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Effect of ecofriendly indigenous products with chemical insecticides on mortality percentage of 3rd instar larvae of *Helicoverpa armigera* (Hubner)

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ABSTRACT

Gram pod borer (*Helicoverpa armigera*) is the most serious pest responsible for higher yield losses in chickpea, cotton and red gram in India. *Helicoverpa armigera* is the major pest of many crops and considered as the main pest of chickpea. No plant seems to be strong enough to avoid attack of *Helicoverpa armigera* in affected field. Larvae of *Helicoverpa armigera* (Hubner) were collected from the nearby fields of chickpea. Present study was conducted to determine the susceptibility of *Helicoverpa armigera* (Hubner) for indigenous products and insecticide at various treatment. Seven treatments and five replication in indigenous products along with four treatment and five replication were taken up for the experiments. The data collected was analyzed using CRD design. Mortality of third instar *Helicoverpa armigera* (Hubner) was evalatued using tobacco leaf extract 10 per cent, Neem seed kernel extract 10 per cent, Neem leaf extract 10 per cent, cow urine 10 per cent, cow dung 10per cent and cow urine + cow dung 5 per cent and plain water as control. The result revealed that T_1= tobacco leaf extract 10 per cent gave minimum mortality (7.37%) and T_6= Cow urine + cow dung 5 per cent gave maximum mortality (26.32%) third instar larvae *Helicoverpa armigera* (Hubner) and Mortality of third instar of *Helicoverpa armigera* was evaluated using Quinolphos 0.01 per cent, Cypermethrin 0.01 per cent and Chlorpyrifos 0.01 per cent and plain water as control. The results revealed that T_2= Cypermethrin gave minimum mortality (48.91%) and T_3 = Chlorpyrifos gave maximum mortality (77.66) third instar larvae of *Helicoverpa armigera*.

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INTRODUCTION

Chickpea (*Cicer arietinum* L.) is one of the most important pulse crops of india. India is the largest producer with 75 per cent world acreage and production

of gram. India is the largest producer and consumer of pulses in the world. The pulses are known to improve the physical characteristics of the soil by their tap root system apart from atmospheric nitrogen through biological fixation. Chickpea is the world third most important pulse crops grown on about 10 million hectares annually (Rheenaen and van Rheenen, 1991). The Gram pod borer, Helicoverpa armigera (hubner) is serious polyphagous agriculture pest responsible for higher yield loss in chickpea,redgram,soyabean,groundnut (Fiit,1989) in India. *Helicoverpa armigera* is a major pest of many crops and considered as the main pest of chickpea. Female lay eggs on the flowering and fruiting structure of these crops, boracious larval feeding lead to substantial economic loss (Reed and Panwar, 1982). The crop is damaged extensively by gram pod borer, *Helicoverpa armigera (*Reed *et al.*, 1980; Lal *et al.*, 1985; Naresh and Malik, 1986 and Deka *et al.*, 1987). It feed on tender shoots and young pods. They make holes in pods and insert their half body inside the pods to eat the developing seeds(Kadam and Patel,1960). The damage may reach 10-30 per cent in grains yield or even up to 60 per cent (Vaishampayan and Veda, 1980). The damage to pods and seeds by pod borer varies from 13.58-84.28 and 3.15-84.28 per cent, respectively. These losses to the crop can be reduced by the application of insecticides (Goholar *et al*., 1987). The investigation was carried out to study the effect of ecofriendly indigenous products with chemical insecticides on mortality percentage of 3rd instar larvae of *Helicoverpa armigera* (Hubner).

MATERIAL AND METHODS

The present investigation was carried out at laboratory of Department of Plant Protection, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad. Third instar larvae of *Helicoverpa armigera* were collected from the nearby field of chickpea.

