

Improving Soil Health with Cover Crops in Florida Citrus Groves

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Take Home Message:

- Cover crops can change the soil microbial community and their functions.
- The magnitude of changes to soil microbes due to cover crops depends on the cover crop mixes and germination.
- Cover crops can impact the abundance of microbes important to soil nitrogen and carbon cycling.

Effort Statement: We have expanded our trials to include commercial groves with younger trees and are starting to examine the changes to plant growth-promoting bacteria in soils planted with cover crops. These organisms might have more direct impacts on tree health.

Summary: Soil health refers to the capacity of a soil to sustain biological productivity, maintain environmental

quality, and promote plant health. Cover crops (CC) are one way to improve soil health. However, the influence of CCs on soil nutrient cycling and microbial communities in Florida citrus groves has been poorly explored. We are examining the impact of planting CCs in the row middles of commercial Florida citrus groves. Treatments have included two mixtures of CCs (legumes and non-legumes and non-legumes only) and a no- treatment/grower standard. Our first trials were started in groves with trees that are over 35 years old. In these trials, both CC mixtures significantly increased soil carbon availability in the row middles compared to the control after three years. Significant increases in nitrogen availability and the number of microbial genes involved in soil nitrogen transformations were found

in the soil planted with legumes compared to non-legumes and the control, suggesting biological nitrogen fixation contributed to improved nitrogen availability. Overall, our results suggests cover crop improvements in soil nutrient cycling in citrus row middles can be observed during the first three years of treatment, and cover crops promote microbial gene abundance linked to improved soil health. We now have additional trials underway in groves with younger trees (8-10 years and newly planted). Projects are also underway to better understand how to quantify cover crop improvements to soil carbon storage and nitrogen availability, as well as how we can optimize the practice (e.g. different cover crop species and mixes).

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