

Composting In Schools: It's a Big Can of Worms

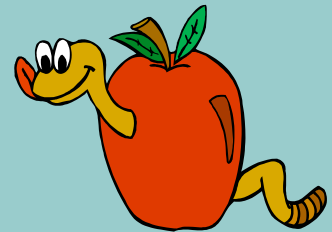
What Is Composting?

Given enough time, anything that was once living will eventually decompose. Composting is a biological process in which organic materials are 'broken down' into an end product called compost – a dark, nutrient rich form of organic matter. It is the same process that Mother Nature uses to recycle leaves, plants and other natural organic remains, except composting is a technique which accelerates the natural decomposition process.

By composting organic waste, we return nutrients back into the soil in order for the cycle of life to continue. Millions of tons of food waste are disposed of each year, at a considerable financial and environmental cost. So instead of discarding food scraps for garbage removal, composting can significantly reduce the amount of waste sent to overcrowded landfills while at the same time providing a nutrient-rich additive for soils. And the best part is, you don't have to be a farmer to be successful at composting!

Worming Into Our Schools

Vermicomposting is, quite simply, composting with worms. At the York Region District School Board, vermicomposting is the only type of composting program supported in our classrooms and schools.



The best kind of earthworm to use for vermicomposting is the red worm (a.k.a. Red Wiggler). These worms are incredible garbage eaters! They eat and expel the equivalent of their own weight every day, so even a small bin of red worms can yield pounds of rich, sweet-smelling compost. Finished compost can be harvested in as little as two to three months.

Red worms are extremely productive. It takes about three weeks for fertilized eggs to develop into a cocoon from which two or more young worms can hatch. Within three months worms are mature enough to produce more worms and by the end of one year you will have a large enough colony that you'll be able to give worms away. Red Wigglers can be purchased or harvested from the ground and are often found in forests under decaying leaves, etc. Other worms, such as night crawlers, are not suitable as they require cooler temperatures and extensive tunneling systems in order to survive.

With the help of the red worms, vermicomposting will turn many types of lunchroom waste into a nutritious soil for plants and trees. When worm compost is added to soil, it boosts the nutrients available to the plants and trees and enhances the soil structure and drainage.

Vermicomposting food waste offers several advantages:

- It reduces garbage and garbage disposal costs;
- It produces less odour and attracts fewer pests than food waste in garbage containers;
- It produces a free, high-quality, nutrient-rich soil additive (compost); and
- It requires little space, labour, or maintenance.

Making the Decision to Vermicompost

Vermicomposting is ideal for apartment dwellers or small home owners that want to derive some of the benefits of composting and reduce solid waste. It is also frequently used in schools to teach students about the benefits of recycling and conservation.

In a school building, vermicomposting is the only type of composting that is acceptable. This method is especially useful for processing food scraps, since the worms consume the materials quickly and there are fewer problems with odour.

What Is Required?

Vermicomposting has only a few basic requirements: worms, worm bedding (e.g. shredded newspaper, cardboard), and a bin to contain the worms and organic matter.

Tending your vermicomposter includes preparing the bedding, burying garbage, and separating the worms from their castings.

Is It Costly to Start?

The materials needed to start a vermicomposting system are simple and inexpensive. All you will need is a worm bin, bedding, water, worms and food scraps.



Do Worms Prefer to Live Indoors or Outside?

Worms prefer temperatures between 40 and 80 degrees Fahrenheit (5° - 27° C). As worm bins are to be stored in the classrooms, it is best to keep the bins out of direct sunlight and away from heat vents. Worms are happiest when stored in a cool, dark corner of the room where they are not disturbed.

Setting Up a New Home For Your Worms

Worm boxes can be purchased or made. Plastic storage containers are convenient and come in a variety of sizes. If a plastic container is used, it should be thoroughly washed and rinsed before the worms and bedding are added.

The size of the bin depends on the amount of food being produced. A general rule of thumb is one square foot of surface area for each pound of garbage generated each week. The container should be shallow because the worms feed in the top layers

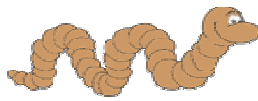
of the bedding (8-12" / 20-30 cm deep). A bin that is too deep is not as efficient and could potentially cause an odour problem. It is suggested that you provide one square foot (.3 m²) of surface area for every pound of food waste per week (i.e. 6 pounds / 3 kg of food waste requires a bin 2' x 3' / 60 x 90 cm).

Like us, worms need air to survive. So be sure to have your bin sufficiently ventilated. Red worms thrive in moist bedding in a bin with air holes on all sides. For aeration and drainage, drill nine 1/2-inch holes in the bottom of a 2x2 foot bin or 12 holes in a 2x3 foot bin. Raise the bin on bricks or wooden blocks and place a plastic tray underneath to capture excess liquid (which can be used as liquid plant fertilizer).

Drilling holes on the upper sides of your bin will also help your worms get oxygen and prevent odours. Keep a lid on the bin, as worms like to work in the dark. Store the worm bin where the temperature remains between 55° and 77°F.



