



Bernalillo County Extension Master Composter Program is based in Albuquerque, New Mexico

Composting in the Desert

What Makes Composting in the Desert Especially Challenging?

Abundant sunshine, intense ultraviolet summer radiation levels, low humidity, frequent winds, and limited precipitation are defining characteristics of a desert climate, and they each contribute to rapid evaporation of any moisture in or on the ground. Drought conditions increase the problem. Moisture is required for the decomposition of organic material. Controlling evaporation in order to keep composting material damp is the biggest challenge in the desert and requires uniquely context-specific approaches?

Why Compost?

Soil amendment: compost added to soil improves water retention and absorption, as well as improving fertility and resilience

Resource conservation: convert organic waste to compost

Reduction of landfill volume: organic waste used for compost does not end up in the landfill

Environmental protection: Food sent to the landfill produces methane gas, a contributor to global warming

Overview

The formula for successful compost production is

Water + Air + Nitrogen + Carbon + Time = Finished Compost

Moisture: The pile should be maintained at a 50% moisture level, similar to the moisture in a wrung-out sponge, throughout the decomposition process. Leaves should glisten with a film of water, but not drip. A bin with a limited number of air holes, placed in the shade during the summer and covered, will reduce evaporation. The contents may be watered as necessary to maintain moisture level.

Aeration: In desert composting it is necessary to modify the pile's exposure to air to prevent rapid evaporation. A dry pile ends the microbial activity that is the cause of decomposition. Regulate air flow by reducing the number of air holes in plastic bins, or by lining wire or wooden bins with plastic or cardboard and covering them. Bulking material should be added as the pile is built. Bulking moderates compaction of wet materials and provides spaces for air flow, compensating for the reduction in air holes. Air moves from the base of the pile, flowing upward through the layers. (see figure, page 6)

Examples of bulking materials: *corn cobs and chopped stalks, thumb-sized sticks and twigs, pine cones, tree bark.*

Carbon and Nitrogen Ingredients: In the context of home composting, organic material refers to plant and animal products that were once alive. Most organic materials contain the elements carbon and nitrogen in differing ratios. The term "browns" is used to refer to materials with a high carbon content because they tend to be brown in color. Likewise the term "greens" is used for high nitrogen content materials.

Carbon combined with nitrogen supports proliferation of micro-organisms which break down organic matter. Nitrogen (greens) is necessary for microbial reproduction and carbon (browns) is a food (energy) source.

Variables: *Size:* the smaller the pieces of material, the more rapidly they will decompose;

Carbon-to-nitrogen mix varies by the composting method used; approximate mix guide is to add 2 parts carbon material to 1 part nitrogen material by weight;

Temperature within the composting setup influences microbial action; “cold” or static piles will produce finished compost more slowly than “hot” or thermophilic piles;

End Result: Successful production results in finished compost ready for use in your garden.

Examples of “greens” Nitrogen Materials	green leaves, grass, trimmings	alfalfa pellets
	coffee grounds	tea and tea bags
	food scraps	vegetarian animal manures
	hair, fur, feathers	crushed egg shells
	leather	leftover dry pet food
	blood or bone meal	
Examples of “Browns” Carbon Materials	dried leaves, plants, grass	straw
	nut shells, corncobs	dryer lint
	used paper towels, napkins, tissues	pine cones and needles
	vacuum contents	shredded paper
	natural fibers, felt, cotton, burlap, wool, rope, string	untreated wood, bark, chips, sawdust

Location: The pile or bin should be:

- conveniently located
- on the ground
- near a water source
- in an area shaded from summer sun

Avoid: dairy products, meat/fish, fats & oils, pet manures, glossy paper, ash, pig manure, pesticides, herbicides, vermicides, fungicides, glass, plastic, styrofoam, glossy or waxed paper.

Composting Methods

Cold/Easy Composting

This method uses a process of continuous additions of organic materials over time. It may also be referred to as: dump-and-run, or slow/static composting. The pile can be managed actively or remain static.

Carbon to Nitrogen Mix: Carbon-to-nitrogen ratio is important, but exact proportions are not required. Any organic material on hand may be moisturized and added at the discretion and convenience of the individual composter.

Size & Containment: sizes vary from small up to 5'x5'x5', however larger piles can become compacted, leading to anaerobic conditions. Containment can be: pit, trench, layered sheet, open pile (covered), container/bin.

