

Unit 1.7

Making and Using Compost – Garden-Scale Demonstration & Photos of Field- Scale Operation



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Garden-Scale Compost Production

Successful composting requires creating the right environmental conditions for decomposers to function optimally. Key conditions include:

- Carbon-to-nitrogen (C:N) ratio of materials, ideally 25–30:1
- Moisture
- Aeration
- Surface area of compost materials
- Volume of compost pile
- Turning and trouble-shooting



Compost includes “green” or nitrogenous materials with a low C:N ratio.



Use greens when fresh. If necessary, make a concentric pile of greens; tarp to preserve N and use as soon as possible.



Wet kitchen waste is another good nitrogen source for a compost pile.



Green materials should be mixed with “brown” or carbonaceous materials (e.g., straw, stable bedding) that have a high C:N ratio.

C:N Ratios of Carbonaceous Materials

Note that there is a wide range of C:N ratios in carbonaceous materials, e.g.:

- wood chips, as high as 400:1
- straw 70:1
- brown leaves 40:1

Materials high in carbon can be stored easily to use later (e.g., store brown leaves or straw stubble from fall to mix with the abundance of greens in the spring). These bulky materials provide aeration in a pile.

Particle Size

Shredding or chopping materials, especially large, woody stalks, will speed the composting process

- The greater the surface area to volume ratio, the faster the rate of potential decomposition. Decomposers work on surfaces, so the more surface exposed, the more decomposers can work.
- Compaction can occur if particle size is too small, and material is wet and nitrogenous (e.g., all lawn clippings), leading to loss of aeration and anaerobic conditions
- Layering sequence and thickness can be adjusted to avoid compaction and maintain aeration; alternate large with small particle sizes



A sharp machete or spade can be used to chop compost materials into smaller pieces for a garden-scale pile.



A minimum base of 5' x 5' is recommended; smaller piles will take longer to heat up and decompose. Loosen the soil and include bulky materials in the base layer to reduce compaction.

Layering Materials

For smaller, hand-built piles, layering is a good way to estimate proportions and “homogenize” the pile. Thin layers are recommended to put the diversity of ingredients in closer proximity.

The aim here is to meet all necessary criteria: C:N ratio (ideally 25–30:1, so more “browns” than “greens”), water content, oxygen content, and particle size uniformly throughout the pile.

Examples of proportions, by volume:

- 3 inches of fresh horse manure/bedding
- 3 inches of loose succulent greens
- 1/2 inch of loose oat straw (pre-wetted)



Build the pile with alternating layers of “greens” and “browns.” Try and make each layer uniformly thick.

Moisture

Moisture content in compost pile should be 50%–60% (moist as a wrung-out sponge)

- Add water as pile is built, watering dry layers especially. More water should be put on layers in top half of pile, as much will trickle down (apply approximately two-thirds in top half, one-third in bottom half).
- Excess moisture will cause compaction and loss of air (you shouldn't be able to squeeze water out of compost). Compost organisms need moisture, but also need oxygen to survive.
- Insufficient moisture will cause a pile to decompose slowly

If you're going to turn a pile frequently, you can add more water as you turn



Add water to dry materials as you build the pile. You can also “pre-wet” very dry materials, such as wood chips, before adding them to the pile.





As you add materials, try and keep each layer of even thickness and the pile square, rather than haystack-shaped.



