102. Diversity Matters: rhizosphere microbiome influence on wheat protection against soil-borne pathogens

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The rhizosphere microbiome is crucial for plant growth and development, including defense against soil-borne pathogens. Despite numerous biological products entering the global market, our understanding of how these inoculants interact with the rhizosphere soil microbiome diversity influencing plant protection remains limited. This study aimed to evaluate the impact of rhizosphere microbiome diversity on wheat plants inoculated with the beneficial Pseudomonas inefficax strain CMAA1741 and exposed to the soil-borne pathogen Bipolaris sorokiniana Using the dilution-to-extinction approach, a bioassay was conducted with natural soil three different dilutions of natural soil mixed with autoclaved soil and autoclaved soil along with treatments containing plants inoculated with P. inefficax and/or B. sorokiniana, as well as control plants (water-treated) and bulk soils.

Plants inoculated only with P. inefficax exhibited increased height and root dry mass. As expected, the disease severity index was higher in plants inoculated with the pathogen in soils with lower microbial diversity. Biocontrol efficacy by the P. inefficax was also higher in soils with lower microbial diversity. Beta-diversity analyses indicated significant changes in bacterial and fungal communities' composition when P. inefficax and/or B. sorokiniana were inoculated. Furthermore, a few bacterial and fungal taxa were detected only when P. inefficax was inoculated, including members of Flavisolibacter, Chthoniobacter, Massilia, and Streptomyces genus. Inoculation only with P. inefficax led to an increase in co-occurrence network modularity and when the pathogen is present, in plants inoculated with P. inefficax, there was a decrease in network modularity and number of nodes and an increase in the number of edges.

In low microbial soil diversity, when plants are more susceptible to soil-borne pathogens, the inoculation of beneficial bacteria changes the structures of bacterial and fungal communities, preventing pathogen invasion of the rhizosphere.

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