THE BIGGEST PUMPKIN EVER
by
Steven Kroll

On the first day/night that Clayton and Desmond began to care for the pumpkin, they watered and fertilized it. The best fertilizer is nature's compost which is formed during the biological process of leaves and grasses rotting. Compost releases an earthy smell similar to the odor you experience when you walk through the woods and disturb the ground cover.

A compost column can be made from 2-liter plastic beverage bottles and put in the corner of the classroom to be observed by your students during the year. In May or June, the compost column can be opened up and its contents examined. Compost columns will produce a liquid fertilizer called "compost tea" which will collect in Bottle #1 (see attached diagram). This fertilizer could be used on classroom plants the way Clayton and Desmond used the manure. Two identical plants could be purchased, but only one given "compost tea" to drink! Weekly observations and measurements of growth would show students if fertilizer from compost makes a difference,

MATERIALS: 3 2-liter soda bottles, 1 single-edge razor blade (used by teacher only) or sharp scissors, old panty-hose, rubber band, marking pen, scissors, duct tape, compost materials.

ACTIVITY: See attached article.

TEACHER NOTES: While working on this sabbatical project, I picked up some books from Titcomb's Books in East Sandwich, MA. I saw a copy of The Greatest Pumpkin Ever and told the booksellers how I link the story to composting. Edye Nesmith said the book makes a great puppet show. She said to get a green golf ball, a small pie pumpkin, a large pumpkin, and finally carve or purchase a jack-o-lantern. Use these props as well as two mice, if you can find them, and act out the story as you read it to the children.

SOURCE: Bottle Biology Resources Network, University of Wisconsin-Madison, 1630 Linden Drive, Madison, WI, (608) 263-5645.

STANDARDS:
BSL: 1.3, 1.4, 1.5, 1.10, 5.2, 11.2, 12.1, 12.2, 12.5
NCTM: 4d, 10d
SCS: A1, C1, C3, H2, H4

Kroll, Steven. The Biggest Pumpkin Ever. Houghton Mifflin Co., 1988. ISBN#0-590-41113-6.

Compost Column

Introduction

Composting, which is based on the biological process of decomposition, is a fascinating educational activity. When people make composting piles and bins of organic material, they encourage the natural process of rotting, and the result – compost – is a dark, earthy smelling, crumbly material that is the best natural fertilizer in the world. Composting returns organic wastes to the earth, recycling them for use by other forms of life.

What turns dead plants and animals into compost? Microscopic bacteria and fungi, which feed on dead tissue, are the chief agents. These organisms are everywhere – in the air, on the leaves of plants, and in the soil. Different kinds specialize in breaking down particular types of tissue, and certain varieties thrive early in the rotting process while others come along at the end to finish the job. Their activity releases a variety of nutrients, as well as water, gases and heat. How many different kinds and colors of fungi and bacteria can you see – and when do they appear – in your column?

What affects the composting process? The amount of moisture and air, temperature, light, source of bacteria and fungi, and the nature of the decomposing material are all critical. Soft banana peels and lettuce, for example, will rot and make compost many times faster than a piece of wood, under ordinary conditions. Old banana peels kept in the freezer, on the other hand, will decompose much more slowly than a piece of wood in a warm, moist place. How can you vary the conditions which affect your column?

The presence or absence of air (oxygen) is one of the most important factors in composting. Modern landfills seal garbage deep in the earth, excluding air and moisture, preventing microorganisms from doing their work. It is said that the newspapers we bury today in a landfill will still be readable 75 years from now. A paper bag may be more biodegradable than a plastic bag, but in a sealed landfill, neither will decompose fully for hundreds of years. The practice of composting, in contrast, allows air and moisture to speed the natural process of biodegradation. Making a composting column lets you see this process, and witness nature's world of recycling.

Making Your Own

The basic column design requires making a hollow cylinder that will hold the materials to be composted. It can be made from one or more empty soda bottles. An additional bottle is needed to hold the column upright, and to catch drippings. These instructions show how to make a two-bottle column.

