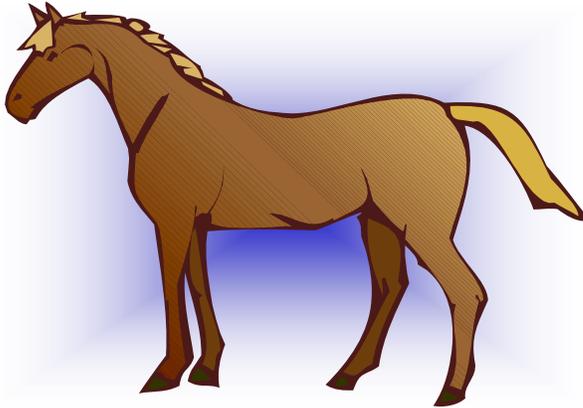


Composting Horse Manure

A Field Guide for Recycling Equestrian Waste

Why Should Horse Manure Be Composted?

Every horse owner knows that a horse can produce a verifiably *large* amount of manure each day (on average a horse will produce 50 pounds daily). Two common manure management practices include applying it directly to the landscape or having it hauled away. However, with a little time and energy, the manure can be turned into a wonderfully useful product that can enrich any garden or landscape.



The *benefits* of composting horse manure are many and include:

- Eliminates the breeding ground for flies
 - Kills harmful parasites (including worm eggs), bacteria and weed seeds
 - Reduces the volume of raw material by half
 - Eliminates foul odors
 - It is relatively inexpensive and simple to do
- The final product is an outstanding soil amendment and mulch that can be used in gardens, pastures and the landscape
 - It reduces the possibility of contaminated runoff leaving the horse property
 - It makes your property more attractive to your neighbors by eliminating unpleasant odors and pesky flies

What Is Composting?

Composting is the *controlled* process of breaking down organic material into a final product called humus. Manure that is stockpiled and never managed will degrade to some extent, but the results are varied, often foul smelling and unpredictable. The organisms that digest the organic material are called microbes. If they are given optimal growing conditions, within two to four months mature compost will be available for use on your property!

The microbes in the compost system depend on four parameters for optimal digestion (and growth) rates; oxygen availability, moisture content, carbon to nitrogen ratio and the temperature within the compost system. These factors can all be easily monitored and managed to provide the microbes with the perfect conditions in which to grow, multiply and eat all the digestible material in the system.

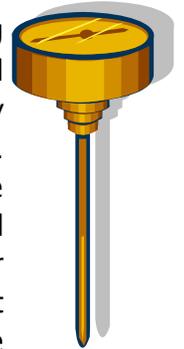


Four Critical Parameters In The Compost System

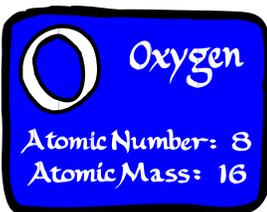
The following factors are important to monitor and control when creating and maintaining a healthy and active compost system.

Temperature

The interior of the compost system will heat up to 150° F (within several days of being turned). The heat is a result of the microbes increasing their metabolic (digestion and growth) rates within the compost system. The high temperatures reached in a healthy system sterilize the compost because pathogens, bacteria and weed seeds are killed. As the compost system ages and nears maturity, the internal temperatures will not rise as high or as quickly as it did earlier in the composting process. If the internal temperature does not rise within several days of the compost system being turned over there might be too little water in a newer system or, in an older system, the compost has reached maturity. Daily monitoring of the compost system's internal temperature will ensure that any potential problems are caught quickly.



Oxygen Saturation

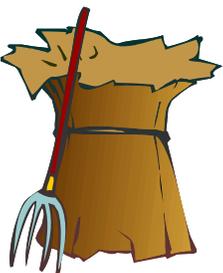


Composting is an *aerobic* process, meaning that the microbes that digest the material require oxygen. When there is not enough oxygen levels in the compost system, the degradation process becomes *anaerobic* and other microbes decompose the material without the need of oxygen. Anaerobic decomposition emits a very foul, sulfur odor and unpredictable results.

