Molybdate reduction by Pseudomonas sp. strain DRY2.

ABSTRACT

Aims:To isolate and characterize a potent molybdenum-reducing bacterium.Methods and Results:A minimal salt medium supplemented with 10 mmol l)1molybdate, glucose (1Æ0%, w⁄v) as a carbon source and ammonium sulfate(0Æ3%, w⁄v) as a nitrogen source was used in the screening process. A molyb-denum-reducing bacterium was isolated and tentatively identified as Pseudomo-nassp. strain DRY2 based on carbon utilization profiles using Biolog GN plates and partial 16S rDNA molecular phylogeny. Strain DRY2 produced 2 Æ4,3Æ2 and 6Æ 2 times more molybdenum blue compared to Serratia marcescens strain DRY6,Enterobacter cloacae strain 48 and Eschericia coliK12, respectively.Molybdate reduction as optimum at 5 mmol l)1phosphate. The optimum molybdate concentration that supported molybdate reduction at 5 mmol l)1phosphate was between 15 and 25 mmol l)1. Molybdate reduction was optimum at 40C and at pH 6Æ0. Phosphate concentrations higher than 5 mmol l)1 strongly inhibited molybdate reduction. Inhibitors of electron transport system such as antimycin A, rotenone, sodium azide and cyanide did not inhibit the molybdenum-reducing enzyme activity. Chromium, copper, mercury and lead inhibited the molybdenum-reducing activity.Conclusions:A novel molybdenum-reducing bacterium with high molybdenum reduction capacity has been isolated. Significance and Impact of the Study:Molybdenum is an emerging global pollutant that is very toxic to ruminants. The characteristics of this bacterium suggest that it would be useful in the bioremediation of molybdenum pollutant.

Keyword: Molybdate-reduction; Molybdenum blue; Pseudomonas sp.