



Unit 3 Finding the Perfect Place: Soil and Land

✦ Glossary

Off-putting:

disconcerting

Pore space:

space within a rock body that is unoccupied by solid material

✦ Soil chemistry

While for many of us the word chemistry can be extremely **off-putting**, the truth of the matter is that everything in life is made up of chemicals. While the pure science of chemistry can be very complex, the chemistry of soil that farmers need to master is relatively simple.



Oxygen

The amount of oxygen in a healthy soil controls the type of life it will support. Nearly all organisms need oxygen to survive. Soils without oxygen are described as anaerobic. Most organisms can survive for short periods under anaerobic conditions, but this causes the accumulation of poisons that can become toxic at high concentrations.

A typical soil has about 50% of its **pore space** filled with air and 50% with water. Only certain bacteria can remain in anaerobic conditions for long periods of time although some species of bacteria can readily switch from oxygen-rich to oxygen-poor conditions quickly to adapt to local conditions. Microorganisms use about 70% of the oxygen in the soil and plant roots use the remaining 30%. Under anaerobic conditions, the efficiency of microbes is poor and decomposition rates are much slower.

Water

Soil water is vital for all soil life. Without it, microorganisms cannot grow or remain active and many will go into 'hibernation' until the water returns. Fungi, on the other hand, are more resistant to water stress than bacteria. With too much water, oxygen levels drop and the lack of air tends to slow down the nutrient cycles driven by microorganisms. Water is also the medium by which essential nutrients are able to enter the plant.

Soil pH

The pH scale is an abbreviated form of 'Potential of Hydrogen'. It is a measure of the degree of acidity or alkalinity of a solution as measured on a pH scale of 1 to 14. The midpoint of 7 on the pH scale represents neutrality. A 'neutral' solution is, therefore, neither acid nor alkaline. If the numbers are lower than 7.0 they indicate acidity; if they are greater than 7.0 they indicate alkalinity.

The level of acidity or alkalinity (pH) of a soil can significantly affect the nutrient availability. Many nutrients become 'unavailable' to plants when the soil is either too acid or too alkaline. Microbial activity in soil is also controlled by pH levels. Fungi tend to predominate in acid soils, bacteria in neutral or alkaline soils.

Soil pH is essentially a measure of the acidity of the soil water, although the soil itself is the deciding factor in respect to what the acidity will be.



Glossary

Allotment: a plot of land for cultivation

Thrive: to prosper, flourish

Fussy: selective

Most plants prefer or are tolerant to a specific pH range. Some plants, such as the hydrangea, exhibit a different flower colour depending upon the prevailing pH. Most **allotment** gardens, especially vegetable, **thrive** within a range of 6-7 pH, which happens to be where the majority of nutrients are available. It is best to maintain the pH in order to optimize the availability of nutrients. Many allotment plants, however, are not too **fussy** about the pH levels, so if you choose plants carefully, it will not be necessary to alter the soil acidity.

[Adapted from: C. and M. Lavelle, *The Organic Gardener*, Lorenz Books, 2003]

Understanding the text

1. Read the text and replace the verbs in bold with the correct synonym. Choose from those given below. Remember to use the correct tense for each verb.

influence • govern • select • favour • stay

- The amount of oxygen in a healthy soil **controls** the type of life it will support.
- Without soil water, microbes cannot grow or **remain** active.
- The level of acidity or alkalinity (pH) in a soil can significantly **affect** the nutrient availability.
- Most plants **prefer** or are tolerant of a specific pH range.
- If you **choose** plants carefully, it will not be necessary to alter the soil acidity.

2. Find adjectives and terms in the text that are associated with the words below.

- soil
- water
- nutrients
- availability
- range

3. Read the text again and find questions for the following answers.

- ?
Anaerobic.
- ?
It has about 50% of its pore space filled with air and the other 50% with water.
- ?
About 70%.
- ?
They may go into hibernation.
- ?
It is a measure of the acidity and alkalinity in soils.
- ?
The nutrient availability.