

MODE OF ACTION

TRUESOLUM® INCREASES BACTERIA THAT IMPROVE IRON ASSIMILATION AND ZINC AND MANGANESE TRANSPORT EQUILIBRIUM

SUMMARY

TrueSolum® 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 iron (Fe) assimilation and increases in bacteria that improve zinc (Zn) and manganese (Mn) transport equilibrium.

INTRODUCTION

TrueSolum 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 are thought to stimulate the natural microbial activity in the soil. Four field studies were initiated to confirm the specific changes that TrueSolum causes in the soil microbiome using advanced gene sequencing and bioinformatics.

METHODOLOGY

Two strawberry farms near Plant City, Florida and two almond orchards in the California Central Valley were chosen as sites to evaluate the effects of TrueSolum on the soil microbiome. Samples were taken pretreatment and 30-35 days after the TrueSolum application. They were sent to Biome Makers for gene sequencing and functional analytics.

RESULTS

There were key similarities between all of the studies that shed light on the mode of action of TrueSolum.

1. TrueSolum significantly changed both the bacterial and fungal populations (the microbiome) compared to the control in both trial locations. These changes were treatment effects and not simply seasonal or crop effects.
2. In all four of trials, the TrueSolum 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 TrueSolum treated plots also had higher levels of bacteria that influence zinc and manganese transport compared to the control in both trial locations.
4. Available soil nutrients were measured in the almond studies and showed increases in Fe, Zn and Mn.

Chart 1: Percent increase relative abundance in the TrueSolum treated compared to the control

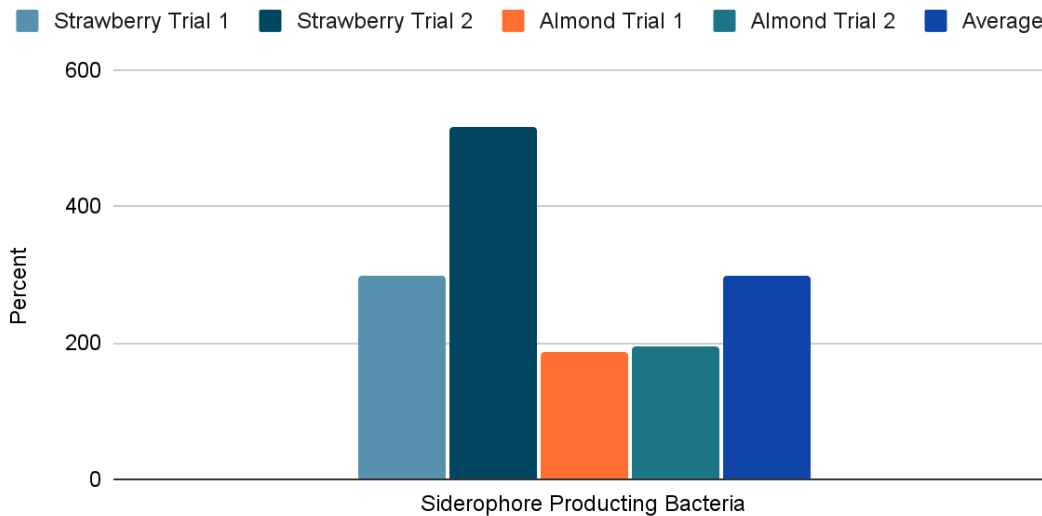


Chart 1 shows that across a series of two strawberry trials and two almond trials, treatments with TrueSolum increased the relative abundance of bacteria that produce iron chelating siderophores by an average of 298%. This compared the change in these populations over time from pre-treatment to the final rating at 30-35 days after the initial treatment.

Chart 2: Percent increase relative abundance in the TrueSolum treated compared to the control

