sDiv working group meeting summary

"sPSF - Soil microbial controls over plant coexistence - synthesizing data and theory to unravel context dependence of plant-soil feedbacks under global change"

Meeting overview.
Our first meeting took place entirely remotely over four days in October 2021. The group members span a wide range of time zones, with members spread between the America (Kandlikar, Yan, Corrales), Europe (Barabas, Harpole), and Asia (Krishnadas, Yadugiri V T, Ke). This posed a considerable logistical challenge, which we navigated by splitting our meeting into two separate small-group meetings per day, and one whole group meeting. Members based in Europe and Asia could work collaboratively for 3-4 hours during their afternoon/evening, followed by a 2 hour plenary meeting, followed by a 3-4 hour work session for members based in the Americas. We found that this schedule maximized interactions while minimizing (but unfortunately not avoiding) extremely early mornings/late nights. Despite the logistical challenges of coordinating across three continents and four time zones, we made considerable progress on our goals.

Our main goals for this working group meeting were to:

1. Introduce all members to each other, as this was the first set of interactions for almost all group members, and establish a collaborative and respectful working community,

2. Define the goals of our first synthesis project, a meta-analysis of plant traits and plant-soil feedback mediated stabilization/fitness differences,

3. Make a plan for the other aspects of the working group, including defining objectives for our conceptual synthesis of the context-dependence of PSF.

Scientific progress.
Our primary objective for the first meeting was to define the datasets and objectives for a meta-analysis of microbially mediated stabilization and fitness differences. Individual sub-groups took on parts of the responsibilities for data cleaning and preliminary analysis, in addition to conceptual discussions which fed back into whole-group discussions. In whole group meetings we had productive conversations about the best metrics to use for capturing plant responses to soil microbes. Specifically, we debated the use of traditional metrics for stabilization/fitness differences compared to integrative measures of invasion growth rates, and also explored the potential for developing new models that yield other metrics. By the end of the working group week the group felt that working with the traditional metrics might be ideal, and members will explore the value of developing other modeling frameworks that can turn into stand-alone projects.

We also discussed how we envision relating functional traits to these metrics of plant growth. One option is to extract whole-plant (above and below ground) data from TRY, but after

extensive discussion, the group felt that there is no clear conceptual or biological basis to directly link above-ground traits to the below-ground processes we are studying. We therefore decided to focus on root traits, a decision facilitated by the recent publication of the GROOT trait database from another sDiv working group. We also decided that instead of relying solely on the belowground growth-defense tradeoffs to incorporate traits, as has been done in some other work on PSF, we will base our analyses on the conceptual framework of Bergman et al. 2020 (an sDiv-related paper).

Next steps.
Our next meeting will be in person, and we are all very excited at the chance to meet our new collaborators face-to-face! The goal by then is to consolidate some key results from the meta-analysis and lay the groundwork for our second objective of conceptual synthesis of traits and PSF in a theory-driven framework.

References
Bergmann, J., Weigelt, A., van der Plas, F., Laughlin, D.C., Kuyper, T.W., Guerrero-Ramirez, N., Valverde-Barrantes, O.J., Bruelheide, H., Freschet, G.T., Iversen, C.M., Kattge, J., McCormack, M.L., Meier, I.C., Rillig, M.C., Roumet, C., Semchenko, M., Sweeney, C.J., van Ruijven, J., York, L.M. & Mommer, L. (2020) The fungal collaboration gradient dominates the root economics space in plants. Science Advances, 6, eaba3756.