Compost Application to Rangelands:

Applying for Funding through CDFA's Healthy Soils Grant Program

Presented by:
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Agenda

- **Intro -** Webinar Format, Agenda and Introduce HSP grant program *(5 min, MK)*
- **Benefits of compost application-** Why apply compost? What are expected benefits? What does the research say? Questions? *(25 min, JC)*
- **Best practices for compost application**- Timing, grazing, location (slope, waterways); How to choose rates; How to choose types (specifically C:N ratio); Questions? *(25 min, JC)*
- **Healthy Soils Grant Program and Funding Compost Application** - QM discussion (JC); Grant requirements: practices, reporting, soil sampling (MK); Resources available: website, cost tool, list of suppliers and spreaders (MK) *(15 min)*
- **Q & A** *(Remainder of time, JC, JW, MK)*

CDFA Healthy Soils Program Overview

- Program incentivizes implementation of on-farm soil health practices that sequester carbon, reduce greenhouse gases, and improve soil health
- Over 30 eligible practices
- Apps due on a rolling basis until **June 26, 2020** (6.5 weeks left)
- $22-25 million left to be allocated statewide (as of 5/1)
- **Flat-rate reimbursement based on implemented practice**:
    - For Compost Application: **$50/ton** ; program requires 2-8 tons/acre depending on compost type and ag system; re-application to same field for **3 consecutive years.**

Online Application and Grant Materials

- **CDFA's Healthy Soils Program Incentives Website**:
  - Application Portal
  - Request for Grant Applications (RGA) = Grant Guidelines and Rules
  - Work Plan Template
  - COMET-Planner Tool
  - RePlan Tool

Marin-County-Specific Resources

- **Marin RCD's CDFA HSP 2020 Resource Webpage**
- **Compost Cost Estimate Calculator** (on MRCD website)
- **List of Local Compost Facilities, Haulers, and Spreaders** (on MRCD website)

marinrcd.org/programs/cdfa-healthy-soils-program-2020-2/

- Native Plants Adapted to Marin County, listed by practice
- Local Native Plant Suppliers/Nurseries

COMPOST:

- MRCD's Guide to Compost Application
- Marin County Compost Cost Estimate Calculator
- Fibershed's Guide to Compost Application
- Compost Application Rate, White Paper
- Local Compost Facilities, Haulers, and Spreaders List

Why a CA Healthy Soils Initiative?

- California cannot meet its GHG reduction goals without an ambitious, soil C-focused, working lands program.

- Compost is particularly effective because of its multiple impacts on the climate change equation. Decomposition within the compost environment maximizes carbon conservation as compost biomass while minimizing emissions of short-lived climate pollutants, including black carbon associated with burning of biomass, and CH4 and N20 emissions from anaerobic disposal alternatives.

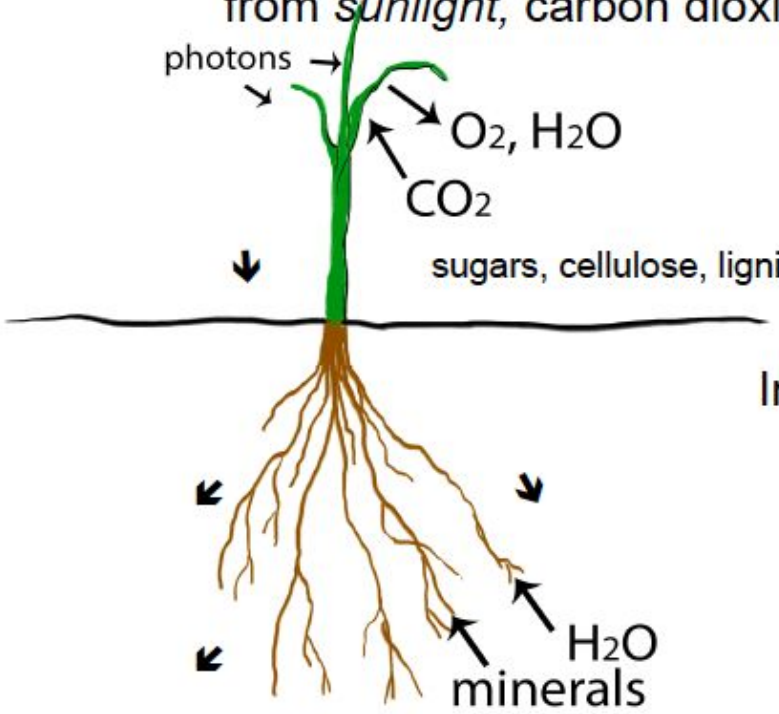
- Compost offers the simplest and fastest way to safely increase SOM on working lands. The compost environment effectively pre-processes and stabilizes organic materials for safe and beneficial application to working land soils, eliminating or radically reducing pathogens, weed propagules and soluble nutrients.

