

MODE OF ACTION

A+® INCREASES AZOSPIRILLUM BACTERIA AND PLANT GROWTH- PROMOTING RHIZOBACTERIA (PGPR) MICROBES IN SOIL

SUMMARY

A+® causes changes in both the fungal and bacterial components of the soil microbiome. These changes are marked by increases in Azospirillum bacteria that fix nitrogen and PGPR microbes that improve crop growth.

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 the microalgae. These metabolites stimulate the natural microbial activity in the soil. Field studies were initiated to confirm the specific changes that A+ causes in the soil microbiome using advanced gene sequencing and bioinformatics.

METHODOLOGY

Two almond orchards in the CA central valley were chosen as sites to evaluate the effects of A+ on the soil microbiome. Samples were taken pretreatment and 30-35 days after the A+ application. They were sent to Biome Makers for gene sequencing and functional analytics

RESULTS

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

- In both trials, the A+ plots had over a 200% increase in levels of PGPR types of bacteria compared to the control. These are bacteria that produce auxins, cytokinins, and/or gibberellins. They can drastically improve root growth and other growth parameters of crops.
- The A+ treated plots also had more than 200% higher levels of Azospirillum bacteria. Azospirillum is a type of bacteria that not only is able to fix nitrogen from the air, but also produces its own metabolites and plant hormones that improve root growth.

Chart 1: Increase relative abundance of PGPR bacteria in the A+ treated compared to the control

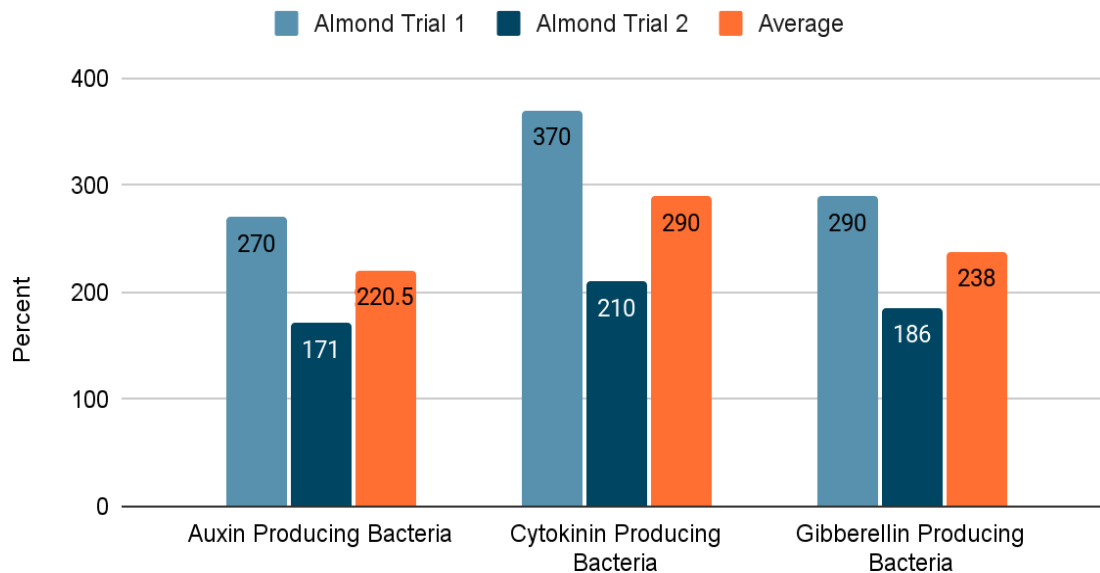


Chart 1 shows that across a series of 2 almond trials, treatments with A+ increased the relative abundance of bacteria that produce auxins by an average of 220%, cytokinin producing bacteria 290%, and gibberellin producing bacteria 238%. This trial compared the change in these populations over time from pre-treatment to the final rating at 30-35 days after the initial treatment. Increases in these PGPR microbes result in enhanced root growth and vigor.

Chart 2: Increase in relative abundance of Azospirillum sp. in the A+ treated compared to the control

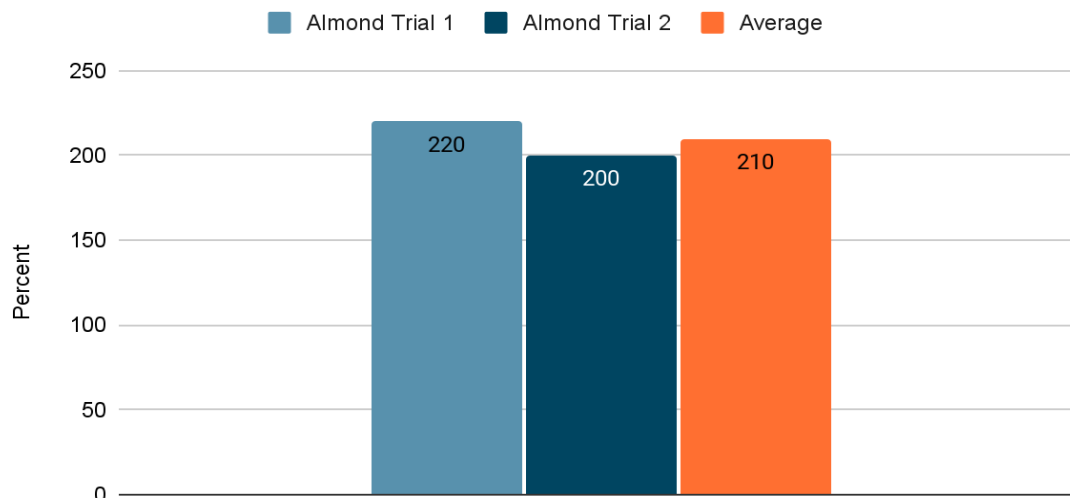




Chart 2 shows that across a series of 2 almond trials, treatments with A+ increased the relative abundance of Azospirillum bacteria by an average of 210%. This genus of bacteria fixes nitrogen from the atmosphere and improves root growth. This trial compared the change in these populations over time from pre-treatment to the final rating at 30-35 days after the initial treatment.

DISCUSSION

A+® causes beneficial changes in the soil microbiome that influence the availability and uptake of nitrogen with a dual mode of action that includes enhancing nitrogen fixing bacteria as well as enhancing levels of PGPR microbes that improve root growth. Growers directly benefit from an increased abundance of Azospirillum by realizing higher N levels in and available to their crop. Development of a more robust root system from PGPR microbes assures that your crop is able to take full advantage of available nutrients and water. A+ provides a natural way of signaling the existing ecosystem to make N and other essential nutrients already present in the soil more available to your crop.