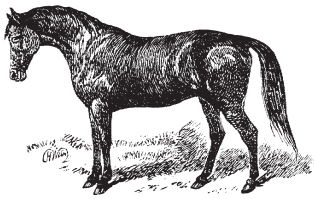
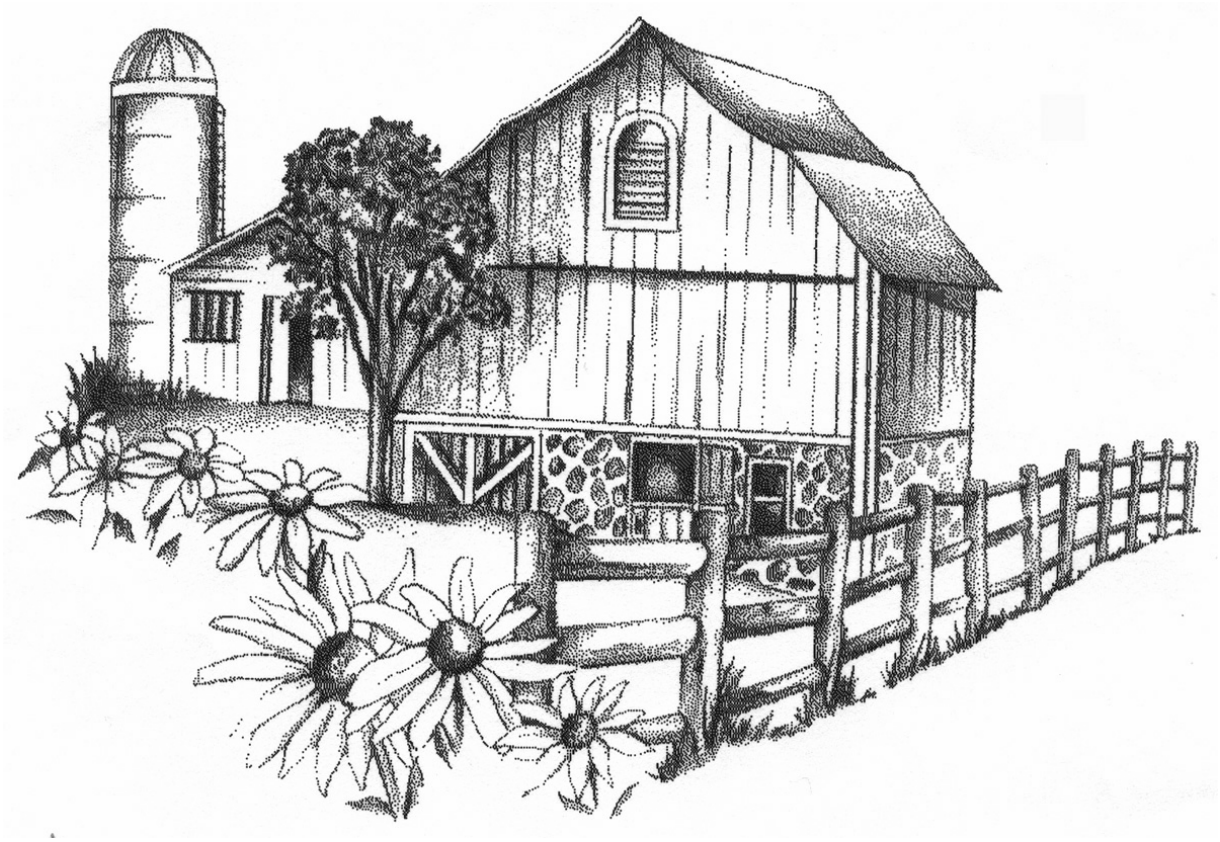


The Horse Owner's Guide to Composting

by Steven Wisbaum



Prepared for:

Otter Creek Natural Resources Conservation District

January 2002

About the Author

Steven Wisbaum has been making and using compost for the past twenty-three years. In 1996, he founded Champlain Valley Compost Co. and now provides custom composting services and products to farms, businesses, and public agencies throughout Vermont, western New Hampshire, and northeastern New York State. He also makes and sells his own Farm-crafted Compost™ to gardeners, landscapers, and farmers in northwest Vermont. Additionally, Steven is the co-creator and distributor of the Drip-Net Windrow Watering System™ and the North American distributor of Compostex® compost covers. Based in Charlotte, VT, he can be reached at (802) 425-5556, or by visiting his web site at www.cvcompost.com, or by e-mail at: steven@cvcompost.com.

Acknowledgements

This "Horse Owner's Guide To Composting" was developed through an EPA Water Pollution Prevention Section 319 grant administered by the Vermont Department of Environmental Conservation, Water Quality Division. Editorial and technical assistance was provided by Vicky Viens, compost coordinator of the Vermont Department of Environmental Conservation, Solid Waste Division, Rick Hopkins of the Vermont Department of Environmental Conservation, Water Quality Division, Betsy Greene of UVM Extension, and Keith Hartline, Al Confalone, Ellen Sivert, Mike Fournier, and Bruce Chapell of the USDA Natural Resources Conservation Service. Sources for additional copies of this Composting Guide can be found in the Resource section (Appendix A).

Credits

Figures 1, 3, 4, 5, 7, 8, 9 and 11: Reproduced with permission from Field Guide to On-Farm Composting (NRAES-114) and On-Farm Composting Handbook (NRAES-54), published by NRAES, the Natural Resource, Agriculture, and Engineering Service, Cooperative Extension, 152 Riley-Robb Hall, Ithaca, New York 14853-5701.Phone (607) 255-7654; e-mail: NRAES@CORNELL.EDU; Web site: WWW.NRAES.ORG.

Figures 2, 6 and 10: Holly Brough, S. Burlington, Vermont.

Disclaimer

Mention or omission of a trade name does not imply endorsement of, or lack of confidence in, any particular brand or product.

This Guide is dedicated to Hank Zandbergen (1935-1994)– accomplished gardener, composter, artist, mentor and friend.

