

Compost Info and Know How



Every year, millions of tons of trash are thrown away into landfills in the U.S. where it will remain for thousands of years. Even organic matter that it supposed to break down will remain intact due to the density of things piled in landfills. This trash will either turn into toxic leachate, or find its way into oceans and other ecosystems, polluting them beyond repair. Because humans are the reason for filling these landfills, we also have the responsibility to divert that waste.

So, what is composting, and why is it important?

Composting is the process of breaking down organic matter. These decomposed materials can be used to make fertile soil, and restore healthy food webs within the soil. By setting up a healthy compost system, you can watch “trash” turn into a nutritious medium right before your eyes!

Types of Compost:

Thermophilic- hot compost
Static- cold compost
Vermiculture- worm compost
Bokashi compost- anaerobic bucket.

Core components of compost:

Oxygen, hydrogen, nitrogen, carbon, and water.

Factors that affect compost and soil:

pH, moisture, airflow, temperature, climate, and region. For example, compost breaks down a lot faster in tropical regions than in temperate regions.

It is important to have a balanced compost pile. You must have a balanced ratio of carbon and nitrogen by weight, not by volume. Note: Nitrogens weigh more than carbons, so you will have more carbons in your pile.

Nitrogen and Carbon are important for compost/soil because it provides nutrients for the living components (microbes, bacteria, fungi, etc.) that break down your compost.

Good sources of nitrogen include: your greens! Anything that is “living or green” aka fruit and vegetable scraps, and grass. Others sources that are high in nitrogen are horse/cow manure, urine, coffee grounds, tea grounds, hair, and fish emulsion.

Good sources of carbon include: your browns! (Except for manure and coffee grounds) anything that is “brown or dead” aka cardboard, brown paper, newspaper, paper towels, dead leaves, hay, wood chips, charcoal, and coconut coir.

What to put in your compost: fruit and vegetable scraps, egg shells, coffee and tea grounds, horse/cow manure, cardboards, brown paper, newspaper, paper towels, napkins, egg cartons, dead leaves, hay, wood chips, charcoal, coconut coir, shells.

What NOT to put in your compost: cooked food (this includes cooked veggies), breads, meats, dairy, fats, oils, grease, lard, plastics synthetics, chemicals, pesticides, metals, glass, receipts, glossy paper (like magazines), human waste, and pet waste. You can compost with human waste, but it requires a much different and more complicated process. Don't put biodegradable plant based plastics in your compost unless it is going to a large composting facility (like bee's ferry). Cold piles and small scale thermophilic composting methods will not get hot enough to break it down.
Tip: make compost less stinky by covering it with carbons or soil.

Berkley's Thermophilic “hot” compost pile:

Benefits: fast turning rate, kills harmful bacteria, and very nutrient rich. It is more labor intensive, can get up to 160 degrees Fahrenheit, circular, takes roughly 18 days to turn into compost based on climate and season, and must be at least 3-6 ft. wide by 3-6 ft. tall (3ft by 3ft min, 6ft, by 6ft max).

Note: The pile must be circular because a pile that is in the shape of a pyramid will go anaerobic in the corners. The pile must be tall and wide enough to circulate heat. Caution! If your pile gets too hot and too dry it can set on fire (very rare, but still

possible!). Microbes (which break down the material) live on the watery films of the organic materials. Water is essential for providing them a habitat to live and reproduce, which is why you want to make sure to give the pile a good watering at least every other day.

How to make the pile:

Day 1: Gather and separate your carbon and nitrogen materials. Once all the materials are gathered (see the quick reference list of carbon and nitrogen materials below,) you begin by making the base layer of the cylinder shaped pile. The pile should be about 3-6 ft. wide by 3-6 ft. tall in total, with each single layer being 2-3 inches thick.

Continue alternating carbon and nitrogen layers in this manner. Be sure to add water every three layers.

Note:

About 2/3 up, you will want to add a layer of what are called “dynamic accumulators.” Dynamic Accumulators serve the ecological role of mining minerals and nutrients from the subsoil layer in the soil profile, and making them bioavailable for other plants and microorganisms within the soil. Simply put, a dynamic accumulator is a plant with a deep taproot that is able to bring up nutrients from deep layers in the soil and then stores the nutrients in its stem and leaves. Therefore, dynamic accumulators provide an extra boost of nutrients which is why we place them 2/3 to the top of the pile - the boost in nutrients induces more heat and microbial reproduction.

Examples of Dynamic Accumulators include: borage, chickweed, valerian, egg shells, dandelions, alfalfa, carrot leaves, chives, oak leaves, lemon balm, marigolds. Continue layering carbon and nitrogen layers.

