

Worm Composting

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Compost

- Composting is controlling the natural decay of organic matter by providing the right conditions for composting critters to convert yard trimmings into a product that can be returned to your landscape and garden.
- Tiny organisms (mainly bacteria, fungi and protozoa) break down garden and landscape trimmings in a moist, aerobic (oxygen-demanding) environment.
- The final product is a dark, crumbly form of decomposed organic matter.



It's like Black Gold!

- Compost improves your soil.
- When added to soil, compost breaks up heavy clay soils, helps sandy soils retain water and nutrients, and releases essential nutrients.
- Compost also contains beneficial microscopic organisms that build up the soil and make nutrients available to plants.
- Improving your soil is the first step towards growing healthy plants.



What Can Be Composted?

- Any natural organic material can be composted.
- Organic trimmings in your landscape, such as grass clippings, weeds, fallen leaves, pine needles, hedge clippings, straw, livestock manures, flowers and remains of garden plants make excellent compost.
- Also, many manufactured organic materials that are not waxed or plastic-coated, such as newspapers, paper boxes, clothing scraps and wood shavings are compostable and may be used.



- Compost made from grass clippings treated with herbicides or any other pesticides is not recommended for use in vegetable gardens.
- Kitchen scraps, such as fruit and vegetable peels and trimmings, crushed eggshells, tea bags, and coffee grounds and filters can also be composted.
- Woody yard trimmings can be run through a shredder before adding to the compost pile.
- Sawdust may be added in moderate amounts if additional nitrogen is applied. Add a pound of actual nitrogen per 100 pounds of dry sawdust.



What Materials Should I Avoid Adding to my Compost Pile?

- Organic materials that should not be added to your compost pile include meat, bones and fatty foods (such as cheese, salad dressing and leftover cooking oil). Do not add pet or human wastes to a compost pile.
- Weeds that have not gone to seed can be added to the compost pile. Weeds with large storage roots like nutsedge or greenbrier should be left out and dried in the sun before composting to reduce their chances of survival.

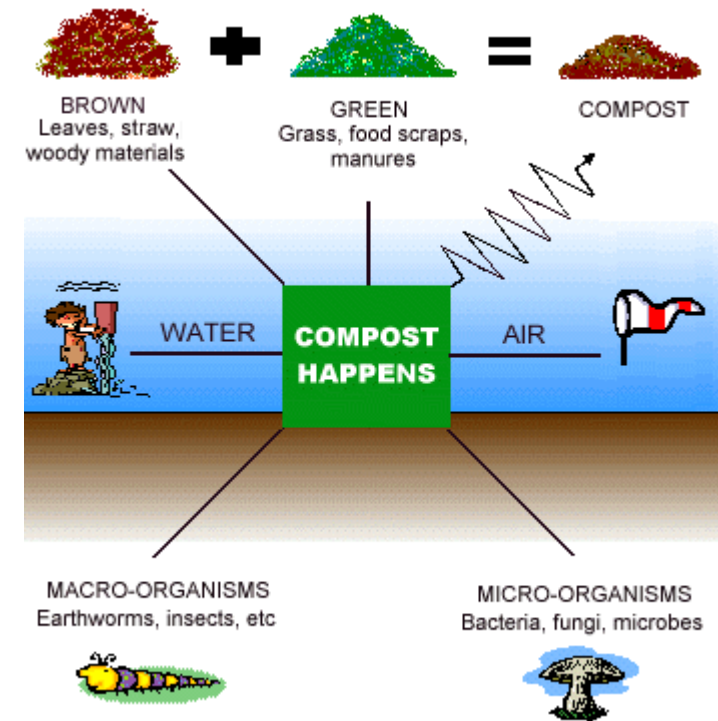


- The high levels of heat produced in the center of the compost pile can kill many pests, such as weeds with seeds and diseased or insect-infested plants.
- However, it is very difficult to mix the contents thoroughly enough to bring all the wastes to the center, so some disease organisms may be returned to the garden with the compost.



"Essentials" Of Composting

- Organic materials for composting all contain nutrients that provide energy and growth for microorganisms.
- These organic materials each have their own ratio of carbon to nitrogen (C:N) in their tissues.