Table of Contents

Introduction

Although a profusion of backyard and on-farm composting information has been published, this information has been written for either homeowners or livestock farms. This guide was written specifically to provide horse owners with the information they need to transform horse manure into a valuable soil amendment using the easiest, most practical, and cost effective methods possible.

Why Compost Horse Manure?

Composting is a microbial process that has long been used to manage a wide variety of organic (i.e. carbon-containing) wastes. Horse owners are increasingly taking advantage of the many environmental and economic benefits this practice offers.

Protection of Water Resources

Horse manure contains nutrients and pathogens that can pollute surface and groundwater if managed improperly. For example, phosphorus-rich runoff from stockpiled manure can cause the uncontrolled growth of aquatic plants in streams, ponds, and lakes. These algae "blooms" kill fish and other aquatic organisms by using up the dissolved oxygen supplies in the water. Runoff and leachate from manure piles also contain nitrates and bacteria, which can make surface and groundwater unsafe for drinking and recreational use. Through a combination of composting and proper environmental controls, these nutrients can be converted to more stable forms, pathogens can be destroyed, and local water resources protected.

Protection of Equine Health

Horse manure commonly contains the larvae or eggs of equine parasites. While spreading untreated manure on pasture increases the risk of exposure to horses that graze there, the heat generated in a properly managed compost pile (120 to 155° F.) has been shown to effectively kill these harmful pests.

Improving the Horticultural Value of Manure

Avoiding the problem of nitrogen immobilization is one of the many horticultural benefits of composting horse manure. Nitrogen immobilization occurs when raw horse manure and its high-carbon bedding (e.g. saw dust and shavings) are incorporated into the soil. To decompose this raw carbon, soil microbes use existing nitrogen reserves temporarily making that nitrogen unavailable for growing plants.

The horticultural value of horse manure is further improved because the heat generated in a properly managed compost pile will kill most weed seeds, harmful bacteria, and fly larvae found in raw manure. Finally, composting also converts ammonia nitrogen into a slow release form ensuring it will not be lost to the air when the compost is spread on the soil surface.

The Benefits of Composting

- Creates a valuable soil amendment
- Eliminates the risk of contaminated leachate
- Stabilizes ammonia nitrogen into a slow release form
- Destroys weed seeds, fly larvae, and pathogens– including equine parasites
- Avoids the problem of nitrogen immobilization
- Reduces manure volume by 40 to 60%
- Eliminates or reduces the cost of off-site disposal

Reduction in Operating Costs

Through composting, the volume of manure is reduced between 40 and 60%. For farms that apply their manure on hay land or pastures, this reduced volume means fewer trips to the fields and therefore less labor and equipment use. For farms that pay to have their manure hauled away, composting can reduce or eliminate this expense by making the composted manure more desirable to the farm, to neighbors, and/or to local landscapers.

The Benefits of Using Compost

Though sometimes viewed simply as a lifeless anchor for plant roots, the soil is actually a highly complex ecosystem teeming with a dazzling array of organisms, from microscopic bacteria to large earthworms. In natural settings such as forests and grasslands, these soil organisms digest and recycle the nutrients contained in dead plant material and animal wastes for reuse by growing plants.

However, in agricultural fields that are continuously harvested or grazed, adding organic matter can be critical for maintaining and improving soil fertility. In addition to supplying needed plant nutrients, the humus and "pre-digested" organic matter in compost improves the water-holding capacity of sandy soils as well as the drainage in heavy clay soils. Finally, the beneficial microbes present in mature compost are also known to suppress a wide variety of plant diseases.

The Benefits of Using Compost

- Supplies organic matter, humus, and valuable plant nutrients
- Increases the water holding capacity of sandy soils
- Improves soil aeration and drainage in clay soils
- Stimulates biological activity in the soil
- Suppresses a variety of plant diseases
- Helps grow healthier and more productive crops

The Art and Science of Composting

Composting is essentially the managed decomposition of raw organic matter (e.g. plant residue, animal manure, etc.) to create a valuable soil amendment (Figure 1). This decomposition process is carried out by naturally occurring, oxygen-dependent microbes—primarily bacteria and fungi. For this reason, successful composting of horse manure requires two things to support these living organisms:

1. The compost pile must have sufficient moisture
2. The compost pile must have sufficient oxygen

Being a dynamic system affected by both external influences (e.g. rainfall, air temperature, sunlight, wind) and internal influences (e.g. biochemical and physical changes to the ingredients, pile temperature, gravity, evaporation), successful composting also requires periodic monitoring and manipulation of the compost pile to maintain favorable composting conditions. For this reason, composting is more than just piling manure and "letting nature take its course."

Ensuring Sufficient Moisture

Since compost microbes live in the thin layer of moisture on the surface of the organic materials they're digesting, the entire pile must have a moisture content of at least 50%—similar to a damp sponge. Unfortunately, raw horse manure and its associated bedding tend to be very dry. For this reason water typically has to be added to initiate the

process. Moreover, since large amounts of water are lost from a hot pile due to evaporation, water may also have to be added later to sustain the compost process–especially during periods of low rainfall.

The three most practical ways to add water to a compost pile are:

1. Shape the pile with a flat or concave top to absorb as much rainfall and snowmelt as possible (Figure 2).
2. Manually add water to the pile using drip irrigation tubing or sprinklers (Figure 2).
3. Manually add water while turning using a sprinkler or by using the watering manifold found on some compost turning machines.

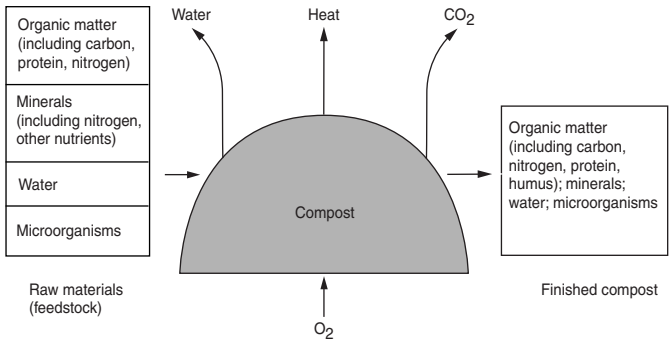


FIGURE 1. Decomposition of carbon and protein through the composting process. Source: NRAES-114.

