

Why worry about acidity?

7 August 2002 [reviewed 16 August 2004]

North coast soils are naturally acid, around pH 5 (CaCl₂) or less. As most pastures and horticultural crops grown in the region tolerate this level of acidity, do you need to do anything about it? Yes, because, in the long term, severe soil acidity (below pH 4.5) can degrade your soil so much that it may never recover its original fertility.

All pH levels mentioned in this leaflet are measured in calcium chloride (CaCl₂). Soil pH measured in water gives a reading 0.5–0.8 pH higher than when measured in CaCl₂ (for example, pH 5.0 (CaCl₂) could be pH 5.6 in water.)

If you do not act now, only acid tolerant-pasture species such as carpet grass will grow, and crop yields will decline. Eventually, you will get very poor growth from even the most acid-tolerant species, and this will have severe effects on your farm's productivity. Subsurface acidity can also become serious, and this is expensive to fix.

How will fixing acidity benefit my soil?

When soil pH falls below 4.5, nutrients in the soil become unbalanced. Some are inaccessible to plants, while others are available in toxic quantities. Reducing acidification, that is, increasing pH to 5–5.5:

- ♦ improves the nitrogen fixing ability of legumes
- ♦ improves nutrient recycling by earthworms and soil bacteria
- ♦ reduces toxic levels of manganese and aluminium
- ♦ releases valuable phosphorus
- ♦ improves molybdenum availability in sandy soils.

What can I do to stop my soil becoming acid?

Acidity prevention checklist

- ♦ Test your soil.
- ♦ Apply lime.
- ♦ Select the right nitrogen fertiliser.
- ♦ Build up organic matter.
- ♦ Replace what you remove.
- ♦ Keep records.

Test your soil

The first and best service you can provide for your soil is to have it tested. Soil used for intensive horticulture such as vegetable growing needs to be tested annually because of the heavy demand on soil nutrients and high fertilising rates. Pastures should be tested every two to three years. Test the same area each time to check any changes in your soil. Test separately those areas which have obvious problems, and any paddocks showing poor growth. Soil tests let you see just how acid your soil is and what action you need to take. NSW Agriculture staff can help you interpret your test results.

Apply lime

Lime can neutralise surface soil acidity and prevent future subsurface acidity (much harder to correct). If your soil is below pH 4.5 you will need an initial heavy application to regain yield potential. On less acid soils (pH 4.5–5.0), regular liming will help prevent future acidification. A target pH for most soils is 4.8–5.0 or more. Application rates will vary according to your soil, but as a guide most soils need around 2–3 tonnes per hectare to raise surface pH from 4.5 to 4.8–5.0. Lime works best when it is finely ground and incorporated into the soil.

Select the right nitrogen fertiliser

Choose your nitrogen fertiliser carefully. The most acidifying nitrogen fertilisers are ammonium sulfate and mono-ammonium phosphate (MAP), while diammonium phosphate (DAP) is moderately acidifying. Some mixed fertilisers contain these compounds, so check the fertiliser bag label for details.

Urea and ammonium nitrate (Nitram®) can be slightly acidifying under some conditions. Legumes are a nitrogen source in pastures, and will cause acidification if grasses cannot use all the nitrate nitrogen produced. Decaying organic matter, such as a green manure crop, has a slightly acidifying effect because the decaying process releases organic acids into the soil. These can be neutralised by spreading a small amount of lime, around 150 kg/ha. Composted organic matter, such as poultry manure, has little acidifying effect.

Build up organic matter

Return organic matter to the soil, either by leaving it on top of the soil as a mulch, or by incorporating it as a green manure crop. Organic matter includes animal manures, stubble and cover crops. Decaying organic matter not only adds nutrients to the soil, it stops nutrients already in the soil from leaching away. The nutritional and structural benefits of organic matter far outweigh the acidity it causes.

Replace what you remove

Soils become acid if crops and produce are taken off farm and the nutrients in them are not replaced in the soil. This also applies to strip-grazed pastures where animal manures do not fall where the pasture was grazed. Replacing these nutrients will keep your soil chemistry balanced and so prevent your soil acidifying. A soil test will tell you what your soil needs in nutrients; your local agronomist or horticulturist can help you work out how much nutrient is removed in a particular crop or grazing pattern.

Keep records

Unless it is severely acidified, most land won't show an instant response to any farm practices you introduce to reduce acidity. You will need to keep records for at least five years to see differences in your soil and yields. Long-term records will also help you make decisions for the future.

For more information on soil acidity, see your local NSW Agriculture horticulturist or agronomist.

Produced by Rebecca Lines-Kelly, formerly soils media officer, Wollongbar Agricultural Institute, for CaLM and NSW Agriculture, North Coast region, under the National Landcare Program, July 1992.