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Response of Brain and Liver Cholinesterases of Nile Tilapia, *Oreochromis niloticus*, to Single and Multiple Exposures of Chlorpyrifos and Carbosulfan

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The toxicity of organophosphorus and carbamate insecticides is mainly due to the inhibition of acetylcholinesterase (AChE), the enzyme which cleaves the neurotransmitter acetylcholine, thereby interfering with proper neurotransmission in cholinergic synapses and neuromuscular junctions. Although both types of insecticides have a common mode of action, organophosphorus insecticides are irreversible inhibitors of AChE whereas carbamates are often considered as reversible inhibitors of the enzyme as a relatively weak bond is formed between the carbamate and AChE (Ecobichon 1992). In addition to AChE, vertebrates may also contain the related enzyme pseudocholinesterase in several tissues (Massoulié et al. 1993). Both enzymes are inhibited by organophosphorus and carbamate insecticides and referred to as cholinesterses (ChE).

ChE activities of fish have been recognized as a potential biochemical indicator for toxic effects of these insecticides (Gruber and Munn 1998; Dembélé et al. 2000; Fulton and Key 2001). Organophosphorus and carbamate insecticides are widely used in tropical agriculture. Nile tilapia, *Oreochromis niloticus* has been suggested as a bioindicator species for testing pollutant impact especially in tropical waterbodies due to its abundance and hardy nature. With repeated inputs of anticholinesterase chemicals to the aquatic environments, fish may be exposed to acutely lethal to sublethal concentrations. The degradation of the chemical on the other hand would allow the affected fish to recover from the poisoning. An understanding of the patterns of inhibition and recovery of ChE enzymes of Nile tilapia under different exposure regimes would enable better interpretation of ChE data of this fish exposed to environmental applications of anticholinesterase chemicals. The objective of the present study was to evaluate the response of cholinesterase in brain and liver tissues of Nile tilapia following single and multiple exposure to two selected anticholinesterase insecticides viz. chlopyrifos (an organophosphorous insecticide) and carbosulfan (a carbamate).