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ABSTRACT BOOK

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ID476 | Bioinoculants as a strategy to mitigate water deficiency in maize growth

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Background: Intensive use of inorganic fertilizers to meet growing food demand has become a major threat to soil health and long-term agricultural productivity. At same time, drought remains a global challenge due to its severe impact on crop yields. Annual crops of economic relevance (e.g. maize) are particularly vulnerable. Plant growth-promoting bacteria enhance maize tolerance to drought stress by improving nutrient uptake and water retention, offering an eco-friendly farming solution. This study aimed to evaluate the effect of bioinoculation on maize growth under two different water regimes.

Methods: Bacterial strains from the CBQF, ESB-UCP collection were pre-selected for their plant growth-promoting traits, namely siderophore production and P solubilization. Further characterization included indole-3-acetic acid production, osmotic stress tolerance, extracellular enzyme activity, and mutual biocompatibility. Six strains, Bacillus pumilus 1Z1 (B1), Priestia aryabhattai LS 1-2 (B2), Bacillus pumilus ST2-22 (B3), Bacillus amyloliquefaciens LR 1-9 (B4), Pseudomonas graminis LS 3-5 (B5) and Pseudomonas fluorescens S3X (B6) were inoculated in pots containing agricultural soil, where maize was grown under well-watered (20% Volumetric water content, VWC) and moderate water-deficient conditions (12% VWC).

Results: Overall, water deficiency reduced fresh and dry shoot biomass. Under moderate water deficiency, bioinoculation enhanced dry shoot biomass compared to non-inoculated plants, with increases of 35, 13 and 12% in plants inoculated with strains B1, B5, and B6, respectively.

Conclusions: Bacterial inoculation alleviated the negative effects of moderate drought stress on maize growth, highlighting the potential of bioinoculants as a sustainable strategy to maintain crop productivity under water-limited conditions.

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