Causes and Consequences of Fungal Diversity: An Example from a Belowground Mutualism

Presentation Overview

Diversity permeates all aspects of my career. From my research on a plant-fungus mutualism, to my classroom instruction, to my service activities, diversity in all its aspects is a core principle guiding my approach. In my presentation, I will summarize my background and experience, and give an overview of my research agenda. I will discuss my many service roles at both on my campus and at the University of Wisconsin System. In turn, my experiences have shaped my leadership style. Lastly, I will explain how trends in higher education, including funding and demographics of potential students informs my vision for a forward-thinking Biology Department to meet the challenges of the 21st century.

Research Summary

The Kingdom Fungi is estimated to contain 1.5 million species, making it one of the largest branches on the tree of life. This diverse group of organisms is of profound ecological significance as decomposers, pathogens, and symbionts. The Subphylum Glomeromycotina is a particularly important group because its members form a mutualistic symbiosis with over 80% of all terrestrial plants. Also known as arbuscular mycorrhizal fungi (AMF), these ubiquitous soil microbes are crucial in assisting plants’ acquisition of nutrients from soil. Field soils often support a complex AMF community with numerous species. I am interested in the intricacies of how the plant and fungal communities interact.

My research focuses on two overarching questions: 1) What drives AMF diversity in native systems? and 2) What are the consequences of this diversity? Evidence from grassland sites indicates that AMF diversity is influenced by a variety of factors including soil chemistry, climatic conditions, and anthropogenic inputs (e.g., fertilizers, fungicides, etc.). I will show evidence that plant diversity and productivity often are positively correlated with AMF diversity. In experimental systems, the plant host(s) can have a profound effect in shaping the fungal community. Moreover, data support the notion of “ecological matching” between the AMF community and plant community, both in terms of species diversity and also mycorrhizal functioning. Elucidating the complex feedback mechanisms between plant and soil communities is crucial to predicting the assembly of grasslands. Knowledge of these belowground processes will help inform strategies for the restoration and management of both native and managed systems.