

## Effect of Neem Extract on Ovicidal Activity of *Spodoptera litura*

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### ABSTRACT

In the present study the ovicidal effect of leaf extracts and seed extract of *Azadirachta indica* was evaluated against *Spodoptera litura*. The results show that the plants induced mortality in the eggs, however the efficacy of plants varied. The ovicidal property of the leaf and seed extracts may be attributed to the chemical compounds present in the plants. Results obtained in present investigation show that seed extract of *Azadirachta indica* was most effective and caused highest mortality in treated eggs. Results were obtained in the present work where 2 % seed extract of *Azadirachta indica* caused 94.66 percent egg mortality. Leaf and seed extracts evaluated in the present study caused mortality in the newly emerged larvae. Highest mortality within 48 hours of hatching was observed in larvae emerged from eggs treated with leaf extract and seed extracts of *Azadirachta indica* at the concentration of 2 % (83.82 and 100 percent respectively).

**Key words:** *Azadirachta indica*, leaf extract, seed extracts, *Spodoptera litura*.

### INTRODUCTION

The ovicidal property of the leaf and seed extracts may be attributed to the chemical compounds present in the plants. The secondary metabolites present in plants are mostly tannins, alkaloids, polyphenols, terpenoids and essential oils, which have wide range of anti-insect properties<sup>1</sup> including ovicidal, larvicidal, pupicidal, growth regulating and repellent actions<sup>3,4</sup>. The ovicidal action of several plants have been reported earlier. Gajendra and Gopalan<sup>2</sup> observed the ovicidal activity of leaf and inflorescence extracts of *Parthenium hysterophorus* against *Spodoptera litura* and found that the extracts blocked the cleavage process in eggs.

Our results revealed that ovicidal effect of plants is dose-dependant and also depends on the method of egg treatment. The percent egg mortality recorded was more pronounced at higher concentrations and when eggs treated by dipping them directly in extract. This is probably due to increased penetration of the active compounds into the eggs, especially through micropyle thus increasing their toxicity.

In the present study the ovicidal effect of leaf extracts and seed extracts of *Azadirachta indica* was evaluated against *Spodoptera litura*.

### MATERIAL AND METHODS

#### EXPERIMENTAL INSECT:

*Spodoptera litura* is a polyphagous pest of large host range including tobacco, cotton, cabbage, groundnut, maize, jute, lettuce etc. For laboratory rearing the egg masses of *Spodoptera litura* were procured from Agricultural Research Station, Durgapura, Jaipur. Rearing was done at the temperature of  $27 \pm 2^{\circ}\text{C}$ ,  $75 \pm 5\%$  RH and 10: 14 hrs of Light: Dark period. The eggs were surface sterilized with 0.02% sodium hypochloride solution, dried and allowed to hatch.

**EXPERIMENTAL PLANT MATERIAL**

*Azadirachta indica* (NEEM) plants was selected for the investigation have been reported to possess ovicidal activity against several insect pests. The toxicity of leaf extracts and seed extracts of *Azadirachta indica* is evaluated by observing their ovicidal action.

**Ovicidal action :****Method of treatment :**

1. Contact with extract-treated substrate
2. Egg-dipping method

**Number of eggs:** 75 eggs at each dose level (3 replicates of 25 eggs each)

**Period of treatment:** Till the hatching of 1<sup>st</sup> instar larvae or 7 days

**Test formulations used:** Leaf extracts and seed extract of *Azadirachta indica*.

**Doses applied:** 0.1, 0.5, 1.0, 1.5, 2.0 and 2.5 %

**Temperature:**  $27 \pm 2^{\circ} \text{C}$

**Humidity:**  $75 \pm 5\% \text{ RH}$

Ovicidal action of plant extracts was evaluated by exposing 75 eggs of *Spodoptera litura* to plant extract at the concentration ranging from 0.1 to 2.5 %. Eggs were treated by contact with extract-treated surface and egg-dipping methods. Parallel controls were also run with required amount of solvent and emulsifier. Freshly laid eggs were collected from the laboratory reared culture and washed with 0.02% sodium hypochloride and dried. Experiments were conducted in petridishes (4 inches diameter) in which 25 eggs were kept. In extract-treated substrate treatment a round disc of filter paper was impregnated with the extract at each concentration by soaking it in the extract for 30 seconds. In egg-dipping method eggs were dipped in the extract for 30 seconds. For experiment, eggs treated by both the methods were kept separately in petridish which was then covered with muslin cloth held by a rubber band.

Observations on the mortality induced in eggs were taken after every 24 hours till 7 days. Mortality recorded was compared with control data. The efficacy of extract was assessed on the basis of effect on following parameters:

1. Percent egg hatching
2. Percent reduction in hatching
3. Percent mortality in newly hatched larvae

**RESULT AND DISCUSSION****Ovicidal Action:**

The ovicidal action of plants was evaluated by treating the eggs of *Spodoptera litura* with leaf extracts and seed extract of *Azadirachta indica*. Observations were taken daily till the larvae hatched out from the eggs.

