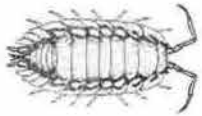


Bin Ecology

There are many critters in your bin, besides just worms, and that's fine! The bin is a functioning ecosystem with prey and predators, primary and secondary consumers. The only unwanted creatures are those that harm the worms or are unpleasant to humans (e.g. ants or fruit flies). But most bugs you find, like springtails and sow bugs, are no problem.

Troubleshooting

Sometimes if you leave your bin for a while, your worms get unhappy. Don't be discouraged, though! Just give them a little attention.

Flies: Either your food scraps have larvae from your storage container (store in fridge) or you don't have enough top bedding to cover the food (add more bedding, cover with cardboard)

Smell: Probably feeding too much, so it's rotting anaerobically. Cut back on food until the worm population grows. Also try increasing bedding and ventilation to get air flowing through.

Ants: Raise the bin above a "moat" of water so they can't climb into it. Ants sometimes also mean the bedding is too dry.

Worm escape: If worms are crawling out drainage holes or climbing up the sides of the bin, there may not be enough food, or it may be too hot, humid, or toxic from lots of worm casting in the bin for the worms! If the environment is comfortable, they won't leave.

Earthworm mites: Typically because too moist in bin, so add dry bedding. Can bait the mites by putting a piece of bread or melon and remove the mite-infested food when mites congregate on it.

For more information:

Worms Eat My Garbage by Mary Appelhof, 2000
www.mastercomposter.com/worm
http://www.calrecycle.ca.gov/vermi
http://www.wormwoman.com

Need help? Need worms?
Contact us at cce@asucd.ucdavis.edu

PROJECT COMPOST'S GUIDE TO

WORM COMPOSTING

VERMICOMPOSTING

A redworm eats its weight every day!

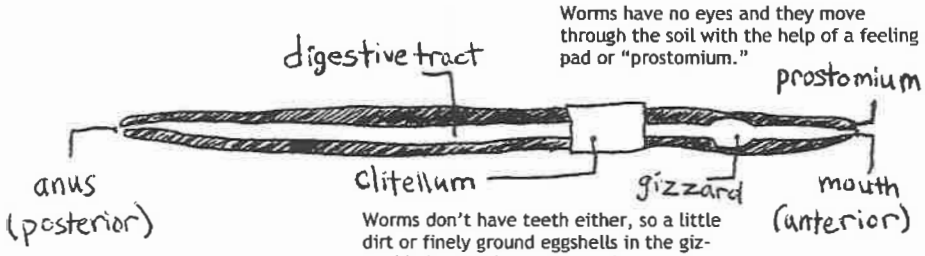
Project Compost
University of California, Davis
The EcoHub (TB 24)
cce@asucd.ucdavis.edu
www.projectcompost.ucdavis.edu
Like us on Facebook!

Vermicomposting

Vermicomposting is the use of worms to digest organic matter. They eat food scraps and excrete worm casting a dark crumbly substance we call **black gold!** Vermicompost contains many of the macro and micro nutrients needed by plants and is a more concentrated and rich fertilizer than ordinary compost. By creating vermicompost systems, we can easily turn food scraps into valuable resources that improves the health of the soil rather than adding to the landfill.

Worms

Red worms, also called "red wrigglers," are best suited for the job. This is because they eat large quantities of organic material and can digest up to their body weight every day. Unlike "night crawlers" and other common earthworms, they are surface feeders so thrive in the confined space and environment of a worm bin. The species *Eisenia foetida* and *Lumbricus rubellus* are most commonly used.



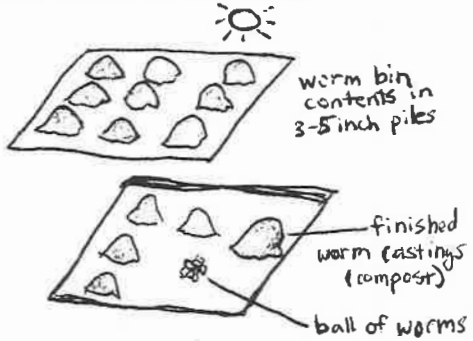
Worms are hermaphroditic (having both ovaries and testes) and can reproduce at about 6 weeks of age. They join together via mucus secretions and both deposit sperm onto the other worm. A cocoon (they look like small brown beads) then forms over the clittelum, collecting both eggs and sperm as it slides off the worm's body. After two to three weeks, baby worms hatch from the cocoon!

Harvesting

Over a few months, the bedding volume will decrease. That's because worms are eating and turning it into castings! This makes the environment less and less healthy for them because there is less air flow and because castings are toxic to the worms at high levels. If you wait until everything is entirely converted to castings, the worm population will be small and unhealthy. But if you harvest the castings sooner, you can give the worms a fresh start with new bedding and start over with a large, robust population. Two basics methods for harvesting out the vermicompost:

ONE TIME:

Empty your worm bin onto a plastic tarp. Make piles 3-5 inches in diameter. When the piles are exposed to light, the worms will migrate to the bottom of each pile, allowing you to remove the compost on the top of the pile. At the bottom of each pile will be a cluster of worms. These can be place back in the refurbished worm bin!



