

Soil Management and Development

A Good Advice Guide for Gardeners

The Garden Clubs of Australia Inc.

The soil is a gardener's raw material. If it's treated with respect, nurtured, coddled and fed like the precious commodity it is, it'll repay you a thousand times over ... the gardener should aim to create a living breathing soil. In its natural state, it contains billions of organisms, most of which are working away to your benefit to help produce strong, healthy plants. Of course, even the gardener expects far more from his or her soil than nature ever intended, so you'll need to put a lot more back in. But if you build that healthy foundation, a successful beautiful and productive garden follows naturally and quite inevitably.

Geoff Hamilton, *Gardeners' World*

All successful gardening begins with the soil and so something needs to be known about its constituents and treatment. Simply, along with air, water and microorganisms, soil is composed of two main components:

- minerals (the **inorganic part**) which are built up from weathered particles of rock
- humus (the **organic part**) consisting of decomposed plant and animal tissue. The organic part is the living part of soil.

Sandstone weathers down to form sandy soils with coarse particles which present no drainage problems, whereas shale and slate disintegrate into fine-particle clays. Between the two are all manner of mixtures called **loams** which have a better physical structure than either sands or clays and are therefore easier to manage. The ideal soil is an equal mix of sand, silt and clay.

Simple tests can provide an approximate evaluation of your soil types (realising that we often have different soil types in different parts of our property). Clay soils dry slowly and are difficult to cultivate and to work properly. Sandy soils lack organic matter and may dry out rapidly.

A simple test is to take a handful of soil from each part of your garden and wet it lightly. Roll the moist soil into a soil ribbon ('sausage' shape) between your hands and see how long you can make it before it breaks apart. More sandy soils will not hold the sausage shape and grains will stick to the hand, while clay soils will easily form the shape and be rather sticky.



Right: The soil sample from this garden bed is shows how crumbly the soil is and that it would not form a substantial ribbon. There are many grains left over the hand. It is a loamy sand.

Left: The soil sample here (a bit too wet) is loam as it was coherent but not smooth and silky as a more clay soil would be. Some grains stuck to the hand, but a lot fewer than in the sample above right.

Below right: The sample ribbon formed quite well but still grains came away. It seems to be more a sandy clay loam.



Humus is important in all soils. It keeps the particles of clay apart, resulting in better friability and aeration; and it also provides a suitable environment for earthworms, which are great helpers in maintaining soil condition. Humus is needed to increase the water-holding capacity of sandy soils; while in clay soils it lets in the air that is essential to good plant growth and will prevent tiny particles of clay from cementing themselves into a solid mass when wet or dry.





Left: A difficult garden area that is steeply sloped. The yellowish soil differs from the standard impression of what garden soil looks like. This north-west-facing area is always dry as it's so exposed and the soil is crumbly and water runs off quickly, worsened by the slope of the land. Terracing (along with building up the organic matter in the soil) has been the solution to slow down erosion and assist the soil in retaining valuable moisture and nutrients.

As humus is essential for plant growth, it must be regularly helped along with animal manures or compost. Dried animal manures supply plant nutrients and can be used to enrich all soils and crops. They also aid in soil aeration and provide nutrients for microorganisms living in the soil.

Animal manure often is unbalanced with high nitrogen content and insufficient potash and phosphate, so the addition of a balanced fertiliser is also recommended. Fowl manure is much richer than cattle manure which is generally better than horse

manure. Take care with fresh manures since they can burn a plant's roots. Digging fresh manure into an empty bed has the advantage of preventing the loss of valuable nitrogen.

Compost is the most common source of humus and the compost heap is a convenient and inexpensive place in which to turn house and garden waste into a useful product.

There seems to be as many recipes for successfully making compost as there are gardeners.

Noted British gardeners provide some advice on their composting practices:

Monty Don begins with:

... a dustbin full of kitchen waste, a bale of straw that got left out in the rain for a month, three barrow-loads of mushroom compost left over from the lorry-load delivered last September ... a pile of gritty sand that gets added to every time the paths are swept, all the cardboard from Christmas, a bucket of (old, very powdery) lime plaster and the contents of the chicken house. I just mix it all with a layering action, keeping the heap as box-like as possible.

