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BOOK OF ABSTRACTS

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Beneficial Microbes and their Antagonistic Activities ~~of~~ Against *Fusarium Oxysporum* for Tomato Growth And Nutritional Quality

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Abstract

This study investigated the potential of beneficial microbes through a series of activities and functionalities for identifying sustainable biological alternatives to chemical soil remediators and fertilizers as well as plant growth promoters and protectors. Twenty species belonging to Lactic Acid Bacteria (LAB) (3), *Bacillus* (16), and yeast (1) were screened for their enzymatic activities, nitrogen fixation capacity, potassium and phosphorus solubilization activities, and exopolysaccharide (EPS) production. All experiments were performed in triplicate and statistically compared by ANOVA-test with $p < 0.01$. The results revealed strong genus-, species, and strain-dependent differences. The best enzymatic activities were found with *Bacillus* (amylase and protease) and yeast (cellulase). Only *Pediococcus* exhibited enzymatic activity (amylase) among LAB. All *Bacillus* species were able to fix N₂ whereas none of LAB exhibited this capacity. Yeast fixed N₂ moderately. All microbe genera were able to solubilize K & P and produce EPS. *Lacticasei bacillus rhamnosus* and *Bacillus subtilis* B3VCR2 showed the highest P and solubilizing capacity, respectively. Three *Bacillus* species were the best EPS producers. Hydrolytic enzyme activities, N₂ fixation activity, K & P solubilizing capacity, and EPS production assessed in vitro can be used as criteria for selecting biofertilizer microbial aptitudes for soil fertility and health and plant growth promotor and protector. In addition, enzyme activities can help for the degradation of some pesticides or harmful organic compound residues in soil and contribute to bioremediation. Beyond soil texturing functions, EPS also have other biological properties such as antimicrobial and antioxidant activities and therefore can be used as indicator of microbe selection for plant growth promoting and protection, either in direct or indirect way. From this study, it will be possible to select the strains to be used alone or in consortia for One Health approaches focused on soil remediation & fertility and plant growth & protection.

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Keywords: Antagonism; *Bacillus*; Biocontrol; LAB; Streptomyces