Materials:

- Three 2-liter plastic beverage bottles
- Bottle Basics tools: marking pen, knife or razor blade, scissors, hot water, sharp needles for poking holes, clear tape, plastic electrical tape
- Netting or mesh fabric, rubber band
- Organic material for composting, such as kitchen scraps, leaves, newspapers, and grass clippings. Why might it be best to avoid materials of animal origin?

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Remove the bottle bases from two bottles, and the labels from all three. Cut them as illustrated, and assemble. Most columns will require air holes for ventilation, and these can be poked into the plastic with a sharp cold needle or with a needle heated in a candle flame. Alternatively, a larger hole can be cut into the sides with a knife and covered with a fine fabric mesh, held in place with tape. See page three for illustrations.

Explorations

The possibilities for compost column discoveries are endless. There is no limit to what can be put inside, or the conditions under which the column can be kept. In addition to simply observing changes, you can design experiments which explore the effects of variables on your column. Here are two ideas.

• Make two identical columns, and fill each with a known quantity of shredded newspaper. Use a bottle balance to determine the weight of the paper. On top of one column, add a handful of garden soil – which is naturally loaded with microorganisms. Pour equal amounts of rainwater into each column, and wait several hours for it to percolate through. If none comes out the bottom, add more in equal amounts until about a half cup drips into the base. Schedule a rain storm to occur in the column every few days. Which column decomposes faster and why?

• Compost columns can be used to produce a liquid fertilizer, called "Compost Tea". You might try making several columns with different contents, whose drippings are likely to differ in color and chemistry. Use this liquid to water and fertilize identical sets of seedlings to see which brand of "tea" induces the fastest growth. How much water should be poured through the column, how often will you recycle the drippings , and how often (if at all) should the column get new ingredients? Can you be sure that the 'tea" and not some other factor was responsible for the plant growth you observe?

Notes from the Field

• At the beginning of each school year, Ann Croal's first grade class makes a compost column which is continuously filled throughout the year. This year her kids named it "Mother Nature's Stew". Though she asks for contributions that would make good compost, both organic and inorganic ingredients get added. During the last week of school they spread out a plastic sheet and dump the remains, and the students root around with tongue depressors to see what's left. Lots of discussion occurs, of course, which Ann guides toward concepts of nature and human nature. She finds that this activity is especially intriguing in autumn, when the newly fallen leaves are beginning to decay. "What you see happening in nature", she says, "is what you're doing in the compost column."

(From Ann Croal, who teaches 1st grade in Madison, Wisconsin)

• In a science methods class at a university, 90 future elementary teachers each make a column which they take home to observe. Teams of four students each construct group columns as well, and these are left in the classroom for study. Throughout the semester, they make many discoveries – that overly large vent holes let the water leak out the sides, that the strong smells of the first few weeks *do* disappear, and that columns with non-biodegradable contents are boring to watch. Weekly observations are logged into a notebook in the classroom, to be read by all.

(This activity was developed by Betty Downs at the University of Wisconsin-Madison)

