

ACETYLCHOLINESTERASE INHIBITION IN NILE TILAPIA, *Oreochromis niloticus* FOLLOWING EXPOSURE TO LOW CONCENTRATIONS OF CHLORPYRIFOS AND CARBOSULFAN: EXPOSURE- RESPONSE RELATIONSHIPS IN FRY, FINGERLINGS AND SUB-ADULTS

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Acetylcholinesterase (AChE) inhibition is considered as a specific biomarker of exposure and effect for organophosphorous and carbamate pesticides. *Oreochromis niloticus*, which is an abundant food fish in inland water bodies is a potential sentinel species in monitoring biological effects of pollutants in aquatic environments in Sri Lanka. In the present study, pesticide exposure and AChE inhibition relationships in different size groups of *O. niloticus* were assessed under laboratory conditions following exposure to an organophosphate, Chlorpyrifos and a carbamate, Carbosulfan, to evaluate the influence of body size on exposure-response relationships.

Fry (0.9-2.0 g, 3.2-4.8 cm), fingerlings (3.0-9.7 g, 5.9-8.5 cm) and sub-adults (11-40 g, 9.2-15.0 cm) of fish were continuously exposed to a series of environmentally relevant concentrations of Chlorpyrifos (0.5 –12 $\mu\text{g l}^{-1}$) or Carbosulfan (1 –10 $\mu\text{g l}^{-1}$) for 14 days in a static system and brain AChE activities on 2, 6, 10, 14 days post exposure were determined using the standard spectrophotometric method. Comparable size groups of fish maintained in aged tap water under similar laboratory conditions served as controls.

Results showed that AChE activities in all groups of fish were inhibited following exposure to the insecticides tested in a concentration dependent manner. Exposure-response relationships indicated that fry stages were more sensitive to the pesticide exposure in comparison to the fingerlings and sub-adults. AChE activity of fingerlings and sub-adults exposed to 1 $\mu\text{g l}^{-1}$ Chlorpyrifos or Carbosulfan restored to near normal levels in 14 days post exposure whereas the activities of the fish exposed to other concentrations remained significantly inhibited even after 14 days. The results suggest that brain AChE activity in *O. niloticus* could be used as a sensitive molecular biomarker in monitoring organophosphorus and carbamate pollution in aquatic environments. However, the size groups of the fish should be taken into consideration when this fish is used in environmental monitoring.