

CARNEGIE MELLON UNIVERSITY CHILDREN'S SCHOOL

Quick Instructions Home Worm Farm

- **Observe the Worms** by opening the lid and pulling back the bedding gently with the worm rake.
- It is okay to **handle the worms**. Try putting them on a white piece of paper or paper plate. Use a magnifying glass for a closer look! Since red worms do not like the light and do not like to be dry, try not to leave them exposed for extended periods of time.
- **Save kitchen scraps** to feed to the worms (a list of appropriate foods is attached). Cut up, tear, or blend the scraps as small as possible to make it easier and faster for the worms to eat. Pull back the bedding gently on one side of the box, put the scraps in and **bury them**. These small farms will need about 1 CUP of chopped food scraps per week. They can be put in all at once or a little each day.
- **Check the worms** at least every other day. The food usually contains enough water to keep the bedding moist. Add a small amount of water or some extra food if the bedding becomes dry. If it is too moist and condensation is forming on the lid, leave the lid off for a couple of hours during the day.
- **Harvesting the castings** is a very important and interesting part of worm farming; however, it can be a time consuming and messy job. To harvest castings to use in your spring planting, simply dump the contents of the box on a plastic tablecloth in a highly lit area (or outside). Make a pyramid shape with the contents. The worms will wiggle down to the bottom away from the light. Scoop the top off of the triangle and put into your garden or store for further use. Make new bedding (soil, shredded newspaper, water) for the worms and return them to their home.
- **HAVE FUN!**

SEE OTHER SIDE FOR ANSWERS TO SOME IMPORTANT QUESTIONS
AND BOOK SUGGESTIONS

What are we doing with these worms?

We are Vermicomposting, or composting with the worms. It is a natural process of converting organic food waste with the use of worms. Table scraps, which we add to the worm farm, will naturally decompose as bacteria eat away at them. The worms speed up this process by digesting the rotted organic matter and transforming it into rich, new soil called *castings*.

Why?

- The worms are our **pets**. Caring for a pet can help children to take responsibility and develop respect for all living things.
- The worms are **helping us**. The odors that normally occur with rotting food do not get a chance to develop because the worms digest the food first. We make our own organic fertilizer, and harvested nutrient-rich castings can be used to improve the soil in our gardens.
- Composting is one way of **recycling** to reduce the trash in landfills. The children are learning that they can make a difference in caring for our earth.

BOOKS related to our Worms to Beans process:

Wonderful Worms by Linda Glaser

Yucky Worms by Vivian French

Compost Stew, An A to Z Recipe for the Earth by Mary McKenna Siddals

Diary Of A Worm by Doreen Cronin

There's A Hair In My Dirt, A Worm's Story by Gary Larson

The Marvelous Mud Washing Machine by Patty Wolcott

I Love Mud and Mud Loves Me by Vicki Stephens

Bean and Plant by Christine Back and Barrie Watts

I'm A Seed by Susan Kuchalla

The Reason For A Flower by Ruth Heller

FOOD WASTES TO FEED OUR WORMS

APPLES
BAKED BEANS
BSICUITS
CAKE
CEREAL
COFFEE GROUNDS
EGG SHELLS
LEMON
OATMEAL
ORANGE PEELS
PEARS
TEA LEAVES
VEGETABLES

APPLE PEELS
BANANA PEELS
CABBAGE
CELERY
CORN
CUCUMBERS
GRAPEFRUIT PEELS
LETTUCE
ONION PEELS
PANCAKES
PINEAPPLE
POTATOES
TOMATOES

Basically, if the product was once alive, the worms will consume it. Avoid large quantities of meats, cheese, and dairy products. Vegetable and fruit scraps seem to work the best in small worm farms.

SOME RED WORM FACTS

- Red Worms are often called Red Wigglers.
- Light is painful to a Red Worm.
- Red Worms have five hearts.
- If a Red Worm is cut in half, only the half of the worm with the five hearts will survive. The other half will die.
- One pound of Red Worms, approximately 1000, can consume one half pound of garbage per day. 100 pounds of worms can consume 50 pounds of garbage per day.
- Red Worms can live 4 to 5 years.
- Red Worms produce castings, worm waste, which is all natural, all organic, and better than the finest topsoil!
- Red Worms produce eggs called cocoons, which are lemon-shaped and about the size of a match head.
- Each cocoon may contain 2 to 20 baby worms. The baby worms look like fine, white thread when they are hatched.

For more information and Red Worm products and supplies, visit:

Uncle Jim's Worm Farm

www.unclejimswormfarm.com

Worms to Beans

Jean Thompson Bird

Our preschool program does a yearlong class project that we call Worms to Beans. In the fall and winter, the children raise worms in the classroom and use the worms to compost food scraps. In the spring, we use the worm castings (manure) to fertilize the soil in our garden. The children plant the seeds, transplant the seedlings in the garden, then watch them grow until the vegetables are ready to pick and eat.

