Compost on Rangeland

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Why apply compost to Rangeland

Applying compost on grazed rangeland can provide multiple forage and soil benefits and can be an important way to divert organic waste from landfills and manure from slurry ponds, reducing greenhouse gas emissions that contribute to climate change. UC research on rangelands across California has shown that a single application of compost can increase forage quantity and quality, increase soil water holding capacity, and lead to sequestration of substantial amounts of carbon. These co-benefits derived from applying compost on rangeland may be particularly significant during drought and on severely degraded sites.

How to apply?

Empirical data and models suggest the optimum compost application rate to support soil carbon storage is a ¼ inch depth. This corresponds to 33.6 cubic yards per acre or about 16.8 tons, depending on moisture content and bulk density of the material. This is sufficient to obtain beneficial effects while keeping the amount of compost needed to a minimum. Applying more than ½ inch depth could negatively impact grass growth by smothering the vegetation. For large areas, compost can be spread with a gypsum or manure spreader. Small areas can be treated by hand. If equipment access is limited, a compost blowing unit may be useful. Only one application is needed for multiple years of benefit.

Gypsum spreader applying compost

It is best to apply in the fall just before it rains to avoid impacts of driving heavy equipment on wet soil. Grazing or mowing the site before application is ideal, but not necessary unless a heavy thatch is present. Rain soon after compost application helps the compost settle into the soil and provides immediate benefit to grasses germinating following rain, while helping to minimize volatilization losses from the compost.

Two sites with compost applied.

Developed with input from Holly Stover, Jeremy J James and Whendee Silver” © 2018 Editing assistance by Mark Bell

Site selection

Compost is best applied to grazed grasslands with poorer soils rather than highly productive soils. Ideally, sites will be accessible to equipment. Avoid steep slopes where it is unsafe to drive equipment. Keep a minimum 30 foot buffer away from riparian or other wetland areas unless specifically deploying compost as part of a restoration program for these areas.

Where to get compost?

Many companies make compost but may be far from your site, making transportation costs high.

Producing your own compost.

1. Compost can be produced on-farm using manure, straw, woodchips and other organic materials, mixed in roughly equal amounts.
2. Compost pile moisture should be maintained at about 50-60% over about a three month period (shown below) by watering as needed.
3. The pile should be turned over as needed to provide aeration.
4. The internal temperature of the pile should be above 131^{o}F throughout the active compost phase, which should last at least 15 days, during which time the pile should be turned at least 5 times if possible.
5. The finished compost can be screened to filter out large (> 1 inch) debris but this is not essential.

Compost pile in progress (left) and finished compost (right)

If you are not making your own compost, it should be inspected for plastic or other unwanted materials and an analysis should be obtained from the seller if possible. Compost for rangeland application should have a C/N ratio of about 15/1 to 20/1, but higher or lower C/N ratios are acceptable. Organic matter (as compared to ash) content should be as high as possible; typical is 40-50%. Commercial compost should meet CalRecycle specifications for pathogens, metals and physical contaminants:

https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=IA084AE51DF784A8A8F58693F0788EB93&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default)&bhcp=1

Compost is more valuable for soil application than its raw materials because they have been converted through the compost process to a material that is pathogen-free, has stabilized soluble nutrients in biological form and acts like a slow release fertilizer. The composted organic matter holds onto nutrients, releasing them slowly over several years without emitting large amounts of greenhouse gases as is the case with raw manure or synthetic fertilizers.

Regulations

Depending on the scale of your on-farm composting effort, it may be subject to regulation by your local regulatory agency (typically, the county environmental health department). See the Cal Recycle website for more information:

https://www.calrecycle.ca.gov/swfacilities/permitting/facilitytype/compost

Want to learn more?

Cornell University has a wealth of information about compost on its Compost website:

http://compost.css.cornell.edu/

Applying compost on rangeland is one of several practices employed through a whole farm planning and implementation process known as “carbon farming,” that focuses on identifying all the opportunities on farm to remove CO2 from the atmosphere and increase soil water holding capacity and carbon storage. To learn more about other carbon farming practices, visit these webpages:

www.carboncycle.org
www.marincarbonproject.org

This fact sheet was based on a webinar, to listen to the webinar. The link will shortly be available

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