

**-49- Summary of**

**ENVIRONMENTAL TOXICITY OF SOME INSECTICIDE  
RESIDUES**

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**By**

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## SUMMARY

This study was conducted during 2006 by using G.S 12 f1 Tomato cultivar (*Lycopersicon esculentum* Mill.). Plants were grown at El-Tahreer area, El-Behera Governorate, Egypt. The treatments included chlorpyrifos-methyl and imidacloprid insecticides using the recommended rates of 250 cm<sup>3</sup>/ 100 liters water and 125 cm<sup>3</sup>/ 100 .liters water, respectively. For control of whitefly, *Bemisia tabaci*

.Research objectives could be summarized as follow

To study the determination of the tested insecticide residues on .<sup>1</sup>  
and in tomato fruits i.e., chlorpyrifos-methyl and imidacloprid at  
.different time intervals

Also, to investigate the toxic effects of these insecticides and their .<sup>2</sup>  
.residues on white albino rat, and hematological effects

:The following points provide a summary of such study

the recovery percentages were 96.14% and 113% for .<sup>1</sup>  
.chlorpyrifos-methyl and imidacloprid, respectively

The initial deposits of chlorpyrifos- methyl on and in tomato .<sup>2</sup>  
fruits were 4.05ppm after one hour from application. And the residual  
levels started to decrease gradually to 3.731 ppm, 3.256, 2.953, 2.784,  
2.510, 2.179 and 1.739ppm after 1, 3, 5, 7, 10, 14 and 21days from  
.application, respectively

The initial deposit (one hour after application) of imidacloprid, .<sup>3</sup>  
which was taken after different time intervals from the last foliage  
applications on and in tomato fruits, was 0.316ppm. Then detected  
residue amounts were 0.316, 0.233, 0.210, 0.139, 0.116 and 0.109ppm  
after 3, 5, 7, 10, 14 and 21days from treatment, respectively. Generally,  
the results obtained from this part of study revealed that the residual  
level of chlorpyrifos- methyl on and in tomato fruits was more than its  
maximum residual limit (MRL = 0.5 mg / kg ), while the residual level

of imidacloprid was less than the maximum residual level (MRL = 0.5 mg / kg)

The insecticidal treatments (chlorpyrifos-methyl at 4.054, 2.784, 2.179, 1.739 mg a.i/ kg b.w. and imidacloprid at 0.316, 0.210, 0.116 and 0.109 mg a.i/ kg b.w.) on some hematological parameters and some biochemical targets in the blood of rats did not cause any signs of acute toxicity and / or mortality in the treated rats. However the effect of the tested insecticides, chlorpyrifos-methyl and imidacloprid on some haematological and biochemical parameters in the insecticide-treated rats were studied

Oral administration of chlorpyrifos-methyl at doses of (4.054, 2.784, 2.179 and 1.739 mg a.i./kg b.w./day) to rats caused significant reduction in RBC's from  $4.470 \times 10^6/\text{mm}^3$  in the control to 3.35, 3.56, and  $3.74 \times 10^6/\text{mm}^3$ , respectively. Also, Oral administration of chlorpyrifos-methyl at doses of 2.784 and 4.05 mg a.i/kg b.w./day caused significant increase in WBC counts compared with control

Imidacloprid at doses equal to the residues on and in tomato fruits at 14 and 21 days from application did not cause any harmful effect on the tested haematological parameters (PCV, RBC's and WBC's) in the treated rats

Chlorpyrifos- methyl produced significant decrease in the activities of GOT, GPT and LDH. Percentages of GPT decrease relative to control were 84.12, 80.36, 79.12 and 76.79 % in the serum of rats given 1.739, 2.179, 2.784 and 4.05 mg/kg b.w., respectively. On contrary, these doses caused significant increase in the activities relative to control with a percentages ranged from 107.62 to 161.6 % control for ALP , from 101.31 to 104.37 % control for CK and ranged from 119.16 to 135.71 % control for GGT

The higher doses of chlorpyrifos- methyl and imidacloprid caused some significant changes (decreases or increases) in the enzyme activity in serum of treated rats. These doses produced significant decrease in the activities of both GOT and GGT with percentages of control ranged from 86.15 to 74.02 % for GOT and ranged from 91.26 to 62.9 % for GGT. On contrary these doses (0.116, 0.210 and 0.355 mg/kg) caused significant increase in the activities of GPT (106.2 –

118.54 % control) , CK (101.99 – 106.93 % control ) , LDH ( 160.82 –  
.( % 171.68 % )and ALP (121.64 – 220.33

Low dose of chlorpyrifos- methyl (1.739 mg/kg) and the low concentrations of imidacloprid did not cause any significant change in the concentration of creatinine, uric acid, total protein and glucose in the serum of treated rats. However, the higher doses of chlorpyrifos-methyl (2.179, 2.784 and 4.05 mg/kg) increased the levels of the tested parameters in a dose dependent manner. In contrast the higher doses of imidacloprid (0.116, 0.210, 0.355 mg/kg) caused significant increase in the level of creatinine (102.01, 103.978, 102.83 % of control); uric acid (104.72, 105.75, 117.94 %of control) and total protein (106.97, 111.88, 123.52 % of control). On contrary, these doses of imidacloprid caused significant decrease of glucose level in the serum of treated rats .ranged from 83.27 to 36.10 % of control

The OP insecticide , chlorpyrifos- methyl , and the neonicotinoid insecticide, imidacloprid, can induce a variety of alterations in the activities of GOT, GPT, CK, GGT, LDH and ALP enzymes and the levels of creatinine, uric acid, total protein and glucose in the serum of treated rats. The severity of their action depends entirely on the level of the given doses and the kind of the tested insecticide. These changes in the tested parameters indicated the presence of damage and alteration in liver, kidney and heart functions

Oral administration of chlorpyrifos-methyl doses which an equal to the residues at different time intervals (1 hour, 7, 14, 21 days after treatment) resulted in a slight inhibition in the activity of sGOT from 24.107 in the control treatment to 14.513 U/l in case of the dose which equal the residues after 1 hr from application, and a decrease in the activity of sGPT from 10.640 U/l to 8.170 for the same dose. On the other hand, oral administration to chlorpyrifos doses (4.054, 2.784, 2.179 and 1.739 mg/kg/day) resulted in a significant increase in the total protein of treated- rats serum by 23.52% over the control by the .high dose

The imidacloprid doses (0.316, 0.210, 0.116 and 0.109 mg a.i/kg b.w./day) which an equal to the residues after the same intervals (1 hour, 7, 14, 21 days after treatment) caused a significant increase in the

**activity of the alkaline phosphatase from 46.622 U/l to 102.72 U/l in case of the high dose (0.316 mg a.i/kg b.w./day) which an equal to the residue after 1 hr. Also, produced an increase in the activity of sGPT from 11.848 to 14.045 U/l with the high dose (0.355 mg/kg/day) by 18.54% over the untreated control. However, this treatment decreased both of sGOT activity from 22.595 to 16.725 U/l and total protein concentration from 1.479 to 1.078 U/l with the high dose which obtained after 1 hr from application (0.316 mg a.i/kg b.w./day) by 25.08 .and 26.11%, respectively**

**Oral administration of both insecticides (chlorpyrifos- methyl and imidacloprid) with the dose which equal to the residues after 21 days from application resulted in non significant difference with the untreated control except in case chlorpyrifos-methyl which case a significant decrease in the activity of sGPT with the dose (4.054 mg a.i/kg b.w./day) which an equal to the residues after 1 hour from its application to tomato fruits**