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Leaf Extract of *Nerium oleander* in Acetone and Ethanol Solvents Affects the Developing Stages of *Heliothis armigera*

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Agriculture plays a greater role to improve economic status of developing countries. It provides livelihood to vast majority of people. The most pressing problem today in agriculture is the need to reduce the loss of crops and their products from the attack or destruction by insects. *Heliothis armigera* is the major pest and feed on more than 170 species of plants belonging to 41 families. The larvae feed on the green leaves, buds, pods and fruits of their host plants [1]. One larva can damage 10-12 fruiting bodies in its life span [2]. In India annual loss of about 2000 crores reported by [3].

Biopesticides caused less harm as compared to chemical pesticides for crop protection. Now a day, chemical pesticides are largely used which caused adverse effects on animals and human beings by polluting environment [4]. Chemical pesticides may cause physical or physiological changes in the soil. *Nerium oleander* is coming from dogbane family Apocynaceae and it is evergreen shrubs or small tree. It is known as oleander from its superficial resemblance to the unrelated plant *Olive olea* but has many other names like *Nerium indicum* Mill and *Nerium odorum* Soland [5]. Bandara *et. al.* [6] reviewed medical aspects of human poisoning by Oleander and the related Yellow *N. oleander (Thevetia peruviana)*. *N. Oleander* contains cardiac glycosides of the cardenolide type. The main cardiac glycoside of oleander is oleander in (C₃₂H₄₈O₉, molecular mass=576.3), but Oleander leaves and seeds contain more than 30 different cardiac glycosides [7].

On the field of gram (*Cicer arietium*) larvae of *Heliothis armigera* was collected. Collected larvae were kept in different plastic bottles because they show cannibalism activity. Larvae are reared in laboratory condition by providing artificial diet (<http://www.cicr.gov.in>). Fresh leaves of *Nerium oleander* was collected from the field and were dried in the oven at

55°C. Dried leaves were powdered in the grinder and stored in the airtight polyethylene bags. The powder was extracted with acetone and ethanol by using soxhlet apparatus [1]. For studied the effect of *N. oleander* leaf extract in acetone and ethanol solvents on the growth of *H. armigera* life cycle stages, first instar larva was released at different concentrations of the extract were prepared and fed with artificial diet the food was changed every day. The observation was made with respect to the effect of extract on duration of the development of larval and pupal periods. Morphological characters are also studied till the emergence of the adults. The control was maintained simultaneously for comparative study.

Efficacy of leaf extract of *Nerium oleander* in acetone and ethanol solvents against developing stages of *Heliothis armigera* i.e., larvae, pupae and also emergence of adult (Table 1, Fig 1-2). At the lowest concentration of 2.0 ml/Kg the larvae were repelled in acetone, while antifeedant activity was observed in ethanol solvent. There was slight decrease in the duration of larval and pupal period as compared to control was recorded. 20% mortality in acetone and 10% mortality in ethanol is noticed. Emergence of adults are 60% in both acetone and ethanol are seen. In 4.0 ml/Kg concentration both acetone and ethanol solvents, repellency was observed and 40% adults are emerged as well as 40% and 30% mortality was found respectively in both acetone and ethanol solvent. The larval period lasted for 17.33±1.03 days and pupal period was 13.75±0.95 days in acetone and 20.14±1.06 days larval and 15.24±0.52 days of pupal period was recorded. At 6.0 ml/Kg concentration repellent action was noted in both acetone and ethanol solvents and 50% and 40% mortality was observed respectively, emergence of adults is 40% in acetone and 30% in ethanol was recorded. The larval period lasted for 18.50±1.51 days and pupal period was 15.25±0.50 days in acetone and 20.53±1.41 days larval and 16.50±0.70 days of pupal period was recorded. At the higher concentration of 8.0 ml/Kg antifeedency response, and 20% adults are emerged in both acetone and ethanol extract while 60% and 50% mortality respectively found in both acetone and ethanol solvents. The larval period lasted for 21.25±1.73 days in acetone and 21.27±1.14 days in ethanol solvents.

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Pupal period 16.50±0.70 days and 17.66±0.57 days respectively.

Present investigation proved to prolonged of larval and pupal period and reduced the emergence percent of adult after the treatment of acetone and ethanol extract of *Nerium oleander*. The extracts had a strong antifeedant [8] as well as toxic effect, as the toxins can accumulate in the body of larvae and subsequently cause mortality [9]. Growth

and feeding physiology of *H. armigera* larva on extracts of *Ricinus communis*, *Glycosmis pentaphylla*, *Vitex negundo* and *Nerium oleander* [10]. Some extracts may have a contact action, via substances such as monoterpenoids, on the nervous system of larvae [11]. Administered phytochemical extracts orally through food to determine the toxicity or efficacy of plant materials for antifeedancy, inhibition of growth or emergence as adults [12].

