

Composting with Worms

HGA-01020

Composting With the Help of Earthworms

Kitchen wastes can be effectively turned into a rich compost using earthworms. The end result is vermicompost, a mixture of worm castings and compost. It is beneficial both as a soil amendment and a slow-release fertilizer.

To get started, you'll need a container and some worms. It's best to start with a pound of worms, or, as they are most often sold, 1,000 worms. There are several online sources for composting worms, or check the classified ads of gardening magazines and catalogs and fishing magazines. Worms will cost between \$30 and \$40 per pound.

Your local Extension office may also have a listing of local sources of earthworms.



Photo by Scott Bauer, USDA

Type and Size of Box

Commercial earthworm boxes are available through many garden supply catalogs. Expect to pay between \$80 and \$120 for a commercial worm composter (not including shipping).

The chief advantage of a commercial system is its tiered design; worms migrate upwards through successive trays, allowing for easier (and worm-free) compost collection.

Inexpensive earthworm boxes may be improvised from household totes (HGA-01025, *Worms in a Tote*) or constructed from untreated wood or plastic. Whether you are constructing a bin or repurposing a tote, be sure that the container is relatively shallow, with plenty of aeration holes drilled in the lid. Never use a container that has been used for chemicals.

The size of the box will depend upon whether or not you want to compost all of your kitchen waste with worms. One square foot of surface area is needed for each pound of garbage buried each week. If your family generates a lot of waste, build a bigger box or build two small boxes. Keep in mind that smaller boxes are easier to move and empty. An average family of four generates 6 pounds of kitchen waste per week. A box 2 feet by 3 feet, or 6 square feet, will work for the average family.

How Many Worms Are Needed

Worms raised at the proper temperature will consume half their weight in kitchen waste per day. In other words, you will need 1 pound of worms to produce a half pound of food waste per day — a ratio of 2:1. On a weekly basis, 1 pound of worms should be able to process 3.5 pounds of waste. If the growing conditions are cooler or not ideal, the rate at which they consume will drop.

$$\frac{3.5 \text{ lb kitchen waste per week}}{7 \text{ days a week}} = \frac{1}{2} \text{ lb waste per day average}$$

Kind of Earthworms to Use

There are two species of red worms that successfully adapt to a box environment.

1. Red worm (*Lumbricus rubellus*)
2. Red worm (*Eisenia foetida*)

Nightcrawlers and other garden worms are very important for soil improvement but are not as adaptable to indoor conditions.

Where to Place a Worm Box

Put the earthworm box in a convenient spot where the temperature and moisture can be controlled. An ideal temperature for earthworms is 55° to 77°F. Air circulation is a must in and around the box.



What to Add to the Box

- Vegetable leftovers
- Egg shells
- Coffee grounds
- Oatmeal
- Cake
- Fruit rinds
- Teabags
- Spoiled food
- Small meat scraps
- Cheese

What Not to Add

- Non-biodegradable material
 - Cat litter
 - Bones (unless ground)
 - Vegetable oils
 - Chicken bones
 - Fats
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Starting a Earthworm Box

Start by placing damp bedding material loosely in the box. Cut or tear corrugated cardboard or newspaper into 1-inch-wide strips. A mixture of leaf mold, horse or cow manure, peat and soil will also make good bedding. Bedding should be moist and the consistency of a damp sponge.

Earthworms need grit to physically break down their food. Add a little sand or topsoil. Add 1 teaspoon of garden lime (calcium carbonate) per box to help keep the mixture from becoming too acidic. Red worms are top feeders. Put them on top. The worms will move down into the bedding.

Moisture

The earthworms and the bedding should have the same moisture content, between 75 and 90 percent. Earthworms will suffocate if the bedding is too dry since they breathe through their skin. Three pounds of water for 1 pound of dry bedding, or a ratio of 3:1, is needed. To determine correct moisture, squeeze a handful of bedding; less than five drops of extrudable water indicates the right moisture level.

Feeding the Worms

Feed the worms once a week, but don't overfeed them. Too much food will harm the worms, create odors and contribute to pest problems, and may

Vermicompost is beneficial both as a soil amendment and a slow release fertilizer

lead to fermentation and subsequent acidity problems. Additionally, overfeeding combined with very warm temperatures may lead to a population explosion of earthworms. When this happens, worms often attempt to leave their worm bin. Should overcrowding occur, simply remove one-quarter to one-third of the worms and give them to a gardening friend.

Adding the Waste

Place the waste on top and cover it with a thin layer of fresh, moistened bedding material. This will help minimize earthworm disturbance.

Select a different spot each day to place the waste. Divide the box into grids and start burying at one end. When all the locations have been filled, start over with the first location.

Grinding most kitchen waste is not necessary since it breaks down in a short time. Egg shells should be pulverized. While paper and cardboard form the bedding material in a bin, worms also like to eat these materials. Over time, you will find that your worms consume quite a bit of paper in addition to food. Therefore, periodically add more shredded newspaper to the worm bin.

Harvesting the Castings

After three to four months, you will want to harvest the castings. Decomposition and composting have taken place. The bedding will become dark and earthlike. It should feel and smell like rich soil. If there is a strong rotting or methane odor, this is an indication that there is too much food for your worms to process. Stop adding food for awhile, but continue to regularly check your worms for correct moisture content.

It is also important to periodically remove the castings, because they become toxic to the worms if left in the worm bin too long.

Changing the Bedding

Push the old material to one side of the box. Put fresh bedding material in the other side. Continue feeding only in the new bedding material. After a week or two, the worms should migrate to the new bedding material. Remove the old bedding material and earthworm castings.

What To Do With the Castings

Worm castings are an excellent source of nutrients and minerals for house and garden plants. Sterilizing is not necessary. An excellent potting mix may be made from one part castings, one part peat moss, one part perlite and one part sand.

Worm castings may be directly added to vegetable gardens and greenhouse beds. Just scatter and work into the soil as you would with any compost, or use as a side dressing for established perennials.

Whenever using worm compost, take care to keep your earthworms in their box. Although most parts of Alaska are too cold for worms to survive through the winter, it is always a good idea not to risk introducing a new species to an area.

If left in the worm bin for too long, the castings become toxic to the worms.

Dividing the Worms

Earthworms multiply rapidly. At four to six weeks the worms mature, mate and produce cocoons. Two or more baby worms will hatch from each cocoon. Realistically, each adult can give rise to 150 offspring per year. Overpopulation should be avoided. The extra worms could be used to start a new earthworm box or shared with a friend.

Troubleshooting

Overfeeding and too-wet and acidic conditions cause pest problems. Fruit flies, fungus gnats and excess mites can be controlled by a combination of methods. Insect traps can reduce high pest numbers but do not remedy the problem. Temporarily stop feeding and mix in dry bedding and a sprinkling of garden lime when pests are suspected.

Cover the top with at least 2 inches of moist bedding.

Common Questions

Can an earthworm see? No, earthworms don't have eyes. They are sensitive to light and try to hide when exposed to light.

Where is the earthworm's mouth? It is in the first segment. There is a small protruding lip just over the mouth. When foraging, this lip will be stretching out for sensing his food.

How does a worm grind his food? Earthworms do not have teeth; they have a muscular gizzard. Small parts of food, mixed with some grinding material such as sand, topsoil and limestone, is ingested. Contractions from muscles in the gizzard compress particles against each other, mix it with fluid and grind it to smaller pieces.

Do earthworms need air? Yes, gaseous oxygen diffuses across the moist tissue of their skin, from the region of greater concentration (air) to that of lower concentration (inside the worm). A constant supply of fresh air is needed by the earthworms.

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