Question:

- *How does imported compost application compare to spreading our own livestock's manure or composted manure/straw?*
- One obvious difference is that imported compost is...imported. That means the nutrients and carbon it contains are coming from off the farm, which helps build soil fertility on the farm more quickly (by taking it from somewhere else). The same thing happens when we import feed or hay from off the farm, and if we compost that material (as manure and bedding, for example), we can optimize the benefits of importing fertility in feed.
- On the other hand, if you think about it, most of what grows on the farm is also "imported;" *from the atmosphere*. Composting that material on site allows us to conserve more of the carbon, and nitrogen, in those materials, while also transforming them into a stable, weed free and pathogen free soil amendment.

Photosynthesis:

The transformation of solar radiation to biochemical energy through the *synthesis* of carbohydrates from *sunlight,* carbon dioxide and water



ALL the **C**ARBON
In **CARBO**HYDRATES
comes from the
AIR

John Wick
Marin Carbon Project

WHAT IS COMPOST ?

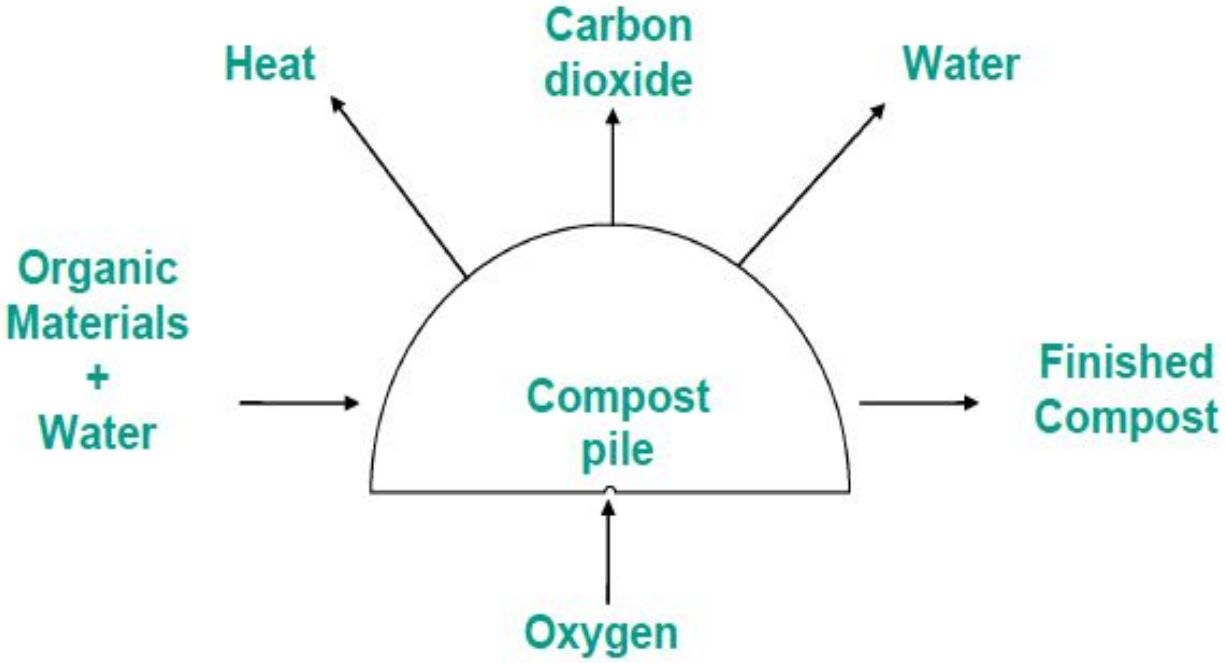
- “The product of a managed process through which microorganisms break down plant and animal materials into more available* forms suitable for application to the soil.”

-USDA NOP

* not always!

WHAT IS COMPOST ?

The End Product of a Managed Aerobic Thermophilic Organic Matter Decomposition Process, Suitable for Beneficial Application to Soil



WHAT IS COMPOST ?

Most Importantly...

Compost is a source of ***energy*** (carbon) for the soil ecosystem

It is ***energy*** that drives soil-plant-water relations and underlies a host of ecosystem processes, including nutrient cycles, biodiversity, hydrology, etc.

“Fertility is the ability of soil to receive, store, and release energy”

Aldo Leopold, 1949. The Land Ethic

Are our Agricultural Systems Nutrient Limited
or
Energy (Carbon) Limited?

