# P47

## Impact of phosphate-solubilizing bacteria inoculation on maize yield, root system architecture and microbiome

(submitted by Sylvia Morais de Sousa Tinoco <sylvia.sousa@embrapa.br>)
Full Author List: Santos, Jonnathan W M[1]; Oliveira, Raquel G[2]; Avelar, Joao V S[3]; Santos, Flavia C[2]; Oliveira-Paiva, Christiane A[2]; Gomes, Eliane A[2]; Lana, Ubiraci G P[2]; Tinoco, Sylvia M S[1 2 3]
[1] Genomics for Climate Change Research Center (GCCRC) Campinas, SP, Brazil, 13083-875
[2] Embrapa Maize and Sorghum, Sete Lagoas, MG, Brazil, 35701-970
[3] Federal University of São João del-Rei (UFSJ), São João del-Rei, MG, Brazil, 36301-158

The global use of bioinoculants in sustainable agriculture is increasing. BiomaPhos®, a bioinoculant composed of two phosphorus-solubilizing *Bacillus* strains (CNPMS B2084 and CNPMS B119), has been shown to enhance maize yield in Brazil. This study aimed to evaluate the effects of BiomaPhos® inoculation and phosphate fertilization on maize yield, root system architecture and microbiome. Field experiment was conducted in low-phosphorus (P) soil at the Embrapa Maize and Sorghum Experimental Station in Brazil during the 2022/2023 season. A maize hybrid was cultivated under different sources and doses of phosphate fertilizers: no addition of phosphorus fertilizer (P0), rock phosphate (RockP), and triple superphosphate (TSP) at 120 kg $P_2O_5$ $ha^{-1}$, with and without BiomaPhos® inoculation. Root system architecture (RSA) was analyzed using the Digital Imaging of Root Traits (DIRT 5.2) platform. Genetic diversity was assessed at flowering time using Terminal Restriction Fragment Length Polymorphism (T-RFLP), and taxonomic groups were identified with MiCA3 software. Significant differences in yield were observed among treatments, with the highest yields recorded for the combination of TSP fertilizer at 120 kg $ha^{-1}$ and BiomaPhos® inoculation. Correlation analysis revealed a significant positive relationship between maize root area, width, and angle, with root angle showing a strong positive correlation with yield. Root area and width were notably greater in treatments with 120 kg $ha^{-1}$ of TSP. Acid phosphatase activity was highest with RockP fertilizer at 120 kg $ha^{-1}$, while alkaline phosphatase activity peaked in non-inoculated treatments with RockP. The inoculation significantly influenced the soil bacterial community, while fertilization primarily impacted the RSA. The bacterial families Streptomycetaceae, Bacillaceae, and Microbacteriaceae were the most abundant across treatments, with Streptomycetaceae being particularly dominant in RockP-inoculated treatments. Diversity indices (Simpson and Shannon) were negatively correlated with acid and alkaline phosphatase activities. Overall, the findings demonstrate that BiomaPhos® inoculation altered the soil microbial community, while phosphate fertilization modulated root architecture. The combined use of P-solubilizing *Bacillus* strains inoculation and phosphate fertilization enhances maize yield, offering a sustainable strategy for improving agricultural performance.

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# P48

## Implementation of a lab-scale highly efficient CRISPR cas-9 gene editing and genotyping system in maize.

(submitted by Zackariah Ellington <zfleming3@unl.edu>)
Full Author List: Ellington, Zackariah[1 2 3]; Wang, Zhen[1 2]; Yang, Jinliang[1 2]
[1] Department of Agronomy and Horticulture, University of Nebraska - Lincoln; Lincoln; Nebraska; 68583
[2] Center for Plant Science Innovation, University of Nebraska - Lincoln; Lincoln; Nebraska; 68583
[3] Complex Biosystems Program, University of Nebraska - Lincoln; Lincoln; Nebraska; 68583

Understanding the genotype to phenotype relationship is a major research topic in plant science and plant genetics. A key tool in reverse genetic studies is the targeted mutagenesis of genes of interest. In this study, we implemented a high efficiency gene transformation system for generating CRISPR Cas-9 edits in maize utilizing the morphogenic factors Baby Boom and GRF-GIF (GGB). The GGB system showed greatly increased transformation efficiency using the inbred line B104 (16% regeneration rate) when compared to published literature. We did not observe the major morphogenic changes typically associated with the use of morphogenic factors. In the meantime, we developed a multiplexed genotyping method to identify the gene edits through next-generation sequencing. This highly efficient and cost-effective transformation and genotyping system makes small-scale, lab-based gene editing more attainable, enabling the advancement of plant scientific research.

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