



4. Monitoring the soil

Concept

- ◆ Soil pH affects the uptake of nutrients and trace elements of garden plants and native vegetation
- ◆ Plants are adapted to the soil types and conditions they have evolved with in their country or location of origin.

Testing for organic matter

The amount of organic matter in soils provides an indication of how much nutrients are available to plants. Many South Australian soils are low in nutrients and many of our local native plants are well adapted to these conditions. Some local native plants are sensitive to increased levels of organic material, particularly when nutrient levels of Phosphorous (P) rise.

On the other hand, most of the vegetables we grow require rich soil high in Nitrogen (N) and Phosphorous. Rich soil will have a greater proportion of organic matter to sand.

The amount of organic matter in soil can be measured very simply. Take a sample of soil from about 10 cm down, and place it in a jar, approximately 500 ml of soil is more than enough. Fill it with water and shake vigorously and let it stand overnight. The material will settle leaving the heaviest material, like sand, settling at the bottom leaving the lighter organic material on top. The distinction is usually very clear with the coarse organic material at the top and the fine material at the bottom. It can be interesting to compare different sites to see which ones have more organic matter.

Testing soil pH

pH is a measure of the acidity and alkalinity of the soil using a scale from 1 to 14; where 7 is neutral, less than 7 is acid and greater than 7 is alkaline. Fresh, clean water is neutral with a pH of 7, lemon juice is very acid with a pH of 2.6 and baking soda is very alkaline with a pH of 8.5.

It is important to remember that pH is a logarithmic scale, so the difference between a pH of 7 and a pH of 6 is ten times the acidity, between 7 and 5 is a 100 times the acidity and between 7 and 4 is a 1000 times the acidity. pH is used as an indicator of the availability of other nutrients in the soil.

Plants vary in their desired pH range and this is to do with the pH of the soil type they evolved in. For instance, plants from the plains area of the Onkaparinga catchment almost

always grow on red-brown earths over limestone which is very alkaline and therefore do not grow well in acid soils. Plants from acid quartz in the Adelaide hills will not grow well in alkaline soils.

Lesson ideas

Monitoring soil with students

Perform a soil pH test. Basic soil pH test kits are available from most nurseries and hardware stores.

Take the soil to be tested from where the plant feeder roots are most active. A chemical is added to the soil sample, a powder applied to the surface of it and the colour the powder turns is compared with those graded on the colour chart. The test should be repeated several times for accuracy.

The ideal pH for most garden plants is between 6 and 7. If the pH deviates too far either side of these measurements plants will not be able to absorb essential trace elements, even if they exist in the soil. Soil chemistry only makes them available to the plant within this small range. That is why it is so important, if plants are to be healthy, that the soil pH is correct.

Acid soils with a pH of less than 6 commonly have deficiencies in:

- ◆ Calcium
- ◆ Magnesium
- ◆ Phosphorus
- ◆ Potassium
- ◆ Molybdenum.

Acid soils with a pH of less than 4 commonly have toxic amounts of:

- ◆ Aluminium
- ◆ Manganese.

Alkaline soils with a pH of more than 7 the following nutrients may be unavailable:

- ◆ Iron
- ◆ Manganese
- ◆ Zinc
- ◆ Copper
- ◆ Boron.



Recommended resources

Your local hardware store can assist in the provision of basic soil testing equipment which is inexpensive and easy to use.

<http://www.clw.csiro.au/education/soils/index.html>

Excellent information about the functions, origins and inhabitants of soil.

[Http://www.landcareaustralia.com.au/infolinks.asp?lsueID=32](http://www.landcareaustralia.com.au/infolinks.asp?lsueID=32)

Information on soil conditions affecting soil health across Australia.

<http://www.environment.act.gov.au/yourenvironmenthwp/gardensoils.html>

Information on different soil types and their relevance to garden health

Resources for further environmental testing

Air quality is an extremely important issue, particularly in the urban context where humans are at risk of respiratory problems caused by polluted air. While it is beyond the scope of Catchment Connections to provide a comprehensive summary of air quality, there are programs available in this state. Of particular note is the *Airwatch* program which offers:

- ♦ Professional development opportunities for teachers
- ♦ Regular Airwatch events involving schools
- ♦ Use of equipment including dust tracks, air testing kits and weather stations

