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Bioefficacy of leaf extract of *Ocimum sanctum* against fecundity & fertility of *Spodoptera litura*

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Abstract

The present investigation was carried out Bioefficacy of Leaf extract of *Ocimum sanctum* against fecundity and fertility of *Spodoptera litura*. Adult females of *S. litura* when fed on *Ocimum sanctum* leaf extract treated honey solution showed disrupted oviposition. Results were manifested in the form of reduced egg masses, less eggs in each egg mass and reduction in hatching of eggs. Percent hatching was also affected by feeding on leaf extract treated diet. Maximum egg hatching was 44.12 (at 5%) which gradually increased to 58.87 percent (at 4%), 72.95 percent (at 3%), 79.69 (at 2%) and 85.67percent (at 1%). Results show that when adult females of *S. litura* were fed on extract treated diet, drastic reduction in fecundity and egg hatching was observed.

Keywords: Fecundity, Egg hatching, Leaf extract, Oviposition, fertility.

1. Introduction

Frequent and the large –scale use of synthetic pesticides in agriculture have developed pesticide resistance, frequent pest out breaks, emergence of new pests, environment pollution and human health hazards that prompted to search an environmentally safe alternative of chemical pesticides to suppress population of noxious insects (Ignacimuthu *et al.* 2003) [3]. There is an urgent need for selective and effective pest control methods which can be easily included in the modern pest management concept, new bioactive products will be needed which are specific, ecofriendly to man and biodegradable, less prone to development of pest resistance and economical viable. Plants are rich source of bioactive organic chemicals and synthesize a number of secondary metabolites to serve as defence chemicals against attack. These chemicals may serve as insecticides, antifeedants, oviposition deterrents, repellents, growth inhibitors, juvenile hormone mimics, moulting hormones, as well as attractants (Murugan *et al.*, 1996) [4].

Spodoptera litura (Fabricius) (Lepidoptera: Noctuidae) commonly called tobacco caterpillar or cutworm was selected for the proposed investigation. *Spodoptera litura* is a polyphagus pest of large host range including tobacco, cotton, cabbage, groundnut, maize, jute, lettuce etc. *Ocimum sanctum* (holy basil), also called Tulsi in India has high medicinal value. Batta and Santhakumari (1970) [1] reported the antifertility effect of *Ocimum sanctum*. Tulsi has been used to treat malarial fever, ringworms and other infections (Butani, 1982) [2].

The present investigation was carried out Bioefficacy of Leaf extract of *Ocimum sanctum* against fecundity and fertility of *Spodoptera litura*.

2. Materials & Methods

Effect of plant extracts on fecundity and fertility of *S. litura* was observed by feeding adults on extract- treated diet. Ten grams of leaf extracts of *O. sanctum* was dissolved in 90ml of 15% honey solution to prepare a 10% stock solution (w/v). The stock solution was further diluted to prepare 1, 2, 3, 4 and 5% test formulations. Cotton swabs soaked in the required concentration of the extract containing honey solutions were offered as food to adults placed in glass jars. In each jar 2 strips of filter paper were provided for oviposition.

Four pairs of 1 day old adults were introduced into each jar which was then covered with muslin cloth. The adults were allowed to feed on the different concentrations of the treated honey solution for 48 hours. The number of eggs laid on filter papers was counted. Muslin cloth covering the jar was also checked for any egg laying. The eggs were allowed to hatch and percent hatching was calculated. In the control jar 15% honey solution was provided as food. Three replicates were kept for each concentration. All diets were replenished after 1 day to avoid fungal growth. Following parameters were recorded:

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1. Number of egg masses laid.
2. Number of eggs per egg mass.
3. Total number of eggs laid.
4. Percent hatching of eggs.

3. Results & Discussion

Adult females of *S.litura* when fed on *Ocimum sanctum* leaf extract treated honey solution showed disrupted oviposition. Results were manifested in the form of reduced egg masses, less eggs in each egg mass and reduction in hatching of eggs. The effect was dose-dependant and was more profound at higher concentrations (Table 1).

At 5% extract number of egg masses were reduced to 5.66 compared to 8 egg masses in control. At 1, 2, 3 and 4% extract egg masses laid were 8.00, 7.00, 6.66 and 6.33 respectively.

A significant reduction in number of eggs in each egg mass was observed at all the concentrations. Eggs laid per egg mass were 200 at 5% extract compared to 293 eggs in control. At 1, 2, 3 and 4% extract eggs laid per egg mass were 260, 254.33, 238 and 227.66 respectively.

Total eggs laid by a female also decreased when extract treated diet was given to them. In control experiment 2347.33 eggs were laid which decreased to 1180.66 eggs at 5%. At 1, 2, 3 and 4% extract eggs laid were 2016.66, 1780.33, 1627 and 1592.66 respectively.

Percent hatching was also affected by feeding on leaf extract treated diet. Maximum egg hatching was 44.12 (at 5%) which gradually increased to 58.87 percent (at 4%), 72.95percent (at 3%), 79.69 (at 2%) and 85.67percent (at 1%).

Table 1: Effect of leaf extract (*Ocimum sanctum*) treated diet fed to *Spodoptera litura* on fecundity and egg hatching.

Doses in %	Number of egg masses laid	Number of Eggs/egg mass	Total number of Eggs laid	Number of eggs hatched /egg mass	Percent hatching of eggs
	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
1	8.00±0.57	260.00±9.86	2016.66±9.38	225.60±0.57	85.67±1.28
2	7.00±0.00	254.33±6.02	1780.33±5.56	202.66±0.66	79.69 ±1.13
3	6.66±0.57	238.00±9.29	1627.00±3.33	184.04±0.33	77.95 ±2.48
4	6.33±0.57	227.66±4.61	1592.66±7.68	136.00±0.58	58.87 ±1.69
5	5.66±0.57	200.00 ±7.63	1180.66±4.66	81.66 ±0.63	44.12 ±0.13
Control	8.00±0.00	293.00±2.08	2347.33±10.08	265.22±0.33	90.47 ±3.09

4. Discussion

Results show that when adult females of *S. litura* were fed on extract treated diet, drastic reduction in fecundity and egg hatching was observed.

Ovicidal activity of *O. sanctum* is probably due to presence of tannins, alkaloids and a volatile oil which are known to possess toxicity against insects. *Ocimum sanctum* showed moderate mortality in hatched larvae. Death in newly emerged larvae may be due to feebly sclerotised cuticle which leads to penetration of extract in larval body leading to toxicity and also results in aborted hatching.

5. References

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