

Isolation of molybdenum-reducing bacterium; *Serratia* sp. strain MIE2 from agriculture soil and its potential use in soil bioremediation

ABSTRACT

Molybdenum is reported to be very toxic to ruminants and shows evidence of spermatogenesis toxicity in animals and insects. Hence, its removal is important. In this study, we report on the first isolation of molybdenum-reducing bacterium from agricultural soil. The bacterium reduces hexavalent molybdenum (sodium molybdate) to molybdenum blue (Mo-blue); a colloidal product, which can be trapped and removed from solution. Phylogenetic analysis resulted in a tentative identification of the bacterium as *Serratia* sp. strain MIE2. The optimum conditions for Mo-blue production using the normal one-variable-at-a-time (OVAT) approach were 10 mM of sodium molybdate, pH 6.0, a temperature of 35°C, ammonium sulphate at 10 g/L as the nitrogen source and sucrose concentrations of between 30-50 g/L as the carbon source and electron donor for molybdate. Studies on the effects of pesticides and solvents on Mo-blue production showed that Mo-blue production from whole cells was relatively more affected by these xenobiotics compared to the crude enzyme. Nevertheless, the strain was resistant to most of the xenobiotics tested. Based on the strain MIE characteristics, the bacterium will be a suitable candidate for the remediation of aquatic bodies and agricultural soils contaminated with molybdenum.

Keyword: Bioremediation; Molybdenum blue; Agriculture soil; Isolation; *Serratia* sp.