TITLE: IRON PHOSPHATE SOLUBILIZATION AND SIDEROPHORE PRODUCTION BY MICROORGANISMS ISOLATED FROM MAIZE

AUTHORS: BATISTA, F. C.; ABREU, C. S.; RIBEIRO, V. P.; FERNANDES, T.A.; OLIVEIRA, M.C.; OLIVEIRA, C.A.

INSTITUTION: EMBRAPA MILHO E SORGO - CNPMS, SETE LAGOAS - MG (Rodovia MG 424 Km 45, Zona Rural, CEP: 35701-970) – BRASIL.

ABSTRACT:

Brazilian tropical soils usually present acidic condition and predominance of iron phosphate (Fe3PO4), which results in low availability of phosphorus (P) for the plants and reduces crops productivity. As a result, large quantities of phosphate fertilizers are normally used to increase P availability in the soil. Alternatively, some rhizosphere and endophytic microorganisms are able to solubilize insoluble forms of P. These microorganisms may solubilize iron phosphate (P-Fe) in the soil, but the mechanisms and substances involved in P-Fe solubilizing are not yet thoroughly elucidated. The aim of this study was to assay the siderophores production and iron phosphate solubilization by microorganisms. Thirty isolates of endophytic and rhizobacteria from the "Embrapa Milho e Sorgo" institutional culture collection, previously characterized as efficient calcium phosphate solubilizing strains, were activated by plating on potato dextrose agar (PDA) and incubated at 30°C for 1-2 days. Soluble phosphate was determined in the supernatant after growth in liquid culture containing iron phosphate as unique source of P. Siderophores production was estimated by the Chrome Azurol S (CAS) liquid assay after growth in TSB at 30°C for 72h. The most efficient strains in solubilizing iron phosphate were the endophytic B1924 (*Klebsiella pneumoniae*), B1917 (*Enterobacter*) and B1926 (unidentified bacteria). The amount of P solubilizated by these strains varied from 231,7 mgP.L-1 to 182,6 mgP.L-1 and the P solubilization was coupled with a decrease in pH values. The highest production of siderophores occurred after 72h of culture, where more than 20 μM siderophores were estimated for the isolates B1928 (*Burkholderia gladioli*), B2081 (*Bacillus cereus*), B2106 (*Bacillus megaterium*) and B2103 (*Pantoea ananatis*). The isolate B1924 showed both high P solubilization and siderophores production, although generally, there was no significant correlation between iron phosphate solubilization and siderophores production. The endophytic microorganisms reported in this study represent potential candidates for biofertilizers development. However, greenhouse and field experiments are needed to test whether, in fact, these microorganisms can contribute to phosphate uptake by maize, in tropical soils.

Keywords: phosphorus, P- solubilizing microorganims, *Zea mays*.

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