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Status and mechanisms of insecticide resistance in three rice insect pests and two of their natural enemies

Insecticide resistance of three rice insect pests (i.e.green leafhopper *Nephotettix virescens*, white planthopper *Cofana spectra*, Paddy bug *Leptocorisa sp*.) and two of their natural enemies (i.e. ladybird beetle *Micraspis discolor* and ground beetle *Ophionea indica*) was studied using insects collected from a rice field at Batalagoda. Adults were subjected to insecticide bioassays by topical application using a microapplicator. Different dosages of insecticide bioassays by topical application using a microapplicator; carbamate carbosulfan and BPMC; and pyrethroid permethrin were used. Mortalities were recorded after 24h and LD_{50S} and LD_{90S} were obtained using log-probit mortility curves. Higher organophosphate, pyrethroid and carbamate tolerance was shown by *N. virecens* and M. discolor (respective LD_{50S} µg/g values for dimethoate, chlopyrifos, permetherin,

carbosulfan and BPMC were 1.875, 5.125, 0.625, 0.25 and 0.9, 10.1, 0.2, 1.2, 4.6). Predatory insects showed higher tolerance for a fixed DDt (organochlorine) dosage.

Highest insect carboxylesterase activity was shown by *N. vireacens* (1.1346 ± 0.7763 µmol/min/mg). Native polyacrylamide-gel eletrophoresis revealed elevated carboxylesterases in all except *O. indica*. High glutathione-S-tranferase activities were observed in *O. indica* and *M. discolor* (0.5447± 0.5671 and 0.4949 ± 0.3.526 µmol/min/mg respectively). Oxidase levels were high in M.discolor (0.3737 ± 0.4999 OD/mg). Inhibition of the insecticide terget site, acrtylcholinesterase, by propoxur indicated te presence of insecticide-insensitive targetsites in predator populations. Malathion caboxylesterase mechanism was absent in all populations.

Carboxylesterases cause high organophosphate and carbamate resistance in N. virescens, C. spector, Leptocorisa sp. and M. discolor. Glutathione-S-transferases are responsible for high DDT resistance in predators.