End on a carbon layer and water the whole pile.

Day 4: Let the pile sit for 4 days and then till the pile. This gives the pile time to heat up, but not become anaerobic. After the 4th day, you should till the pile every other day. Aeration of the pile is very important. When tilling the pile, focus on turning outsides in, and the inside of the pile out. (See the picture below to get an idea of the tilling process.) This ensures that the entire pile is getting enough oxygen to break down the various organic materials. Surface area and particle size of the organic materials used to make the compost pile play a large role in facilitating the decomposition process. If the particle size of the materials are smaller, that will help induce a faster decomposition process so it is best to chop up the materials while making the compost pile. For example, I always chop up my apples before I put them in the pile, or they end up rolling around and taking a long time to decompose. Other components such as weather, climate, water, pH, and shape of pile also affect the decomposition process.

Till and water on Days 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18

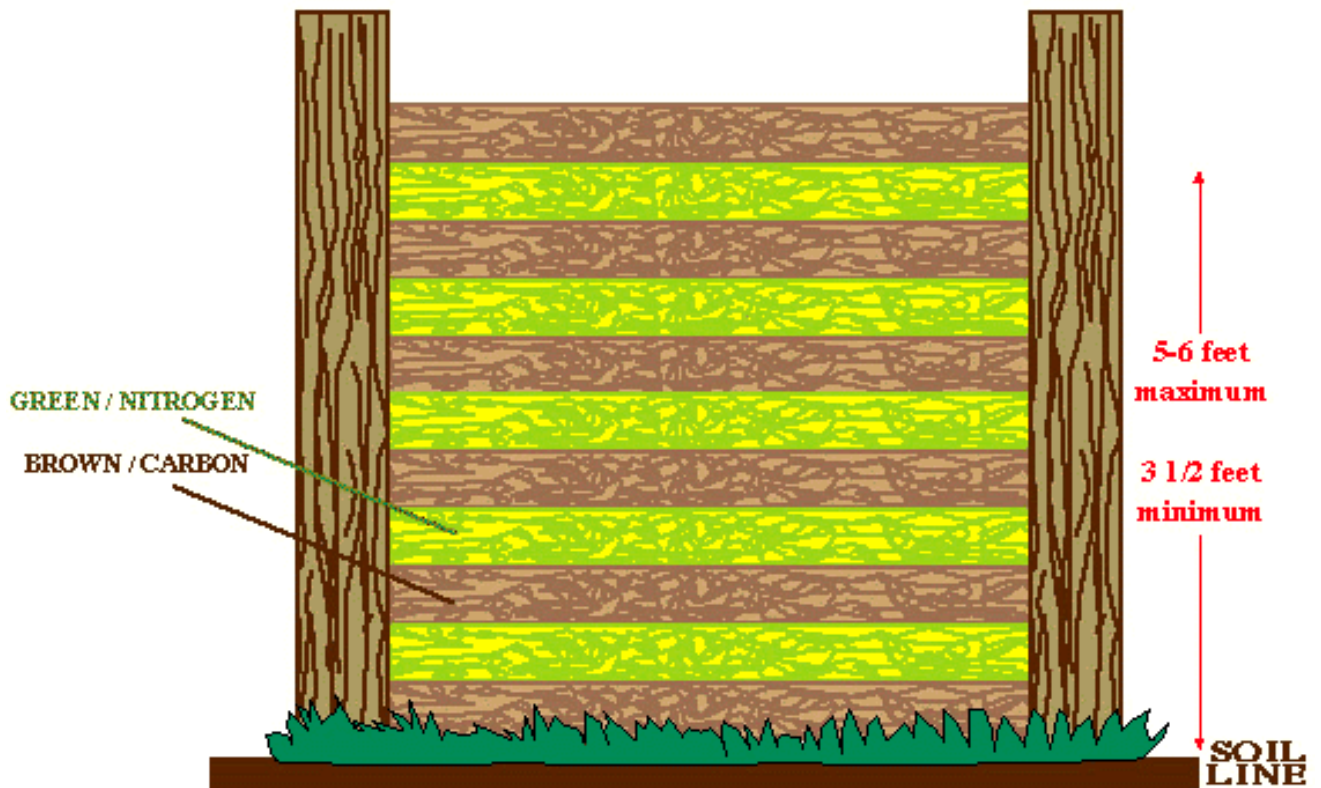
Symptoms if you're pile is lacking Nitrogen:

- pile is very dry
- the pile is giving off little to no heat
- Food and other organic materials are not breaking down

