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Henry, Leonia

University of Dar es Salaam

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Leonia Henry

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This thesis reports on multiresidue analyses of water, sediments, soil and fish from Southern Lake Victoria and its catchments; and laboratory investigations of chemodynamic patterns of endosulfan and fenitrothion in Tilapia species. Total DDTs in Lake Victoria and catchments were up to 1.6 µg/L in water, 700 µg/kg dry mass in sediments and 90 µg/kg dry mass in soil during wet season. Total HCHs were up to 0.2 µg/L in water, 132 µg/kg dry mass in sediments and 59 µg/kg dry mass in soil. The dry season samples indicated generally low levels of these residues most of them being below their average method detection limits. Nile tilapia and Nile perch caught from Lake Victoria had levels of endosulfan, DDTs and fenitrothion of up to 42 and 3.0 and 0.7 mg/kg lipid weight, respectively in their muscles. Predominance of DDT and endosulfan isomers over their metabolites indicates recent exposure of the fish to the pesticides. The overall degree of pesticide pollution in the catchments is generally low. Laboratory studies of endosulfan and fenitrothion in two Tilapia species indicated high capacity of the species to absorb the two pesticides from water with rapid distribution in the organs (BAF of 33 and 346 L/kg fresh weight respectively). The formulated pesticides demonstrated higher toxicity than the pure compounds with both pesticides. Endosulfan was rapidly absorbed by the fish with rapid conversion to the corresponding sulphate in the body, but it took longer time to equilibrate between the matrices; water, sediments, and glass wall, eventually ending up with higher levels in sediments. Preferential metabolism of phosphorothioates was demonstrated by steady disappearance of fenitrothion in all the matrices. Enzymatic desulphuration of the P=S moiety to the more toxic Oxon derivative facilitated the hydrolysis to less toxic metabolites. Thus, fish contaminated with organophosphorous pesticides are likely to be safer than those contaminated with organochlorines, provided there is sufficient time before consumption.