

Composting with Worms Guide

Developed by Chicago Conservation Corps & Chicago Academy of Sciences / Peggy Notebaert Nature Museum

Why Worm Bins?

Food scraps make up 12% of the waste that Americans generate every day. That adds up to about 28 million tons of food that gets thrown out over the course of a year! Food scraps that are sealed in airtight landfills can react with other materials and create methane, a greenhouse gas, and acidic leachate. If the food is composted instead, it creates environmentally friendly, nutrient-rich soil. **Vermicomposting (or vermiculture)** is the practice of using worms to turn organic food waste into a nutrient-rich fertilizer called vermicompost. Worms eat the decaying food and transform it into castings (i.e., worm poop) that are full of the nutrients and bacteria that gardens and houseplants love. Vermicomposting is a great way to compost in an urban setting where outdoor compost bins may not be practical. You can keep the worm bin inside, and, if you do it right, it won't smell or attract flies.

Building a Worm Bin:

Materials (for a family of ~4)

Rubbermaid bin	Black-and-white newspaper or shredded paper
1 pound of red worms	
1/4 pound of organic food waste	

Step 1: Use the 1/16 inch bit to drill ventilation holes about 2 inches apart along the side of the bin near the top (to prevent worms escaping). Drill 8-10 holes in the bin's top. Remember to wear safety glasses when you drill.

Step 2: Prepare bedding materials. Bedding provides the medium in which worms live, holds the moisture and provides the air worms need to survive, and covers the garbage you bury.

Tear newspaper into long strips about 1 inch wide or shred old office paper. Fill the bin with the strips. Note: Do not use slick paper (like magazine pages), which can be toxic to the worms. The paper should be well-fluffed – don't pack it in. Add just enough water to moisten the paper so it is about as damp as a wrung-out sponge.

Step 3: Add about 1 pound of worms.

Step 4: Bury about 1/4 lb (about a handful) of food in the bedding. 1/4 pound of food equals about 3/4 cup of sliced fruit or veggies.

Step 5: Put the lid on it! Worms are sensitive to light, so keep the lid on the bin whenever you're not adding food or working on maintenance.

Making a Home for Your Worms:

Finding a place for your worm bin

Worms prefer moderate temperatures (between 55 and 77 degrees Fahrenheit), so find a place for the bin somewhere where it will not freeze or overheat. The kitchen is a good spot because it is where most of your food waste will occur, but you could also keep them in a garage, utility room, or other out-of-the-way location.

Feeding the worms (ongoing)

In general, earthworms consume about half their weight each day. Since you started with about 1 pound of worms, add no more than 1/2 pound of food per day. The worm population will adjust according to how much food you add, but the bin will probably not be able to handle much more than 1 pound of worms, so don't add too much food. Chopping the food scraps into small pieces with more surface area should help the worms eat it faster and will decrease the chance of rotting or molding.

Begin feeding the worms a little at a time. You can add more food as they multiply.

Bury the waste in pockets, rotating around the bin as you go. Most of the food should have been eaten by the time you return to the first spot. If not, cut back on the amount of waste you add.

You may have to do some trial and error to figure out which food scraps work best in your bin, but to start, here are some basic tips on what to feed the worms:

Feed lots of...		Feed some of...	Don't feed...		
Fruits, vegetables, & herbs	Newspaper	Coffee grounds/filters	Breads and grains	Bones	Spicy things like hot
Used tea & tea bags	Cardboard	Smelly veggies like	Oils, fats, and butter	Cheese and dairy	peppers
Rinsed egg shells	Paper towels	onions and garlic	Meat, poultry, and fish	Glossy paper	Manure

Maintenance (ongoing) – Keeping moisture in check

In addition to feeding the worms, you'll want to remove excess liquid to keep the worms from drowning. To keep moisture levels down, you can add dry shredded newspaper to the surface of the worm bin to soak up moisture, use a turkey baster to draw off excess liquid, and/or carefully pour the liquid out of the bin (making sure to keep everything else in). The liquid produced in the bin is known as "worm tea" or "compost tea" and makes a great, potent fertilizer for house or outdoor plants.

Harvesting Your Compost (After about 8-16 weeks)

After 2 to 6 months, you should start to see compost. Once you see that most of the bedding has been eaten and replaced with dark, crumbly fertilizer, it is time to “harvest” the compost and provide new bedding for the worms. Here are a few suggestions:

Scoop Method: If you just need a little compost, leave the top of the bin open for about 10 minutes. After the worms have wriggled to the bottom (to escape the light), scoop out a few handfuls of compost.

Migrating Method: Push the compost to one side of the bin and add fresh bedding to the other side. After a month or so, all the worms will have migrated to the fresh side and you can remove the old compost.

Pile Method: Empty the contents of the bin onto a sheet of plastic and separate into little piles. The worms will wriggle away from the light into the center of each pile and you can brush away the compost on the outside by hand.

Troubleshooting:

Problem	Probable Cause	Solution
Worms are dying	<ul style="list-style-type: none">• Too hot• Too dry• Too wet• Not getting enough food• Bedding is used up	<ul style="list-style-type: none">• Move bin to cooler location• Moisten bedding• Add more bedding• Add more food• Harvest bin and add more bedding
Bin stinks or attracts flies	<ul style="list-style-type: none">• Exposed food in bin• Not enough air circulation• Improper items added• Too much food added	<ul style="list-style-type: none">• Bury food in bedding• Fluff bedding and add more• Remove meat, dairy, etc.• Turn contents, add bedding; stop feeding until problem goes away
Other	Mold	Mold is an active part of the worm bin; the mold helps break down the food that the worms eat. People with extreme mold sensitivities should avoid tending the bin.
	Worms trying to escape	The bin probably has other problems; troubleshoot using the above tips.

Applying Compost:

Outdoor plants:

To mulch (after planting): Apply one inch to the soil around plants; make sure compost is not piled against plant stems.

To amend (before planting): Mix compost into the top few inches of soil before planting; or mix with potting soil and spread over your planting area; or mix it into the bottom of seeding trenches or transplant holes.

Houseplants: Sprinkle compost around the base of plants.

FAQs:

Q: What do I do if the compost is ready to harvest before I'm ready to use it in my garden?

A: Worm castings (i.e., the compost) are toxic to worms, so you should harvest the compost soon after it is ready. You can try storing the compost, but it may dry out or get moldy. We recommend finding a way to use compost soon after it is ready – such as on your houseplants.

Q: Will population control be a problem? Will my worms multiply out of control?

A: Your worms will not take over the house. The availability of food and space limit the population size. Worms reproduce quickly, but if you continue to add the same amount of food you always have, the population size will be kept in check. (Don't worry about finding dead worms in the compost; they decompose very quickly.)

Q: Can I put too much waste in the worm bin?

A: Yes. If you put more food waste in the bin than it is equipped to handle, anaerobic conditions may develop, causing odor. To decrease odor, you can aerate the bin by turning the material and stop adding food until the odor goes away.

Additional Resources:

Mary Appelhof's *Worms Eat My Garbage* is considered the authoritative source on vermicomposting.