Effect of TrueSolum® on the Microbiome and Soil Nutrition of Avocados

OBJECTIVE

This trial assessed the impact of TrueSolum on the health of Hass avocado trees and the microbial activity in the soil associated with that.

TRIAL SPECIFICS

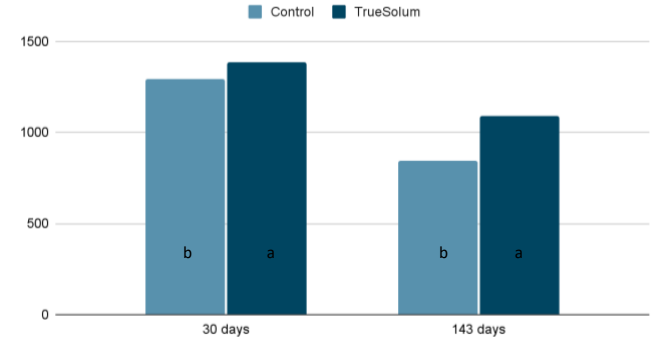
Location: Santa Maria, CA
Date: January, 2022 – May, 2022
Variety: 2009 Hass Avocado Planting
Design: Treated block was 3.3 acres and the control was a similar size. Specific trees were marked for repeat analysis both visually, and through soil analysis, in both blocks.
Treatments: Control - Grower's standard (no micronutrients or microbials added).
Treatment 1 - Grower's standard plus True Solum applied at 1/2 gallon per acre approximately every 7 days through the drip irrigation. Total of 14 applications before trial termination.

OVERVIEW

TrueSolum was mixed with Grower's standard inputs and applied every 7 days through drip irrigation. There were a total of 14 applications occurring between January 24, 2022 and May 9, 2022. Soil samples were taken of both the Control and Treated areas on 1/20/2022, 2/21/22 and 5/9/2022 and analyzed by Trace Genomics for microbiome and nutritional content.

RESULTS

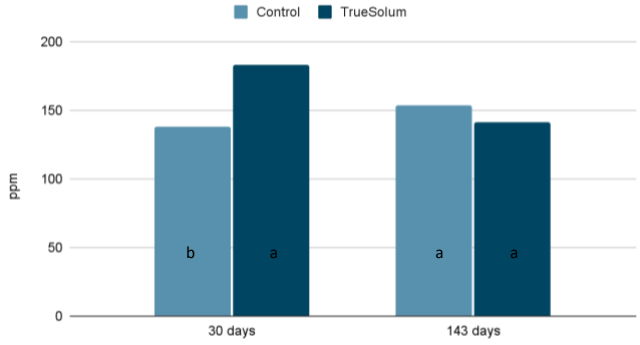
Bacterial Diversity



Means followed by the same letter are not different LSD, p=.15

There was significantly more bacterial diversity[1] in the soil at 30 and 143 days after trial initiation. This is likely due to the effects of TrueSolum on microbial signaling.

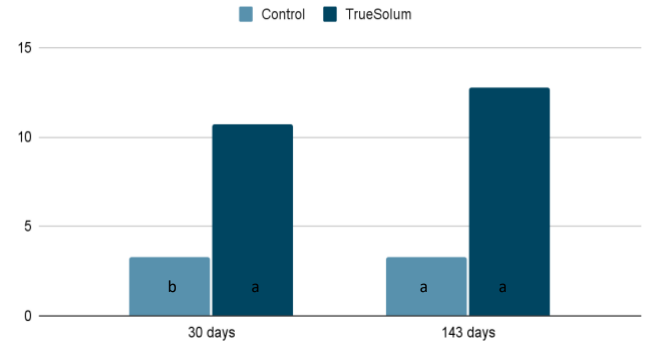
Soil Iron



Means followed by the same letter are not different LSD, p=.01

There was significantly more Fe in the soil at 30 but not at 143 days after trial initiation. This early effect may have been due to the effects of TrueSolum signaling key microbes that produce siderophores that improve iron absorption, such as *Bacillus*, *Pseudomonas* and *Actinomycetes*.

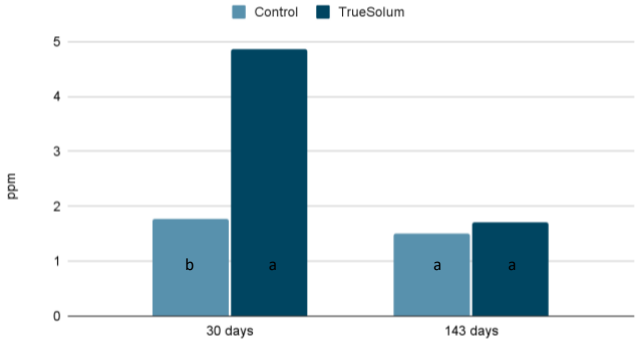
Soil Nitrate (NO3)



Means followed by the same letter are not different LSD, p=.01

There was significantly more NO3 in the soil at 30 and numerically more NO3 at 143 days after trial initiation. This may be due to the effects of TrueSolum signaling key microbes associated with nitrogen fixing and assimilation, such as *Azospirillum*.

Soil Ammonium (NH4)



Means followed by the same letter are not different LSD, p=.01

There was significantly more NH4 in the soil at 30 and numerically more NH4 at 143 days after trial initiation. This may be due to the effects of TrueSolum signaling key microbes associated with nitrogen fixing and assimilation, such as *Azospirillum*.

CONCLUSION

TrueSolum signals key microbes that influence nitrogen fixation and assimilation, such as Azospirillum, as well as microbes that produce siderophores that improve iron absorption, such as Bacillus, Pseudomonas, and Actinomycetes.

The TrueSolum treated plots had greater bacterial diversity than the control at both 30 and 143 days after trial initiation. There was a trend towards higher iron levels in the treated plots with significantly higher iron levels 30 days after trial initiation. However, the treatments were not different at 143 days after trial initiation.

There was a trend towards higher nitrogen in the TrueSolum treated plots with significantly higher levels of both ammonium and nitrate at 30 days after trial initiation. However, this was not significant at 143 days after trial initiation.

[1]The bacterial diversity indicator is a unitless index that takes into account the number of species present (richness) as well as the relative abundance of each species (balance or evenness). This diversity indicator includes both bacteria and archaea, which are classified as prokaryotes and both are typically unicellular organisms. Certain soil processes are carried out either by bacteria or archaea or both. For example, both groups are involved in nitrification. To ease communication we use the term “bacterial” diversity instead of “prokaryotic” diversity, as the former is more familiar to most users. Bacterial diversity is expected to be higher at moderate soil pH (not very acidic nor very alkaline) and in soils that experience minimal disturbances, such as no-till. Bacterial diversity also tends to increase with decreasing soil moisture content.