Bioassays :

The trail was conducted at Plant Protection Laboratory. The bioassay was done in beaker (100ml) by using pod dip method. The chickpea pods were dipped in the extract of different treatment *viz.*, Neem seed kernal extract (T_1), Neem leaf extract (T_2), Cow urine (T_3) Cow dung (T_4) and Cow urine + cow dung in indigenous and in chemical insecticide quinolphos (T_1), Cypermethrin (T_2), Chlorpyrifos (T_3), Newly emerged third instar larvae of *Helicoverpa armigera* were exposed of the test insecticides at seven treatments in indigenous and in chemical four treatments. The pod dip method was used as unsparayed chickpean pods were taken, and washed. The were dikpped in test solution for ten second with gentle agitation and were placed on filter paper for drying. The pods were palced in a plastic box with a thin layer of agar underneath to avoid desiccation in five replicates. In each box twenty five larvae were placed with a fine camel hair brush and boxes were placed with lids in order to keep everything under controlled environmental conditions.

Indigenous products:

Undamaged ripe berried and fresh leaves of neem were gathered from neem trees. The outer layer of the pulp was removed from the seeds. After cleaning, the seeds and leaves were spread out separately under shaded on cloth to dry for few days, grinding of dried neem seeds and leaves was done using electric grinder and the resulting powder was sieved using sieves in order to remove coarse particles. The mortality percentage in different treatments were recorded against percentage was calculated after necessary correction with natural mortality by Abbott (1925).

RESULTS AND DISCUSSION

The mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) was noted after 24 hours of treatment of given in Table 1.

All the treatment of indigenous gave statistically significant mortality of third instar larvae of *Helicoverpa armigera* (Hubner) as comarpd to the control. After 24 hours of exposure maximum mortality was noted in the treatment of T= Cow urine + Cow dung 5 per cent (26.32%) and minimum mortality was noted in the T_1 = Tobacco 10 per cent (3.37%) treatments at T_2 = NSKE 10 per cent (13.68%), T_4 = Cow urine 10 per cent (17.89), T_3 = Neem leaf extract 10 per cent (21.05%) and T_5= Cow dung 10 per cent (24.21%), were found statistically significant when compared with the treatment of T_6 = Cow urine + cow dung 5 per cent (26.32%).

The mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) was noted after 48 hours of treatment of given in Table 2. All the treatment of indigenous gave statistically significant mortality of

third instar larvae of *Helicoverpa armigera* (Hubner) as compared to the control. After 48 hours of exposure maximum mortality was noted in the treatment of T_5 = cow dung 10 per cent (25.00%) and minimum mortality was noted in the T_1 = Tobacco 10 per cent (8.33%) treatment at T_4 = cow urine 10per cent (11.46%), T_3 N= Neem leaf extract 10 per cent (14.58%), T_2= NSKE 10 per cent (18.76%), and T_6 = cow urine + cow dung 5 per cent (22.92%) were found statistically significant when compare with the treatment of T_5 = cow dung 10 per cent (25.00%).

The mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) was noted after 72 hours of treatment of given in Table 3. The mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) was noted after 48 hours of treatment

Table 1 : Effect of mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) by indigenous products at 24 hour after expose

Treatments	R_1	R_2	R_3	R_4	R_5	Net mortality
T_0 (Control)	0	1	2	2	0	0.00
T_1 (Tobacco leaf extract)	3	4	2	2	1	7.37
T_2 (NSKE)	2	4	5	4	3	13.68
T_3 (Neem leaf extract)	4	3	89	6	4	21.05
T_4 (Cow urine)	4	6	2	5	4	17.89
T_5 (Cow dung)	4	2	9	7	6	24.21
T_6 (cow urine + cow dung)	2	5	7	5	11	26.362
F-test						S
S.E. $\pm$						1.232
C.D. (P=0.05)						2.613

Table 2 : Effect of mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) by indigenous products at 48 hour after expose

Treatments	R_1	R_2	R_3	R_4	R_5	Net mortality
T_0 (Control)	0	1	1	0	2	0.00
T_1 (Tobacco leaf extract)	3	2	2	2	3	8.33
T_2 (NSKE)	2	3	8	7	2	18.375
T_3 (Neem leaf extract)	4	3	2	5	4	14.58
T_4 (Cow urine)	3	4	3	2	3	11.46
T_5 (Cow dung)	2	8	5	3	5	25.00
T_6 (cow urine + cow dung)	2	5	6	11	2	22.92
F-test						S
S.E.$\pm$						1.310
C.D. (P=0.05)						2.777

Table 3 : Effect of mortality percentage of third instar larvae of *Helicoverpa armigera* (Hubner) by indigenous products at 72 hour after expose

