Composts and growing media – the facts

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Practical Guide

There is frequent confusion surrounding the word “compost” and misunderstandings over which types of compost to use for different purposes. This guide defines the different types of compost and growing media, explains briefly how to make your own compost and underlines the reasons for moving away from peat-based growing media.

Definitions

In the UK, the word compost has two completely different meanings as follows:

1. **Compost: a stable, sanitised soil conditioner made from biodegradable organic materials through a composting process. [Composting can be defined as a controlled, aerobic (with oxygen), microbial decomposition process which involves self-generated heating]. True compost can be made at any scale, from garden compost heaps and bins to large commercial composting systems designed to take municipal food and garden wastes.**

2. **Compost: a growing medium in which seeds are sown or young plants are grown in containers. It’s usually bought and sold in plastic bags, though larger quantities can sometimes be sold in bulk bags. This type of compost is perhaps better called “growing medium” to distinguish it from the first type of compost, since the two types are very different. The term growing medium is used for this type of compost in the remainder of this guide.**

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467753LH / 02.03.2022

Understand the difference

It is important to understand the difference between the two types of compost. The sort that you make in a well-run garden compost heap may look the same as that which you might buy in a colourful plastic sack and use to sow seeds in or grow young plants in, but it is not. Garden compost is much too nutrient-rich for use alone as a growing medium, and the physical structure is not suitable. In fact it is chemically and nutritionally similar to farmyard manure and few people would try to sow seeds in that! Garden compost is an excellent, nutrient-rich fertiliser and soil conditioner and is best applied to soils to improve them for fruit and vegetable production or (at lower rates) as a mulch around ornamental plants.

Growing media are best bought from companies who understand how to make blends that are suited specifically for sowing seeds, striking cuttings or growing on young plants. The consequences of using a poor quality growing medium are serious.

You will lose the money spent on the medium itself, but also the cost of seeds that were wasted. Worse than that, you may lose several weeks of the growing season, which can mean serious financial losses.

The following sections explain more about how to make and use garden compost, and more about growing media and how to choose and use them.

Composting

Composting is seen by many to be a bit of a dark art, but the principles of making good compost are relatively simple, and they are the same whether you are making compost on a garden scale or on a massive commercial scale indoors or outside. It is a microbial process and the microorganisms which do the job are present naturally in the environment and on the organic materials which make up the starting materials (or feedstocks) for the process. Providing there is enough air (or more specifically, oxygen) and moisture, the microorganisms will break the organic materials down over time. As they do so, the heap will heat naturally, then cool gradually over time. It is important to turn the heap at least once, ideally several times during the process, to allow more air in, and to ensure that the cooler materials on the outside of the heap get moved into the middle zone, which usually heats and therefore decomposes more rapidly. Well-run domestic compost heaps and bins, the contents of which are turned two or more times over the course of the process, can self-heat very well and may produce top quality compost in as little as 3 months, but 6 months or even 1 year are commonly needed.The natural heating in a compost heap is very important, because it's the heat which kills plant, animal and human pathogens, weed seeds and weed propagules and which denatures viruses. The heat also helps to break down pesticides and other organic contaminants that might be present.

There are several things which you can do to ensure that your compost heap provides an ideal environment for the microorganisms to do their job in breaking down the organic wastes and therefore also produce the required heat. These are as follows:

1. **Ensure a good mixture of woody/papery/cardboard (high carbon) wastes and green/fleshy (high nitrogen) wastes (very roughly 50% of each by weight) and make sure that these are well-mixed. Microorganisms need a mixture of carbon and nitrogen in order to do their work.**
2. **Ensure that there is sufficient air in the compost throughout the process. It helps if your compost heap is open to the air on one or more sides, or has slatted sides. It also helps if the material that you are composting is coarsely shredded rather than too fine and dense. A garden shredder, which can shred branches is a much better way of creating the woody fraction of your starting materials than to put in paper or cardboard, because it allows more air in during the process. Turning is also a key method to ensure that air gets to all parts of the heap during the process. A lack of air in the lower parts of compost heaps is a frequent cause of slow garden composting processes.**

4. **Ensure that there is enough moisture, but not too much throughout the heap. This too is related to the structure of the materials in the heap: if materials are too coarse, they are often too dry, particularly in dry areas. Similarly if materials are too fine in structure, they hold too much moisture, particularly in wet areas. In dry areas, you may find that you need to water your heap and cover it to keep moisture in. In wet spells, you may find that you need to cover it to prevent too much rain getting in to the heap. A lack or an excess of moisture (and you might get both in the same heap, hence the need to turn) is another frequent cause of poor garden composting processes.**

Production of good garden compost does require a bit of thought and effort, but a basic understanding of the principles and a willingness to put them into practice are all you really need in order to produce a great finished product which is rich in fertiliser nutrients, organic matter and beneficial microorganisms. There is no need for expensive additives or for proprietary composting bins.

