D-56 Significance of carboxylesterases in insecticide resistance of the rice brown planthopper, *Nilaparvata lugens* Stal

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Two insecticide resistant strains of the rice brown planthopper, *Nilaparvata lugens* from Batalagoda and Jaffna both had a single diffuse but prominent elevated esterase band on native polyacrylamide gel electrophoresis. Biochemical assays were carried out in Jaffna, to investigate the presence of altered acetylcholinesterase and glutathione-S-transferase mechanisms of insecticide resistance. Also the effect of mixed function oxidases in the resistance was assessed by insecticide bioassays using those which were pre-exposed to an oxidase inhibitor piperonyl butoxide. Results showed that these mechanisms are not responsible for the observed insecticide resistance.

Partial purification of the elevated esterase of this strain by column chromatography gave a stable enzyme preparation with a specific activity of 5.85 ì mol mg^{-1} min^{-1}. Despite the diffuse nature on gels, it purified as a single

isoform, with an estimated molecular weight of approximately 60 kDa. Kinetic experiments carried out with insecticides showed a very high binding rate (bimolecular rate constant) and very low turnover rate (deacylation rate constant) with the oxon analogues (the insecticidally active compound) of organophosphates and with carbamates. Therefore sequestration rather than metabolism is the primary role in this resistance mechanism. No interaction could be observed with pyrethroids. In contrast to earlier studies on the elevated esterase of *N.lugens* from Japan and the Philippines, any malathion metabolism by this esterase, could not be detected nor did malathion inhibit the esterase, although it was sensitive to inhibition by malaoxon, the oxon analogue of malathion.

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