2013 International Conference on Agriculture and Biotechnology
IPCBEE vol.60 (2013) © (2013) IACSIT Press, Singapore
DOI: 10.7763/IPCBEE. 2013. V60. 24

Larvicidal Effects of Leaf Powder of *Calotropis Procera* and *Argimone Mexicana* against 4th Instar of American Boll Warm, *Helicoverpa Armigera* (Hubner) (Noctuidae: Lepidoptera)

Deepali Lall[1+], Sudha Summerwar[2], Jyoutsna Pandey[3] and Arti Prasad[4]

[1] P.G. Department of zoology. S.D. Govt. College, Beawar, Rajasthan, India.
[2, 3] Research scholars, S.D. Govt. College, Beawar, Rajasthan, India.
[4] M.L.S. University Zoology Department, Udaipur 313004 India.

Abstract. The resistance of pesticide by the pest is an important matter of concern .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 perameters. The effect on paritrophic membrane is also studied.

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

1. Introduction

The problem of insect pest is intensified by a large number of insects of nuisance value to man and having a broad spectrum of their harmful effects .The most common example of this category is the Lepidopterain pests that are interfering in maintenance of a hygienic environment for healthy leaving. This moth is the single major pest for global plant agriculture. This moth and its close relatives over come chemical insecticide to attack over 100 crop plant species at an annual cost of over US $ five billion [1]. The gram (*Cicer aretinum*) is an important vegetable crop grown in the country, unfortunately this vegetable crop suffers heavily from various insect pest and disease which reduces not only to its yield but also spoil thequality [2]. Among the various pests the gram pod borer has been reported to cause maximum economic damage to the gram crops in India In agricultural pest management botanical insecticides are best suited for us in organic food production in industrialized countries but can play a much greater role in the production and post harvest protection of food in developing countries[3]. The use of simple formulation of plants such as leaf, flower or seed powder extracts needs of to be popularized. Their being safe to non target organism, including human [4].

2. Material and Methods

The selection of the pest was mainly based on the local pest problem and the rearing possibilities of the selected pest species under laboratory conditions. The gram pod borer *Helicoverpa armigera* belongs to order lepidoptera and family Noctuidae. It's a phytophagous pest. For rearing, adults were collected from the field by light trap method. They were allowed to mate and lay eggs in glass troughs which contain moist soil.

+ Corresponding author. Tel.: + 09549995657.
E-mail address: ravi.rqp@gmail.com.

The sides of the troughs were provided with paper so that female could rest and lay eggs on them. Water was added to the soil to maintain the humidity. The honey soaked cotton was changed daily. Soon after hatching of the egg, the 1st instar larvae transferred to the plastic vials containing fresh castor leaves. After 3rd instar stage the larvae were kept individually in plastic vials to avoid canabolism. 4th Instars were treated with the different doses of plant extract of *Argimone maxicana and calotropis procera,* observations were recorded up to F_1 generation. Doses were applied on the gram pods and also on the constant area of casor leaves with the help of pipette. The larvae were allowed to feed on them after the acetone were allowed to evaporate. In control the insect were fed on acetone treated food only. Doses applied from 25,50,75,100 ppm. and temp. was 27+3o.

3. Results and Discussion

3.1. Calotropis Procera (leaf extract):

Mortality increases as the dose level increases. At the dose levels of 10,25,50,75 and 100ppm, the percent corrected mortality comes to 41.17,52.17,69.56,100 as compared to 8 percent mortality in control (Table-1). There is a significant increase in the average larval periods. At the dose levels of 10,25,50 ppm. average larval period comes to 22.2,19.1and 20.0 respectively as compared to 6.0,9.2,6.0 days respectively. In control the average larval and pupal periods coms to 14.0,7.13 days respectively. There is no adult emergence at the dose level of 75ppm and higher. The adult emerged out of the treated forth instar larva show reduced fecundity and fertility. Prolongation in pre-oviposition period is occurred [5].

