

Compost Systems

Introduction

Compost is decomposed organic matter that is used as a fertilizer. Green waste such as leaves and food waste (although not all food waste is suitable) are broken down over a matter of weeks or months to produce nutrient rich humus, with the help of worms, fungi, bacteria, oxygen and water (also, urine is a great addition to a compost heap!). Compost can also be used as a mulch to help suppress weeds, warm the soil and retain moisture, all of which are beneficial to the plants being grown.

There are many composting systems, all of which are very efficient in their own way, but your choice may be limited depending upon the space and resources available to you.

Most composting systems follow the rule of layers, ie. alternate layers of green and brown organic waste, sometimes with additional layers of other material such as soil or straw.

It should also be noted that there are materials that should never be used in a composting system such as cooked or raw meat, cooked vegetable leftovers, perennial weeds, weed seeds, woody plant prunings and faeces.

Cold Composting

Cold composting is based on a simple system requiring very little work. A pile of organic waste is made in a suitable location, with small amounts of matter added to it at a time, and is left to decompose in its own time, which can take a long time. Although it is called “cold” composting, due to the breakdown and decay of the organic matter, some heat is inevitably produced.

Many gardeners prefer to use compost bins to create more complex cold composting systems, but these require more attention as the organic waste needs to be built up in layers of green (eg. tea bags, vegetable peelings, urine) and brown (eg. dead plant waste, whole egg boxes (for added air content), fallen leaves) waste of about a 50:50 ratio in order for it to be efficiently broken down into humus.

Example of a cold compost bin showing green (kitchen waste) and brown (leaves or grass) layers



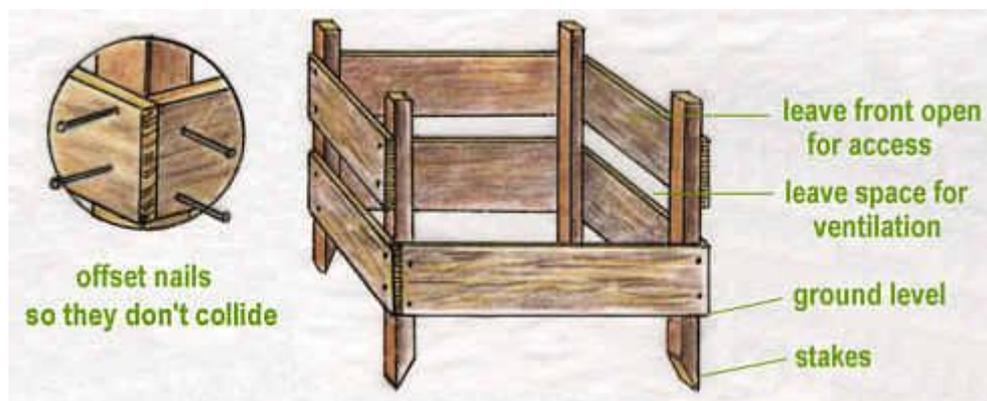
The advantages of a cold and maintained, it can be nutrient rich.

started very

However, downsides include the fact that due to the low temperature within the pile, unwanted weeds, pests and diseases will survive, and the organic matter takes a long time to produce usable humus, sometimes taking up to a year, during which time useful nutrients can be leached. In addition, in some cases, the smell can be a problem, and will attract flies and animals.

Hot Composting

A hot composting system is more complicated than a cold system, but its construction could still be as simple a heap of organic matter in a suitable location. However, most growers prefer to use bins or build a purpose-built unit as illustrated below.



As the name suggests, hot composting requires heat which helps to breakdown the organic matter much faster than in a cold composting system and to destroy pests, diseases and weeds.

Hot composting systems are more suitable to situations where large amounts of organic waste will be added at a time, unlike a cold composting system, and therefore a container should be at least 1 cubic metre square in order to hold enough matter to be able to contain the heat produced by microbes during decomposition.

In order to efficiently maintain a hot composting system, balance of green and brown waste must be monitored more closely than in a cold system, and moisture levels must also be monitored and added to if required (being careful to keep the matter moist, not wet). The waste will also need to be agitated regularly in order to aerate it. There are compost tumblers on the market, which are enclosed and easy to aerate, thereby speeding up the decomposition process.

The following table shows the temperatures required to destroy entities such as weed seeds and pathogens.

<i>To destroy:</i>	<i>Temperature required:</i>	<i>For how long:</i>
Weed seeds	49°C - 71°C	2-3 days
Pathogens, fly larvae	65°C - 71°C	3-4 days

With maintenance of the layers and moisture the heat levels will rise naturally. It should be noted, however, that maintaining temperatures above 65°C could also

destroy beneficial microbes. In order to reduce the temperature, aerate the organic waste more regularly.