Aerobic decomposition, on the other hand, smells "earthy" and not unpleasant. In order to ensure that enough oxygen is available for the aerobic microbes, the compost system should be turned over frequently. The frequency of turning will be determined by the size of the compost pile and how long the compost has been maturing. Turning the compost system at least once every week is highly recommended. The more often a pile is turned, the faster the compost will mature.

Moisture Content

The moisture level of the compost mixture is vital to the microbes in the compost system. If the system is too wet, anaerobic conditions will result and foul odors and other problems will occur. If the system is too dry, decomposition will stop as the microbes will "shut down" until more moisture is added. A healthy compost mixture contains between 50 to 60% moisture (a handful of the compost mixture will be as moist as a wrung out sponge). If the mixture is too wet, add dry material and turn it more often. If it is too dry, add water while it is being turned over.



Carbon-to-Nitrogen Ratio

The macronutrients (food) consumed by the microbes in a compost system are carbon and nitrogen. The optimal C:N ratio is 25 to 30:1 by weight. Horse manure typically has a C:N ratio of 50:1. An ideal C:N ratio can be easily attained by simply adding the horses' bedding material to the compost mixture.

The Finished Product!

The compost has reached maturity when it is completely degraded and the internal temperature of the compost system does not spike upon being turned over. The mixture should be evenly textured and have an earthy smell. Generally, it should be mature within two to four months.

Starting A Compost System

Selecting a compost site

Before starting, carefully choose the location of the compost system as a properly situated system will save you time and work in the future! The site should be a high, level area that allows runoff to drain around it. Low areas, where water will drain, will turn the compost system into a soggy disaster. In order to prevent water pollution, the compost site should also be situated away from creeks and streams. Make sure the site is located near stalls and paddocks so manure and bedding can be easily and conveniently moved to the compost system

Building the compost bins

If you choose to use a compost bin system rather than compost piles (which are very effective as well), a two- or three-bin system can be constructed in one weekend. A two-bin system will allow you to fill one bin with manure and, once it's full, let it compost while the second bin is being filled. If you have several horses, a three-bin system will allow you to fill the first bin to capacity, compost it while the second bin is being filled and then compost the second bin while the third bin is being filled. By the time the third bin is full, the first bin should have reached compost maturity and be ready for use.

The bin design below is a recommendation and can be replicated for two or more bins.

Supplies for a three bin compost system:

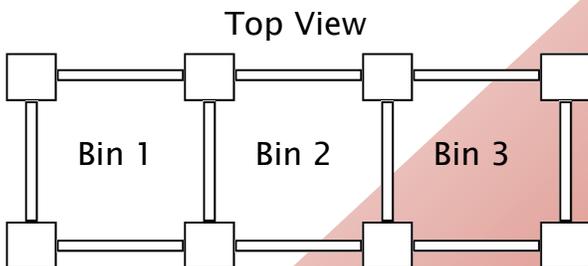
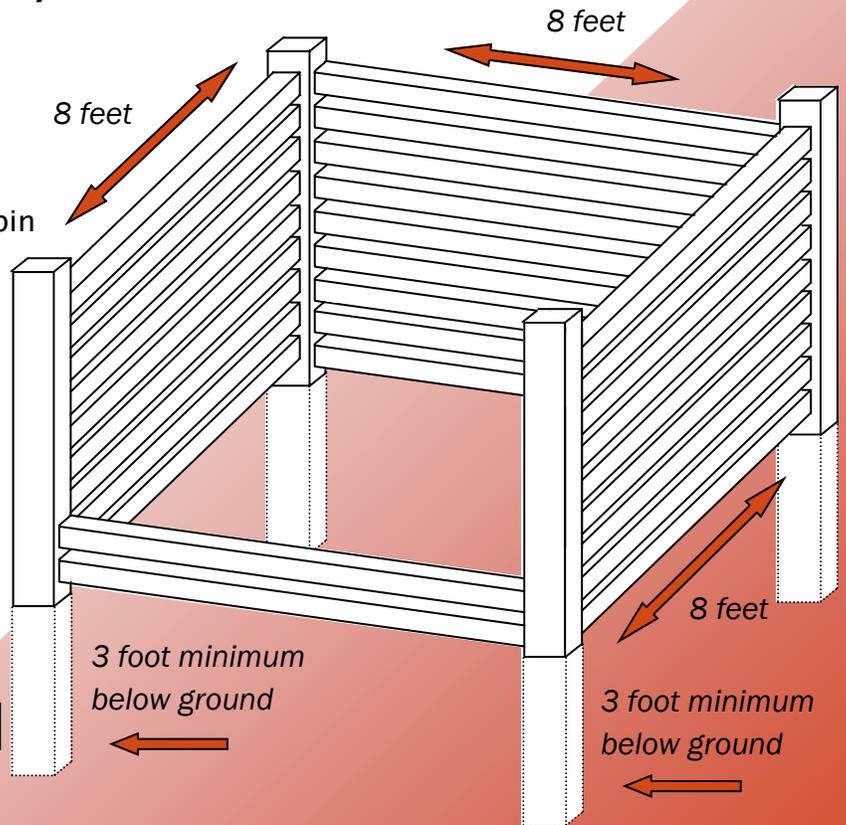
- 8 - 8' x 6" x 6" posts
- 110* - 8' landscape timbers
- Approximately 160 - 3" deck screws
- A tarp or plastic sheet to cover each bin