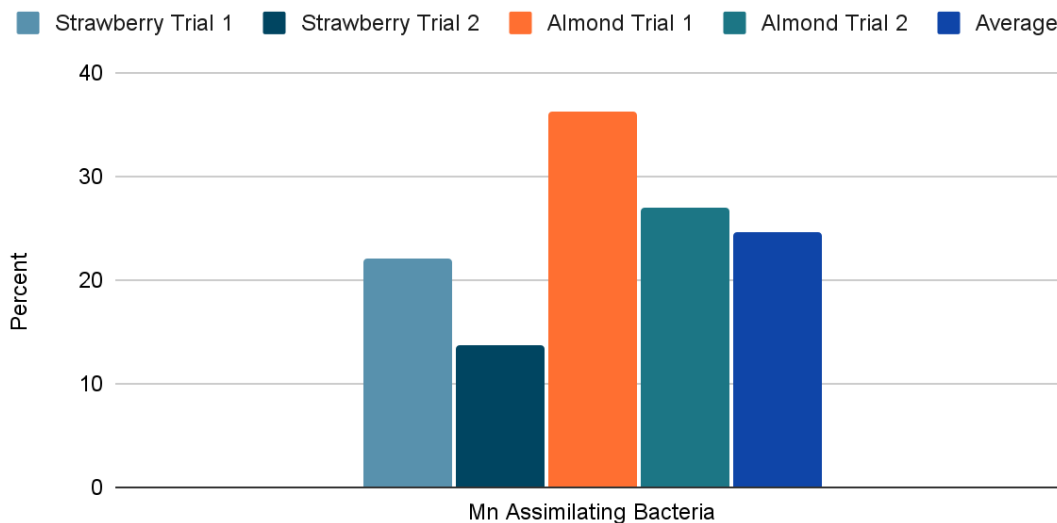


Chart 2 shows that across a series of two strawberry trials and two almond trials, treatments with TrueSolum increased the relative abundance of bacteria that enhance the availability and uptake of manganese by an average of 25%. This compared the change in these populations over time from pre-treatment to the final rating at 30-35 days after the initial treatment. Additionally, available soil nutrients were measured in three almond trials and a wine grape study. All three trials demonstrated higher available levels of Fe, Zn, and Mn.

Chart 3: Iron in the soil in three almond trials

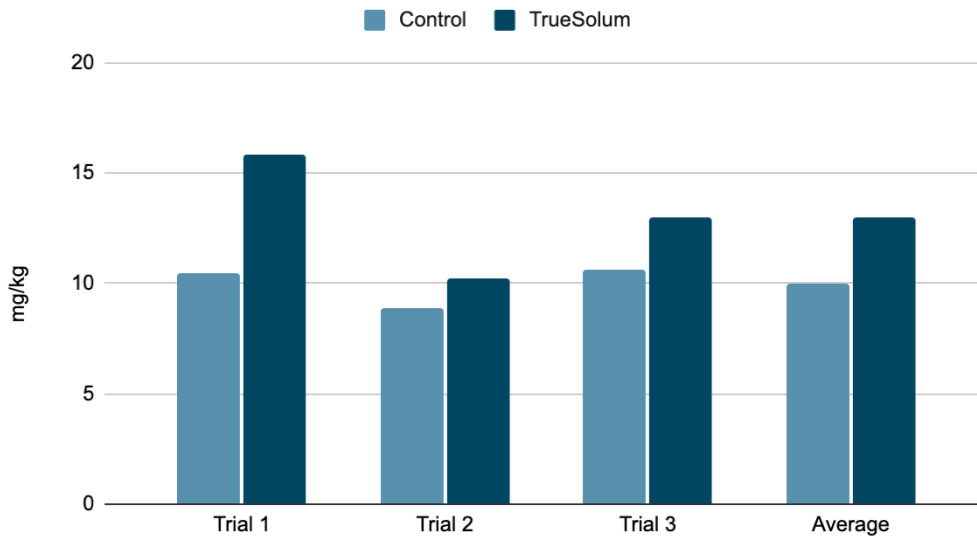


Chart 3 shows that at 30 days after the initial TrueSolum application, there was an average of 30% more iron in the soil treated with TrueSolum compared to the control.

