Turning a heap regularly speeds up the composting process.

Making compost

Making compost is a 'win-win' situation: you produce a valuable garden resource and reduce the amount of material collected by the local authority

RHS / BOB MARTIN

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Composting provides a means of converting waste materials from the kitchen and garden into useful organic matter that can be used throughout the garden – to improve soil fertility, conserve soil moisture and enhance plant growth.

Composting is a biochemical process whereby coarse organic matter is broken down by bacteria, fungi and other soil organisms, into a finer-textured material. Adding this to soil increases its organic matter content, improving structure and texture, opening up heavy soils to make them more workable, and helping light soils retain moisture. It also provides a natural source of 'slow-release' nutrients for plants. Humus, derived from organic matter, holds onto nutrients that would otherwise be leached away by rain.

The 'raw materials' for composting can include almost anything of vegetable origin: garden waste, kitchen waste, paper and cardboard. Over time – typically six to 12 months, depending on the time of year and method used – suitable material can produce rich, dark brown, crumbly compost, uniform in texture.

When gardeners struggle to make good compost this is usually due to an imbalance in the proportions of 'green' and 'brown' materials. Larger compost heaps are easier to manage, but even small plots can generate enough compost to make it worthwhile. In tiny gardens with little garden waste but some kitchen waste, a better alternative may be a wormery.

Stage 1: raw ingredients

Compost heaps should contain a mixture of woody, carbon-rich 'brown' waste and softer, nitrogen-rich 'green' materials.

What to add

To compost well, heaps need a mix of woody, carbon-rich 'brown' waste (such as prunings, wood chippings, paper, cardboard or straw), and softer, nitrogen-rich 'green' materials (including leafy plant matter, grass clippings and kitchen vegetable waste).

Citrus, rhubarb and the clippings of conifer, walnut, laurel and yew can all be composted: any toxicity will break down in the heap. Woody material will decompose more quickly if shredded, as will conifer, eucalyptus and rhododendron leaves.

Small quantities of autumn leaves can be mixed into heaps, but larger quantities should be used to make leafmould. Moss can be slow to decompose and should be mixed thoroughly with other materials. Manures and used animal bedding from herbivores and birds are acceptable. Paper is best added scrunched up into fist-sized balls – shredded paper often compacts.

What not to include

- Diseased material, perennial weeds and seedheads are unlikely to be killed by the temperatures generated in a domestic heap.
- Plant material with soil-borne diseases such as white rot.
- Avoid roots of ground elder, bindweed and other tough weeds.
- Cat and dog waste may pose health risks.
- Clippings from lawns treated with herbicide, as residues can persist in the compost. Follow the manufacturers instructions.
- Meat, fish and cooked food scraps – these may attract rats.
- Glossy paper and cardboard coated with fine plastic films.

Shredded plant matter

Fruit and veg waste

Woody prunings

Weed foliage

Deadheaded flowers

Vegetable trimmings

Style of compost bin

There are many proprietory compost bins on the market – some of the most common are shown below.

Wooden

Relatively expensive. Often of a modular, extendable design. Avoid models with gaps between the planks as this allows heat loss. A slatted, removable front makes filling or emptying easy, while a lid retains heat and prevents excess rain or drying.

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Home-made

Can be created from a variety of materials. Solid sides help retain heat. Pallets or reclaimed wood can be used to make bins, or composting bays can be constructed of breeze blocks or brick (but may require foundations).

Plastic

Convenient and tidy for smaller gardens. Durable and light-weight, and may be available cheaply from your local council. Easily moved. Plastic lids retain heat, prevent drying out and make bins easy to fill. The bin can be lifted off to gain access.

Rotary bins

Expensive and quite small. Useful if you are unable to turn compost; do not overfill. Thorough mixing speeds initial composting to make good mulch, but material is often far short of the finished compost produced in heaps.

Stage 2: maintaining a healthy heap

A heap of organic matter in a corner of the garden will produce compost eventually, but a bin helps insulate the material and accelerates decomposition. Choose a well-drained site that gets sun for at least part of the day. An earth base allows drainage and access to soil organisms but bins can also be constructed on hard standing.

Aerating

Good aeration is essential in providing the conditions for aerobic bacteria to break down organic matter and produce high-quality compost. Various devices for aerating compost heaps are available, including winged aerating tools. Push these into the compost heap, twist to engage the wings, then pull out to lift and churn compacted layers. However, the handles on these tools are rarely long enough and considerable strength may be needed to operate such devices. Building the heap up around drilled plastic pipes is also recommended for improving aeration but little diffusion of oxygen into the heap is likely.

Turning

This is the most efficient method of aerating compost. Turning consists of emptying the bin, mixing, and refilling. This is best done with a garden fork.

Although laborious, turning is beneficial because it promotes aeration and gives a thorough mixing, which speeds the whole process. With regular turning, the time to complete composting can be reduced significantly. Realistically, most gardeners will turn the heap only once but even this can result in good compost within six months. Failure to turn the heap is one of the main causes of poor results.

Watering

As the heap is built, water can be added to moisten (but not saturate) the mix. It may be necessary to water the heap occasionally (left, adding compost activator) if the contents appear too dry, otherwise composting may stall. Much of this can be avoided if correct proportions of 'brown' and moist 'green' material are mixed during filling.

Covering bins

All compost bins need a cover or lid to prevent excess water from rain driving air out of the decaying material. Excessive moisture may waterlog the heap, reducing air spaces and therefore lessening the structural strength of the composted materials. This increases compaction and slows the composting process.

Lids also help to retain some heat, but in dry spells heaps may need a little extra water added using a watering can.