Treatments	R_1	R_2	R_3	R_4	R_5	Net mortality
T_0 (Control)	1	2	1	1	2	0.00
T_1 (Tobacco leaf extract)	2	3	5	4	4	11.83
T_2 (NSKE)	3	4	6	3	3	12.90
T_3 (Neem leaf extract)	6	2	8	5	4	19.35
T_4 (Cow urine)	2	4	5	5	8	18.28
T_5 (Cow dung)	6	4	2	2	3	22.58
T_6 (cow urine + cow dung)	3	4	3	2	1	24.73
F-test						S
S.E. $\pm$						1.310
C.D. (P=0.05)						2.777

Table 4 : Comparison table of indigenous products

Treatments	24hrs	48hrs	72hrs
T_0 (Control)	0.00	0.00	0.00
T_1 (Tobacco leaf extract)	7.37	8.33	11.83
T_2 (NSKE)	13.68	18.75	12.90
T_3 (Neem leaf extract)	21.05	14.58	19.35
T_4 (Cow urine)	17.89	11.46	18.28
T_5 (Cow dung)	24.21	25.00	22.58
T_6 (cow urine + cow dung)	26.32	22.92	24.73
Comparisons	F-test	S.E.±	C.D. (P=0.05)
Hours	NS	0.47	0.96
Treatments	S	1.08	2.21

NS=Non-significant

of given in Table 2. After 72 hours of exposure maximum mortality was noted in the treatment of T_6= Cow urine + cow dung 5 per cent (24.73%) and minimum mortality wsa noted in the T_1 = Tobacco 10 per cent (11.83%) treatment at T_2 = SNKE 10 per cent (12.90%), T_4 = cow urine 10 per cent (18.28), T_3 = Neem leaf extract 10 per cent (19.35%) and T_5 = cow dung 10 per cent (22.58%) were found statistically significant when compared with the treatment of T_6 = Cow urine + Cow dung 5 per cent (24.73%).

The mortality percentage of third instar larvae of Helicoverpa armigera was noted after 24 hours, 48 hours, and 72 hours of treatments given in Table 4. All treatments of indigenous products gave statistically significant mortality of third instar larvae of *H. armigera* as compared to the control. After 24 hours of exposure maximum mortality was noted in the treatment of T_6 = cow urine + cow dung 5 per cent, (26.32%) and minimum mortality was noted in the T_1 = Tobacco leaf extract 10 per cent (7.37) treatment at T_2= Neem seed kernel extract 105, (13.68%) and T_4 = Cow urine 10 per cent, (17.89%), T_3 = Neem lea extract 10 per cent (21.05%) and T_5 = Cow dung 10 per cent (24.21%) were found statistically significant when compared with the treatment of T_0 = Control and 48 hours of exposure T_5 = Cow dung 10 per cent (25.00%) tobacco leaf extract 10 (8.33%), T_4 = Cow urine 10 per cent, (11.46%), T_3 = neem seed kernel extract 10 per cent, (14.58%) T_2= Neel leaf extract 10 per cent (18.75%) and T_6 = Cow urine + cow dung 5 per cent (22.92).

After 72 hours of exposure T_6 = Cow urine + dung 5 per cent (24.73%) as compared to T_1 = Tobacco leaf extract 105 11.83%) T_2 = Neem seed kernel extract 10 per cent (12.90), T_4 = cow urine 10 per cent, (18.28), T_3 = Neem leaf extract 10 per cent (19.35%) and T_5 = cow dung 10 per cent (22.58%) all the treatment were found statistically significant when compared with control.

The present study generally indicated that Cow – urine – Cow dung have significantly reduced the growth and development of *H. armigera* larvae and pupae. The results of the present study showed that T_6 = Cow urine + Cow dung 5 per cent was more effective for third instar larvae of Helicoverpa armigera as coamrped to other treatments.

The same result were observed by Peries (1985) and Rankin (1986), respectively. The second instar larvae were more susceptible to the cow urine + cow dung and after 72 hours the maximum mortality was observed in the treatment where cow urine + cow dung was used. This treatment gave the mortality of 3rd instar larvae of *H. armigera* at the same exposure interval.

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