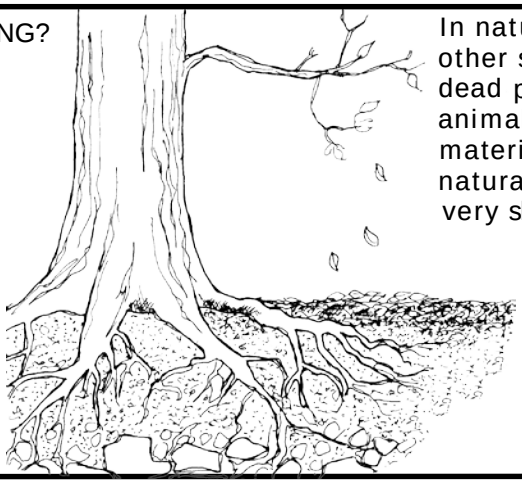
UNITED STATES BOTANIC GARDEN www.usbg.gov

COMPOSTING Science Page

WHAT IS COMPOSTING?

Composting is the controlled decay of plant and animal matter to produce compost—a dark, rich soil-like material. Compost can be added to soil to improve its structure and nutrient content.



In nature, bacteria, fungi, worms, and other soil organisms help to break down dead plants and animals, as well as animal wastes. The decomposed organic material becomes part of the soil. This natural decay process usually takes place very slowly.

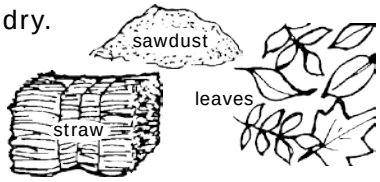
Leaves that fall to the forest floor slowly decay to form part of the organic matter in soil.

Composters create ideal growing conditions for compost organisms. This speeds up the natural decay process.

WHAT COMPOST ORGANISMS NEED

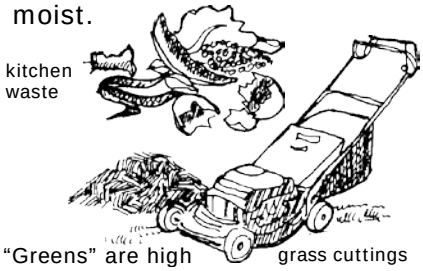
1. A balanced diet of compost materials

"Browns" are compost materials that are brown and dry.



"Browns" are high in carbon, which is energy food for microbes.

"Greens" are compost materials that are green and moist.

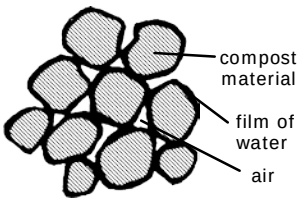


"Greens" are high in nitrogen, which microbes need to make proteins.

2. Just the right amount of air and water

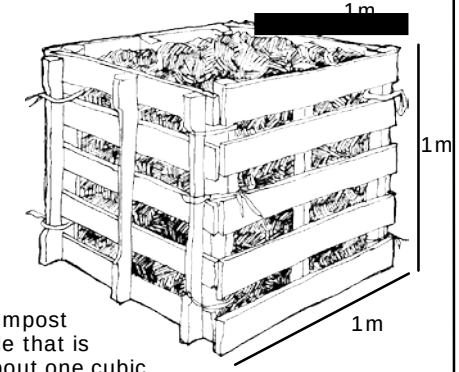
If there's the right amount of oxygen and moisture, microbes can rapidly grow and multiply. Too much—or too little—water, and microbes will die.

Compost materials should have a thin film of water around them, and lots of pore spaces filled with air.

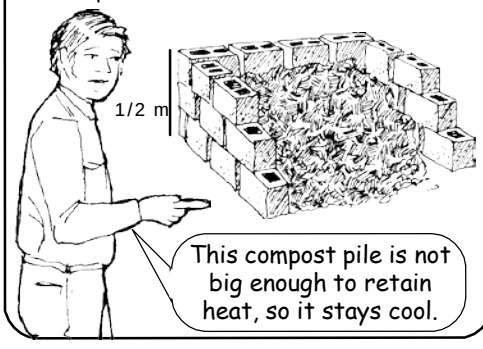


3. The right temperature

Organic materials will eventually decay, even in a cold compost pile. But the decay process is speeded up in a hot compost pile. When bacteria and fungi grow rapidly, they burn a lot of food, and give off a lot of heat. If the compost pile is big enough, the heat will build up inside the pile. Bacteria that grow well at high temperatures take over and speed up the decay process.



A compost pile that is about one cubic meter (1m x 1m x 1m) in size is big enough to hold in heat and warm up.



