

Vermicomposting — “Composting with Worms”

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NOTE: The following information is for the home vermicomposting enthusiast. This resource is not intended to be a reference for commercial bins or bins located in businesses, schools and/or government agencies.

Many gardeners compost both yard waste and kitchen waste with compost piles, sheet composting or some other method during the growing season. Fortunately, very little yard waste is generated during winter months when cold temperatures make composting difficult. However, usable kitchen waste is constantly being generated and must be disposed of. Vermicomposting is the process of using worms and micro-organisms to turn kitchen waste into a black, earthy-smelling, nutrient-rich humus.

To Begin

You need five basic ingredients to start vermicomposting:

1. a container
2. bedding
3. water
4. worms
5. non-fatty kitchen scraps.

Containers

In the book, *Worms Eat My Garbage*,* writer Mary Appelhof suggests weighing your household food waste for one week (in pounds), and then provide one square foot of surface area per pound. The container depth should be between eight and twelve inches. Bins need to be shallow because the worms feed in the top

layers of the bedding. A deep bin is not as efficient as a shallow bin and could potentially become an odor problem.

Worm boxes can be purchased or made. Plastic storage containers are convenient and come in a variety of sizes. These containers are easily transported and are a nice alternative to heavier wood bins. Many people choose to have several small bins as opposed to one heavier, large wood bin. Small bins work best in homes, apartments and school classrooms. They are easy to tuck under desks, place below kitchen sinks and keep out of the way in laundry rooms.

TIP: If you make a worm bin out of a plastic storage container, never snap the lid shut tight. The lid should lay loosely on the bin. An airtight bin will kill the worms.

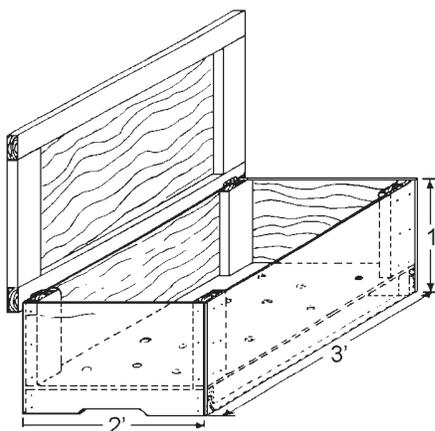


Figure 1. 1-2-3 Portable Worm Bin

Mary Appelhof's 1-2-3 Portable Worm Bin (1' deep, 2' wide and 3' long) (figure 1) is heavier than a plastic bin, but is desir-

able in situations where a bin is going to be outdoors part of the year or in a heated garage. Wood bins allow for better air movement and a bin this size (figure 1) can easily take care of food scraps from a family of four.

This bin has a bottom so it can be moved and used in a heated garage or basement during cold weather. When a worm box is used outside, it does not need to have a bottom. You may want to line the bottom with rocks or boards to keep rodents and other worm-loving creatures from tunneling in. Wooden boxes will typically last for 2 or 3 years.

TIP: If you are truly going to make this an “environmental experience,” try making your bin out of an old dresser drawer.

Depending on the size of the container, drill 8–12 holes (1/4–1/2 inches) in the bottom for aeration and drainage. A plastic bin may need more drainage — if contents get too wet, drill more holes. Raise the bin on bricks or wooden blocks, and place a tray underneath to capture excess liquid which can be used as liquid plant fertilizer.

The bin needs a cover to conserve moisture and provide darkness for the worms. If the bin is indoors, a sheet of dark plastic or burlap sacking placed loosely on top of the bedding is sufficient as a cover. For outdoor bins, a solid lid is better to help keep out unwanted scavengers and rain. Like us, worms need air to live, so be sure to have your bin sufficiently ventilated.

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Know how. Know now.

Bedding

The bedding for vermicomposting systems must be able to retain both moisture and air while providing a place for the worms to live. Bedding does not have to be purchased and most of us have plenty of bedding resources in our home, office or school. Here are some suitable sources of bedding.

