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Ovicidal effect of four plant extracts on the eggs of *Corcyra cephalonica* (Stainton)

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Abstract

Extracts from Four plants, leaves of *Argemone mexicana Euphorbia tirucalli, Nerium oleander* and cotyledons of *Semecarpus ancardium* tested against eggs of *Corcyra cephalonica*. In contact toxicity test of different concentration of plant extract i.e 1ml, 2ml, 3ml and 4ml were applied on the freshly laid eggs. The inhibition of egg hatching increased with increased in concentration of plant extracts. It was observed that at 4 ml concentration of chloroform extract of *Argemone mexicana* exhibited 60.02 % ovicidal action whereas at the same concentration cotyledons of *Semecarpus anacardium*, phylloclade of *Euphorbia tirucalli, Nerium oleander* exhibit 45.72%, 34.64%, 39.83% respectively.

Keywords: *Corcyra cephalonica*, *Argemone mexicana*, *Semecarpus anacardium, Euphorbia tirucalli, Nerium oleander*

INTRODUCTION

In the recent years, the use of synthetic pesticides for pest management has become highly controversial. These insecticides cause extensive environmental hazards as these pesticides accumulate themselves at various concentrations in different levels of ecosystem, and also the development of pesticide resistance in the insects against the insecticides. Even though the insects are exposed to an insecticide for long duration to manifests slowly, the insect not only develops resistance against the specific insecticides to which they are expose, but also a group of insecticides by way of cross-resistance. To overcome these problems, attempts were made to develop alternate methods of pest control such as the use of cultural practices, biological control, use of antifeedants, hormonal insecticides, plant extracts *etc,* [3,11,12,14,17,21].

Realizing the adverse effect of chemical insecticides, attention has now been diverted in favor of non-synthetic chemical methods of pest management. The safety of these biopesticides to non-target organisms over conventional pesticides has already been reported by several scientist [16] who pined that botanical mixture are the best alternative to conventional pesticides to deal with the problem of resistance, resurgence and residues but reports on safe botanical compound to non-target insects are still lacking.

Scientists in different parts of the world are working for the development and establishment of plant based pesticide, usually called as phytopesticide, botanical pesticide, biopesticide or natural pesticides [19].

Corcyra cephalonica is a serious lepidoteran pest of store cereals such as wheat, rice , sorghum, maize, millet etc.in tropical and sub tropical regions of the world [13,14] .

Corcyra cephalonica was first identified and reported by Stainton who named it *Melissoblaptes cephalonica.* The only recognized species of this genus is *cephalonica.* Ayyar made the first record of *Corcyra cephalonica.* Its larval stages cause serious damage to rice, gram, sorghum, maize, ground nut, cotton seeds, peanuts, linseeds, raisins, nutmeg, chocolates, army biscuits, wheat, coffee, cocoa beans and milled products [2].

Corcyra cephalonica moth 15-25 mm wingspan; upper forewing: uniform pale buff-brown; no distinctive markings, although veins may be slightly darkened. Up to 160 eggs are laid in or near the larval food. The larvae are dull white in color with brown heads, and have long, fine hairs covering the body. They persist for 15-20 days under favorable conditions. Rice moth larvae produce large amounts of strong webbing and frass, before spinning a dense white cocoon in which to pupate. The pupal stage lasts 7-10 days.

The objective of the present study was to obtain precise laboratory assessment of the botanicals having potent ovicidal properties, which could be utilized to protect stored grains from infestation of rice moth (*Corcyra cephalonica*). Many workers namely [4,5,7,8,9,10,20] have evaluated some plants for their ovicidal properties against the eggs of *C.cephalonica*.

MATERIAL AND METHODS

Collection and Extraction of Plant:

Kernel (seeds) of *Somecarpus anacardium,* locally called Golumbi were purchased from the market dried and was ground to make powder. Fresh leaves of Argemone *maxicana, Nerium oleander* and phylloclade of *Euphorbia tirucalli* were collected from the field near Aurangabad and were dried in the shade and then in the oven. The dried leaves were powdered in the grinder and powders of all plant materials were stored in the airtight polyethylene bags. The powder was packed in filter paper and extract was extracted in Soxhlet apparatus in 1:10 ratio i.e. 20gm powder in 200ml solvent. After eight hours of continuous extraction the final extract was kept open to evaporate the solvent and remaining as stock solution extract was stored at 4ºC in a refrigerator until use. Extracts of each plant material were extracted in chloroform were stored after evaporation of solvent in refrigerator.

