

## Compost Units Series

# Worm Composting Bin

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Worm composting or vermicomposting is a suitable composting option for apartment dwellers and homes with no yard space and is also a great classroom activity. The worms stay in the bin and eat household food scraps, and the bin has no odor if properly maintained.

### Worm Bins

Worm bins can be made from plastic tubs by drilling air holes in the tub or by following the directions in this fact sheet to build a large plywood bin. Plastic tub bins tend to get wetter than wooden bins. If the bin is too wet, odor problems occur and worms die or leave the bin. Holes can be drilled in the bottom of the tub. Set the bin on wooden blocks or attach legs to the tub to increase air circulation. Manufactured worm bins are available from a variety of vendors.

Materials needed to get started:

- Shredded newspaper
- Cool tap water
- Garden soil, about a cup (do not use potting soil)
- One crushed eggshell
- Worm bin (vented for good air flow)
- Redworms (*Eisenia fetida*)

### Bedding

Moist bedding provides the medium that worms need to survive. Shredded newspaper is the best bedding material because it is readily available, provides excellent moisture retention and

preparation is simple. Other bedding such as shredded office paper, shredded cardboard, peat moss and leaves can be used.

Moisten the bedding material by placing it in a 5-gallon bucket and adding water to achieve a 75 percent water content by weight. Weigh the dry material and multiply the weight by three to determine the weight of the water to add. If the material cannot be weighed, or if it is already wet, add enough water to dampen all the bedding. Seventy-five (75) percent moisture is about as wet as a wrung out sponge. Excess moisture drains off most materials when they are placed into the composting bin; however, peat moss may hold too much water.

Add about 8 inches of moistened bedding to the bottom of the bin. It is a good idea to put wet bedding material into the bin outdoors and wait until all the water has drained out (one to two hours) before setting the bin up indoors. Gradually mix the water, garden soil and crushed eggshell with the shredded paper. Bedding should not be packed too tightly.

### What Kind of Worms and How Many?

Be sure to specify redworms when getting worms for worm composting. *Eisenia fetida* are the preferred species for a worm bin environment. A worm bin will support up to 1 pound of redworms per square foot of surface area.

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A large bin with 7 square feet of surface area will accommodate up to 7 pounds of redworms and process about 3 1/2 pounds of food waste daily. Bins can be started with a smaller amount of worms and numbers will build up within a few months. For a 2 foot by 2 foot bin, add 1 pound of *Eisenia fetida*.

## Adding the Worms

Place the worms on top of the bedding and leave the lid off for a while. The worms will work down into the bedding away from the light. Make sure there is good air circulation. Worms do best at temperatures between 55 and 77 degrees Fahrenheit.

## Adding Wastes

Dig a small hole in the bedding, add vegetable and fruit scraps, then cover the hole with bedding. Always cover the food scraps. Do not add any inorganic or potentially hazardous materials, such as chemicals, glass, metal or plastic.

Worms are not picky eaters, but they will only eat hard food after natural degradation softens it. Don't exclude these foods, and do not be concerned if it takes a while for them to disappear. It does help to break up or puree hard foods in a processor.

Redworms do not have teeth. Instead, they digest food material in their gizzard. The gizzard needs a small amount of grit to grind food. That is why the garden soil was added to the bin.

Many variables will affect how much the worms will eat. For example, they are more active at room temperature than at 40 degrees. A general rule is that worms will consume up to half their weight in food waste per day under ideal conditions. If you start with 1 pound of worms, you can expect them to eat up to 1/2 pound of food per day. Start with small bits of food until the worm population increases. Do not overload the system. Overfeeding can lead to odor problems.

Suggested foods for the worm bin are fruit and vegetable scraps; grains, corn meal and breads; coffee filters and grounds\*; tea bags\*; eggshells and citrus\*. Be cautious with acidic foods; feed these in small quantities only.