- **Shredded corrugated cardboard** is an excellent bedding, but is difficult to find.
- **Shredded paper** like newspaper and computer paper is easy to find, but may dry out quicker than corrugated cardboard. There is not a problem with the ink from the paper.
- **Peat moss** has a low pH level that may cause a problem for the worms and it is more expensive.
- **Commercial worm bedding** is available in sporting goods stores, but it is also more expensive.

The amount of bedding you need depends on the size of the box. A 2' x 2' box will need between 4 and 6 pounds of dry bedding, a 2' x 3' box will take 9–14 pounds. No matter what the size, the bin should be 2/3 filled with “fluffed,” prepared bedding (see below). For smaller bins, experiment — if you prepare excess bedding, it can be dried, stored and used another time.

Prepare the Bedding

Water is needed to moisten the bedding. Place the dry, shredded bedding in a large container and add water until it covers the bedding. Allow the bedding to absorb as much water as possible before putting it in the worm bin. This could take from two to 24 hours, depending on the bedding used.

Before putting the bedding in your bin, squeeze the water out from the bedding as much as possible. The bedding should feel like a well-wrung washcloth. Place the bedding in the bin and fluff.

Your bedding needs to remain moist. If it is drying out, mist the paper with water from a spray bottle and dampen the bedding again.

The Worms

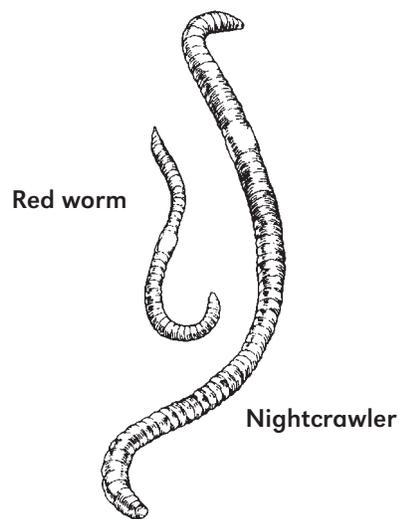


Figure 2. Red worms (left) are best for a vermicomposting.

The worms used in vermicomposting are called redworms (*Eisenia foetida*), also known as red wigglers, manure worms, red hybrid or tiger worms.

- You can order them through lawn and garden catalogs or from on-line sources.
- You may be able to find them in a bait store.
- If you know someone who has an established supply, they may be willing to sell you some of their worms.

What About Nightcrawlers?

Do not try to use nightcrawlers or other worms native to Nebraska to stock your worm bin. These worms depend on cooler temperatures and an extensive tunneling system to survive. They will die in your worm bin.

Why Redworms? Redworms prefer temperatures between 55 and 77 degrees F and are suited to living in a worm bin. The temperature of the bedding should not be allowed to get below freezing or above 84 degrees F.

How Many Worms Do I Need?

The amount of worms needed will depend on the amount of kitchen waste generated per day. One pound of redworms will easily take care of each half-pound of garbage. To add worms to the bin, simply scatter them over the top. The skin on the worm reacts to light and they will immediately work their way down into the bedding to get away from the light.

Kitchen Waste

The kitchen waste fed to worms can come from a variety of sources, including all vegetable and fruit waste (don't be surprised some seeds may germinate and potato peels with eyes sprout), pasta leftovers, coffee grounds (with filter) and tea bags. Worms may have a problem with garlic and onion skins. Worms have a gizzard much like chickens so fine grit should be added to help the worms digest food. This gritty material includes cornmeal, coffee grounds and/or finely crushed egg shells (dry the shells and then crush). Avoid large amounts of fat, meat scraps or bone. Some sources feel a small amount of meat and eggs will provide protein to the worms, but be careful you don't overdo it and know you may attract rodents.

Adding Kitchen Scraps: First, and foremost, **START SLOWLY**. It will take time for the food to start breaking down so the worms can eat it. If you rush and add too much food, your bin can quickly become very smelly. In the beginning, add a very small amount of gritty material (see above) and a small amount of vegetable matter. Don't worry about the worms starving because they will be eating bedding as well. You can gradually increase the amount of food as the bin becomes established.