Enclosed bins keep the contents dry and reduce evaporation, therefore making it easier to monitor moisture levels, as well as temperature. However, it can be more difficult to aerate the contents of a compost bin, which is essential to a hot compost system.

Open pens make moisture and temperature monitoring more difficult at the contents are likely to become wet as a result of rainfall and the temperature is hard to control. This can be overcome to an extent by covering with a tarpaulin or similar material.

In order to monitor temperature accurately, especially if you require temperatures high enough to kill pathogens and other undesirable elements, it would be wise to invest in a compost thermometer, which is long enough to reach the middle of the waste.

An example of a hot compost bin showing layers



KEEP MOIST: As wet as a wrung out sponge.

AERATE: Air helps to speed up decomposition. Aeration should be done throughout the entire composting process.

KEEP COVERED: Use a compost lid, cardboard or canvas over top of your pile.

An advantage of hot composting is that it will produce usable humus much more rapidly than cold systems (sometimes within 6 weeks), however the nutrient level is much lower than that of cold compost. Also, due to the speed with which decomposition takes place, it is less likely to attract unwanted visitors such as insects and animals. Another advantage is the ability to eradicate weed seeds and plant diseases due to the high temperatures within the compost.

However, in order to maintain a good hot compost system it needs to be closely managed. It takes a lot of time and effort to maintain in order to turn and aerate the compost. In addition, the temperature must be monitored closely. Although higher temperatures are needed in order to speed up decomposition and kill seeds and pathogens, if the temperatures rise too high problems may arise.

In a large, poorly managed hot compost pile, temperatures can reach around 82°C, and in extreme cases this is high enough to cause the dry material on top of the pile to ignite. If temperatures rise above around 71°C the oxygen will be used up which can result in anaerobic bacteria occupying the pile causing odours, loss of nutrients and build-up of toxins.

Trench Composting

Trench composting is a method most suited to vegetable gardens to aid the growth of thirsty vegetables such as the Fabaceae and Cucurbitaceae families.

Organic kitchen waste is broken down in a trench or pit over the winter to serve vegetable planting the following year. The trench therefore needs to be prepared during late autumn or winter and away from existing root systems such as surrounding trees, so some forward planning is required in order to decide your planting plan, and therefore where to locate the trench.

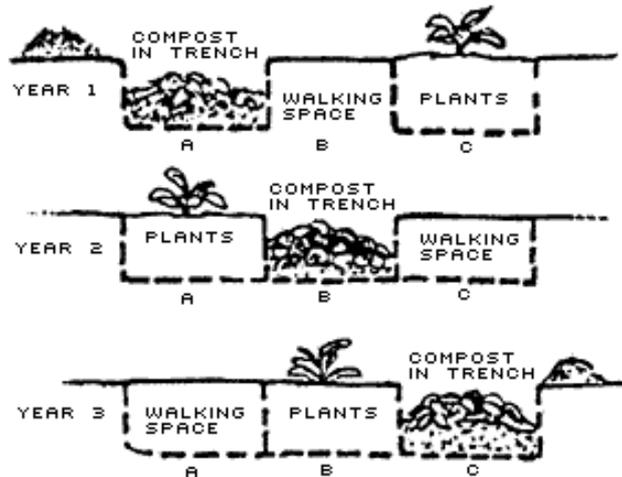
The trench needs to be about 60cm (2 feet or 2 digging spade depths) deep. Once dug out it is ready to receive some organic kitchen waste such as vegetable peelings, raw fruit waste or tea bags.

Once the waste is placed in the trench, it should be covered with a 2.5cm layer of soil, and this should be repeated each time a layer of waste is added until the trench is full. As with other composting systems, it is advisable to make layers of green and brown waste with a layer of soil between each, with the bottom layer consisting of brown waste. The top layer should consist of 10cm-20cm of soil



The trench should then be left undisturbed for the kitchen waste to decompose over the winter period. As the organic waste rots down it will retain a lot of moisture and nutrients, and the following spring vegetables can be planted into the trench.

With planning a 3 year rotation can be achieved, as shown in the following diagram.



Advantages of trench composting are that it is one of the simplest forms of composting. Materials can be added a little at a time, and once started in the autumn, the organic matter is decomposing underground during the winter, ready for your vegetables to be planted the following spring, with no further need to add compost to the area.

It can improve poor soils quickly, particularly sandy soils by improving the soil structure and encouraging micro-organisms which will further improve the soil.

However, the disadvantages are that, if you want to use this method, you need to set aside a relatively large area in order for it to be efficient.

The organic material can take some time to break down completely and this may result in pockets of anaerobic activity. In addition, because it is below ground you cannot monitor its progress, nor will you see the dark, nutrient rich composted material that results from a compost heap.

This method does take some careful planning insofar as considering the location, and organising filling up the trench with the required layers of wet and dry material to balance carbon and nitrogen.