VII Simpósio de Microbiologia Agícola
Inovação e Sustentabilidade para transformar o campo
18 a 21 de maio de 2026

Detection and Description of Auxotrophic Bacteria in Maize Rhizosphere and Bulk Soil: Insights into Microbial Dependencies

Gabriel de Castro Theodoro[1], Armando Cavalcante Franco Dias[1] and Simone Raposo Cotta[1,2]

[1]University of São Paulo, Luiz de Queiroz College of Agriculture (ESALQ/USP), Department of Soil Science, 11 Pádua Dias Avenue, Piracicaba, São Paulo, 13416-900, Brazil.

[2]University of São Paulo, Center for Carbon Research in Tropical Agriculture (CCARBON/USP), Piracicaba, São Paulo, 13416-900, Brazil.

**E- mail gabrieldecastrotheodoro1601@usp.br*

By releasing amino acids and other compounds, plants shape bacterial communities in the rhizosphere, potentially favoring the enrichment of auxotrophic bacteria organisms that cannot synthesize specific amino acids and depend on external sources. We hypothesize that these auxotrophs are more abundant in the maize rhizosphere than in bulk soil and may enhance plant resilience under nutritional stress. To test this, we employed a dependency-based cultivation strategy to assess auxotrophy profiles in rhizospheric and bulk soil microbial communities associated with maize. The analysis was conducted using two contrasting soil textures (clay and sandy soils) collected from a greenhouse mesocosm experiment carried out over 50 days. Enrichment cultures were grown in minimal medium containing only minerals and carbon sources (pyruvate and glucose). Amino acids and vitamins were classified into six chemical categories and individually supplemented into the growth medium, with microbial growth monitored by optical density measurements after 24-48 hours. Soil suspensions were inoculated at dilutions of 10^{-2}, 10^{-4}, and 10^{-6}; only the latter two allowed discrimination between treatments. Rhizospheric communities preferentially consumed aliphatic non-polar, polar and negative, and polar non-charged groups, while bulk soil communities favored aliphatic non-polar, polar and positive, aromatic, and polar non-charged compounds. Both environments strongly utilized aliphatic non-polar amino acids such as methionine, a cooperative metabolite. We are currently assessing the auxotrophic profiles of bacterial isolates obtained from these enrichment cultures, and subsequent metabolomic analyses will further elucidate their metabolic dependencies and roles in plant-microbe interactions.

KEYWORDS: Soil microbiology, Auxotrophy, Rhizosphere, Microbial dependencies

FUNDING: Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP)