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Evaluation of Leaf Extracts for their Ovicidal Action Against *Callosobruchus chinensis* (L.)

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Acetone extracts of seven plant species *Tamarindus indica Linn., Ficus indica Linn., Ficus religiosa Linn., Tabernaemontana livaricate Linn., Murraya koenigii Linn., Chenopodium album Linn., Syzygium cuminii Linn.* were evaluated for their ovicidal action. *Murraya Tabernaemontana* and *Chenopodium* showed 70%, 75% and 66.6% ovicidal action at 100% dose level whereas at the same dose level *T. Indica, F. indica, F. religiosa* and *S. cuminii* showed 48.3%, 41.6%, 13.3%, 53.3% ovicidal action respectively.

Key Words :- Leaf extracts, ovicidal action, *Callosobruchus chinensis* (L.).

Introduction :

Injudicious use of chemicals as a pest management method have lead to the development of resistance in insects towards them and have a high degree of residual effect due to their nondegradable nature. Hence biodegradable plant products have gained attention as a substitute to chemicals in the field of insect toxicology.

Many plants have thus been explored for their insecticidal, action. Kamakshi *et. al.*, (2000), Dwivedi and Maheshwari (1996), Sharma *et. al.*, (1999) have all studied the effect of various botanicals on the pest *Callosobruchus sp*. This notorious pest attacks the stored pulses and has dispersed throughout the tropics and subtropics through the medium of commerce and now has become a real menace. The female beetle lays eggs on the seed surface and the larva immediately after hatching bores into the seed. By the time it reaches the adult stage it consumes the seed cotyledons.

Thus the present study is aimed at assessing aboriginal plants for their ovicidal action against the eggs of *C. chinensis* so that the extent of damage and loss is checked at the very first stage itself.

Materials and Methods :

Culture of the Experimental Insect :-

The culture of pulse beetle *C. chinensis* (L.) was reared in laboratory in pre-sterilized jars containing cowpea seeds (*Vigna sinensis Linn.*). This culture was kept at a temperature of 27± 2^0 C and a relative humidity of 60 ± 10%. The ovicidal experiments were conducted in the optimal conditions.

Collection and Extraction of Plants :

The leaves of all the test plants were collected from the Botanical Garden of Universityof Rajasthan, Jaipur. They were then thoroughly washed under tap water, followed by distilled water to remove all the dust and dirt particles. These leaves were then dried in shade and further they were pulverized with the help of an electric grinder. The extracts of each of these were prepared by Soxhlet Extraction method using acetone as solvent (Deshmukh and Borle, 1975). 30 grams of leaf powder and 300 ml. of solvent was taken for the extraction keeping the ratio of 1 :10. After 8 hours of extraction, the extracts were filtered using whattmans filter paper and kept in the refrigerator as stock solution. Further dilution was done with the solvent to get the desired doses for the experiments.

Experimental Design :

Newly emerged adults were sorted out from the main culture jars and released on fresh cowpea seeds for egg laying. The seeds containing freshly laid eggs on its surface were taken for the experiment. 20 eggs were taken in a petriplate and treated with 1ml. of each desired dose levels. The doses taken were 25, 50, 75 and 100 percent of the stock solution. For each concentration three replicates were run along with a control, having eggs treated with solvent only. The vials were observed until the last egg hatched. The number of unhatched eggs in each vial was counted and the percent mortality of egg was calculated 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 :

Results of the ovicidal action of plant extracts are documented in Table1 *T. indica*, depicts 42.6% corrected mortality at 100% concentration and % egg mortality when subjected to t test showed significance at t. 010 level. Per cent corrected morality calculated for *F. indica* and *F. religiosa* was 8.7% and 35.1% respectively at the highest concentration and were significant at t- 010. For *T. livaricate* and *M. Koenigii* 67.7 and 65.7 percent corrected mortality was evaluated. The % egg mortality showed significance at both t. 010 and t. 005 levels. 62.9 and 49.5 percent corrected mortality was calculated for *C. album* and *S. cuminii*.

These results get support from the observations recorded by Pathak et. al., (1997) who reported that the oil of *M. koenigii* is toxic and fumigant and also possesses ovicidal properties. Dwivedi and Kumari (2000) 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.

In the order of effectiveness as an ovicide, the extracts under present study could be arranged in the following descending order :

T. livaricate > M. koenigii> C. album> S. cuminii> T. indica > F. religiosa > F. indica.

In the present study, the high percentage of egg mortality caused by the extracts is assumed to be caused by the active ingredients present in them which might have disrupted blastokinesis and inturn impaired the larval hatching.

In the present investigation it was found that leaf extracts of *Tabernaemontana, Murraya, Chenopodium* and *Syzygium* showed potential for ovicidal action against *C. chinensis*. However it needs detail investigation to reach to conclusion for their inclusion in IPM.

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Table 1. Ovicidal actions of plant extracts against the eggs of *Callosobruchus chinensis* (L.)

S. No.	Name of Plants	Concentration Level	%egg Mortality	% Corrected Mortality	t- test	
					t-010	t-005
1.	*Tamarindus indica Linn.*	25%	21.6	12.9		
		50%	23.3	14.8		
		75%	40	33.3	S	NS
		100%	48.3	42.6		
		C	10	-		
2.	*Ficus indica Linn.*	25%	6.6	1.7		
		50%	10	5.2		
		75%	13.3	8.7	S	NS
		100%	13.3	8.7		
		C	5	-		
3.	*Ficus religiosa Linn.*	25%	16.6	7.3		
		50%	21.6	12.9		
		75%	36.6	29.6	S	NS
		100%	41.6	35.1		
		C	10	-		
4.	*Tabernaemontana livaricate Linn.*	25%	35	16.1		
		50%	48.3	33.3	S	S
		75%	66.6	56.9		

C = Control **NS = Non significant** **S = Singnificant**

S. No.	Name of Plants	Concentration Level	%egg Mortality	% Corrected Mortality	t- test	
					t-010	t-005
		100%	75	67.7		
		C	22.5	-		
5.	*Murraya koenigii Linn.*	25%	33.3	23.7		
		50%	51.6	44.7		
		75%	66.6	61.8	S	S
		100%	70	65.7		
		C	12.5	-		
6.	*Chenopodium*	25%	15	5.5		
	album Linn.	50%	31.6	24.0		
		75%	45	38.8	NS	NS
		100%	66.6	62.9		
		C	10	-		
7.	*Syzygium*	25%	13.3	6.3		
	cuminii Linn.	50%	36.6	31.5		
		75%	41.6	36.9	NS	NS
		100%	53.3	49.5		
		C	7.5	-		

C = Control **NS = Non significant** **S = Singnificant**