Preventing Excessive Moisture and Anaerobic Conditions

Although horse manure usually starts out being too dry, too much moisture can also become a problem if a compost pile receives excessive rainfall. Aside from producing nutrient-laden leachate, this excess moisture can displace oxygen inside a windrow creating anaerobic conditions, which in turn generate unpleasant odors and phytotoxic substances (e.g. sulfides and organic acids). There are basically three ways to prevent manure or compost from getting too wet:

1. Do not locate piles on wet and poorly drained areas.
2. Place piles on a gently sloped surface with the piles oriented parallel to the slope.
3. As needed, use impermeable plastic tarps (during the rainfall event) or specially designed "compost covers" which shed rainfall and snowmelt but are completely permeable to oxygen and water vapor. Made of highly durable polypropylene fibers, compost covers can be reused for 5 to 10 years or longer. Since they are permeable to air, they are much easier to secure to piles than impermeable poly tarps and can be left on for extended periods of time.

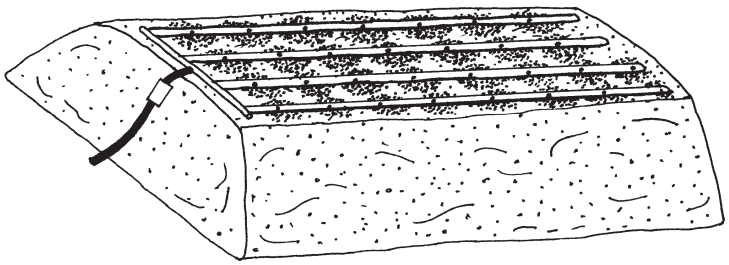


FIGURE 2. Compost windrow shaped with a flat or concave top to capture snowmelt and rainfall. A watering system using drip irrigation piping is also shown.

Facilitating Passive Aeration

Since compost organisms are primarily "aerobic," they require oxygen to survive. If a compost pile has adequate porosity (or fluffiness), oxygen will enter the pile through a process called "passive aeration" (Figure 3). Although compost piles made from horse manure typically start out having very good porosity due to the presence of bedding and waste hay, compost piles naturally settle over time and become compacted. This settling restricts airflow and slows down the compost process.

Although some compost literature advocates using perforated pipes to increase airflow, a more practical aeration method is to periodically "turn" the pile with a bucket loader, manure spreader, specialized compost turner, or a pitchfork (for small piles). Beyond fluffing and restoring porosity to the pile, this turning action also serves to remix and homogenize the ingredients, break apart large clumps, distribute moisture throughout the pile, and uniformly expose all the ingredients, especially weed seeds and pathogens, to the hottest temperatures inside the pile.

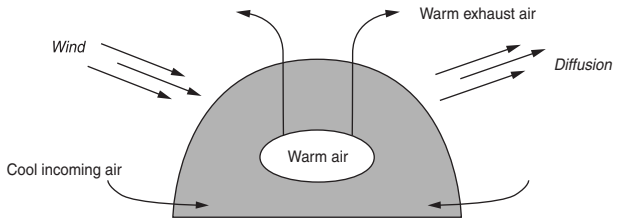


FIGURE 3. Natural (passive) air movement in a compost pile or windrow. Source: NRAES-114.

The Carbon to Nitrogen Factor

All living organisms require a certain amount of carbon and nitrogen in their diet. Compost microbes are most active when their diet contains about 30 times more carbon than nitrogen compounds—or a "C: N ratio" of about 30: 1. Although horse manure typically has a C: N ratio between 40 or 50:1 due to the large amounts of bedding mixed with it, as long as a compost pile has adequate moisture and oxygen, horse manure can be composted quite effectively without the addition of any extra nitrogen.

Manure Storage and Compost Area Design Considerations

All manure storage and compost areas must be designed to avoid any impact on surface and ground water resources. In particular, Vermont horse owners must comply with Vermont Accepted Agricultural Practice Regulations (AAPs) related to the storage, and application of manure and nutrients. Portions of these AAP's are included as Appendix B. The full text of the regulations is available from the Vermont Department of Agriculture. Among other things, these AAPs conditions and restrictions apply to:

* Direct or concentrated overland flows of waste or manure runoff into surface or groundwater from barnyards or manure storage areas (e.g. compost areas).
* Placement of manure storage, stacking, or composting areas in relation to floodways, wells or springs.
* Seasonal timing of manure spreading.

While an unimproved sod or bare earth pad can be used for manure storage and composting during dry weather, a gravel (small diameter and dark, not white stone) or concrete pad (Figures 4 and 5) is recommended for larger farms for at least the wettest times of the year. Some additional site selection and design considerations for an unimproved sod or bare earth pad are:

1. *Soil Type:* If the soil has a high sand or silt content, the site will be more accessible during and following wet weather but there will be greater potential for contamination of groundwater. On the other hand, If the soil has a high clay content with minimal slope, it will rut easily during wet weather. In either case, do not choose sites with shallow groundwater or minimal depth to bedrock.
2. *Slope*: To prevent water collecting around the compost windrows, a 2 to 4% slope is best with windrows oriented parallel to the slope.

Depending on these site conditions, specific site modifications may be required or advised. These include: ditches or swales to funnel upslope drainage away from the site; use of sod buffer strips down slope of the site to filter particulates and retain nutrients; and retention ponds to hold runoff. Furthermore, if a horse owner uses Federal or State cost share funds to help pay for the construction of manure storage or compost facilities, USDA "Conservation Practice Standards for Compost Facilities" (Code 317) and "Conservation Practice Standards for Waste Storage Facilities" (Code 313) would also apply. Sources of additional information regarding these Vermont and Federal regulations can be found in the Resource List.