Cold Pile Construction:

- Begin the pile with a 6"-8" layer of bulking material.
- Chop/shred materials.
- Soak any dry organic material in water to approximate 50% moisture. Mix in any nitrogenous materials, and begin a 6" layer of this organic fill.
- Cover the pile with plastic or other non-porous material, cardboard, or old rugs to limit evaporation.
- Add moisturized organic material as it becomes available.
- Add another 2-4" layer of bulking material after every 6" of fill.
- Sprinkle with water to maintain moisture level as needed.
- When finished compost has been created at the bottom of the pile, it should be harvested, then screened to remove bulking and pieces that have not decomposed.
- A cold pile may remain undisturbed as long as it is bulked and moisture is maintained at 50%. Turning and churning is not required and is the choice of the individual composter.

Temperature: Cold piles equilibrate with the ambient air temperature. If the pile temperature goes below 55 °F, microbial action will slow. Attempts to increase or preserve heat are not necessary.

Microbial Action: The environment of a cold pile often favors decomposers like fungi, molds, actinomycetes and those bacteria that appreciate cooler temperatures. Insects also eat the organic materials. Red composting worms may be added to the pile.

End Product: Finished compost amounting to 1/2 - 1/3 of original pile size will form in 6 - 12 months.

Hot/Intensive Composting

It may also be referred to as: dynamic, managed, fast, batch, or thermophilic composting. This is a batch method -- all materials are assembled and combined at once rather than adding materials over time. Microbes consume and break down carbohydrates, releasing energy in the form of heat. This heat is appreciable and sustained. The heat is intrinsic to the pile, not generated from external sources.

Carbon-to-Nitrogen Mix: A workable mixture is 2 parts carbon material to 1 part nitrogen material.

Size & Containment: From 3'x3'x3' - 5'x5'x5' bin with a limited number of air holes. Smaller bins do not sustain the temperature well. Larger piles can result in compaction of materials, leading to anaerobic conditions. Bins can be made of wood, straw bales, concrete blocks, lined plastic or wire mesh.



The New Zealand-style compost bin, adapted for the desert climate, at the Bernalillo County Extension Center in Albuquerque. Note plastic lining to reduce evaporation; the top will be covered as compostable material is added.

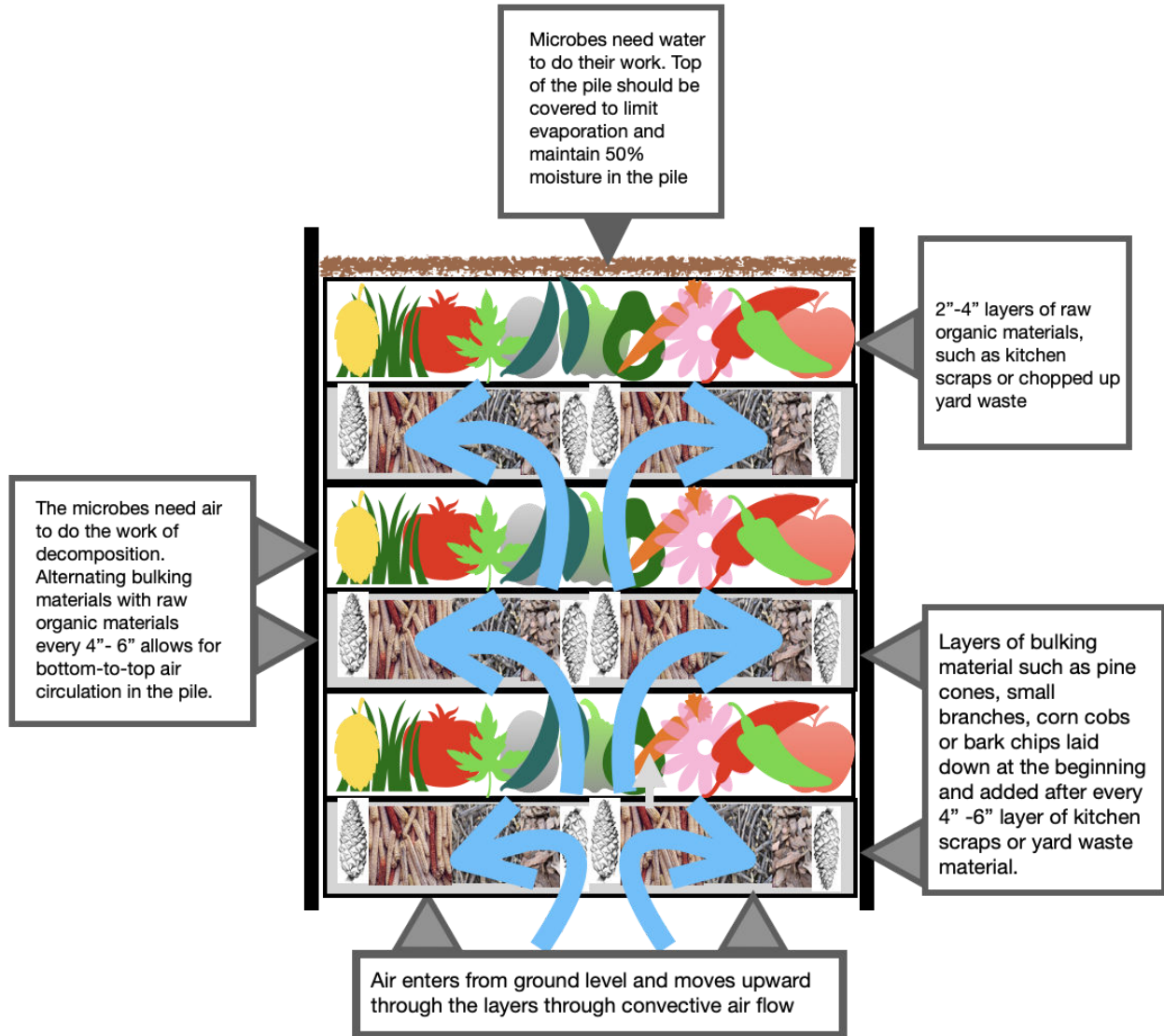
Hot Pile Construction:

