

MASENO UNIVERSITY

DISSIPATION RATE OF CHLORPYRIFOS WITHIN MOSQUITO LARVAE HABITATS IN MASENO AND ITS ACTIVITY AGAINST THE LARVAE RELATIVE TO DICHLORODIPHENYLTRICHLOROETHANE

ABSTRACT

Despite more than a century of efforts to eradicate and control malaria, it still remains a major risk to public health and economies of countries in the tropical and subtropical regions of the world. Control of malaria has been based on eradication of the vector, mosquito, by use of pesticides. In order to reduce malaria incidence, some African countries are re-introducing the banned dichlorodiphenyltrichloroethane (DDT), however, organophosphates are known to have far more immediate toxicity than organochlorines and other related products. Chlorpyrifos is a wide spectrum organophosphate used to control range and forage insect pests as well as sediment dwelling grubs, rootworms, borers and subterranean termites and could therefore be used to replace DDT use in mosquito larval control, however, its persistence in the mosquito larval habitats and toxicity towards the mosquito larvae, in comparison to DDT is unknown. The objective of this study was to determine the degradation rates of these two pesticides in the various mosquito larval habitats and their toxicity on mosquito larvae in Maseno, an area in western Kenya characterized by endemic malaria. Water, moist sediment and *Justicia flava* leaves, the selected common habitats, were spiked with DDT and chlorpyrifos and samples were thereafter collected after 0, 2, 4, 6 hours and then at longer intervals of time up to 2120 hours, and analyzed separately using Gas chromatography to determine their environmental persistence. The dissipation of the pesticides were rapid and half-lives of DDT in moist sediment, *Justicia flava* leaves and water were; 15.4 days, 3.1 days and 6.1 hours and 7.8 days, 2.0 days and 6.3 hours, respectively, for chlorpyrifos. Toxicity tests of the pesticides against *Anopheles gambiae* larvae from Maseno using WHO standard test method in the laboratory were done, based on the LC₅₀ and LC₉₀ in water. The LC₅₀ after 24 hours exposure were; 0.0014 ppm and 0.0398 ppm for chlorpyrifos and DDT respectively, while the LC₉₀ were; 0.0132 ppm and 0.19 ppm respectively. Chlorpyrifos had a shorter dissipation half-life than DDT. Chlorpyrifos was more toxic to *Anopheles gambiae* than DDT. Chlorpyrifos can therefore be used effectively in controlling both mosquito larvae formerly controlled by DDT. The information obtained in this study is most useful to the ministry of public health and researchers involved in malaria vector control work for planning malaria control on lethal doses and their persistence in the environment.