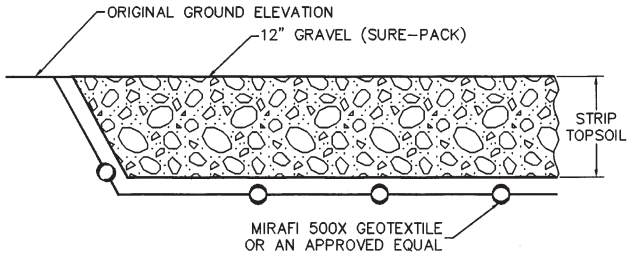


FIGURE 4. Detail of gravel pad for manure storage and/or composting. Source: Natural Resources Conservation Service

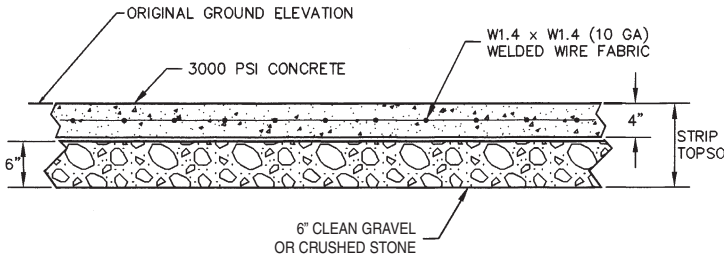


FIGURE 5. Detail of concrete pad for manure storage and/or composting. Source: Natural Resources Conservation Service

Composting Mechanics and Equipment

Compost Bins

Although horse manure is often composted in open piles, for farms with just one or two horses, it may be more desirable to compost in large bins. Unlike a typical backyard compost bin which is only designed to hold small amounts of food scraps and yard waste, a compost bin used for horse manure should be approximately 5 ft wide by 5 ft deep by 5 ft tall (Figure 6)–or capable of holding about 4 cu yd of material. To determine the number of bins needed, assume 1 cu yd (or 27 cu ft) is equal to four large wheelbarrows and therefore, a 4 cu yd bin would hold the manure from 16 wheelbarrows. If possible, it's best to use multiple bins so the contents of one bin can be turned into another. Using multiple bins will also ensure that manure generated during one time period can be composted in distinct batches separate from fresher material.

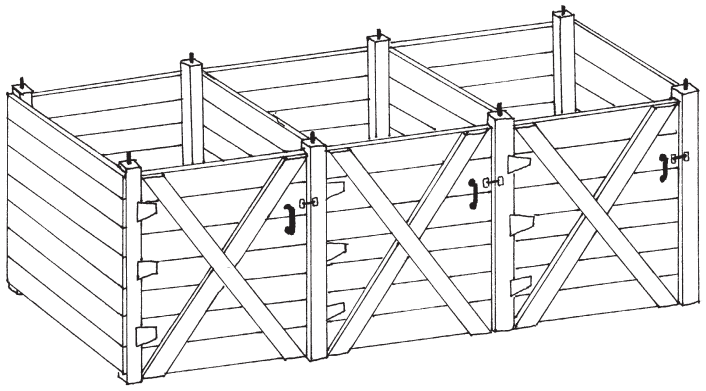


FIGURE 6. Multiple compost bins suitable for farms with only one or two horses. A roof (not shown) and front doors are optional.

The materials used for compost bins should be rot resistant such as non-arsenic containing pressure treated lumber or recycled plastic lumber. The bins should be designed with sufficient air holes to maximize passive aeration and be sized to accommodate the composting method and equipment to be used. For example, if the bins are to be emptied and/or turned by hand, they should not be so large that turning is just too much work. On the other hand, if a tractor or skid loader is to be used, the bins should be wide enough to accommodate the bucket. Similarly, if the bins are covered with a roof, there needs to be sufficient overhead clearance. Finally, access to a water source is important, as is a method of covering the bins to protect them from excessive rainfall (e.g. roof, tarp, or specialized compost cover).

Compost Windrows

For farms with more than a few horses, it's usually more practical to use long open piles or "windrows" rather than bins. These windrows should be 6 to 10 ft. wide by 4 to 5 ft. high depending on the method used to build and turn them. Windrows can be built with a manure spreader (Figure 7), dump wagon, dump truck (Figure 8), bucket loader (Figure 9), or even a wheelbarrow and pitchfork. When using a wheelbarrow, it's helpful to use a wide (10" to 12") board as a ramp (Figure 9) so the piles can be built with enough height and mass to heat up properly. For both aesthetic and practical purposes, it's also useful to keep the sides of the windrows straight and uniform. Finally, the windrows should also be far enough apart to allow any surface water to flow unimpeded between the windrows and to accommodate access for pile trimming and for mowing.

