Food scraps make up 14 percent (34.7 million tons) of all municipal solid waste in the United States. The Environmental Protection Agency estimates that less than 3 percent of food waste is being recycled compared to 62 percent of paper and cardboard. The result: a missed opportunity and a wasted resource. The solution: vermicomposting.

Vermicomposting is a natural process that uses worms and microorganisms to turn waste material, such as food scraps, into valuable soil amendments. The finished product is primarily made up of worm castings.

Compared to the traditional compost bin or pile, vermicomposting:

- Excludes undesirable animals to access the waste
- Needs less space
- Occurs more rapidly than the traditional pile or bin
- Requires less labor
- Produces worms for fishing or fish food

What Type of Worms Can Be Used and Where Can They Be Found?

The best species of worms for vermicomposting can thrive in confined quarters, and they have a voracious appetite for kitchen scraps. Only a small number of earthworm species have these abilities.

The most adaptable and readily available species is Eisenia fetida, commonly called red wigglers, manure worms, or brandling worms. These worms prefer, dark, moist (not wet), organic-rich environments. They are easily found for purchase in small quantities where fish bait is sold, but it's best to find a supplier that sells worms by the pound. Many sources are available on the World Wide Web. Always purchase worms from domestic suppliers.

How Many Worms Do I Need to Handle the Food Scraps We Produce?

The number of worms needed depends on the amount of waste generated. Red wigglers can consume 25 to 50 percent of their body weight per day. If your family generates three to four pounds of food scraps per week, you need two pounds of worms to gobble up this waste.

Be conservative on the amount of waste added because it is easy to overfeed them, causing odor and excess moisture problems. Wait until it appears that all food has been consumed before adding more.

What About the Worm Bin?

Bins can be purchased from commercial manufacturers but are easy to build from untreated wood or a retrofitted dark-colored plastic storage container. A typical 14-gallon plastic storage container has about three square feet of space and is a perfect home for one to two pounds of worms. Be creative! Almost any plastic container in this size range can work (figure 1).

Containers should have proper ventilation in the sides near the top and a few, small drainage holes in
the bottom (figure 2). Place the bins off the ground or floor to allow drainage and air movement. If they are located indoors, put a waterproof tray under the bin (figure 3).

If located outdoors, prevent water from running into or pooling in the bin, and avoid temperature extremes (below 32 degrees F or above 95 degrees F). Indoor locations are convenient and provide the best temperature for vermicomposting, but they can be problematic. If the environment is not correct, worms may attempt to escape, and fruit flies can be an issue if food is exposed or left uneaten. An unheated attached garage may provide the best environment.

Keep in mind that as temperatures go further below or above the optimum range (59 to 77 degrees F), the worms decrease the amount they eat and breed, and this can affect their survival. Moisture level influences everything else. It should never be drier than 60 percent humidity or wetter than 90 percent humidity (about as moist as a wrung-out sponge). Oxygen is critical, so ensure good air flow. Feed the worms gradually to maintain proper pH (acidity and alkalinity levels). Excess food (or the wrong food) that sits too long is often the cause of improper pH, ammonia, and salt levels.

What Goes Inside the Bin?

Suitable bedding material provides an environment for worm growth and covers the food waste. Shredded newspaper (not shiny magazines) and cardboard are good materials.

Tear newspaper in long strips about 1 to 2 inches wide. Tear or cut cardboard into small pieces. Cardboard is a favorite food and habitat for red wigglers. Soak the bedding material in water and wring out excess water before adding (figure 4). Loosely fill the bin half full of bedding (figure 5).

Add the worms to the bin along with the bedding material they were shipped with and a handful of garden soil. Cover them with a handful of fresh bedding to help them acclimate to their new home.

How Do I Feed Them?

Add more food when you notice most of the previously added food has been consumed. Overfeeding the worms leads to rotten scraps and a smelly bin. A general guide is to feed every other day.

Add food by either placing a small mound of scraps in each corner of the bin or by spreading the scraps in a thin layer (1 inch or less) on top of the bedding. Always cover the scraps with some bedding to prevent nuisance guests, such as fruit flies.
Check on the worms’ activities often to learn their average daily consumption, food preferences, and environmental changes in the bin. As your knowledge grows, managing this minirecycling facility will become much easier.

**What Will the Worms Eat?**

Start with low-moisture foods until you gain experience. Scraps such as grapes and melon have higher water content than coffee grounds and apples. Add a few spoonfuls of fine grit material, such as cornmeal, coffee grounds, fine sand, or finely crushed egg shells, to provide grit that the worms need for “chewing.”

Feed the worms plant-based materials lower in salts and acidity. Completely avoid citrus foods that are too acidic and minimize feeding items high in salt. Red wigglers would only choose small amounts of these in nature, so only add them to the bin in moderation. Never add meat, bones, fish, or other seafood, onions, garlic, grease, fat, tobacco, or feces of any kind.

Tips for excess food scraps.

- Add them to a backyard composting pile or bin. Bury the scraps a foot deep to discourage animals from getting to them.
- Add another worm bin of similar size. Having two bins of the same size is easier to manage.
- Put scraps in a container in the refrigerator or freezer. Feed these later when the worms are eating more or when you don’t have enough fresh scraps.
- Chop food materials into small particles for faster consumption.

**Vermicompost and Worm Harvesting**

A successful vermicomposting process yields valuable compost and castings (organic material) as well as additional worms. Every few months, you must harvest the compost and castings and start over with fresh bedding. The simplest method lets the worms do all the work.

Start by withholding food a few days so there is minimal food in the worm bin. Make fresh bedding and have it nearby. Gently shift everything (worms, too) to one end of the bin and place fresh bedding at the other end. Add a fresh batch of kitchen scraps and cover as usual. The hungry worms will migrate to fresh bedding to find food. Then remove the vermicompost from the other side.

**Castings** All animals create waste material as a normal body function. Earthworm manure is called castings. This recycled organic matter is rich in soil nutrients and looks like dark fine textured clay.
Remove some worms too. They reproduced as they were recycling your kitchen scraps. Ideally, reduce the total worm numbers back to your starting point of two pounds. There is no need to be so precise as to weigh them.

Use the harvested worms as fish bait or to start another bin for you or a friend. Use the vermicompost as soil amendment in any garden area or add it to potting mixes for outdoor or indoor plants. Vermicompost improves soil structure, acts as a slow release organic fertilizer, and even suppresses some soilborne diseases. If used around indoor plants, make certain that all scraps are fully decomposed to avoid attracting household pests.

**Figure 6.** Healthy worms make lots of compost.

**For more information**

Mary Appelhof  
_Worms Eat My Garbage_  
http://www.bae.ncsu.edu/topic/vermicomposting/

Rhonda Sherman  
North Carolina State University

http://sarasota.ifas.ufl.edu/compost-info/tutorial/worms.shtml  
Terry Brite Del Valle  
_Make Compost with Worms_  
University of Florida, IFAS

Sarah Kimball and Gerald Doeksen  
_Vermicomposting_  
Oklahoma Cooperative Extension Service

**Compost Tea** Add 2 tablespoons of vermicompost to 1 quart water and steep 24 hours, stirring occasionally. Use this “tea” as a fertilizer and soil amendment. Tea should be used within 24 hours after brewing.