Benefits of Compost Application on Rangelands

COMPOST AND COMPOSTING

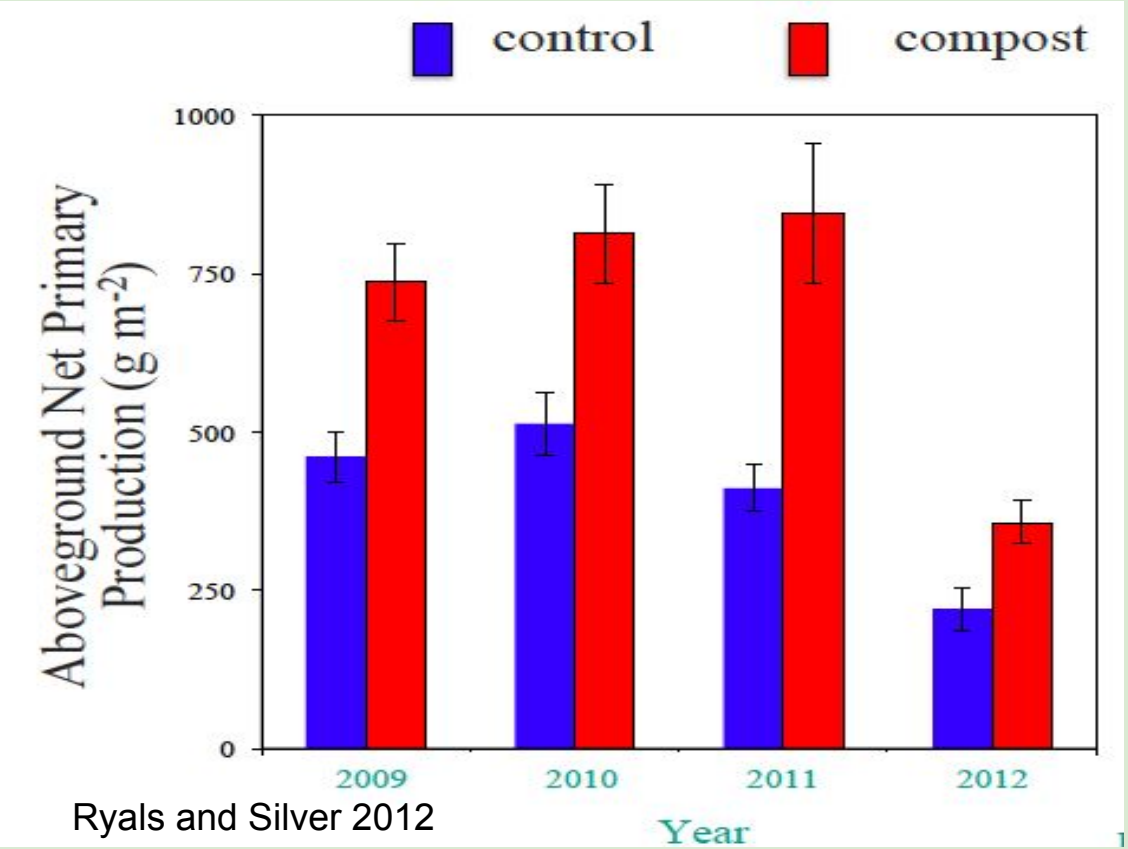
- Compost feedstocks include many materials which would otherwise represent significant sources of methane due to their anaerobic decomposition under business as usual scenarios, including livestock waste ponds and landfills.

- The use of compost in crop, pasture and rangeland ecosystems offers the most rapid means of directly increasing SOC, as soil organic matter (SOM), in working land soils, and enables the rapid elevation of SOM to levels that might take a decade or more to achieve with farm management changes alone.

Marin Carbon Project Research: 2006-2015

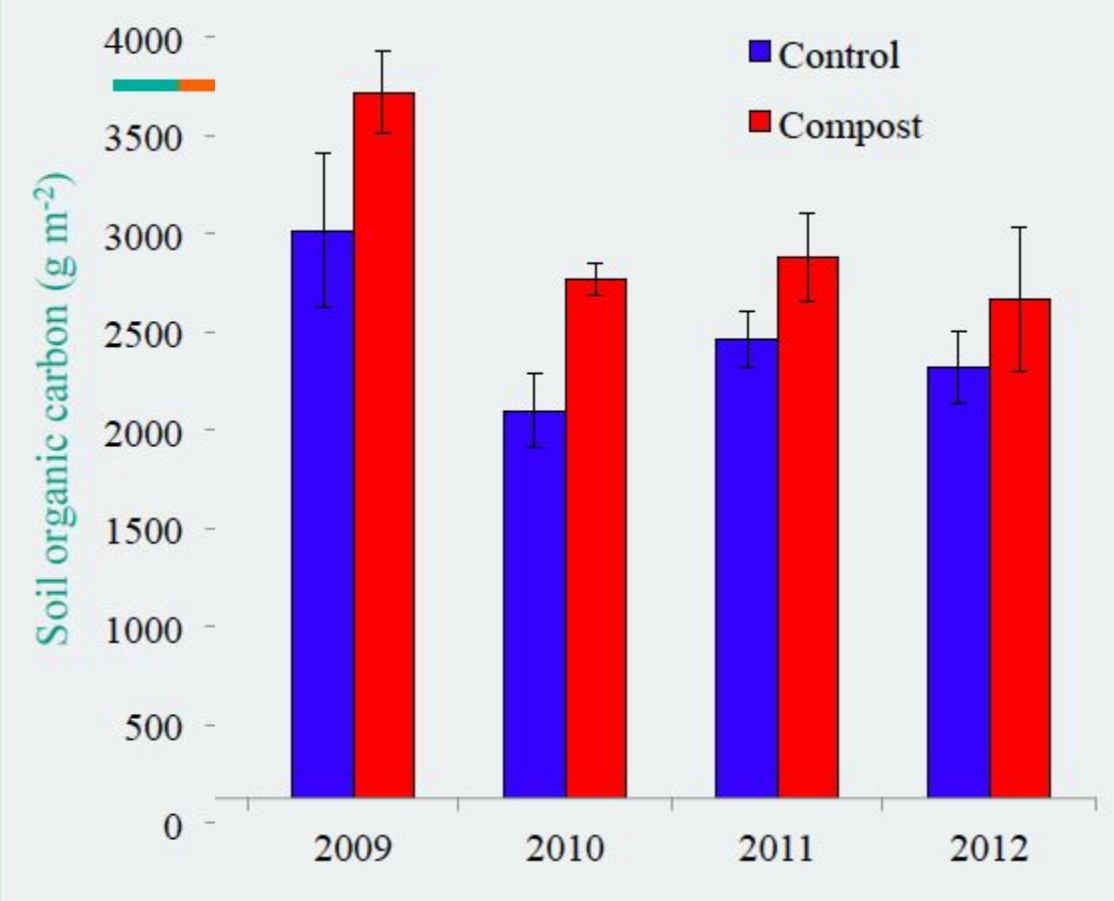
Cows Preferred Compost-Treated Forage!