Adjusting the mix

Ideally, fill the container with a mix of material in one go – the large volume of material with plenty of air creates aerobic conditions that stimulate microbial activity, leading to higher temperatures. However, garden waste is usually produced in small quantities and, when added piecemeal, this can easily compact and become airless. Such anaerobic conditions may still produce usable compost, but only slowly (after one or two years).

In summer there is often an excess of soft, sappy material (such as grass clippings); in autumn and winter woody material predominates. The key to rapid and successful composting is a good balance of 'green' and 'brown' material. Avoid letting one material dominate (especially grass clippings). Aim for between 25 percent and 50 percent of soft, green nitrogen-rich materials.

Troubleshooting

Wet, slimy, strong-smelling compost indicates too little air and too much water. Cover the heap to keep it drier and add more brown waste, such as chopped woody material or scrunched-up paper.

Dry and fibrous compost with little rotting indicates too little moisture and too much brown material. Add more green waste, a commercial 'activator', or fresh manure at one bucket for every 15cm (6in) layer of compost.

Compost activators

Activators are materials that create a better balance of carbon and nitrogen within a heap. Well-made heaps should contain a suitable balance of materials and, with adequate turning, activators are unlikely to have much effect on the rate or quality of composting. In winter, when woody, carbon-rich waste dominates, a high-nitrogen activator may be of benefit.

Some activators contain carbon and are aimed at composting grass clippings or other green waste where there is insufficient brown waste.

A suitable mix of 'greens' and 'browns' (above). **Soggy, compacted, airless compost** (below) **is often due to too many grass clippings in one layer.**

The science of composting

Paul Alexander, Principal Scientist RHS Garden Wisley

The composting process, by which garden waste is turned into compost, is complex. Assuming the carbon:nitrogen ratio, heap volume, air and moisture balances are adequate (and there is scope for variability in all these parameters), the process of decomposition (composting) should begin naturally thanks to the natural population of micro-organisms in a compost heap.

These micro-organisms are made up of microscopic decomposers and physical decomposers. Microscopic decomposers consist of bacteria (which do most of the work), ably supported by actinomycetes, protozoa and fungi. These micro-organisms change the chemistry of the organic material. Microbial decomposition is largely driven by the need of microbes to source energy and nutrients to carry on their life cycles. Physical decomposers tend to be visible to the naked eye and include mites, millipedes, woodlice, snails, slugs and more. These populations physically break up the material, making the decaying matter more attractive to the microscopic decomposers.

Heat is generated through the process of oxidation (largely from carbon in the heap) as microbes decompose garden waste.

Some material is more easily decomposed than others and this is often used up quickly, leading to an initial increase in temperature within the heap followed by a cooling-down period (this change in temperature is not necessarily a problem). The initial stages of composting create quite acidic conditions but finished compost is usually alkaline.

Microbes and temperature

As the temperature of a compost heap changes over time, so can the microbes found within it. While the heap is between 10 and 45°C (50–113°F) it is mainly 'mesophilic' bacteria that are active. As the decaying material warms to 45–70°C (113–158°F), then 'thermophilic' bacteria become most active – these are simply better adapted to higher temperatures.

Key fauna found in your heap

Compost heaps have a range of invisible 'microfauna' breaking down the material. Populations of larger decomposers or 'macrofauna' will also build up, such as:

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Woodlice

Efficient detritovores, woodlice physically break down organic matter as they feed.

RHS / RACHAEL TANNER

Brandling worms

This worm (*Eisenia foetida*) collects in large numbers in the cooler parts of compost heaps.

RHS / ANDREW HALSTEAD

Slugs

Some slug species feed only on dead plant matter, contributing to the composting process.

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Ants

These are not harmful, but may indicate a heap is too dry with too many air spaces – add water.

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Stage 3: using the end product

Compost heaps of whatever description eventually produce at least some compost, at some point. Poorly done, this may take two years or more, but properly managed, the volume produced can be increased and the process speeded up to take only a few months in summer.

Well-constructed heaps, turned at least once, generate temperatures above the ambient for a short while. However, home composting generally involves 'cool' heaps that do not produce the high temperatures of 'hot' composting that the processing of large volumes of municipal green waste can reach. Home-made composts may not be entirely free of weed seeds and other 'contaminants' but are rich in organic matter and return a community of beneficial organisms to the soil. These continue the process of making nutrients available to plants: although containing less than 2 percent nitrogen, phosphate and potassium, garden compost is a natural 'slow-release' fertiliser. Its main value, however, is as organic matter for improving soil structure and texture, and as a source of humus that binds to nutrients, making them available to plants.

Making the most of garden compost

You have several options of what to do with good-quality, well-rotted garden compost.

Sieve compost

A garden fork can be used to take out larger pieces of uncomposted material but, where finer compost is required, use a coarse sieve to sift this material. Re-compost the lumps sieved out.

Potting compost

Mix mature, home-made compost with other materials to make your own growing media – for example, using equal parts of sifted compost; topsoil; and sharp sand, horticultural grit or perlite.

Soil conditioner

Lightly fork in a layer of at least 5cm (2in) of compost into the soil surface where most plants have their roots. The compost will release nutrients as it breaks down over one to two years.

Mulch

Alternatively, add compost as a surface mulch up to 10cm (4in) thick and allow earthworms to do the mixing. Applied in spring, the compost will provide nutrients as well as conserve soil moisture.

Find out more

Search 'Composting' and 'Wormery' at **www.rhs.org.uk**
For a video guide to composting, search 'Making compost' on the website.
The RHS Advisory Service can help with specific compost problems: for contact details see p6.

FURTHER READING

- *Compost*, by Ken Thompson, Dorling Kindersley, 2011, £7.99, ISBN 9781405362290.
- *The Garden Organic Book of Compost*, by Pauline Pears *et al.*, New Holland Publishers, 2011, £12.99, ISBN 9781847734372.