Biocolumn Composting

As your students grow Fast Plants, they will explore a plant's life cycle from germination, through growth and development, pollination and fertilization, to embryo and seed development. Each major stage allows students to observe the plant's ability to use nutrients in the soil, carbon dioxide from the air, and light energy to complete its cycle and produce seeds for the next generation. After your students have harvested seeds from the dried plants for storage and future planting, one more stage remains to fully understand the natural cycle.

The dried plants and potting mix in the quad cells are an important connecting link to the growth of future generations of plants in the web of life. In nature, leaves and plants return their nutrients to the soil by the process of *composting*. Microorganisms, mainly bacteria and fungi, and other larger organisms decompose the plant materials into a dark, granular compost (humus) with the pleasant odor of freshly turned soil. This compost provides essential nutrients for the next generation, helps retain soil moisture and aeration, feeds useful earthworms, and supports bacteria essential to nutrient recycling.

The dried Fast Plants debris and potting mix (with fertilizer) offer the ideal opportunity to explore decomposition and the recycling of nutrients in the ecosystem. Waste can be disposed of by chemical means (burning), physical means (landfill), or by biological means (composting). Composting is a method which returns the wastes to the earth in the form in which they can be effectively used. As your students explore composting they will understand the processes of *biological decomposition* and the importance of "biodegradable" products in our "use it once and toss it" economy.

A succession of organisms, each group breaking down biodegradable materials into a simpler and more usable material, is the heart of the composting process. As these organisms decompose plant and animal material, energy is released. The organisms use some of this *energy*, but much is lost as heat. This succession of organisms and conversion of waste materials to compost can be investigated in the classroom with a "compost column."

You will need the following materials to build and establish a compost column:

- dried Fast Plants and potting mix
- other plant and animal matter, food scraps, yard waste, paper, etc.
- 3 two-liter soda bottles of similar size and shape (same brand)
- scissors and razor blade
- Bunsen burner or propane torch and Pyrex test tube
- nylon stocking, electrical tape and rubber band
- water
- marking pen, paper

Procedure

1. Prepare a "compost column" from 2-liter bottles (see page 3). Use a razor blade or knife to start a cut after marking the bottle and then finish the cut with scissors.
2. Provide air holes in the column by heating a Pyrex test tube in a flame and poking holes in the plastic while the tube is hot. A small, sharp knife can also be used. When the plastic cools, use pieces of nylon stocking and electrical tape to screen the holes.
3. Secure a piece of nylon stocking over the bottle opening in the bottom of the column with a rubber band.
4. Place the dried Fast Plants and potting mix in the column along with grass clippings, food wastes, newspaper, etc.
5. Add just enough water to moisten the materials. No additional water should drain from the column.
6. Observe and record daily changes. Check the temperature of the column. Look for evidence of the succession of decay organisms. Observe the odor at each air hole. Periodically recycle any water the drains into the bottom of the column and/or add more water to keep the material moist. Oxygen and moisture are both necessary to promote aerobic decomposition.