Results: Above-ground production (forage) exceeded controls by 40-70% every year following the single ½” compost application in 2008

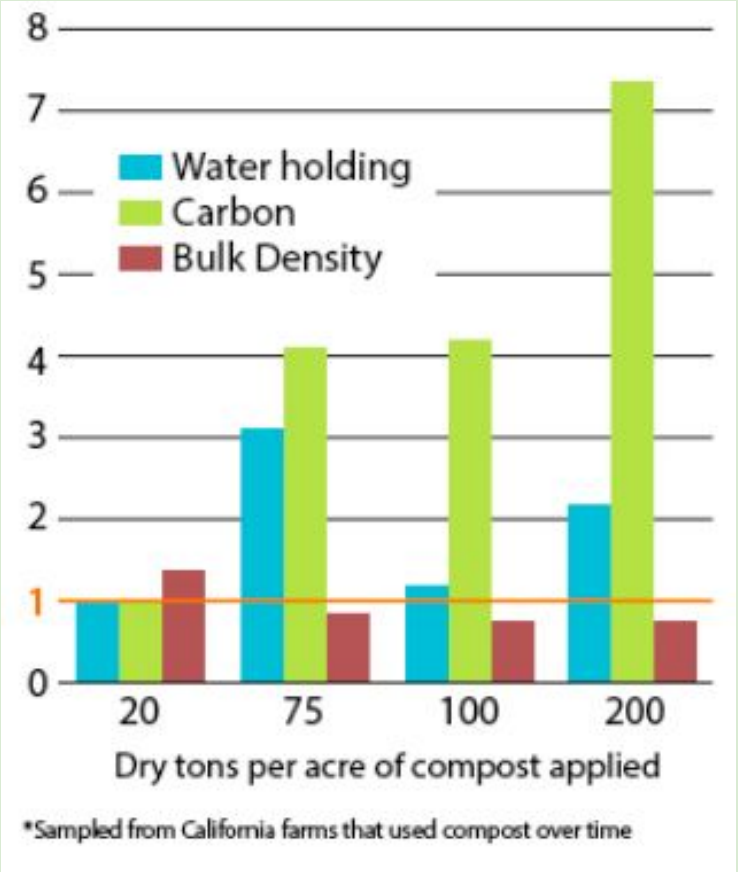


Ryals and Silver 2012

And, Compost increased Soil C Pools

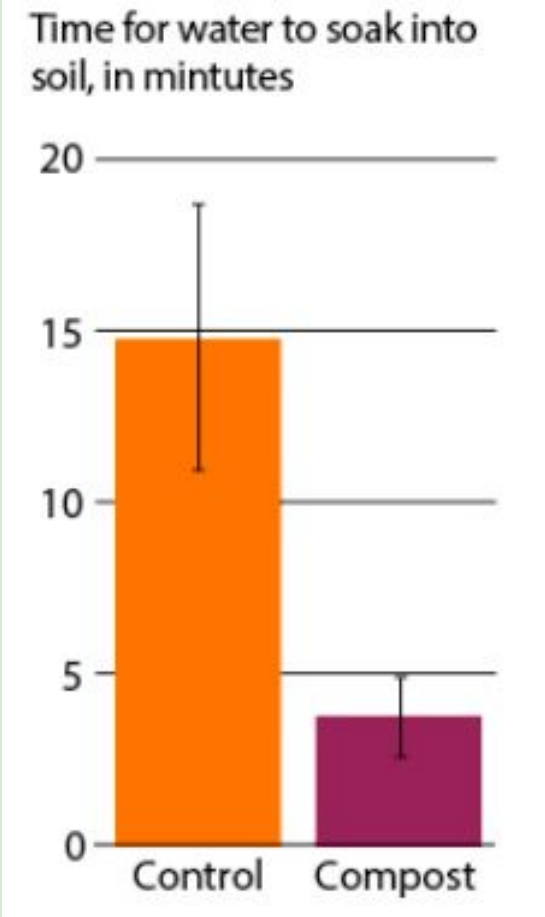


Compost Effects on Soil Quality



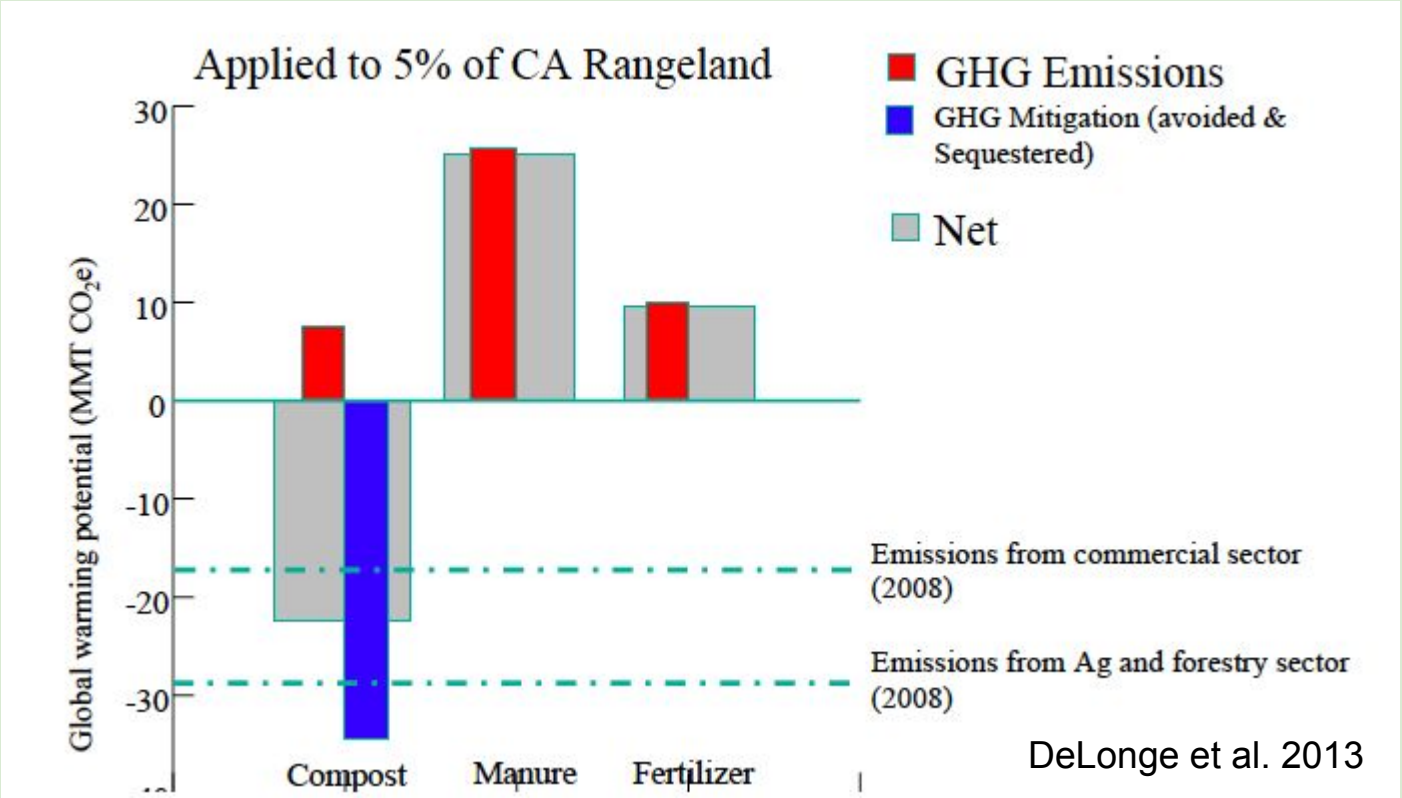
Brown, 4/14/20. Biocycle

Water Infiltration Time



Brown, 4/14/20. Biocycle

Life Cycle Assessment Shows Significant GHG Mitigation Potential Statewide



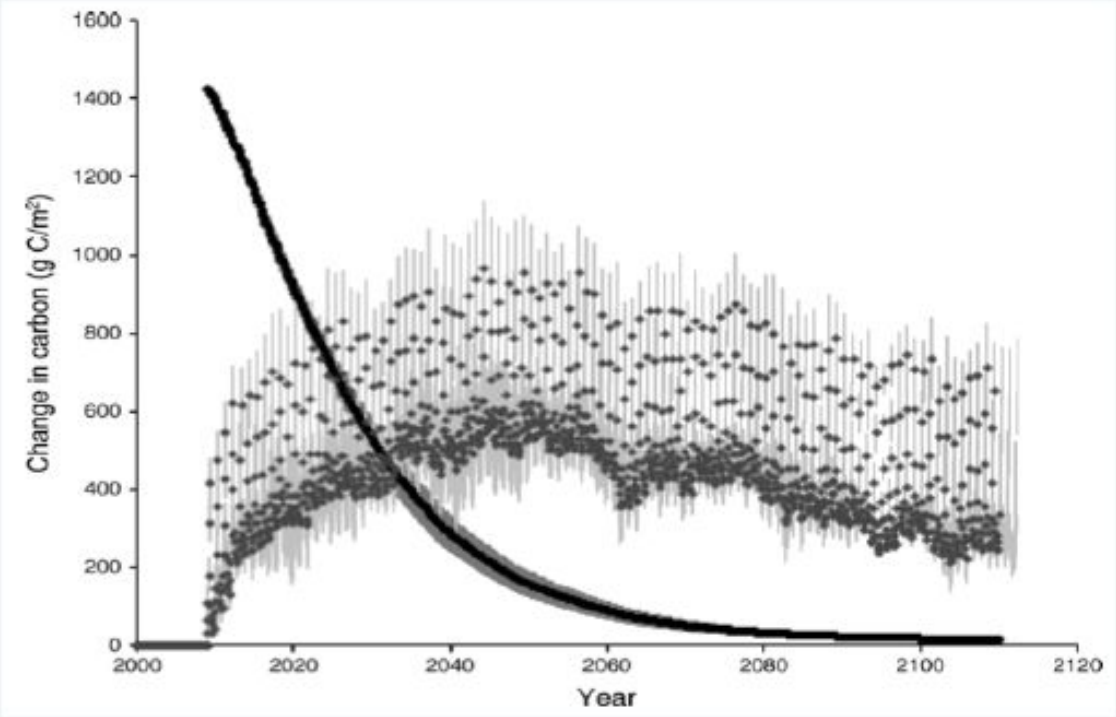
DeLonge et al. 2013

USDA-NRCS SOIL HEALTH INFOGRAPHIC SERIES #002

unlock the SECRETS IN THE SOIL

what's underneath

Carbon Benefits of Compost Application to Grazed Grassland



The black line shows simulated decomposition of the compost following application to grassland soils. Gray circles show the monthly change in total ecosystem carbon, not including compost carbon.
Values are averages across site characterizations, with standard error bars in light gray.
Ryals et al, 2015. Ecological Applications, 25(2): 531–545.

One Mendocino Soil Over Time

(4 Years)

Questions

Best Practices for Compost Application

Best Practices for Compost Application

- For grazed rangeland; apply about ¼" of compost one time every 10-20 years. (CDFA requires ⅓ of this amount, every year for 3 years)
- For intensively managed pastures, silage or hay ground, see croplands.
- Use a high C/N compost to avoid undesirable species changes, maximize carbon (energy) input and reduce costs
- Avoid slopes over about 20% for safety reasons if using machinery
