**GARBAGE-EATING WONDER WORMS – Lesson 1**

Hands-on observations and experiments with red wiggler worms are used to teach students about decomposition, recycling, and reducing waste.

**OBJECTIVES**

· Introduce students to the concept of composting kitchen wastes in a worm bin.

· Give examples of the important roles worms play in the environment.

· Observe worms and worm behavior using magnifiers.

· Perform simple experiments to test whether worms prefer light or dark –and- wet or dry.

· Create a classroom composting worm bin. (Compost created by the worms can be examined in a follow-up lesson.)

· Conduct simple experiments to test worm preferences for various foods and observe the process of composting.

**MATERIALS**

· Red wiggler worms

· Materials for creating a worm bin:

· shredded newspaper (black ink)

· water in spray bottles

· dry, shredded leaves (avoid oak leaves)

· chopped vegetable leftovers such as lettuce (no fruit, eggs or nuts)· a third item for student predictions about which will decompose first – the worksheet calls for a stick, but you may select another item

· Large worm composting bin with air holes

· Small plastic “investigation” bins with holes for ventilation (these are optional: use small bins if you are leaving bins in the classroom for a short period of time)

· Large white sheets of laminated paper or bowls for worm observations (1 sheet or bowl for every two students)

· Light/dark and wet/dry experiment boxes

**INTRODUCTION**

**1.** **Introduce Recycling - Trash sort.** Ask students if they are familiar with recycling paper (point out a blue paper recycling bin), and then ask them if they think that food can go in a recycling bin.

Ask them how we can recycle food?

Ask if anyone has ever heard of composting. Composting is a big word that means changing natural materials (like food, fallen leaves and mowed grass) into soil.

· Are the leaves that fall from trees in autumn still on the ground in the spring? Most are not. So what happened to them? Fungi, worms, woodlice (rolly pollies) and bacteria eat the leaves. When they eat leaves, they are breaking them down into organic material that is an important component of soil. This happens to anything that dies outside. This is why we don’t find big piles of dead things…which is really good! Compost can be rich in nutrients that help new plants grow.

· Composting to make healthier soil for our school or home gardens can be done in many ways. One way is to build an outdoor compost bin and to add the materials to the bin. If it is done the right way, the bin will attract soil creatures to help break down the natural materials. Another way is to build a special home for worms, called a “worm composting bin.” You keep worms in the bin – usually **inside** your house or classroom. You feed them stuff from your kitchen (“food wastes”) that would otherwise be thrown in the trash.

· By letting worms eat our unwanted leftovers, we are reducing waste. ***Ask, how does this reduce waste?*** Talk with students about how composting reduces the amount of trash your home or school sends to the incinerator. Also, less waste means fewer bags are needed to hold trash and less energy is needed to take the bags to the incinerator.

**Activity (Optional):** Have the kids sort the trash/compost/recycling into the appropriate piles. Ask them how long they think these things would take to break down if we left them outside? Plastic takes a really long time (Milk bottle = 5 years, apple = 1 month)

**2. Introduce the red wiggler worms**

· Ask questions to get the students thinking about how worms differ from other animals (show photos of the animals as you talk about them).

Worm facts: worms have soft bodies made up of segments. Worms do not have eyes, but can sense light and dark.Worms keep eggs inside a “cocoon.” Worms do not have bones - they are invertebrates. Worms breathe through their skin. Worms can have up to 5 hearts. If a worm loses its tail it can grow it back.

· Red wigglers are a type of worm, but they are a bit different from earthworms you may find around your home. If you dig a hole and find worms, you are probably finding European night crawlers. These worms live deep in the soil and come to the surface at night to eat bits of leaves and other dead things.

· Red wigglers don’t like to live in soil. Instead, they prefer to live in rotting [vegetation](http://en.wikipedia.org/wiki/Vegetation), [compost](http://en.wikipedia.org/wiki/Compost) and [manure](http://en.wikipedia.org/wiki/Manure). They really like to eat some of the food we throw away! Because of this they can do a special job for people. They turn food waste into compost that can be used in gardens. They are **nature’s recyclers**.

**3. Take a few minutes to set up the red wiggler “behavior experiments.”**

1. **Do the worms like to be in the light or the dark?** Place a worm in between the light and dark sections of the experiment box. Lightly dampen the box before showing it to the students.

**- Ask students for their predictions about what the worms will prefer.**

1. **Do the worms prefer to be moist or dry?** Place a worm in between the wet and dry sections of the experiment box.

**- Ask students for their predictions about what the worms will prefer.**

Set the behavior experiment boxes aside and come back to them at the end of the lesson.

**HANDS-ON ACTIVITY: WORM INVESTIGATIONS**

· Students will work at their tables or desks to observe (that means carefully look at) the red wigglers. Tell them you will come around and place some red wigglers on the tables (on placemats or in bowls). Provide 1 placemat or bowl for every two students.

· In addition to worms, there will be the material that they live in as well as compost that they’ve made.

· **Give specific instructions about touching the worms.** We can touch the worms using one touching finger (ask students to put up their pointer finger). Do not pick up the worms because it is not good for them. The bodies of worms must always be moist. If you pick them up, your skin removes water from the worms’ bodies and this can make them sick.

· Is it safe to touch the worm? Of course! Worms do not have teeth and their mouths are very small. They can only take very small bits of food into their mouths. Worms do not have eyes so they can’t even see you. Should we touch the worms gently? Yes! They do not have any bones and their bodies are very soft. Be very gentle.

**Talk about things to observe** (this will depend on the grade level)

o Long worms, Short worms , Fat worms

o Baby worms (these are very small and might be white or light pink and look like a piece of thread)

o Worm egg sacks (look like small brown balloons – also called cocoons)

o What does a worm do when you touch it?

o What the worms are living in (which is also what they eat)

Ask the students to draw the worm.

**EXPERIMENTS WITH WORMS**

· **4. Begin setting up a worm composting bin.**

· Each class will add materials to the worm bin that you create for the school. The materials the worms live in are called “bedding” materials. A few types of bedding materials are:

o Shredded newspapers. We use newsprint with regular black ink (no colors) or soy inks (colored soy inks can be used in a worm bin).

o Partially decomposed leaves – dry leaves that can be shredded easily

o Soil – one or two handfuls with initial bedding that comes with the worms

· Have students add either a handful of shredded newsprint, broken up dried leaves, chopped vegetable leftovers (lettuce is a good choice) or water (use a spray bottle).

· You can add a handful of worms to the bin now or wait until after the lesson and have the students add the worms they have observed. (Keep enough worms for observations!)

· Review what the red wiggler worms are good at composting.

o Vegetable “wastes” from food preparation: potato peels, carrot peels, cucumber peels, onion skins, outer leaves of lettuce and cabbage, celery ends. It is best to cut the vegetable wastes into small pieces.

o “Plate scrapings” or uneaten food – pasta, vegetables, potatoes, grains, bread (these foods should not have been prepared with sauces or butter)

o Coffee grounds (not too much at one time)

o Tea leaves (including the used tea bags, which should be torn open)

o Students may suggest different types of **fruit** or **meat**. Worms will eat fruit and meat, but we don’t add these to an indoor worm compost bin because they attract fruit flies and can cause the bin to smell bad. Remember, **foods to avoid include fruit and meat**.