3.2. Argimone Mexicana (leaf extract):

Higher dose levels are very effective at the dose of 10, 25.50.75, and 100,the percent corrected mortality comes out to be 17.30,21.74 34.78,41.30,100as compared to 8 percent mortality in control (Table- 2). Abormalities maily observed at a very high dose level which mainly affects the fecundity n fertility [6]. In action the plant extracts are found to be larvicidal, pupicidal and adulticidal as evident by the occurrence of high mortality, peculiar abnormalities as well as reduced reproductive capability of the adults emerged out of treated developmental stage. Feeding treatment is found to be more effective to early instars in terms of abnormalities and reproductive potentiality of the adult emerged. [7]. Sharma at all (2009) reported the larvicidal properties of some plant extracts against *S. Litura*. [8].

The selected bio pesticides block the molting process at the level of synthesis of new cuticle and there by death occurs at exuviations. On treatment to larvae the effective doses were determined based on parameters mortality, abnormalities and reproductive potentiality of the emerged adults [9]. In general the effect of the pest includes the fall in natality due to disruption in development and growth and increase in mortality due to toxic action and death during moulting because of inadequate mode of action by the plant extracts. [10]. Adverse effects on reproduction which includes the following:

- Occurrence of larvae- pupae and pupae adult intermediate stage in capable of becoming adult [11].
- Adverse effect of larvae, such as darkening of skin and change in behavior.
- Reduction in fecundity and fertility. [12].
- Suppression of f1 generation. Eliman et al. (2009) suggested that compounds present in plants may individually or collectively contribute to produce larvicidal, pupicidal, adult emergence inhibition and other bioactivities against insects. [13].

3.2.1 Behavioural Aspect:

Treated fourth instar larvae becomes sluggish at higher dose level. The body becomes very dark, they become very lethargic. Food intake capacity become slow down, the average pupal period increases at a higher dose level.

4. Mode of Action

The prevailing view of mode of action is further supplicated the histopatholical studies on midgut of the larvae of *Helicoverpa armigera* treated with the plant extract of *Argimone Mexicana* and *Calotropic procera*

at the doses level of 25 ppm, 50 ppm, 75 ppm and 100 ppm respectively . The mid gut gets broken, dismantled and intermingled with the totally displaced epithelial cells Thus it is concluded that both these biopesticides have enough potentiality to suppress the dangerous pest *Helicoverpa armigera*, a better scope for agriculture and environment.

Table 1. Effect of plant extracts on mortality of 4th instar larva of *H. armigera*

Plant extracts	Dose (ppm)	Average larval period (days)	Percent larval mortality	Average pupal period	Percent pupal emergence	Percent total mortality	Percent corrected mortality	Percent adult emergence
Calotropis procera (Leaf)	10	22.02 ± 0.28a	40	6.02 ±0.14a	60	44**	41.17	56
	25	19.01 ± 0.06a	48	9.2 ±0.48a	52	56**	52.17	44
	50	20.02 ±0.22a	68	6.01 ±0.15a	32	72	69.56	28
	75 to 100	-	100	-	NIL	100	-	NIL
Argimone Mexicana (Leaf)	10	19.6 ±0.34	16	9.02 ±0	84	28*	17.39	76
	25	20.01 ±0.30a	20	9.04 ±0.02a	80	40*	21.74	72
	50	22.35 ±0.41a	36	9.02 ±0.64a	64	46**	34.78	60
	75	21.4 ±0.21a	40	9.1 ±0.10a	60	100	41.30	54
	100		100	-	NIL	-	-	NIL
Control		14.01 ±0.17	-	7.13 ±0.07	92	8	-	92

A=Values are significantly different from control (P‹0.01)
B=No significance between treated and control values. Number of test larvae Treated =25
=Individual died after undergoing very little or no morphogenetic change. Control=25
Died with severe morphogenetic change.

