

Composting with Worms

or making black gold from garbage

February 18, 2020

Why worms?

Worms have been efficiently converting organic residues to a usable form for 300 million years.

Figure 4. Total MSW Generation (by material), 2017
267.8 Million Tons

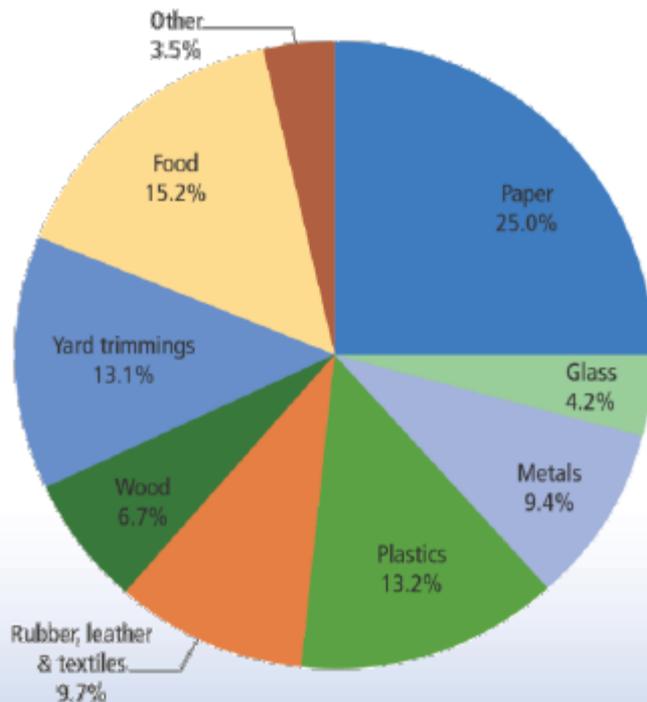
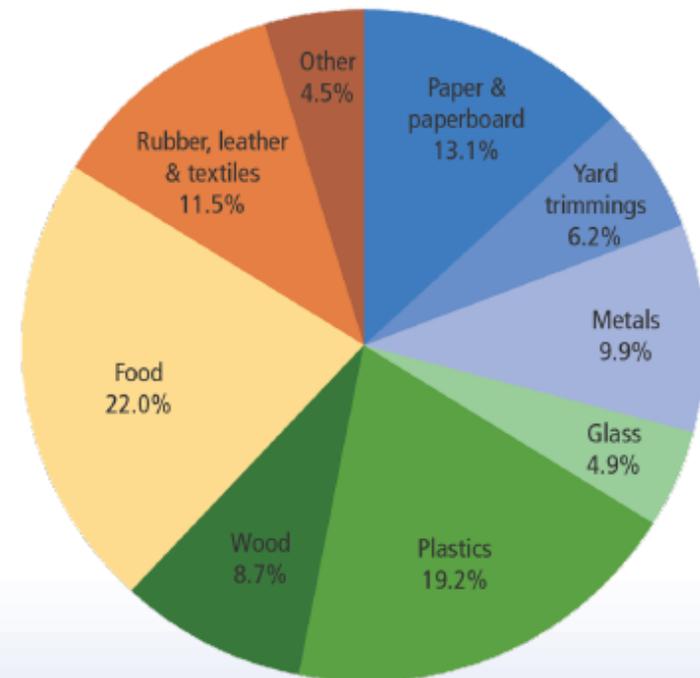


Figure 8. Total MSW Landfilled (by material), 2017
139.6 Million Tons



Barry Commoner – The Closing Circle

- Everything is connected to everything else
- Everything must go somewhere
- Nature knows best
- There is no such thing as a free lunch

The First Step—Food!

What to feed:

Worms will eat pretty much anything. When food recommendations are made, they serve as a guideline.

Consideration is also given to other factors such as pests, odors, and the overall PH of the bin environment. The following list will give you an idea of the variety of items that worms can be fed...

-Apples and peels *-Banana peels* *-Baked Beans* *-Biscuits* *-Cabbage*
-Cake *-Celery* *-Cereal* *-Cheese* *-Corn bread* *-Cream cheese* *-Cream of*
Wheat *-Cucumber* *-Deviled eggs* *-Egg shells* *-Farina* *-Citrus peels* *-Grits*
-Lettuce *-Molasses* *-Oatmeal* *-Onion peel* *-Pancakes* *-Pears* *-Pineapple*
and rind *-Pizza crust* *-Potatoes* *-Coffee grinds(and filter)* *-Tea*

...and the list goes on!

