



Cows, Compost, and Soil Health

SURPRISE VALLEY GRASSLAND COMPOST DEMONSTRATION

As part of the California Department of Food and Agriculture's (CDFA) Healthy Soils Program, this project demonstrates compost and compost tea application on a grazed, irrigated grassland ecosystem. The ability of compost to improve soil quality and health over time has been documented. Due to the remote location of Surprise Valley, and the distance to certified compost suppliers, compost application in Modoc County is often prohibitively expensive and energy intensive because of the transport required. Conversely, compost tea can be produced on site, using a fraction of the compost required for direct application. Compost tea is a liquid produced by extracting beneficial microorganisms from compost through a brewing process. Using a conventional spray rig, compost tea can be applied to the crop land. This project will allow a comparison of applications of compost versus compost tea, to determine whether compost tea is a viable substitute. If it provides similar benefits, compost tea could be a far more carbon-friendly alternative to agricultural producers in remote areas of California.

Project Overview:

The goal of this project is to implement soil health practices while building an understanding of the cost-benefit ratio of implementing these practices on the Modoc Plateau grazing lands. We will test the effects different types of composts have on rates of GHG emission reduction, carbon sequestration, grassland soil fertility, plant productivity (yield and quality), soil microbiology, and overall biodiversity of a typical working ranch. The project will compare various methods of compost applications over the course of three years to fully assess the impact of treatment on pasture quality and productivity, soil health, and carbon sequestration.

Location:

Triple 3 Family Farm is located on the eastern edge of Modoc County. This multigenerational ranch is grazed using a combination of management intensive grazing and holistic planning. Sheep and cattle are moved daily in order to achieve efficient forage utilization, improve forage quality, and ensure proper plant recovery times.

Project Design:

Our project focuses on demonstrating feasibility and testing the outcomes of three practices:

- 1) Annual compost application (5 tons/acre)
- 2) One-time compost application with higher rates for grazed grasslands (12 tons/acre)
- 3) Microbial inoculation with compost tea



This map shows the four-acre study plots across the entire irrigated hay field.



Project Activities Completed:

Compost Tea application three times during the growing season (2021, 2022, partial 2023)

High-rate compost application (Spring 2021)

Annual compost application (Spring 2021, 2022, 2023)

Initial base monitoring and ongoing seasonal monitoring

Rancher-to-rancher on-farm outreach field event

Preliminary Results:

Production Measurements: Both compost and high-rate compost treatments experienced increases in total production but were smaller than that experienced by the control. Thus, there is no evidence that either treatment increases forage two years after application.

Soil Carbon: Plots that received compost tea and high-rate compost application nearly doubled surface soil carbon. However, this was NOT statistically significant.

CO₂ Flux: Carbon dioxide (CO₂) fluxes tended to vary seasonally, as we anticipated. As temperature and soil moisture content increases, CO₂ fluxes increased. High-rate compost application shows trends toward higher CO₂ fluxes, but the patterns need to be monitored over time.

Phospholipid Fatty Acid (PLFA), Haney Soil Health, & Forage Quality: We observed strong differences in each of these measurements by year, but not by treatment. This highlights the impact of weather on these measurements.



Project Partners & Sponsors



Healthy Soils Program
CDFA OFFICE OF ENVIRONMENTAL FARMING & INNOVATION



MODOC RESOURCE CONSERVATION DISTRICT

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