Toxicological Assessment on *Clarias gariepinus* (Cat Fish) Exposed to Leachates from Awotan Landfill, Ibadan Oyo State, Nigeria

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In Partial Fulfillment of the Requirements for the Award of Master of Science Degree (MSc) in Molecular Biology and Genomics

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Certification

This is to certify that John Opeoluwa OTITOOLA with the matriculation number LCU/PG/002583 carried out this research work titled "Toxicological Assessment of *Clarias gariepinus* exposed to Leachate from Awotan Landfill, Ibadan, Oyo State, Nigeria" in the Department of Biological Sciences, Faculty of Natural and Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria for the award of Master of Science Degree (MSc) in Molecular Biology and Genomics and that this has not been previously submitted.

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Dedication

This project is dedicated to God Almighty and my Parents, Mr and Mrs Otitoola.

Acknowledgements

First and foremost, I want to thank God Almighty, for the gift of good health which was key to seeing me through the completion of this project.

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Even though the above-mentioned persons have assisted in the process of this research work, I alone stand responsible for the errors, if any, found in the work.

Abstract

Solid waste disposal is a major environmental and public health concern in Nigeria. Leachate samples collected from Awotan landfill in Ibadan were investigated for their genotoxicity using juveniles of *Clarias gariepinus* as the bioindicator species. The leachates' physico-chemical qualities and heavy metal characteristics were analyzed using standard methods. Samples of juveniles were obtained from the Department of Aquaculture and Fisheries Management University of Ibadan and transported to the Biology Laboratory at Lead City University, where they were acclimatized in chlorine-free borehole water for 14 days. After the acclimation period, the toxicity assessment setup was initiated at the Animal House, Faculty of Natural and Applied Sciences. Five treatment bowls including control (0%), 5%, 10%, 25% and 50% (v/v leachate/distilled water) of leachate samples in triplicates were prepared, and 15 juveniles of *Clarias gariepinus* were introduced into each of the treatment bowls, where they were cultured and observed for 21 days. Haematology analysis of the blood, histopathology analyses of the liver and gel electrophoresis on p53gene were performed on *C. gariepinus* at the end of the culture period. The physico-chemical characteristics of the leachate (electrical conductivity, 4200 ± 13.0 S/m; total dissolved solids, 2450 ± 14.4 mg/L, nitrate, 87.00 ± 5.7 mg/L, and phosphate, 3.134 ± 0.11 mg/L) and heavy metals concentrations (copper, 9.28 ± 3.2 μm; manganese 45.64 ± 6.3 mg/L; and iron, 604.48 ± 10.62 mg/L) exceeded the SON and WHO recommended limits for physico-chemical and heavy metals. The haematological test showed that high concentrations of the leachate samples significantly reduced the number of red blood cells, haemoglobin, white blood cells, and packed cell volume in *C. gariepinus*. Histological examinations showed liver damage, with the highest leachate concentration (50%) leading to steatosis. The molecular analysis revealed that *Clarias gariepinus*, exhibits no genetic diversity within the tumour protein (TP53).

Keywords: Leachates, *Clarias gariepinus*, Genotoxicity, Heavy metals

World count: 299

Table of Contents

List of Tables

List of Figures

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List of Plates