STUDIES ON INSECTICIDAL PROPERTIES OF NON-LEGUMINOUS PLANTS OF THAR DESERT

*Shriya Sharma, Deepali Lall and Kamlesh Rawat

[1] *Department of Zoology, S.D. Government college Beawar (Raj.), India.*
[2,3] *Research Scholars, S.D. Government college Beawar (Raj.)*

Abstract: Papilio demoleus, commonly known as the lime butterfly, poses a significant threat to citrus crops due to the extensive damage caused by its larvae. Traditional insecticides have been employed to control P. demoleus populations, but their adverse effects on human health and the environment have led to the search for alternative, eco-friendly solutions. This research article investigates the insecticidal properties of three plant species—Euphorbia royleana, Lantana camara, and Cascabela thevetia—against P. demoleus. Through laboratory bioassays and analysis of bioactive compounds, this study evaluates the efficacy and mechanisms of action of these plant extracts as potential natural insecticides. The findings contribute to the development of sustainable pest management strategies for the lime butterfly. Based India

Keywords: Papilio demoleus, lime butterfly, Euphorbia royleana, Lantana camara Cascabela thevetia, insecticidal properties, natural insecticides, pest management.

INTRODUCTION

India is basically an agriculture-based country and more than 80% of Indian population depends on it. Insect pest are known to cause significant damage. The Insect selected for the research is *Papilio demoleus* and *Helicoverpa* belongs to the order lepidoptera. *Papilio demoleus (Linnaeus)* the common "Citrus butterfly" (lime butterfly) causing considerable economic loss to many plants. The major one's being citrus, bael, *Murraya koenigii* (curry tree), *Ziziphus mauritiana* (Ber) etc. through Asia to Australia.

Papilio demoleus which is a well-known pest of citrus in the oriental region cause several defoliations of seedlings in nurseries and young plantation (yunus & munir, 1972) reported that *Papilio demoleus* larvae feed on the leaves of the least 19 citrus species or varieties. Narayanamma have reported upto 83% defoliation of young Grove trees in Andhra-pradesh and (Thakre and borle, 1974) reported severe outbreak leads to the "skeletonization" of the entire citrus garden.

Adult female laid eggs singly or in groups of two to five on the under surface of tender leaves and also on tender twigs. The mean duration of the different stages *viz.*, the egg period of 2.87 days, larval period of 17.53 days, pre-pupal period of 1.04 days, pupal period of 9.01 days, female adult longevity period of 6.75 days and male longevity period of 3.81 days respectively. Pulses are important sources of protein for India’s large and growing population. Chickpea (Cicer arietinum) is one of the most important pulse crops of India. India is the largest producer with 75% of world acreage and production of gram. India produces 5.3 mt of chickpea from 6.67 mha with an average production of 844 kg.

***P.demoleus* development stages: Egg, Larvae, Chrysalis, Adult**

The survey conducted from time to time by various agencies in different parts of the country revealed that there are many factors which influence the production of chickpea. Among the insect pests particularly pod borer, Helicoverpa armigera is one of the main constraints which limit the production of chickpea. The yield loss in chickpea due to pod borer was 10 – 60 per cent in normal weather conditions (Bhatt and Patel, 2001).The pod borer [Helicoverpa armigera Hubner (Lepidoptera: Noctuidae)] is responsible for causing up to 90% damage in chickpea due to its regular occurrence from the vegetative growth to the pod formation stage. In order to manage this problem, growers are tempted to increase the amounts of pesticides, but indiscriminate or injudicious use of pesticides has resulted in residues in the food chain, pesticide resistance, and pest resurgence, in addition to causing harm to non-targeted beneficial organisms and the environment.At initial stage larva feeds on green leaves and later it feeds on flower bud and pods. The matured larvae half body inside the fruit half out side this peculiar characteristics. Due to feeding on flower buds and flower lead to reduces in fruit setting. Medium sized light brown moths measuring about 40 mm across the wings have a dark speck and dark area on the forewings.Hind wings are light in colour with a dark patch at the outer end.

Females lay several small white eggs singly. Upon hatching in 3-4 days the caterpillars feed on the leaves for a short time and subsequently attack the pods.

A full-grown caterpillar is about 34 mm long, greenish to brownish in colour with scattered short white hairs and buries itself in the soil to make an earthen cell inside which it pupates. The life cycle is completed in about 30-45 days. The pest completes eight generations in a

year. The developments of insect resistance, distribution of natural enemy complex and increased contamination by harmful environmental applications of the synthetic chemicals have compelled the search of alternative methods. This led to increased development of compounds of biological origin, having antifeedant, repellent, deterrent, chemosterilants and growth regulator due to the presence of nearly 30,000 secondary metabolites (Schoonhaven, 1993).

MATERIALS AND METHODS:

1. Citrus butterfly (papilio demoleus) collection from Lemon plant, Bael plant and Curry tree plant and Helicoverpa armigera from chick pea plant work in progress from farms near Beawar and Ajmer area.
2. Young leaves of Lantana camara and Cascabela thevetia and branches of Euphorbia royleana will be gathered from the field.

