Biochemical studies on the effect of some pesticides on cotton leaf worm and experiment animals

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The present work was divided into two parts. The first one was carried out to study morphological, biological and biochemical effects of Bacillus thuringiensis var kurstaki, Chlorpyrifos as an organophosphorus compound; and Flufenoxuron and Hexaflumuron as Insect growth regulators on cotton leaf worm Spodoptera littoralis.The other part of the study was carried out to study the changes occurred to albino rats treated with each of the previous noted pesticides separately which include; serum study of biochemical parameters of blood including cholinesterase activity, liver function tests, kidney function tests, serum triglycerides and serum cholesterol which confirmed by the histopathological findings of tissues. The work studied also the changes of the hematological parameters (complete blood picture) and reproductive system parameters including progressive motility, live and dead sperms, abnormal sperms and concentration of sperm cells.The effects of B. thuringiensis, chlorpyrifos and flufenoxuron and hexaflumuron on toxicological studies, certain biological, biochemical aspects of late 6th instars of S. littoralis treated as newly moulted 4thinstars with the LC50 values of these compounds were studied.B. thuringiensis (Kurstaki) exhibited good mortality (LC50) against 4th instar of Spodoptera littoralis at concentrations of 3.5x103 IU/ml. data also revealed that the LC50 of chlorpyrifos was 0.89 ppm and the LC50 of flufenoxuron and hexaflumuron were (0.97-1.93) ppm, respectively. The data obtained showed that the treatment of 4th instar larvae of Spodoptera Littoralis with Bacillus Thuringiensis, chlorpyrifos and both IGRs resulted in a significant prolongation in both the larval and pupal duration except in case of chlorpyrifos the pupal duration had not affected. On the other hand all treatment decreased the pupal weight, pupation %, adult emergence % and adult longevity for both male and female.B. thuringiensis, Chlorpyrifos and Flufenoxuron and Hexaflumuron significantly decreased AST and ALT activities of S. littoralis late 6th instars treated as 4th instars with the LC50 of these compounds as compared to non-treated larvae. In contrast, the used treatments significantly increased the acid and alkaline phosphatases activities of late 6thinstars treated also as 4th instars. However the treatment with Chlorpyrifos and Flufenoxuron decreased acid phosphatase.The total content of the main nutrients (lipids, proteins) of late 6th instars showed a great variation with the different treatments. The total content of lipids was increased at treatment with Chlorpyrifos and both IGRs while was decreased at treatment with B. thuringiensis, only. The total content of proteins was decreased at all treatment. All treatments decreased cholinesterase activity significantly. On contrast the treatmentsSummary and Conclusion - 116 -caused increasing in proteases activity except in B. thuringiensis it caused non significant decrease.On the other hand there is several larval malformation recorded when the 4th larval instars treated with Hexaflumuron and Flufenoxuron, the larvae showed shrinkage of the all body compared to control. As the result of treatment the 4th instars of S. littoralis with Hexaflumuron and Flufenoxuron, the larvae failed to complete the pupation so that there is larval pupa intermediate shape. Also the abnormalities of adult appear as shorten of the wings and adult failed to get rid of its puparium.The 2nd part of the present study revealed that administration of B. thuringiensis (Kurstaki) for 12 weeks to rats at dosages of 10000 mg/kg/day produced no toxic effects. No significant increase or decrease in body, liver, kidney, and testicular

