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# THE FIRST RECORD TO MOTH OF *OCNOGYNA LOEWII* ZELL. (ARCTIIDAE: LEPIDOPTERA) ON WHEAT PLANTS IN IRAQ AND EVALUATE EFFICACY OF SOME AQUEOUS PLANT EXTRACTS AGAINST ITS CATERPILLARS

**Hussein Ali Salim[1]*, Majida Hadi Mahdi Alsaady[2] and Liqaa Mohammed Shiblawi[1]**

[1*]Directorate of Diyala Agriculture, Ministry of Agriculture, Diyala, Iraq.
[2]Ministry of Higher education, College of Science, University of Baghdad, Iraq.

## Abstract

The study was carried out in the plant pathology Lab in Directorate of Diyala Agriculture during March-April, 2016. The objective of the study was to evaluate aqueous plant extracts *viz. Azadirachta indica, Nerium oleander, Eucalyptus* sp against caterpillars of *Ocnogyna loewii*, the factorial experiment was conducted with three replications were set up for each treatment. Mortality percentage of caterpillars was increased significantly in treatments *Eucalyptus sp* 76.0%, *Azadirachta indica* 74.0% and *Nerium oleander* 70.6% as compared with control 46.6%, means of intervals were significantly different with increased gradually in percent mortality 37.3, 52.0, 77.3, 86.6 and 92.6% after 7, 14, 21, 28 and 35 days respectively, *A. indica* and confidor were showed maximum percent mortality 100% after 35 days. All aqueous plant extracts of *A. indica, N. oleander* and *Eucalyptus sp* have larvicidal activity against caterpillars of *Ocnogyna loewii.*

***Key words:*** *Ocnogyna loewii, Azadirachta indica, Nerium oleander, Eucalyptus sp*

## Introduction

The spring webworm *Ocnogyna loewii* (Zeller, 1846) is polyphagous pest occurs widely in Iraq, it has one generation a year, the adults emerge from mid-November and the mating occur after two days, the female usually lays its eggs in 1 mass containing hundreds of eggs (520 average), the egg stage lasting 90-100 days from about mid-November to mid-February under field conditions, the larva has 6 instars and the total larval period averaged 69 days, The pupae last 190-210 days from April to November, after which the adults emerge (Swailem and Amin, 1979). Frequent uses of insecticides have negative effects on the survival of natural enemies and led to the development of resistance in many of pests (Hossain and Poehling, 2006). Due to environmental pollution associated with continuous use of synthetic pesticides and high costs of these chemicals, there is an interest in the use of botanicals and focus on derived products from these plants for crop protection and reduce losses caused by pests and diseases (Tewary *et al*., 2005; Devi and Gupta, 2000; Facknath, 2006 Ssekyewa *et al*., 2008). The potential alternative for the sustainable management of this insect may be products of natural plant, which have been successfully used for centuries (Crosby, 1971). *Azadirachta indica* has been reported to contain a plethora of chemical compounds. Extracts from the seeds and kernels have been reported to adversely affect lifecycle and biology of many insect pests ( Verkerk and Wright, 1993; Schmutterer, 1997; Das *et al*., 2010; Naveena *et al*., 2010; Wondafrash *et al*., 2012 ). *Nerium oleander* has been used in medicine, as a compound of antibacterial, anti-inflammatory and ant nociceptive (Erdemoglu *et al*., 2003). Eucalyptus oil have a wide range of appropriate properties for pest management (Boland *et al*., 1991; FAO, 1995; Barton, 2000). The present study was conducted to evaluate some aqueous plant extracts *viz. Azadirachta indica, Nerium oleander, Eucalyptus* sp and confidor insecticide against caterpillars of *Ocnogyna loewii*.

***Author for correspondence :** E-mail : h_salim11111@yahoo.com

## Materials and methods

The present study was carrying out at plant pathology Lab in Directorate of Diyala Agriculture during 2016. Fresh plant materials used in this study consisted of

*Nerium oleander* and *Eucalyptus* sp (leaves) were collected from Baqubah district Diyala province, Iraq. *Azadirachta indica* (neem kernel cake powder) was collected from Allahabad district, India. Dry powdered neem kernel cake (100 g) was exhaustively mixed with distilled water in blender for several times, the obtained extract was filtered through muslin cloth.

The leaves of *Nerium oleander* and *Eucalyptus* sp were thoroughly washed with tap water and were pulverized with distilled water by blender then were passed through the muslin cloth twice, these extracts were diluted with distilled water to make10% and stored in bottles (Salim *et al*., 2016a) (Fig. 1), Confidor insecticide SL 200 was used as an active chemical input to evaluate in this study, formulation type is a suspension concentrate containing active ingredient imidacloprid 200 g/L concentrate, manufacturer is Bayer company, country of origin is Germany, Its recommended dose in Iraq is 50 ml/100L,dosage used in this study is 0.6 ml/L. Caterpillars of *Ocnogyna loewii* were collected from wheat crop in project of wheat researches at Galybia district, Diyala province at 7/3/2016 (Fig. 4), this is consider first record in infection of wheat plants by this insect in Iraq, Symptoms of larval feeding were appeared on leaves chlorophyll through the scrape of chlorophyll layer and chewing it, then the leaves become transparent, due to the larvae didn't Preferred wheat leaves (Fig. 2). Ten caterpillars in same age approximately were introduced to each plastic Jar (8.5 cm diameter × 16 cm depth) covered with muslin cloth under laboratory conditions (Fig. 3), Fresh cabbage leaves were treated by a leaf - dip method in the aqueous extracts and kept in jars after drying and the leaves are replaced each time as needed, while other leaves were left untreated as control, cabbage leaves were used instead of wheat leaves because cabbage leaves are a favorite plant to this pest, whereas wheat leaves are considered new and not favorite (Salim *et al*., 2016b). The number of dead caterpillars was counted every 7 days during the bioassay; the factorial experiment was conducted with three replications were set up for each treatment. Caterpillars' percentage mortality was calculated through Abbott's formula (Abbott, 1925).