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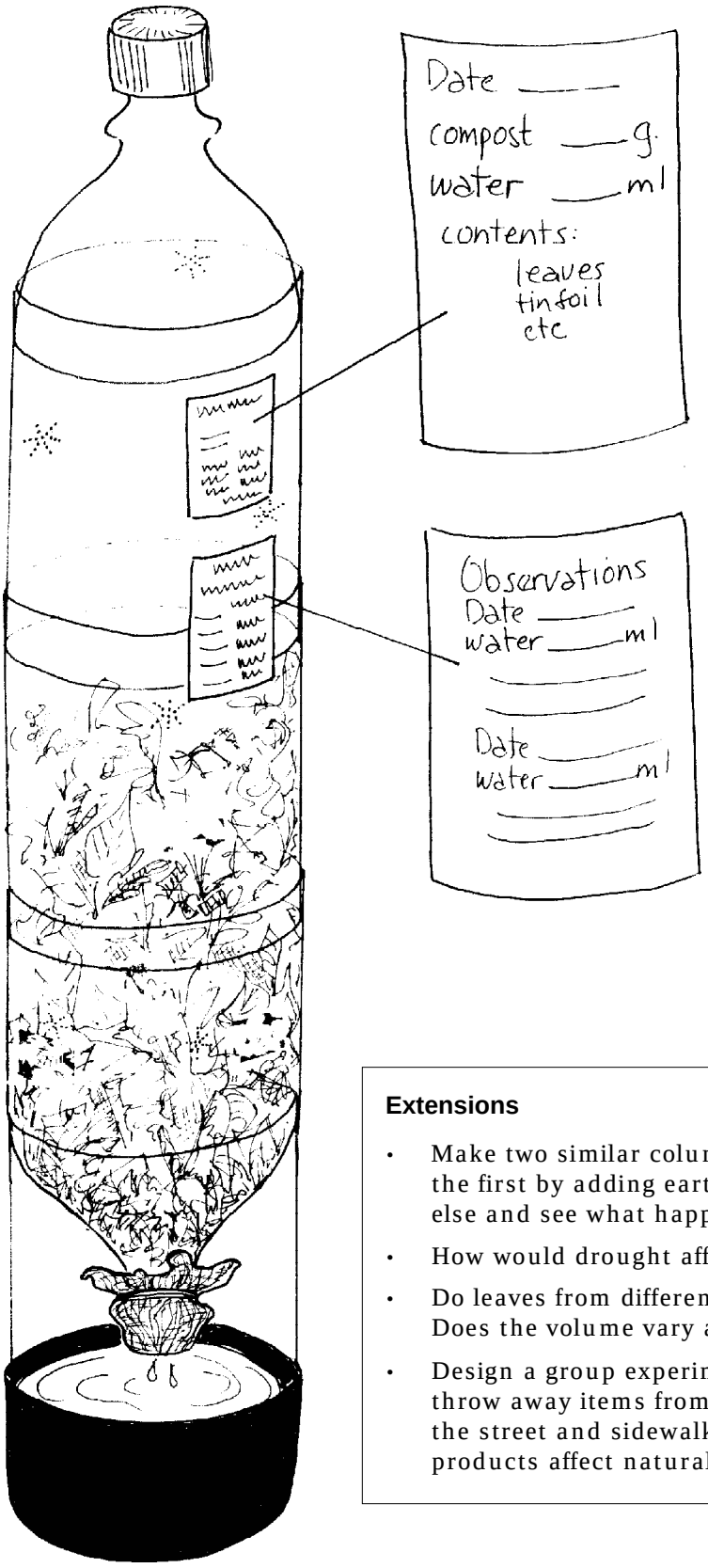


As bacteria attack the material the temperature in the interior of the column may increase. As days go by, fungi will appear. Various animals which physically decompose the wastes may also be observed in the column. These organisms will appear in succession as the food web is unveiled. Organisms which may be found in the column include mites, springtails, beetles, flies, sowbugs, snails, slugs, millipedes, centipedes, spiders and worms. Keep track of the appearance of these organisms in the column and construct a food web.

If you start your compost column in the fall, you will obtain a rich compost by spring. The nutrients in the waste materials will have been converted to forms ready to supply nutrients to plants. Try experimenting with your compost using Fast Plants. Compare plants grown with compost with those grown with the NPK fertilizer pellets.

Through the use of this simply constructed compost column, you and your students can explore the natural recycling of matter. In the recycling process, the previous generation of Fast Plants is linked with the growth of the next.

Extensions

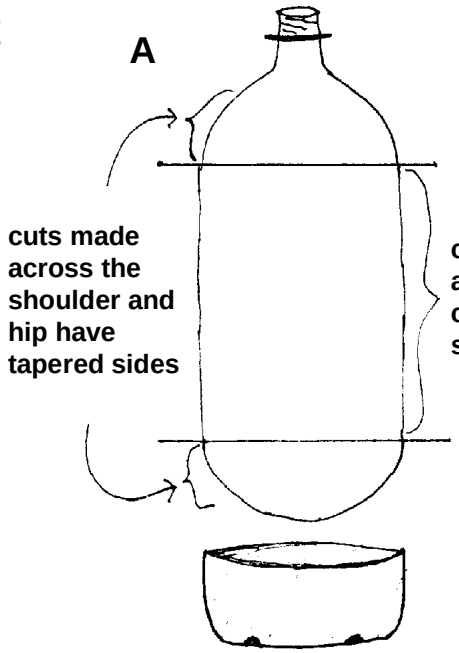
- Make two similar columns, then vary the second compared to the first by adding earth worms, 100 ml urine, or something else and see what happens.
- How would drought affect the composting process?
- Do leaves from different trees decompose at the same rate? Does the volume vary as they decompose?
- Design a group experiment with several biocolumns, e.g. with throw away items from the fast food trade, with litter from the street and sidewalk. How might some of these disposable products affect natural outdoor composting in the future?

