Vermicomposting: Innovative Kitchen Help

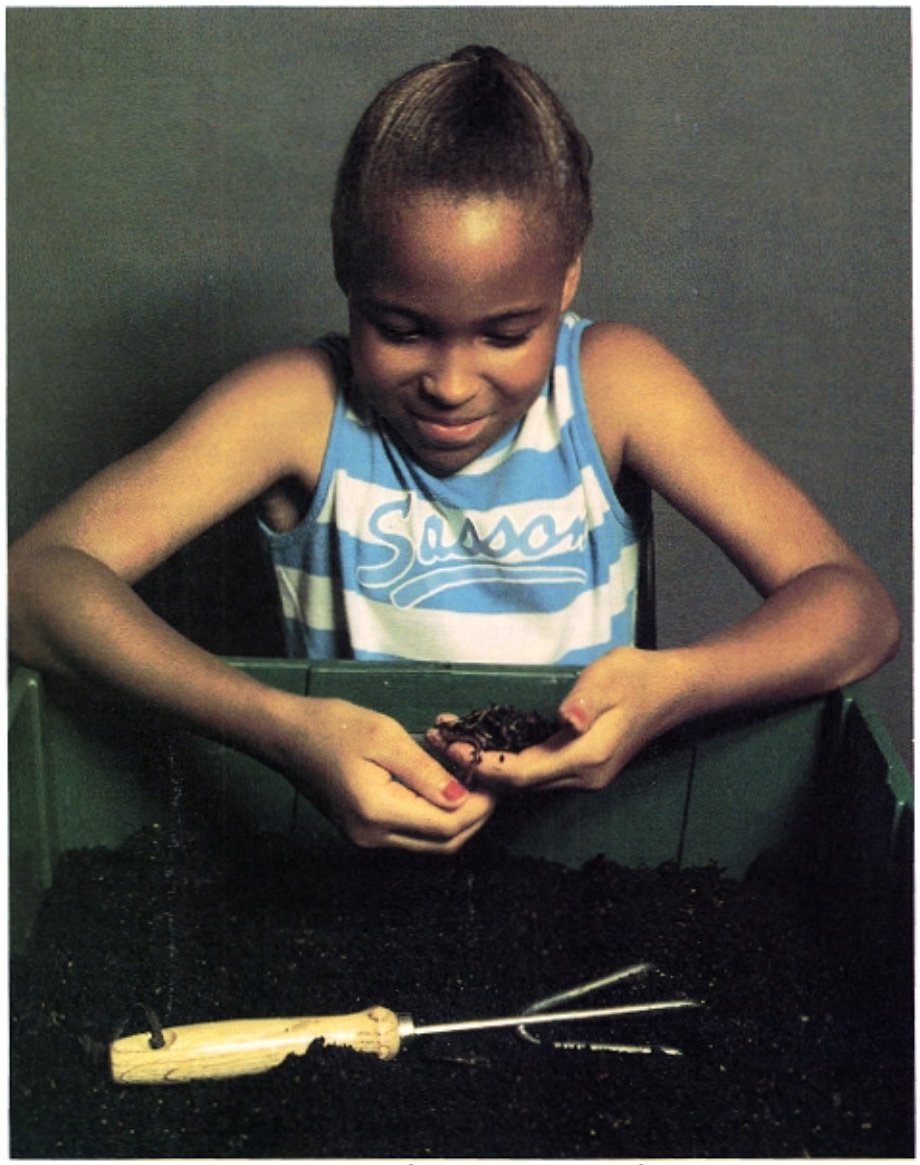
by Dennis Hansen

Each person in Missouri produces about 1.3 tons of trash a year. About one-fourth of these wastes, around 650 pounds, are food wastes and yard wastes such as grass clippings and leaves. Food waste and other plant and animal matter naturally decompose under the proper conditions of light, air and moisture. As the waste decomposes, it produces carbon dioxide. In fact, much of the carbon dioxide produced naturally on earth originates from decomposition. In turn, plants use carbon dioxide for growth and give off the oxygen that we breathe. Decomposition is nature's way of recycling organic refuse.

It also breaks a substance down into its basic elements. Breakdown of organic materials is a continuous process, but it does not happen just because the proper physical conditions are present. There must be living organisms present in order for decomposition to occur. Composting is a method that uses physical and biological processes to accelerate decomposition.