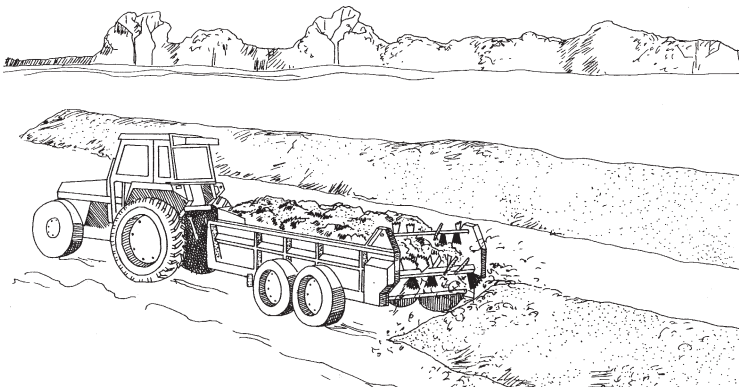


FIGURE 7. Building or turning windrows with a manure spreader. Source: NRAES-54

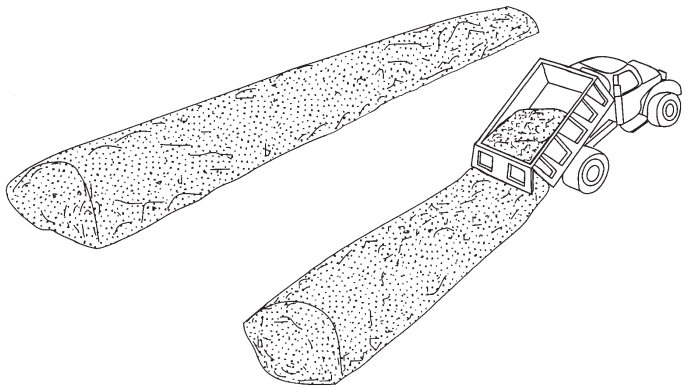


FIGURE 8. Building windrows with a dump truck. Source: NRAES-114

Compost Turning

Compost "turning" is the physical manipulation of a pile to restore porosity and homogenize ingredients. Turning is typically done either with a pitchfork (for small piles), a manure spreader (Figure 7), a "skid-steer" or bucket loader (Figure 9), or a compost turner (Figure 11) specifically designed to mix and aerate large volumes of ingredients in a single pass. Since turning is so critical to maintaining sufficient aeration and producing quality compost, even if a farm doesn't own its own turning equipment, it can often be borrowed, cooperatively owned, rented or contracted.

Only 3 to 4 turns over a 2 to 3 month period (i.e. about once or twice per month) is typically needed to complete the active composting phase if the compost pile is maintained at the proper moisture content. After the initial heating process has begun, these turns should ideally be done before the internal pile temperature drops below 100° F.

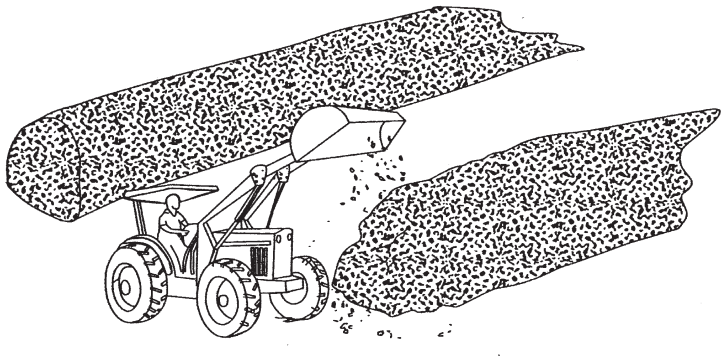


FIGURE 9. Building or turning windrows with a bucket loader. Source: NRAES-114

Winter and Wet Weather Composting Considerations

While compost piles or windrows can be built any time there's access to the compost site, in regions that experience extended periods of deep snow, freezing temperatures, or wet weather, there are a few additional considerations:

1. When access to a compost site becomes restricted due to wet weather or deep snow, an alternative gravel or concrete manure stacking or composting area may be needed.
2. Unless a pile is excessively dry and needs the additional moisture, it should not be turned if covered with snow.
3. During excessively wet, cold, or snowy seasons, both raw manure and unfinished compost can simply be left in stockpiles or windrows until the weather improves. As needed, these stockpiles or windrows should also be protected from excessive rainfall.

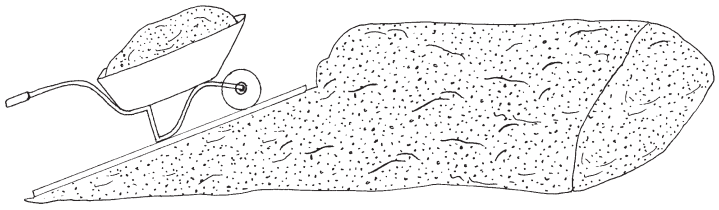


FIGURE 10. Building windrows with a wheelbarrow and ramp.

Monitoring the Compost Process

As a dynamic process, compost piles should be monitored to assess the need for turning and moisture control. More frequent monitoring may be necessary for novice composters—for example, every five to ten days during the early stages of the compost process. If the compost is to be used by a certified organic farm, monitoring and turning records have to be maintained to show that an approved turning schedule was followed. Specific compost monitoring parameters include:

Moisture

The ingredients of a pile with adequate moisture will have the feel of a damp (but not dripping wet) sponge. Excessive moisture conditions will be characterized by a saturated texture and unpleasant odors inside the pile and leachate around its base. Corrective actions for excess moisture include covering the pile with a tarp or specialized compost cover during wet weather and/or turning the pile during dry weather to increase evaporation.

Temperature

Ideally, temperature should be measured with a digital or a dial-type (non-mercury) compost thermometer which is at least 18 inches long. Sustained temperatures of 120 to 155° F in the pile interior are an indication of optimum decomposition and pathogen reduction. On the other hand, temperatures above 160° F may indicate insufficient moisture. To increase the moisture content of a dry pile, water has to be added and the pile turned. A compost pile whose temperature never goes above 100° F may not have enough oxygen due to settling, may be too wet, or conversely, too dry.

Odor and Physical Appearance

A well-managed active compost pile will shrink in height relatively quickly, and will have a slightly sweet, fermented aroma when opened. Conversely, a poorly managed pile will not decrease substantially in height, may emit an unpleasant odor, and will likely have weeds sprouting from its surface.

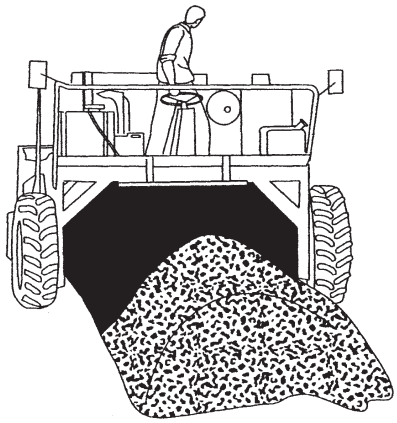


FIGURE 11. Turning windrows with a straddle-type compost turner. Source: NRAES-114

