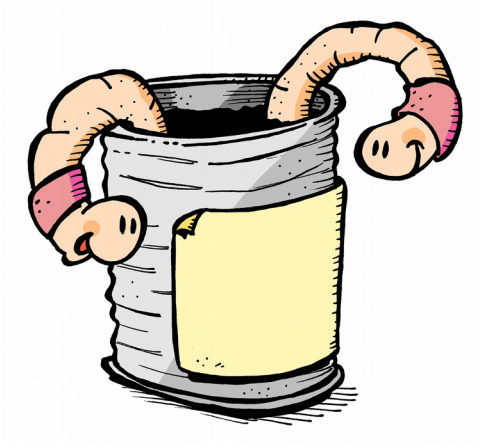
How to Make a Classroom Worm Bin

A lesson from the New Jersey Agricultural Society
Learning Through Gardening program

OVERVIEW: Discover why earthworms are considered a gardener's best friend. The worm bin or *wormery* built in this activity allows students to observe the worms as they convert plant material into rich compost.

GRADES: PreK-5



MATERIALS:
Large plastic bin
Soil from your garden or outside the school
Red worms (r*ed wigglers)*
Newspaper
Black plastic sheet or plastic, cloth or wood lid for bin
Clean kitchen fruit and vegetable scraps, coffee grinds, tea leaves, egg shells

NOTE: Don't go out and dig for night crawlers that live in the soil to populate your worm bin. Night crawlers need to tunnel through dirt to eat and survive, and they can't live on vegetable waste. Instead, you need red worms, Eisenia foetida (also known as red wigglers), which live in rich organic material like manure and compost (not soil), and are adapted to crowding and warmer temperatures.

PROCEDURE:
Show your class the New Jersey Agricultural Society point presentation *Worms and Other Decomposers* available to download from the Learning Through Gardening Teacher Tool box: *http://www.njagsociety.org/basic-gardening-lessons.html.*

Tell students you are going to make a worm bin so that you can harvest the worm casting for compost for your garden. Explain that the red worms you will use in the bin are somewhat different from worms you find in the garden. They don't live in soil. They live naturally in manure piles and compost. They live and feed near the surface and do not create tunnels.

Vocabulary:
Vermiculture: the raising of worms to make compost.

Vermicompost: the mixture of decomposing vegetable or food waste, decomposing leaves, and pure *vermicast,* (worm poop), also known as *worm castings*.

Worm tea: is made by leaching vermicompost in water (just like a tea bag). The resulting liquid after it has steeped for several hours is a tea-colored liquid that can be used to fertilize plants.

Making the Worm Bin:

Find or buy a plastic bin or dishpan. An approximate size is 16" x 24" x 8" or 10 gallons, but bigger or smaller bins will work as well. Make sure the bin is clean by rinsing it with tap water to remove any residues which may be harmful to the worms.

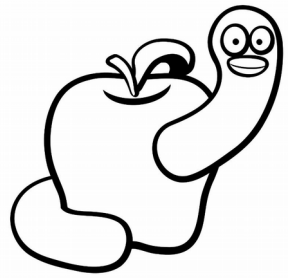
Drill about twenty evenly spaced ¼-inch holes in the bottom of each bin. These holes will provide drainage. Drill ventilation holes about 1 – 1 ½ inches apart on each side of the bin.

Prepare the bedding. Instead of soil, your red worms will live in moist newspaper bedding. Like soil, newspaper strips provide air, water, and food for the worms. Tear newspaper into 1/2" to 1" strips, enough to fill your bin three-quarters of the way to the top. Avoid using colored print, which may be toxic to the worms.

Place newspaper strips into a large plastic garbage bag or container. Add water until bedding feels like a damp sponge, moist but not dripping. Add dry strips if it gets too wet.

Add the strips to the bin, making sure bedding is fluffy (not packed down) to provide air for the worms. The bin should be three-quarters full of wet newspaper strips. Sprinkle two to four cups of garden soil in bin, which introduces beneficial microorganisms. Gritty soil particles also aids the worms' digestive process. Use natural soil, not potting soil,.

Add the worms. Your worms will mostly feed and live in the topmost layer of the bin, so it is the surface area that matters when figuring how many worms to use. About one pound of worms can live in one square foot of composting surface. So if you have X pounds of worms, you need at least X square feet of surface at the top of the container.



Feed your worms fruit and vegetable scraps, such as peels, rinds, and cores. Egg shells, coffee grinds, and used tea leaves are good, too. Limit the amount of citrus fruits that you place in the bin so that it does not become too acidic. N*O MEATS, BONES, OILS, OR DAIRY PRODUCTS.*

Cut or break food scraps into small pieces – the smaller, the better. Measure the amount of food. Feed the worms approximately three times their weight each week. Monitor the bin every week to see if the worms are eating the food and adjust feeding levels accordingly. (If you start with one pound of worms, add three pounds of food per week.) Bury food scraps in the bin. Lift up bedding, add food scraps, then cover food with bedding.

Place a full sheet of dry newspaper on top. This will help maintain the moisture balance, keep any possible odors in the bin, and help prevent fruit flies from making a home in the bin. Replace this sheet frequently if fruit flies are present, or if bin gets too wet.

Cover the bin with a lid made of plastic, black plastic sheeting, plywood or cloth, but leave the lid ajar so the bin receives some air. Place the bin away from windows and heaters. Worms prefer temperatures of 55 to 70 degrees Fahrenheit.

FEED, WATER and FLUFF! To keep worms happy, feed them about once a week. If the bedding dries up, spray it with water. If bedding gets too wet, add dry newspaper strips. Fluff up bedding once a week so the worms get enough air.

Harvesting your compost:

After three to six months, you should have a fair amount of worm compost stored up in your bin. Now it's time to harvest. Keep in mind that you might not be able to save every worm when harvesting the compost. That's okay; by and large, your worms have multiplied, and there should be plenty to continue composting.

Put on rubber or plastic gloves and move any large uncomposted vegetable matter to one side. Then gently scoop a section of worms and compost mixture onto a brightly lit piece of newspaper or plastic wrap. Scrape off the compost in layers. Wait awhile giving the worms time to burrow into the center of the mound. Eventually you will end up with a pile of compost next to a pile of worms. After harvesting, you should replace the bedding and then return the worms to the bin and add your compost to your garden.

If you prefer a hands-off technique, simply push the contents of the bin all to one side and add fresh food, water, dirt, and bedding to the empty space. The worms will slowly migrate over on their own. This requires much more patience. It could take up to a few months for the worms to fully migrate to the scraps side of the compost bin.

Student Observations:

Have the students draw the contents of the bin. Label this drawing as “start.” Ask students to hypothesize about what will happen in the next weeks to the worms, the bedding, and to the food. Have students check the bin regularly draw and write what they see, and date their observations.

Ask the students: Have any of the fruits and vegetable scraps disappeared? How about the bedding? What does it smell like? How many worms are there now? What do they look like?

EVALUATION:

Students' drawn and written observations of the changes in the worm bins.

EXTENSIONS:

Read: *Diary of a Worm,* by Doreen Cronin OR *An Earthworm's Life,* by John Himmelman.

New Jersey Learning Standards

Science: PreK:5.1.1-5, 5.3.1,3 K:LS1.1, ESS2.E 1:LS1.A,B 2:LS4.1 3:LS1.B 4:LS1.A 5:LS2.A