Ready, Set, Compost!



To start your vermicomposting system, you will first need to select a location within your classroom to store your worm bin. Remember to keep the bin away from direct sunlight, heat and water.

The next step is to prepare the bedding. If you use newspapers, tear the paper into 1/2" to 1" wide strips (go with the grain of the paper and it will tear neatly and easily). Soak the newspaper in water for a few minutes, wring it out like a sponge and fluff it up as you add the newspaper to your worm bin. Aim for the bedding to be very damp, but not soaking wet.

Spread the bedding evenly until it fills about three-quarters of the bin. Sprinkle a couple of handfuls of soil (from outdoors or potting soil) into the bedding to introduce beneficial microorganisms and aid the worms' digestive process. Fluff up the bedding about once a week so the worms can get plenty of air and freedom of movement.

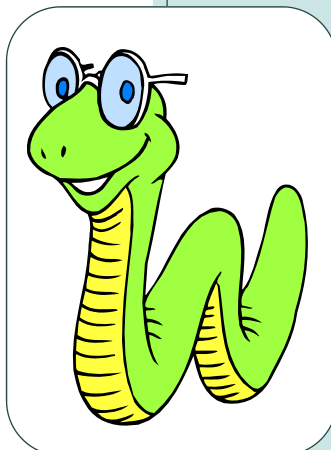
Once the bedding is ready, gently place

your worms on the top. Leave the bin lid off for a while so the worms will burrow into the bedding, away from the light. The worms will not try to crawl out of the bin if there is light overhead. Once the worms have settled into their new home, start to add the food scraps that you have been collecting. Dig a hole in the bedding or pull the bedding aside, place the food scraps in the hole and cover it with at least an inch of bedding. After this first feeding, wait a week before adding more food.

Leave your worms alone during this time to allow them to get acquainted with their new surroundings. Bury food scraps in a different area of the bin each time to encourage the worms to move around. The worms may be fed any time of the day and don't worry if you have to leave them for a few days, as they can be fed as seldom as once a week.

Finally, don't be surprised to see other creatures appear in your worm bin, as they also help break down the organic material. Most of the organisms will be too small to see, but you may also spot white worms, springtails, pill bugs, molds, and mites.

The Real Dirt on Worms!



- ≈ There are about 1000 worms in a pound and one pound of worms will eat roughly a half pound of organic waste in a day.
- ≈ The scientific name for the red worm is *Eisenia fetida*.
- ≈ Worms live about 3 years, but have been known to survive for 15 years.
- ≈ Worms can lay sufficient eggs to double their own population every 6-8 weeks.
- ≈ Worms will not eat anything that is alive.
- ≈ Worms have five hearts.

A Vermicomposter's Compendium

Bedding

Redworms can survive and breed in many different kinds of bedding materials. The important thing to remember is that the red wiggler will eat its own bedding. The worms need bedding material in which to burrow and to bury the garbage.

Bedding should be a non-toxic, fluffy material that holds moisture and allows air to circulate. Suitable materials include shredded paper (such as black-and-white newspapers, paper bags, computer paper, or cardboard); composted animal manure (cow, horse, or rabbit); shredded and decaying leaves; peat moss (which increases moisture retention); or any combination of these. If using peat moss,

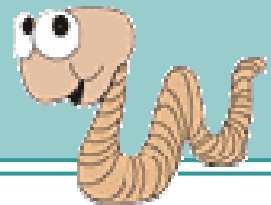
mix it with other bedding as it can be too acidic to use alone. Additionally, do not use glossy paper or magazines.

Along with your bedding, add two handfuls of soil to supply roughage for the worms. Include crushed eggshells for both roughage and calcium for the worms, plus it lowers the acidity in the bin. About four to six pounds of bedding is needed for a 2x2-foot bin (for two people), and nine to 14 pounds of bedding should be used in a 2x3-foot bin (for four to six people). Worms will eat the bedding, so you will need to add more within a few months. You can also purchase prepared bedding which may be machine-ground paper or paper mixed with loam.

Water

Bedding must be kept moist to enable the worms to breathe. To keep bedding moist, add three pints of water for every seven pounds of bedding. You will need about 1-1/2 to 2-1/4 gallons of water for 4 to 6 pounds of bedding. If the bedding dries out, use a plant mister with water to moisten.

Dampen the bedding until the moisture level is like a well-wrung sponge. Fill the bin three-quarters full with bedding. Add the worms. Since worms don't like light, they will quickly crawl down into the



Harvesting ~ Worms and Compost

After about six weeks you will begin to see *worm castings* ~ a soil-like material that has moved through the worms' digestive tracts. These castings can be used to boost plant growth. Within three to four months it will be time to harvest the castings. Mixed in with the castings will be partially decomposed bedding and food scraps, in addition to worms. This is called *vermicompost*. You may harvest the vermicompost by one of two methods:

Method 1

Place food scraps on only one side of your worm bin for several weeks, and most of the worms will migrate to that side of the bin. You can remove the vermicompost from the other side of the bin where you have not added food. Then repeat this

process on the other side of the bin and alternate accordingly.