Children respond enthusiastically to caring for the worms and plants, and they enjoy tasting food they grew themselves. Many families are inspired by the project and begin composting, gardening, and establishing their own worm farms.

Teachers can continue the worm farm and garden from year to year. Worms will continue to reproduce as long as they are fed every few weeks and get new bedding every few months.

Worm to Beans Activity Plan

Why do this activity? To help children gain respect for living things and their contributions to the earth.

What can children learn? Natural science processes of worm life cycles, recycling, composting, conservation, and plant growth, as well as nutrition concepts related to health, like eating plenty of vegetables.

Vocabulary words: *compost, recycling, conservation, castings, fertilizer, roots, stems, leaves, flowers, fruits, seeds, seedlings, stretch and squeeze* (worm movement terms), *aerate, shovel, rake, hoe, primary and secondary leaves.*

Materials:

Worm farms

Worm composting bin (17" x 13" x 11")

Worms (collect 20–40 earthworms from the soil or purchase 1 lb. of much smaller red worms [approximately 1,000] by mail)

Bucket (1 gallon)

Garden soil (6 cups)

Newspaper (shredded to fill a ½ gallon container, like a milk jug)

Water

Hand rake (tine cultivator)

Food processor

Fruit and vegetable food scraps (1–2 lbs. per week)

Large plastic sheet or tablecloth

Plastic containers of any size to store castings

Vegetable garden

Potting soil

Egg cartons or small recycled food containers

Seeds (sugar snap pea and green bean or other vegetables grown in your area)

Low fencing to enclose the garden

Topsoil

Tools (child-size rakes, shovels, hoes)

Prepare for the activity

1. Purchase or gather the materials listed above.
2. Write to families to explain the steps in the project, what children will be learning, and to invite them to be involved.

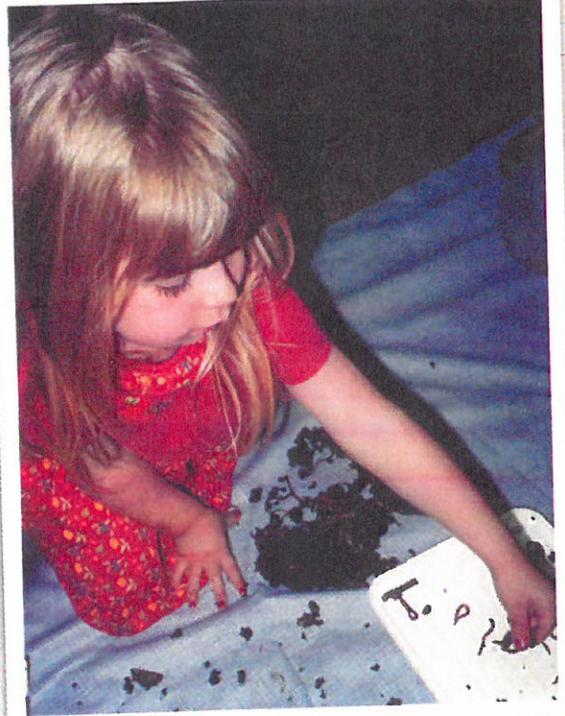
3. Introduce the project to the children. (We do this for half the class at a time.) Explain what you will be doing throughout the year—worm farming, composting, planting seeds, and growing a garden. Ask children what they know about worms and what questions they have. Record their responses on a concept web and post it in the classroom.
4. Add books about worms to the classroom library. Read them aloud to children in small and large groups. Leave the books on display so children can revisit them on their own.

Lead small and large groups

Children and teachers work together to carry out the steps below. Involve one or more children at a time, depending on the task and the children's interest in participating.

Worm farms

1. **Make the worm bedding.** Shred the newspaper into one-inch squares or smaller. Mix a half gallon of this newspaper (loosely packed) with six cups of garden soil and enough water so the worm bedding is moist but not dripping wet. It will look like solid, moist mud. Fill the bin three-quarters full with the bedding.
2. **Add all the worms.** Place the worms on top of the bedding. Wait about two days for the worms to dig into the bedding.
3. **Feed the worms.** Have children save fruit and vegetable scraps from their snacks and lunches. Every two weeks, grind six cups of scraps to a pulp in a food processor or cut the scraps into fine pieces (the smaller the food pieces are, the easier it is for the worms to eat them). Bury the pulp in one corner of the bin, alternating corners each time.
4. **Separate the castings.** Once a month, spread a plastic tablecloth on the floor, then dump out the worm bin contents. Worms will move to the bottom to avoid light, so children can gently lift the top layers of soil. Repeat until worms are separated from most of the castings. Store the castings in an airtight container so they do not get hard and dry. Castings will last for many months.
5. **Repeat steps 1 through 4.** Each time, put the worms into new bedding. Continue the process throughout the year.