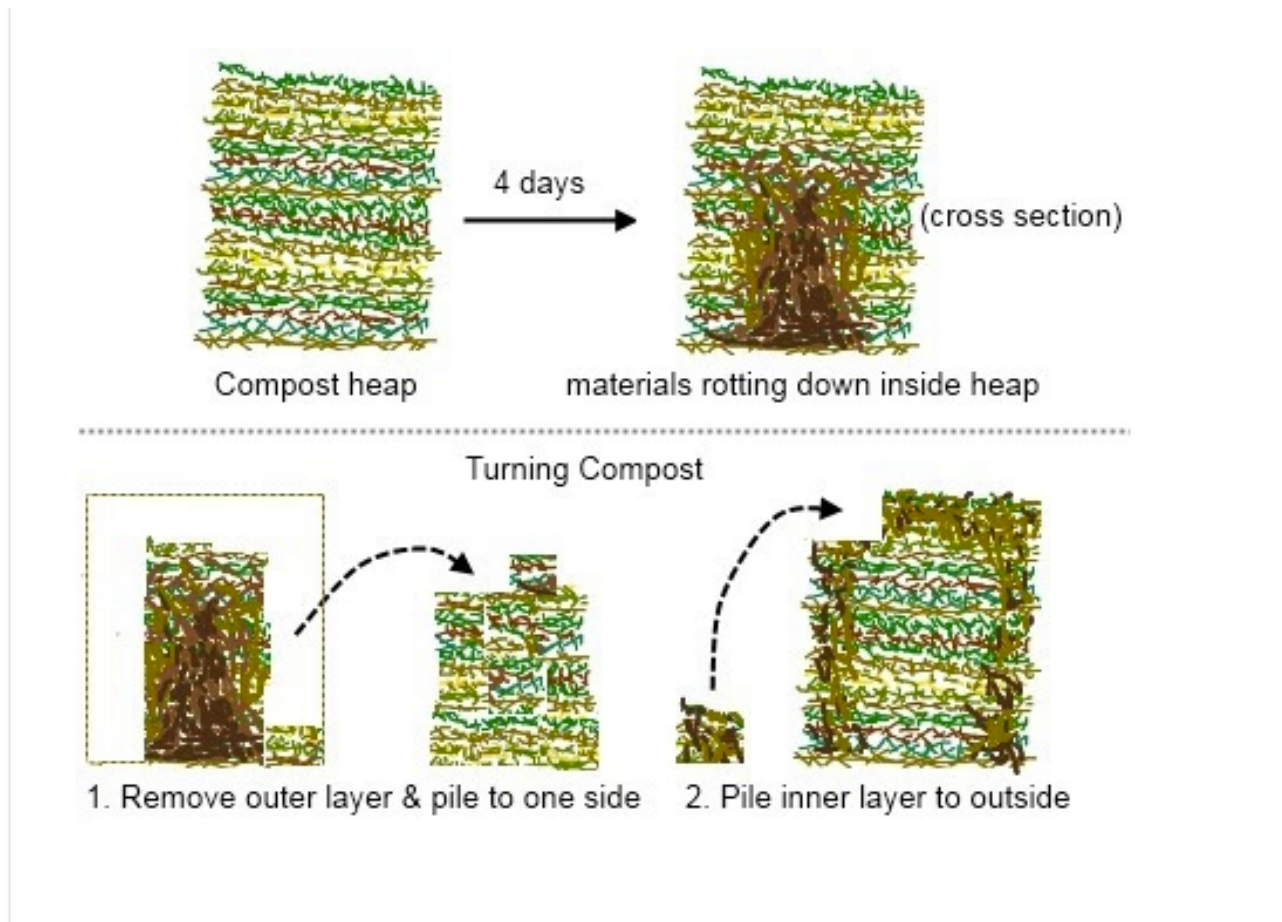
Symptoms if you're pile has excess Nitrogen:

- the pile smells like ammonia or has a pungent smell
- You see white mycelial looking matter growing on inside the pile- if it is smelly and has this type of growth, it is actually a type of bacteria called "Activa Bacteria."

Photo representations:



CROSS SECTION OF LAYERING IN COMPOST BIN



Static or "Cold" Composting:

Benefits: Long term, and low maintenance. Nature does the work!

Takes about 6 months or more (depending on your climate and season.)

One perk is that you don't have to worry about exacting carbon and nitrogen ratios—meaning that you can add different materials without throwing the pH of the pile too off balance. This can be a good place to start if you have never composted before. Worms, and other microbes will also help facilitate the decomposition for you! **Caution:** can attract rodents if you don't cover the food waste properly. Make sure you make your cold pile in a secure area.