Do not feed heavily salted foods, such as salted peanuts, potato chips, etc.; manure from dogs, cats or horses (horse manure may contain wormers or antibiotics that will kill your worms) and animal feeds which may also contain antibiotics.

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\*acidic foods

## Maintaining the Worm Composting Bin

Keep the bin moist, but not wet. If flies are a problem, place more bedding material over the wastes or place a sheet of plastic over the bedding. As an alternative, try placing some flypaper inside the lid. Every three to six months, when the bedding is mostly digested, the castings or vermicompost will need to be removed from the bin. This is referred to as "harvesting" and can be done in the following ways.

## Harvesting Castings

This is one natural reward for your composting efforts. Casting compost is one the best natural soil additives available. It completes the recycling loop and illustrates how important worms and other organisms are to the balance of our ecosystem.

## Dump and Sort Method

Materials needed:

- 1 small plastic sheet
  - Light source (either a lamp or bright overhead fluorescent)
1. Prepare fresh bedding as described earlier.
  2. Empty the contents of your container onto the plastic sheet.
  3. Add fresh bedding to the container.
  4. Position the light source over the casting pile. The worms will move down into the castings.
  5. Carefully pick the castings from the pile in layers, working toward the bottom center of the pile. Place castings in a separate container.
  6. Continue this procedure until there is only a small pile of castings with worms beneath it.
  7. Add this pile and worms to the fresh bedding in the bin.
  8. Use the harvested castings for a horticulture project.

## Split Harvesting Method

### Method #1

If the above method seems like too much trouble, you can simply add two-thirds of the castings (worms and all) directly to your garden. Add the remaining

one-third to your fresh bedding. This will inoculate the bedding and provide some worms to get you going again, but it depletes your worm population for a while.

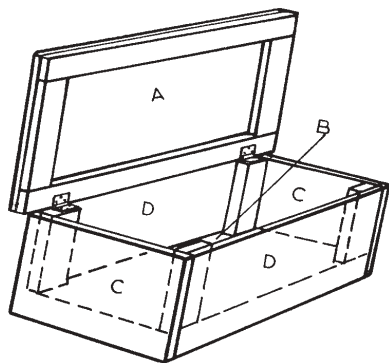
## Method #2

If you don't want to loose any of your redworms, try this method. Don't feed the worms for a few days. Move all the castings and worms to one side of the bin. Add fresh bedding to the empty area, moisten the bedding, add some soil and eggshells and then bury food in the new bedding. The worms will start to move to the new bedding to feed. In about a month, you can remove the worm castings and use them in your garden. When you remove them, you may need to add some more bedding.

## Building a Worm Composting Bin

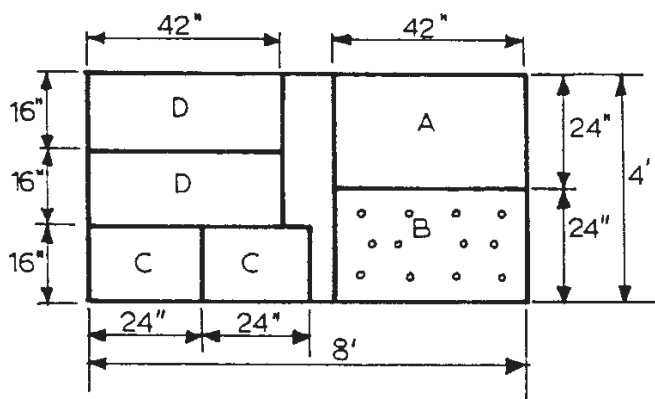
Materials needed for a wooden bin:

