Getting the Balance Right

Many people think soil balancing is just a nice way for some fertiliser companies to make more money! Unfortunately, some fertiliser companies seem to think that way too!

However, the soil is more than just a chemical sponge that soaks up nutrients from fertiliser for plants to absorb. Soil is part of the environment in which the plant must survive, so its physical and biological properties also have a substantial impact on the ways that crops or pasture perform.

For example, a soil that is either waterlogged or heavily compacted will keep plant roots from penetrating properly. It may be highly fertile, and yet still quite unproductive. Also, some soils form thick crusts that prevent seeds from germinating and starve roots of oxygen, while others may be overly susceptible to erosion. These and many other problems have significant impacts on production, but nothing at all to do with NPK.

And yet many farmers are hesitant about dealing with such problems because of the cost.

The real problem is that you need to know BOTH the amount of minerals available to plants AND ***their relative proportions to each other***. That is, you need to know the fertility of your soil and the proportional relationship called “Soil Balance”.

The most important components of this balance are the exchangeable soil Cations (pronounced “Cat-Irons”) – Calcium, Magnesium, Potassium, Sodium and Hydrogen.

Many people question the importance of Hydrogen in this scheme. The problem is that they are thinking about them only in terms of plant nutrition. Naturally this is an important consideration, but when speaking about ‘Balance’ we are more interested in the strong influence they have on the Physical Character of the soil – whether it is hard, friable, crusting, dispersive and so on.

Also, plants obtain nutrients like Calcium by secreting weak acids from their roots. These ‘exchange’ Hydrogen for the other minerals. Consequently, the older a soil is (& many Australian soils are VERY old), the more Hydrogen ions end up stuck to soil particles. The other cations may have good proportions relative to each other, but the high percentage of Hydrogen becomes the dominating feature. In other words, to get the balance right, you need to know that amount of ALL the major Exchangeable cations.

To restore the proper balance then, you add what is needed and (sometimes) reduce the levels of those that are present in excess. Typically, Australian soils are relatively high in either Magnesium or Sodium and/or low in Calcium. This can make them hard when dry, sloppy when wet, often with a tendency to form hard crusts after rain or irrigation and very often acidic.

Lime is one way to add Calcium to the soil, while also reducing the amount of Exchangeable Hydrogen. Doing this not only improves the soil pH, but also makes the soil softer and easier for plant roots to penetrate. However, calculating the amount of Lime needed can be a bit of a fright – especially on soils with high organic matter.

Organic matter is always high in Hydrogen, but it behaves differently from the mineral particles in the soil and trying to achieve a balance that takes all the exchangeable hydrogen into account can cause damage.

In fact, it has only been relatively recently (after the extensive research done by Ted Mikhail at SWEP) that this has become clear. So it is important to reduce the amount of Hydrogen used in the balance equation according to the amount of organic matter.

Doing this results in recommendations that are much easier to live with, but even so, some Australian soils still need large amounts of Calcium and their response to liming can be a little hard to predict. For this reason, Lime applications should never exceed the industry standard of one tonne per acre.

Re-testing the soil after two years will then show if more is still needed and (if so) how much. Farmers can also keep costs under control by working on one paddock at a time. In this way, the returns from one paddock help to cover the cost of doing the next.

For more information on improving your soil, contact either Ted Mikhail or Peter Brown at SWEP Analytical Laboratories, on (03) 9701 6007.