TITLE: TOLERANCE TO HEAVY METALS IN BACTERIA FROM THE GENUS *MUCILAGINIBACTER* ORIGINATED FROM TWO DISTINCT AREAS.

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ABSTRACT:

Some heavy metals are essential to bacteria, since they are cofactors of several enzymes. However, in high concentrations, they are toxic to bacteria, and several mechanisms that allows them to tolerate metal toxicity are known. Serpentine soils are rich in heavy metals, especially nickel, therefore we expect from bacteria living in these soils some tolerance to heavy metals. The main goal of this work was to compare the tolerance to heavy metals in two isolates of *Mucilaginibacter* genus, one obtained from a serpentine soil in the Cerrado and the other from Amazonian soil, which does not contain high concentrations of heavy metals. Both isolates produce copious amounts of a exopolymer that may function as a metal adsorbent, leading to tolerance to heavy metal. Bacteria were pre-cultivated in R2A medium in the presence or absence of nickel, the most abundant metal in serpentine soils. Then, these bacteria were transferred to solid medium containing increasing concentrations of either nickel, cobalt, copper, or zinc. Growth was evaluated using a plate dilution method in which the highest dilution containing bacterial colonies was recorded as the maximum tolerated concentration (MTC). The *Mucilaginibacter* species originated from serpentine soil presented higher MTC on medium amended with nickel when compared to the other metals. However, bacteria originated from a pre-inoculum without nickel exhibited a delay on colony formation when exposed to nickel compared with bacteria originated from a pre-inoculum containing nickel. On the other hand, the tolerance to nickel exhibited by the *Mucilaginibacter* species originated from the Amazonian soil was lower than observed in the *Mucilaginibacter* of serpentine soil, but it showed higher MTC for cobalt, zinc, and copper. It is not yet clear whether these two isolated of *Mucilaginibacter* belong to the same species, but they exhibit different responses to heavy metal toxicity. The results indicated that although they both produce exopolymers as a response to nickel exposure, other heavy metal tolerance mechanisms may be involved, such as efflux pumps or intracellular metal complexation, which may be expressed differently in these two isolates.

Keywords: heavy metals; bacterial growth; serpentine soils; nickel.

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