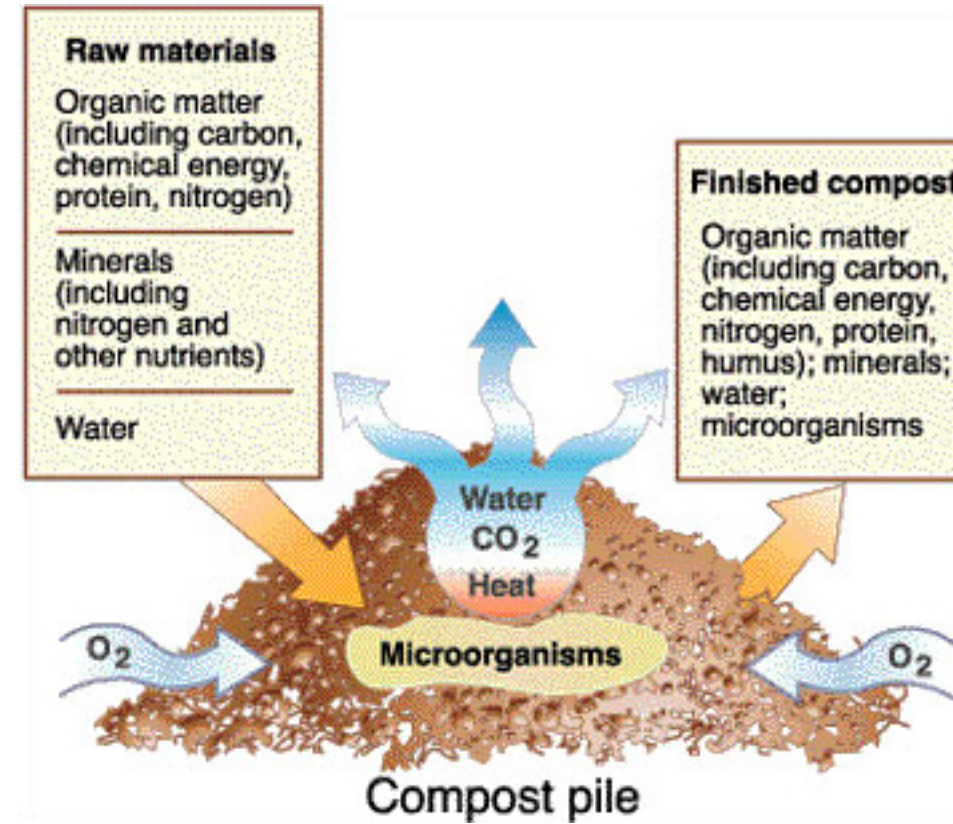
- These C:N ratios are important because the tiny decomposers need about 1 part of nitrogen for every 30 parts of carbon in the organic material. If the ratio is greater than 30:1, nitrogen will be lacking, and materials will decompose more slowly.
- Greens, such as grass clippings, are high in nitrogen.
- Browns, such as leaves or sawdust, contain high amounts of carbon.



- Leaves, straw and sawdust are high in carbon, while grass clippings, manure and vegetable scraps are higher in nitrogen. It helps to think of these materials as greens and browns.
- Be aware that anything organic will decay
- It may take a long time to make compost when the C:N ratio is too high.
- For example, a pile made solely of sawdust will take years to decay. Adding more greens, such as grass clippings or vegetable scraps, will speed up decay and produce compost in less time.
- Experiment to find the right combination of materials for your compost pile.



- The composting process is an aerobic process; decomposition needs air or oxygen to occur.
- When the compost pile is lacking in oxygen, decomposition slows and odors occur.
- Add air to the pile by mixing, turning, stirring, fluffing or using air stacks (pipes with holes) in the pile.



- Adequate moisture is essential for microbial activity that is responsible for decomposition.
- A dry compost pile will decompose slowly. Proper moisture encourages the growth of microorganisms that break down the organic matter into humus.
- If rainfall is limited, water the pile periodically to maintain a steady decomposition rate. Add enough water so the pile is damp but not soggy.



- A rule of thumb is "about as wet as a wrung-out sponge." Avoid over watering.
- During rainy periods, you may need to cover the pile. Excess water can lead to an anaerobic (lack of oxygen) condition which slows the decomposition process and causes to odors.
- If the pile should become too wet, turn it to dry it out, or add dry carbon materials to the pile.



Benefits of compost

- *Compost improves the structure of the soil by adding organic matter.* In sandy soil, compost holds moisture and helps to hold soil together. In heavy clay soil, compost particles bind with clay particles to form larger particles.
- *Compost attracts earthworms.* Worm tunnels aerate the soil, improve drainage and bring up minerals from the subsoil. Earthworm activity contributes to good soil structure.



- *Compost is a soil conditioner.* It releases small amounts of plant nutrients and essential trace elements slowly throughout the growing season. It also helps latch onto nutrients added in the form of fertilizer and prevents them from leaching out of the soil. Some chemical fertilizers release elements so quickly that rain can leach them away before plants derive much benefit.
- *Compost improves soil health.* Compost has been shown in some research trials to reduce plant diseases; suppressing or controlling some soil-borne plant pathogens.