How to make a cold pile: Layer nitrogen and Carbon materials in the pile. If you are adding food waste or fresh grass clippings, just add another layer of carbon such as cardboard, wood chips, saw dust, or leaves on top to prevent or attract pests from getting into the pile. Make sure to water the pile whenever you add materials as well. It is best to keep the static compost pile in the shade under a tree or near some bushes.

Photo representation:



Vermiculture:

Vermiculture is a form of composting that relies on worms to help break down organic matter. Red Wigglers and Red Earthworms, are special species of worms that are recommended because they are some of the only species of worms that move vertically in the soil, doesn't burrow, and doesn't mind being in a crowded space. Your average earthworm needs his/her space. Vertical movement is important because it helps aerate the compost.

Benefits: Once set up, it is low maintenance, very nutrient rich, can you use the worm castings to make worm tea, or sprinkle it through your garden as a wonderful soil amendment. Vermicomposting however, does not have a fast turn over rate, and cannot take in a large amount of compost scraps.

How to get started on making your own bin:

Set up a multilayered system for the worms. You can either purchase a system, such as the Worm Factory 360, or create your own using plastic bins. Be sure to have holes on the lid to allow the worms to breathe, but you also want to prevent other pests and too much moisture from getting in. Use a drill, or a hammer and nail to poke plenty of air holes in the lid top. The idea is to feed the worms from the top and that the organic matter will break down as it passes through the different levels. The bottom level should consist of finished vermicompost and leachate. You can drain the leachate if you add a spout to the bottom layer of your bin. Do not put the leachate directly onto soil or plants. You must dilute the leachate 100 to 1 in water to use it as a soil amendment.

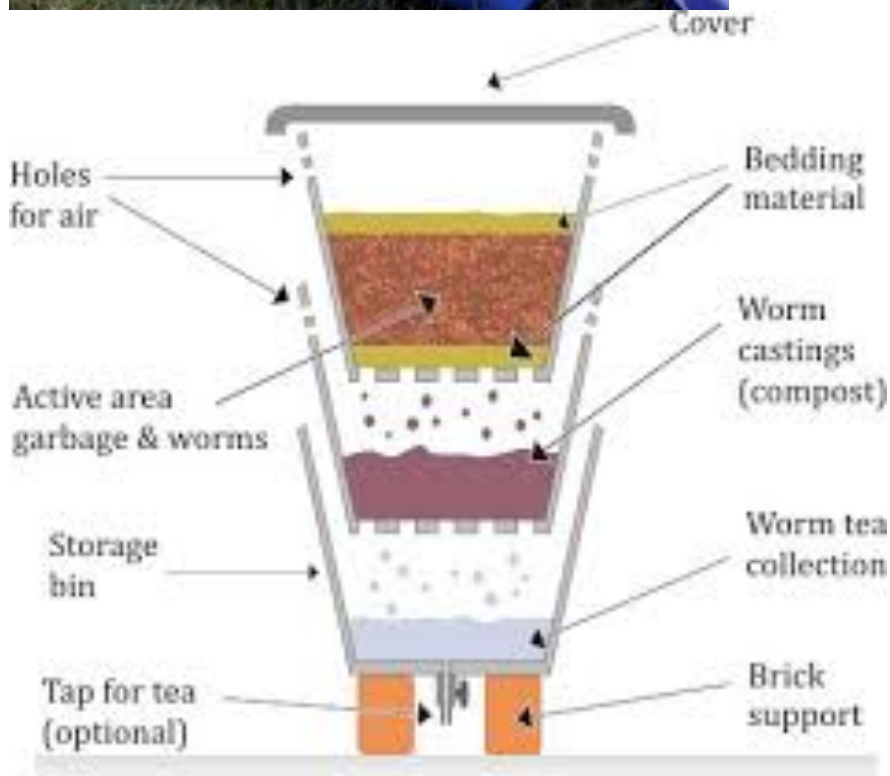
Once your bin is set up, add damp shredded paper and food scrap mixed with clean (pesticide free!) soil to your worm bin. Your shredded paper will go in first. Let the paper and food scraps sit for about two weeks before adding your worms.

