

# Synergistic effect of *Azadirachta indica* and *Calotropis* leaves extracts, in combination on the antifeedant behavior of 2<sup>nd</sup> instar *Plutella xylostella* – A new approach to a ecosafe world.

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## Abstract:

*Plutella xylostella* (L) (Lepidoptera, Plutellidae) also known as DBM is the major insect pest which poses a threat to the *crucifer crops* every year. Damage caused to the crops is estimated around 30-90%. Farmers foresee chemical pesticides as their only source of hope. They spray chemical pesticides such as chlorpyrifos, fenvalerate, endosulphan, dimethoate, Malathion, Permethrin, cypermethrin, Carbaryl and many more to protect their crops from the threat of pest. These chemical pesticides are hazardous to health of living beings and also a threat to the biodiversity. As a result, it hinders the path to a sustainable eco-safe world.

Botanical pesticides play a vital role in eco-safe pest management strategy. Most importantly, this research paper intends to investigate synergistic effect of *Azadirachta indica* and *Calotropis procera* leaves extracts on the antifeedant behavior of *Plutella xylostella*. Combination of the aforesaid plant extracts are found to be more effective as an antifeedant when compared with the efficacy of the individual plant extracts against 2<sup>nd</sup> instar larvae of *Plutella xylostella*. Secondly, the research work aims to provide farmers with a better option to obtain a pesticide-residue free cauliflower yield.

**Keywords:** synergism, botanical-pesticides, antifeedant.

## Introduction:

Azadirachtin, an important pesticidal compound, obtained from *Azadirachta indica* plant extracts, plays a vital role in Integrated Pest Management (Rembold, 1989). On the other hand *Calotropis procera* (Asclepiadaceae) contains alkaloids such as calotropin and calotoxin (Dubey et al., 2007). These alkaloids show a new hope in eco-safe pest management possibilities.

Griffiths et al. (1991) reported that mixtures of plant extracts as an antifeedant, are a better option rather than the plant extracts used separately (apart from the mixture). Considering the fact, that combining of plant extracts improves the bio-efficacy of the bio-pesticides (Liu et al., 1999), here a synergistic rationale is been approached. This paper deals with the antifeedant property of the leaves extract of *Azadirachta indica* (Neem) in combination with the leaves extract of *Calotropis procera* (1:1 ratio) against 2<sup>nd</sup> instar larvae of *Plutella xylostella* (L) (Lepidoptera, Plutellidae).

*P. xylostella* is also known as (DBM) Diamond back moth. The total life cycle of DBM varies from 24 to 35 days on cabbage and cauliflower crop (Abraham and Padmanaban, 1968). The pest passes through 4 larval instars and larval period ranges between 8 to 16 days, depending upon the weather conditions at different geographical locations (Ho Thian Hua, 1965; Patel, 1968). The larvae feed vigorously on the leaves and the florescence of the crucifers leading to unmarketable crop yield, thus to develop a biopesticide with better antifeedant property this present research work was undertaken.

## Method:

The 2<sup>nd</sup> instar larvae were reared on cauliflower plant's leaves at room temperature. They were reared using 'Rearing Method', with slight modifications (Dela Mondedji et al., 2015). The 2<sup>nd</sup> instar larvae so obtained were then subjected to the toxicity (leaf-dip) bioassay, also known as 'no-choice bioassay' (Tabashnik et al., 1990). Each treatment was replicated 6 times.

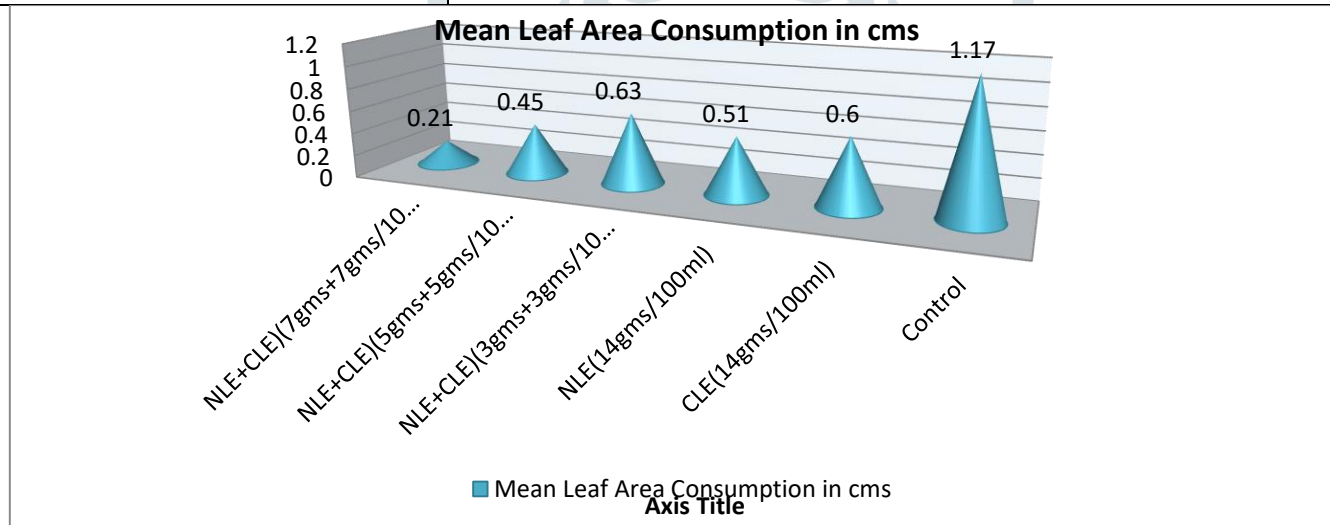
After 48 hours, the leaf area consumed by the larvae was charted on a graph paper and the mean leaf area consumed by the larvae was calculated (method as followed by D. Singh et al. (1982)).

## Results:

**Table: 1**

**Showing mean leaf (cauliflower) area consumed by the 2<sup>nd</sup> instar larvae of *Plutella* in 'No-choice' bioassay:**

Biopesticide (in gms/ml)	Mean Leaf Area Consumption in cms
NLE+CLE)(7gms+7gms/100ml)	0.21
NLE+CLE)(5gms+5gms/100ml)	0.45
NLE+CLE)(3gms+3gms/100ml)	0.63
NLE(14gms/100ml)	0.51
CLE(14gms/100ml)	0.60
Control	1.17



## Discussion and Conclusion:

Results revealed that higher concentration of the combination bio-pesticide showed significant feeding deterrence, and antifeedant property. The efficacy of the bio-pesticide declined considerably with the decrease in concentration of it. From the results, we observed that the highest feeding deterrence was exhibited by the 2<sup>nd</sup> instar larvae, when it was fed with leaf disc(of cauliflower) dipped in biopesticide- NLE +CLE (7gms +7gms/100ml), it consumed only .21 cm<sup>2</sup> mean leaf area, which is significantly quite less when compared to mean leaf area consumed by the larvae fed with leaves dipped in the individual plant extracts that is NLE (14gms/100ml) and CLE(14gms/100ml).The lowest antifeedant behaviour was observed in the control, where leaf disc was dipped in distill water. So, we can conclude that combination of *Azadirachta indica* and *Calotropis procera* leaves extracts display some synergism and are found to be more effective as an antifeedant when compared with the efficacy of the individual plant extracts against 2<sup>nd</sup> instar larvae of *Plutella xylostella*.

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