Vermicomposting

Worms are great for composting. They take your food waste and turn it into rich, dark crumbly dirt for your garden. Here are some of the benefits of vermicompost (material left after worms eat all the food):

- improves root growth and structure
- enriches soil with micro-organisms
- attracts deep-burrowing earthworms already present in the soil;
- improves water holding capacity;
- enhances germination, plant growth, and crop yield
- improves soil's physical structure;



Worm composting

- A great composting option for:
 - Apartments
 - Classrooms
 - Homes with little or no yard space



Which worms are best for you?

- Redworms (*Eisenia fetida*)
- If you want to raise your own fishing worms the European nightcrawlers are the worm for you. They are larger than the red worms, making them just the right size to fish with.
- Sometimes referred to as the "Jumbo Reds", the European nightcrawlers can just as easily be raised in a compost bin but are much larger.





- You will never need to pay \$5 a dozen (for small, tired, looking worms) when you can have an unlimited supply of big, fresh, lively worms at home.



Feeder worms

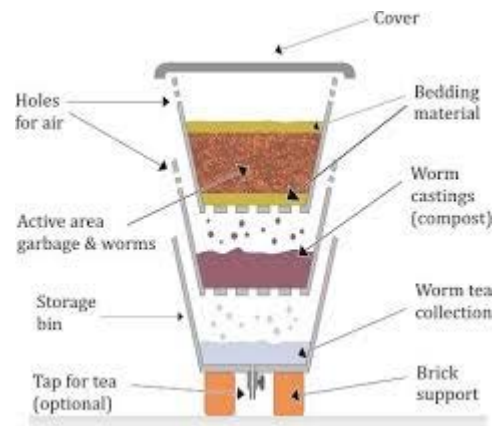
- For pet reptiles, amphibians, or birds?
 - Red worms
 - They make great pet food for: frogs, turtles, snakes, salamanders, newts, birds, and many other animals.
- Larger pets - European nightcrawlers



Worm Bins

- Manufactured worm bins are available from a variety of vendors.
- Plastic tubs by drilling air holes in the tub
- 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.





Above ground or in-ground?



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*)



- 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.



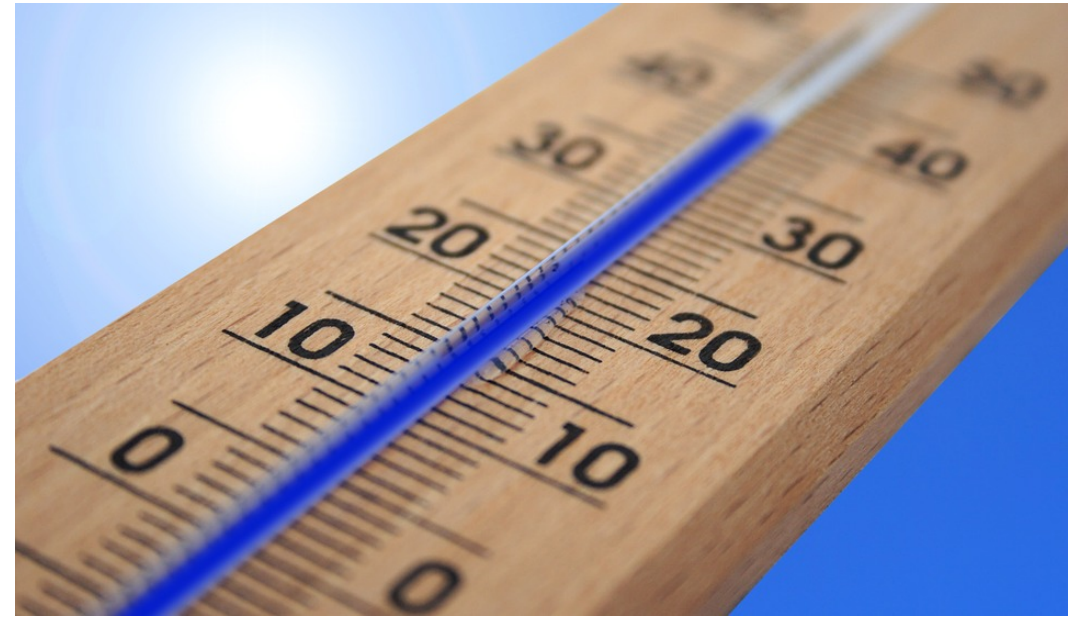
- A worm bin will support up to 1 pound of redworms per square foot of surface area.
- A large bin with 7 square feet of surface area will accommodate up to 7 pounds of redworms and process about 3 1/2 pounds of food waste daily.



- 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 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.



- 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. 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
- Citrus
- Be cautious with acidic foods - feed these in small quantities only.



- **Do not feed:**
- heavily salted foods, such as salted peanuts, potato chips
- 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.



- 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”.



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 #1

- Method #1
- If the Dump & Sort 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.

