

Control of *Helicoverpa Armigera* with the use of Some Biopesticides



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Abstract

The pesticide of plant origin having nontoxic biodegradable and environmental friendly qualities. The frequent spraying of toxic chemicals developing resistance to the pesticide. Leaf powder of the plants like *Argimone-mexicana* and *Calotropis-procera* is prepared, Different doses of these plant extracts is given to the Fourth instar stages of *Helicoverpa-armigera* through feeding methods, To find their efficacy the experimental findings will be put under analysis using various parameters. The effect on paritrophic membrane is also studied.

Keywords: Alcohol, Acetone, pipette, Distillation plant, Castor leaves, Grams pods, larvae of *Helicoverpa-armigera*, plant extract, vails, Jars, Cotton etc.

Introduction

Among the various pests the gram pod borer (*Helicoverpa-armigera*) has been reported to cause maximum economic damages to the gram crops in India, this pest has acquired status of national agricultural pest².

German lady, Dalmatia, who noticed dead insects on pyrethrum flowers, ultimately led to the discovery of insecticidal activity of pyrethrum plant which revolutionized the approach for protection against insect pests^[1].

These pesticide of plant origin having nontoxic biodegradable and environmental friendly qualities. Leaf and flower extracts of the plants *Argimone-maxicana* and *Calotropis-procera* is prepared. Different doses of these plant extracts is given to the different developmental stages of *Helicoverpa-armigera* through feeding and topical methods³. Feeding method is found to be more effective then topical method, DharamShaktuand Menon (1983) reportedlarvicidal effects of *Agave americana*. A *Americana-marginata* and *culex-quinque-fasciatus*, Pandey et. al (1984) studied efficacy of extracts of four plants products and fond the effects in the order, *chrysanthemum cinerifolin*> *Gynandropsispentaphylla*> *AcorusCalams*> *croton sparsiflorus*^[4].

Material & Method

Experimental Insect

Helicoverpa-armigera (Hb) Lepidoptera: Noctuidae) common called grampodborer was selected for the proposed investigation. It is a polyphagous pest of a large host range including tobacco, cotton, cabbage, groundnut, gram, tomato etc. For laboratory rearing the adult moth of *Helicoverpa-armigera* was reared in glass tough jars in the laboratory, rearing was done at the temperature 27 ± 5, 75ts % RH 10:14 light dark period.

Result

The pupicidal and larvicidal action was evaluated by treating larvae and pupae of *Helicoverpa-armigera* with leaf extract of *Argimone-maxicana* and *Calotropis-procera*, observations were made through out larvae and pupae development till the adult formation.

A. *Argimone-Maxicana*

The larvicidal action and pupicidal action of *Argimone-maxicana* was evaluated by treating all the six larvae stages and pupae of *Helicoverpa-armigera*.

Leaf Extract

Effects on Larvae

Method of treatment – feeding, effective does – 75 ppm, 100 ppm leaves of *Argimone-maxicana*.

At the dose levels of 50, 75 and 100 ppm, the percent corrected mortality comes to 41.30, 65.22, 78.26 respectively as compared to 19.02 and 6.02 days in control, this is the case with third instar larvae. When Vth instar larvae were treated with the same doses, only 20 percent adult emergence is recorded as compared to 92 percent in control.

Effect on Pupae

Topical does 10, 15, 25, 50 ppm per pupa.

1. The percent mortality of male pupae is increases with the increases in the doses levels, only 20 percent adult emergence is recorded. Pupae period is also increases the maximum pupae dies within the exuviae. It the average adult emergence also decrease with the increase in the dose levels.

Calotropis Procera

Leaf Extract – Doses - 25 ppm and 50 ppm and the most effective doses.

Effective Larvae

At the doses level of 50 ppm, 100 percent mortality is recorded At 25 ppm 47.83 percent mortality is recoded as compared to only 8 percent in control. (Table -1) the larval and Pupae period is also increases. Vth instar stage is highly sensitive as 100 percent mortality at 75 ppm dose level is recorded and also there is a fall in the emergence of normal adults.



Blackening of 4th 5th & 6th instar larvae

Effects on Pupae

In the case of male pupa the percent mortality. Increases as the doses increases. At higher doses levels of 25 & 50 ppm per pupa the percent mortality. Comes to 40 and 50 as compared to no mortality in control.



**Death during Moulting of Pupae
Effects on Peritrophic Membrane**

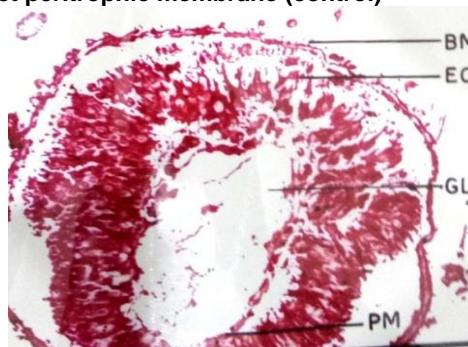
Following drastic changes observed in the peritrophic-membrane on treatment with the effective doses of both the plant extracts.

1. Discontinuous-peritrophic membrane.
2. Vacuolization in peritrophic membrane.
3. Flow of secretory granules towards lumen.
4. Disintegration of peritrophic membrane.
5. Vacuolization in epithelial cells.
6. Loosening of nuclei cells and their migration towards lumen.

