



**Suez Canal University
Faculty of Science
Ismailia**



Evaluation of *Ruta angustifolia* (Pers.) plant extracts as a control agent of cotton leafworm, *Spodoptera littoralis* (Boisd.)

**A Thesis Submitted by
Mohamed Gamal Mahmoud Ibrahim Salama
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Abstract

The toxic effects of some *Ruta angustifolia* extracts as bio agents to control *Spodoptera littoralis* were investigated. Based on LC₅₀ values, the acetonic extract was more effective than hexane and ethyl alcoholic ones. Three compounds were isolated from the acetonic crude extract (neobavaisoflavone, ergosterol-propyl ester and 2-(2phenethyl chromone) 3methoxy) by thin layer chromatography and identified using Infra-Red spectrophotometer and Mass Spectrum. These compounds were evaluated for its larvicidal, biological, ultrastructure and biochemical effects on 4th instar *S. littoralis* larvae as compared to pyrethrin (commercial plant extract). The most prominent biological effects were presented as: prolongation in the total larval and pupal duration and reduction in the percentages of survived larvae, pupation, as well as, pupal weight. The adult emergence percentages, longevity, fecundity, hatchability were significantly decreased compared to controls. Also, some deformation symptoms were recorded in larvae, pupae and adults. The ultrastructure alterations in *S. littoralis* 4th instar larvae were observed in cuticle microfilament in muscle myofilaments, destruction of epithelial cells and their boundaries dilation in epithelial nucleus with fragmentation of chromatin matter and fragmentation in microvilli compared to control. Biochemical responses of the 4th instar *S. littoralis* larva

has decreased in the activities of ALT, AST and chitinase, except ergosterol-propyl ester and pyrethrin recorded increased in activity of AST enzyme. The activity of carbohydrate hydrolyzing enzymes (amylase, invertase and trehalase) generally high significant decrease as affected by all tested treatments than controls, except neobavaisoflavone and ergosterol-propyl ester were recorded increased in activity of invertase enzyme. All treatments showed a decrease in total lipid content compared to (-ve and +ve) controls.

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