شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

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HANAA ALY

MONITORING AND BIOREMEDIATION OF HEXAVALENT CHROMIUM IN INDUSTRIAL EFFLUENTS

By

AHMED MOHAMED SAAD ABO-ELAZM
B.Sc. Agric. Sci. (Biotechnology Div.), Fac. Agric., Cairo Univ., 2015

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

In

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Department of Microbiology
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APPROVAL SHEET

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Date: / / 2020

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Dr. Ali Talat Sabbor
Department: Agricultural Microbiology **Approval: / / 2020**

ABSTRACT

The hexavalent chromium salts are widely used in many industries worldwide including leather tanning industry. The residues of these salts are discharged into the environment causing serious health hazardous to human, animals and plants. The chemical remediation of the Cr VI residues is costly and adds more pollutants to the environment. Therefore, the bioremediation of toxic hexavalent chromium residues is the aim of this study. For this purpose, the soil and wastewater samples from the heavily contaminated sites near tanneries were used for the isolation of Cr VI resistant bacteria. A total of 33 bacterial isolates was obtained from samples grown on LB medium amended with 50 mgL^{-1} potassium di chromate (Cr VI). These isolates were screened for their growth in the medium amended with Cr VI concentrations ranging between 100 and 200 mgL^{-1}. Seven isolates showed tolerance to the highest concentration. These isolates were subjected to analysis of 16S rDNA genes followed by RFLP of the PCR product. The most promising isolate (No.3) that withstood the highest Cr VI concentration was further subjected to 16S rDNA gene nucleotide sequence. This isolate turned to be *Microbacterim* spp. with 98% similarity to the standard strain in the gene bank. The sequence was deposited in NCBI data bank under accession number mk878392. The efficiency of this indigenous strain of bacteria in removal of Cr VI from aquas solution showed that it was capable to remove 30% of Cr VI within first 20 hours then exponential increase took place after additional 20 hours. The total removal of Cr VI reached 97.2% after 96 hours of incubation. The immobilization of the strain on either alginate or chitosan accelerated the removal of Cr VI that reached 90% removal in 18 hours. This strain seems very promising as potential bioremediation agent for hexavalent chromium residues.

Keywords: Hexavalent chromium, *Microbacterium* spp., Bioremediation, immobilization.