The Compost Recipe

Bon Appétit

Four Ingredients

Carbon (browns)

- leaves
- woodchips
- straw

Nitrogen (greens)

- grass
- manure
- landscape trimmings

Water

Oxygen

Remember – the top reason for compost failure is too little moisture!

Composting

in Montana

Montana Department of Environmental Quality

Solid Waste Management

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Factors that will affect the compost process

All organic material will eventually decompose. The speed at which it decomposes depends on these factors:

1. **carbon to nitrogen ratio** of the material
2. amount of **surface area** exposed
3. **aeration**, or oxygen in the pile
4. **moisture** level in the mix
5. **temperatures** attained
6. **time** allowed for the process

1. Carbon to nitrogen ratio

The ratio should be roughly 30 parts carbon to 1 part nitrogen (30:1) by weight. The composting process slows if there is not enough nitrogen, and too much nitrogen may cause the generation of ammonia gas which can create unpleasant odors. Dry leaves, straw and wood chips are a good source of carbon; fresh grass, manures and blood meal are sources of nitrogen.

2. Surface area

Decomposition by microorganisms in the compost pile takes place on the particle surfaces. Increasing the surface area of the material to be composted can be done by chopping, shredding, mowing, or breaking up the material. The increased surface area means that the microorganisms multiply more quickly, are able to digest more, and generate more heat.

3. Aeration

Efficient decomposition can only occur if sufficient oxygen is present. However, the decomposition process itself depletes available oxygen. Aerating the compost replaces the oxygen. Effective methods to add oxygen include using equipment to turn the compost pile, and using a blower to force air through the pile. If the compost pile is not aerated properly the "active" stage will slow down and objectionable odors may develop.

4. Moisture

The compost pile should have a moisture content of 40-60 percent. If the moisture content falls below 40 percent the microbial activity will slow down or become dormant. When the moisture content exceeds 60 percent, aeration is hindered, nutrients are leached out, decomposition slows, and the odor from anaerobic decomposition is emitted. A pile that is too wet can be turned or can be corrected by adding dry materials.

5. Temperatures

Microorganisms generate heat as they digest organic material. A compost pile with temperatures between 90 – 150° F is composting efficiently. Higher temperatures will begin to kill off some of the beneficial organisms in the pile; turn to release heat. The process will inevitably slow during the winter months in cold climates, but re-heat in the spring. Some microorganisms like cool temperatures and will continue the decomposition process in cooler weather, though at a much slower pace.

6. Time

The composting process takes time. Different microorganisms populate the pile at different temperatures.

- During the psychrophilic stage the bacteria will begin to colonize and generate heat. This will take a few days.
- Once temperatures increase the mesophilic bacteria will take over – this will take a few more days depending on the weather, moisture, oxygen level, etc.
- The thermophilic stage may take from a few days to several weeks and allows the heat-loving bacteria that digest the more resistant fats, cellulose and proteins to thrive.
- Lastly, the compost will need to cure for up to several months.

West Yellowstone Compost Facility
Compost curing over the winter

Resources

Cornell University
Waste Management Institute
http://cwmi.css.cornell.edu/composting.htm

US Composting Council
http://compostingcouncil.org/

Biocycle Magazine
http://www.jgpress.com/

Washington State University
http://whatcom.wsu.edu/ag/compost/

Montana State University Extension
http://www.msuextension.org/ruralliving/

How to Compost.org
http://www.howtocompost.org/

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The correct C:N ratio, water, and air are the keys to successful compost!