



Worm Bin Composting

Peter DuBois

Worm castings are nature's miracle grow. Sprinkled around houseplants, mixed into potting soil, added to container plantings, spread in seed rows a little goes a long way.

- N-P-K. As much as 4-3-4
- Micronutrients not found in commercial fertilizers - Mg, Cu, Zinc, Boron
- Stored in a slow-release form that is water soluble and readily available to plants
- Binds with soil particles to provide structure, air flow and holds water

What do you do with your food scraps?

Material	Est. Percent	Est. Tons
Inedible Food – Fruits & Veggies	6.6%	23,000
Edible Food - Vegetative	6.1%	21,222
Yard & Garden Waste - Leaves & Grass	5.7%	19,830
Animal Manure	3.5%	12,176
Inedible Food - Meats, Fats, Oils	2.2%	7,654
Edible Food - Meat, Fats, Oils	2.1%	7,306
Total	26.2%	100,000

Subtotals and totals in tables and figures may not exactly match due to rounding

How many of you have pets?



Learning
objectives

Maintaining a
worm bin

Harvesting
worm castings

Using
vermicompost

Red the Worm

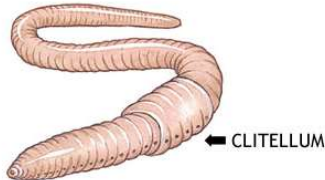


More formally known as *Eisenia fetida*. Other Names: Red wiggler, Brandling worm, Tiger worm, Manure worm, Fish worm

You can find red worms in the top layer. Turn over leaves and you might see them. They will come and go in your compost bins and livestock manure.

Redworm breeding

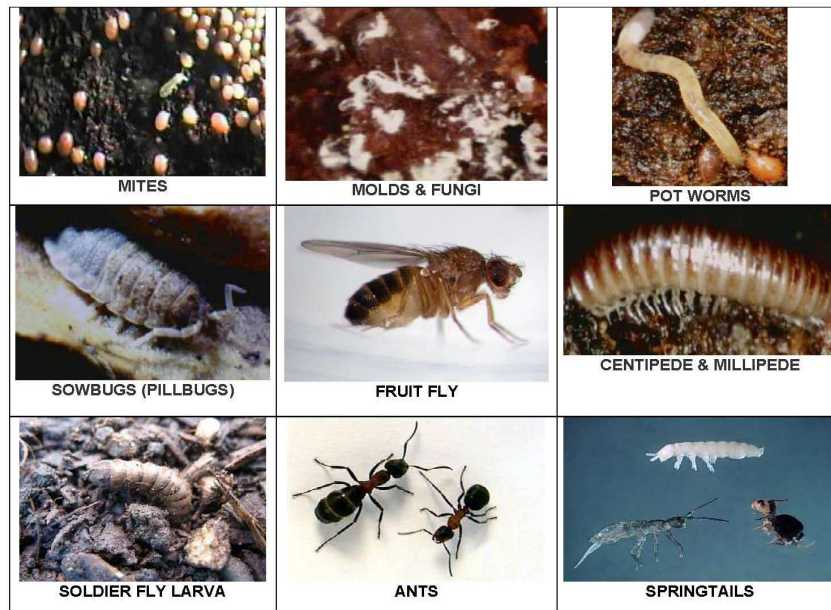
- Mature in 3 months
- 1 cocoon per week
- Hatch in 3 weeks
(ave. 3 hatchlings)
- Can go dormant for months



- Earthworms are both boy and girl- hermaphroditic. Two worms join with mucus from their clitella.
- Then, a cocoon forms on the clitellum of each worm. The worm backs out of the hardening cocoon which contains the egg. Newer egg capsules will be yellow. As they mature, they will shift to red. A dark red capsule is indicative of hatching.



A Living Ecosystem



A worm bin host a large supporting cast of characters who help speed along the process and cycle nutrients.

Microorganisms and Critters in your bin:

- Bacteria. The bin is teeming with billions of bacteria. Redworms lack the enzymes to break down much of what they eat, so they rely on these microbes to do it for them.
- Mites. You might see a sea of red or white dots especially around rotting food. These are mites and like wet conditions.
- Molds and fungi. They secrete enzymes which also help break down materials in the bin. Because they grow in still environments, large amounts indicate there is more food than the system can quickly manage and feeding rate should be decreased.

