6-SUMMARY

The present study aimed to evaluate the biological effect of some insect growth regulators (Cascade and Match) as a chitin synthesis inhibitors and (Mimic) as a molting agonist, against 2nd and 4th larval instars of *Spodoptera littoralis*, to determine their toxicity. Effect of sublethal doses LC_{25}, LC_{50} and LC_{90} were used to investigate the enzymatic activities and molecular changes in the vira-like gene at different time's intervals.

➢ Biological studies:-

Second and fourth larval instare of *S. littoralis* were treated with different concentrations of the tested IGRs, and some biological aspects of the treated instars as well as their sub-sequent developmental stages were determined.

All the tested IGRs significantly increased the larval and pupal durations, on the other hand decrease the percentages of pupation, adult emergency, fecundity and fertility of the eggs produced by the adult progeny. All the tested compounds significantly induced larval mortalities, which were dose dependant.

➢ Morphological abnormalities:-

- **Larval instars:**

Treatments of the 2nd and 4th larval instars with the tested IGRs induced some morphogenic abnormalities in larval stages, larval-pupal intermediates were also recorded.

- **Pupal stage:**

Pupae with different degrees of morphogenic malformations such as dwarfed pupae, pupae with C-shape, pupae with enlarged and shortened body were recorded, as well as pupal-adult intermediate.

- **Adult stage:**

Some emerged adults have various degrees of malformations. Adults were completely free but possessed crumpled and incomplete formation of wings and dwarfed adults were also recorded.

➢ Toxicological studies:-

All the treated larvae as 2nd instar showed a high sensitivity to all tested IGRs more than 4th instars, Cascade was the more toxic compound followed by Match , finally Mimic showed the least toxic effect.

➢ Some enzymatic activities:-

The treated larvae in both 2nd and 4th larval instars with the sublethal doses LC_{25}, LC_{50} and LC_{90} showed a significant decrease in enzyme activities of acid phosphatase and the non- specific esterases, α,β esterases at different times intervals post treatments.

➢ Molecular studies:-

Both of molecular observations and bioinformatics studies showed that the tested IGRs have a significant effect on the vira-like chitinase gene. Induced mutations could be representing the mechanism in which these compounds acting inside insects. Generally the chitin synthesis inhibitors IGRs used in this study were more effective on the studied gene more than the molting agonist one.