Chart 4: Iron in the soil in the vineyard trial

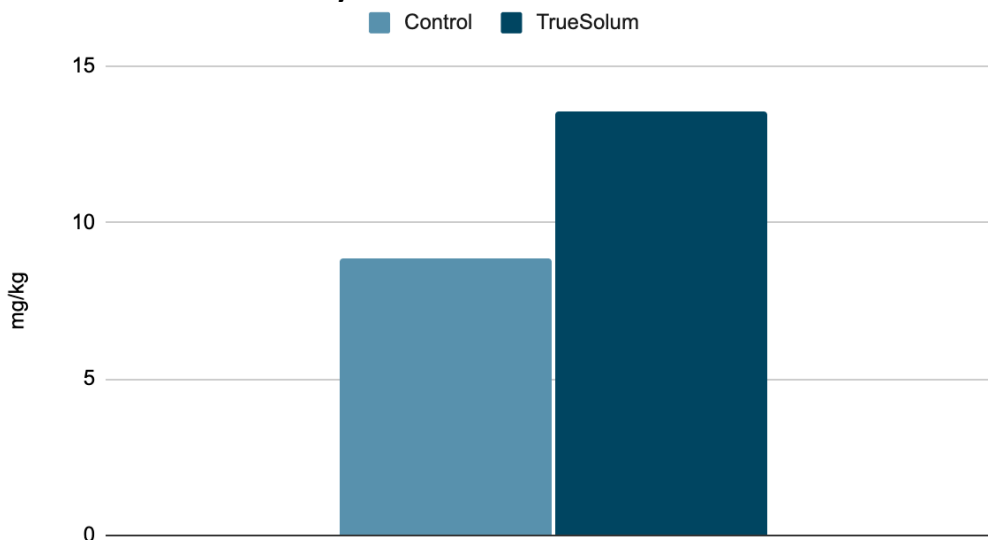


Chart 4, similar to the almond studies, shows there was a 53% increase in Fe in the TrueSolum treated compared to the control in the vineyard soils.

Chart 5: Zinc in the soil in three almond trials

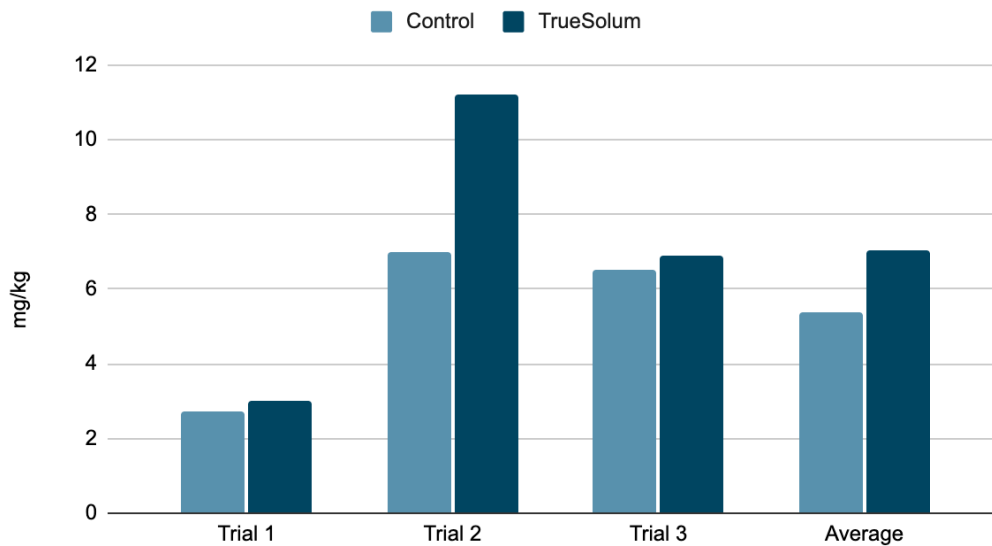


Chart 5 shows that at 30 days after the initial TrueSolum application, there was an average of 30% more zinc in the soil treated with TrueSolum compared to the control.

Chart 6: Zinc in the soil in the vineyard trial

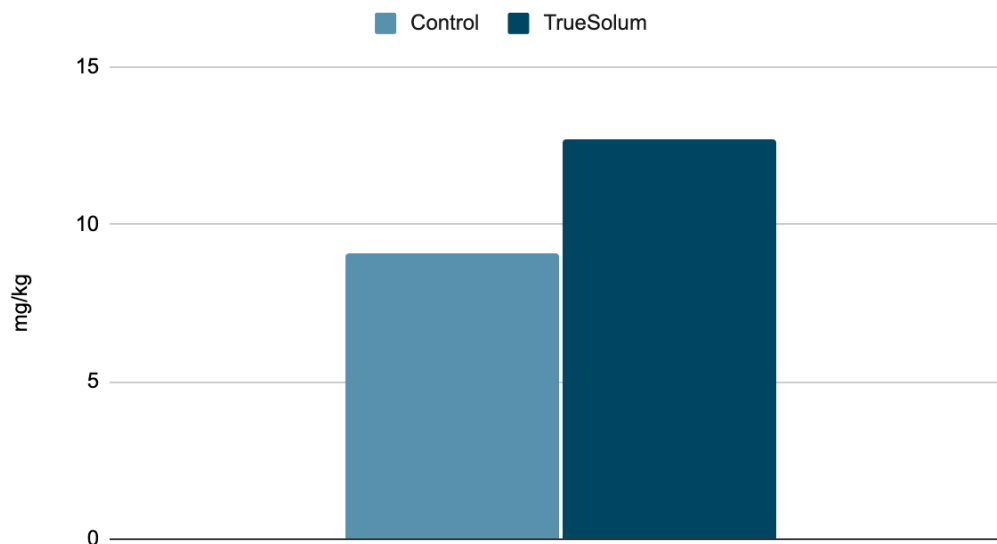


Chart 6, similar to the almond studies, shows there was a 40% increase in Zn in the TrueSolum treated compared to the control vineyard soils.