- Place 6-12" of bulking material at the bottom of the bin.
- Chop/shred materials before using.
- Soak the browns in a wheelbarrow, then mix in the greens. (50% moisture level)
- Use about 6" of the mixture, then add 4" of bulking. Continue the layers until the bin is full.
- To limit evaporation, lightly cover the top of the pile with plastic or other non-porous material, cardboard, or old rugs.
- In 24 to 72 hours the pile will heat up as a result of microbial enzymatic activity. A temperature of 130° F is adequate, 150° is preferred, and should be sustained for several days. If a pile fails to heat sufficiently, it may be turned and more nitrogenous material added. Overheating may be controlled by turning and watering the pile.
- When the pile starts to cool down (about 7-14 days) then it should be turned, churned and watered to maintain 50% moisture. Ideally the top becomes the bottom (turning) and the sides become the insides (churning) so that all the material eventually becomes exposed to the high core temperature.
- The turned pile will heat up again. This turning process continues until everything except the bulking material has turned to finished compost.
- The end product of microbial decomposition. The rate of decomposition is variable; finished compost amounting to 1/2 to 1/3 of original pile size will form in 3 - 6 months.
- Screen the decomposed matter to remove bulking material. Then allow it to cure for 2-4 weeks. Do not allow the finished compost to dry out completely.



All steam! Always a rewarding testament to dedicated hot composting efforts!

Compost Pile Cross Section (Hot or Cold)



Summary

The hot, dry desert climate contributes to rapid evaporation. Decomposition of organic material to form the finished compost requires moisture. Composting techniques for desert living are all directed at decreasing evaporation.

- ✓ Use a containment system that moderates airflow to decrease evaporation. Bins made of wire or widely spaced wooden slats should be lined with plastic or cardboard. Tape over some of the air holes in commercial bins. Lightly cover the top of the pile or bin with plastic or other non-porous material, old rugs or cardboard.
- ✓ Add layers of bulking material between layers of fill material as the operation is built up. Bulking helps maintain spaces in the organic fill so that air can penetrate throughout. Bulk as you build. The bottom layer should be 6 – 8 inches thick and successive layers 2 – 4 inches thick. Bulking materials decompose more slowly and resist compression.
- ✓ Chop, shred and/or tear materials into small pieces before use.
- ✓ Presoak any dry organic material (such as leaves or paper) before adding it to a composting operation. Shred or break up dry materials and allow them to soak in a bucket or wheelbarrow to absorb moisture.
- ✓ Place the compost operation in the shade during hot months.
- ✓ Compost material containment method should allow for drainage.
- ✓ Add water as necessary.
- ✓ Hot piles need to be completely turned, mixed and watered at 7- to 14-day intervals until contents are completely decomposed.
- ✓ Cold piles may remain static (no turning) as long as bulking material is added regularly and 50% moisture is maintained.





Prepared by
B C E M C
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revised & reprinted 2023

Free public composting classes are posted at nmcomposters.org

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