

SUMMARY AND CONCLUSION

The present study was carried out at Environmental Toxicology Laboratory, Department of Environmental Studies, Institute of Graduate Studies and Research, Alexandria University. The aim of the present study was to investigate the ability of methomyl to induce oxidative stress, biochemical perturbations and histological changes in male rat in comparison to the use of the biopesticide; *Bacillus thuringiensis* and their combination. Animals were divided into four groups:

- Group I (control): was orally treated with distilled water.
- Group II: was treated with methomyl (MET; 3.4 mg/kg BW).
- Group III: was treated with *Bacillus thuringiensis* (*Bt* : 267 mg/kg BW).
- Group IV: was treated with both MET and *Bt* (MET; 3.4 mg/kg BW + *Bt* :267 mg/kg BW)

Rats were orally administered their respective doses daily for 21 days.

The result obtained can be summarized as follows:

1. Thiobarbituric acid reactive substances (TBARS) concentration was significantly increased in plasma and tissue organs (liver and kidney) in rats in all groups treated with MET, *Bt* alone and in combination as compared with control.
2. The activities of superoxide dimutase (SOD), catalase (CAT), glutathione S-transferase (GST) and glutathione content (GSH) were significantly reduced in rats in all groups treated with MET, *Bt* alone and in combination as compared with control.
3. The activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) were significantly decreased while LDH activity was significantly increased in rat liver as compared with control.
4. The aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) were significantly increased in rat plasma treated groups as compared with control.
5. Protein content was significantly decreased in plasma and tissue (liver and kidney) in all treated groups as compared with control.
6. Acetylcholinesterase activity was significantly inhibited in plasma in the treated groups as compared with control.
7. The level of urea, creatinine, total cholesterol, triglycerides, low-density lipoprotein-cholesterol (LDL-C),very low density lipoprotein-cholesterol (VLDL-C) were significantly increased while high -density lipoprotein-cholesterol (HDL-C), albumin content were significantly decreased in plasma of treated rats as compared with control.

8. The histological examination of the liver sections showed that exposure of male rats to methomyl caused a hydropic change in hepatocytes, portal fibrosis and inflammation. Examination of liver sections of *Bacillus thuringiensis*-treated rats showed piecemeal necrosis, portal fibrosis and inflammation. Also, liver sections of rats treated with methomyl and *Bacillus thuringiensis* showed hydropic change, portal fibrosis and inflammation.
9. The histological examination of the kidney sections showed that exposure of male rats to methomyl caused a congestion with swelling of the endothelial cells and degeneration of the epithelium cells lining the renal tubules. The examination of the kidney sections of the *Bacillus thuringiensis*- treated rats showed hydropic change in renal tubules, thickening in glomerular basement membrane with swelling in epithelial and endothelial cells. Also, kidney sections of rats treated with methomyl and *Bacillus thuringiensis* mixture showed hydropic change in renal tubules, thickening in glomerular basement membrane with swelling in epithelial and endothelial cells and in blood vessels.

In conclusion, pesticide treatments in the present study, singly or jointly induced LPO, generation of free radicals and histopathologic changes in male rat plasma and tissues (liver and kidney). Additionally, the antioxidant defense system, lipids profile and biochemical indices were significantly affected by MET or/and *Bt* treatments. When the rats were given combination of these pesticides, the effects were more pronounced than for any single pesticide.