

Assessing Nutrient Tradeoffs: Soil Nutrient Dynamics in Response to Compost Application Rate in Previously Cultivated Rangelands

***Dr. Stewart Wilson, Assistant Professor of Soil Resources***

California Polytechnic State University, San Luis Obispo

Large applications of compost (20+ tons per acre) may be required to achieve soil health and carbon sequestration benefits. However, tradeoffs exist between compost application rates to achieve benefits, and excess rates that may lead to offsite losses of nutrients to neighboring waterbodies and/or accumulation of micronutrient metals. This conversation will center on the impact of compost application rate on soil nutrient dynamics and assess potential negative impacts from compost application rate on soil phosphorus and micronutrients. The discussion will center on results from a compost application rate experiment in previously cultivated coastal terraces in Santa Cruz County, Ca.



Healthy Soils Project: Carbon Sequestration Potential and Soil Health Effects of Various One Time Compost Application Rates on Degraded Coastal Rangelands.

Aaron Lee, Soil Science Graduate Student

California Polytechnic State University, San Luis Obispo, Environmental Sciences and Management Program

One time compost application to rangelands can sequester carbon, boost net primary productivity (NPP), and improve soil health. However, the current recommended application rate from CDFA of 6-10 tons/acre may not be enough to realize the multiple benefits of compost application to carbon sequestration and soil health. Previous studies lacked a comparison between soils with differing properties but similar environmental factors as well as comparisons of different application rates. In this study we applied compost at rates of 0, 10, 20 and 30 tons/acre along a chronosequence of two marine terraces (T1 and T2). A randomized block design was utilized with 4 blocks per terrace, each block containing every treatment. Carbon sequestration was measured by testing soil GHG emissions, total soil carbon, labile soil carbon, NPP, and other soil health factors. Percent total carbon increased 1.94% (p-value < 0.05) in the top 5 cm of the 30 ton/acre treatment compared to control, and labile carbon increased by 238.6 mg/kg soil (p-value < .01) in the 30 tons/acre treatment over control in the top 5 cm of T2. NPP increased by 53% (p-value <. 05) when pooling both terraces in the 20 tons/acre treatment compared to control one year after application. This study indicates an application rate of 20-30 tons/acre would be more effective at sequestering carbon and improving soil health over the recommended 6-10 tons/acre. Other benefits and tradeoffs from compost application rate to soil health and soil C dynamics will also be discussed.