

Vermicomposting: Composting with Worms

Worms can turn kitchen waste into a nutrient-rich soil conditioner called vermicompost. Vermicompost is a mixture of worm castings (droppings) and decomposed organic material. This small-scale form of composting is ideal for apartment-dwellers and those who lack space for an outdoor compost bin. Vermicomposting also extends the composting season, an important consideration in our northern climate. Worms kept indoors will continue to consume waste when outside compost piles are frozen.

What You Will Need

1. Container

The size of the container and the number of worms needed depends on the amount of waste added. Try to get a rough estimate of the amount of kitchen waste you produce in a week. A worm bin should be about a foot deep and provide one square foot of surface area per pound of waste.

Number of People	Quantity of Worms	Bin Size
1 or 2	1 lb	1 ft x 1.5 ft x 2 ft
2 or 3	1 lb	1 ft x 2ft x 2 ft
4 to 6	2 – 3 lbs	1ft x 2ft x 3.5 ft

Plastic bins are suitable for a small number of worms but they may require drainage holes. Wooden boxes are more absorbent and provide better insulation.

Worms like a dark, moist environment. Cover your bin with a piece of moistened burlap sacking and a sturdy lid.

The location of your bin is important to the success of the project. A worm box makes an excellent addition to any kitchen, basement, laundry room, shed, or garage. Outdoor bins should have a lid and the worms need to be protected from extreme temperatures. Select a shady location and move them indoors when winter comes. We have noticed at MUN Botanical Garden that they do not like drafts or cold temperatures and will actually migrate from the bin if they are not comfortable. Worms are cold-blooded creatures and do require some external heat to stay active. However, they should never be placed directly near a heat source.



2. Worms

Red wigglers (*Eisenia fetida* and *Lumbricus rubellus*) are the best worms for vermicomposting. They are much smaller and thinner than earthworms and they don't seem to mind being kept in captivity. Some people call them "redworms", "manure worms", "brandling worms", or "trouters".

The red wigglers used at MUN Botanical Garden were generously donated by Bill Glynn of Trouters Special Worm Farm in Bay Bulls. Mr. Glynn has been raising worms and vermicomposting in Newfoundland for many years. He sells worms, bedding, castings and containers to the public. He is also an endless source of knowledge and advice. At time of printing, there are no other worm farms in our area.

3. Bedding

Your worms will eat everything you put in the bin, including their bedding! Use a variety of materials to provide them with more nutrition. The following materials make ideal bedding:

- Shredded newspaper
- Shredded cardboard
- Shredded fall leaves
- Chopped straw
- Dried grass clippings
- Peat moss
- Add a couple of handfuls of sand or soil to provide your worms with grit for their digestive systems.



4. Food Waste

Feed your worms the same kitchen waste that you would add to your outside compost heap. Bury wastes and vary the location of each deposit to avoid overloading your bin. Finely chopped food will be broken down more quickly than large chunks. Do not add meat, fish, dairy products, or fats. Citrus fruit peels take a long time to break down so add them sparingly. For more information on what to compost, please refer to Compost Information Leaflet #2 of this series.

Harvesting Vermicompost

Red wigglers will convert waste into vermicompost within a few months. The compost is ready to be harvested when there's little original bedding left and the food scraps have been converted to brown and earthy-looking worm castings.

Move the finished compost to one side of the bin and place new bedding in the space created. Bury fresh food waste in the new bedding. Your worms will gradually migrate to the new food and fresh bedding, leaving the finished compost to be skimmed off.

Using Vermicompost



- Sprinkle into a seed row when planting
- When transplanting, add a handful of vermicompost to the hole.
- Use as a top-dressing or mulch around the base of plants
- Mix half and half with potting soil for your houseplants.

Vermicompost Potting Mix Recipe

- 1 part worm castings for nutrients
- 1 part peat moss to help hold moisture
- 1 part perlite to aerate the soil
- 1 part sand or garden soil for bulk

Common Questions...

Will it smell?

Not if air can circulate through the layers.

- Drill holes in plastic bins and line with mesh
- Raise the bin above the floor
- Choose bedding that will not mat down (newspaper tends to get soggy)
- Turn the bedding every two weeks
- It is best to compost only recommended wastes: dairy products, fats, and meats can cause unpleasant odors.

How can I avoid fruit flies?