- Avoid special status soils (eg, Serpentine and Histosols)
- Avoid special status plant communities (eg, native coastal prairie)
- Use best grazing management practices, including adequate rest periods
- Observe appropriate riparian buffers based on slope, soil, and vegetation
- On croplands, apply based on site-determined agronomic rates, or CDFA rates if working under HSP. Low C/N compost may be appropriate.

Questions - Best Practices for Compost Application:

- *Do you suggest applying for compost application and rangeland seeding on the same plot of land, and is that possible through the HSP?*
  - Yes, the Compost Application and Range Planting practices are allowed to overlap for HSP funding. Those two practices are recommended in combination.
  - Prescribed grazing is another HSP-supported practice that could be “stacked” in this situation.

Questions

Funding Compost Application through the Healthy Soils Grant Program

CARB/CDFA's GHG-Quantification Methodology used for GHG reduction estimates

- COMET Planner 'California Healthy Soils Tool:' http://comet-planner-cdfahsp.com/
  - Use of this version of COMET-Planner is *required* for CDFA Healthy Soils Program Projects.

Compost Application Rates Eligible for CDFA Funding, Derived from CARB QM, and Assumed under COMET-Planner analysis

Agricultural System	Compost Type	Tons/Acre*
Cropland	Higher N (C:N ≤ 11)	3 – 5
	Lower N (C:N > 11)	6 – 8
Orchard/Vineyard	Higher N (C:N ≤ 11)	2 – 4
	Lower N (C:N > 11)	6 – 8
Grazing Land	Lower N (C:N > 11)	6 – 8

- (p. 9 of RGA)

Compost Application Rates

