

Gardening Curriculum Elementary

Food Chains

Lesson 1

Read: *Food Chains and the Food Web in our Backyard* by Kathleen Weidner Zoehfeld

1. Have students design their dream garden (graph paper). How big will it be? What will you grow where? Compost pile? Chickens? Make sure to include a list of supplies you will need!
2. Students can start their dream garden by creating egg carton seedlings!

Provide 12 seeds of a variety of plants. Students will fill each egg cup with potting soil and with the information on the seed packet, plant seed at the appropriate depth. Don't forget to give them a light watering! Seedlings can grow in the classroom (space permitting) or in a place at home with adequate lighting. When they are ready to plant, separate egg cups and plant straight into the ground or larger container!

3. Have students research 5 of the plants they are growing and create a poster, short powerpoint presentation or spoken presentation for the class. Include: Where that plant originated from, nutrition benefits, favorite recipe, fun facts, etc.

Lesson 2

1. Have students view: <https://mass.pbslearningmedia.org/resource/thnkgard.sci.ess.chain/think-garden-whats-a-food-chain/>
2. Use the Schoolyard Gardens worksheets and have children identify: Decomposers, Producers and Consumers in the garden.
3. Have your students choose a prominent plant or animal in the garden. Write it in the center of the dry erase board. Then build a food chain around it. Where does this plant or animal get its energy? Who eats this plant or animal? What does it eat? Repeat a couple of times until students are comfortable with the concept.

Create a list of all the producers, herbivores, carnivores, omnivores and decomposers they can think of that may visit your garden.

Assign one plant or animal to each student from the list. Have them write the word and draw a picture on an index card. They can use the hole punch and string to make the card into a label to hang around their neck.

Ask each student to explain who he or she is, what they eat and who eats them. Then, starting with the sun, have your students spin a garden food web by passing the ball of string from one person to any person that is connected (i.e. sun to plants to aphid, etc...). Once the web is spun, ask students to tug gently on the string. How does the web feel? Who else feels the tug? Is the web supporting you? What would happen if one piece of the web were to be wiped out? Have

one student led go of the string. What happens to the strength of the web? How is this true in the garden? Can you give an example?

4. Challenge students to think of their favorite meal and create food chain for it!

Gardening with Fungi

Kid's Gardening Fun with Fungi Lesson: <https://kidsgardening.org/resources/garden-activities-fun-with-fungi/>

Earthworms

Lesson 1

Earthworm Science Experiment

This is a typical earthworm experiment you might find in a science class (preschool all the way to high school). It's a great beginning experiment to work on science skills – asking questions, making predictions (and hypotheses), making observations, collecting data, and drawing conclusions. Here's what you'll need to get started.

Materials:

- shoe box sized container (plastic or cardboard is fine)
- paper towels
- water
- earthworms (you can do the experiment with just one, but I suggest using at least 5 to get better results)

We are testing preferences of the earthworm. You can let your child design this experiment. Here are some sample ideas:

- Do earthworms prefer wet or dry conditions?
- Do earthworms prefer the dark or the light?
- Do earthworms prefer different colors of light? (Change the light color by placing colored transparencies, colored acetate, or colored plastic wrap between the earthworm habitat and the light source.)
- Do earthworms prefer different surface types? Surface ideas: paper towel, cloth, soil, sandpaper, grass, rocks, etc.
- Do earthworms prefer certain soil/food types? (Test plain soil vs. soil and grass mixture.) For this one, you'll want a larger bin.
- Test if earthworms prefer wet or dry conditions. What do you predict?

1. Place a dry paper towel so it covers one side of a shoe box sized plastic container.
2. Place a wet paper towel so it covers the other half of the container. (The wet paper towel and the dry paper towel should touch in the middle of the container.)
3. Add earthworms to the middle of the container so they are touching both paper towels.
4. Observe the earthworms. Are they moving to one side or the other?
5. Place the lid on top of the container and wait.
6. After 10-20 minutes, check on your earthworms. Where are they – on the wet paper towel or on the dry? Is there anything else that you notice about them?

Lesson 2

Make a Worm Observatory!!!

Materials Needed

1. The container

5 gallon aquarium, recommended.

(anything larger gets very heavy once you fill it with soil)

A tank divider made of Plexiglas, a scrap piece of wood, rigid insulation (my preference) or some other impenetrable material, cut to fit snugly.

Silicone caulk, epoxy or some other material used to seal around the divider.

A fitted lid of some kind, a snap on screen lid for an aquarium works great.

2. The soil layers

Sand – bottom 2 inches or so (solely for drainage)

Soil – about a 4-6 inch layer of a light colored loamy soil (beige, red, any other color but black so the change to black worm cast material is evident) A very dark color indicates that the soil contains lots of organic compounds, that's why worm cast material is black.

Leaf Litter – on top put about a 3 inch layer of crushed, dried leaves.

Hardwood tree litter is best. Maple, Aspen, Birch or Basswood leaves are best, use Oak only as a last resort since they are less palatable to worms. Last years dried leaves work the best. If you collect fresh leaves, dry them completely until they crumble easily. Crush the leaves by hand until they are broken into small bits (1/8 – 1/2 inch) but not powdery. Some larger bits are fine too.