Chart 7: Manganese in the soil in three almond trials

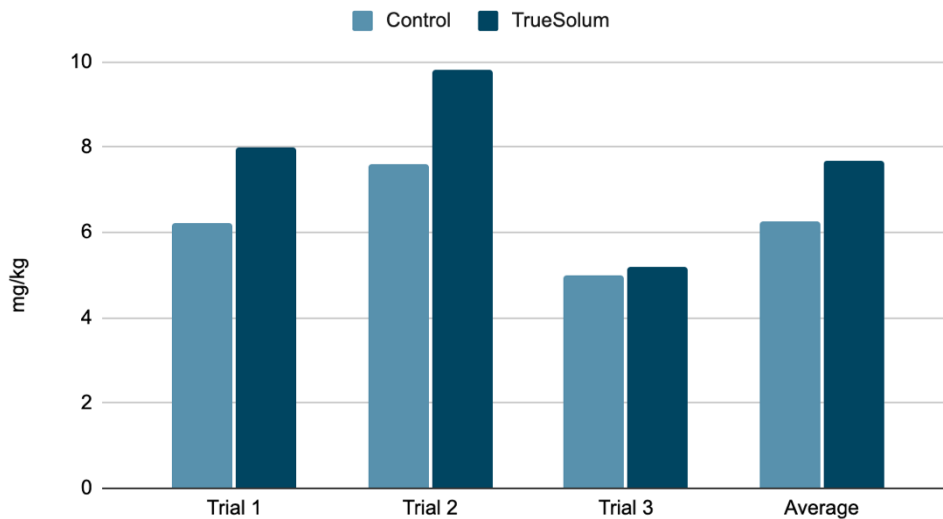


Chart 7 shows that at 30 days after the initial TrueSolum application, there was an average of 22% more manganese in the soil treated with TrueSolum compared to the control.

Chart 8: Manganese in the vineyard trial

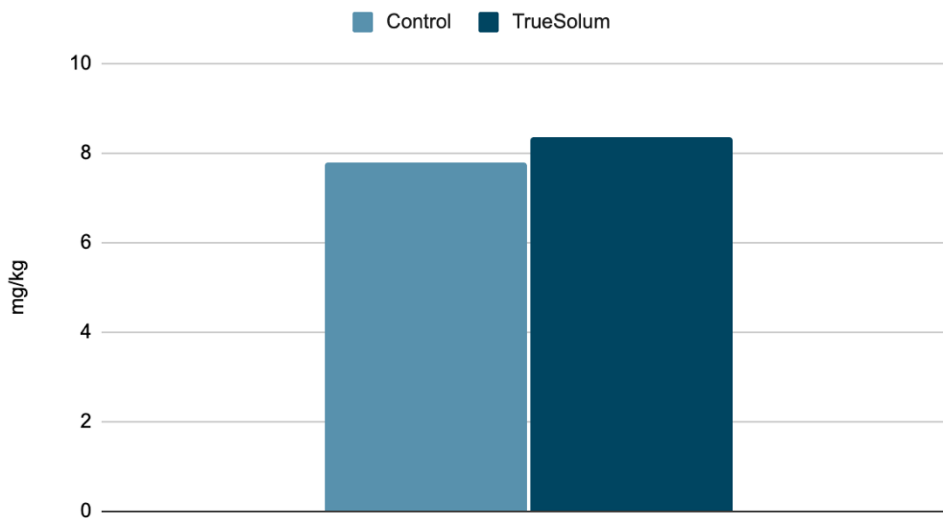


Chart 8, similar to the almond studies, shows there was a 7% increase in Mn in the TrueSolum treated compared to the control in the vineyard soils.

CONCLUSION

TrueSolum® causes beneficial changes in the soil microbiome that influence the availability and movement of key cations. 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. TrueSolum provides a natural way of working with the existing ecosystem to make essential nutrients present in the soil more available to the crop.