Culture of the Experimental Insect:

The eggs of *C.cephalonica*, obtained from the Research

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Institute at Pune were reared in the laboratory conditions (28±2ºC and relative humidity of 65±5%). The culture was maintained on Rice grains with 12 per cent moisture content, kept in plastic jars of 10kg capacity. Each 0.5 cc of eggs was reared on a newly formulated medium consisting of the 2.5kg of crushed sterilized Rice grain, yeast powder (1gm), Crushed groundnut (100gm), streptomycin (0.5gm) sprinkled over the rice and 0.5 cc of *Corcyra* eggs placed into the grain and covered with muslin cloth.

Experimental Design:

An egg laying apparatus consisting of plastic jar was used as the oviposition case for *Corcyra cephalonica*. Newly emerged males and females were shifted to egg laying apparatus (oviposition chamber). Eggs laid by the females were collected and then placed in ovicidal experiment preferred concentration i.e. 1ml, 2ml, 3ml and 4ml.

The evaluate ovicidal action a film of preferred concentration was prepared by uniformly spreading 1ml, 2ml, 3ml and 4ml extract on a Petri dish. The solvent was allowed to evaporate before transferring the eggs. In each treatment 30 eggs were treated in three replication of 10 eggs each was run along with a control. The each Petri dish was observed until the last egg hatched. The number of unhatched eggs in each Petri dish was counted and the percent mortality of egg was calculated the Abbott's formula [1]

$$\% \text{ Corrected Mortality } = \frac{\%\text{Kill in treated} - \%\text{Kill in control}}{100 - \%\text{ Kill in control}} \text{ X } 100$$

RESULTS AND DISCUSSION

The impact of application of plant extracts of *Argemone mexicana*, *Semecarpus anacardium, Euphorbia tirucalli, Nerium oleander* were evaluated on egg hatching inhibition. All the concentration of plant extracts was found appreciably better in reducing the egg hatchability over control. In *Argemone mexicana* highest corrected mortality of 60.02 % at 4 ml concentration. At 1 ml concentration 23.36 % corrected mortality were observed. At 2 ml concentration 44.05% corrected mortality were observed. At 3 ml concentration 48.01% corrected mortality were observed. In *Semecarpus anacardium* highest corrected mortality of 45.72% at 4 ml concentration. At 1 ml concentration 19.16 % corrected mortality were observed. At 2 ml concentration 26.90% corrected mortality were observed. At 3 ml concentration 42.26% corrected mortality were observed. In *Euphorbia tirucalli* highest corrected mortality of 34.64% at 4 ml concentration. At 1 ml concentration 3.81 % corrected mortality were observed. At 2 ml concentration 11.54% corrected mortality were observed. At 3 ml concentration 30.71% corrected mortality were observed. In *Nerium oleander* highest corrected mortality of 39.83% at 4 ml concentration. At 1 ml concentration 31.83 % corrected mortality were observed. At 2 ml concentration 35.88% corrected mortality were observed. At 3 ml concentration 39.83% corrected mortality were observed.

These results get support from the observations recorded by [15] who reported that the oil of *M. koenigii* is toxic and fumigant and also possesses ovicidal properties. Dwivedi [6] reported that acetone extract of *Ipomoea palmata* exhibited 57.8% egg mortality at 100% concentration and Citrus clean which is a mixture of plant oils of Citronella, Pine, Lemon grass and Marigold registered 66.6% egg mortality at 100% dose level.

Dwivedi [6] reported six plant name leaf extracts for their ovicidal activity against *C. cephalonica* out of these *Withania somnifera* exhibited percent mortality.

Table. Ovicidal action of Four plants extract in Chloroform on the eggs of *Corcyra cephalonica*

Plant's Name	Concentration(ml)	Average Nos.of Eggs Hatched	% Hatching	Eggs Mortality	% Egg Mortality	%Corrected Mortality
Argemone mexicana	Control	8.33	83.3	1.67	16.7	-
	1	6.33	63.3	3.67	36.7	23.86
	2	4.66	46.6	5.34	53.4	44.05
	3	4.33	43.3	5.67	56.7	48.01
	4	3.33	33.3	6.67	66.7	60.02
Semecarpus anacardium	Control	8.66	86.6	1.34	13.4	-
	1	7.00	70	3	30	19.16
	2	6.33	63.3	3.67	36.7	26.90
	3	5.00	50	5	50	42.26
	4	4.66	46.6	5.34	53.4	45.72
Euphorbia tirucalli	Control	8.66	86.6	1.34	13.4	-
	1	8.33	83.3	1.67	16.7	3.81
	2	7.66	76.6	2.34	23.4	11.54
	3	6.00	60	4	40	30.71
	4	5.66	56.6	4.34	43.4	34.64
Nerium oleander	Control	8.33	83.3	1.67	16.7	-
	1	5.66	56.6	4.34	43.4	31.93
	2	5.33	53.3	4.67	46.7	35.88
	3	5.00	50	5	50	39.83
	4	5.00	50	5	50	39.83

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