Rhizosphere Microbial Communities of *Spartina alterniflora* and *Juncus roemerianus* From Restored and Natural Tidal Marshes on Deer Island, Mississippi

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The U. S. Gulf of Mexico is experiencing a dramatic increase in tidal marsh restoration actions, which involves planting coastal areas with smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*) for erosion control and to provide habitat for fish and wildlife. It can take decades for sedimentary cycles in restored marshes to approach reference conditions, and the contribution of the sediment microbial communities to these processes is poorly elucidated. In this study, we addressed this gap by comparing rhizosphere microbiomes of *S. alterniflora* and *J. roemerianus* from two restored marshes and a natural reference marsh located at Deer Island, MS. Our results revealed that plants from the restored and reference areas supported similar microbial diversity indicating the rapid colonization of planted grasses with indigenous soil microbiota. Although close in composition, the microbial communities from the three studied sites differed significantly in the relative abundance of specific taxa. The observed differences are likely driven by the host plant identity and properties of sediment material used for the creation of restored marshes. Some of the differentially distributed groups of bacteria include taxa involved in the cycling of carbon, nitrogen, and sulfur, and may influence the succession of vegetation at the restored sites to climax condition. We also demonstrated that plants from the restored and reference sites vary in the frequency of culturable rhizobacteria that exhibit traits commonly associated with the promotion of plant growth and suppression of phytopathogenic fungi. Our findings will contribute to the establishment of benchmarks for the assessment of the outcome of coastal restoration projects in the Gulf of Mexico and better define factors that affect the long-term resiliency of tidal marshes and their vulnerability to climate change.

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