

A-17: Insecticide cross-resistance spectra and underlying resistance mechanisms of anopheline vectors of malaria

S H P P Karunaratne

(Dept of Zoology, University of Peradeniya)

Present status of insecticide resistance was investigated in 2 major vectors of malaria: *An. culicifacies* and *An. subpictus*, in Galewela, Matale during 1996/1997. Mosquitoes were collected using bovid baited trap huts. Adult and larval bioassays were carried out according to the standard World Health Organisation methods. Log-probit mortality lines were obtained for malathion, propoxur, permethrin and chlorpyrifos. Respective LD₅₀ values were 4.45%, 0.002%, 0.16% and 0.001% for *An. culicifacies* and 0.66%, 0.004%, 0.004% and 0.04% for *An. subpictus*. Adults were also tested for WHO discriminating dosages of malathion, propoxur, permethrin, DDT, cypermethrin deltamethrin and lambda cyhalothrin.

Both populations were highly resistant to DDT. *An. culicifacies* was more resistant to malathion and *An. subpictus* was more resistant to chlorpyrifos. About 25% of both populations were resistant to permethrin. *An. culicifacies* was susceptible to propoxur, deltamethrin and lambda cyhalothrin and *An. subpictus* to cypermethrin and lambda cyhalothrin.

Adult mosquitoes were individually tested for insecticide detoxifying enzymes and altered target-site, acetylcholinesterase. High general esterase activity indicated the presence of amplified esterase genes in both populations. Native gel electrophoresis resolved one elevated esterase isoenzyme, with high affinity to organophosphates, from each species. Malathion carboxylesterase mechanism was present in both populations. Higher Glutathione-S-transferase activity was marked in *An. subpictus*. Synergistic studies showed the involvement of monooxygenases in resistance in both species. Acetylcholinesterase activity of ~80% of both populations was not inhibited by a standard dosage of propoxur.

Low resistance to carbamates shows that the impact of agricultural pesticides is not significant in the development of resistance especially in *An. culicifacies*. Pyrethroids, other than permethrin, can be successfully used in vector control programmes. Carbamates will be an alternative.

Financial assistance by NARESA (Research grant RG/95/B/6) is acknowledged.