COMPOST PROCESS TROUBLE-SHOOTING

PROBLEM	*PROBABLE CAUSE*	*REMEDY*
Pile contains lots of fresh manure but won't heat up	1. Ingredients are too dry—cannot squeeze water from them 2. Ingredients are too wet—looks or feels soggy 3. Outside air temperature is too cold	1. Add water evenly throughout pile with drip tubing, sprinklers, or during turning 2. Apply compost covers to protect from additional rainfall and turn to aerate 3. Wait for warmer temperatures and turn pile as needed
Pile has heated up but is falling consistently over several days	1. Pile is settling, air flow is limited 2. Moisture has fallen below 50%	1. Turn pile 2. Add water evenly throughout pile with drip tubing, sprinklers, or during turning
Pile is extremely hot (>160 F.) and/or has a gray, ash-like mold	Ingredients are too dry	Add water evenly throughout pile with drip hose, sprinklers, and/or during turning
Pile has gone through two or more heating cycles but the finished compost still contains lots of undigested bedding	Wood shavings degrade very slowly—especially in nitrogen-limited materials such as horse manure	Ensure that the pile is moist, add water if needed, and give the ingredients more time to degrade. If desired, add some old compost to speed up the process. Semi-mature compost can also be used as mulch
Pile continually emits rotten—egg or putrid odor	Pile is too wet and has become "anaerobic" inside	Apply compost covers to protect from additional rainfall, reshape to shed rainfall, and/or turn to aerate and increase evaporation
Pile is on a sod base and the grass/sod is growing up into it along the base	The grass/sod next to the pile is simply taking advantage of the nutrients and moisture available in the pile	*Short Term:* Trim off enough of the bottom edge of the pile to remove the green vegetation and underlying roots. *Long Term:* Manipulate the pile width and placement to smother the sod. Do not cultivate or disturb the soil to re-expose underlying seeds.

Determining When the Compost is Done

Generally, with good management, the active (hot) composting phase should last from six to ten weeks. At this point the ingredients will not reheat after turning or adding water if dry. If the compost is to be tilled into the soil, it's recommended to let it "cure" for another 2 to 6 months. During this curing period, large woody particles have more time to break down and lower temperature compost organisms (e.g. mesophilic bacteria, fungi, earthworms, etc) can reestablish themselves. In addition, any remaining ammonia nitrogen is converted to nitrate nitrogen and any phytotoxic compounds that may have formed during the process will be degraded.

Characteristics of Mature Compost

Mature compost will have a pleasant earthy aroma and there will be minimal amounts of recognizable ingredients (e.g. wood shavings, hay, etc.). In addition, any recognizable ingredients that can be found should easily tear or fall apart when handled.

Protecting Finished Compost

To prevent leachate and associated soluble nutrient loss, to maintain optimum aeration, and to avoid excessive moisture inputs during curing or storage, the finished compost should ideally also be protected from snowmelt and rainfall under a roof, tarp, or compost cover. A tarp or compost cover will also help prevent reintroduction of windblown weed seeds.

Application Rates and Methods

On average, compost made from horse manure may contain as much as 1.5% nitrogen (by dry weight), 1% phosphorus (P), 1% potassium (K), in addition to various micronutrients. In a typical agricultural setting, compost application rates can be as much as 40 to 60 tons/acre on low fertility soils to as little as 10 tons/acre on more fertile soils. In more intensive cropping systems or in home gardens, application rates can be as much as 100 tons/acre (or 270 cu. yd/acre) which would be a layer of compost approximately 2" thick. After determining the nutrient and organic matter content of your soils and compost, assistance in determining compost application rates can be obtained from the NRCS and UVM Extension.

Containing nutrients that have been biologically stabilized, compost can be applied in the spring, summer, or fall, either by mechanical cultivation or by being left on the surface for incorporation into the soil profile by earthworms and other soil organisms.

Appendix A – RESOURCES

USDA Natural Resources Conservation Service
State Office: 69 Union Street
Winooski, VT 05404
802-951-6796; www.vt.nrcs.usda.gov; www.nrcs.usda.gov (for offices in other states)

For additional copies of this composting guide and Conservation Practice Standards as well as design and other technical assistance related to manure storage facilities, barnyards, and compost pads.

Vermont Department of Agriculture
116 State St., Drawer 20
Montpelier, VT 05620-2901
802-828-2431 www.state.vt.us/agric

For additional copies of this composting guide and Accepted Agricultural Practices (AAP's) related to manure storage, handling, and application in Vermont.

Vermont Agency of Natural Resources
Compost Center
DEC-WM, 103 S. Main St, West Bldg.
Waterbury, VT 05671-0404
802-241-3448; Vicky.Viens@anrmail.anr.state.vt.us;
www.anr.state.vt.us/compost

Provides general information regarding composting of solid waste including permitting of farms wanting to compost food and yard waste accepted from off-site sources

UVM Extension
691 Main Street
Burlington, VT 05405
802-656-5433; www.uvm.edu/extension

Workshops and seminars on equine health and pasture management. Soil testing lab as well as assistance in determining compost application rates.

Natural Resource, Agriculture & Engineering Service (NRAES)
Cooperative Extension
152 Riley-Robb Hall
Ithaca, NY 14853-5701
607-255-7654; www.NRAES.ORG
e-mail: NRAES@CORNELL.EDU

Numerous publications on-farm composting, manure management, and other sustainable agricultural practices. Publisher of the "Field Guide to On-farm Composting (NRAES-114).

Champlain Valley Compost Co.
245 Ten Stones Cr.
Charlotte, VT 05445
Ph: 802-425-5556 web site: www.cvcompost.com;
e-mail: steven@cvcompost.com

Information and technical assistance related to on-farm composting. "Custom" composting services including pile building and compost turning (available only in Vermont, western New Hampshire, and NE New York state). Distributor of Compostex® compost covers and Drip-Net Windrow Watering System™.

Woods End Research Laboratory, Inc.
Box 1850, RD 2
Mt. Vernon Maine 04352
Ph: 207-293-2457; www.woodsend.org
E-mail: will@woodsend.org
Distributor of Solvita compost maturity test kit. Also provides laboratory analyses of soil and compost.

ReoTemp Instrument Corp.
11568b Sorrento Valley Rd., Suite 10
San Diego, CA 92121
619-481-7737, www.reotemp.com
E-mail; reotemp@reotemp.com

Sells compost thermometers

Ministry of Agriculture, British Columbia, Canada.
PO Box 9120, STN PROV GOV'T, Victoria, BC
V8W 9B4 , Canada. Ph: 250-387-1023; www.agf.gov.bc.ca.