**Leaf Extract :**

A significant reduction in egg hatching was observed in eggs treated with the leaf extract of *Azadirachta indica* by both contact and egg-dipping methods (Table 1). Reduction in hatching was highest of 87.08 percent and lowest of 16.27 percent when eggs were treated by egg-dipping method at 2% and 0.1% concentrations respectively. When treated by contact method eggs showed highest reduction of 86.36 percent and lowest of 17.59 percent at 2% and 0.1% concentrations respectively.

Mortality in newly hatched larvae was recorded as 11.42, 15.33, 30.48, 58.18 and 66.66 percent when eggs were treated by contact method and 16.98, 23.33, 33.23, 69.83 and 83.83 percent when eggs were treated by dipping method at the concentrations of 0.1, 0.5, 1.0, 1.5 and 2.0% respectively.

**Seed Extract :**

Maximum reduction in egg hatching was observed when eggs were treated by dipping method at the concentration of 2% (90.74) (Table 2). This was followed by a reduction of 88.02 percent at 2% when eggs were treated by contact method. Minimum reduction of 33.65 and 25.02 percent in hatching was recorded at 0.1% concentration when eggs were treated by egg-dipping and contact methods respectively.

Mortality in the newly emerged larvae from treated eggs was highest of 100% at 2% concentration in both types of treatments. At 0.1 % of extract mortality in larvae was recorded as 46.90 and 21.93 percent in egg-dipping and contact treatments respectively.

**Table 1 : Effect of Leaf extract of *Azadirachta indica* on eggs of *Spodoptera litura***

Doses %	Percent Egg Mortality		Percent Egg Hatching		Percent Reduction in Egg Hatching		Percent Mortality in 1st Instar Larvae within 48 hrs	
	Eggs on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE			Mean± SE	Mean ± SE
0.1	18.66 ± 0.33	29.33 ± 0.22	81.33 ± 0.31	70.33 ± .66	17.59	16.27	11.42 ± 0.47	16.98 ± 0.38
0.5	30.66 ± 0.25	34.99 ± 0.33	66.66 ± 0.3	65.33 ± 0.4	21.22	23.98	15.33 ± 0.55	23.33 ± 0.33
1	48.00 ± 0.33	56.00 ± 0.25	52.00 ± 0.33	44.00 ± 0.33	40.9	46.6	30.48 ± 0.33	33.23 ± 0.41
1.5	58.66 ± 0.42	73.33 ± 0.33	41.33 ± 0.25	26.66 ± 0.25	53.04	67.66	58.18 ± 0.38	69.83 ± 0.33
2	88.00 ± 0.33	89.33 ± 0.25	11.00 ± 0.33	12.00 ± 0.33	86.36	87.08	66.66 ± 0.35	83.83 ± 0.38
Control	12.33 ± 0.15	10.58 ± 0.33	87.67 ± 0.21	89.62 ± 0.15	-	-	8.33 ± 0.25	1.55 ± 0.25
F-Value	233.38	333.64	238.68	252.5	238.52	330.64	252.4	258.3
CV at 5%	3.61	3.61	3.61	3.62	3.58	3.61	3.61	3.61

**Table 2 : Effect of Seed extract of *Azadirachta indica* on eggs of *Spodoptera litura***

Doses %	Percent Egg Mortality		Percent Egg Hatching		Percent Reduction in Egg Hatching		Percent Mortality in 1st Instar Larvae within 48 hrs	
	Eggs on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method	Egg on Treated Substrate	Egg- dipping Method
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE			Mean± SE	Mean ± SE
0.1	33.33 ± 0.25	41.33 ± 0.33	66.66 ± 0.33	58.33 ± 0.35	25.02	33.65	21.93 ± 0.38	46.90 ± 0.43
0.5	41.33 ± 0.22	49.33 ± 0.32	58.66 ± 0.22	50.66 ± 0.33	34.02	41.38	34.91 ± 0.33	44.65 ± 0.65
1	65.33 ± 0.33	62.66 ± 0.33	34.66 ± 0.35	37.33 ± 0.42	61.02	59.98	42.12 ± 0.42	53.70 ± 0.33
1.5	77.33 ± 0.38	81.33 ± 0.38	22.66 ± 0.22	18.66 ± 0.51	74.52	78.42	71.18 ± 0.52	84.20 ± 0.32
2	90.66 ± 0.33	94.66 ± 0.41	9.33 ± 0.33	5.33 ± 0.26	88.02	90.74	100.00 ± 0.33	100.00 ± 0.00
Control	13.33 ± 0.21	10.32 ± 0.25	86.67 ± 1.65	99.68 ± 0.33	-	-	9.02 ± 0.33	8.04 ± 0.25
F-Value	288.38	284.28	128.96	321.78	253.15	320.15	425.38	259.38
CV at 5%	3.61	3.61	3.61	3.61	3.61	3.61	3.61	3.61

## CONCLUSION

Leaf extract of *Azadirachta indica* was effective, although the ovicidal effect was slightly effective than the seed extract. Gajmer *et al.* (2002) observed that extracts of neem and bakain caused maximum adverse effects on fecundity and hatching when the adults were fed on extract containing sucrose diets. Their results showed that egg laying was completely inhibited at the concentrations of 6, 8 and 10% neem extract concentrations. Similar results were obtained in the present work where 2 % seed extract of *Azadirachta indica* caused 94.66 percent egg mortality. *Azadirachta indica* may be due to higher concentration of chemical substances including active compound azadirachtin.

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