Corrected Mortality % =

$$1 - \frac{n \text{ in } T \text{ after treatment}}{n \text{ in } Co \text{ after treatment}} \times 100$$

Where: n = Insect population, T = treated, Co = control

## Results and Discussion

Mortality percentage of caterpillars was increased significantly among means of treatments *A. indica* (74.0%), *N. oleander* (70.6%), *E.* sp (76.0%) and confidor (78.6%) as compared with control (46.6%), whereas means of intervals were significantly different among them which increased gradually in percent mortality 37.3, 52.0, 77.3, 86.6 and 92.6% after 7, 14, 21, 28 and 35 days respectively, while the results were significantly different in interaction between means of treatments and means of intervals, *A. indica* and confidor were showed maximum percent mortality 100% after 35 days While the minimum percent mortality was observed in control 16.0% after 7 days (Table 1). All the aqueous plant extracts were found toxic or antifeedant to caterpillars of *Ocnogyna loewii* after different intervals as compared to control, These findings are similar to (Prakash and Rao, 1997) who mentioned the most active compound in neem is 'azadirachtin which has been reported to produce varied effects, including insecticidal activity, growth retardant, oviposition deterrent, antifeedant, moulting inhibitor, sterilant. Neem oil contains at least 100 biologically active compounds, the most important being azadirachtin which cause 90% of the effect on most pests. Other components include meliantriol, nimbinin, nimbin, nimbolides, nimbidin, salannin and fatty acids (palmitic, oleic and stearic) (Estefânia *et al*., 2016). Azadirachtin can effect on mitosis and has direct effects on fatty tissues, muscles and insect gut epithelial cells, leading to decreased insect activity and restricted movement (Qiao *et al*., 2014). These resultes were in agreement with (Roni *et al*., 2013; Sedaghat *et al*., 2011) who reported that family of *N. oleander* is produce some of components such as flavonoids, coumarins, and triterpenes which have larvicidal activity. The phytochemical screening to extract of *N. oleander* has explained it contains some of the compounds which have insecticidal activity by the effect of phytochemical components: flavonoids, sterols, terpenes, triterpenes, and coumarins (Fouad *et al*., 2015). It had reported that these compounds affect insects as antifeedant by causing a delay in larval growth and inhibit growth and development of many species of insects (Sudhakar *et al*., 2017). *Eucalyptus globulus* consisting of á-pinene, p-cymene and 1.8-cineole were acted as a good repellence as against insects (Koul *et al*., 2008). Eucalyptus contains bioactive constituents and having insecticidal, herbicidal and fungicidal activities also the essential oil from Eucalyptus has had toxic properties on the insect pests (Shiva and Oruj, 2015).

## Conclusion

This study concluded that all aqueous plant extracts of *A. indica*, *N. oleander* and *E.* sp possesses larvicidal activity against caterpillars of *Ocnogyna loewii*. Experiments are needed to evaluate its activity and economic aspects under conditions of the field because the results will be widely differed from the result of this lab study due to differed environmental factors dominated in the field in Iraq during infestation time compared with controlled lab condition.

**Authors' contributions:**

Hussein Salim planned the study, participated in analysis and interpretation of data and wrote the manuscript, Majida Alsaady and Abbas Ali have participated in other aspects of the research.

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**Table 1:** Effect of *A. indica*, *N. oleander*, *E.* sp and Confidor on mortality percentage of *Ocnogyna loewii* caterpillars after different intervals.

| Treatments A | Mortality of caterpillars % | | | | | Means of treatments |
|---|---|---|---|---|---|---|
| | Intervals B | | | | | |
| | 7 Days | 14 Days | 21 Days | 28 Days | 35 Days | |
| Control | 16.6 | 26.6 | 46.6 | 66.6 | 76.6 | 46.6 |
| *Nerium oleander* | 36.6 | 53.3 | 83.3 | 86.6 | 93.3 | 70.6 |
| *Eucalyptus* sp | 53.3 | 56.6 | 86.6 | 90.0 | 93.3 | 76.0 |
| *Azadirachta indica* | 33.3 | 60.0 | 86.6 | 90.0 | 100.0 | 74.0 |
| Confidor 200 SL | 46.6 | 63.3 | 83.3 | 100.0 | 100.0 | 78.6 |
| Means of intervals | 37.3 | 52.0 | 77.3 | 86.6 | 92.6 | |

CD (0.05) Treatments 12.9
CD (0.05) Intervals 12.9
CD (0.05) Treatments × Intervals 28.9
Factor A df = 4 f= 8.085
Factor B df = 4 f= 26.996
Factor A X B df = 16 f= 0.273


**Fig. 1:** Concentrations 10 % of different aqueous extracts.

**Fig. 2:** Damages of caterpillars of *Ocnogyna loewii* on wheat

**Fig. 3:** Plastic jars of laboratory assay.

*A. Caterpillar*

*B. Pupa*

*C. Adult*

**Fig. 4:** Stages of life cycle of *Ocnogyna loewii.*

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