- One 4- x 8-foot sheet of 1/2-inch exterior plywood
- One 12-foot length of 2 x 4 lumber
- One 16-foot length of 2 x 4 lumber
- 16d galvanized nails (1/2 pound)
- 6d galvanized nails (2 pounds)
- Two galvanized door hinges
- (optional) 1 pint clear varnish
- (optional) Plastic sheets for placing under and over the bin
- 1 pound of red worms (*Eisenia fetidia*) per square foot of bin surface area (see What Kind of Worms and How Many?)
- Bedding for worms: peat moss; brown leaves; moistened, shredded newspaper; or moistened shredded cardboard
- Tape measure
- Skill saw or hand saw
- Hammer
- Sawhorse
- Long straight-edge or chalk snap line
- Screwdriver
- Drill with 1/2-inch bit
- Eye and ear protection
- Work gloves
- (optional) Paint brush

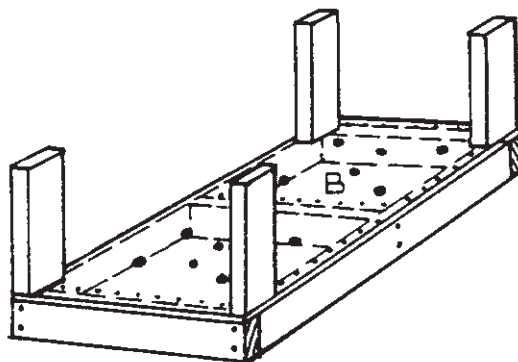


## Worm Composting Unit

1. Measure and cut the plywood as shown, so that you have one 24- x 42-inch top, one 24- x 42-inch base, two 16- x 24-inch ends, and two 16- x 42-inch sides.



2. Cut the 12-foot length of 2 x 4 lumber into five pieces: two 39-inch pieces, two 23-inch pieces and one 20-inch piece.
3. Lay the five pieces on edge on a flat surface to form a rectangle, with the long pieces on the inside and the 20-inch length centered parallel to the ends. Nail the pieces together with two 16d nails at each joint.
4. Nail the 24- x 42-inch piece of plywood onto the frame with 6d nails every 3 inches.



5. Cut four 1-foot lengths from the 16-foot length of 2 x 4 lumber. (Save the remaining 12-foot piece.) Take the two 16- x 42-inch pieces of plywood and place a 1-foot length flat against each short end and flush with the top and side edges. Nail the 2 x 4s in place using 6d nails.
6. Set the plywood sides up against the base frame so that the bottom edges of the 2 x 4s rest on top of the base frame and the bottom edges of the plywood sides overlap the base frame. Nail the plywood sides to the base frame using 6d nails.

7. To complete the bin, nail the 16- x 24-inch pieces of plywood onto the base and sides at each end.
8. To reinforce the bin, stagger nails at least every 3 inches wherever plywood and 2 x 4s meet.
9. Drill twelve 1/2-inch holes through the plywood bottom of the bin for drainage.
10. To build lid frame, cut the 12-foot piece (from the 16-foot length) of 2 x 4 lumber into two 45-inch pieces and two 20-inch pieces. Lay the pieces flat, forming a rectangle with the short pieces inside.
11. Lay the 24- x 42-inch piece of plywood on top of the lid frame so that the plywood is 1 1/2 inches inside all the edges of the frame. Nail the plywood onto the frame with 6d nails.
12. Attach the hinges to the inside of the back of the bin at each end (on the 2 x 4) and the corresponding undersides of the back edge of the lid frame so that the lid stands upright when opened.
13. The unfinished bin should last for at least five years; finishing the bin with varnish or polyurethane will protect the wood and prolong the life of the bin. Two coats of varnish with a light sanding between coats should be sufficient.
14. Find a good location for the bin. It can be placed anywhere, as long as the temperature is more than 50°F (10°C). The most productive temperature is between 55° and 77°F (13° and 25°C). Garages, basements and kitchens are all possibilities, as well as the outdoors in warm weather (not in direct sunlight). Make sure to place the bin where it is convenient for you to use. It is wise to place a plastic sheet under the bin.
15. The bin has 7 square feet of surface area and will house up to roughly 7 pounds of redworms. Density of worms in a bin depends on what and how often the worms are fed, food particle size, temperature and other factors.

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