Background

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Experimental goals are to measure the effect of compost on SOC, yield, and soil salinity on irrigated grasses over three years. We will also be looking at the economics of this practice.

Why that might be interesting:

- Practices, such as compost additions, cover crops, and decreased tillage, positively impact soil characteristics, including SOC.
- SOC is one of the most important constituents of soil. It influences nutrient availability, water holding capacity, water infiltration and is the main source of energy for microorganisms.
- There is also an abundance of carbon credit programs that are coming into the marketplace. Major companies like Bayer, Yara, Indigo Ag, and others are implementing compensation platforms to incentivize farmers/ranchers to implement practices to reduce carbon in the supply chain. Implementing these practices could provide another source of farm/ranch revenue and influence rural economic vitality.

Treatments and Testing Locations

Treatments:

- Compost Only: 16 tons/A
- Compost plus Fertilizer: 6 tons/A, plus urea to meet N demand
- Fertilizer Only: Nitrogen and phosphorus supplied to meet plant nutrient needs, based on soil test
- Control: Nothing applied

Two sites: Ridgway and the Experiment Station in Fruita. 12 plots (10x260 or 360) at each location, plots are marked by GPS and orange sensors at the corners that allow us to locate plots in a grass field in subsequent years without flags or stakes. Each treatment is replicated 6 times total across the sites.

Rate of Compost

Relationships in crop production and soils that influence productivity and pools of carbon are climate, potential biota, time, topography, parent material, soil resources, temperature, water, species composition, vegetative productivity, nitrogen and nutrient availability – the two most limiting factors in cropping systems are water and then N.

We cannot control many of these factors and are controlling for some of these factors with experimental design.

Above and below ground plant productivity is the dominant pathway for soil organic carbon. We decided to apply compost to meet the nitrogen demand of irrigated grass, based on soil test and available N in compost – thus the high rate. This was acceptable to us as we wanted to observe: 1. Does it work and 2. the influence on SOC would be observable at such a high rate. Further research can decide at what rate do we start to see significant gain in SOC and yield.

Measurements

- Yield was measured in 2021 and 2022.
- Species composition was measured in 2021 and 2023.
- Soil data: 2022 and 2023.
    - We aggregated 3 meter-deep soil cores per plot based on depth. In the lab, we looked at soil carbon, bulk density, and a variety of other soil health metrics.