Christopher Lloyd in *The Well-Tempered Garden* gives a description of his processes:

To make a compost heap, then, you start with a six-inch deep layer of refuse, covering an area of up to 12ft (4m) square. If the refuse contains long stems, such as old herbaceous plant stems, they should be chopped up into shorter lengths ... the heap will be too well aired and will not heat. On the other hand, refuse like green lawn mowings packs down too well. These should be kept as loose as possible by mixing with coarser rubbish. If mowings pack down too tightly, the absence of air has the effect of not allowing them to heat properly and you end with silage instead of compost.

You thoroughly wet this layer and add a proprietary accelerator (containing nitrogen and lime) before going on to the next. The stack can be added to until 4 or 5ft (1.1–1.8m) high ... An alternative to a proprietary 'compost maker' is to add sulphate of ammonia and garden lime in alternate layers. They must be kept separate in this way, because they react with one another with a consequent loss of nitrogen.

Clearly both their gardens are large as their compost-making would swamp the average suburban garden and few of us would ever have this quantity of material to compost at one time. However, the principles they outline apply equally to us when using our compost heap or plastic compost bin.

- Most vegetable matter can be composted. Large quantities will develop heat as it decays killing weed seeds. If you don't have the quantity, weeds from your garden should be collected before they seed and so are safe to go in the compost bin.
- Layering the compost heap is good practice. Many 'recipes' talk about a mix of 'green and brown'. 'Green' is obviously leaf matter and the 'brown' can be provided using autumn leaves or shredded newspapers

Left: A garden demonstrating good soil culture with flowering plants in abundant bloom, the lawn a vivid green and trees showing lush, nitrogen-enhanced growth. Adequate moisture and nutrients have obviously been supplied.



including junk mail and torn-up cardboard work very well.

- Kitchen scraps are good, but meat, bone and fat scraps or dairy products might attract vermin.
- Keep the compost lightly damp. Add a sprinkle of sulphate of ammonia, some garden soil, chicken or other animal manures if available at different times and try to loosen the compost as it develops with a garden fork to increase the availability of air to the bin.
- Your bin will produce compost, but don't be impatient!

Compost worked into the top 5cm of the soil will greatly benefit your garden. It is, however, wise not to dig compost in too close to existing plants and shrubs to avoid 'burn' which can be caused if the compost has not quite finished decomposing.

Mulching is good garden practice to maintain the fertility in the soil as the mulch breaks down. Spreading mulch over your garden beds also reduces evaporation and lessens the need for watering as well as discouraging weeds. There are many commercial mulches on the market and all are effective.

For many of us, lawn clippings are a favoured mulch but remember that lawn clippings (and other mulches) will remove some of the nitrogen from the soil, so it pays to add a little nitrogen during the mulching process.

No-Digging or minimum digging are techniques which are becoming popular with some gardeners, not only because of the reduced workload, but these processes don't mix the different layers in the soil profile, disrupt the soil food web or break down the 'crumb' structure we have worked so hard to achieve. Even when cover crops are grown to add fertility to the soil, it is not necessary to turn them into the soil, as is usually recommended. You can bury the cover crop under a heavy mulch to kill it. If the soil is loose and friable, it is easy to pull the cover plants up by the roots and lie them down on the bed as mulch.

Soil is sometimes described as "the living, the recently dead and the very dead" and this is a helpful way to understand the processes that shape soil and make it fertile.

The *living* portion of soil is made up of plant roots and of the numerous microbes and other living organisms that improve soil structure by breaking down organic material.

The *recently dead* components include deceased soil organisms, green plant material and fresh manures. They decompose readily and release nutrients quickly.

The *very dead* portion is those decomposed particles of rock and humus, the final residue of organic matter breakdown that's important for soil structure and disease suppression.

For fertile soil, all three components are essential.



Left: A newly-built home is an exciting prospect for the owners, but brings with it challenges for establishing appropriate garden beds and then developing the soil.
Below: The owner had a stairwell constructed (rather than using the driveway only for access to the home) and then terraced the steep garden bed in a series of creative pockets with treated pine sleepers. Quality loam was introduced and then the joys of planting, mulching and nurturing the newly-planted treasures could begin.



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