated by Biurette method, went through the procedure, took reading at 540nm of normal (control), treated and recovery samples by spectrophotometer (Systronics 106) and graph were plotted.

### RESULTS

In the present study an attempt has been made to study the effect of Malathion on some biochemical alterations in the larvae of *C. cephalonica*. It was observed that the  $LC_{50}$  value was found at 8ppm concentration level of Malathion after 24hrs. Then treatment with  $1/5^{th}$  concentration of  $LC_{50}$  were given to another fresh larvae group for 168hrs. After treatment lived larval bodies were used for estimation of carbohydrate (glucose & glycogen) & protein content. Recovery changes were also noted in the remaining lived larvae after 168hrs of normal feeding. It was found that the concentration of glucose in normal, treated and recovery samples were 900 $\mu$ g, 550 $\mu$ g & 720 $\mu$ g/ml respectively while glycogen was 800 $\mu$ g, 500 $\mu$ g & 650 $\mu$ g/ml respectively and protein was 200 $\mu$ g, 320 $\mu$ g & 290 $\mu$ g/ml respectively.

The results shows that glucose & glycogen content were found to be normal in the larvae which were fed on normal diet while pesticidal (Malathion) treatment caused an overall decrease, after recovery it was found that there was some elevation in the concentration of glucose & glycogen in the larvae of *C. cephalonica*. The chart shows the concentration of the glucose & glycogen contents in the normal, treated and recovery samples.

**Chart: showing concentration of glucose, glycogen & protein**



Similarly the protein content was also found to be normal in the larvae which were fed on normal diet while pesticidal treatment caused an overall increased in protein content. Recovery treatment showed that the protein content in the larvae gradually decreased as compared to the treated larvae.

## DISCUSSION

The present investigation showed that different dose level of Malathion affects different biochemical cycles. The toxicity of Malathion increases significantly with the increase in its concentration. Malathion at 1/5<sup>th</sup> concentration of LC<sub>50</sub> reduced the concentration of glucose and glycogen, while the concentration of protein content increased. It means Malathion altered the carbohydrate and protein metabolism in the larvae of *C. cephalonica*. Reduction in carbohydrate was attributed to its utilization at the time of high energy demand warranted due to altered metabolism [20-24]. Utilization of protein at the time of depletion of carbohydrate, deranged protein synthesis and proteolysis were attributed for the reduction in protein level [22, 23, 25-27]. [28] Studied the effects of organophosphates (quinalphos & monocrotophos) and a pyrethroid (sumicidin) on the protein metabolism in the haemolymph of *Periplaneta americana*. The author reported that the total protein content increased for 2hr following treatment and then declined. In another study [29] reported, the effects of quinalphos & organophosphates on the metabolism of the nerve tissues of *P. americana* and he found that after 24hr, there was a decrease in the total carbohydrate, glucose & glycogen content vis-à-vis a simultaneous increase in protein, free amino acid & total RNA. According to another author [30] the soluble protein contents increased significantly at LC<sub>10</sub> and decreased insignificantly at LC<sub>20</sub> in adult beetles of *Tribolium castaneum*. [31] Studied the effect of powdered leaves of *Lantana camara*, *Clerodendrum inerme* and *Citrus limon* on physiological parameters like Total Haemocyte Count (THC), Total Protein content and glycogen level. They found that there was significant reduction in the THC (39-53%), protein (30-38%) and glycogen (40-61%) content in the treated larvae of rice moth *C. cephalonica* with respect to their controls. [28-31] supports the present investigation. The carbohydrate metabolism has been found influenced, the glucose & glycogen content of the larvae were found decreased and protein content was found increased by pesticidal treatment. The observation reveals that the lethality of pesticide is directly proportional to their concentration present in diet. The present observations corroborate with various authors who observed the reduction in carbohydrate contents and increase in protein content in different test animals.

## CONCLUSION

From the results described above it is concluded that the Malathion at the sub lethal dose (1/5<sup>th</sup> concentration of LC<sub>50</sub>) altered some biochemical cycles, the levels of carbohydrate (glucose & glycogen) contents were reduced and the protein content was found to be increased in the larvae of *C. cephalonica*.

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