



THE INSECTICIDE RESISTANCE STATUS OF MALARIA VECTORS IN SOUTHEAST ASIA.

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Vector control, which played an essential role in the reduction of malaria in Southeast Asia, is of essential importance to control malaria in endemic foci. The available vector control methods rely on the use of insecticides for bed net impregnation or indoor spraying. Consequently, the development of insecticide resistance may jeopardise the vector control efforts. Hence, knowledge of vector resistance and changing trends of resistance in target species are basic requirements to guide insecticide use in malaria control programmes.

Therefore, a network for the monitoring of insecticide resistance, MALVECASIA, was set up in Southeast Asia in order to assess the insecticide resistance status of the major malaria vectors in different regions of Cambodia, Laos, Thailand, and Vietnam. From 2003 till 2005, bioassays were performed on adult mosquitoes using the standard WHO susceptibility test with diagnostic concentrations of permethrin 0.75% and DDT 4%. Additional tests were done with insecticides applied by the different national malaria control programmes.

After three years of intense insecticide resistance monitoring in 116 study sites a clear picture of insecticide resistance status of malaria vectors was achieved. *Anopheles dirus s.s.*, the main vector in forested malaria foci, was susceptible to permethrin. In central Vietnam, *An. dirus s.s.* showed possible resistance to alpha-cypermethrin and one population was resistant against lambda-cyhalothrin. In the Mekong Delta, *An. epiroticus* was highly resistant to all pyrethroid insecticides tested. It was susceptible to DDT, however near Ho Chi Minh City *An. epiroticus* showed possible DDT resistance. In Vietnam, pyrethroid susceptible and tolerant *An. minimus s.l.* populations were found, whereas *An. minimus s.l.* from Cambodia, Laos and Thailand were susceptible. Only two *An. minimus s.l.* populations showed DDT tolerance, one in western Cambodia and one in northern Vietnam. *Anopheles vagus* was found resistant to DDT and to several pyrethroids in Vietnam and Cambodia.

In conclusion, in Laos, Cambodia and Thailand, insecticide resistance in the malaria vectors *An. dirus s.s.*, *An. epiroticus* and *An. minimus s.l.* was almost absent. In Vietnam, insecticide resistance was mainly observed in low or transmission free areas and the network concluded in a list of recommendations that there is no need to actually change the malaria control strategy currently implemented in Vietnam. However, trends in resistance status should be carefully monitored, mainly in *An. dirus*. The impact of existing vector control tools on resistant populations of *An. epiroticus* in Southern Vietnam is now ongoing.



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