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Soil acidity, alkalinity and salinity

What is soil pH?

Soil acidity and alkalinity are described by the term **pH**, which is defined as the negative common logarithm of the hydrogen ion concentration in a solution. The pH scale covers a range from zero to 14. A pH value of 7.0 is neutral. Values below 7.0 are acid. Those above 7.0 are alkaline or basic. Most productive agricultural soils range from 4.0 to 8.5 in pH. An acid is a substance that releases hydrogen ions (H^+). At low pH, a soil behaves as a weak acid. The more hydrogen ions held on the exchange complex, the greater the soil's acidity. Aluminium (Al) also acts as an acidic element.

Figure 2.1 illustrates soil pH values that range from 3.5 to over 10.

Soil pH measures hydrogen-ion activity and is a logarithmic scale. The practical significance of the logarithmic relationship is that each unit change in soil pH means a tenfold change in the amount of acidity or basicity. That is, a soil with a pH of 6.0 is 10 times as acid as a soil with pH 7.0, and has 10 times the concentration of H^+ ions in the soil solution as one with a pH of 7.0. Therefore, when lime is needed in an acid soil, its requirement increases rapidly as pH becomes lower.

In much of the overseas and earlier Australian literature, soil pH was commonly measured in a water extract of the soil solution. The pH of soils as shown in most Australian laboratory soil test reports is referred to as water pH (pH_w) or calcium chloride pH (pH_{Ca}). This means that it is measured in a suspension of soil in water, usually at the rate of 1 part by weight of soil to 5 parts of water, or soil in a weak 0.01 M solution of calcium chloride. While it is commonly considered that the pH_w is of the order 0.9

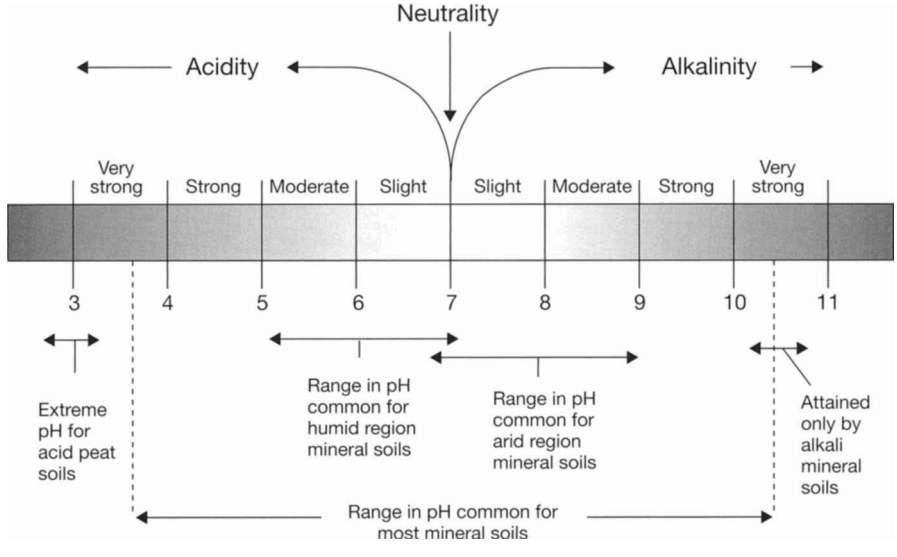

Figure 2.1 Soil pH ranges. (Peverill, Sparrow and Reuter 1999)