

Composting

By Geoff Juden



Regular composting, also known as “cold composting”, involves placing a variety of organic materials in a compost bin, enclosure, or even just in a large heap, and leaving it there until it breaks down several months later. It’s a very slow process and typically takes 6 to 12 months. It can be sped up by turning the compost (i.e. moving the material around at the bottom of the heap to the top and vice versa to mix it up and get more oxygen in there) but it’s still a long wait.

The other approach to composting is “hot composting”, which produces compost in a much shorter time. It has the benefits of killing weed seeds and pathogens (diseases), and breaking down the material into very fine compost. In contrast, cold composting does not destroy seeds so if you cold compost weeds, any weed seeds will grow when you put the compost into the garden.

Cold composting does not destroy pathogens either so if you put diseased plants into your cold compost the diseases may spread into the garden, hence the common advice not to (cold) compost diseased plants. The other issue with cold composting is that you end up with lots of large pieces left over in the compost when the process is completed whereas hot compost looks like fine black humus (soil).

The Berkeley method of hot composting, developed by the University of California, Berkley, is a fast, efficient, high-temperature composting technique which will produce high quality compost in 18 days.

The requirements for hot composting using the Berkley method are as follows:

- Compost temperature is maintained between 55-65 degrees Celsius
- The C:N (carbon:nitrogen) balance in the composting materials is approximately 25-30:1
- The compost heap needs to be roughly 1.5m high
- If composting material is high in carbon, such as tree branches, they need to be broken up (for example with a mulcher)
- Compost is turned from outside to inside and vice versa to mix it thoroughly

With the 18 day Berkley method, the procedure is quite straightforward:

- Build compost heap
- Do not turn for four days
- Then turn every 2nd day for 14 days

Composting Materials and the Carbon-Nitrogen Balance

In the hot composting method, the ratio of carbon to nitrogen in the compost materials needs to be between 25 to 30 parts carbon to one-part nitrogen by weight.

This is because the bacteria responsible for the composting process require these two elements, in these proportions, as nutrients to construct their bodies as they reproduce and multiply.

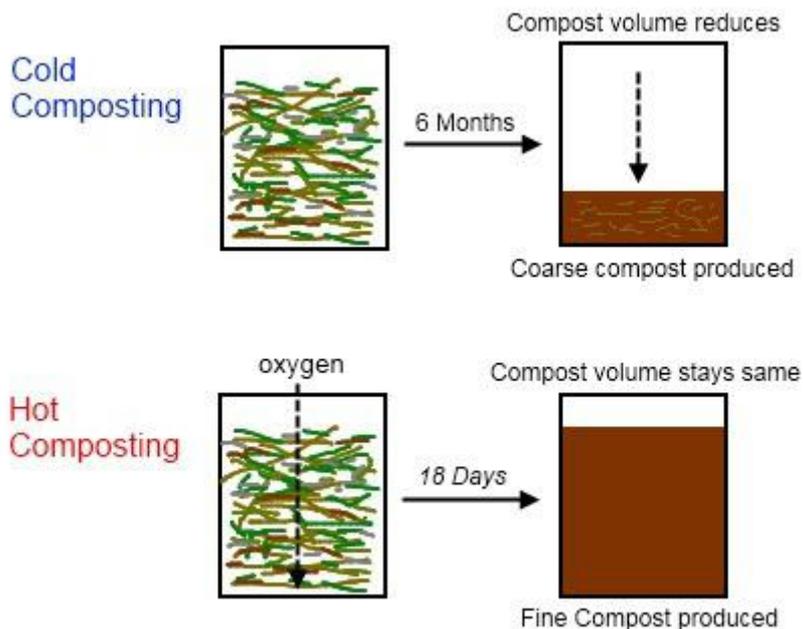
Materials that are high in carbon are typically dry, “brown” materials, such as sawdust, cardboard, dried leaves, straw, branches and other woody or fibrous materials that rot down very slowly.



Materials that are high in nitrogen are typically moist, "green" materials, such as lawn/grass clippings, fruit and vegetable scraps, animal manure and green leafy materials that rot down very quickly.



If the C:N ratio is right in this technique of fast, aerobic (with oxygen), hot composting, the compost will break down to the same volume. This is in contrast to slow anaerobic (without oxygen) composting that happens in a compost bin which drastically reduces in volume as it rots down.



Many ingredients used for composting do not have the ideal ratio of 25-30:1. When using hot composting methods, you need to make an assessment of how quickly materials decompose, and then use a blend of things that rot quickly and things that rot slowly.

Composting materials with a very low C:N ratio of 7:1 would rot very quickly because they are high in nitrogen - e.g. fish which decomposes very quickly.

Composting materials with a very high C:N ratio of 500:1 would take a long time to decompose because they are low in nitrogen and need to be broken up – e.g. tree branches.

For example, if the C:N ratio is too high, you can lower it by adding manure or grass clippings. If the C:N ratio is too low, you can raise it by adding cardboard, dry leaves, sawdust or wood chips.

