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## EVALUATION OF TOXICITY OF MALATHION AGAINST RICE MOTH CORCYRA CEPHALONICA

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### Abstract:

*Commercial Malathion was tested for the efficacy against the stored grain insect pest Corcyra cephalonica (Staint.) in the Deptt. of Zoology, P.C. Amalner, during 2011-12. Five different doses ranging from 0.01%, 0.012%, 0.014%, 0.016% and 0.018% were tested against this common insect pest of rice to evaluate the effect on its life cycle and mortality. 10% larval mortality was found at 0.008997232% dose level while 50% mortality at 0.013498332% dose levels of Malathion. The observation reveals that the lethality of pesticide is directly proportional to their concentration present in the diet.*

### KEYWORDS.

Corcyra cephalonica, Malathion, lethal concentration, larvae, mortality.

### 1 INTRODUCTION

Rice moth *Corcyra cephalonica* is a major pest of stored cereals and cereal commodities in India as well as in other tropical & sub tropical regions of the world. Its larval stages cause appreciable loss to rice, sorghum, maize, gram, ground nuts, cocoa beans, pea nuts, cotton seeds, linseeds, raisins, chocolates, army biscuits, nutmeg and milled products (Chittenden, 1919; Ayyar, 1919; Munro and Thompson, 1929; Richards and Herford, 1930; Noyes, 1930; Herford, 1933; Atwal, 1976 and Piltz, 1977). In addition to consumption, as they become fully grown, larvae contaminate the grain by producing dense webbing containing their fecal material and cast skin.

Besides, some entomopathogenic nematodes such as *Steinernema feltiae* also reared on the larvae of *C. cephalonica* (Kumar and Murthy, 2000). In India, rice moth is being utilized in various bio control research, developmental and extension units for mass production of number of natural enemies (Jalali and Singh, 1992).

About one third of the realizable global crop (Worth rupees 6,000crore) is estimated to be lost annually due to insect pests (Dhaliwal and Arora, 1996).

The aim of the present study was to investigate the toxicological effects of commercial Malathion against the larvae of rice moth *C. cephalonica* (Staint.).

### MATERIAL & METHOD:

The larvae of rice moth *C. cephalonica* were used in the present study. Already contaminated stored food grains by *C. cephalonica* were collected and reared in the laboratory conditions. The standard

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culture of this insect was maintained in the laboratory of Deptt. of Zoology, P.C. Amalner on normal dietary medium composed of coarsely ground jowar (*Sorghum vulgare*) mixed with 5% (w/w) yeast powder at  $26\pm 10^{\circ}\text{C}$  and  $93\pm 5\%$  relative humidity (R.H.). Young *Corcyra* larvae hatched out from the eggs within 3-4 days and fed on the grains by webbing.

A commercial Malathion (Hindustan Insecticide Ltd.) with empirical formula of C<sub>10</sub>H<sub>19</sub>O<sub>6</sub>PS<sub>2</sub> was used for this study. Stock solution was prepared by dissolving a measured amount in solvent & then desired concentrations were made. Then the dietary medium mixed and treated separately with 9 different dose levels i.e. 0.01%, 0.012%, 0.014%, 0.016% and 0.018% of Malathion and one control group in separate petridishes. The larvae of *Corcyra* were transferred to these petridishes and allowed to feed. Each petridish consisted of 20 larvae, after 24hrs of time interval the dead and live larvae were recorded to calculate % mortality. Lethal toxicity test were conducted and the average was used to calculate median lethal concentration. LC<sub>10</sub> and LC<sub>50</sub> values were calculated for 24hrs by method described by Finney (2009) and simplified by Busvine (1971).

**STATISTICAL EVALUATION**

Regression equation, variance,  $x^2$ , Empirical Probit, Expected Probit, Fiducial limit (M<sub>1</sub> and M<sub>2</sub>) and LC<sub>10</sub> and LC<sub>50</sub> calculated with the help of Probit Analysis (Finney, 2009).

**RESULTS:**

The dose mortality experiments with Malathion were carried out to find the lethal effects to the larvae of *C. cephalonica*. Regression equations, results on toxicity for the larvae of *C. cephalonica* and accuracy calculated for Log of LC<sub>10</sub> and LC<sub>50</sub> values are presented in the Table No.1 with the help of Graph No.1 and Table No.2.