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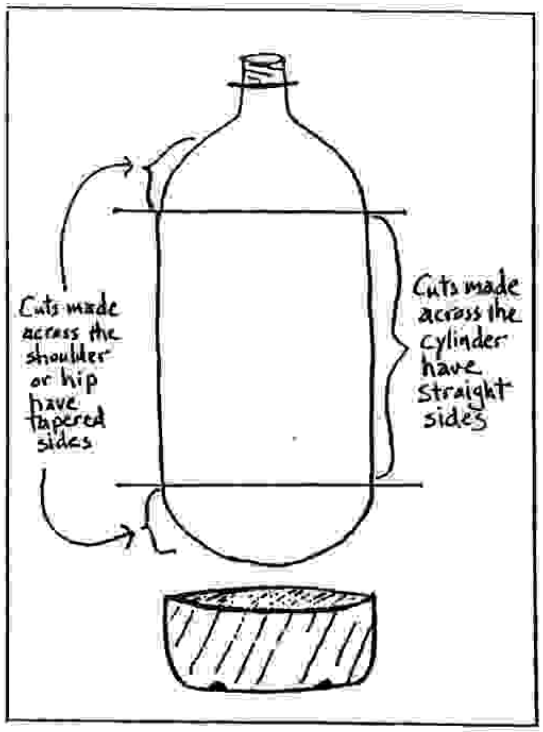
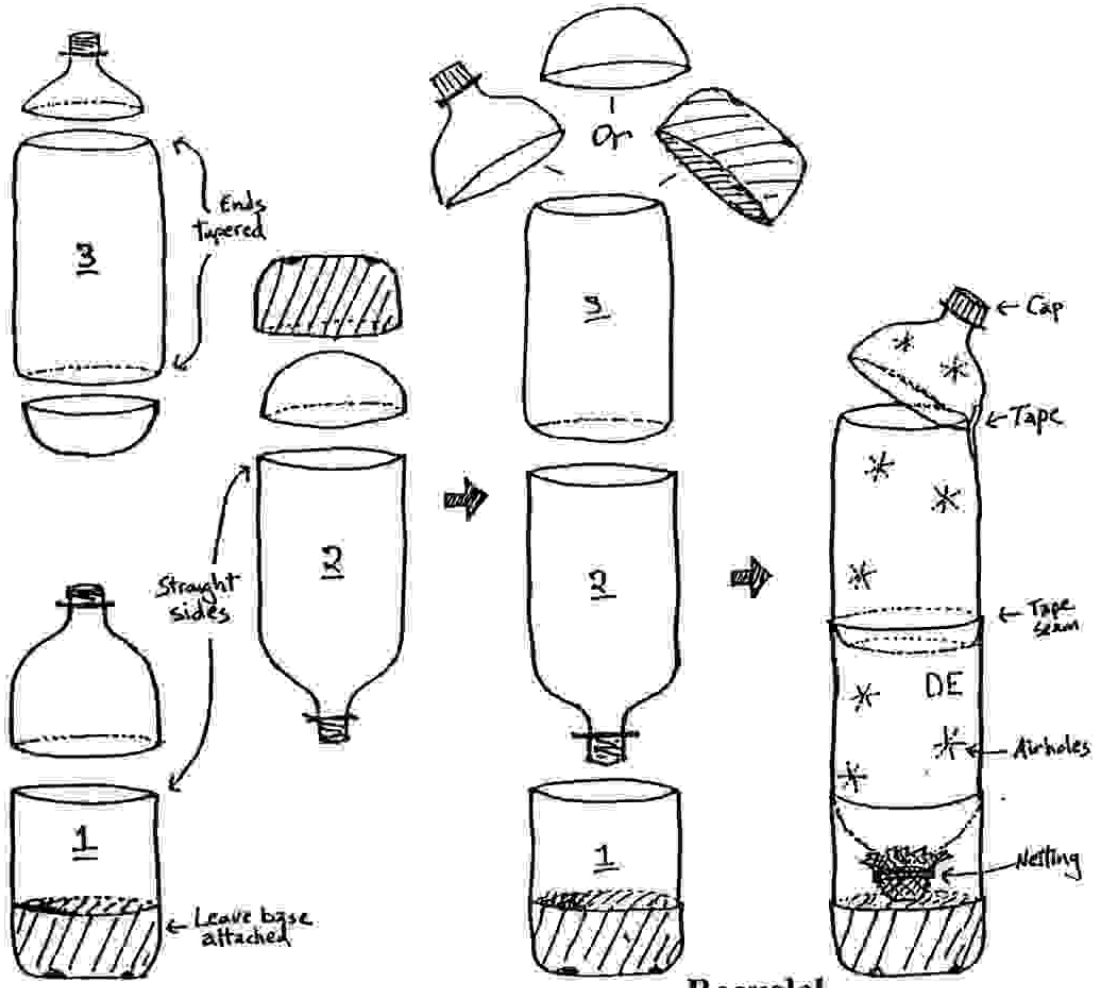
Compost Column (3-Bottle version)





Bottle Biology Resources Network

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Recycle!

All column components and unused parts are recyclable.

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