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Ovicidal Effect of 5 Semiarid Plant Seed Extracts on the Eggs of Rice Moth, *Corcyra cephalonica* (Stainton)

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Abstract : Laboratory experiments were conducted to study the effect of botanical seed extracts of kapas (*Gossypium arboreum* Linn), castor (*Ricinus communis* Linn), amaltas (*Cassia fistula* Linn.), harsingar (*Nyctanthes arbortristis* Linn.), and bitter gourd (*Momordica charantia* Linn.) on the eggs of rice moth. In contact toxicity test of different concentration of plant seed extract viz. 25%, 50%, 75%, 100% were applied on the eggs (0-24 hrs old) by dipping method along with control. The inhibition of egg hatching increased with the increase in concentration of plant extracts. It was observed that at 100% concentration of acetone extract of *Ricinus communis* exhibited 100% ovicidal action whereas at the same concentration *Gossypium arboreum, Momordica charantia, Nyctanthes arbortristis, Cassia fistula* exhibit 98.16%, 96.52, 93.0% and 80.73, respectively.

Key words: Biopesticides, Ovicidal action, *Corcyra cephalonica*

Introduction :

Corcyra cephalonica is a serious lepidopteran pest of stored cereals such as wheat, rice, sorghum, maize, millet, etc. in tropical and sub tropical region of the world (Krishna Ayyar, 1930; Russel *et al*., 1980).

The control of stored grain pest by using synthetic chemicals has resulted in toxicity even to non-target organisms. Realizing the adverse effects of chemical insecticides attention has now been diverted in favour of non-chemical methods of pest management. The safety of these biopesticides to non-target organisms over conventional pesticides has already been reported by several scientist (Ragurman, 1987; Schmutterer, 1990; Ragurman and Singh, 1997) who opined 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. 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 Chander and Ahmad (1986); Chauhan *et al*. (1987); Srivastava and Bhatt, (1993); Dwivedi and Kumar (1999); Dwivedi and Garg (2000); Dwivedi and Venugopalan (2001); Sharma and Bhargava (2001); Dwivedi and Pareek (2003) have evaluated some plants for their ovicidal properties against the eggs of *C. cephalonica*.

Materials and Methods :

Plant materials : Seeds of *R. communis, G. arboreum, N. arbortristis, M. charantia, C. fistula* were collected from the premises of University of Rajasthan, Jaipur.

Extraction and formulation of plant materials : The extract of seeds of aforesaid plants was prepared using acetone as a solvent. The seeds were cleaned, dried, and than pulverized with the help of electric grinder. The extracts of these were prepared by Soxhlet extraction method following Desmukh and Borle (1975). 30gms of powdered seeds and 300 ml of solvent

keeping the ratio 1:10. Acetone and pet ether were used as solvent. After 8 hrs. of extraction, the extract was filtered using Wattman filter paper and kept in refrigerator as stock solution. Further dilution for experiments was done with the solvent to get the desired conc. i.e. 25%, 50%, 75%, and 100%.

Toxicity test : Culture of *Corcyra cephalonica* was obtained from agriculture research station, Durgapura, Jaipur. In the laboratory the stock culture was maintained in transparent presterilized glass jars. Rearing of insect was done on artificial diet which comprises half crushed sterilized sorghum + 10% Brewer's yeast powder. The culture was kept at 28 $\pm$ 2°C temperature and 70 $\pm$ 5% relative humidity.

To evaluate ovicidal action a film of desired conc. was prepared by uniformly spreading 1 ml extract on a Petri dish (5 cm diameter). The solvent was allowed to evaporate before transferring twenty 0 – 24 hrs. old age to each Petri dish. In each treatment 60 eggs were treated in three replication of 20 eggs each. Eggs in control were treated with the same volume of acetone. The data thus obtained on percent egg hatch inhibition was transformed into angular values by the Abbott's formula (Abbott, 1925).

$$\% \text{ corrected mortality} = \frac{\% \text{ Kill in treated} - \% \text{ Kill in control}}{100 - \% \text{ Kill in control}} \times 100$$

Results and Discussion :

The impact of application of plant seed extracts of *G. arboreum, R. communis, C. fistula, N. arbortristis, M. charantia* were evaluated on egg hatching inhibition. All the concentration of plant extracts was found significantly better in reducing the egg hatchability over control. The percentage of egg hatching inhibition was dose dependant in all the treatments.

