Decomposition on the Red Wiggler Farm

Overview: Students will learn what worms need to live and how to create garden compost through vermicomposting.

Subject area: Science

Grade level: Kindergarten

Next Generation Science Standards:

K-LS1. From Molecules to Organisms: Structures and Processes

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

1-LS1. From Molecules to Organisms: Structures and Processes

- 1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Objectives: Students will be able to investigate and compare the basic needs of worms and humans, identify what worms provide for plants, and what they provide for us. Students will describe how worms interact with their environment through the process of decomposition.

Prep time: 10 minutes

Lesson time: 30 minutes

Background Information for Teacher: Worms are true tillers of the soil. They digest organic matter and excrete it as *castings*: pellets that are excellent fertilizer high in nitrogen, phosphorus, and potassium. Worms improve the topsoil and enrich plants with the nutrients from their castings. That is why farmers and gardeners love them so much. In this activity, students will see worms at work by observing them in their worm bin.

Earthworms, or night crawlers, tunnel deeply into the soil and construct semi-permanent burrows. These tunnels allow air and water to enter the soil. In the process of digging their tunnels, earthworms mix soil layers. Another type of worm, red worms or red wigglers (the ones we will observe), are surface feeders and are used in worm composting (also known as *vermicomposting*). Worms can produce their own weight in castings every 24 hours at optimal conditions.

Here are some special facts about worms:

- Worms have no eyes but can sense light;
- Worms have no teeth but they can grind up food in their gizzard;
- Worms have no feet or hands, but they move efficiently through the soil;
- Worms have no antennae or nose but they can sense the presence of water nearby;
- Worms have no ears but they can sense the tiny vibrations of an approaching predator;
- Worms have no lungs but they can breathe air through their moist skin;

- Worms have a brain about the size of a pinhead but are able to regenerate small sections of their tail. When cut in half, worms do not become two—they can only regenerate small sections of their tail.

Materials needed:

- Active worm bin
- Watering can
- Egg shell, rinsed and dry
- Kitchen or garden scraps
- Scissors
- Newspaper

Space needed: School Garden or outdoor space

Staff needed: 1

Preparation steps: Set up a worm bin ahead of time, or use an already established worm bin for this activity. Acquire a small handful of kitchen or garden scraps and an egg shell ahead of time.

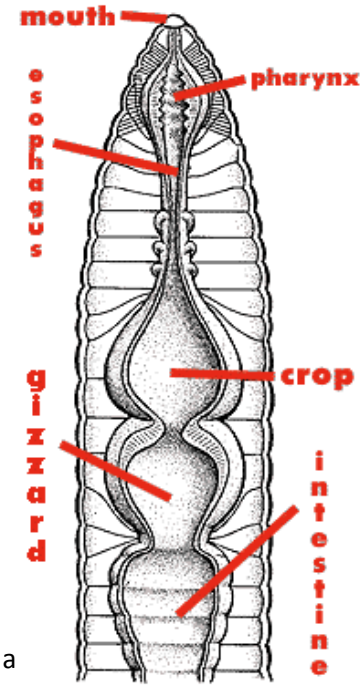
Presentation Steps:

1. Review: What do living things need to survive? (sun, air, water, space, home, food)
   What do worms need to survive? (the same thing)
2. Worm Discussion:
   a. What do worms eat? Decaying plants, all fruits and vegetables that are kitchen scraps, egg shells, etc. **Basically everything except meat and dairy.**
   b. Explain how worms eat. They have a mouth, but they can only take in small particles. Microorganisms in the soil soften the food before worms will eat it. Worms also have a muscular gizzard, like chickens. Small parts of food mixed with grinding material, like sand, topsoil, egg shells, or limestone is ingested, and the gizzard muscles contract to compress the particles against each other, mix it with fluid, and grind it into smaller pieces.
   c. Where do worms live? In the soil, underground, they REALLY like darkness and even though they don't have eyes, they sense light, and move away from it.
   d. Why are worms important in the garden? They break down decaying plants and food waste and make compost that has loads of nutrients in it. They add nutrients to the soil so our growing plants are healthy and in turn, highly nutritious for us when we eat them.
3. Worm Bin Observation:
   a. Why are there holes in the worm bin? To let air into the bin; to keep the inside of the bin from getting too wet.
   b. Why is there a lid on the worm bin? To keep it dark inside the bin.
   c. Before opening the worm bin, tell the students that they will get the chance to hold a worm, if they want to. Explain the rules for holding a worm:
      i. Respect the worms—they are very helpful to our garden and all living things should be respected.

ii. To hold a worm, hold your palm flat and do not squeeze your hand.
iii. Do not drop the worm.
iv. Do not touch the worm too much (just let it be in your hand).
v. Keep the worms' skin moist.
vi. If you no longer want to hold the worm, tell the instructor and he or she will help you gently place it back in the bin, under the soil.
vii. Make sure to wash your hands after holding the worms.

d. Open the worm bin and let the students take a look. Explain to them that the shredded newspaper is in there to keep the bin from getting too wet and also that the worms eat the newspaper.
e. Ask the students who want to hold a worm to hold their palms out flat. Carefully dig through the bin and look for worms (they are usually in the bottom). Place one in each student's hand.
f. After a couple of minutes, return the worms to the bin. Try to place them close to the same place as you found them, close to the food and under the soil. It is now time to feed the worms.

4. <u>Feeding the Worm Bin:</u>
   a. Collect a SMALL handful of scraps from the compost (best items are salad greens, veggie scraps, and all fruit except for citrus and papaya – papaya seeds can cause infertility in worms).
      i. Tear or chop scraps into small pieces.
      ii. Lift any newspaper bedding and place scraps under newspaper.
   b. Check moisture level of the bedding.
      i. Bedding should be moist, but not dripping wet.
      ii. If dry, water with watering can to moisten.
   c. Freshen bedding.
      i. Tear about 1" strips of newspaper.
      ii. Place fresh bedding on top of food scraps or old bedding.
      iii. Water with watering can so the bedding is moistened.
   d. Add grit for the worms' gizzards!
      i. Grind or smash an egg shell.
      ii. Sprinkle it on top of the food scraps, under the bedding.



Conclusion:
Ask students: What do worms need to survive? How do they benefit our garden? What do they eat?

Variations:
Explore the worm bin further for other critters that help with decomposition. Hunt for worm eggs. They look like small white or pinkish ovals (about the size of a small lentil). A healthy worm bin will have many worm eggs.