- Potworms – Tiny hair-like white worms measuring about ¼ of an inch (not to be confused with baby red worms which are reddish even when tiny). They like wet conditions.
- Sow bugs and Pill bugs “rolly polly bugs” shred and consume some of the tougher woody materials.
- The pesky fruit fly. Eggs come in on your fruit. Some folks freeze or microwave food scraps which is above and beyond. Some tips to control infestations:
 - Make sure your food is completely covered with bedding so fruit flies cannot get to the fruit where they want to lay eggs. Each adult can lay 500 eggs in the 7 day life cycle.
 - Add an extra layer of shredded paper barrier
 - Bring your bin outside and leave the cover off
 - YouTube fruit fly traps
 - Drape a fine woven piece of cloth over your bin.
- Millipedes are vegetarians and eat decaying plant matter. Centipedes are predators that will kill worms. Remove carefully and relocate to the garden where they eat a lot of bad bugs
- Springtails (tiny white specks) feed on mold and love wet conditions.



Black
Soldier
Fly
Larvae




- Soldier fly larvae, ½ inch in size (also known as maggots) are harmless to you, your worms and your plants. They are great decomposers make a high-quality casting. They hatch into a black soldier fly which is harmless. It has no mouth and cannot bite or spread germs and lives 7 days to lay eggs and repeat the cycle. Just be sure your worms get plenty of food scraps to eat too you may want to remove them to prioritize your worms needs.

Critters to remove:

- Slugs and snail. Biggest issue is the eggs they lay

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Finding a location for your worm bin

-  Basement
-  Garage
-  Outdoors

- If you find your worms wandering or congregating around the lid, place a light above your bin to keep them in (they move away from light as that will dry them out and kill them). Do not like vibrations

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Pete DuBois, 9/24/2020



Bedding for your Worms (**Browns = Carbon / Energy**)

Bedding should be moist like a wrung-out sponge. Worms create tunnels as they work their way through the waste. The slime on the bodies seal the tunnels. Oxygen is then able to flow through the bedding allowing the worms to breathe through their skin.

Redworms will survive in bedding temperatures between 35-85 degrees and need enough compost/bedding area to get away from the extreme temperatures

Browns = Carbon for providing energy

As it breaks down the browns become food. They also provide water absorption (fruits and vegetables are 80% water). You continue to add bedding.

Materials include: shredded paper, torn newspaper, pieces of cardboard, ripped egg cartons, leaf mold



Leaf Mold Compost

















Foods for your Worms (Greens = Nitrogen / Reproduction)

Greens = Nitrogen for protein production

The smaller the food the quicker it will disappear. More surface area for microbes to work on. Some people put food in blender. I like to give mine a quick chop with a shovel in a bucket.

Most fruits and vegetables have a protective skin to keep mold and bacteria out, prolonging decomposition. Cutting them up speeds up the process and you can drain off any liquid.

WHAT TO FEED YOUR WORMS:	
Yummy!	Yucky!
 <p>Anything green - especially the leafy stuff!</p>	 <p>Citrus - no orange, lemon or lime</p>
 <p>Fruits</p>	 <p>Fats, Oils, Salad dressing</p>
 <p>Vegetables</p>	 <p>Breads & Cereals - can attract gnats</p>
 <p>Coffee grounds & filters</p>	 <p>Salts - no seasoned food</p>
 <p>Tea bags</p>	 <p>Meat - creates odors</p>
 <p>Brown Paper, Black & White newspaper</p>	 <p>Sugars - no processed food</p>
 <p>Eggshells - crushed; adds calcium</p>	 <p>Garlic, Onions - creates odors</p>

Red worms are secondary eaters, meaning they consume softened organic material left after microorganisms break down larger food waste.