Table 2. Fecundity and fertility of 2 pairs of adults emerged out of of 4th instar larvae of *H. armiegra* treated with the plant extract *Argimone mexicana* and *Calotropis procera* by feeding method

Plant Extracts	Dose (ppm)	Number of eggs adult		(%) Hatching
		Total	Eggs/female	
Calotrpis procera (leat)	25	180	90.4	22.12
Argimone Mexicana (leaf)	25	402	170.0	50.00
	50	304	152.0	40.78
	75	296	148.0	33.78
Control		584	292.0	85.56

5. Acknowledgement

The Authors acknowledge the women farmers of fields for their keen interest regarding our work on biopesticide and the harmful consequences of pesticidal spray. Thanks to U.G.C. New Delhi for financial support.

6. Referencess

[1] N. Bhuyan, B. N. Saxena, and K. M. Rao. Repellent property of oil fraction of garlic *Allium sativum* Linn. *Indian J. Exp. Biol*. 1974, pp. 575-576.

[2] H. Chander, and S.M Ahamd. Effect of sum plant material on the development of rice moth. *Entomen*. 1986,11(4): 273-276.

[3] M.F. Mahmoud, and M.A. Shoieb. Sterilent and ovi position deterent activity of neem formulation on peach fruit fly *Bactrocera zonata* sounders Diptera: tephritidae. *Jouranl of bio Pesticides*. 2008, 1(2): 177-181.

[4] O. Koul, M.P. Jain, and V.K. Sharma. Growth inhibitory and antifeedant activity of extracts from *Melia dubia* to S*podoptera litura* and *Helicoverpa armigera, Indian Journal Exp Biology.* 2000, 38(1): 63-68.

[5] A. Sharma, R. Gupta and R. Kanwar. Larvicial effect of some plant extracts against *Spodoptera litura* (Fab) and *Pieris brassicae (*Linn*). Journal Entomol Res*. 2009, 33: 213-218. *s*

[6] O.N. Oigiangbe, I.B. Igbinosa, and M. Tamo. Insecticidal activity of the medicinal plant, Alstonia booonei De Wild, against Sesamia calaistis Hampson. *Journal Of Zhejiang University Science*. 2007, B 8: 752-755.

[7] R. Pavela. Insecticidal activity of certain medicinal plants. *Fitoterapia.* 2004, 75: 745-749.

[8] O. Koul, M.P. Jain, and V.K. Sharma: Growth inhibitory and antifeedant activity of extracts from *Melia dubia* to

S*podoptera litura* and *Helicoverpa armigera, Indian Journal Exp Biology* 2000., 38(1): 63-68.

[9] G. Sundavarajan, and R. Kumuthakalavalli. Antifeedant activity of aqueous extract of *Gnidia glauca Gilg and Toddalia asiatica* Lam on the gram pod borer, *Helicoverpa armigera (*Jubner*). Jour. Environ. Biol.* 2001, 22(1): 11-14.

[10] A.M. Eliman, K.H. Elmalik and F.S. Ali. Efficacy of leaf extract of *Caltopis procera* Ait. (Asclepiadaceae) in controlling *Anopheles arabiensis* and *Culex quinquefasciatus* mosquitoes. Saudi. *Jour. Of Biol. Sciences.* 2009, 16 : 95-100.

[11] A. Sharma, R. Gupta and R. Kanwar. Larvicial effect of some plant extracts against *Spodoptera litura* (Fab) and *Pieris brassicae (*Linn*). Journal Entomol. Res.* 2009, 33: 213-218.

[12] A.M. Eliman, K.H. Elmalik and F.S. Ali: Efficacy of leaf extract of *Calotropis procera* Ait. (Asclepiadaceae) in controlling *Anopheles arabiensis* and *Culex quinquefasciatus* mosquitoes. Saudi. *Jour. Of Biol. Sciences*. 2009, 16: 95-100.

[13] K. Elumalai, A. Jeyasankar, N. Raja and S. Ignacimuthu. Ovicidal and larvicial activity of certain plant extracts against the tobacco armyworm, *Spodoptera litura* (Fab). (Lepidoptera:Noctuidae). *J. Curr. Sci.* 2004, 5: 291-294