Molecular genetic identification of yeast strains isolated from Egyptian soils for solubilization of inorganic phosphates and growth promotion of corn plants.

Hesham A and Mohamed H

Abstract:

Abstract Forty yeast strains isolated from soils taken from different locations in Egypt were tested for their P-solubilizing activities on the basis of analyzing the clear zone around colonies growing on a tricalcium phosphate medium after incubation for 5 days at 25\textdegree C, denoted as the solubilization index (SI). Nine isolates that exhibited P-solubilization potential with an SI ranging from 1.19 to 2.76 were genetically characterized as five yeasts belonging to the genus Saccharomyces cerevisiae and four non-Saccharomyces, based on a PCR analysis of the ITS1-26S region amplified by SC1/SC2 species-specific primers. The highest Psolubilization efficiency was demonstrated by isolate PSY-4, which was identified as Saccharomyces cerevisiae by a sequence analysis of the variable D1/D2 domain of the 26S rDNA. The effects of single and mixed inoculations with yeast PSY-4 and Bacillus polymyxa on the P-uptake and growth of corn were tested in a greenhouse experiment using different levels of a phosphorus chemical fertilizer (50, 100, and 200 kg/ha super phosphate 15.5% P2O5). The results showed that inoculating the corn with yeast PSY-4 or B. polymyxa caused significant increases in the shoot and root dry weights and P-uptake in the shoots and roots. The P-fertilization level also had a significant influence on the shoot and root dry weights and P-uptake in the shoots and roots when increasing the P-level from 50 up to 200 kg/ha. Dual inoculation with yeast strain PSY-4 and B. polymyxa at a P-fertilization level of 200 kg/ha gave higher values for the shoot and root dry weights and P-uptake in the shoots and roots, yet these increases were nonsignificant when compared with dual inoculation with yeast strain PSY-4 and B. polymyxa at a P-fertilization level of 100 kg/ha. The best increases were obtained from dual inoculation with yeast strain PSY-4 and B. polymyxa at a P-fertilization level of 100 kg/ha, which induced the following percentage increases in the shoot and root dry weights, and P-uptake in the shoots and roots: 16.22\%, 46.92\%, 10.09\%, and 31.07\%, respectively, when compared with the uninoculated control (fertilized with 100 kg/ha).

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