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The Department of

Botany & Plant Pathology

SEMINAR NOTICE

Diversity and functions of root associated fungi in the pine barrens ecosystem

Dr. Ning Zhang

Department of Plant Biology
Rutgers University

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3:30pm WSLR Room 116

Abstract:

Pine barrens ecosystem has acidic, sandy and nutrient-poor soils. Pines and oaks are the dominant trees, and other common plants in pine barrens include switchgrass and other grasses (Poaceae), sedges (Cyperaceae), orchids (Orchidaceae), blueberries and other heath family members (Ericaceae). Scarce attention has been paid to studies of fungi in the pine barrens, and much remains unknown about fungal biodiversity and functions in this ecosystem. The largest and most uniform area of pine barrens in the United States is the 1.4 million acre (57,000 km^2) pine barrens of New Jersey (NJ) located in the southern region of the state. The NJ Pine Barrens represents one of a series of barrens ecosystems along the eastern seaboard of USA and one of a series of similar ecosystems around the world. The podzolic soil in the NJ Pine Barrens is highly acidic (pH ~4.0 with very low cation exchange capacity), sandy, dry (low moisture holding capacity), nutrient poor (e.g. low in P, K, N) and containing elevated levels of soluble aluminum. During the 1600's and 1700's when settlers first came to this area they discovered most of the region's soils would not support the growing of grain crops from traditional European agriculture. Therefore they named the region "Barrens". But why and how do wild grasses thrive in the pine barrens acid and nutrient poor soil? Do fungi play a role in aiding plant establishment and survival in such stressed environments? In order to address these questions, we have been studying root-associated fungi in the pine barrens using both culture method and Illumina metabarcoding method. Our data showed that with regard to fungal diversity, the pine barrens is anything but barren.

We found that grass (Poaceae) roots in the pine barrens are a rich reservoir of novel fungi. Importantly, we observed that *Acidomelania panicicola* (Leotiomycetes), a new genus and species we described from switchgrass in the NJ Pine Barrens increases root hair growth of switchgrass and rice in low nutrient conditions. We also described another new genus *Pseudophialophora* (Magnaporthales, Sordariomycetes) that contains several pathogenic species. We compared the root fungal community between the wild switchgrass from the NJ Pine Barrens and cultivated switchgrass in managed farms using both culture and metabarcoding methods. Both methods suggest that Leotiomycetes are dominant fungi in the switchgrass roots from pine barrens soils, while Sordariomycetes are dominant in the roots growing in the rich farm soils. Metabarcoding method uncovered a more diverse microbiome from the plant roots. More experiments are being conducted to test our hypothesis that *Acidomelania* and other Leotiomycetes play a role in increasing plant tolerance to abiotic stresses (e.g., low pH, low nutrients, drought) and contribute to improved establishment in poor soils. Results from this work will facilitate ecological and evolutionary studies on root-associated fungi.

-To schedule a meeting with the speaker contact Stacie Miller at kitchen0@purdue.edu-