Dec. 25 (Fri.)

Global Change Research Center 2F Room G202 12:20-14:00

Environmental Cross-disciplinary Seminar

Title Predicting the effects of plant-soil microbe interactions on plant community dynamics 柯柏如 - 博士後研究員, 普林斯頓大學生物學系 / 訪問學者, 臺灣大學海洋研究所 Po-Ju Ke – Postdoc, Department of Biology, Princeton University / Visiting scholar, Institute of Oceanography, National Taiwan University

Abstract

Reciprocal interactions between plants and soil microbes (i.e., plant-soil feedback, PSF) are increasingly recognized as a process structuring plant communities. However, as the impacts soil microbes have on plants vary greatly across different systems, it is challenging to integrate results into a general predictive theory. Moreover, current theories also assume simplified microbial dynamics and constant interaction strength between plants and soil microbes, therefore overlooking the temporal complexity embedded within plant-soil microbe interactions. In this talk, I will first show how we can use the concepts of stabilizing (i.e., increasing) species' niche differences) and equalizing (i.e., decreasing species' competitive hierarchies) from modern coexistence theory to contextualize the diverse effects of soil microbes on plant coexistence. In the second part, I will focus on how the temporal dimensions of PSF regulate the pathways through which soil microbes influence plant competitive outcomes. Using a >20-year soil conditioning chronosequence, I present evidence that soil microbial communities are progressively changing as plants continue to condition the soil, and such turnover of soil microbes translate into temporally varying PSF strength. With a patch occupancy model, I further show that the conditioning and decay rates of PSF, as well as the specific plant demographic transition affected by soil microbes, predict whether soil microbes act primarily as stabilizing or equalizing forces. Taken together, I demonstrate how we can work towards a framework to better predict the outcomes of plant-soil microbe interactions in their natural context.

Organizer



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