We like to recommend a vegetarian diet.

Some foods can cause problems:

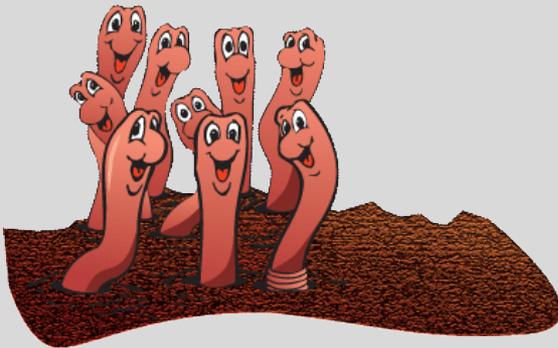
- *Meat and bones*: While meat will be broken down by worms, and offers nitrogen, potassium, and phosphorus, it can create offensive odors and attract flies, ants and rodents. Bones can be a nuisance when harvesting castings.
- *Excessive citrus, onion, and garlic*: While small amounts are fine, too much of these items are not recommended. Experiment with how much your bin can handle without adverse effect.
- *Non-organic material*: Take a few moments to remove stickers, ties, rubber bands and any other non-organic items from your waste before adding to the bin.

How much waste do I have?

It's a good idea to measure how much waste your household will generate before putting your bin together.

Plan on one square foot of bin surface area for each pound of garbage per week

You can construct your box from lumber to your specifications, utilize plastic bins or totes, or purchase commercially produced set-ups. Our examples will utilize plastic bins and totes.



The Second Step—Worm Bin!

Size constraints within your home:

- Where will the bin be housed?
 - Kitchen is handy, but is there room? How about a closet or pantry?
 - Patio is an option, will you be able to manage temperature extremes?
 - Basement is usually cool and damp, but how accessible is it?

Managing temperature:

- The bin can withstand a range of temperatures, but worms will convert waste best at 59-77 degrees F.
 - Outdoor bins may require insulation and/or supplemental heat during winter.
 - Outdoor bins may need to be brought indoors during high temperatures in summer.
 - Plastic bins do not insulate well. If outdoors or garage is your preferred location, a different bin material may protect from temperature challenges.

Managing air flow – the worm bin is an aerobic environment

- Ensure adequate oxygen can enter the bin.
 - Drill holes in your plastic bin for air to get in.
 - Ensure bedding is loose and allows for air movement.

Managing moisture – worms need moisture to breathe

- Check your bin for too dry or too wet conditions
 - Ensure there are drainage holes in the bottom of the bin for excess water to escape. Liquid draining from the bin may be used as a liquid fertilizer.
 - If the bedding or castings seem dry, add water. You can also soak leaves or paper and add to the bin for additional moisture. Your food waste is a good source of added moisture also.

Managing acidity – the final component of a healthy bin

- Worms will tolerate pH in the range of pH5(a bit acid) to pH9(somewhat alkaline). pH7 is neutral.
- The slightly more acid is preferable

Red worms are happy to be in the bin environment! Your best clue that there may be an issue is when worms try to escape.

Bin assembly – at last!!

- Bedding
 - Leaves or newspaper work well, and are generally plentiful and free or cheap. Other carbon based bedding such as wood chips, sawdust, peat moss, shredded cardboard, and some manures work well also. For best results, shred newspaper and mulch leaves.
 - Thoroughly wet the bedding before adding to the bin. Bedding moisture should be a 3:1 ratio.
- Soil
 - For a newly started bin, a few handfuls of soil introduce other helpful micro-organisms and “grit” into the bin.
- Pulverized eggshells
 - Also provide grit in the bin as well as calcium carbonate, which is beneficial to the worm’s reproductive health.
- Food waste
 - Add some waste as described. Chopped waste, and partially decomposed waste will provide food for the worms immediately. There should be a 2:1 ratio of worms to food.

Other critters in the bin....

Good bugs or bad bugs?

- white worms
- springtails
- isopods (sowbugs, pill bugs, woodlice, slaters)
- centipedes
- millipedes
- flatworms
- mites

The Final Step—Harvest!

