

Recycle Your Food Waste with Worms

Vermicomposting – A Starter’s Guide

As a society, we look for ways to reduce, reuse, and recycle as much as we can. We can reduce the number of products we buy to only what we use. We can reuse an empty coffee can or donate the computer we are no longer using. Recycling can be done through home recycling services or at drop-off recycling centers.

Another way you can recycle is by composting your food scraps instead of throwing them in the trash. An efficient and fun way to compost food is with worms. This process is known as vermicomposting. The worms used in vermicomposting eat and then break down food waste and, thanks in part to their digestive systems, create an enriching source of nutrients called castings. Castings are a fancy way of saying “worm poop”. Whether you call it compost, castings, or worm poop, it’s full of microbes and nutrients that can be used as a beneficial additive to your garden or potted plants.

A vermicompost bin is a small ecosystem that you can keep in your classroom, office, home or garage and it only requires a few supplies. To get started, you will need a worm bin, bedding, food, and red worms. The worm bin can be used for observing, describing, asking questions, measuring and recording, life cycle studies, and even written exercises. Before starting, you will need to consider what worms need to survive. Like all animals, worms need food, water, shelter and space to survive.

Getting Started

For this guide, we will start out by using inexpensive materials. The guide will cover the following:

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2. [Bedding](#)
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4. [Food](#)
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Bin

An inexpensive and easy-to-use bin for vermicomposting is a plastic storage container. The container should be **dark** in color and shallow. Red worms are top feeders and prefer to live/feed near the surface, so a container should be 18 inches high or less. A 3-gallon to 12-gallon plastic storage container will be adequate.

Vermicomposting is an aerobic activity, meaning it needs oxygen. For air circulation, you can use a drill with a $\frac{1}{4}$ inch to $\frac{1}{2}$ inch drill bit to add holes in the top or side of the container. If the lid is loose fitting and not airtight, there is no need to drill holes in the container.

Red worms survive best if the temperature is kept between 55° to 77° Fahrenheit. Keep your worm bin away from drafts, vents, and windowsills, as the temperature can fluctuate in these areas.

Once you become comfortable with vermicomposting, you can investigate larger worm bins. There are specially designed bins for vermicomposting you can find online, or you can build your own.

Bedding

Bedding for your worm bin will serve several purposes. It will serve as a food source for your worms, a good medium in which to bury the food scraps, and it will keep your worms comfortable and feeling safe. Using newspaper as bedding for your worm bin is inexpensive, readily available, and simple to use. To use newspaper:

1. Shred newspaper into one-inch-wide strips or use a paper shredder for strips or crosscut paper.
2. Soak the strips of newspaper in water for 24 hours. Add enough water so that the strips of newspaper are submerged.
3. Wring out the strips of soaked newspaper so it feels like a wet sponge. Water should **not** be dripping from the newspaper.
4. Fluff the paper so that the worms can easily move through the paper.
5. Fill the bin to two-thirds full with the fluffed paper.
6. Add a small handful of soil or sand to the bedding (more on this under the Food section).

Notes:

- Avoid using glossy paper (such as magazines) or color newspaper inserts and mailers.
- You only need to add bedding when you first set up the bin and after harvesting the castings.
- You can use other materials such as peat moss or coconut fiber as bedding, too. Due to high acidity levels or salt levels, these items need additional attention and may need longer soak time in water.
- You can also purchase worm coir at most home stores and online. It is inexpensive and you only need to add water to turn the coir into dirt. Coir can be used in conjunction with newspaper.

Worms

There are over 4,000 different species of worms. Worms may look similar, but each species needs different requirements for survival. Worms that survive best in a compost bin are *Eisenia fetida*, also known as “red worms”, red wiggler, and even “manure worms”. Worms can be purchased from local growers, bait stores, pet stores, garden centers, or online.

Red worms can eat half of their body size in a day. If you start with a larger bin (12-gallons), you could add up to one pound of worms, which is about 1,000 worms or you can start out with a few hundred and they will populate the bin naturally. In four months, your worm population will have the potential to triple in size. The worms in your bins, known as a “worm herd,” will stabilize at levels that can be supported by the food given to them and the size of the bin.