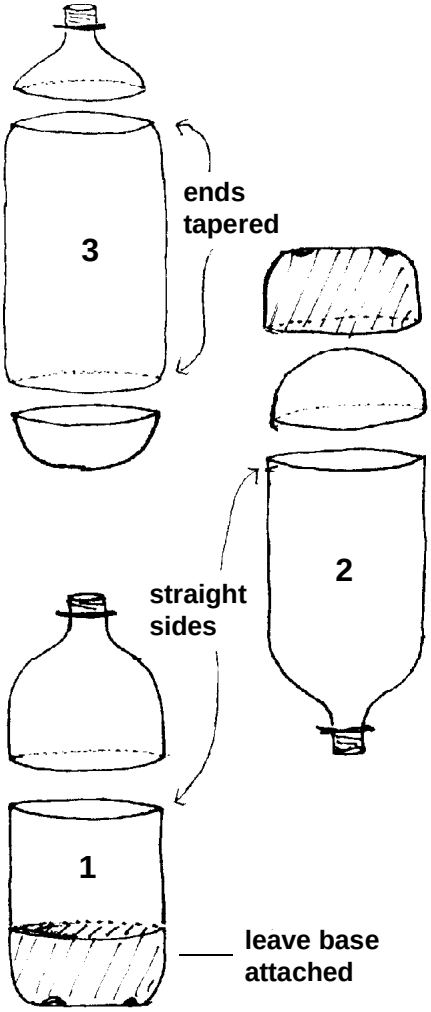
References

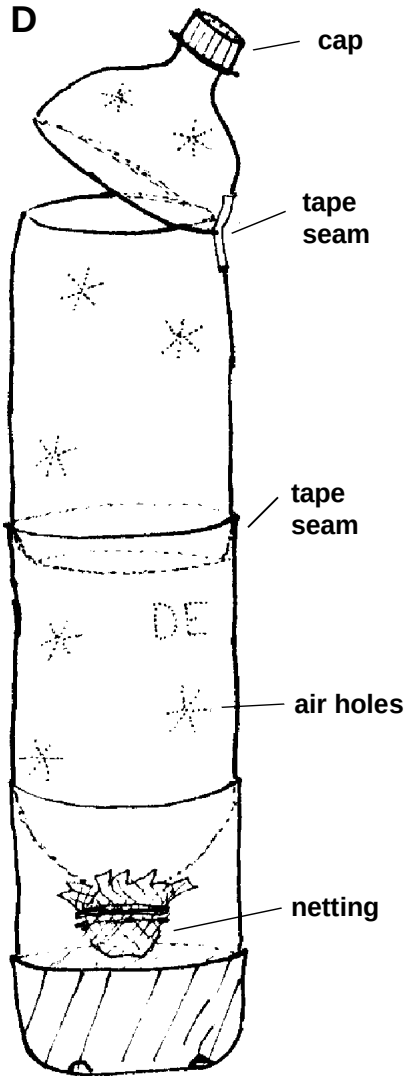
Catton, C. and J. Gray. 1984. *The Incredible Heap.* St. Martin's Press (New York).
Kreuter, M. 1985. *The Macmillan Book of Organic Gardening.* Macmillan Publishing (New York).
Minnich, J., M. Hunt, et al. 1979. *The Rodale Guide to Composting.* Rodale Press (Emaeus, PA).

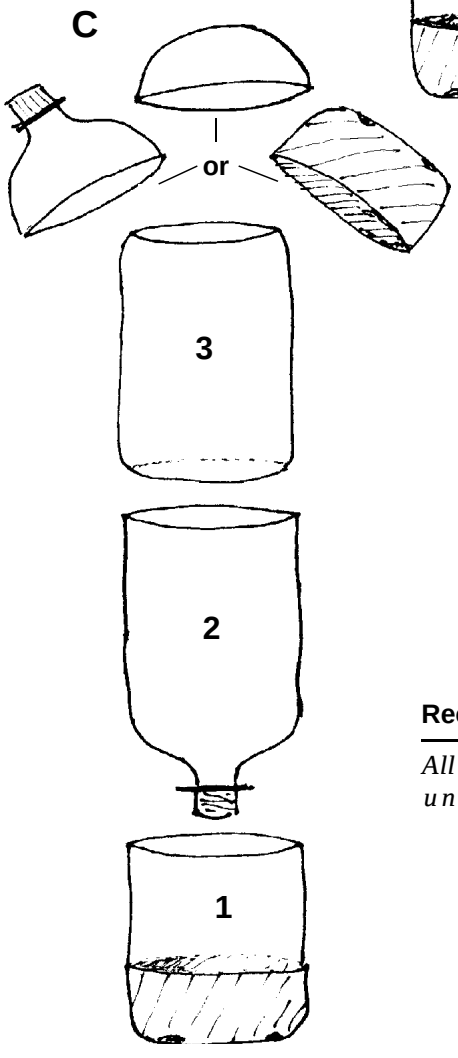
Biocompost Column

(3-Bottle Version)









Recycle!

All column components and unused parts are recyclable.