SUMMARY

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The present study aimed to evaluate the effect and the insecticidal activity of some tested compounds such as the bacterial formulation protecto *(B. thuringiensis var kurstaki),* the chemical insecticide (lannate) and the plant extracts namely (coumarin & azadirachtin) against the 4th instar larvae of the cotton leafworm, *S. littoralis.*

This study aimed to evaluate:

1. The antifeedant activity of tested compounds against 4th instar larvae of the cotton leafworm , *S. littoralis*
2. Insecticidal and some biological aspects of *S. littoralis* such as larval mortality, larval duration, percentage of pupation, pupal duration, percentage of adult emergence and sex ratio. Also, malformation of pupae and adults, egg deposition, hatchability percentage and sterility percentage.
3. The histopathological effect of tested compounds on the mid gut of treated larvae.
4. The effect of tested compounds on total soluble protein, carbohydrate hydrolyzing enzymes, transaminase (GPT&GOT), alpha & beta esterase, acid & alkaline phosphatase and acetylcholinesterase enzyme.

The results may be summarized as follows:

I. Antifeedant activity:

Out of 4 different tested compounds with regard to antifeedant effects against 4th instar larvae of the cotton

leafworm larvae, data indicated that the plant extracts coumarin and azadirachtin recorded the highest antifeedant activity while insecticides lannate and protecto gave the lowest antifeedant activity. Coumarin recorded the highest mean of antifeedant activity reached (69.07) followed by azadirachtin (58.17), lannate (48.15) and protecto (19.50), respectively.

II. Insecticidal activity:

Data indicated that the chemical insecticide, lannate had the superior insecticidal activity followed by coumarin, while azadirachtin showed moderate activity. On the other hand protecto showed lower larvicidal activity. The tested compounds could be arranged according to their larvicidal activities against the cotton leafworm larvae based on LC_{50} in the following descending order:

Lannate (13.72 ppm), < protecto (0.39 g/100 ml), < coumarin (0.84g/100 ml), < azadirachtin (1.85m1/100m1).

III- Biological effects of tested compounds on the 4th instar larvae of *S. littoralis*.

1- Larval mortality:

Cumulated mortality percentage increased with increasing both the time elapsed after treatment and the tested concentration of these compounds. So, the larval mortality after treatment of the 4^{th} instar larvae with lannate, protecto, Coumarin and azadirachtin ranged between (48.3-70.0%), (20.0-50.0%), (25.0-60.0%) and (21.6-55.0%), respectively.

2- Larval duration:

Data showed that coumarin, azadirachtin and lannate concentrations exhibited longer larval duration of the 4th instar larvae, when compared with untreated larvae, while protecto gave a slight difference in the total larval period between the treated and untreated larvae.

3- Pupal stage duration:

The results showed that all tested compounds concentrations led to significant increase in pupal stage duration after treatment of the 4th instar larvae compared with the untreated ones.

4- Percentage of adult emergence:

It increased with decreasing the tested concentrations of the four tested compounds. The percentage ranged between (44.4-77.4%), (73.3-91.6%), (50.0-88.8%) and (66.6-85.1%) after treatment of the 4th instar larvae with lannate, protecto, coumarin and azadirachtin, respectively.

5- Sex **ratio:**

The comparable results of the 4th instar treated larvae revealed that the average number of males was higher than that of females with protecto, coumarin and azadirachtin treatments. In contrast, with lannate treatment, the average number of males was slightly lower than females.

Also, data showed that adult and pupal deformation percentage and increased with increasing tested compounds concentrations, while lannate treatment did not show any pupal malformation. In addition, the untreated (control) did not show

any adult or pupal malformations. Number of eggs/female and hatchability % were decreased with increasing concentrations of tested compounds. Female sterility percentage increased by increasing concentrations of tested compounds.

V. Histological effects of tested compounds on the mid-gut of the 4th instar treated larvae of *S. littoralis.*

1. The effect of lannate (chemical insecticide)

Lannate led to basement and peritrophic membrane detachment and destruction, appearance of numerous vacuoles, destruction of epithelial cells that emptied their cytoplasmic contents in the lumen.

2. The effect of protect ، *(B. thuringiensis kurstaki)*

Protecto caused detachment and destruction of the basement and peritrophic membrane, vacuolization and destruction of the epithelial cells.

3. The effect of coumarin & azadirachtin (plant extracts)

Plant extracts caused basement membrane detachment followed by destruction, destruction of epithelial cells which showed thickness in some points. In some cases, the epithelial cells appeared deformed and became elongate in size than those of the control larvae.

VI. Biochemical effects of the tested compound on 4th instar larvae of *S. littoralis:*

The tested compounds caused significant decrease in the total soluble protein content of the 4th instar larvae of the cotton leafworm. On contrary, the tested compounds (except lannate)

caused significant increase in the activity of acetylcholinesterase enzyme. Also, tested products caused significant increase in the activity of acid phosphatase and amylase enzyme (except protecto and lannate decrease the activity of amylase enzyme), on contrary, tested compounds showed significant decrease in the activity of alkaline phosphatase enzyme. On these compounds coumarin and azadirachtin, significantly, increased a-esterase. While the other compounds caused significant decrease in the activity of this enzyme and 13-esterase enzyme. Data also indicated that tested compounds, significantly, increased the activity of GOT (except lannate). On contrary, all tested compounds caused decrease in the activity of GPT. As for invertase activity all tested compounds caused decrease in this enzyme activity except coumarin had no effect and similar to control. Trehalase showed the same decreasing effects (except coumarin), while azadirachtin similar to control and had no effect on the 4th instar larvae of *S. littoralis.*