Using your own compost

Typical garden compost contains useful amounts of plant nutrients including trace elements. You can apply it to the soil surface or dig it in. Typical application rates for vegetable gardens would be between around 30 to 40 t/ha each year (20 to 4 kg/m^2) or perhaps a little more where soil analysis results show that the soil is deficient in phosphate or potash. Application rates should be lower when the compost is used as a mulch on ornamental beds, since too much compost on ornamentals can result in lots of lush green growth (which is particularly susceptible to pest and disease attack) and a lack of flowers. Garden compost can also be used as a top dressing for turf, but it is better sieved through a 0 – 10 mm sieve and mixed with sand and/or loam when used for this purpose. Garden compost can also be used as one of several constituents of a home-made growing medium, but this is not recommended other than for limited situations (Boxes 1 and 2).

Growing media

Most growers wanting to produce vegetables, salads and ornamental plants grow their plants in growing media using seed trays, modules and plant pots.

Although many growing media manufacturers sell “multipurpose” blends, these are always a compromise. In some cases, the compromise works very well, but for the more sensitive seeds, such as tomatoes, peppers, cucumbers and some ornamental species, it is better to choose specific media for propagation (seeds and cuttings) and potting on plants of various ages. For example, John Innes media, which were traditionally based on a mixture of peat, sterilised loam and coarse sand were developed for propagation and for potting on plants with different nutrient requirements (John Innes composts 1, 2 and 3). Commercial growing media tend to be produced with specific purposes in mind, whereas many of the amateur products are simply labelled “multipurpose”.

Buying good growing media for sowing seeds and potting on young plants has become a lot more complicated in recent years. Since the 1970’s most growing media have been based largely on peat, but for good reasons, peat, which is a limited and finite resource, is now being replaced partly or wholly

as the main constituent by other materials. A justifiable ban on the use of peat in amateur growing media will come into effect in 2030 in England and Scotland is likely to follow suit. Further bans on the use of peat in professional growing media will follow in due course.

Peat has worked very well as the main bulk constituent in growing media because it has been very cheap and widely available. It is also light in weight, extremely consistent, free from plant pathogens and pests and low in nutrients and pH, thus making it easy to add nutrients and lime too in a consistent manner. As far as growing media manufacturers are concerned, there are no alternative constituents which are good as peat in every respect. Alternative bulk constituents are more variable, heavier, more expensive, often in critically short supply and many have sustainability issues, just as peat does. The increased weight and the higher costs for lab testing in peat-free and reduced peat media is making growing media much more expensive and difficult to produce.

Although there are now some very high quality amateur and professional peat-free and reduced-peat media available, the quality of many amateur products remains low and often inconsistent from year to year. This is leading to poor confidence in such media and is the reason why most professional and many amateur growers continue to use peat-based media whilst they still can.

There is no legal requirement for growing media manufacturers to state the constituents and percentage composition of their products, although bags are usually labelled as containing peat, having a reduced peat content or being peat-free. Alternative constituents to peat include coir, wood fibre, composted bark, expanded clay minerals, sand, gravel and loam (topsoil). There are practical, financial, chemical and physical advantages and disadvantages with all of these materials (see Table 1). The major growing media manufacturers have signed up to the “Responsible Sourcing Scheme”, which aims ensure that growing media is made from materials that are sourced and manufactured in a way that is both socially and environmentally responsible.

What it means to go peat-free

Whilst some peat-free and reduced-peat media perform in a very similar manner to peat, many do not. They tend to look different, they feel different in use, they hold and release water in a different manner, they may be more or less affected by small flies (sciarid flies or fungus gnats) and plants growing in them may need more or less supplementary feeding during use. The best advice is not to expect them to behave the same as your tried and trusted peat-based growing media. Check your plants more carefully and more often, particularly with regard to watering. Lift pots and trays to see whether watering is needed and don’t rely on the colour of the medium surface. Overwatering is a major cause of death in peat-free media. If plants are not growing well, try to assess symptoms and decide whether supplementary liquid feeding might help. Experienced growers who make the effort to find a good peat-free growing medium tend to acknowledge that they have to learn how to get the best from it, but once they have done so, it can work very well.

How to choose good growing media

If you are a professional grower requiring large volumes of growing media, work with one of the main manufacturers to explain what you are growing and they will produce media for you to suit your purposes. The main manufacturers are now making very good peat-free and reduced-peat blends.