"Environmental Guidelines for Horse Owners" contains very detailed information on fertilizer value of horse manure, prevention of water pollution, fate of nutrients in soil/root zone, and manure application rates. Complete data from tests on destruction of equine parasites through composting to be available August, 2002.

Appendix B - Vermont AAP's

VERMONT ACCEPTED AGRICULTURAL PRACTICE REGULATIONS (partial text)
Effective Date: June 29, 1995

LAW–REGULATIONS: This section not included here. Full text available from Vermont Department of Agriculture www.state.vt.us/agric.

INTRODUCTION: This section not included here.Full text available from Vermont Department of Agriculture www.state.vt.us/agric.

SECTION 1: GENERAL

1.1 Purpose
It is a policy of the State of Vermont to protect and maintain water quality by reducing agricultural nonpoint source pollution through implementation of Accepted Agricultural Practices.

1.2 Authority: 6 V.S.A. o4810, 10 V.S.A. o1021(f), and 10 V.S.A. oo1259 (f) and (i).

SECTION 2: DEFINITIONS

2.01 Buffer Zone means the area between the edge of cropland and the top of the bank of the adjoining water. The purpose of the buffer zone is to stabilize stream banks and to filter out sediments, nutrients and agricultural chemicals that would enter the adjoining water through either sheet flow or channelized runoff. The vegetation within the buffer zone shall be perennial vegetation. The type of vegetation shall be determined by the landowner.

2.02 Commissioner means the Commissioner of the Vermont Department of Agriculture, Food and Markets.

2.03 Concentrated Overland Flow, except where the runoff is generated principally by rainfall or snowmelt events, means silage runoff, manure runoff, and untreated milkhouse waste. Subject to the same qualification, it also means other surface runoff with sufficient velocity and flow to either detach or carry soil, manure or other nutrients.

2.04 Department means the Vermont Department of Agriculture, Food and Markets.

2.05 Discharge means the placing, depositing, or emission of any wastes directly or indirectly, into an injection well or into waters of the state.

2.06 Farming means:

(a) the cultivation or other use of land for growing food, fiber, Christmas trees, maple sap, or horticultural and orchard crops; or

(b) the raising, feeding or management of livestock, poultry, equines, fish or bees; or

(c) the operation of greenhouses; or

(d) the production of maple syrup; or

(e) the on-site storage, preparation and sale of agricultural products principally produced on the farm; or

(f) the on-site production of fuel or power from agricultural products or wastes produced on the farm.

2.07 Farm Structure a structure or structures as defined herein that is used by a person for agricultural production that meets one or more of the following:

(a) is used in connection with the sale of $1000 or more of agricultural products in a normal year; or

(b) is used in connection with the raising, feeding, and management of at least the following number of adult animals: four equines; five cattle or American bison; fifteen swine; fifteen goats; fifteen sheep; fifteen fallow deer; fifteen red deer; fifty turkeys; fifty geese; one-hundred laying hens; two-hundred and fifty broilers, pheasant, Chukar partridge, or Coturnix quail; three camelids; four ratites (ostriches, rheas, and emus); thirty rabbits; one hundred ducks; or one-thousand pounds of cultured trout; or

(c) is used by a farmer filing with the Internal Revenue Service a 1040 (F) income tax statement in at least one of the past two years; or

(d) is on a farm with a business and farm management plan approved by the Commissioner.

2.08 Floodway means the channel of a watercourse and adjacent land areas which are required to carry and discharge a one-hundred year flood within a regulated flood hazard area without substantially increasing the flood heights. Floodways are depicted on the National Flood Insurance Maps on file with the Town Clerk.

2.09 Floodplain means the land in the community subject to a one percent or greater chance of flooding in any given year. The area may be designated as Zone A on the National Flood Insurance Program maps.

2.10 Intermittent Waters means waters of the state where the presence of water is not continuous and may occur periodically and infrequently such as during and immediately following a rain event.

2.11 Livestock, for purposes of this regulation means: cattle, sheep, goats, equines, fallow deer, red deer, American bison, swine, poultry, pheasant, Chukar partridge, Coturnix quail, camelids, ratites (ostriches, rheas, and emus), and cultured trout propagated by commercial trout farms.

2.12 Nonpoint Source Pollution means wastes that reach the waters of the state via indirect discharge in a diffuse manner as a result of agricultural practices.

2.13 Person means:

(a) an individual, partnership, corporation, association, unincorporated organization, trust or other legal or commercial entity, including a joint venture or affiliated ownership; or

(b) a municipality or state agency; or

(c) individuals and entities affiliated with each other for profit, consideration or any other beneficial interest derived from agricultural land management.

2.14 Pesticides are any substance produced, distributed or used for preventing, destroying, or repelling any insects, rodents, nematodes, fungi, weeds, or other forms of plant or animal life or viruses, except viruses on or in living humans or other animals, which the Commissioner shall declare to be a pest or any substance produced, distributed or used as a plant regulator, defoliant or desiccant.

2.15 Wastes are defined as sediments, minerals including heavy metals, plant nutrients, pesticides, organic wastes (including livestock waste and crop debris), waste oils, pathogenic bacteria and viruses, thermal pollution, silage runoff, and any other waste compound or material which is determined by the Commissioner or the secretary to be harmful to the waters of the State, or other wastes as defined in 10 V.S.A. Section 1251 (12).

2.16 Secretary means the secretary of the Vermont Agency of Natural Resources, or his or her designated representative.

2.17 Shallow well means a well that is not a drilled well.

2.18 Structure means a silo, a building for housing livestock, raising horticultural or agronomic plants, or for carrying out other accepted agricultural practices as defined in Section 3.2 of these rules. It also means a barnyard or waste management system, either of which is created from an assembly of materials, but excludes a dwelling for human habitation.

2.19 Waters and Waters of the State include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the state or any portion of it.