CIVI ECOLOGY LAB

Cornell University

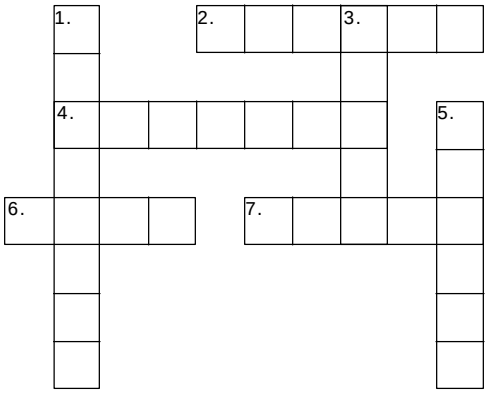
CROSSWORD PUZZLE

Across

2. Compost materials that are high in carbon.
4. Dark, rich, soil-like material.
6. A compost pile should be big enough so _____builds up inside it.
7. A balanced diet for microbes is about _____parts browns to one part greens.

Down

1. Microbes that help break down plant and animal matter.
3. Compost organisms need just the right amount of _____.
5. Compost materials that microbes use to make proteins.



TRY THIS

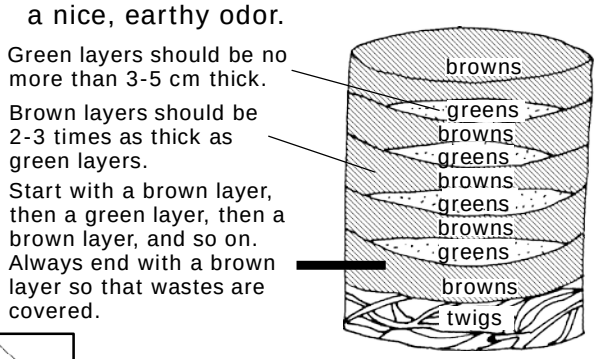
BUILD A COMPOST PILE

What you need

* 3-meter length of wire mesh fencing
* wire cutters
* twist ties
* compost materials
* duct tape

What to do

1. Choose a site to set up your compost bin. Try to find a shady, well-drained, level place that is convenient.
2. Snip off the fencing close to the cross wires and cover the sharp ends with duct tape to avoid getting scratched. Lap the ends of the fencing together and tie together with twist-ties to make a cylinder one meter high and one meter in diameter.
3. Put a layer of twigs in the bottom of the bin to help air to reach the center of the pile.
4. As you collect compost materials, layer them in the compost pile, as shown in the picture.
5. Stir or turn the compost every week or so to let in more air. To reach the compost, undo the twist-ties and open the fencing.
6. The length of time it takes for compost to be ready depends on many factors, such as weather conditions, the type of materials included, and the amount of turning. If you want your compost to be finished faster, keep it moist and turn it a couple of times a week. Finished compost is about one-third or less of its original size, dark brown, and has a nice, earthy odor.



SPOTLIGHT ON RESEARCH

Compost Can Help Control Plant Diseases

Recent research has shown that compost not only improves soil. It can also help to control plant diseases caused by fungi. Fungi that attack plants include molds, rusts, mildews, and smuts. They over-winter in the soil and in plant debris. When the weather is warm, they produce spores, which can be splashed or blown onto wet leaves. Then the spores can germinate and infect plants.

Scientists are testing different composts to find out what types are most effective at suppressing harmful fungi. In one study, a team of scientists tested different composts to see which one would be best for controlling fruit rot in pumpkins. Fruit rot is a serious problem that affects pumpkins, melon, squash, peppers, tomatoes, and eggplants. In greenhouse trials, scientists first screened composts made of several different materials. One product, made from brewery wastes, stood out as very effective. In the following year, the brewery waste compost was applied to two fields where fruit rot had been a big problem in the past. In one field, no disease occurred, and the growth and yield of pumpkins improved a great deal compared to untreated fields. In the other field, the brewery waste compost was not effective in suppressing fruit rot. Scientists think that perhaps there was just too much of the fruit rot fungi present. If brewery compost were added to this field for several more years, then the disease might be suppressed. Time will tell.

Source: Rangarajan, A., Tuttle McGrath, M., and Blomgren, T. (2001). Evaluation of two commercially available composts for managing phytophthora fruit rot of pumpkin. New York IPM Program, Cornell University, Ithaca, NY. <www.hort.cornell.edu/extension/commercial/vegetables/ online/2001veg/pdfs/text/IPMfinalreportPumpkins.pdf>

RIDDLE

Why did the gardener bury money in his compost pile?

Answer: Because he wanted his soil to be rich!