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Bacterial Strains from Tannary Waste Polluted Soil Showed Heavy Metal Resistance and Bioaccumulation Capacity

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Abstract: Tanning is the process of treating skins and hides of animals to produce leather. Various chemicals are being used in this process and accordingly, tannery wastewater contains the variety of toxic heavy metals like chromium, cadmium, cobalt, lead, nickel, selenium and arsenic (1). Hence these regions are suitable sources for obtaining heavy metal resistance bacteria with application in bioremediation. In this study we isolated the bacterial strains from tannery effluent polluted soil and evaluatedtheir resistance to some heavy metals and their potentials for application in bioremediation process. The desired dilutions of soils were inoculated in the nutrient agar media containing 50 ppm of each arsenic, chromium, copper, lead and zinc ions. A total of 12 strains were obtained where their tolerances to heavy metals for the arsenic, chromium, copper, lead and zinc were as 2000 ppm, 2900 ppm, 1600 ppm, 3300 ppm, and 1600 ppm, respectively. In order to identify the bioaccumulation capacity of these strains, bacterial suspensions were inoculated in the 100ml Erlenmeyer flasks containing nutrient broth that supplemented by 50 ppm of each mentioned metals. The cultures were kept at 30 ºC and agitation at 150 rpm for 72 hours. Bacterial cell pellets were removed by centrifugation (1000 g for 10 min) and the supernatants were passed through 0.45 µm filters. The potentials of bacterial strains to accumulate metals were determined based on the measurements of the remaining amount of primary metals in the supernatant by the inductively coupled plasma optical emission spectrometry (ICP-OES) (SPECTRO ARCOS, Germany) (2). The highest remediation rates for arsenic, chromium, copper, lead and zinc were as 6.7% (strain TP4), 13.1% (strain TN3), 9.9% (strain TP4), 76.9% (strain TN3), and 1.2% (strain

TN3), respectively. The results of this study showed that tannery waste contaminated soils are good candidates to obtain of bacterial strains with the potentials in bioremediation.

References

[1] N.Patel et al., Environmental Impact and Treatment of Tannery Waste. In: Inamuddin, Ahamed M.I., Lichtfouse E. (eds) ***Water Pollution and Remediation: Organic Pollutants. Environmental Chemistry for a Sustainable World,*** vol 54. Springer. **2021**.

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