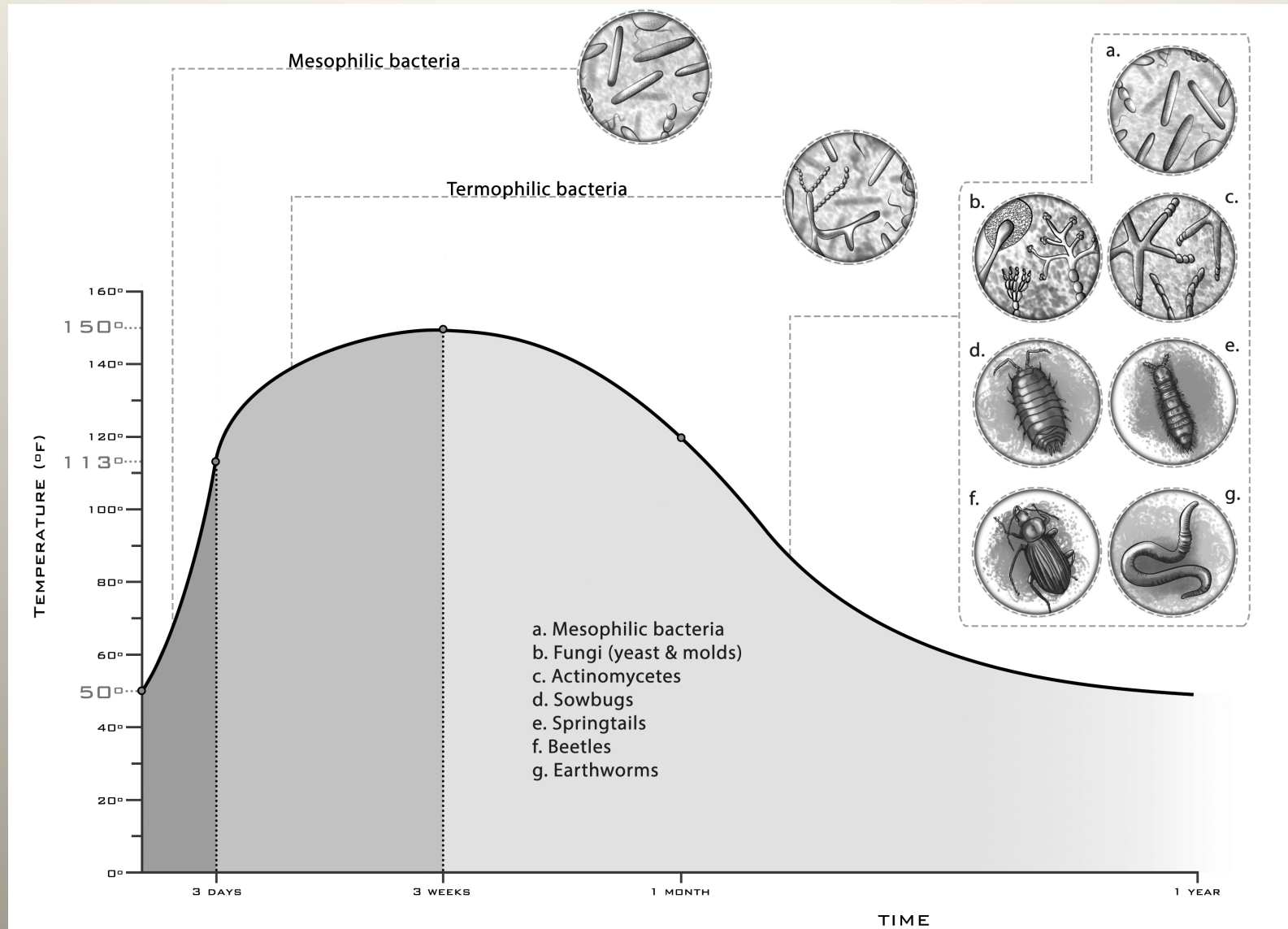
Use a long-handled fork to scratch or “cinch” a new layer into the layer below to slightly mix the layers differing in C:N ratios.



Maximum height and width of the pile should be 6 feet so as not to limit aeration or increase compaction; air does not move more than 3–4 feet into a static pile. Piles can be any length.



A well-made pile will quickly heat to 130–150°F for 10 days to 3 weeks. Turn the pile if it reaches 150°. Lower heat piles will compost with time.



As the compost pile heats and then cools, micro- and macro-organisms break down the compost materials via enzymatic (chemical) and physical actions.



A compost pile at 3 months.



A compost pile at 10 months.



Finished compost.



Finished compost: dark, earthy smelling, and slightly greasy to the touch.

Farm-Scale Compost Production

Making compost at a larger scale requires –

- A dedicated space for feedstock delivery and windrowing
- A dedicated water source
- A regular supply of quality feedstock
- Adequate equipment for moving feedstock and turning windrows
- Labor and knowledge to produce a quality product
- Adherence to National Organic Program regulations (for organic operations) and local health and safety regulations



Feedstock can include culls and other on-farm waste materials.



Manure from livestock operations can be used in compost.



A compost turner is used to turn and aerate the windrows.



Water is added to the pile as it is turned.



View of windrowed compost nearing maturity.