Mechanism of the House Fly, *Muscadomestica* L. Resistance AgainstCypermethrin, Imidacloprid and Spinosad

By

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B.Sc., Agric. Sci., Fayoum University – 2006

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ABSTRACT

The house fly, *Muscadomestica*L., is a vectorfor more than 100 human and animal diseases and has the ability to develop resistance to different insecticides. This study evaluated Cypermethrin, Imidacloprid and Spinosad insecticides under laboratory conditions against larvae and adults of *M.domestica* for laboratory and field strains. The LC_{50}s of the three insecticides were 579.30,415.46 and 16.32 ppm, respectively, in the laboratory strain larvae 48h post treatment. While, in the field strain LC_{50}s were 660.99, 438.36 and 14.21ppm, respectively. The toxic effect of these insecticides against *M. domestica* adults was assessed 24h post treatment. The LC_{50}s of Cypermethrin, Imidacloprid and Spinosad recorded 208.75, 238.30 and 86.05 ppm, respectively, against the laboratory strain. The LC_{50}s of the same insecticides against the field strain were 514.13,354.73 and 101.60 ppm, respectively.

The present study indicatedthat the resistance phenomenon against theseinsecticides in Fayoum Governorate by studied two resistance mechanisms; the metabolic resistance and mutation in the target site. The resistance level of the selected strains reached in the 30^{th} generation 24.8 fold for Cypermethrin, 15.53 fold for Imidacloprid and 9.56 fold for Spinosad compared with the laboratory strain.

This study also showed the possibility of breakdown of resistance using insecticide mixtures, where the mixture of Cypermethrin+Imidacloprid showed potentiation at the ratio of 1:1 and 1:2 against all the resistant strains. Also, the combination of Cypermethrin with Spinosad gave potentiation at the ratios of 1:1, 1:2 and 2:1 against Imidacloprid and Spinosad resistant strains.

Biochemical measurements of the total protein, esterase, glutathione-S-transferase (GST) and cytochrome P-450 enzymeswith their relationship to insecticides resistance in *M. domestica* were assessedin the current study. There was a significant increase in total protein of all the resistant strains atthe 30^{th}generation compared with the susceptible laboratory strain. A closely relationship exist between the esterases activity and resistance of house fliestoCypermethrin, but no relationship with Imidacloprid and Spinosad resistant strains was established. The GST and cytochrome P-450 activities played a role in the resistance against the tested insecticides.

Acomparison between strains of *M. domestica* was definedby the specific polymerase chain reaction (PCR) for genotyping base mutation.Theseresultsdemonstrated the presence of point mutation knockdown resistance (kdr mutation)in kdr gene caused change the sodium channel proteinin the field, Cypermethrin, Imidacloprid resistant strains, while this mutation was absent in the laboratory and Spinosad resistant strains.
Keywords: *Muscadomestica, insecticides resistance,protein, enzymes,kdr mutation.*