OBJECTIVE:

The purpose of the proposed investigation is to check the efficacy of ***Euphorbia royleana, Lantana camara*** and ***Cascabela thevetia*** plants aqueous and acetone extracts with potential activity, especially pesticidal action against selected citrus pest (lime butterfly) *Papilio demoleus and Helicoverpa armigera* 4^{th} and 5^{th} instar larvae.

1. EFFECT ON OVIPOSITION
2. EFFECT ON FECUNDITY
3. EFFECT ON MORTALITY

$$\text{PERCENTAGE MORTALITY} = \frac{No.\ of\ dead\ larvae}{No.\ of\ introduced\ larvae} \times 100$$

SPECIFIC OBJECTIVE:

1. To prepare plant based biopesticides which have more efficiency in controlling pesticides.
2. Analyse the aptitude of developed bio pesticide products in contrast to specific pest under lab and field condition.
3. Advance technology is used as a product to enhance organic farming by using plant-based bio pesticide.
4. Collection of Data for bio pesticide authorization for registration.
5. In order to increase the Indian economy if the selected plant-based bio pesticide succeed in comparison to it, then it is a commercial product that works to increase agricultural production and generate income by licensing.

SEX SPECIFICITY TEST:

- Treated Male × Untreated Female
- Treated Male × Treated Female
- Untreated Male × Treated Female

Control:

Untreated Male × Untreated Female

SELECTED PLANT PRODUCTS:

1.) *Euphorbia royleana* (Danda thor) -

The latex of the plant is a valuable source of in-genol esters. Ingol is a macrocyclic diterpene and is of therapeutic interest due to its antileukemic properties. Danda Thor has been used in Ayurvedic and Yunani medicine.

2.) *Lantana camara* (Panchfooli) -

Lantana leaves can display antimicrobial, fungicidal and insecticidal properties. *L. camara* has also been used in traditional herbal medicines for treating a variety of ailments, including cancer, skin itches, leprosy, chicken pox, measles, asthma and ulcers. *L. camara* extract has shown to reduce gastric ulcer development in rats. Extracts from the plant have also been used in Brazil to treat respiratory infections.

3.) *Cascabela thevetia* (Yellow oleander) -

A decoction of the *Cascabela* leaves is taken to treat jaundice, fever and as a purgative for intestinal worms. The leaf sap is used as eye drops and nose drops to cure violent headaches.

Preparation of aqueous plant extraction: -

After collection of fresh leaves, it will be washed thoroughly by distilled water so that it can be cleaned to follow the dirt, mix it with 2-3 days after drying the filter paper at room temperature and then blend it by grinder or crush it by mortar and pestle and the finely pulverized paste to formulate the fine powder. Then the powdered material has been extracted by using the Soxhlet apparatus with acetone solvent. After the completion of the extraction 2gm, 5gm and 10gm of extract will be weighed and dissolved with 100 ml of **acetone** and **water**. These concentrations of stock solutions are used to check the insecticidal properties of

plant extracts. Different concentrations of aqueous and acetone solution (1%, 3% and 5%) will be used to check the pesticidal properties of plants. Three different methods will also be used to conclude the results which are as follows:-

1. **CONTACT METHOD: -** In this method the insect is kept in the petridish which will already have tissue paper bathed with the prepared extracts. The result will be observed.

2. **FEEDING METHOD: -** In this method the insect will be taken in the close vicinity of the extract to help him eat the extract and the results will be observed.

3. **TOPICAL METHOD: -** In this method the insect will be sprayed with both the plant extracts (water and acetone) and the results will be observed.

- Students "t" test will be used to compare different variables.
- To inspect the fatal concentration in 50% (LC 50) the toxicity and mortality rate for individual insect stages vary, standard error will be used.
- Report and structure were also added which would help in demonstrating efficiency and mortality.
- ANOVA test will apply.

DISCUSSION

To proposed research work will be completed in two years. The year plan is as follows: -

1. Collection of literature and research related information about research topics from different universities, libraries and institutions.
2. Examine plant based aqueous extracts effect on crop production eg Data (citrus plant, curry tree, chick pea) and pest of infected plant.
3. To receive information and reaction of proposed concentration of plant aqueous extracts on ***Papilio demoleus*** and ***Helicoverpa armigera***.

Insect collection:

- The egg, larvae and adult will be also collected from the citrus, curry tree and chick pea plants of nearby fields of Ajmer district, Rajasthan, India.
- The different larval stages of the butterfly *Papilio demoleus* and *Helicoverpa* armigera will be collected and reared in plastic/glass jars with best aeration. To allow air passage, a hole of 2cm in diameter was cut opened in the centre of each jar lid, and sterile cloth will glued to the underline of each lid throughout the experiment
- Wet fresh loose leaves of Indian curry leaf *Murraya koinigii* and chick pea plant leaf will be provided daily.

- Throughout the experiments insect culture will be maintained as optimum temperature, photoperiod and relative humidity.

Work in progress

1. Analysis of Data.
2. Comparison of Data information and confirmation through statistical methods.
3. Creating graphs, tables and figures for presentation.

Preparation, writing and typing thesis.

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