



Vermicomposting

Composting indoors with worms

Vermicomposting, or worm composting, is an easy process that requires only a few simple components: some red wiggler worms, a ventilated bin, bedding for the worms to live in, food for the worms, and some time to harvest their nutrient rich castings. Once you have all the components in place, worm composting is easy! Vermicomposting is perfect for apartment and condo dwellers who do not have an area for backyard composting.

Effort Scale:

Easy	1	2	3	4	5	Hard
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Vermicomposting is easy, with most effort coming around harvest time. Great for all ages!

The Worms and Other Worm Bin Organisms

Red Wigglers

Vermicomposting requires a special type of worm called a red wiggler (*Eisenia foetida*). The red wiggler is a deep red colour, unlike the common earthworm (*Lumbricus terrestris*) which is more of a pink colour and is found in your garden soil. Unlike typical garden worms, which like to travel through the soil, red wigglers prefer to live in smaller, more enclosed spaces with a concentrated food source – like worm bins! Worms are the predominant decomposing organism in your worm bin.

You will also notice other organisms that make their way into your worm bin - do not panic! These are all part of the vermicomposting process and will not harm the worms or escape into your home. A multitude of organisms is indicative of a healthy worm bin. Some organisms you may find are whiteworms, sowbugs, springtails, centipedes, and millipedes. For more information on compost organisms see Fact Sheet #8 – Compost Ecology.

The Worm Bin

Design

There are many different ways to make a worm bin, but all worm bins should meet certain criteria in order to ensure the bin can process food scraps and keep your worms comfortable:

- ◆ To handle food scraps from two people, the bin should be at least 3 feet³ (.08m³) in size. The dimensions of this size bin might be 2' (60cm) long, 1.5' (45cm)



Worm bin with stand

wide and 1' (30cm) deep. You can make your bin as large as you want, but a bin full of worm castings is heavy.

- ◆ The bin must have a lid. The lid keeps moisture (and the worms) in and flies and light out. It does not need to be tight fitting.
- ◆ The bin must have drainage. A few holes in the bottom of the bin will suffice. A tray beneath the bin can catch the drippings, which make a wonderful fertilizer. As well, you will need a stand to hold the bin up above the drip tray (see photo).
- ◆ The bin will need a source of air. Holes drilled in the side and fitted with soffit vents will provide the necessary aeration.

Locating Your Worm Bin

It is important to place your worm bin in a good location. Consider the following factors:

◆ Temperature

Worms prefer a temperature of about 17C-22C (70-80F). Thus, it should be kept indoors in the winter and can be put outdoors in the summer if it is in the shade.

Do not place the bin too close to a heating device like a radiator or heater, which can quickly warm the bin and kill the worms.

◆ Accessibility

It is a good idea to place your bin where it can easily be accessed and monitored. Some common places for worm bins are:

The patio	In the kitchen
Under the sink	Garage
Under a shaded tree	Bathroom

The Bedding

Worms need a comfortable material in which to live - what we call 'bedding'. This bedding should resemble a light, moist, fluffy soil that makes it easy for the worms to move around in. Here are a few items and tips that can help you achieve this environment:

- ◆ Shredded leaves make wonderful bedding for worms. They can be used on their own, or mixed 50/50 with shredded newspaper. Leaves, however, are only available at certain times of the year, so stockpile them when you get the chance!
- ◆ Shredded newspaper (about ½"-1"/1-3cm wide) is a great bedding product because it is abundant and free. However, it cannot really be used on its own; it mixes well (50/50) with leaves, peat moss, or coir.
- ◆ Coir (coconut husks) is a by-product of the coconut industry and has a texture much like peat moss (though less acidic). It can be mixed 50/50 with newspaper for bedding.



