Title: BACTERIA CONSORTIUM CHANGE THE SOIL BACTERIA COMMUNITY AND α-DIVERSITY IN SUGARCANE CULTURE

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Abstract

Microorganisms play an essential role in the phosphorus cycle in soil (P) and are important for P transfer from soil and to the plant. Every day there is more interest in manipulating soil microorganisms to improve P uptake, in order to increase the overall efficiency of P-use in agricultural systems. An example is the sugar cane culture, where large amounts of mineral phosphate fertilizers are applied to maintain crop productivity. P-mobilizing bacteria (PMB) can increase the availability of soil P through solubilization and mineralization of phosphate sources unavailable to plants. The aim of this study was to evaluate the effect on the native soil bacterial community and its α-diversity, caused when PMB were inoculated in sugarcane soils treated with distinct P sources. Pre-germinated sugarcane gems were placed in recipients with 11 kg of soil. We used five P sources: compost, apatite (Araxá rock), compost + apatite, triple superphosphate (TSP) and a control without P. Sugarcane seedlings were inoculated with two different inoculants: inoculum 1: *Pseudomonas* sp. PSBR10, *Azotobacter* sp. AZTBR19, *Rhizobium* sp. RIZBR01; inoculum 2: *Bacillus* sp. BACBR04, *Bacillus* sp. BACBR06, *Rhizobium* sp. RIZBR01. The experimental design was in randomized blocks with four repetitions. Sugarcane seedlings were harvested at 75 days after planting. The total DNA of the soil was extracted, followed by Illumina MiSeq sequencing of the 16S rRNA gene to determine the effect of each treatment on the soil bacterial community and soil α-diversity (using the PD Whole Tree Estimator). Inoculant application changed the structure of the bacterial community, when compared to un-inoculated treatments, particularly in treatments that showed most efficient use of P. The bacterial strains used in this study (mainly inoculant 2) changed the structure of the natural soil bacterial communities and, therefore, improved the use of P and other nutrients, due to the significant reduction in the number of observed OTUs (indicative of the number of species). Our results suggest that changes in community structure can be related to greater P uptake in sugar cane, where the application of bacterial consortium could be a beneficial practice to reduce the sugarcane production costs.

Keywords: P mobilizing-bacteria, Sugarcane; P availability; Illumina; Bacterial communities

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