Method 2

Empty the contents of your worm bin onto a plastic sheet or used shower curtain in an area where there is strong sunlight or artificial light. Wait 20-30 minutes, then scrape off the top layer of vermicompost. The worms will keep moving away from the light, so you can scrape more compost off every 20 minutes or so. After several scrapings, you will find worms in clusters. Pick up the worms and gently return them to the bin in fresh bedding.

(Watch for worm eggs; they are lemon-shaped and about the size of a match head with a shiny appearance and light-brownish color. The eggs contain between two and ten baby worms. Place the eggs back inside your bin so they can hatch and thrive in your bin system.)

Making Use of Your Compost



Vermicompost can be used immediately or stored for later use. The material can be mulched or mixed into the soil in the garden and placed around the trees and yard plants. You can also use the soil as a top dressing on

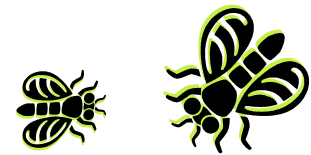
outdoor plants or sprinkle it on the lawn as a conditioner.

For indoor plants, you can mix vermicompost with potting soil. To top dress indoor plants, remove decaying bedding and food scraps from the castings. Make sure there are no worms or eggs in the castings as they will not survive the conditions in a plant pot.

In addition, you can also make a "compost tea" to feed to your plants. Simply add two tablespoons of vermicompost to one quart of water and allow it to steep for a day, mixing occasionally. Water your plants with this "tea" to help transfer nutrients in the compost to the plants.

Troubleshooting Tips (From "Worms Eat My Garbage".)

What can I do about fruit flies in and around my worm bin?



The best approach is prevention.

1. When you add food scraps, always bury them under the bedding. Be sure they are well covered with about 3" / 7.5 cm of bedding material. As an extra measure, you can also put a bit of fresh bedding on top.
2. Keep a tight lid on the container you use to store food scraps before adding them to the bin. This will prevent flies from laying eggs in the scraps.
3. Keeping the bin covered with moist burlap also deters these pests.

Will my worm bin smell?

It is unlikely that your worm bin will have an unpleasant odour. If it does, there are a number of possible causes and steps you can take to remedy the situation.

Cause: You have overloaded the bin with too many food scraps.

Solution: Give the worms a break and don't add any food scraps for a week or so.

Cause: The bedding is too wet and compacted.

Solution: Check the drainage holes to make sure they are not blocked and drill more holes if needed. Gently stir up the entire contents to allow in more air and add some fresh dry bedding.

Cause: The bin is too acidic.

Solution: Add very finely crushed eggshells to neutralize the acidity.

Cause: The contents of the bin have not been harvested in over three months.

Solution: Harvest the bin.

Special of the Day: Food Scraps

What you feed your worms is important to the success of your vermicomposter. Worms are not necessarily picky eaters, however there are still a few things you should know about what to feed your little wigglers.

Worms eat organic waste such as fruits, vegetables, eggshells, tea bags, coffee grounds, paper filters, and shredded garden waste. They especially like cantaloupe, watermelon, and pumpkin. Limit the amount of citrus fruits you add to the bin to prevent it from becoming too acidic.

Even though worms are voracious eaters, tear or cut food scraps into small pieces so they break down easier. Stay away from meat scraps, fish, greasy or oily foods, dairy, fat, tobacco, pet or human manure and non-biodegradable items.

Cover the food scraps completely with the bedding to discourage fruit flies and molds.

Remember, one pound of worms will eat about four pounds of food scraps a week. If you add more food than your worms can handle, anaerobic conditions will set in and cause odour. This should dissipate if you stop adding food for a while.

You can feed your worms anywhere from every few days to once a week. Simply pull aside some of the bedding, bury the food waste, and cover it with bedding. Each time you feed the worms, choose a different location to bury the food.

Eggshells will maintain the bedding at a safe pH level. Without them, the bedding may become too acidic. When adding eggshells you should:

1. Let the shells dry out.
2. Crush them finely with a rolling pin.
3. Sprinkle approximately one tablespoon (15 ml) per pound (.5 kg) of worms onto your bedding each week.

The Wiggler Buffet

Keep your worms happy by referencing this feeding chart as a basic guideline. Remember - do not over feed your worms!

- ✓ Coffee grounds and filters
- ✓ Crushed egg shells
- ✓ Dry cereals, breads & grains
- ✓ Melon rinds
- ✓ Grass clippings
- ✓ Plant trimmings
- ✓ Fruit and veggie scraps
- ✓ Tea bags
- ✓ Shredded paper towels

SIDE DISHES

The following may or may not be a favourite in your worm bin, so add in moderation:
Citrus peels, onions, and garlic



Avoid adding any of the following to your worm bin:



Meat Products:

Beef, pork, chicken and poultry, fish, or luncheon meats

Grease, Fats and Oils:

Butter, margarine, mayonnaise, or salad dressings

Dairy Products:

Cheese, milk, yogurts

Miscellaneous:

Corn cobs, tobacco, salty food, starches and bones