PHOTOS COURTESY OF THE AUTHOR

Children's books about worms

Wonderful Worms, by Linda Glaser. Illus. by Loretta Krupinski. 1992. Brookfield, CT: Millbrook.

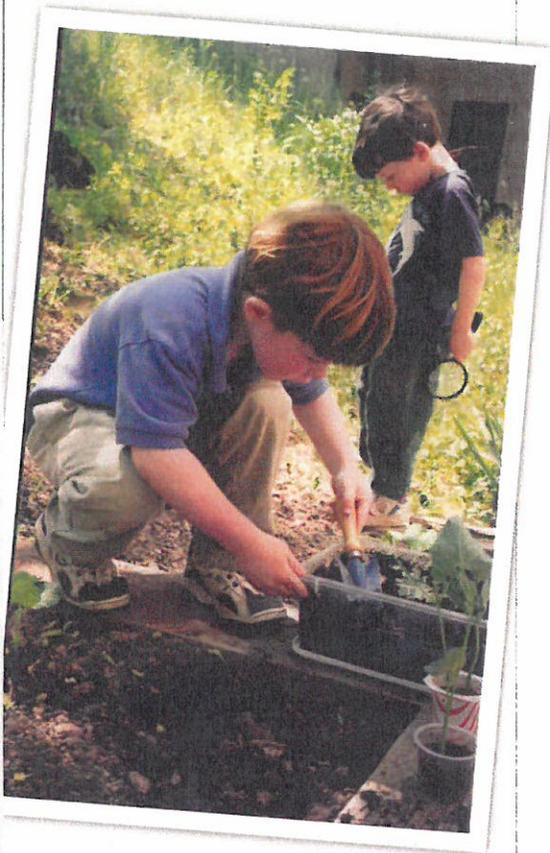
Wiggling Worms at Work, by Wendy Pfeffer. Illus. by Steve Jenkins. 2004. New York: HarperCollins.

Under One Rock: Bugs, Slugs and Other Ughs, by Anthony D. Fredericks. Illus. by Jennifer DiRubbio. 2001. Nevada City, CA: Dawn Publications.

How a Seed Grows, by Helene J. Jordan. Illus. by Loretta Krupinski. 1992. New York: HarperCollins.

Yucky Worms, by Vivian French. Illus. by Jessica Ahlberg. 2009. Somerville, MA: Candlewick.

Download a blank planning form from naeyc.org/tyc.



For More Information

Worm World provides links to information on worm composting.
www.wormwrl.com

Worms can be purchased via mail from Co-Jo Farm.
cojogrif@windstream.net

The University of New Hampshire provides information on gardening with preschool and kindergarten children.
<http://horticulture.unh.edu/ggg.html>

Vegetable garden

1. **Prepare the garden beds.** Three weeks before outdoor planting time, turn the soil, remove rocks and sticks, mix in a two- to three-inch layer of top soil, and put up the garden fence.
2. **Grow seedlings.** Fill egg trays or small recycled food containers with a mixture of $\frac{3}{4}$ potting soil and $\frac{1}{4}$ castings. Plant seeds as directed on packets. In a few days, the seeds will sprout and leaves appear. When the second set of leaves (secondary leaves, total of four on the plant) appear, it is usually time to transplant the seedlings in the garden bed (check packet).
3. **Plant seedlings in the prepared garden.** Follow seed packet instructions.
4. **Care for the plants.** Every few weeks, add a handful of castings around each plant. Gently mix into soil without disturbing the plant. Weed and water frequently.
5. **Harvest the crop.** When the vegetables are ripe, pick, rinse, eat, and enjoy! Talk about why fresh vegetables help us stay healthy.

Respond to individual needs

1. If some children are hesitant to touch worms, invite them to observe with magnifying glasses. Hold a worm in your hand so a child can see it without having to touch it. Be patient. Over time, most children get used to holding the worms.
2. Help children with disabilities participate in all aspects of the project. Provide one-on-one support, have them work with a partner, and offer hand-over-hand guidance as appropriate.
3. Make a list of key words for the projects in English and the children's home languages. Place the list near the children's books on worms and gardens or anywhere teachers and children can put these words to use.

Follow up after the activity

1. Have children document each step of the project. They can draw, take photographs, and write or dictate captions to create a timeline or a book. They can measure, record data, and create graphs.
2. Use the documentation to review the project steps and reinforce learning.

Involve families

1. Make a take-home worm bin. Interested children and families can borrow or keep the bin. We use an opaque plastic half-gallon container with holes in the lid or a clear container covered with black paper. Prepare bedding as described above and divide it among the smaller bins. Take some worms from the class worm farm to start each family worm farm.
2. Invite families to help water and weed the class garden. Suggest they start a garden of their own.
3. Provide project updates in a family newsletter or on a bulletin board.