Improving Soil Health with Cover Crops in Florida Citrus Groves

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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 nitrogen-cycling microbial communities in Florida citrus groves has been poorly explored. We examined the impact of planting CCs in the row middles of a commercial Florida citrus grove. Two mixtures of CCs (legumes and non-legumes and non-legumes only) were examined, and a no-treatment/grower standard was used as a control. After two years, both CC mixtures significantly increased soil carbon availability in the row middles compared to the control. Significant increases in nitrogen availability and the number of microbial genes involved in soil nitrogen transformations were detected 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 suggest: 1) cover crop improvements in soil nutrient cycling in citrus row middles can be observed during the first two years of treatment, and 2) cover crops promote microbial gene abundance linked to improved soil health. Results from a similar experiment in a different grove show the overall patterns in changes to soil nutrients and microbes are similar, though there are some differences between locations. As the study continues, we hope to have a better understanding of what might be contributing to these differences between the locations (e.g. fertilizer and herbicide applications or climatic conditions).

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