Eligible for cost share under CDFA HSP, 2020

1. Incentives Program Projects

Application rates are now based on moist compost!

This makes it easier on the farmer so that they do not have to do the conversion to dry tons.

2. Demonstration Projects

Applications must be converted to dry tons/acre, based upon the moisture content of each batch of compost applied.

Compost Application Rates

Eligible for cost share from CDFA HSP, 2020

Different composts have different moisture contents and thus different moist/dry conversion rates.

Under the HSP Incentive Program:

- Order the 3-5 or 6-8 tons/acre. Don't worry about the moisture content.
- Your compost may be sold by the yard, in which case you need to know the bulk density to know the tons to yards conversion; OR
- Use this statement from CDFA:

"…1 cubic yard of compost can weigh 900 – 1200 lbs.

CDFA uses the conversion ratio of 2 cubic yards of compost equal to 1 ton of compost." This is a standard industry conversion, but obviously varies with moisture content, etc.

Andrew Whitaker, Ph.D., Environmental Scientist, Healthy Soils Program, CDFA, 4/28/20

Compost Application Rates

Eligible for cost share from the CDFA HSP, 2020

NOTE these are CDFA's Compost Application Rates;
They are NOT agronomic rates!

- Agronomic rates are site, soil and crop-specific, as determined by the producer and/or a qualified consultant.
- CDFA bases its recommendations on the assumption that 25% of compost N is available in the first year.
- At 2% N, a ton of compost contains 40 lbs of N, almost all in organic form, ie, not immediately available.

