



Preliminary Assessment of Biomarker Responses in *Oreochromis Niloticus* from Selected Water Bodies with Reference to the Trophic Status

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ABSTRACT

Fish biomarkers are useful detection tools in aquatic biomonitoring. This study aimed to assess selected biomarkers of feral Nile tilapia (*Oreochromis niloticus*) in two irrigational water bodies, namely, Lunugamwehera reservoir and Pannagamuwa Lake in Hambanthota district with reference to trophic status. Water quality parameters including dissolved oxygen, temperature, pH, alkalinity, salinity, biological oxygen demand, chemical oxygen demand, and determinants of the trophic status (nitrates, total phosphorus (TP) and orthophosphate (OP), chlorophyll-a and Secchi disc depth) were measured (n=3). A fish culture pond at University of Ruhuna was used as the reference. Adult *O. niloticus* (n=11-15) was sampled and Liver Somatic Index (LSI), Fulton's condition factor (K), erythrocyte nuclear abnormalities (ENA), total leukocyte frequency, carbonic anhydrase activity (CAA) and gill histopathology were examined. There was no significant difference in pH, salinity, and nitrate among all sites. Highest OP and TP concentrations were observed in Pannagamuwa Lake and the lowest in reference water. Estimated Carlson trophic status index (TSI) revealed Pannagamuwa Lake as eutrophic (62.55 ± 0.86), the reference as moderately eutrophic (58.20 ± 0.80), and Lunugamwehera reservoir as mesotrophic (50.60 ± 1.37). Within the context of this study, these preliminary findings on trophic status were assumed to be representative of long term status. A significantly low condition factor was observed in fish from the reference pond and Pannagamuwa Lake, and highest in the mesotrophic Lake. The LSI value was significantly high in fish in the reference site and significantly lower in Pannagamuwa Lake. Greater total ENA frequency and leukocyte count ($p < 0.05$) was reported in the fish inhabiting Pannagamuwa lake compared to the others. However, CAA was not significantly different among all sites. Further, fish in Pannagamuwa and Lunugamwehera sites showed toxicopathic signs in gill filaments such as inter-lamellae hyperplasia, epithelial lifting and lamellae fusion. Biomarker responses revealed that the fish inhabiting eutrophic sites may be subjected to stress due to gill damage and genotoxicity among other causes compared to the mesotrophic site. Some pathological changes seen in fish from mesotrophic water body necessitate additional research to screen different contaminants affecting fish. Monitoring the trophic status of water bodies, therefore, is mandatory to ensure the wellbeing of the aquatic biota, and an integrative approach of biomarker responses will be useful in this regard.

Keywords: Biomarkers, Gill histology, *Oreochromis niloticus*, Trophic status