



There are various materials that can be used to alter physical properties of soil, allowing the cultivation of a wider range of plants

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Garden practice
Soil conditioners

Few gardens have most gardeners' idea of the perfect soil – fertile, well-drained but moisture-retentive loam. But no matter how intractable your soil may seem, it is always possible to alter it to make it better suited to growing particular plants and crops.

Soil conditioners (also referred to as soil improvers or ameliorants) are materials that alter and improve soil structure. A well-structured soil has a crumbly, moist texture, with a network of pores that holds both air and water. The crumbs are held together by minerals, by decomposed organic matter and by organic compounds produced by soil organisms and plant roots. In such a structure, plant roots can spread easily and exploit a large volume of soil for nutrients and water.

Soil conditioners may be organic (such as manures), mineral (such as grit) or chemical (lime or gypsum). Organic and chemical soil improvers function differently, but both help to aggregate soil particles and so improve soil structure. Mineral improvers increase aeration and drainage, but have no direct effect on soil fertility.

Benefits of soil conditioners

While chalk and limestone soils are naturally well structured, sandy or silty soils have little to bind them together. Clay soils are often compacted, with poor drainage. Applied correctly, suitable conditioners improve the aeration, drainage and cultivation of clay and silt soils, and the moisture-retaining abilities of light sandy or chalky soils.

Organic-based soil conditioners also provide nutrients for plants, mostly through micro-organisms in the soil breaking down the material. The end product of this breakdown, humus, also holds on to nutrients, preventing them being washed away.

The choice of soil conditioner and when to apply is dependent on soil type. Autumn is a good time – but on sandy soils apply organic matter in spring, as nutrients are soon leached out. Organic matter also breaks down more rapidly in sandy soils, so they require more frequent applications of coarser material, such as manure or mushroom compost.

Organic conditioners are best forked into the top 15 centimetres (6in) of the soil or applied as a mulch. If supply is limited, concentrate on improving a small area. As a minimum, apply a bucketful per square metre (11sq ft) and around twice this to cropped areas.

Over the years, the structure of well-worked garden soil improves, especially with regular applications of conditioner, so even the most daunting sites may become manageable, given time and effort. ●

www.rhs.org.uk For more information on your own garden's soil type, enter 'soil types' into the search box on RHS Online



Popular soil conditioners

Composted bark

❖ **What is it?:** A waste product of the timber industry from sustainable commercial forests. It is available bagged or in bulk from specialist suppliers. Works well on clay soils, dug into surface layers to open up the soil.

❖ **Effect on soil structure:** Composted bark usually has a low pH and may acidify the soil locally after prolonged use. Due to its bulky nature it helps improve aeration and drainage better on clay soils than other organic soil improvers, but on sandy soils it will not improve moisture retention to the same extent initially.

❖ **Drawbacks:** Contains few nutrients but high quantities of carbon that the soil micro-organisms break down, possibly depleting the nitrogen levels in the soil, which reduces soil fertility temporarily. Breaks down relatively slowly, which compensates for it being more expensive than other materials.

Garden compost

❖ **What is it?:** Rotted-down garden and kitchen waste. Free and environmentally friendly, this material is best made in purpose-made bins of at least 1cu m (35cu ft). Use a mix of soft green material and woody brown matter (shredded prunings, cardboard, leaves). Avoid letting one material dominate, especially grass clippings, which can form a smelly, slimy mess.

❖ **Effect on soil structure:** This is an excellent alkaline soil improver and a good alternative to animal manure. It has bulk, improves moisture retention and has more nutrients than most.

❖ **Drawbacks:** It can be difficult to produce sufficient quantities, taking six months or more to make, especially in winter. Emptying the bin occasionally and turning material to add air is needed for good results but is hard work. Weeds seeds and fungal spores are unlikely to be destroyed.