CONTINUOUS:

Let the worms sort for you. Just feed your worms on one side of the bin for a month. The worms will migrate to the side with the food, and the worm castings can then easily be removed! Requires a bin large enough to split.

Compost Use

Worm compost is a great source of nutrients for plants, and it also improves the structure and water-holding capacity of the soil. You can sprinkle the compost onto garden beds, in seed flats, or even potted plants indoors. The leachate can also be diluted to make compost tea that can be applied on leaves to help protect against fungus or diseases.

Bedding

Worms need a nice comfortable home, similar to their natural habitat. Bedding should be light and fluffy, so that air can flow through. It should also be moist but not wet, like a wrung-out sponge. Possible bedding materials are shredded newspaper (non-glossy), straw, or leaves. You should have about 6 inches of moist bedding at the bottom, and a nice thick layer of dry bedding on top to cover and insulate the worms.

Environment

Worms hate light, are cold-blooded, and breathe through their wet skin, so they like dark, warm, moist environments! Optimal temperatures are 55-77 F. They need air, so holes for aeration are very important. Worms will also drown if it gets too wet, so add dry bedding if it becomes too moist or consider having drainage holes. Your goal is to create a 5-star worm hotel!

Food

Worms eat a primarily vegan diet of fruits, veggies, and grains. Avoid acidic things like citrus. Meat and dairy contain pathogens and tend to produce strong odors, so don't feed them to your worms! (Clean and ground egg shells though can be a nice source of grit.) Careful with bread because it tends to get moldy very quickly which can overwhelm your worms. Worms also don't like really salty or fatty foods, so avoid heavily processed foods. Experiment with how much food your worms can handle at a time. They like moldy, but if you find lots of VERY moldy, smelly food piling up, then you're probably overfeeding. If all the food is gone every time you check, you can probably feed them more. Chopping pieces up small increases surface area, so they can be eaten faster.

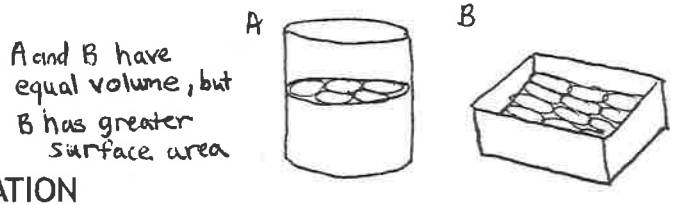
Fruit/veggies scraps, tea bags, coffee grounds, egg shells	Citrus, meat, dairy, fatty or salty foods
YES	NO

Bins

There are many options, from a homemade wooden box to a plastic tub or commercial bin. The container should be wide and shallow, because red worms work off of surface area. It should have plenty of holes for ventilation, and possibly for drainage as well. The following are important things to consider when setting up a bin:

SURFACE AREA

How much material do you want to compost? The more surface area, the more food you can add. There should be about one square foot surface area for every pound of material per week. But this is just an estimate—you should experiment! The worms will adjust and equilibrate their population to whatever size bin you provide.



LOCATION

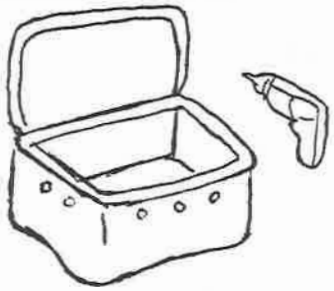
Worms are great for students because they can be kept indoors in a small space. If managed properly, there won't be any problem with odors, flies, etc! Indoor worms are much happier during the cold winters and the hot sunny summers, and they're more likely to survive and keep reproducing year-round. You can keep a bin under the kitchen sink, in a pantry, the garage, or wherever is convenient for you.

If you keep your bin outdoors, it should be located on the north side of the house (away from direct sunlight). Keep it in the shade, protected from rainfall, and as insulated as possible during the winter.

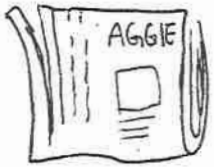
Setting Up a Worm Bin

How to set up a worm bin from a plastic Rubbermaid storage bin

1. Choose a bin—remember you want surface area, not depth



2. Drill holes for ventilation at the top of the bin; drainage holes if desired

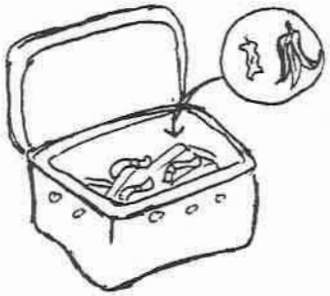


3. Tear newspaper into 1 inch wide strips for bedding

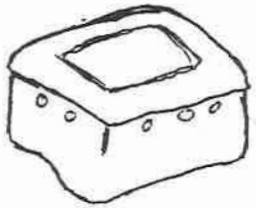
4. Fill bottom of bin (6 inches) with moistened bedding—like a wrung-out sponge

5. Acquire worms. Half to one pound of worms, depending on the size of the bin

6. Spread worms around the top of the bedding



7. Add food scraps. (no meat, dairy, etc.), and cover with more bedding (3-6 inches)



8. Cover bin with lid and store indoors or insulated location outdoors