Investigating plant growth promotion and strigolactone signaling with spaceflight-isolated rhizobacteria

Strigolactones are best known for the role they play in promoting root colonization by beneficial arbuscular mycorrhizae (AM) fungi. In response to low phosphorus or nitrogen, plants increase the excretion of strigolactones into the soil, which AM fungi sense and grow towards. Nitrogen-fixing *Rhizobium* bacteria have also been shown to move towards strigolactones.

The model plant *Arabidopsis thaliana* does not form associations with AM fungi or *Rhizobium*. However, Arabidopsis and other brassicas still retain active strigolactone signaling and synthesis genes. These signaling genes may play a role in recruiting other plant growth promoting microbes (PGPMs) to colonize plant roots, but the role that strigolactone signaling plays in associations with microbes beyond AM fungi and *Rhizobium* remain largely unexplored.

Many beneficial bacteria, such as ones recently isolated from plants grown on the International Space Station (ISS), have the ability to make otherwise insoluble phosphorus available to plants. Since strigolactone synthesis is triggered by low phosphate levels, these bacteria may be actively recruited by plant strigolactone secretions similar to AM fungi and *Rhizobium*. However, research to date has only tested these microbes for phosphate solubilization on microbial media, and has not directly examined the effects on plant growth. For my project, I am evaluating six spaceflight-isolated bacterial strains known to solubilize phosphorus *in vitro* to see if they promote plant growth under normal and low-phosphorus conditions. I am also testing if these microbes differ in their attraction to wild-type plants and strigolactone synthesis or export mutants.