



The following article was written by Soiltech
Soil Scientist, Dave McKie MAgSc (Hons)

pH and Nutrient Availability

The pH, or acidity, of the soil refers to the concentration of hydrogen ions present in soil solution. The term “pH” is derived from a mathematical logarithmic correlation which describes the relative proportion of positively charged hydrogen (H^+) ions present as compared to the negatively charged hydroxyl (OH^-) ions.

Based on the above correlation, the pH of soil (or any other substance) will always lie within the range 1 – 14, where 1 = very acidic, 7 = neutral & 14 = very alkaline. Most NZ soils lie within the pH range 5-7, which means they are slightly acidic. By comparison, the pH of wine lies between 3-4, coffee 5-6, milk 6-7 and blood between 7.5-8.

Historically, farmers have measured the pH of the soil to determine whether lime (calcium carbonate) needs to be applied. Yet many farmers do not really understand why it is important to maintain a good pH level in the soil.

Why is pH important? Because the level of acidity in the soil has a major impact on nutrient availability, and, as a consequence, the growth of the plants living in that soil. For pastoral soils a good “rule of thumb” is to aim for a soil pH between 5.8-6.2. Within this range most of the nutrients required by the pasture plants will be available and thus, all things being equal, optimum growth can be expected. Different nutrients are available at different pH levels i.e. some are more available at a higher pH (calcium, magnesium), others at lower pH levels (manganese, iron, copper, zinc), while some are most available at a slightly acidic/neutral pH (phosphorus, potassium, sodium, boron, selenium, molybdenum). The availability of some nutrients (nitrogen, sulphur) is not greatly impacted by soil pH. However, between pH 5.8-6.2 all the plant essential nutrients will be available.

Some elements are toxic to plants if made too available i.e. aluminium and manganese are a problem below pH 5. However, lifting the soil pH > 5.5 effectively eliminates this toxicity. Likewise, above this pH, there should also be an adequate supply of both molybdenum available for legumes to flourish (and in turn fix good quantities of nitrogen) and of selenium for animal health.

Soil pH is therefore a critical indicator of what is happening in the soil in terms of nutrient availability. However, it is only one of several parameters which give the farmer a useful handle on how efficiently the soil resource is functioning. We will touch on other parameters and related information in future articles.