The Microbe's Best Friend!

A+ IMPACTS BOTH FUNGAL AND BACTERIAL COMMUNITIES IN THE SOIL

SUMMARY

A+ Soil Amendment causes changes in both the fungal and bacterial components of the soil microbiome. These changes are marked by increases in siderophore producing bacteria that improve Fe assimilation and increases in bacteria that improve Zn and Mn transport equilibrium.

INTRODUCTION

A+ is an organic and proprietary liquid that is produced from the cultivation of Chlorella microalgae. The product contains useful metabolites that are expressed during the growth process of microalgae. These metabolites are thought to stimulate natural microbial activity in the soil. Four field studies were initiated to confirm the specific changes that A+ causes in the soil microbiome using advanced gene sequencing and bioinformatics.

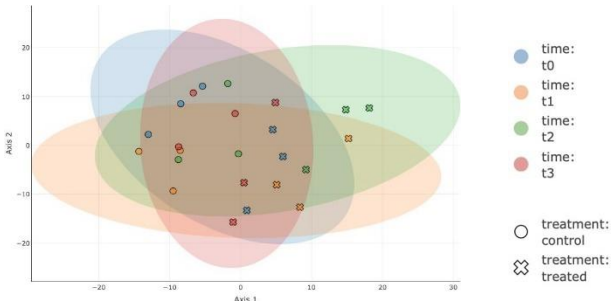
METHODOLOGY

Two strawberry farms near Plant City, Florida were chosen as sites to evaluate the effects of A+ on the soil microbiome. A+ was applied at 1 gallon per acre weekly beginning 8 weeks post planting. Soil samples were taken from the plant rhizosphere pre-treatment at 7, 21, and 35 days after the initial application of A+ and sent to Biome Makers for gene sequencing and functional analytics. Biome Makers analyzed bacterial and fungal changes in these strawberry fields using gene sequencing and bioinformatics from 48 soil samples using advanced machine learning technology.

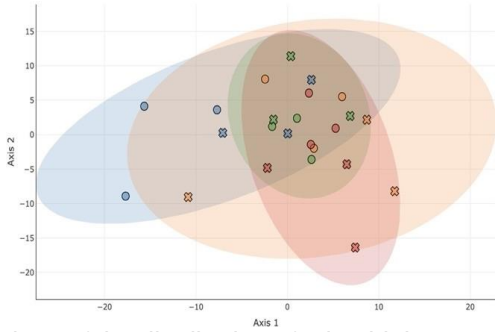
RESULTS

Location 1

- A+ significantly modified the bacterial and fungal composition of the microbiome, explaining 11% and 7% of the changes seen over time in respective populations.
- Increasing trends were identified in the abundance of siderophore producing bacteria, gibberellin producing microbes, and beneficial nematicide biocontrol agents in the A+ treated plots compared to the control.
- Microbes influencing zinc, manganese, and sulfur transport increased in the A+ treated plots throughout the study compared to the control.



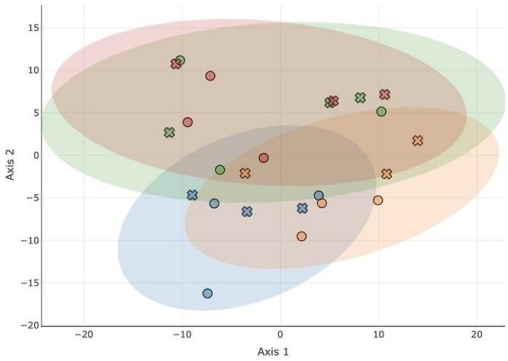
Comparison of the distribution of microbial communities of **bacteria** according to treatment and time point



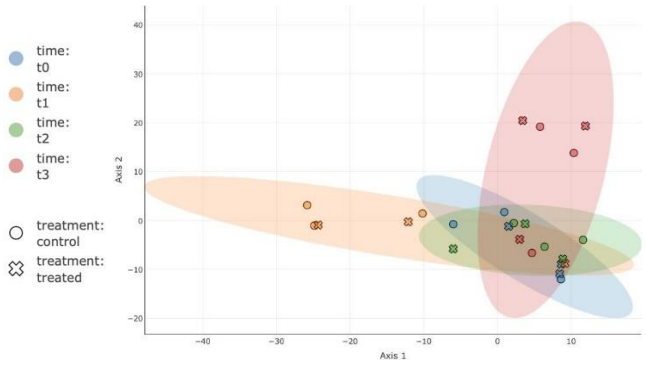
Comparison of the distribution of microbial communities of **fungi** as a function of treatment and time point

Location 2

- A+ had a significant effect on the bacterial and fungal composition of the microbiome and explained 10% and 6% of the changes in the microbiome seen over time respectively.
- A+ caused increases in bacteria influencing Zinc, Manganese, Calcium and Copper transport throughout the study with significant increases in siderophore (chelating molecules that increase iron bioavailability) producers (517%, p=.01) at 30 days after the initial application compared to the control.
- Carbon fixation, respiration, and methanogenesis increased slightly in the A+ plots, signaling higher activity of both aerobic and anaerobic microorganisms involved in the carbon cycle.
- Levels of soilborne pathogens causing Botrytis Gray Mold, Crown Rot, and post-harvest rots decreased consistently throughout the study in the A+ treated plots compared to the control.



Comparison of the distribution of microbial communities of **bacteria** according to treatment and time point



Comparison of the distribution of microbial communities of **fungi** as a function of treatment and time point

DISCUSSION

There were key similarities between both studies that shed light on the mode of action of A+.

1. A+ significantly changed both the bacterial and fungal populations (the microbiome) in both trials over the season compared to the control in both trial locations. These changes were treatment effects and not simply seasonal or crop effects.
2. In both locations, the A+ plots had higher levels of siderophore producing bacteria compared to the control. Siderophores are strong iron chelators that make iron much more available to plants.
3. The A+ treated plots also had higher levels of bacteria that influence zinc and manganese transport compared to the control in both trial locations.

This trial strongly indicates that **A+** causes beneficial changes in both fungal and bacterial aspects of the soil microbiome that influence the availability and movement of key cations, iron, zinc, and manganese. These nutrients are widely known to be critical components of successful crop production with many crops requiring supplemental applications of these micronutrients throughout the growing season. A+ provides a natural way of working with the existing ecosystem to make essential nutrients present in the soil more available to the crop.