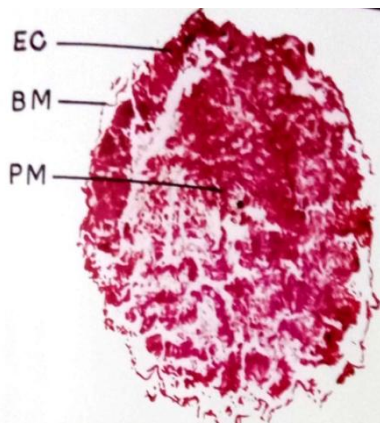


EC= Epithelial Cell,
GL = Gut Lumen,
PM = peritrophic membrane,
BM = Basement membrane

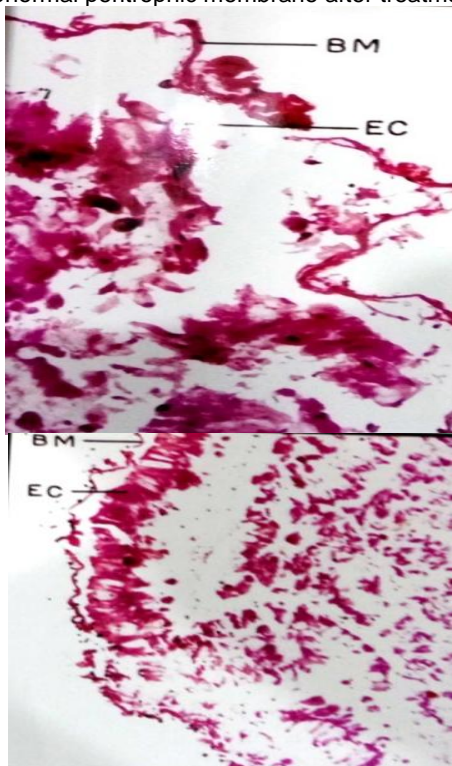
Intact peritrophic membrane (control)



EC= Epithelial Cell,
GL = Gut Lumen,
PM = peritrophic membrane,
BM = Basement membrane

Abnormal Peritrophic Membrane After Treatment

EC= Epithelial Cell,
PM = peritrophic membrane,
BM = Basement membrane

Abnormal peritrophic membrane after treatment

Abnormal PM after treatment with the effective doses of AM and CP leaf extracts

Aim of the Study

Bio-pesticides are bio-degradable and environmental friendly qualities and they have the potency to suppress the pest population. The main aim is to protect the environment and the biodiversity and to increase the crop production in comparison to pesticide.

Discussion

On treating the larvae with both the plant extract by feeding method the most effective dose come to 50, 75 and 100 ppm. most of the treated larvae die at the same stage at which the treatment is given. In the present findings high mortality during

moulting is due to weak and fragile exoskeleton, Singh and Kataria (1985) reported efficacy of chloroform extracts of bark of Karanja and petroleum ether extract of roots of french meringold. *Tagetes patula* as larvicide against *Culex fligans*. It is also suggested that as a result of damage caused to midgut, the food intake also reduces which leads the insect to starvation death.

Conclusion

The plant extracts of *Argimone-maxicana* and *Calotropis-procera* have the potency to suppress the reproducibility of the pest population. Prevailing view on the mode of action that these biopesticide plant extract inhibit chitin synthesis. Use of Biopesticides are less effected to the field bio-diversity also.

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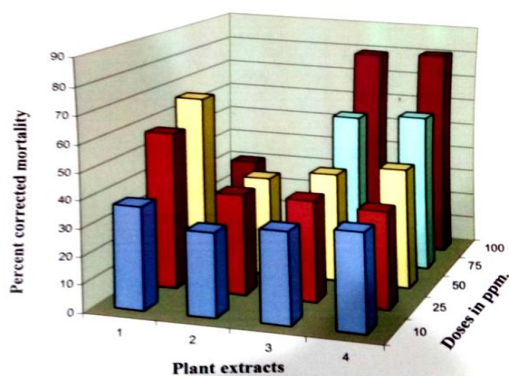
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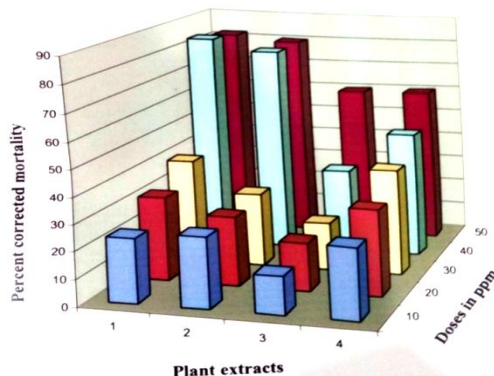
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Effect on feeding the newly emerged 6th instar larvae of *H. armigera* on the diet mixed with different doses of the plant extracts.



1. Calotropis Procera (Leaf)
2. Calotropis Procera (Flower)
3. Argimone Maxicana (Leaf)
4. Argimone Maxicana (Flower)

Effect of the plant extract on the 6th instar larvae of *H. armigera* applied topically on the ventral side of the abdomen.



1. Calotropis Procera (Leaf)
2. Calotropis Procera (Flower)
3. Argimone Maxicana (Leaf)
4. Argimone Maxicana (Flower)

Fecundity and fertility of 2 pairs of adults emerged out of 4th instar larvae of *H. armigera* treated with the plant extract of *Argimone maxicana* and *calotropis procera* by feeding method

Plant Extract	Dose (ppm)	Number of eggs laid		Percent egg hatching
		Total	Eggs/Female	
Calotropis procera (leaf)	25	180.0	90.4	22.12
	50	104.0	52.0	19.23
Argimone maxicana (leaf)	25	402.0	170.0	50.00
	50	304.0	152.0	40.78
	75	296.0	148.0	33.78
argimone maxicana (flower)	25	458.0	200.0	55.00
	50	323.0	160.0	45.40
Control	7	302.0	150.0	38.18
Control		584.0	292.0	85.56