Food

Worms are not picky eaters and will eat a variety of food scraps. Worms do not have any teeth, but they do have a gizzard to aid them in food digestion. A gizzard for a worm is like a garbage disposal in a sink. Inside the gizzard there are powerful muscles and small mineral particles, like soil or sand (that you added to your newspaper). Food enters the gizzard and then the muscles and small mineral particles pulverize food making the food small enough to pass into the worms' intestines.

When starting a bin, keep the food choices simple. As you get familiar with vermicomposting, you can start adding a variety of foods.

Foods to add to your bin can include:

- Fruit and vegetable trimmings or peels (some foods take longer to break down because they are fibrous, such as broccoli, carrots, and potato peels).
- Bread (should not have anything on it like peanut butter, mayonnaise, butter, etc.)
- Coffee grounds and filters
- Tea leaves and tea bags (paper bags only, not plastic)
- Egg shells (washed and ground up)

Foods to avoid in your bin include:

- Meat
- Fish
- Dairy
- Citrus
- Oily Foods

Give the worms a few days to acclimate to their new bin before you begin feeding them. When starting a new bin, add a small amount of food and check on the worms every few days. You will see how quickly they are eating and can then adjust the food amounts provided accordingly. If you add one pound of worms to your bin, they will eat approximately a $\frac{1}{2}$ pound of food waste per day. Whether you add one pound of worms or just a handful to your new bin, the worm-to-scrap ratio should be 2 to 1.

Harvesting

When your bin looks like soil and there are no more pieces of shredded paper visible, it is time to harvest or remove some of the compost from the bin. To harvest the compost, you have several options:

1. **Migrating Method** – Open your worm bin and gently push the compost over to one side of the bin. In the other half of the bin, add new bedding and some tasty food scraps. Once the worms have migrated to the new bedding, you can remove the compost and pick out any stragglers. Add more bedding to the now empty side of the worm bin.
2. **Cone Method** – This is a fun method to use with students. Lay a piece of plastic down on a table. Gently remove the compost and place into cone shaped piles on the table. Each cone shaped pile should be approximately six inches in diameter. Give the worms about 10

minutes to burrow down into the compost and move away from the light. Next, take a small handful of compost from the top of each cone and place it into a separate container. Give the worms another 10 minutes to burrow down again. You can repeat this process until all you have left is worms. Return the worms to the bin where you have added new bedding.

3. **Scoop Method** – Remove the lid to your worm bin and give the worms about 10 minutes to burrow down deeper into the compost. You can then scoop the top layer of compost out of the bin. Repeat the process until all that is left is the worms and new bedding.

Notes:

Worm compost is an excellent soil amendment or fertilizer you can add to potted plants and flowers, or gardens.

If adding compost to a potted plant, use $\frac{1}{4}$ compost to $\frac{3}{4}$ potting soil. If you use too much compost, it can make the soil hard and leave plants unable to grow properly.

You will need to harvest compost every three (3) to six (6) months.

Troubleshooting

Having a successful worm bin is a trial-and-error activity. There are a variety of bins, bedding, and food that can all be used to make a successful worm bin. Some common issues with worm bins are:

Problem	Cause	Solution
Smell issue	Too much food.	Feed worms less.
Bin is too dry	Not enough moisture.	Add a piece of food with high water content (such as an apple core, watermelon or berries) or add newspaper soaked with water and any excess water wrung out.
Bin is too wet.	Did not wring water out of newspaper enough or too much high-water content food present.	Add strips of dry newspaper or add less high-water content foods.
Fruit Flies	Food content.	Bury food under bedding.

Vermicompost Bin Assembly

Setting up a bin is simple and can be done in just a few easy steps!

		
Step 1: Choose a container. drill $\frac{1}{4}$ " - $\frac{1}{2}$ " holes in the lid and around the upper rim of container.	Step 2: Add enough bedding (coconut coir pictured) to cover the entire bottom of the container.	Step 3: Add water to the coir.
		
Step 4: Add enough water to dampen all the coir. The coir should be moist to touch.	Step 5: Gather a handful of shredded paper. Wet shredded paper for 24 hours, wring out, and fluff	Step 6: Add the damp paper to the container with the damp coir material.
	Once you have prepared the container, you are ready to start your vermicomposting journey by adding worms and food scraps.	
Step 7: Mix shredded paper and coir together.		

Resources

For questions or concerns you may have about your worm bin, email IDEM at: education@idem.in.gov.

For more information about Vermicomposting, visit IDEM's Environmental Education page at <https://www.in.gov/idem/iee/>