

**HYPERACCUMULATIVE POTENTIAL AND DNA PROFILING OF
EICHHORNIA CRASSIPES FOR TOXICANTS IN SELECTED POLLUTED
WATER BODIES**

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OCTOBER, 2021

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WATER BODIES**

BY

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE
STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
AWARD OF MASTER OF SCIENCE (M.Sc) DEGREE IN APPLIED BIOLOGY
AND BIOTECHNOLOGY IN THE DEPARTMENT OF BIOLOGICAL
SCIENCES, COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT
UNIVERSITY.**

OCTOBER, 2021

ACCEPTANCE

This is to attest that this dissertation is accepted in partial fulfilment of the requirements for the award of the degree of Master of Science in Applied Biology and Biotechnology in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria.

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DECLARATION

I, **OLAYEMI, FUNMILAYO BILEWU (13CO015794)** declare that this research was carried out by me under the supervision of Dr. Isaac O. Ayanda of the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Nigeria. I attest that the dissertation has not been presented either wholly or partially for the award of any degree elsewhere. All sources of data and scholarly information used in this dissertation are duly acknowledged.

OLAYEMI, FUNMILAYO BILEWU

.....
Signature and Date

CERTIFICATION

We certify that this dissertation titled “**HYPERACCUMULATIVE POTENTIAL AND DNA PROFILING OF EICHHORNIA CRASSIPES FOR TOXICANTS IN SELECTED POLLUTED WATER BODIES**” is an original research work carried out by **OLAYEMI, FUNMILAYO BILEWU (13CO015794)** in the Department of Biological Sciences, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Dr. Isaac O. Ayanda. We have examined and found this work acceptable as part of the requirements for the award of Master of Science in Applied Biology and Biotechnology.

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DEDICATION

I dedicate this work to the Almighty God; my help in ages past.

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All praise is to God Almighty in Heaven without whom I would have ever made it this far, His name alone is highly exalted.

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ABSTRACT

Hyperaccumulator plants are herbaceous or woody plants that can tolerate and accumulate high concentrations of heavy metals without any visible symptoms of damage. In this study, hyperaccumulative ability of *Eichhornia crassipes* for pollutants was evaluated. The study also aimed to determine whether pollution can negatively impact the genetic makeup of the plant. Water hyacinth samples were collected from National Horticultural Research Institute (NIHORT) and University of Ibadan (UI) in Oyo State and the Ogun River at Kara cattle market, Ojodu-Berger, Lagos State, in the months of April and June of 2021. Pollution status for the water samples collected was determined after analysing physicochemical parameters and calculating the water quality index (WQI). Heavy metal and Organochlorine pesticide analyses were done using ICP-OES and GC-MS respectively. Phylogenetic analysis was done using the Geneious prime software. Water quality indices revealed that water samples from NIHORT were the most polluted followed by Berger then UI. Accumulation of metals by the plants was in the order of Zn >Fe >Cd >Hg >Mn >Cr >Cu >Pb >Ni >As. The study revealed that the concentrations of some OCPs such as Isodrin, Endrin aldehyde and Endrin ketone were detected across the three sampling locations and were higher in the plant than in the water samples. Five OCP components namely α -Chlordane, p,p'-DDD, cis-Nonachlor, Endosulphan sulphate and beta.lindane were not detected at all. The molecular analysis produced a phylogenetic tree with three clusters and one outlier, this suggests a monophyletic origin of the plant collected. The phylogenetic analysis showed that there was no difference in the genetic profile of the plant across the sampling location. This study revealed that *Eichhornia crassipes* despite being a menace in the aquatic environment is useful as a phytoremediator plant in water bodies polluted with heavy metals and OCPs.

Keywords: Water hyacinth, Heavy metals, Organochlorine pesticides, Hyperaccumulation