SECTION 3: ACCEPTED AGRICULTURAL PRACTICES

3.1 Persons engaged in agricultural operations who follow the agricultural practices as defined in Section 3.2 of these rules and who comply with the conditions and restrictions contained in Section 4 shall be presumed to be pursuing Accepted Agricultural Practices.

3.2 Agricultural practices that are governed by these regulations include, but are not limited to, the following:

(a) The confinement, feeding, fencing, and watering of livestock.

(b) The handling of livestock wastes and by-products.

(c) The collection of maple sap and production of maple syrup.

(d) The preparation, tilling, fertilization, planting, protection, irrigation and harvesting of crops.

(e) The ditching and subsurface drainage of farm fields and the construction of farm ponds.

(f) The stabilization of farm field streambanks constructed in accordance with the United States Department of Agriculture Natural Resources Conservation Service standards and specifications or other standards approved by the Commissioner.

(g) The construction and maintenance of farm structures in accordance with Federal Flood Insurance Management Program standards. The construction and maintenance of farm ponds, farm roads, walls, fences, structures to control the grade and head cutting in natural or artificial channels, and an irrigation, drainage or other water management system that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation.

(h) The on-site production of fuel or power from agricultural products produced on the farm.

(i) The on-site storage, preparation and sale of agricultural products principally produced on the farm.

(j) The on-site storage of agricultural inputs including, but not limited to, lime, fertilizer and pesticides.

SECTION 4: ACCEPTED AGRICULTURAL PRACTICE CONDITIONS AND RESTRICTIONS

4.01 Discharges

(a) Agricultural operations shall not create any direct discharge of wastes into the surface waters or groundwater of the State from a discrete conveyance such as, but not limited to, a pipe, ditch, or conduit without a permit from the secretary.

(b) Agricultural operations shall not create a concentrated overland flow of wastes into the adjoining waters of the state.

(c) Barnyards, manure storage lagoons or animal holding areas shall be managed or controlled to avoid discharge of manure runoff to adjoining waters of the state or across property boundaries.

(d) Manure shall not be stacked on fields if such stacking can create a concentrated overland flow of manure runoff into surface waters.

4.02 Nutrient and Pesticide Storage

(a) Manure, fertilizer, and pesticide storage structures shall not be constructed within a floodway area as presented on National Flood Insurance Maps on file with Town Clerks. Such structures may be constructed outside this area yet within the 100-year floodplain when adequately protected from inundation and floodwater damage.

(b) All manure, fertilizer, and pesticide storage structures constructed within a floodplain must conform to National Flood Insurance Program Standards.

(c) Field stacking of manure, fertilizer, or other nutrient sources shall not occur within 100 feet of neighbors' shallow wells or springs unless the farmer can demonstrate to the Commissioner that there is no practicable alternative site.

(d) Stacking or storage of manure shall not occur on lands subject to annual overflow from adjacent waters unless the farmer can demonstrate to the Commissioner that no suitable alternative sites exist.

4.03 Nutrient and Pesticide Application

(a) All sources of nutrients shall be considered when determining recommendations for crops. Nutrient applications shall be based on one or more of the following considerations: leaf analysis, soil testing, manure testing, current recommendations from generally recognized sources such as universities, crop consultants, agricultural professionals, or a nutrient management plan for the farm approved by the Commissioner.

(b) Manure spread on row crop land that is subject to annual overflow from adjacent waters of the state shall be incorporated within 48 hours. This regulation shall not apply to no-till land and land planted to cover crop.

(c) Manure shall not be spread between December 15 and April 1 unless the Commissioner grants an exemption because of an emergency situation, such as, but not limited to, the structural failure of a manure storage system. In granting an exemption, the Commissioner shall determine that the manure will be spread on fields with the least likelihood of generating runoff to the adjoining waters. Receiving a waiver does not exempt persons from complying with the Vermont Water Quality Standards.

(d) Pesticides shall be used in accordance with Title 6 V.S.A. Chapter 87 Control of Pesticides and all regulations promulgated thereunder.

(e) Fertigation and chemigation equipment shall be operated only with an adequate anti-siphon device between the system and the water source.

4.04 Soil Cultivation

Cropland shall be cultivated in such a manner that results in an average soil loss less than or equal to two times the soil loss tolerance for the prevalent soil as calculated through application of the Universal Soil Loss Equation, or through the application of similarly accepted models.

4.05 Agricultural Waste Management

All agricultural wastes including, but not limited to, chemicals, petroleum products, containers, and carcasses shall be properly stored, handled and disposed of, so as to eliminate adverse water quality impacts.

4.06 Vegetative Buffer Zones

Except along intermittent waters such as those occurring in row crop lands or along drainage ditches, a buffer zone of perennial vegetation shall be maintained between the row crop land and the top of the bank of adjoining waters in order to filter out sediments, nutrients and agricultural chemicals and to protect the waters from erosion of streambanks due to excessive tillage. Adjoining waters shall be buffered from row crop lands by at least 25 feet of perennial vegetation where ordinary rainfall events enter adjoining waters by sheetflow runoff and by at least 50 feet of perennial vegetation where ordinary rainfall events enter adjoining waters by channelized runoff. Tillage shall not be performed in a buffer zone except to establish or maintain the buffer.

4.07 Construction of Farm Structures

(a) Prior to construction, the farmer must notify the zoning administrator or the town clerk in writing of the proposed construction activity. The notification must contain a sketch of the proposed structure including the setbacks from adjoining property lines and road right-of-ways.

(b) Local setbacks established by the municipality shall be maintained unless upon written petition of the farmer the Commissioner has approved other reasonable setbacks for the specific farm structure being constructed or maintained.

(c) New structures that are not additions to existing farm structures associated with farm operations shall be constructed so that a minimum distance of 50 feet is maintained between the top of the bank of the adjoining waters and the farm structure. Such structures do not include those for irrigation, drainage or fencing. [Top of Regulations].

SECTION 5: ENFORCEMENT: text not included here. Full text available from Vermont Department of Agriculture www.state.vt.us/agric.