The easiest way to add food is to spread the kitchen scraps in a thin layer on top of the bedding. If the bin is kept in a dark place or covered, the worms will come to the surface to eat. You can also pull back a small amount of bedding in the bin and dump in the scraps. Cover the scraps with an inch of bedding. Start at one corner of the bin and bury garbage in a pattern to fill in all the spaces. By the time you get back to the first burying spot, the worms will have composted most of the food waste.

TIP: If you notice odors, cut back on the amount of food or try chopping the food up into smaller pieces.

TIP: Citrus does have a strong odor and the peelings seem to last a long time in the bin. Bins seem to be more manageable when there is less fruit and citrus and more of the leafy vegetables.

Harvesting the Compost

Given the right environment, the worms will go to work to digest the kitchen scraps and bedding faster than any other compost method. The material will pass through the worms' bodies and become "castings." In about 3–4 months, the worms will have digested nearly all the garbage and bedding and the bin will be filled with a rich, black natural fertilizer and soil amendment. Compared to ordinary soil, the worm castings contain five times more nitrogen, seven times more phosphorus and 11 times more potassium. They are rich in humic acids and improve the structure of the soil.

To keep your bin going, you will need to remove the castings from time to time. One way to do this is to remove the lid on the bin shine a bright light into the bin. The worms are sensitive to light and will move to the lower layers of the bin. After you've waited several minutes, remove the top layer of casting by using your hands or a sieve. Each time you remove some bedding, the worms will be exposed to the light and they will keep migrating down to the bottom of the bin. Pick out any wigglers or worm eggs (small, opaque cocoons) and return them to the bin. Refill the bin with fresh layers of moist bedding and food.

Another method of harvesting composts is to push the black, decomposed material to one side of the bin, and fill the other side with new, moist bedding and kitchen scraps. Then wait several days. The worms will migrate to the freshly filled side of the bin and you can just scoop out the finished compost. Make sure you pick out any wigglers or worm eggs and return them to the bin.

Using the Compost

For potted plants, add a thin layer of the compost to the top of the potting soil. You can also add the compost directly into your soil mix when repotting. In the garden, simply work it into the ground around the base of each plant. The compost is very mild and you won't have to worry about accidental burning or over-fertilizing.



Some Don'ts

- Don't put plastic bags, bottle caps, rubber bands, sponges, aluminum foil and glass in the bin. These materials will be there forever and make your worm bin look like trash.
- Don't let your cat use your worm bin as a litter box. First, cat urine would soon make the odor intolerable. Secondly, the ammonia in the urine could kill your worms. There is also a concern with toxoplasmosis, a disease that is of particular concern to a pregnant woman who may pass on the disease to her unborn child. If you have cats, provide a screen or other device to keep them from using the worm bin as a litter box.
- Don't use insecticides around your worm bin. You'll not only take care of a few pests, but also your worms.
- Don't use garden soil as bedding for the worms.
- Don't mix fresh cow, horse and especially chicken manure into your bedding. These manures will "cook" your worms.

Other

After you've had your worm bin established, you may begin noticing other creatures besides the redworms — especially if you keep your bin outdoors. Most of these are helpful because they help breakdown the materials. These helpful creatures include springtails, sowbugs, pill bugs and millipedes.

There are also some creatures that may cause you problems. These would include centipedes, predatory mites, fruit flies, rove beetles and ants. Nonlethal methods of control (swatting, traps for fruit flies and ants, etc.) are the best for areas around your worm bins. Rodents should not be a problem when the bin is constructed and managed properly.

In Mary Appelhof's book *Worms Eat My Garbage*, she suggests that if you are allergic to molds and mildew, you may want to keep your home bin outside or away from living areas. Molds and mildew are part of the composting cycle that help to break down organic materials and naturally occur in a worm bin.

References:

**Worms Eat My Garbage*, Mary Appelhof.
Published by Flower Press, 10332 Shaver Road,
Kalamazoo, Michigan 49002.