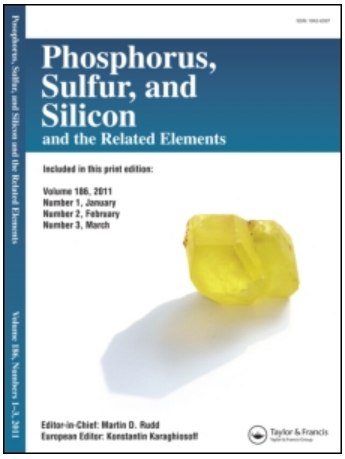

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Microbiological solubilization of inorganic P-fractions normally encountered in soils

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Abstract

Phosphorus solubilizing microorganisms were isolated from four different soils collected from two regions of the province of Quebec. All soils contained P-solubilizing microorganisms, but 10 bacteria and 3 fungi were selected because of their high solubilizing activity. These selected organisms were able to grow on solid culture media containing $FePO_4$, $AlPO_4$, $CaHPO_4$ or $Ca_3(PO_4)_2$ as sole source of phosphorus. In liquid cultures, fungal isolates were better P-solubilizers than bacterial isolates. In fact, SEM microscopy showed that the hyphae of fungi are attached to the P particles while bacteria are not.

A greenhouse trial was conducted to study the effect of inoculation with P-solubilizing microorganisms on maize (cultivar Funk's 4066) yield and phosphorus uptake. The soil used (one of the four used for the isolation of the microorganisms) was a loam with a pH of 6.22, 4.83% organic matter content, and it contained 175 kg ha^{-1} P and 730 kg ha^{-1} K. An equivalent of 180 Kg ha^{-1} N as ammonium nitrate, and 60 Kg ha^{-1} K as KCl was applied to all pots. Phosphorus was added at a rate of 70 Kg ha^{-1} P_2O_5 as superphosphate or rock phosphate. The experimental design was a split plot with 14 treatments (10 bacteria, 3 fungi and a check) and 3 phosphorus treatment (check, rock phosphate and superphosphate) with 5 replications. After 3 weeks of growth, all treatments had no effect on maize dry matter yield. However, the bacterial isolate # 3 did increase the P-uptake of maize plants receiving rock phosphate by 17% as compared to uninoculated control ($P > 0.132$). In general, in the greenhouse trial, the bacterial isolates performed better than the 3 fungi tested. The effects of 3 bacteria and one fungal isolate on maize and lettuce yield and P uptake are under investigation in the field.

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