Almost all fruits and vegetables with possible exception of:

- citrus (can change pH, fruit flies, molds from bread help break down)
- banana skins (organic better)
- potatoes, onions, garlic (may cause a septic smell)
- avocado (oils)

Bread, flour, ground grains (may attract rodents)

Egg shells (grit for gizzard, slow release calcium – you can pulverize, I don't)

Coffee grounds & filters (no more than 20%)

Harmful Foods:

- Milk products (contain oils that may be harmful to worms)
- Meats (due to spoiling/stench)
- Fats, oils, grease, mayonnaise, salad dressing, butter - coats worms skin so they can't breathe
- Grass clippings (generate heat)
- Dog and cat feces (may contain harmful parasites/pathogens that will not die from decomposition)

Food, Bedding (repeat)

- Feed 1" layer weekly
- One half side at a time
- Cover with bedding
- Replace cover



- Bin under ideal conditions should handle up to 1 gallon per week
- Do not over-feed – creates excessive moisture and lots of flies
- Feed before vacation, can go 2-3 weeks

How Much Can I Feed?

Worms eat $\frac{1}{2}$ their weight/day

One pound (1,000) of worms will eat $3\frac{1}{2}$ pound of food/week

Always cover with bedding

Bin under ideal conditions should handle up to 1 gallon/week



Make sure worms are actively eating the food you most recently added before adding more. Do not over-feed – creates excessive moisture

Feed before vacation, can go 2-3 weeks. You can sprinkle 2 cups of flour, cornmeal, oatmeal and cover with a thin layer of moist bedding.

How Much Can I feed

Bin under ideal conditions should handle up to 1 gallon of food scraps per week. Don't feed on hot days. You can try feed a bit heavier in winter to keep bacteria going for heat.

Feeding Tips

worms actively eating recent food

For extended vacation sprinkle 1/4 cup of flour and cover

Don't feed on hot days

Feed heavier in winter to keep bacteria going for heat



How to Correct a Wet (stinky) Bin

- Crack the lid
- Stop feeding
- Gently stir in new dry bedding
- Drain leachate



- Too much moisture in your bedding will prevent the flow of oxygen and allow anaerobic bacteria to thrive. This will cause a noticeable offensive odor. Worms will not thrive in this environment. They cannot breathe without oxygen. They should not be condensate on your lid. If this happens make sure to crack the lid to allow for better air flow.

Managing Moisture Levels



It is not to be confused with compost tea which is aerated and alive and should be used within 2 hours. Leachate is nutrient water and can be diluted 10:1 water to leachate and is great for watering house plants.

You might want to leave the spigot open with a plastic container to catch drips to better monitor moisture levels. If you are getting more than 2-3 ounces of leachate draining in a week's time the bin is probably too wet.

Worms looking like ground hamburger?



One way worms react to stress is balling up which is a protection mechanism. They will attempt to leave in large numbers or a sudden wormicide. Could be from temperature extremes, new habitat (new home, bin, food), moisture extremes (drowning), or drastic change in food or feeding food they don't like (e.g. high salt).

When Should You Harvest Compost?



In nature this can take many years. Redworms can do this decomposition job in as little as three months making nature's humus or in the worm bin – vermicompost. A teaspoon contains 1 billion microorganisms.

Harvest Ready



Compost Harvesting Steps

- Scoop out the top 3 - 6 inches and set aside
- Store vermicompost in a bin or put on the garden
- Return top 3-6 inches to begin new bin



The Melon Trick



Storing your Vermicompost



- Store with loose lid, don't want it to dry out cover with moist blanket of newspaper
- Stored this way the vermicompost has a shelf life of more than three years.
- If there are still worms they will decompose or can be "baited" and returned to the worm bin
- Vermicompost is a mixture of worm castings (worm poop), decomposed organic matter that did not pass through the worm, and partially decomposed organic matter that is still somewhat recognizable.
- Castings comprise 70-80% of the total depending on how the bin has been managed
- The partially decomposed organic material continues to break down during storage



Vermicompost is a mixture of worm castings (worm poop), decomposed organic matter that did not pass through the worm, and partially decomposed organic matter that might still be recognizable.

Castings comprise 70-80% of the total depending on how the bin has been managed. A little goes a long way.

- 1 gallon per 4' x 8' garden
- Doesn't provide the bulk organic value of compost, and so you'll want to use castings mainly around the root zone of plants for the most benefit.

Using your Vermicompost

- Use 2 Tbsps per 4" pots; ¼ - ½ cup per gal. transplants
- Sprinkle on houseplants & garden plants
- Spread in seed rows or new plantings
- 1 gal. provides 3 months for for a 4' x 8' garden bed
- Potting mix
 - 3 parts leaf compost : 1 part vermicompost



Types of worm bins

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Other Questions?



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