All wood should be treated for long-term use!

*The number of landscape timbers will depend on the actual height of the bin system. Save time by deciding on the final height of the bins before buying the materials!

3 to 4 feet
above ground



A multi-bin compost system should use the common wall of the sides of the bins to save on space and the cost of construction material.

Management Of The Compost System

Controlling the decomposing process will ensure that mature compost will be ready within two to four months. Frequently turning the compost mixture allows oxygen to permeate the system and speeds the composting process. Monitoring the moisture levels and adding water when necessary will ensure the microbes the perfect habitat in which to thrive and grow (and digest!). Tracking the internal temperature of the compost system often will enable you to catch any potential problems quickly and will also help you to determine when the compost is mature and ready to use in your gardens and landscape. Please refer to page two for the optimal temperature ranges, carbon-to-nitrogen ratios, and moisture and oxygen levels in a healthy and active compost system.

Using The Compost



Compost is a wonderful soil amendment as it contains many of the nutrients needed by plants to thrive. It also helps the soil retain moisture. Simply mix the mature compost into the soil of any garden or landscape and watch the plants flourish. Compost can also be used as a mulch.

Troubleshooting Guide

What's Wrong?	The Problem Is...	How to Fix It!
There is a bad odor	There is not enough oxygen in the mixture	Aerate the mixture by turning it over
There is a bad odor and the compost mixture is very wet	The mixture is too wet and there is not enough oxygen in the mixture	Mix in dry material (such as straw or other bedding) and ensure that the mixture is aerated properly
The middle of the compost mixture is dry	The mixture does not have enough water	Add more water to the mixture as it is being turned over
The compost mixture is damp, but it is only warm in the middle and nowhere else	The compost pile (or amount in the bin) is too small	Increase the size of the compost pile by adding more raw material and mixing it into the pile
The compost mixture is damp and there is no bad odor, but the internal temperature will not rise	The compost mixture does not have enough nitrogen	Increase the nitrogen levels in the mixture by adding more manure or other nitrogen sources (like green leaves and kitchen scraps)
The compost mixture is attracting flies, rodents and other pests	The compost is not mixed thoroughly (uneven mixture)	Make sure that the compost pile is mixed evenly

Resources



Cooperative Extension - The Cooperative Extension and County of San Diego's Farm and Home Advisors Office is an excellent resource to learn about composting. Contact the San Diego office at (858) 694-2845 or www.co.san-diego.ca.us/fha/index.html.

Resource Conservation Districts - Resource Conservation Districts are also a great place to find composting information. Mission RCD, in Fallbrook, CA, can be contacted at (760) 728-1332 or www.missionrkd.org.