Fruit flies can become a problem if a high amount of fruit waste is put in the compost. The problem may be compounded if the lid is opened quite frequently as in a classroom setting. The following procedures may prevent this problem:

- Bury all food waste
- Avoid adding too much slow-decomposing fruit waste like citrus peel
- Don't overload your bin
- Keep the surface of the compost covered with a piece of burlap and a lid

To Solve a Fruit Fly Problem:

Place a flypaper coil next to the box or spray the surface with a fine mist of Safers soap every second day for one week.

Try a fruit fly trap: Cut a plastic pop bottle in half and fill the bottom with an inch of vinegar. Fit the top of the bottle upside down into the bottom so that the neck is just above the vinegar.

Compost versus Fertilizer

Plants need water, sunlight, and nutrients to grow. Three important nutrients are nitrogen (N), phosphorous (P), and potassium (K).

Nitrogen (N) is used to make protein and chlorophyll by the plant. It is important for good leaf development and vegetative growth. Too little nitrogen causes slow, spindly growth. Leaves may turn yellow due to lack of chlorophyll – the green pigment which helps plants make food.

Phosphorous (P) is vital for the growth of root and stem systems. When little of this nutrient is present in the soil, seedlings may not become well established.

Potassium (K) plays an important role in the plant's metabolism. It is involved in resistance to chill, drought, and disease. Lack of potassium may result in brown, scorched patches on leaves. Leaves may also roll inwards or downwards

Compost also provides nutrients, but usually at lower concentrations than chemical fertilizers.

Compost does, however, release nutrients to plants over the long-term, whereas chemical fertilizers are a short-term solution and must be reapplied regularly over the growing season. Extensive use of chemical fertilizers has also been linked to environmental degradation. Excess fertilizer can leach out during rain and end up in local rivers and ponds. Fertilization does not replace the value of soil improvement, which involves adding organic material.

Worms: A Gardener's Best Friends

Worms dig tunnels which allow air and water to penetrate the soil and improve root development. They are also living miniature compost factories! During digestion they secrete chemicals which free nutrients necessary for plant growth. Worm castings (or droppings) contain five to eleven times more available nitrogen, phosphorous, and potassium than the soil they ate to make the castings.

A Word about Good Worm Stewardship...

By removing worms from their natural habitat, you're taking responsibility for their care and well-being. Worms, like any creature kept in captivity, will die if neglected. Before starting your vermicomposting project, please ensure that everyone involved is ready to be a good worm steward!

The Biology of Worms

Worms can live up to about a year in a worm bin. Because the worm's body is about 90 percent water, if a worm dies in the worm bin, it will shrivel up and become part of the compost rather quickly.

Worms are hermaphrodites, which means they are both male and female at the same time. However, worms still need to mate. Two worms attach to each other for a few minutes, and several days later, both produce a cocoon or egg case. The cocoon eventually separates from the worm. Inside the cocoon, two to five baby worms may be found. The baby worms live in the egg case for at least three weeks, sometimes longer depending on the surrounding conditions. In the winter time, for example, baby worms may stay in the cocoon for many weeks until the temperature warms up again. When the baby worms eventually crawl out, they are the thickness of a piece of thread and about 1 centimeter long. Usually the worm appears white, as they have not yet developed enough blood (pigmentation) to be seen. In two or three months, worms are mature.

True or False?

Worms breathe through their skin? True

Cutting a worm in half will make two worms: False
(Cutting a worm in two will eventually kill it.)

Red wigglers can eat their weight in food every day : True

Worms have teeth: False

Worms are blind: True
(Worms don't have eyes and so they cannot see. They are, however, sensitive to bright light – that's why they burrow into the earth.)

Worm Facts

How long does a worm live?

In the wild, most worms live for a year. Worms must survive cold weather, droughts, and predators. In captivity, some worms have lived for as long as four and a half years!

What does the early bird have in common with the worm?

Both birds and worms have a muscular gizzard which contains small particles of grit. When the muscles of the gizzard contract, these hard particles help grind food into smaller bits, which are easier to digest. Worms in captivity need to be provided with a handful of sand or grit to help them digest your kitchen waste.

Have you ever wondered why worms are slimy?

Worms need air to survive, but unlike people, they don't have lungs. Instead they breathe through their skin! Oxygen enters their bodies by dissolving in the moist layer that covers them. If a worm dries out, it can't breathe.