Note: All of the soil and litter components must be completely worm free. Sift soil to get rid of any worms that may be there. Use only very dry leaf litter since wet litter often contains worms. If you can spread the soil and litter out on a tarp in a thin layer, in the blazing sun for a few days or a week to really cook it, this will kill or drive off any tiny worms present.

A related math exercise: have the kids calculate how much of each material you will need based on the volume of the container and the desired thickness of each layer.

3. **The Worms**

Any kind of worm will work. Different species of worms will have different affects due to their ecology and feeding habits (see "worm type" handout). Some live only in the litter (small-bodied red worms), some live only in the soil (larger whitish - gray worms) but the night crawler (large-bodied red worm) goes everywhere and, being so large, they eat a lot. For the fastest and most dramatic results, use either leaf worms (*Lumbricus rubellus*) or night crawlers (*Lumbricus terrestris*), both of which can be found in local bait shops. If you choose to dig you own worms and see what you think may be several different types of worms, just pick one of the types and use it. For one side of the container (remember you are leaving one side worm free!) use enough worms to equal 200-400 individuals per square meter...

- Leaf worms (*L. rubellus*) about 15-20 worms
- Night crawlers (*L. terrestris*) about 6-10 worms
- Red-Wigglers (*Eisenia fetida*) or Angle worms (*Aporrectodea* species) about 10-15 worms

A related math exercise: have students calculate how many worms you would need for the container to achieve the desired density of worms.

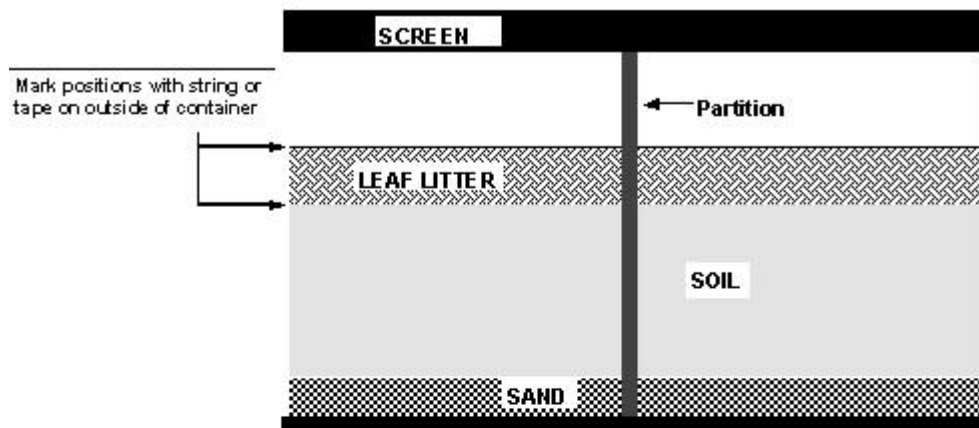
Assembling Everything

1. Divide the tank into two equal halves. Be sure the divider is tightly fitted and sealed (silicone caulk, epoxy glue, etc.) to prevent movement of worms from one side to the other. Tiny juvenile worms can move through any fine mesh and even big worms can get through very tiny spaces. Be sure the lid fits snugly down on the divider to prevent worms from crawling over (yes, they will do this!). If you are using a screen lid be sure the divider fits snugly to the screen.
2. Build the layers of soil from the bottom up...smoothing each as you go so they are level and equal on both sides.
 - Sand goes on the bottom. This is primarily for drainage so the upper layers do not get overly saturated.
 - Loamy soil simulates the thickest and deepest layer of soil generally found in rich, mesic hardwood forests. This layer is often called the "mineral soil."
 - Leaf litter simulates the forest floor or "duff" layer of worm-free hardwood forests. In a natural forest, this layer would be full of insects, roots, fungal hyphae and hordes of other organisms. But for our purposes, this simulated duff layer does a great job.
3. If the soil and litter are very dry, sprinkle water slowly over the whole demonstration to moisten the upper layers with a minimal amount of flow through to the sand. Maintain moisture levels throughout the run of the experiment since earthworms will become inactive when conditions are to extreme (to dry, hot or cold). They can live in

saturated conditions but they do not prefer it. FYI-worms do not come up during rainstorms to avoid drowning. They do so because it is an opportunity to disperse when surface conditions are moist and cool.

4. Use tape or string to mark the top of each layer on the outside of the aquarium (these will change during the demonstration and if you don't mark them it's not as obvious).
5. Add worms. They will find their way down, no need to bury them, just throw them in on top of everything! Be sure to make note of how many you put in and the date.
6. Wait, keep observations. If you used night crawlers, you should see obvious activity on that side within a few days or weeks. After a month or more, the differences between the worm-free and the worm-populated sides will be obvious. Some suggestions on observations...a) measure changes in the thickness and height of the different layers using the reference markings you placed on the outside. b) note changes in color or texture to each layer. c) note which layers you see the earthworms in (they should move along the glass every once in a while, leaving burrows, so you can see where they have been).

Worm-free conditions on both sides at the beginning of demonstration



Worm-free conditions on left side, worm-worked on right, at the end of demonstration

