Organochlorine and organophosphorus pesticide concentrations in water, sediment, and selected organisms in Lake Naivasha (Kenya)


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Abstract

Water, sediment, red swamp crayfish (Procambarus clarkii) and black bass (Micropterus salmoides) from Lake Naivasha were analyzed for selected organochlorine and organophosphorus pesticide residues. The mean $p,p'$-DDT, $o,p'$-DDT and $p,p'$-DDE residue levels recorded in black bass (28.3 (± 30.0), 34.2 (±54.0) and 16.1 (±16.1) $\mu$ g kg$^{-1}$, respectively) and crayfish (4.6 (±5.1), 3.2 (±2.8), and 1.4 (±1.1) $\mu$ g kg$^{-1}$, respectively), were higher than previously recorded. This indicated recent usage of technical DDT in the lake's catchment. Levels of $p,p'$-DDT, higher than those of $p,p'$-DDE further emphasized this. Mean lindane, dieldrin, $\beta$-endosulfan and aldrin concentrations in black bass were 100.5, 34.6, 21.6 and 16.7 $\mu$ g kg$^{-1}$, respectively. The same residues were detected at lower concentrations in crayfish at 2.0, 2.0, 2.0 and 1.9 $\mu$ g kg$^{-1}$, respectively. The higher fat content (3.7 ± 2.7% SD) in black bass (compared to 0.6 ± 0.3% in crayfish) accounted for the significantly higher residue concentrations in black bass. Organophosphate pesticides were the most commonly used pesticides in the lake's catchment, but none was detected in any of the samples. The results indicate that there is need for further work to identify sources and fate of pesticide contaminants, as well as to improve monitoring of pesticide use throughout the catchment.

organochlorinated and organophosphorus pesticide residues - bioaccumulation - Procambarus clarkii - Micropterus salmoides