BIOREMEDY OF SOME HAZARDOUS LIQUID WASTE USING BACTERIA AND MOLECULAR DESCRIPTION FOR TOLERANT ISOLATES OF IT

A Thesis Submitted
For The Degree Of Doctor of Philosophy
In Science (Microbiology)

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بسم الله الرحمن الرحيم

وَقُلِ اعْمَلُواْ فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ وَسَتُرَدُّونَ إِلَى عَالِمِ الْغَيْبِ وَالشَّهَادَةِ فَيُنَبِّئُكُم بِمَا كُنتُمْ تَعْمَلُونَ

صدق الله العظيم

(الايه ١٠٥من سورة التوبه)

This thesis has not been submitted for any degree at this or any other University

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Dedication

To my father, my brothers, my sister, my husband, my children and my late mother

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Firstly, my unlimited thanks to God for helping me in every thing.

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Walaa Salah El-Din.

Abbreviations

APHA	American public health association
APS	Ammonium Persulfate
Biolife	Biolife company
BOD	Biochemical oxygen demand
CAT	Catalase
Cd	Cadmium
Co	Cobalt
COD	Chemical oxygen demond
CTAB	Cetyl trimethyl ammonium bromide
Difco	Difco company
DNA	Deoxyribonucleic acid
dNTPs	Deoxyribonuclotides triphosphates
DO	Dissolved oxygen
DWAF	Department of water affairs and forestry
EC	Electrical conductivity
EDTA	Ethylene diamine tetra acetic acid
EMB	Eosin Methylene Blue
FC	Faecal coliform
G.d	Genetic distance
Hg	Mercury
HMC	Heavy metal contamination
HPC	Heterotrophic plate count
ICP-OES	Inductively Coupled Argon Plasma- Optical Emission Spectroscopy
MBC	Minimum bactericidal concentration
MF	Membrane filter
m-FC	Modified-faecal coliform
MIC	Minimum inhibitory concentration
m-PA	Modified-*Pseudomonas aeruginosa*
PAGE	Polyacrylamide Gel Electrophoresis
Pb	Lead
PCR	Polymerase Chain Reaction
POX	Peroxidase
RAPD	Random Amplified polymorphic DNA

RNA	Ribonucleic acid
ROS	Reactive oxygen species
S.I.	Similarity index
SDS	Sodium dodecyl sulfate
SOD	Superoxide dismutase
TAE	Tri acetic EDTA
TC	Total coliform
TCA	Trichloroacetic acid
TDS	Total dissolved solid
TE	Tri/ EDTA buffer
TEM	Transmission Electron Microscopy
TEMED	N,N,N,N-Tetramethylethylenediamine
TSI	Triple sugar iron medium
TWQR	Target Water Quality Range for irrigation
WHO	World health organization

Symbols

µg	Microgram
µl	Microliter
cfu	Colony forming unit
Conc.	Concentration
g	Gram
h	hours
L	Liter
mg	Milligram
mg/l	Milligram per liter
min	Minute
mM	Millimoler
mS/m	milli-Siemens per meter
nm	Nanometer
ºC	Degrees centigrade
rpm	Revolution per minute
Sec	Seconds
V	Volte
X	Power

Aim of the work

The plan of this study aims to the following;

- Study metal tolerance of isolated bacteria.

- Optimization of heavy metal removing by determination the effect of some important factors (pH, time, temperature, metal concentration and biomass concentration).

- Molecular description and differentiation between tolerant isolates treated and untreated with heavy metal ions through these points:
    - Catalase enzyme, lipoprotein, glycoprotein and protein were detected electrophoretically.
    - DNA of selected tolerant isolate was tested using RAPD-PCR assay.

These studies could be of great significance since the results could provide some information on the possible use of these tolerant bacterial isolates for bioremediation of heavy metals in metal contaminated environments.

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Part I