Soil acidity

Agriculture produces food and fibre products.
The very nature of plant production causes the soil to become more acidic.

Recent studies indicate that the rates of lime currently used in contemporary farming systems are generally too low to raise pH in the first instance, then maintain a desirable pH by neutralising acidification.

The problem

- The pH of a soil is a useful general fertility index.
- The optimal soil pH range for most plant species is between 5 and 8, throughout the root zone.
- Low pH may limit plant growth and productivity before plants show clinical symptoms of acid soil toxicity.

How do you know?

- Poor plant growth in acidic soils is due to the combined effect that low soil pH has on plants, microbes and nutrients in the soil.
- Look for:
  - Presence of layers of soil within the surface 0-20 cm with pH < 5.0.
  - Relatively high Al and Fe levels in soil test results, compare with Ca, Mg and K.
  - Reduced plant vigour, stunted and thickened roots, and few root hairs.
  - Poor or no nodulation in legumes.
- **However**, diagnosis by observation of plant symptoms is ineffective because by the time these symptoms are present, production loss would have occurred.
- The best method to diagnose and monitor soil acidity is to establish a periodic soil sampling strategy (every two to four years).

What to do about it?

- Despite soil acidification being an unavoidable consequence of agricultural production, management CAN influence the rate of acidification.
- Measure and monitor changes in soil chemical analyses over time and between farm practices.
- Apply liming material as required, using soil test results to guide liming rate.
- Minimise the use of acidifying ammonium fertiliser.

How does it happen?

Product removal

- In agriculture, the removal of the alkaline plant products either directly (as crop) or indirectly as wool, meat or milk is an acidifying process.
- The greater the production, the greater the acidification due to product removal.

Fertiliser use

- Elemental sulfur, MAP, ammonium sulfate, DAP.
- In a closed system, use of some fertilisers such as urea is not acidifying. However in a paddock the various chemical reactions that take place do not occur at the same site within the profile. This leads to pH changes (acid and alkaline) in different areas of soil profile, or stratification of soil pH.
- Stratification is accentuated in controlled traffic, no-till systems where fertilisers are repeatedly placed in the same area of the profile year after year and there is no mechanical soil mixing.

This factsheet was written by Dr Jason Condon, Helen Burns and Abigail Jenkins from NSW DPI as part of the **Extension of best practice principles for identifying and managing soil limitations in southern and central NSW** (GRDC Project code FLR1909-001SAX).

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