Sr. no.	x	Log of x	n	r	P (%)	Empirical Probit	Y	w	nw	y
1	0.01	-2	10	2	20	4.15	4	0.43	4.3	4.16
2	0.012	-1.920818754	10	4	40	4.74	4.43	0.55	5.5	4.67
3	0.014	-1.853871964	10	6	60	5.25	5.3	0.61	6.1	4.88
4	0.016	-1.795880017	10	7	70	5.52	5.7	0.53	5.3	5.51
5	0.018	-1.744727495	10	8	80	5.84	6.1	0.4	4	6.65

Table No. 1 Maximum Likelihood Computations for Malathion-*Corcyra cephalonica* Test

$$\begin{aligned}
 1/S_{nw} &= 0.0397 \\
 \bar{x} &= 0.013936508 \\
 \bar{y} &= 5.124761905 \\
 S_{nw}x^2 &= 0.00507 \\
 S_{nw}xy &= 1.8499 \\
 S_{nw}y^2 &= 677.4294 \\
 Y &= -1.15661493 + 284.7303638x \\
 LC_{50} &= 0.013498332 \\
 LC_{10} &= 0.008997232 \\
 V &= 5.0294 \\
 S_m &= 0.000709183 \\
 x^2 &= 1.336821497 \\
 M_1 &= 0.015326506 \\
 M_2 &= 0.01254651
 \end{aligned}$$

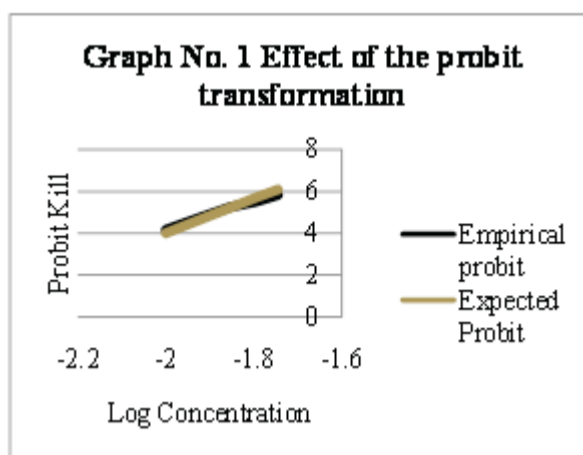


Table No. 2 Estimation of expected probit from empirical probit

X-Values	Empirical Probit	Expected Probit
-2	4.15	4
-1.920818754	4.74	4.43
-1.853871964	5.25	5.3
-1.795880017	5.52	5.7
-1.744727495	5.84	6.1

It was observed that the LC10 and LC50 values for 24 hrs were found at 0.008997232% and 0.013498332% concentration of Malathion. The results indicate that Malathion was found to be toxic to the larvae of *C. cephalonica*.

#### DISCUSSION:

The present investigation showed that the toxicity of Malathion increases significantly with the increase in its concentration. Adrain et al., (1947) first observed the inhibition properties of organophosphorus esters against cholinesterase. Yadav, (1980) carried out experiment to determine the toxicity of DDT & Lindane against the 13 species of stored product pests and he has found that DDT & Lindane both were more toxic to *C. cephalonica*. Boongee (1987) studied the effect of Malathion & primiphos methyl on the rice moth *C. cephalonica* and reported that primiphos methyl was more toxic than Malathion to the larvae (except 3rd & 4th instars), but Malathion was more toxic than primiphos methyl to the eggs, 3rd, 4th instars and adults of *C. cephalonica*. According to Tiwari & Bhatt, (1987) the lethality of pesticides was directly proportional to their concentrations present in the diet. Diet containing 0.012% (w/w) of BHC and 0.03% (w/w) of Malathion caused 100% larval mortality in *C. cephalonica*. Diflubenzuron caused significant larval mortality in *C. cephalonica* at 0.1% concentration of diflubenzuron 53.34% larval mortality was found Sharma & Bhargava (2004). Similar study has been made by Bhargava & Urs (1993) on *C. cephalonica*. Chakraborty & Chakraborty, (2009), were found that the Abamectin 2.9% w/w EC was the most efficient (LC50 value 144.30ppm) followed by Indoxacarb 14.5%SC (LC50 value 1087.81ppm) and Neemacin (LC50 value 5681.99ppm) at 24hrs against 3rd instar larvae of *C. cephalonica*. On the basis above observations and percent larval death at different dose levels of Malathion, it is possible to categorize the relative effectiveness of their dose levels and it shows that Malathion can be used to control the rice moth *C. cephalonica* in granary and store houses.

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