Plant Sciences Symposium 2018
University of Hawai‘i at Mānoa
Speaker List

Dr. Linda Kinkel

Professor of Plant Pathology, University of Minnesota

8:45 AM - 9:30 AM

Phytobiomes: Competition, Coevolution, and Disease Suppression

Microbes and plants exist within complex networks of interacting plant and microbial species. Our work explores the roles of plant community diversity, plant host, and fungal and bacterial species interactions in determining the pathogen-suppressive potential and composition of soil microbiomes, and the consequences for plant productivity. Unraveling the complex coevolutionary interactions among plants and soil microbiomes can suggest novel insights for active management of soil microbes to support plant productivity. Our results show that rhizosphere Streptomyces associated with the same plant host are significantly more pathogen-suppressive when the host grew in monoculture vs. within a high-diversity plant community. In contrast, populations of Streptomyces in the rhizosphere of plant hosts growing in high-diversity communities are more niche-differentiated than populations associated with the same host in monoculture. These data suggest that plant community diversity plays a critical role in determining the likelihood of antagonistic arms race coevolution vs. niche differentiation among sympatric soil populations, with significant implications for plant disease suppression. Our work illustrates how diffuse networks of species interactions over diverse spatial scales contribute to determining the antagonistic potential of indigenous soil microbes, and suggests specific phytobiome management approaches targeting species interactions that may offer potential for sustainable disease control.

Dr. Anthony Amend

Assistant Professor of Botany, University of Hawai'i at Mānoa

9:30 AM - 10:15 AM

The causes and consequences of fungal foliar symbionts on Hawaiian plants

Found inside the healthy leaf tissue of every plant species yet examined, foliar fungal endophytes play a critical role in mediating hosts interactions with their abiotic environment and with other organisms including pathogens and herbivores. Though invisible to the naked eye, endophytic fungi form ubiquitous and hyperdiverse communities spanning hundreds of millions of years of evolutionary history. Over the past five years our lab has leveraged Hawai'i's unique isolation, diversity of habitats and spectacular flowering plant adaptive radiations to gain insight into the distribution, diversity and specificity of this group. Combining culture-based methods, high-throughput environmental sequencing and stored banks of genomic DNA from critically endangered (and extinct) species, we've made sense of the major biotic and abiotic drivers that determine which of these fungi are found on native plants throughout the archipelago. We are using these data in conjunction with microbial "transplants" to help restore some of our most imperiled endemic plants.

Dr. Eugenia Munaro

Research Scientist for Pioneer, Johnston, Iowa

10:45 AM - 11:30 AM

Encirca® : Enhancing Corn Nitrogen Research and Services

Nitrogen management is among the most uncertain and costly aspects of modern corn production. Because soil nitrogen varies dynamically in response to the interaction between soils and weather, the optimal nitrogen application rate for any year or location varies widely. Inefficient use of N fertilizer has profound economic and environmental consequences. This presentation will report on a public-industry partnership for enhancing corn nitrogen research and Encirca® Nitrogen services that combines the knowledge and experience in agronomy, soils, weather and analytics needed to offer customized nitrogen management tools helping farmers make critical decisions and promote a sustainable agriculture.

Dr. Nhu Nguyen

Assistant Professor of Tropical Plant and Soil Sciences, University of Hawai'i at Mānoa

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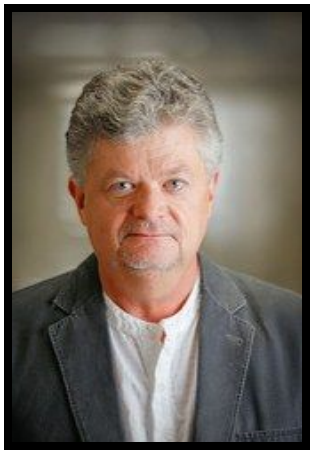
1:00 PM - 1:45 PM

Plant-symbiotic soil fungi in a changing environment

The planet is changing, both in climate and in the exchange of biological material across broad geographic distances. Communities of plant symbiotic fungi, namely mycorrhizal and saprobic fungi, are expected to change in response. I will use several examples from my previous work to discuss fungal community shifts in response to new biotic and abiotic environmental pressures, starting with the importance of symbiont dependency in a new environment that speaks to invasive potentials of plants, followed by how both hosts and symbionts respond to simulated global warming scenarios, and how fungi may employ a waiting strategy to temporarily escape major impacts.



Dr. Gary Felton

Professor of Entomology, Penn State University

1:45 PM - 2:30 PM

Herbivore-Associated Microbes Mediate the Intersection of Herbivore and Plant Immunity

The lateral transfer of microbial genes from bacteria, baculoviruses, polydnaviruses, and fungi has shaped the genomes of herbivores such as Lepidoptera. Such transfer has enabled herbivore speciation and the successful colonization of host plants among other impacts on fitness.

In present time, herbivore-associated microbes play an exceedingly important role in mediating phenotypic variation in herbivores. Using the example of one highly polyphagous herbivore, the tomato fruitworm (*Helicoverpa zea*), we will show how herbivore-associated microbes strongly impact the phenotype of the herbivore and its impact on induced defenses in the host plant.

Herbivore cues found in their saliva are recognized by plants to turn on antiherbivore defenses. Microbes associated with these herbivores including bacteria, fungi, baculoviruses, and polydnaviruses

impact the composition of these salivary cues and ultimately mediate the ability of the host plant to mount their antiherbivore defenses.