At the 25% concentration, *R. communis* exhibited 96.33% followed by *M. charantia, G. arboreum, C. fistula, N. arbortristis* which shows 59.27%, 68.55%, 54.42%, 45.63% ovicidal activity, respectively. At 50% dose level, *R. communis* has highest ovicidal activity of 98.16%. In *G. arboreum, C. fistula, M. charantia, N. arbortristis* the ovicidal activity recorded 81.50%, 77.77%, 66.68%, 57.89%, respectively. In 75%, *R. communis* shows 100% ovicidal activity whereas *G. arboreum, N. arbortristis, M. charantia, C. fistula* exhibited 92.61%, 78.94%, 89.47%, 70.21%, respectively. At 100% dose level, *R. communis* has highest ovicidal activity i.e. 100%, whereas *G. arboreum, N. arbortristis, M. charantia, C. fistula* exhibited 98.16%, 93.00%, 96.52%, 80.73% ovicidal activity.

All the results documented in table-1, clearly indicate that all plant seed extracts exhibit potent ovicidal property.

Although scanty work has been carried out on egg hatch inhibition of *C. cephalonica*, however, similar type of work on other insect pest including rice moth has been carried out. Agarwal (1990) used neem extract and undi (*Calophyllum inophyllum*) extract at 1.0% concentration by dipping the eggs of *M. undecimpustulatus* and found 100% and 94.66% egg mortality, respectively. Sharma and Bhargava (2001) recorded ovicidal effect of some growth disrupting compound present in neem, undi (*Calophyllum inophyllum*) karanj (*Pongania glabra*) lemon grass (*Cymbopogan flexuosus*) oil (0.25, 0.50, 1.0, 2.0, 3.0 and 5.0%) were applied on eggs of *Corcyra* cephalonica Stainton of different age groups 0-12, 12-24, 24-36 hr. by dipping method. The inhibition of egg hatching is directly proportionate to the dose level of plant extract.

Table 1 : Ovicidal action of plant seed extracts in acetone on the eggs of *C. cephalovica*

Plant's name	Conc. of dilution of SS	AV no. of eggs hatched	% hatching	Egg mortality	% egg mortality	% corrected mortality
G. arboreum Linn.	25	7.33	36.65	12.67	63.35	59.27
	50	3.33	16.65	16.67	83.35	81.50
	75	1.33	6.65	18.67	93.35	92.61
	100	0.33	0.65	19.67	98.35	98.16
	Control	18.00	90.00	2.00	10.00	-
R. commmunis Linn.	25	0.66	3.30	19.34	96.70	96.33
	50	0.33	1.65	19.67	98.35	98.16
	75	0	0	20.00	100.00	100.00
	100	0	0	20.00	100.00	100.00
	Control	18.00	90.00	2.00	10.00	-
N. arbortritis Linn.	25	10.33	51.65	9.67	48.35	45.63
	50	8.00	40.00	12.00	60.00	57.89
	75	4.00	20.00	16.00	80.00	78.94
	100	1.33	6.65	18.67	93.35	93.00
	Control	19.00	95.00	1.00	5.00	-
M. charautia Linn.	25	5.66	28.30	14.34	71.70	68.55
	50	4.00	20.00	16.00	80.00	77.77
	75	2.00	10.00	18.00	90.00	89.47
	100	0.66	3.30	19.34	96.70	96.52
	Control	19.00	95.00	1.00	5.00	-
C. fistula Linn.	25	8.66	43.30	11.34	56.70	54.42
	50	6.33	31.65	13.67	68.35	66.68
	75	5.66	28.30	14.34	71.70	70.21
	100	3.66	18.30	16.34	81.70	80.73
	Control	19.00	95.00	1.00	5.00	-

No. of eggs treated -20, No. of replication – 3, SS – Stock solution Control – Untreated food in each replication

Number of workers has reported varying degree of egg hatch inhibition of different plant extracts in *C. cephalonica* (Kumar, 1977; Bhargava and Urs, 1993; Kumar and Jain, 2004). Dwivedi and Kumar (1999) reported six plant name leaf extracts for their ovicidal activity against *C. cephalonica* out of these *Withania somnifera* exhibited cent percent mortality. Dwivedi and Garg (2000) have also reported that citrus clean (a mixture of plant oils of *Citronella, Pine lemon grass, Marigold*) as good ovicide registering 100% mortality at 100% dose level.

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