Newspaper and leaf bedding

- ◆ Peat moss is good bedding (50/50 with newspaper) but is not a renewable resource so should be used sparingly.
- ◆ The bedding should be moist but not soaked. We recommend that it be as wet as a wrung out sponge or slightly wetter.
- ◆ It is a good idea to mix, or turn, your bedding every few weeks to help aerate the bin. This prevents the bottom and corners from getting too wet and becoming anaerobic – creating an unpleasant smell.

The Food and Feeding

Food

Worms can eat a wide variety of food scraps such as:

- ◆ Fruit and vegetable scraps
- ◆ Coffee grounds
- ◆ Tea bags (string and all)
- ◆ Egg shells
- ◆ Plant prunings

Worms can also eat the following items, but your worm bin must be managed closely if you feed them:

- ◆ Cooked rice and pasta
- ◆ Breads
- ◆ Cooked beans
- ◆ Other processed foods

Do not add meat, dairy, or excessive oils to your worm bin. These items risk attracting fruit flies and houseflies, and can rot if not ingested quickly. Also, be sure to feed your worms a wide variety of materials. Limiting their diet to one or two items can slow their population growth and disrupt the pH of your bin. Adding too many items like lemons, tomatoes, coffee grounds or other acidic foods can also alter the pH of your bin and attract fruit flies.

Feeding

Red wigglers are voracious eaters, with the ability to eat their full weight in food a day – so they are ideal for worm composting. One pound of worms can eat seven pounds of food each week, and as their population grows they can eat even more.

It is a good idea to feed your worms on a regular basis, ideally once or twice a week. When you feed your worms, dig a small hole in the bedding, place the food scraps underneath, and then re-cover them with the bedding. This prevents the food scraps from smelling and attracting

flies and other pests. Be sure to feed your worms in a different place in the bedding each time, ideally moving in a consistent direction. This ensures that you do not dig up your other food scraps when burying new ones, and that the worms are moving throughout the whole bin, consuming the bedding along with the food scraps. One idea is to put an arrow (easily made out of wood or well laminated paper) over the spot where you have just fed the worms. Point the arrow in the direction you want to feed the worms next. After feeding them the next time, move the arrow to that spot.

Harvesting Your Castings

Harvesting the worm castings is the most labour intensive part of the vermicomposting process. There are many ways that you can harvest your worm castings, but here are just a few:

1. Migration Method

The migration method is an easy but lengthy process for harvesting your castings. You will want to begin your migration method when you see the worm bin is about 90% finished. This is easy to determine if you have used some newspaper in your bedding. When the newspaper is almost all gone and most of the bedding has turned to moist, black worm castings, it is time to migrate your worms. The timing of your migration is important because the castings are toxic to worms and they will eventually die if left in their own waste for too long.

Feed your worms on one short side of the bin, and the worms will all migrate to that side to feed. After 2-4 weeks you can harvest the castings on the opposite side of the bin and replace them with new bedding. You can then start placing the food in the new bedding and the worms will migrate to it. A good way to attract the worms quickly is by using horse manure as a feed.

2. Tarp Method

The tarp method is a more labour intensive process of harvesting your castings, but it can be done much more quickly than the migration method.

- 1) Simply dump the contents of your finished worm bin onto a big tarp. This is best done outside.
- 2) Separate the castings into small piles or make a long windrow pile (a long tall mound).
- 3) Shine a light on top of the pile (or use the sun

outside) and the worms will move to the bottom of the castings to escape the light and the heat.

- 4) Scoop the castings off the top of the piles and then re-pile them several times until all you have left is a bit of castings and a bunch of worms.
- 5) Add more bedding to your bin and return the worms to their home with a large amount of food.

The tarp method can also be used right inside the bin. Simply take off the lid and place the bin outside on a sunny day or under a bright light inside. Mix up the bedding thoroughly (but gently) and then let it sit for about an hour. The worms will have worked their way downward, out of the light, and you can skim the compost from the top of the bin. Repeat this process several times until you have a thin layer of worms and castings at the bottom of your bin. You can then add new bedding directly to the bin and continue with feeding.