In trying to understand what C:N ratios are about, it may help to point out that all plants have more carbon than nitrogen (remember, they get their carbon from the carbon dioxide in the air) so that is why the C:N ratios are always greater than always above 1:0.

Below are the average C:N ratios for some common organic materials used for composting.

- The materials containing high amounts of carbon, but low in nitrogen are considered "browns"
- The materials containing higher amounts of nitrogen are considered "greens."

Here are some C:N ratios of some common composting materials:

Browns = High Carbon C:N

Wood chips	400:1
Cardboard, shredded	350:1
Sawdust	325:1
Newspaper, shredded	175:1
Pine needles	80:1
Corn stalks	75:1
Straw	75:1
Leaves	60:1
Fruit waste	35:1
Peanut shells	35:1
Ashes, wood	25:1

Greens = High Nitrogen C:N

Garden waste	30:1
Weeds	30:1
Green Wood	25:1
Hay	25:1
Vegetable scraps	25:1
Clover	23:1
Coffee grounds	20:1
Food waste	20:1
Grass clippings	20:1
Seaweed	19:1
Horse Manure	18:1
Cow Manure	16:1
Alfalfa	12:1
Chicken Manure	12:1
Pigeon Manure	10:1
Fish	7:1
Urine	1:1

Anything that was once living can be hot composted. All manner of things, including strange additions such as wool and cotton clothing, bones, leather boots, even things like "roadkill" (i.e. dead animals) but these have to go in the very centre of the heap to break down properly. There's no trace of the original ingredients when the process is complete! Remember, the greater the variety of ingredients, the better the compost because it will have a wider range of nutrients in the final product.

Basically, if you want to get started in a hurry aim to use one third Manure and two thirds dry carbon materials. Just pile alternating thin layers of greens and browns until you end up with a compost heap that is one metre square and a bit taller than that. There's no need to get caught up in the mathematics of precise C:N ratios. It's more a matter of trying it out.

Step by Step Hot Composting

On day 1

Mix ingredients together by laying them in alternating thin layers of "greens" and "browns" to form a heap approximately 1 metre wide and 1½ metres high.

Wet the compost heap down very well so it is dripping water out of the bottom and is saturated.

Activators, such as comfrey, nettles, yarrow, animal, fish, urine, or old compost, put in the middle of the compost heap will start off the composting process.

On day 2

When heap is completed water well until it drips from the bottom.

On day 4

Turn the compost heap over - outside to inside and inside to outside.

When turning compost move the outside of the pile to a spot next to it and keep moving material from the outside to the new pile. When you're done all the material that was inside will be outside and vice versa.

Ensure that moisture stays constant. Put gloves on and squeeze a handful of the compost materials. It should only release one drop of water or almost drip a drop.

If it gets too wet spread it down or open a hole about 3" to 4" wide with the handle of the pitchfork or put sticks underneath for drainage.

On days 6 & 8

The compost heap should reach its maximum temperature on these days. As a simple guide if you can put your arm into the compost up to the elbow then it is not at 50 degrees Celsius and is not hot enough. It is best to use a compost thermometer or a cake thermometer.

You need an optimum temperature of 55 to 65 degrees Celsius. At temperatures over 65 degrees Celsius, a white "mould" spreads through the compost, which is actually "fire blight", an anaerobic bacteria. Temperature peaks at 6 to 8 days and gradually cools down by day 18.

Turn the compost heap over every second day - on day 6 and again on day 8.

If the compost pile starts coming down in size quickly there is too much nitrogen in the compost.

To heat up the compost faster use a handful of blood & bone fertiliser per pitchfork when turning.

If it gets too hot and smelly and goes down in size, it has too much nitrogen, so you need to slow it down. Throw in a handful of sawdust per pitchfork when turning.

When using the Berkley method, methane is released from the compost.

By day 18

Your compost should be just warm, dark brown and smell good. When earthworms move into the compost, you know it is finished and ready because it's cooled down and full of nutrients!

Some important points to note:

- Locate your compost heap in an area protected from too much sun or heavy rain to prevent the compost from drying out or becoming water-logged and slowing down the composting process.
- Space required for your heap should be about 1.5 x 1.5 metres and enough space in front of it to stand when turning the compost.
- Water each layer until it is moist as you build the heap. After three or four days give the compost air by mixing and turning it over, then turn every three days until the compost is ready, usually in 14 to 21 days. Remember, frequent turning and aeration is the secret of successful composting.
- Turn the compost using a garden fork, or even better, a long-handled pitchfork.
- In cold or wet weather, you can cover the compost heap with a tarpaulin or plastic sheet to prevent the rain cooling it down since the water will penetrate into the core of the compost pile. Even though cold outside air will cool the surface, but not the core of the compost heap, covering it prevents some heat loss from the surface and retains the heat within the compost heap itself.

Happy composting!

July 2013