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The Potential of Grassland to Help Mitigate Climate Change

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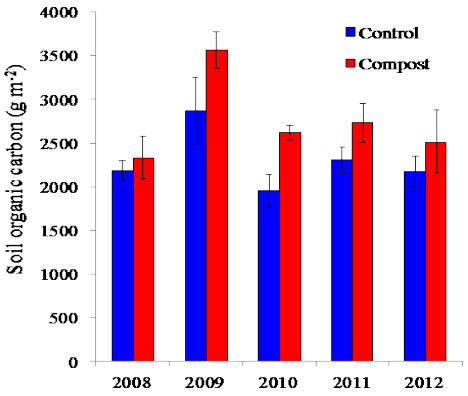
Human activities are increasing atmospheric carbon dioxide (CO_2) concentrations and driving rapid climate change. While emissions reductions are critical for solving the climate crisis, emissions reductions alone will no longer be sufficient to mitigate climate change. We need to develop strategies to remove CO_2 from the atmosphere. Grasslands cover 40% of the land area of California, and over 30% of the land area in the US and worldwide. These ecosystems have great potential to store carbon in soils, but approximately 80% of grasslands are degraded with regard to carbon. ***Our research determines the potential for grassland management to help mitigate climate change through carbon sequestration and diversion of high-emission waste sources.***

Our research showed that composted organic material (agricultural and green waste) sequestered new carbon at rates of 1 metric ton (Mt) each year for 3 years following a one-time application. The compost-amended fields had higher forage production, water holding capacity, and fertility than the control plots, providing ranchers with important co-benefits and enhancing sustainability. When scaled to an area of just 25% of California's grasslands, new carbon sequestered using this approach (21 million Mt CO_2 equivalents (CO_2e)) would more than offset emissions from cattle (15 million Mt CO_2e) or most of the emissions from the commercial sector (21.6 million Mt CO_2e) based on California's 2016 greenhouse gas inventory. Diverting organics from the waste stream to amendments led to additional greenhouse gas savings of 28 million Mt CO_2e when scaled to just 5% of CA grasslands. Livestock manure and landfilled organics are promising resources for compost programs.

Key Points:

- ✦Climate change can be slowed by repurposing the organic waste stream to compost.
- ✦Application of compost to grasslands removes CO_2 from the atmosphere by storing it in soil. This slows climate change even more!
- ✦Carbon-rich soil produced from compost applications increases production, retains more water, and reduces soil loss from erosion.

Soil Carbon Stocks After 2008 Compost Amendment



Implications for Policy

Future research is needed to evaluate the potential of this practice in dry grasslands (Southern California) and to identify the potential water savings for the State. *We propose to conduct large scale, well-replicated trials to quantify the impacts of compost applications in dry grasslands to help mitigate climate change as well as measure and model the water saved using these practices.* Our team of experienced scientists from U.C. Berkeley and Lawrence Berkeley National Lab combine skills in biogeochemistry, ecology, microbiology, remote sensing, and computer modeling. Our close collaborations with stakeholder groups (marincarbonproject.org) facilitate feasibility assessments, outreach to the public and policy makers, and wide application of results.