If you are an amateur or small-scale commercial grower, don’t assume that a brand which worked for you last year will be as good next year. Evidence has shown that that is not necessarily the case and there can be very poor consistency within named products from year to year. Ask around friends, colleagues and contacts at the very start of each growing year to find out who’s had successes or problems with what. A good recommendation from a trusted source is worth a lot. It is also worth obtaining the “Gardening Which” recommendations for peat-based, reduced-peat and peat-free amateur growing media, which come out before the start of each production season and are based on growing trials of a wide range of amateur brands.

Why not make your own growing media?

For a growing medium to work well, it must have appropriate physical and chemical properties. It needs to have a stable, open structure which holds sufficient water, but not too much. It needs to have an appropriate pH (not too acid or too alkaline, depending on the crops to be grown) and should have a good balance of (ideally controlled-release) nutrients and should not be too salty or nutrient rich. There must be an appropriate balance of carbon to nitrogen, because if there is too much carbon, the microorganisms which inhabit the medium will scavenge all the available nitrogen and the plants will have none. (This is a major cause of poor growth in peat-free growing media).

Manufacturers of amateur growing media spend a great deal of time and money formulating their products and conducting laboratory tests to determine its chemical properties and those of their chosen constituents, but even they find it difficult to consistently achieve high quality media.

Given the high cost and heartache associated with using poor quality growing media, it's probably best to leave the manufacturing process to experts and to try your best to choose one of the better available products. However, if you do want to try making your own, start by producing media for growing "hungry" crops, such as potatoes and brassicas in containers (see Box 1).

For more information:

www.fas.scot; Growing Media Association webpage on Responsible Sourcing Scheme **(https://growingmedia.co.uk/responsible-sourcing.html)**; "Horticulture – a Handbook for Crofters" **(https://www.crofting.org/enterprise/books-and-cards/horticulture-handbook/)**; RHS webpages on: composting **(https://www.rhs.org.uk/advice/profile?pid=444)** and peat-free growing media **(https://www.rhs.org.uk/advice/profile?pid=441)**.

Table 1. Commonly used constituents of commercial growing media

Main bulk constituents of growing media	Advantages	Disadvantages
Peat	Low cost, good availability (although that will change as peat bogs close throughout Europe), consistency, freedom from pests and pathogens, good physical and chemical properties.	Use is environmentally damaging and unsustainable; supply of peat will stop in the near future.
Coir (wastes from coconut production)	Freedom from pests and pathogens, consistency, good physical and chemical properties.	Supply shortages; long transport distances from production sites.
Composted bark	Some have good physical properties, some types might suppress plant diseases.	High cost; relatively inconsistent, and can have poor chemical properties (too salty and nutrient-rich).
Composted wood fibre	As above	As above; not currently obtainable other than to major growing media manufacturers who have built their own production facilities.
Sterilised, heat-treated wood fibre	Relatively consistent, with useful chemical and physical properties. This is likely to be the major bulk constituent in future.	High cost; not currently obtainable other than to major growing media manufacturers who have built their own production facilities.

Constituents typically included at lower volumes	Advantages	Disadvantages
Top quality commercial green compost (sieved garden compost can be used in home-made growing media).	Excellent in terms of sustainability, relatively inexpensive and can have a good physical structure.	Relatively inconsistent; can have poor chemical properties (too salty and nutrient-rich); can contain physical contaminants such as plastic, glass, metal fragments.
Sterilised loam/natural topsoil (a mixture of sand, silt and clay)	Can be a useful constituent when combined with lighter weight materials.	Heavy, and less suitable for use in large containers due to its low air content and tendency to hold too much water.
Unsterilised loam/ natural topsoil	As above	As above; risks that the material might contain plant pests and pathogens.
Coarse sand and gravel	As above	Heavy and only suitable for inclusion at small volumes.
Perlite or vermiculite	Can improve the way in which growing media hold nutrients and drain after watering.	High cost; some types have sustainability issues.
Expanded clay minerals (other than the above two)	Can improve the way in which growing media hold nutrients.	As above

Box 1. Making your own growing media

If you do decide to make your own media, start first by making a medium for use in large containers to grow less sensitive nutrient-hungry crops such as potatoes and brassica transplants. Dilute your own nutrient-rich garden compost with coarse, open-structured, nutrient-poor material such as coir, wood fibre (if you can get it), coarse sand and perlite. Materials such as leaf mould, chopped bracken, topsoil and composted bark can also be included, but ideally they should each form only a small % of the total volume. If your early experiments go well and you decide to start making media for more sensitive plants such as seedling salads, test every batch on a small scale before risking using it widely.

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