Organisms that aid in decomposition can be separated into two groups – microorganisms and macroorganisms. Microorganisms are too small to see without magnifying instruments. Macroorganisms can be seen with the unaided eye. Together, the organisms break down organic materials. Through this breakdown, vital elements tied up in organic materials are released and made available to plants in a usable form. Decomposition provides plants with a constant flow of nutrients.

Microorganisms that play a role in composting include bacteria, fungi and actinomycetes. Bacteria found in compost metabolize, or break down raw organic material and use it as an energy source.



DNR photo by Nick Decker

Vermicomposting - composting with worms-presents classroom opportunities for children to learn about the food chain cycle, solid waste and other environmental issues; or it can be used to recycle kitchen scraps.

Fungi and actinomycetes clean up what the bacteria leave behind. They decompose the toughest things to break down: starches, cellulose, lignin and proteins.

Macroorganisms that aid in decomposing organic materials include insects, grubs, nematodes, mites and earthworms. The chewing, eating, digesting and digging done by these

organisms increase the surface area of the organic materials. This gives bacteria and other microorganisms more space to complete their task. Earthworms play a significant role in decomposition due to their symbiotic relationship with bacteria. As earthworms ingest and digest organic matter, they also take in microorganisms and metabolize them, When the organic material passes through the gut of the earthworm it again increases the surface area of the matetial so that the microorganisms can break it down further. The undigested materials, or castings, are fertile and rich in nutrients readily available to plants.

Worms can break down large amounts of organic matter in a short time. Each day, a worm eats half its weight in food. Composting with worms, or vermicomposting, is an efficient and natural way to recycle organic food scraps.

The components necessary to begin vermicomposting include a container to house the worms and their bedding material. When worms are kept in an indoor worm bin, the volume of kitchen scraps can be reduced by as much as 25 percent and the resulting mixture of worm castings, organic material, and bedding in various stages of decomposition (vermicompost), makes a wonderful soil conditioner.

Benefits of keeping a worm bin go beyond waste reduction and soil amendments. Maintaining a worm bin in a classroom can serve as an innovative teaching aid. Subjects that include science, language arts, math and art may be involved in some manner with a classroom worm bin.

Attitudes such as responsibility for taking care of the worm bin and respect for other living things and the role they play in the environment can •be addressed with a worm bin.

Environmental issues such as solid waste management, sustaining natural resources and water conservation also can be addressed. Following are a few activities that can use earthworms as a teaching aid in the classroom.

ACTIVITIES

1. Have students determine how many earthworms it takes to compost one pound of kitchen scraps and how long the composting will take. How many pounds of kitchen scraps can 1,000 earthworms compost in one week? Given: There are 1,000 earthworms in a pound. One earthworm will eat one-half its weight in one day. Answers: It will take 2,000 earthworms one day to compost one pound of kitchen scraps. One thousand earthworms can compost 3.5 pounds of kitchen scraps in just one week.

2. Have students investigate the effects of worm castings on plant growth. Mix worm castings with a clay soil in different ratios; 1:1, 1:2, 1:3, 1:4, etc. Plant tomato seeds in 100 percent clay soil, and in the soil mixtures. Does the vermicompost have any effect on the germination rate of the seeds? Do the seedlings show any growth differences?

3. Write a story about worms based on observations students have made and facts they have been given in the previous examples.

4. Ask students to compare the water-holding capabilities of vermicompost and other materials. What effect does this have on the growth of plants? What effect does this have on water conservation?

5. Set up a worm feeding schedule for the students. Each student will be responsible for maithaining the worms, including feeding them the proper amounts daily and making sure the bedding is moist.

Teachers who would like a worm bin design sheet can contact the Department of Natural Resources, Solid Waste Management Program, P.O. Box 176,Jefferson City, MO 65102; or call toll free 1-800-334-6946; or (314) 751-5401.

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Construct Your Own Simple Worm Box

Trim vinyl window screen to fit and place in bottom of container – for holding bedding material and worms.

10 gallon plastic storage container

Drill 12, 1-inch holes in boffom for ventilation and drainage.

Two 2-inch by 2-inch planks for ventilation

Cafeteria tray for catching moisture