

## PROJECT SUMMARY

### Compost and Mulch Application at Limoneira ~ Healthy Soils Project 2019 – 2022



Community  
Environmental  
Council

UC  
CE

University  
of California  
Cooperative  
Extension



AGROMIN



This project will study and demonstrate the application of compost and mulch on approximately 40 acres of newly planted citrus trees in Santa Paula, California. Through the use of varying applications of mulch and compost, this project will evaluate the cost and benefit of the low and high application rates, in addition to GHG emissions, soil health benefits, water cycle benefits, and tree health benefits of improved soil health in a citrus system.

### Definition of SOIL HEALTH

*"the continued capacity of soil to function as a vital, living ecosystem that sustains plant, animals and human life"*

#### Project Summary

The Healthy Soils Project at Limoneira has 3 main goals.

- **Apply** compost and mulch at different rates on a young citrus orchard once a year, for three years.
- **Research** the impacts of compost and mulch– on GHG emissions, tree health, soil health, and water retention.
- **Demonstrate** the process of applying compost and the resulting benefits to other farmers and policymakers and the public.

#### What are you researching?

We are interested in studying a few different metrics – both environmental and agricultural. Our research is attempting to answer the following questions:

- Can compost and mulch improve citrus tree health and productivity and strengthen the company's financial position?
- Can compost and mulch increase the orchard's ability to sequester greenhouse gasses and mitigate climate change?
- Can compost and mulch improve the health and resilience of the orchard and its soils?
- Can compost and mulch improve the ability of the orchard to cycle and capture water, and reduce agricultural runoff?
- Do these results vary in relation to the amount of the compost and mulch material that is applied?

#### Who are your project partners?

- Limoneira
- Ventura County Resource Conservation District
- Community Environmental Council
- Agromin
- UC Cooperative Extension

**How much and what type of acreage are you studying?**

We will apply mulch and/or compost at variable rates on beds within a 45-acre block of newly planted lemon trees. This block will be split into 3 replicates and each 15-acre replicate will be further divided into 6 experimental units - one control (C), two variable rate compost treatments (T1, T2), and three variable rate mulch treatments (T3, T4, T5) - for a total of 18 experimental units. Each experimental unit has 10 beds of lemon trees (each bed is about 700 feet long) and there are about 70 lemon trees per bed.

**What are the benefits you hope to see?**

Potential Benefit	Metrics to Study Benefit (Control V Treatment)
Improved Citrus Tree Health and Crop Yield	Tree height, Trunk diameter Leaf health Fruit yield (3rd year)
Reduced GHG Emissions and Improved Carbon Sequestration	Fluxes of CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O - determined by chamber methodology
Improved Soil Health	Soil Organic Matter (SOM) Soil Nutrient Status
Improved Water Availability	Soil Moisture Percolation Rates

BENEFITS	Mulch	Compost
Agronomic	Moisture retention Weed suppression Reduces erosion Protection from droughts and freezes Regulates soil and orchard temperature	Increases soil organic matter Promote healthy population of soil organisms Plant growth/yield Nutrient management - provides supplemental amount of slow-release nutrients Water management Integrated Pest Management Encourages healthy root structure Moderates soil temperature
Environmental Sociopolitical	Reduces reliance on imported water Reduces nitrate runoff Assists in compliance with water quality regulations	Decreases use of petrochemical fertilizers Reduces organic material in landfills Reduces methane release from organic decomposition Reduces reliance on imported water

**How much compost are you applying? How much mulch are you applying?**

Compost will be applied at TWO rates:  
2 tons/acre and 8 tons/acre  
Mulch will be applied at THREE rates:  
2 inches, 3 inches and 6 inches

The variation in application rates will help us determine the costs and benefits of the different approaches, and whether we can accomplish the same environmental and agricultural benefits with fewer resources and inputs.