

# **Insecticide resistance and, efficacy of space spraying and larviciding in the control of dengue vectors *Aedes aegypti* and *Aedes albopictus* in Sri Lanka**

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## **Abstract**

Unprecedented incidence of dengue has been recorded in Sri Lanka in recent times. Source reduction and use of insecticides in space spraying/fogging and larviciding, are the primary means of controlling the vector mosquitoes *Aedes aegypti* and *Ae. albopictus* in the island nation. A study was carried out to understand insecticide cross-resistance spectra and mechanisms of insecticide resistance of both these vectors from six administrative districts, i.e. Kandy, Kurunegala, Puttalam, Gampaha, Ratnapura and Jaffna, of Sri Lanka. Efficacy of the recommended dosages of frequently used insecticides in space spraying and larviciding in dengue vector control programmes was also tested. Insecticide bioassay results revealed that, in general, both mosquito species were highly resistant to DDT but susceptible to propoxur and malathion except Jaffna *Ae. aegypti* population. Moderate resistance to malathion shown by Jaffna *Ae. aegypti* population correlated with esterase and malathion carboxylesterase activities of the population. High levels of acetylcholinesterase (AChE) insensitivity in the absence of malathion and propoxur resistance may be due to non-synaptic forms of AChE proteins. Moderate pyrethroid resistance in the absence of high monooxygenase levels indicated the possible involvement of 'kdr' type resistance mechanism in Sri Lankan dengue vectors. Results of the space spraying experiments revealed that 100% mortality at a 10. m distance and <50% mortality at a 50. m distance can be achieved with malathion, pesguard and deltaxide even in a ground with dense vegetation. Pesguard and deltaxide spraying gave 100% mortality up to 50. m distance in open area and areas with little vegetation. Both species gave <50% mortalities for deltaxide at a distance of 75. m in a dense vegetation area. Larval bioassays conducted in the laboratory showed that a 1. ppm temephos solution can maintain a larval mortality rate of 100% for ten months, and the mortality rate declined to 0% in the eleventh month. In the field, where 1. ppm concentration is gradually decreased with water usage, 100% mortality was observed only for the first four months, <50% mortality for the next two months, and 0% mortality was observed eight months after the application of temephos. Deltaxide can be effectively used for space spraying programmes in Sri Lanka. Larval control can be successfully achieved through temephos with public participation.

## **Author keywords**

Dengue vectors; Fogging; Insecticide resistance; Temephos

## **Indexed keywords**

**Species Index:** *Aedes aegypti*; *Aedes albopictus*