Isolation of a Novel Molybdenum-reducing and Azo Dye Decolorizing *Enterobacter* sp. Strain Aft-3 from Pakistan

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ABSTRACT

Removing pollutants, such as heavy metals and organic dyes, using bioremediation is the most economical approach over the long term, when other methods, such as physical or chemical, may not be effective or feasible. The heavy metal molybdenum is toxic to ruminants and spermatogenesis in many animals, while dyes, including Methyl Red, are mutagenic to animals. In this study, we report on the ability of a molybdenum-reducing bacterium isolated from contaminated soil to decolorize the dye Methyl Red. The bacterium reduced molybdate to Mo-blue optimally between pH 5.8 and 6.5 and at 37°C. Glucose was the best electron donor for supporting molybdate reduction, followed by lactose, sucrose, maltose, raffinose, mucate, d-mannose, cellobiose, d-adonitol, d-mannitol, melibiose, glycerol, l-rhamnose, d-sorbitol, and l-arabinose, in descending order. Other requirements included a phosphate concentration at 5 mM and a molybdate concentration between 20 and 25 mM. The absorption spectrum of the Mo-blue produced was similar to that produced by previous Mo-reducing bacterium, and closely resembled a reduced phosphomolybdate. Molybdenum reduction was inhibited by mercury (II), silver (I) and copper (II) at 2 mg/L by 74.6, 67.0 and 63.3%, respectively. Biochemical analysis resulted in a tentative identification of the bacterium as Enterobacter sp. strain Aft-3. The ability of this bacterium to detoxify molybdenum and decolorize azo dye makes this bacterium an important tool for bioremediation.

Keywords: Bioremediation, Molybdenum, Azo dye, Microplate format, *Enterobacter* sp., Characterization