weights of B.t. treated rats as compared to the level of the control group. No significance in the values of serum liver enzymes, triglycerides, cholesterol, total protein, kidney function tests, serum uric acid, serum cholinesterase activity and hematological changes.The present study revealed that the effects of Flufenoxuron and Chlorpyrifos on body weight, since it was observed a significant decrease in body weight of rats, increased liver weight but the kidney weight decreased, in addition to that there were slightly decrease in testicular weight as compared to the level of the control group.The mean values of plasma transaminase activities of AST ALT and ALP. showed slightly increase in the treatment of chlorpyrifos and flufenoxuron in comparing to control group in the 4 weeks and 8 weeks but there were highly significant increase in the 12 weeks in comprising to control group.Values of triglycerides showed significant increase throughout the experiment and significant hypercholesterolemia was noticed in treated rats. Regarding serum total protein, the results showed slightly reduction in total protein after oral administration of chlorpyrifos and flufenoxuron after 4th, 8th and more decrease in the 12th weeks in comprising to control group. Mean values of serum urea, creatinine and uric acid were elevated throughout the experiment. The significant uremia was noticed during the 8th week and 12th week of treatment of the both insecticides.Data presented indicated that serum acetyl cholinesterase (AChE) activity flufenoxuron administration caused slightly decreased in the all time of treatment, but there were significant decrease in this enzyme activity in the treatment of chlorpyrifos in the 4th week and became highly decreased in the rest of time of treatment in comparison to control.Regarding to hematological parameters the results revealed that prolonged administration of chlorpyrifos in 4 weeks, 8 weeks, and 12 weeks caused no effect of hemoglobin concentration, a significant decrease in leukocyte count, erythrocyte count, hematocrite value, platelet count and blood indices, while flufenoxuron had a significant decrease in allhematological parameters in comparison to the control group.Regarding to the point of reproductive parameters of the treated rats the work results indicated that chlorpyrifos and flufenoxuron administrated caused that testis weight showed significant decrease at the end of 12th week in comparison to that of control group. The concentration of sperm cells in flufenoxuron administration showed significant decrease in comparison to the control group. However, it showed in chlorpyrifos highly significant decrease in comparison to the control. Data also indicated that the percentage of live sperms of the flufenoxuron treated rats significantly decreased, while it showed highly significant decrease in chlorpyrifos treated rats in comparison to the control. The percentage of abnormality sperms flufenoxuron administration to rats showed slightly increase in abnormal sperm. However, it showed in chlorpyrifos significant increase in comparison to the control.About the point of the microscopic exanimation revealed mild to moderate degree of degenerative changes in germinal layers of seminiferous tubules in the form of appearance of vacuolation moderate separation of basement membrane and occlusion of seminiferous tubule of the testis of the flufenoxuron treated rats. While administration of chlorpyrifos led to severe degree of degenerative changes in germinal layers of seminiferous tubules with engorgement of blood vessels.SThe kidneys showed that following picture on the flufenoxuron treated rats; the capillary tuft appeared smaller with partial endothelial vacuolation. The Bowman’s space was increased. The convoluted tubules were widely separated, narrowing of tubules due to cloudy swelling of their cells. While in case of chlorpyrifos administration; the glomeruli capillaries appear small with partial endothelial vacuolation. There were also widening in Bowman’s spaces. There is an increase with marked distortion. The intertubular spaces were marked increased.The hepatocytes showed cytomegalic changes in size and the cytoplasm was granular and vacuolar. Hepatic cell nuclei appeared fragmented chromatin along the hepatic sinusoids. Most of the hepatic blood sinusoides dilated. Intracytoplasmic vacuolation of different sizes widening blood sinusoids denoting degenerating hepatic cells in flufenoxuron treated rats. Although chlorpyrifos administration led to loss of cell architecture and increased degeneration of hepatic cells. Most of hepatic cells were necrotic showing most of hepatic cells were enlarged and cytoplasm were granular and vacules. Widening blood sinusoids denoting degenerating hepatic cells (has no nuclei).Finally, the mentioned study suggested that Insect pathogens commonly used for pest control not pathogenic to mammals. Indeed, the pathogen is usually capable of infecting only a limited number of insect species. Insect pathogens areSummary and Conclusion - 120 -extremely safe comparison to chemical insecticides

acts on insect metabolism, ultimately affecting development and growth of the target insect, particularly when such compounds are applied during the sensitive period of insect development.The study suggested also, that insect growth regulators (IGRs) induce biochemical and morphological abnormalities as well as death of treated insects. These characteristics made IGRs one of the most promising new control agents for controlling insect populations of economic importance such as S. littoralis larvae. IGRs have lesser effects on the mammals than Chlorpyrifos.