If 25% were available, that would be 10 lbs/ton.

Compost Application Rates

CARB's "Quantification of GHG Emissions for Compost Application in California Croplands," underlies CDFA's recommendations for compost use.

Assumptions

1. Compost is applied based on N content.
2. Compost users will continue to apply synthetic N at the full agronomic rate.

- In other words, the QM limits compost application on the assumption that all N in compost is available. This is FALSE !
- And assumes enough synthetic N is also applied to meet crop needs without compost.
- This essentially guarantees an over-application of N, and erroneously restricts compost application rates to very low levels.

Compost Application Rates

CARB's "Quantification of Greenhouse Gas Emissions for Compost Application in California Croplands," underlies CDFA's GHG quantification for compost use.

For "managed grasslands," CARB assumes an average "grazing density" of "one cattle per acre" and an average excretion rate of 93.8 kg N/head/year (ASAE, 2005).

However, the 2008 UC Davis paper cited actually reports a stocking rate of 4 acres per cow, not one! (And refers to irrigated pasture).

The QM thus over-estimates N inputs by cattle, and therefore lowers the recommended compost rate per acre on managed grassland based on this error.

We might also ask: where does the N the cows are excreting come from?

GHG Benefits of Compost Application
CARB/CDFA

(C:N > 11, 6-8 tons/acre) Marin County, MTCO2e/ac/yr (CARB 2017)

TYPE	CO2	N2O	CH4	GHG
Annual Crops	4.535	-0.190	0.003	4.347
Per/Orchard/ Vineyard	4.610	-0.184	0.002	4.428
Grazed Irrigated Pasture	4.580	-0.215	0.001	4.366
Grazed Grassland	4.541	-0.092	0.003	4.451

Grant Requirements: Eligible Compost Sources
1) Purchased Compost

- Must be produced by a facility permitted or local/state authorized facility.
- Required to submit a report of laboratory analysis on compost C:N ratio (often facility can provide you with recent report) (p 9-10 of RGA).

See Marin RCD's List of Local Compost Facilities, Haulers and Spreaders for places to purchase.

**Notice, this list has been compiled as a local reference document and is not meant as an endorsement of any of the services listed. If a business or service provider should be added to this list, please contact michelle@marinrcd.org.*

>Local Compost Facilities

- **Bolinas-Stinson Resource Recovery Project**
  25 Olema-Bolinas Road
  Bolinas, CA 94924
  Site Manager – Mike Aitken
  (415) 868-1796 – drop-off/pick-up questions
  (415) 868-1224 – billing questions
  Free with no limit to how much you can take. No delivery but will aide you in loading up to truck and transfer. Compost made from greenwaste (no manure). Not certified organic but they are careful about what they accept into their compost piles. Show up at site, or call Mike for more information. You can also take small amounts for home-garden scale. A joint project of the Bolinas Community Public Utilities District (BCPUD), the Stinson Beach Water District, the Bolinas Fire Protection District, and the Stinson Beach Fire Protection District.

- **Cold Creek Compost**
  6000 E. Side Potter Valley Road
  Ukiah, CA 95482

Grant Requirements: Eligible Compost Sources
2) On-farm produced compost

- Must use following methods to produce compost, and have documentation:
  - In-vessel or Static Aerated Pile System: Maintain a temperature between 131°F and 170°F for 3 days;
  - Windrow Composting: Maintain a temperature between 131°F and 170°F for 15 days. The materials must be turned a minimum of five times.
- Required to submit a report of laboratory analysis on compost C:N ratio.
- Type of material(s) used for composting must be documented.
- Must be produced at the agricultural operation that the project is located on.
- Cannot be vermicompost (p. 10 of RGA)

Grant Requirements: Implementation and Soil Sampling

- First compost application must be before **December 31, 2020.**
- **3 years** of compost application required, 3 years of payment
- Must use CDFA application rate for full reimbursement
- Must take soil samples before compost application, one year after, two years after, and 3 years after the initial application (**4 soil samples total, per field, required**). The first 3 samples are reimbursed by CDFA, the last sample will be an expense to the landowner.