Tarp windrow

Troubleshooting Your Worm Bin

Symptom	Problem	Solution
Worms escaping the bin	Compost finished, now toxic to worms; too much moisture; high pH	Harvest bin and add new bedding
Excessive moisture and drippings	Too wet - possibly from overfeeding	Take lid off bin and mix bedding and castings to aerate; reduce feeding
Fruit flies	Food not covered; or too much food added	Cover bedding with wet newspaper and bury food scraps carefully; reduce feed; cover with dry material
Bedding is dry	Not enough moisture	Add water

All About Red Wiggler Worms¹

Red Wiggler worms are intriguing creatures that are best known for their composting abilities. Understanding more about how worms live and reproduce can help make your job as a worm steward easier and more interesting...

Worm Anatomy

Worms are part of a phylum (a specific group of organisms) of creatures called *Annelida*, or ringed animals. They have segmented, flexible bodies and no bones (or eyes, ears, nose or teeth!). Worms move by contracting and expanding their bodies; small 'hairs' along the body called setae help the worms sense its surroundings in place of eyes and ears. Worms do not have lungs so they breathe through their *epidermis*, or skin, which also helps them sense odours.



Worm anatomy

Red Wiggler worms are *hermaphroditic*, meaning they contain both male and female sexual organs; however, two worms are still needed in order to breed. A sexually mature worm can be recognized by the prominent band, called the *clitellum*, located about 1/3rd of the way down its body. Sexual maturity is usually reached by the time the worm is 4-6 weeks old. The sexual organs, which provide egg and sperm, are located between the clitellum and the head of the worm (the anterior side).

Worm Reproduction

To reproduce, two worms join (approaching each other head on) by secreting mucus from their clitella. Sperm pass from each worm into sperm storage sacs in the other. The clitellum then secretes a substance, *albumin*, which hardens on the outside of the clitellum to form a cocoon (a lemon-shaped object the size of a small grain of rice). The worm backs out of this cocoon, pushing it over its head, depositing eggs and sperm into the cocoon as it passes over the sexual organs in a 2-3 day process. Worms can lay 2-3 cocoons a week for six months to a year. One cocoon can contain up to 20 eggs, but normal numbers are closer to 2-3.

Once the cocoon is separated from the worm it takes at least three weeks before the worms hatch. As the cocoon matures, it changes colour from a luminescent white to yellow then brown.

Worm feeding

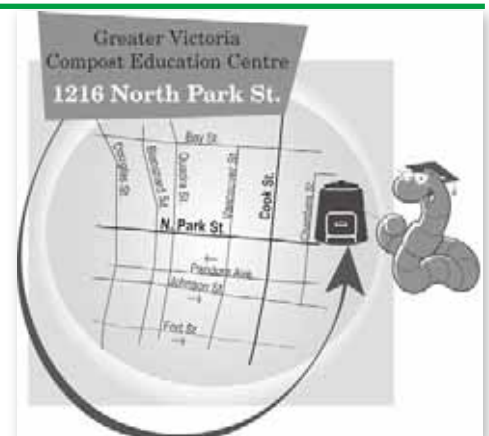
Worms do not have teeth, so they digest their food in their *gizzard*, much like birds. The gizzard is found between the clitellum and the head, very close to the sexual organs. To eat, the worm pulls food into its mouth using its *prostomium*, a piece of flesh protruding over the mouth. The food is pulled into the gizzard and ground up with sand and other debris before being moved into the intestine where it is dissolved and absorbed into the blood. Undigested material is then secreted out the rear of the worm through the anus (the *posterior* side), producing compost or *castings*. Worms can only eat small particles of food, and are greatly aided by bacteria, which soften and break down the food to make it easier for worms to ingest.

¹Text adapted with permission from Mary Applehoff's *Worms Eat My Garbage*; Flower press, Kalamazoo, Michigan 1982

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We sell composting equipment, gardening guides and more. Call, e-mail, drop by or visit our web site.

**Call the Compost Hotline:
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