A Garden Organic Factsheet

Surveying the soil on a new growing site

The soil is perhaps one of the most important factors that will determine how and what you grow at your site. This sheet provides some guidelines on what you can look out for when you first visit a household garden or an allotment plot.

1. Look at the general features

The general features of a site should be the first thing that you look at before you delve into the nitty gritty. We only mention the features related to soil here, but while you are at it, you will probably want to consider other features such as aspect, shading and potential frost pockets.

Questions of the general site relating to soil that you may ask are:

- Is it on a steep slope where loss of topsoil through run off may be a problem? Top soil is a valuable asset, so it is worth taking measures to make sure it doesn't get lost. This may include digging drainage ditches or planting a slow-growing hedge. Planting is best done at right angles to the slope rather than up and down it.
- Is the site open and exposed to wind blow? Again it is worth taking measures to make sure that your precious topsoil doesn't end up in next door's garden. Hedges make the best wind break – walls can just funnel the wind concentrating the damage.

2. Look at your weeds

One of the many useful functions of weeds is to give an indication of your soil type and its condition. It gives you a fairly good idea, at a glance, what may be happening beneath without even having to get your hands dirty. Here is a quick guide:

Chickweed
Good news, fertile soil, good structure.

Creeping thistle
Heavy clay soil.

Dandelion
Heavy clay soil, slightly acidic.

Perennial sow thistle
Wet soil; neutral or alkaline.

Creeping buttercup
Poorly drained acidic clay.

Pineapple weed
Crusty surface.

Corn spurrey
Sandy light soil, acidic.

Clovers
Can be sign of low soil fertility if predominant.

3. Look at the soil surface

- Is it crusty or capped? – This could cause problems with water running off and not actually reaching the roots where it is needed. It can also starve the roots of air. Soil capping can be caused if the soil is cultivated too finely or subject to very heavy rain or irrigation. Adding organic matter and applying a mulch will both improve the situation.
- Is there standing water some of the year round? This is an indication of poor soil structure such as a soil pan (see below) impeding drainage. This needs some judgement. If it is only occasionally wet, the soil structure problem could be ameliorated (see below), but otherwise it may be better to use raised beds, or if you have a severe problem, turn it into a pond and grow somewhere else.
- Is there moss on the surface? – This indicates that there is standing water for a good proportion of the year – see above.

4. Investigate the hardness of the soil

- Investigate the depth to which you can push a metal rod into the soil until it encounters resistance. Try this a few times in a number of places. (It is difficult to do on a very stony soil!). The deeper you can push it down, the greater the depth of soil can easily be exploited by the roots of the plant. This has implications for how well a plant will grow and how often it needs watering; plants growing in a shallow volume of soil will only have access to a very limited reserve of water and have poor resilience to drought.
- If you can only push it in a short way, there may be a hard pan which will limit root growth. Cultivations may help, but a better long term approach is including green manures for improving soil structure in your rotation. Grasses such as cocksfoot have a particularly fine root structure for breaking up compacted soil. Chicory, alfalfa (lucerne) and sweet clover have tap roots which are good for breaking through hard pans.

Chicory has a good tap root for breaking up soil pans.

Cocksfoot has a fine root structure for breaking up compacted soil.

5. Take a look below ground

Most people only look at how their plants are growing above ground, but that is only half the story. Digging a hole can often reveal why a plant is growing in a particular way. Overleaf is an indication of what you may find:

O horizon containing decaying plant matter

A horizon (Top Soil) containing organic matter - most of the biological life and nutrients are in this layer. Colour depends on the soil type.

B horizon (Sub soil) with higher mineral content and lower nutrient

What a hole will show you

- What total depth of soil you have. Many household gardens are a pile of builders rubble with some topsoil scattered over the top – a case for raised beds.
- The depths of various horizons, ie decaying organic matter, topsoil and subsoil. In most cases they are demarcated by a change in colour but the colours vary with soil type. Most of the biological activity takes place in the top soil because it has the highest organic matter content from decaying plant litter litter deposited on the soil. Plants take up most of their nutrients from this layer. It is possible to completely lose the top soil through erosion by wind or water. It is best to minimise the amount that you stir this layer up and mix it with others.
- Any problems with soil structure in the top 20 cm that need to be remedied (see section on soil hardness)
- How well the soil is drained and the position of any water tables
- How deep the roots are growing and how they are positioned to access the soil water reserves
- Any problems with soil aeration – these are commonly indicated by a blueish tinge to clay soils. Any unpleasant odours are normally a sign of poor drainage, as most things starved of oxygen don't smell good!

6. Soil testing

In many garden situations, a soil test may be overkill but there are a number of reasons you may wish to test it:

- You think it may be contaminated
- You wish to test the soil pH
- You wish to know the nutrient content of the soil

First you need to take a sample that represents the area you are interested in. A true representation is essential, otherwise any information from your soil sample is meaningless. Generally, only a small amount needs to be analysed, so to ensure that it is representative, take ten samples from the area (generally 0-15 cm depth), mix it thoroughly in a bucket and then, from it take the smaller amount you need to analyse.

Soil contamination

Soil contamination is a worry for many sites in urban areas. It is a complicated subject that cannot be covered in detail here.

- The best initial course of action is to contact your local authority to find out the history of the land, which will give an indication of any high risk activities that may have led to soil contamination. This could indicate what to test for as testing for every possible contaminant would be prohibitively expensive. Test may have already been undertaken.
- If you do need to carry out a soil test, it is important that it is carried out by an accredited laboratory and that the results can be interpreted. If contamination is found, the complexities of who is liable for remedying the situation are far from clear. It may be necessary to contact a qualified professional who can compare the levels found to published toxicity data in order to establish the degree of risk.

Soil pH

Soil pH (how acid or alkaline the soil is) may be of interest to gardeners and can be done using a home testing kit.

- Most vegetable crops will grow optimally in the range 6 – 7.5 although they will grow outside that range. Generally, organic growing methods stabilise the soil pH by the addition of composts and organic matter, and the fact that acidfying nitrogen fertiliser is not used.
- Occasional application of natural dolomitic limestone may help to bring the pH up if it is slightly below 6 (slightly acidic), but if it is below 5 (very acidic), you will be fighting a losing battle and the site is probably not suitable for vegetable growing. Fruit bushes such as blackcurrants, blueberries and raspberries may still grow.

Testing for soil nutrients

This won't be necessary for most home gardens, but could be done if you are interested.

- A standard soil test will provide information on available phosphorus, potassium and soil pH. Information on calcium and magnesium are often also provided.
- Results are often interpreted for you as a simplified index form from 0 – 4, with 0 being the lowest and 2 – 3 considered optimal.
- Nitrogen levels in the soil fluctuate wildly throughout the season, so it is not worth testing for this unless you are testing very regularly (at least every month!). Samples for nitrogen also need to be kept frozen, greatly adding to the expense and hassle.