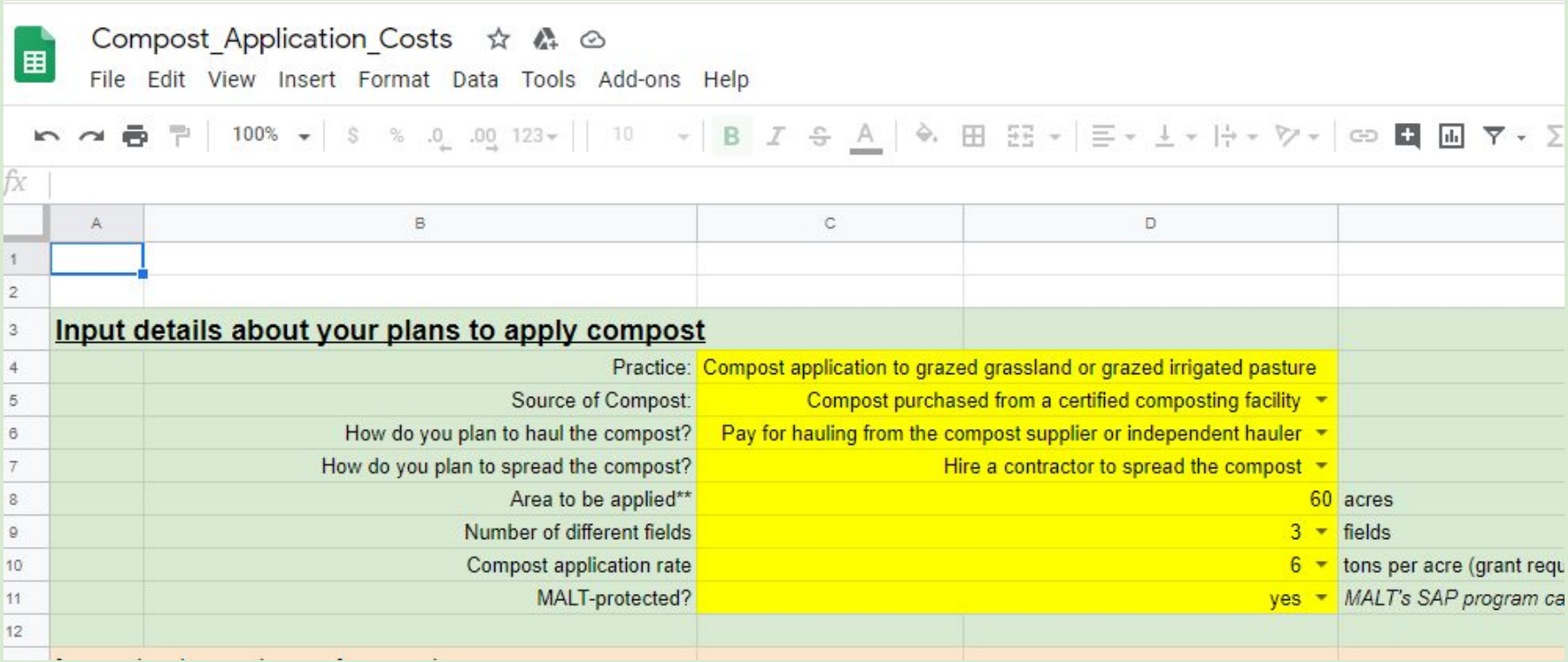
Grant Requirements: Verification

1) A composting log including materials, method and temperatures (if produced on-farm) OR copy of compost receipts
2) Compost analysis report: C:N ratio (>11/1 vs 20/1 in the CARB model)
3) Estimated tonnage of compost applied (if produced on-farm)
4) Verification when compost is spread or visible

- Verification will be conducted by CDFA environmental scientists; visit or photo from landowner
- State of CA has right to review project docs and conduct audits during project implementation and over life of project

Compost Application Costs

- Through CDFA, grant awardees may be eligible for advance payments of up to 25% of grant award (p. 21 of RGA) - otherwise grant program is an **annual flat-rate payment system on a reimbursement basis.**
- MALT/Marin RCD's Compost Cost Estimate Calculator


Compost_Application_Costs
File Edit View Insert Format Data Tools Add-ons Help
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A B C D
1
2
3 Input details about your plans to apply compost
4 Practice: Compost application to grazed grassland or grazed irrigated pasture
5 Source of Compost: Compost purchased from a certified composting facility
6 How do you plan to haul the compost? Pay for hauling from the compost supplier or independent hauler
7 How do you plan to spread the compost? Hire a contractor to spread the compost
8 Area to be applied** 60 acres
9 Number of different fields 3 fields
10 Compost application rate 6 tons per acre (grant requ
11 MALT-protected? yes MALT's SAP program ca
12

Cost estimates for applying compost

Total quantity of compost	720	yards
Cost of compost	$18,000	
Cost of hauling compost	$6,000	
Cost of spreading compost	$4,320	
Total Project Cost:	**$28,320**	* all numbers are appr
CDFA funding reimbursement	**$18,000**	* all numbers are appr
MALT SAP funding reimbursement	**$5,160**	* all numbers are appr
Cost to landowner after reimbursement (per year)	**$5,160**	* all numbers are appr
Total cost to landowner after reimursement over 3 years	**$15,480**	* all numbers are appr
Supporting information		
Convert tons of compost to yards	*2*	*yards per ton*

Questions -Healthy Soils Program

1. Is CDFA making any exceptions for producers facing economic hardship due to COVID-19?
    a. *CDFA 5/6/202… "The CDFA HSP team has not received further guidance on delays and extensions regarding the COVID-19 pandemic, but we have made inquiries and are awaiting response. Once we have more information, we will share with all of the recipients promptly, as we recognize the challenges this situation presents for all of the HSP projects."*
2. We have a applied for an HS grant which includes compost application. We mistakenly proposed a one-time application before realizing that 3 are required. Can we amend the application as such?
    a. *You cannot edit an application once it is submitted. One proposed compost application instead of the required three, may disqualify your application during the review process. I would recommend submitting another application. CDFA confirmed you may do this.*

Questions