

Compost on Rangelands – *Lessons Learned from Amador County Healthy Soils Project*

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Compost Application Rate:

Research suggests the optimum compost application rate to support carbon storage is ¼ inch depth. This corresponds to 34 cubic yards per acre or about 17 tons (depending on moisture content). Broadcast application of compost on annual rangelands requires a level of efficiency in order for the practice to be cost effective. Without the proper equipment, the time and cost to spread can increase 10 fold. *For our project we applied compost at ½” or 67 cubic yards per acre or about 34 tons as a one-time application.*

Funding Sources:

The California Department of Food and Agriculture Healthy Soils Program (HSP) has an incentive program for this practice. The HSP Incentives Program accepted applications from November 1, 2021 - February 25, 2022. CDFA received 1,328 applications requesting \$90.52 million. To date, 870 applications have been awarded for a total of \$61.2 million. It is estimated that a total of \$67 million will be awarded in 2022.

This practice consists of three consecutive yearly compost applications of 6-8 tons per acre, which would equal a cumulative total of 18-24 tons/acre. The current reimbursement rate through CDFA is \$50/ton/year, or \$300 - \$400 per acre/year depending on the application rate chosen. After 3 consecutive years, the total cost per acre is \$900 - \$1,200. For more information or to apply, <https://www.cdfa.ca.gov/oeffi/healthysouils>

Cost of Application:

The cost of applying compost will often consist of three costs: compost, delivery, and application. Compost purchased from a commercial facility can be \$20/ton not including delivery, or \$30/ton delivered. Delivery costs can vary greatly and will depend on the distance from the facility to the site and the size of the trailer. Some haulers charge a flat rate and others will charge on an hourly basis. *For our project, we paid \$10/yard or \$20/ton and an hourly delivery rate of \$120/hr. which resulted in an average delivery cost was \$15/ton.*

Types of Spreaders:

Compost can be spread using a variety of equipment. For large areas, compost is typically spread using a fertilizer/gypsum spreader or manure/compost spreader. In general, the larger the equipment, the faster the material can be spread. Spreaders can consist of trucks with built-in spreaders, or pull behind box trailers. There are four main types of spreaders and each type has its advantages. The four types include; side-discharge spreaders, box spreaders with horizontal beaters, box spreaders with vertical beaters, and box spreaders with spinner beaters.

Types of Spreaders

Brands/models are only used as an example. No endorsement of listed products is intended, nor criticism implied of those not mentioned.

Size	Small	Medium	Medium - Large	Large	Large
					
Brand /Model	Adams HLS-3 Spreader	Adams L5034	Kuhn Knight SLC141	NewLeader NL 600	NewLeader L5034G4
Capacity (yds ³)	3	7	16	22	22
Capacity (tons)	1.5	3.5	8	11	11
Loads/acre (@8 ton/acre)	5.3	2.3	1	0.7	0.7
Acres / hr.	0.5	3	10	12	12
Rate (acres/day)	4	16	100	300	300

The main factors that contribute to efficiency of compost application are as follows:

- Size of front loader to load spreader
- Size of spreader
- Slope of site
- Obstacles on site (trees, rocks)
- Proximity of staging area to application site

Self-Application:

Spreaders can be rented or purchased. New equipment can cost up to a hundred thousand dollars or more depending on the size. Rental equipment can be difficult to find in California so for those wanting to spread their own compost, check with a fertilizer company or look at buying a used spreader. Several farm equipment auctions have used spreaders for sale. Used trailer spreaders can often be found for several thousand dollars. An important factor to keep in mind for self-application is the equipment needed. For trailer spreaders, be sure the tractor pulling the spreader is of adequate size. In addition, a separate tractor loader will be needed to load the spreader. *For our project we used the Adams HLS-3 Spreader. Since our application rate was 34 tons to the acre, it took 22 loads to cover an acre. Much of the time was spent refilling the spreader. At this rate it took a day to treat an acre. At the CDFA rate of 8 tons/acre, we estimate that you could treat ½ acre per hour or about 4 acres per day. Larger spreaders would be able to hold more compost resulting in less trips and have a wider discharge resulting in fewer passes.*

Auction sites for equipment:

- Ritchie Brothers - <https://www.rbaction.com>
- Auction Time - <https://www.auctiontime.com>
- Tractor House - <https://www.tractorhouse.com>
- Fastline - <https://www.fastline.com>

Hired Application:

Several commercial compost facilities have the ability to deliver and spread compost. For large acreages or for landowners that don't have equipment, this can be the preferred method. Based on 2019 figures, the rate was \$43/ton which included compost delivered and spread.

Range Seeding:

Similar to compost application, range seeding requires proper calibration to get the desired results. On small acreages and relatively flat terrain, a broadcast seeder can be used effectively.

In this project we used a 3-point seed spreader mounted on a tractor. The seed chosen was a clover cover crop that consisted of nine clover types. The mix was chosen based on a medium rainfall suitable for sites that receive between 12-30 inches of precipitation. Seed was broadcasted at a rate of 20 pounds per acre at time of compost application in September just prior to fall rains. Seed cost was \$4.25/lb. for a total cost of \$85 per acre. At a driving speed of 5mph and a seed spread rate of 20 feet, you can treat approximately 12 acres per hour. (MPH x width of seeder in feet x 0.1212 = Acres/hr.)



RS-321 MEDIUM RAINFALL (12 - 30 IN.)

LOSA SUB-CLOVER	10%
CAMPEDA SUB-CLOVER	15%
ANTAS SUB-CLOVER	15%
GOSSE SUB-CLOVER	15%
SEATON PARK SUB-CLOVE	10%
ROSE CLOVER	10%
FRONTIER BALANSA CLOVER	10%
NITRO PERSIAN CLOVER	10%
JESTER MEDIC	5%

Return on Investment:

If following the compost application guidelines through the CDFA Healthy Soils Program, after three years, the total cost for compost application will be between \$900 - \$1,200. This is a substantial investment. With the current funding from HSP, the program should offset the entire cost. Without the funding, it would be important to weigh the short and long term benefits. Some of the short term benefits measured in this project include:

Forage Quantity

1. With two years of data, we saw a 22% increase in forage production as a result of the compost application.
2. In the areas where we seeded with the clover seed mix and added compost, we saw an 8% increase in forage production.

Forage Quality

1. Crude protein was 30% higher in the compost plus clover seed sites.

Presence of Clover

1. If you just add compost, you are likely to see more clover. In our study we had 87% more clover.
2. If you add clover seed mix at time of compost, we saw clover increase by 233%.

Reduction in Weeds

1. In the compost plus clover seed mix sites, we saw a 45% decrease in weeds.

In addition to the above short term benefits, there may be longer term benefits which include increased carbon sequestration, increased water infiltration, increased soil health, increased organic matter, increased soil nutrients, etc.