Notes and tips:

Follow the same food scrap rules with regards to regular composting, **BUT** avoid putting acidic/pungent food scraps into your vermiculture bin. The wormies don't like it! Avoid adding citrus peels, acidic fruit, coffee grounds, pine needles, onions, and garlic. Worms also have a hard time breaking down eggshells and avocado pits, but you can still put them in there. Worms hate sunlight, so make sure to keep them covered (I prefer torn up brown paper bags), but make sure that they get air too by having holes in the top of your bin! The bin should be as moist as a damp sponge. I spray my worm bin with a spray water now and then to keep it moist. Don't drown them though! An indoor temperature of 55 to 75 degrees is perfect for the worms. You can keep your worms inside or outside (if you live in a more tropical climate). If you keep them inside, keep them away from ovens, heaters or air conditioners – too cold and your worms will freeze, too hot and they'll roast. Remember, the worms create their own heat through their work. Worms are a little like children – they are picky eaters and they like it when their caretakers chop their food. Cut food scraps into 1 to 2 inch pieces, and shred clothe and paper before adding it to the bin. If you ever juice, worms loooooove the shredded veggie scraps! I sometimes blend my food waste for them. This allows more surface area for the worms to eat faster. Try to keep about a 70:30 ratio of brown matter to green matter About once a week, or every other week, move the material in the bin around to help with aeration. Always keep a layer of shredded paper or sawdust over the top of the pile to discourage smells and bugs. If you need to go on vacation, don't worry. Your worms can be left alone for about 3 to 4 weeks without any help. Before you leave, provide them with a freezer bag or two full of food scraps and distribute it evenly around the bin. If you'll be gone longer ask a friendly neighbor to feed the little guys once or twice and move things around. After such a long time without care there might be a slight smell to the bin. Once you stop adding new material the compost should be ready to harvest in 1 to 2 months (depending on how much is added in the last feeding). The compost is ready when it is a deep blackish brown

color, and is moist. See the links below to watch how to make your own vermiculture bin, as well as a great book with everything you need to know!

Photo representations:



Making Worm Tea: Worm tea can be used to water your gardens. We will be making some later in the semester!

1. Collect worm castings (worm poop).

2. Place the worm castings in an old t-shirt and tie it up so that the castings are wrapped in the middle.
3. Fill a 5-gallon bucket with rainwater and 1 oz. of organic molasses.
4. Place the t-shirt with the worm castings into the bucket and stir using a large stick both clockwise and counterclockwise for at least five minutes in each direction. After you have stirred, remove the t-shirt and aerate the tea using bubblers or air stones. You should keep the air stones on for 24 hours. Once your tea has “bubbled” for 24 hours, you only have 48 hours to use it!

Visual representation:



Bokashi Method:

Bokashi composting is an anaerobic form of composting that uses inoculated bran to ferment your food waste. The Bokashi host medium can indeed be almost any fine organic grain or grass-like substance — bran, rice, wheat mill run (WMR, a waste product from flour milling), used mushroom growth medium, dried leaves, even sawdust. This medium is inoculated with beneficial microbes that flourish in anaerobic, acidic environments but smell less foul than do those in unfettered, natural anaerobic conditions. To prepare the inoculant, a brew that will attract the appropriate bacterial strains is prepared, the host material is immersed in it, and the microbes are allowed to ferment. Molasses provides an energy source for the

microbes, which reproduce wildly for several days. Once the fermentation stage is over, the inoculated host can be dried, packaged, and stored for long periods. Though this is a simplified version of a process that requires several steps, it does describe what we buy when we buy Bokashi. The finished compost is not actually compost, but fermented “pre compost”.

Benefits: Can be used inside or outside, can use leachate to make compost tea, can put meat, dairy, and breads into it (some people say you can put pet waste and kitty litter in here, but I would NEVER do that for health and safety reasons).

How to use: Build your own bucket or buy one. I would suggest buying one. You must use inoculated bran for this process. Mix food waste and bokashi “bran” together, and press down into the bucket. Pressing the food scraps down is important to push out air pockets. Since this is an anaerobic process. Make sure to sprinkle extra bran over the top before you close the lid. Some suggest putting a paper plate on top of the last layer on bran to keep more air out. It needs to be kept as free from oxygen as possible. Avoid stirring up the previous day’s waste when putting in new garbage. When the bucket is full, it is sealed shut and set aside for ten to twelve days. Make sure to keep it out of the sun. Every other day during that time, the leachate that is an inevitable by-product of anaerobic composting needs to be emptied. If you want to use the leachate in your garden, you must dilute it 100 to 1 (like the worm tea). The leachate needs to be used within a day or so once you have emptied it from the bucket. When the bucket is opened, the contents, though recognizable, are thoroughly pickled. At this stage, the “pre-compost” can be buried in a fallow spot in the garden. One Caution: It is still so acidic that plant roots should not come in contact with it for two to four weeks.

Visual representations:



Happy Composting!!!!