



**Morphological and biochemical effects of insect growth
regulators; Diflubenzuron and chromafenozide on the cotton leaf
worm *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae)**

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First and Foremost,
Great Thankful To ALLAH
For Helping Me
To Finish This Work

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ABSTRACT

The present study was undertaken to investigate the possible harmful impacts of the LC₅₀ of the IGRs: the chitin synthesis inhibitor, Dimilin® (Diflubenzuron), and the ecdysone agonist, Virtu® (Chromafenozide) on the susceptibility, biology, biochemistry, ovarian tissue of adult female and larval corpus allatum of *Spodoptera littoralis*. The LC₅₀ (1.3 & 3 ppm of Dimilin® and 0.1 & 0.1 ppm of Virtu®) were applied to the 2nd and 4th larval instars, respectively. Treatments caused a reduction in pupal weight, adult emergence, fecundity, fertility and male & female longevity. Sex-ratio was directed to female rise with Dimilin® treated larvae but to males in Virtu® treated cases.

Quantitative and qualitative analysis of 6th instar larval haemolymph and whole-body homogenate revealed an increase of total protein content with Dimilin® in haemolymph but a decrease of total protein content in the rest. Total carbohydrate and lipid contents were decreased in all treated samples. However, native protein, glycoprotein, lipoprotein as well as alcohol dehydrogenase (ADH), aldehyde oxidase (AO), α - and β -Est and fractional protein were differed in banding patterns compared to control.

Histopathological study of the ovary showed that the ovarian follicles of treated F1 females with Dimilin® exhibited vacuolization, stuffing of follicular sheath, loss of vitellin and degeneration of many cell components of follicular epithelium and oocytes. These obvious signs of damage were increased when using 4th larval instars treatment than the 2nd. Also, damage was pronounced in the ovarioles of the Virtu® treated F1 females. Ovariole growth was stunted and vitellogenesis and chorion formation were inhibited.

While at the ultrastructural level, the moth ovary from treated 2nd instar larvae with Dimilin® (**D II**) showed separation of outer sheath and shrunk of tunica propria as well as pyknotic follicular nuclei. The

moth ovary from treated 4th instar larvae with Dimilin® (D IV) illustrated irregular shaped and pyknotic follicular nuclei, degenerated microvillar region, degenerated yolk granules and signs of autolysis. In 2nd instar larvae treated with Virtu® (V II), pyknotic follicular nuclei with irregular shape, ruptured of nuclear envelope and degenerated yolk granules were observed in moth ovary. However, the 4th instar larvae treated with Virtu® (V IV) showed follicular nuclei with irregular shape and pyknosis and the cytoplasm appeared with fragmentation of RER with loss of ribosomes.

Corpus allatum of 6th larval instar treated with LC₅₀ of diflubenzuron appeared with oval shape and decreased size. Contradictory, an increase was observed in cellular cortex and glandular cell numbers and their nuclei lost their spheroid shape. Also, damage was pronounced in the CA of the LC₅₀ chromafenozide treated larvae.

Therefore, this work shows the high potency and efficacy of the two IGRs on developed ova of *S. littoralis*. Also, results indicated that the Virtu® was more effective than Dimilin® on the pupal weight, fecundity, egg hatchability and percentage of emergence. Moreover, 2nd instar larvae were more susceptible than 4th instar larvae.

Key words: Cotton leafworm *S. littoralis*, diflubenzuron, chromafenozide, toxicity, biology, biochemistry, histology, ultrastructure, ovary, corpus allatum

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Arabic summary

Arabic abstract

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