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### **Insecticide resistance of the malaria vector *Anopheles culicifacies* collected from four districts in Sri Lanka**

Insecticide resistance status and underlying mechanisms were studied in the major vector of malaria *Anopheles culicifacies* collected from four high malaria transmission districts, namely Anuradhapura, Moneragala, Puttalam and Trincomalee during 199 Sept.- 2001 March. Adults were tested for the World Health Organization (WHO) recommended discriminative dosage of DDT, Malathion, propoxur, lambda-cyhalothrin, deltamethrin, cypermethrin, permethrin and etofenprox. Preparation of insecticide impregnated papers and the test procedure were according to the WHO standard methods.

*An. Culicifacies* from all four districts were highly resistant to organophosphate malathion, but highly susceptible to carbamate propoxur. Out of the pyrethroids tested, all populations gave 100% mortality to lambda-cyhalothrin and cypermethrin. 3.3% of Moneragala and Trincomalee populations showed resistance to deltamethrin. Resistant percentages to permethrin were 50%, 35%, 13% and 77% for Anuradhapura, Moneragala, Puttalam and Trincomalee populations respectively. For etofenprox, resistance percentages varied from 5%-15%.

Activity levels of insecticide detoxifying enzymes were also investigated. Carboxylesterase activity was measured with the substrate para-nitrophenylacetate. Highest mean specific activity was from Moneragala ( $1.01 \pm 5.55 \mu \text{mol min}^{-1} \text{mg}^{-1}$ ). Native polyacrylamide gel electrophoresis resolved one elevated esterase isozyme, with high affinity to activity levels of glutathione S-transferases for the substrate reduced glutathione/chlorodinitrobenzene were observed from all populations. High oxidase levels were reported from Trincomalee ( $1.09 \pm 3.39 \mu \text{mol min}^{-1} \text{mg}^{-1}$ ) and Moneragala ( $0.99 \pm 2.20 \mu \text{mol min}^{-1} \text{mg}^{-1}$ ). Inhibition of the organophosphate and carbamate target-site, acetylcholinesterase (AChE), indicated the presence of altered AChE mechanism in 1.8 - 6.5% of these populations. Carbamates and some pyrethroids can be used successfully in vector control programmes.