Depending on the amount of worms, waste, and bedding you have added to your bin, you will be able to harvest castings within two to four months. This can be achieved by:

- Dump and sort method
- Self sort method—when the bedding mix has depleted in the bin, make another fresh batch of bedding. Push bin castings completely to one side of the bin. Place the new bedding on the empty side and place food waste only on the new side. In a short time, the worms will be completely on the “new” side, and you can pull out the original compost.
- Some commercially produced systems have a mesh bottom which allow you to harvest from the bottom of the bin.

How do I use vermicompost(mix of castings and bedding)?

- General fertilizer – can be worked right into garden or plant beds as is.
- Seed beds
 - Won't burn plants like some commercial fertilizers can.
 - Stretch your supply by placing vermicompost only in the trench where you bury the seeds. This way, the seeds can utilize the nutrients when they germinate and in early stages of development.
- Transplants
 - Place in the holes where you will plant transplant seedlings.
- Top dressing
 - Nutrient boost for established plants.

What about castings (pure castings)?

- Potting mixes
 - Create a potting mix of equal parts castings, peat moss, perlite, and sand or garden soil.
- Top dressing or turn into your garden soil.

Outdoor System

The outdoor system works much like the indoor system and a full cycle takes about nine months.

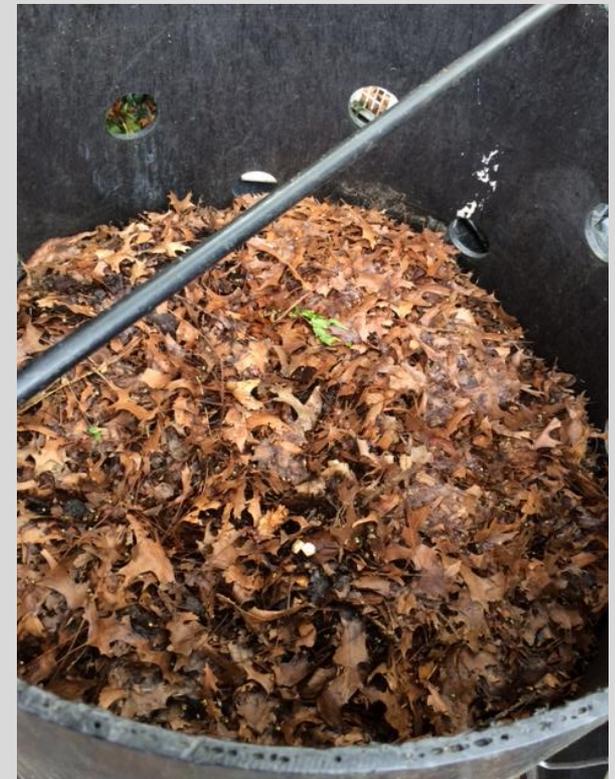
- Select a shady spot(about 60%) and ensure an adequate supply of leaves. Water should be readily available as well.
- Barrel one has the most holes. Add carbon(we like mulched leaves, but shredded paper or cardboard or other bedding materials will work as well) and nitrogen(food waste) in equal amounts. Add worms from your indoor bin.
- Always add the food waste first, then the bedding.



- Barrel two has fewer holes. When Barrel one is full (about 3 mos), lift the barrel off of the compost and shovel or pitch the contents into Barrel two. Do not add worms or food to this barrel. Add water to keep moist. Aerate occasionally.
- Barrel three has the least amount of holes. When Barrel one is full for the second time, lift the Barrels one and two off of their respective contents. Shovel or pitch the contents of Barrel two into Barrel three and Barrel one into Barrel two. Aerate Barrel three occasionally. It should stay moist due to less air.
- By the time Barrel one is full for the third time, Barrel three has become finished vermicompost.



Barrel
two
w/water
supply



Barrel
two
contents



Barrel three



Barrel three contents

- Ground contact allows access to other worms and beneficial micro-organisms
- This system can easily be adapted to your food waste amounts and available space.
- Select containers with a cone shape, they are easier to lift off. Darker containers that don't allow light in are recommended.
- Monitor temperature in Barrel one, maintain the 59 – 77 range if possible.



Tools recommended for outdoor worm composting:

- Thermometer
- Aerator
- Shovel and/or Pitchfork
- Hose and timer for adding water to barrel two – drip irrigation

is an easy, low pressure option that will require minimal effort

once set up.

Resources:

- Worms Eat My Garbage: How to Set Up and Maintain a Worm Composting System, 2nd Edition [Paperback]
by [Mary Appelhof](#) , [Mary Frances Fenton](#)
- John Christy, 827 Hobson St. WW 99362
(509)525-0333