INSECTICIDE TOLERANCE IN THE BRUCHID *CALLOSOBRUCHUS MACULATUS*

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Bruchid *Callosobruchus maculatus* is a storage pest of legumes. Status and the mechanisms of insecticide resistance were investigated in adults. Insects were collected from a culture in Horticultural Research and Development Institute (HORDI) Gannoruwa and reared at the Department of Zoology, University of Peradeniya. Adults were subjected to insecticide bioassays by topical application using a microapplicator. Different dosages of four insecticides; carbamate carbosulfan, organophosphate dimethoate and pyrethroid permethrin were used. LD_{50} and LD_{90} values were obtained using log-probit mortality curves. Percentage mortality for fixed dosages of malathion (50 μg/μl) and DDT (40 μg/μl) were also obtained.

LD_{50} (μg/g) values for carbosulfan, dimethoate and permethrin were 6.23, 2.17 and 5.21 respectively. LD_{90} (μg/g) values were 371.23, 48.85 and 3842.81 respectively. Resistance percentages (percentage survivals) to malathion and DDT were 11.25% and 10% respectively.

Activity of insecticide metabolizing enzymes such as glutathione S-transferases (GST), carboxylesterases and monooxygenases, in insect crude homogenates (n> 200) were investigated using a kinetic spectrophotometer. Mean GST specific activity for the reduced glutathione/chlorodinitrobenzine was 0.55 ± 0.28 $\mu molmin^{-1}mg^{-1}$. Mean specific activity of carboxylesterases with the substrate para-nirtophenylacetate was 0.49 ± 0.36 $\mu molmin^{-1}mg^{-1}$. Native polyacrylamide gel electrophoresis resolved two elevated esterase isoenzymes in adult bruchids. Mean monooxygenase level was 0.14 ± 0.21 OD/mg. Sensitivity of the insecticide target-site, acetylcholinesterase (AChE), to insecticides was monitored by inhibiting AChE with the carbamate propoxur. Inhibition co-efficient (K_i) for the inhibition reaction was $0.10 \times 10^5\ M^{-1}min^{-1}$ indicating a high sensitivity of the target-site. Results show that the resistance to insecticides in *C. maculatus* is mainly due to increased activity of insecticide metabolizing enzymes.

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