Table 1 Efficacy of leaf extract of *Nerium oleander* in acetone and ethanol solvents against developing stages of *Heliothis armigera*

S. No.	Concentration (ml/kg)	Percent mortality	Larval periods (days)	Pupal periods (days)	Percent adult's emergence	Activity
Acetone solvent						
1	Control	-	19.87±1.12	15.12±0.83	100	Actively feeding
2	2.0	20	15.25±1.28	12.83±0.75	60	Repellency
3	4.0	40	17.33±1.03	13.75±0.95	40	Repellency
4	6.0	50	18.50±1.51	15.25±0.50	40	Repellency
5	8.0	60	19.75±1.70	16.50±0.70	20	Antifeedency
Ethanol solvent						
1	Control	-	19.87±1.12	15.12±0.83	100	Actively feeding
2	2.0	10	19.33±1.22	14.17±0.63	60	Semi active
3	4.0	30	20.14±1.06	15.24±0.52	40	Repellency
4	6.0	40	20.53±1.41	16.50±0.70	30	Repellency
5	8.0	50	21.27±1.14	17.66±0.57	20	Antifeedency

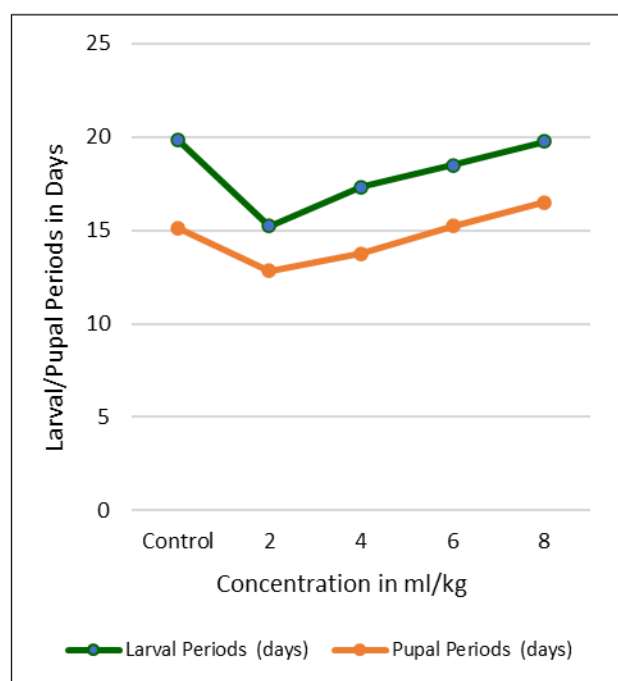


Fig 1 Efficacy of leaf extract of *Nerium oleander* in acetone solvent against larval and pupal period of *Heliothis armigera*

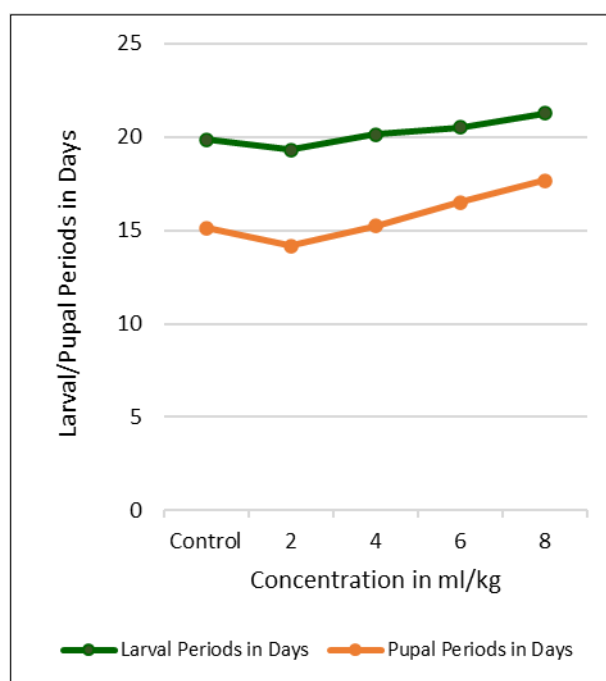


Fig 2 Efficacy of leaf extract of *Nerium oleander* in ethanol solvent against larval and pupal period of *Heliothis armigera*

SUMMARY

Pests are the most pressing problem today in agriculture field by affecting crops yield and nutritional values. Present investigation evaluates the adverse effect of leaf extract of *Nerium oleander* in 2 different solvents i.e., acetone and ethanol. For the study, larvae of *Heliothis*

armigera were exposed to different concentration of acetone and ethanol extracts of *Nerium oleander* in artificial medium. At higher doses emergence of adults are reduced and mortality was increases. The duration of the larval and pupal period was prolonged due to the effect of leaf extract of *Nerium oleander* were observed.

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