Leafmould

❖ **What is it?:** The partly rotted leaves of (usually deciduous) trees, stacked for a least a year in post-and-wire netting enclosures. Small quantities can be made in sealed black plastic bags. Collecting leaves with a mower or passing through a shredder may speed up composting.

❖ **Effect on soil structure:** Leafmould helps open up the soil without drying it out; contains few nutrients. Usually neutral to slightly acidic; leaves from trees growing over chalk are more alkaline.

❖ **Drawbacks:** Not available commercially so must be made at home but hard to produce sufficient amounts. Leafmould for soil improvement may take a year or two to make; the best takes at least three.

Rotted manure

❖ **What is it?:** Animal (usually cattle) manure, with straw, that has been stacked and allowed to decay. Bagged manure is often processed to ensure material is easy to apply. Relatively high in nutrients and a good source of trace elements. Widely available; fresh manure is best stacked for six months.

❖ **Effect on soil structure:** Manure is usually alkaline; it provides an initial quick release of nutrients, then a slow gradual release. If supplies are limited, composted manure is best applied late winter

to early spring. It encourages worms and improves moisture retention.

❖ **Drawbacks:** Bagged products can be costly and heavy to move. Herbicide residues have been a problem.

'If supplies are limited, composted manure is best applied in late winter'

Using sandy grit at RHS Garden Hyde Hall



Ian Bull, Garden Manager, RHS Garden Hyde Hall, explains why it was necessary to add large volumes of grit to the newly extended Dry Garden

❖ We mix in copious amounts of sandy grit when replanting or developing an area of the garden. Soil at Hyde Hall is heavy Essex clay which gets cold and wet in winter and dries to 'rock' during our dry summers. Mixing in grit opens the soil and helps prevent clay particles sticking

together, creating gaps between particles, which helps water drain freely.

Our mix of sandy grit consists of 60 percent 6mm (¼in) coarse grit and 40 percent sharp sand. It is spread in a layer 5–8cm (2–3in) thick over the soil, then mixed in a spit (spade's depth) or so deep. We use a greater ratio of sandy grit to organic matter when preparing new areas to ensure it is free draining, vital in the Dry Garden, where we grow plants from Mediterranean-like climates. These need free-draining soil, and rot off if grown in cold, wet soil.

Adding grit is labour-intensive, heavy work. Organic matter, being lighter, is easier to use for opening the soil but it does increase the soil's moisture-holding capacity. For plants that resent winter wet, grit may be the best option.

Improving soils

Other soil conditioners



Clay breaker

What is it?: Material based on gypsum (calcium sulphate). Available from specialist horticultural suppliers and garden centres.

Effects on soil: Corrects soil structure problems of heavy clays without affecting pH. Applied in autumn it can help open up clay soils high in sodium, but the effects can be unpredictable – test in a small area first.

Garden lime can also bind clay soils that are low in calcium, but raise their pH.

Composted bracken

What is it?: Dead bracken collected in autumn; makes humus-rich compost. Limited commercial availability. Spores may be carcinogenic, so do not gather bracken in late summer, at which time spores are released. Allow to rot down for a couple of years.

Effects on soil: This compost is generally acidic and relatively fine so is rapidly assimilated by some soils. Little nutrient value.



Spent mushroom compost

What is it?: Traditionally, well-rotted horse manure and straw; now usually composted straw with added fertilisers, as used by mushroom producers. Contains chalk. Available bagged at garden centres, but will be cheaper bought in bulk from dealers. If from non-organic sources, it may contain pesticides.

Effects on soil: Good soil ameliorant; alternative to animal manure, relatively high in nutrients. Useful for improving acid soils. Do not use for plants that like acid soils.

Green waste

What is it?: Recycled garden waste, high-temperature composted by local authorities. Material should be weed free and environmentally sound. Products sold as soil improvers are often derived from processed green waste. If bagged, the material may be fairly expensive.

Effects on soil: Material is a good source of organic matter and nutrients, but it can contain appreciable amounts of chipped woody material. Good for improving both moisture retention and aeration of soil.