Time to Re-Lime

Acidity & Lime

Soil acidity

Soil acidity is measured in units of pH. *The lower the pH*, the greater the acidity. pH is measured on a logarithmic scale, which means that a soil with a pH of 5 has 10 times more acid than a soil with pH 6 and a soil with a pH of 4 has 100 times more acid than a soil with a pH of 6.

Why acidic soils are a problem

Soil acidification is a natural process accelerated by agriculture. Acidic soils cause significant losses in production.

Low pH in topsoils may affect nutrient availability and microbial activity, most notably decreasing nodulation and nitrogen fixation in pastures. These problems rarely occur if the topsoil pH is above 5.5.

Subsurface acidity is more complex. In WA, the major problem when soils acidify is aluminium toxicity. When pH drops, aluminium becomes soluble. In this form, aluminium retards root growth, restricting access to water and nutrients.

Rule-of-Thumb Lime Guide

This guide provides a good indication of the amount of lime required to achieve the ACC targets*. Seek expert advice to develop individual recommendations.

Soil depth	рН	Lime amount over 5 years				
0–10 cm	under 5	2 t/ha				
	under 5.5	1 t/ha				
		plus				
10, 20 cm	under 4.5	2 t/ha				
10-20 Cm	under 4.8	1 t/ha				
		plus				
20–30 cm	under 4.5	1 t/ha				
	under 4.8	measure pH in 3 years				



pH is a measure of hydrogen ions in the soil. A small change in pH can result in a large change in hydrogen ion concentration.

Treating acidic soils

Lime will be required every 3-7 years to counter ongoing acidification.

- The first step is to measure the soil pH (0-10 cm, 10-20 cm and, on sandy soils, 20-30 cm).
- Apply lime to achieve topsoil pH above 5.5. This will also treat subsurface acidification.
- Aim for subsurface pH above 4.8. This will avoid aluminium toxicity.

Depending on your soil pH profile, it could be time to re-lime now.



Roots of barley grown in acidic subsurface soil are shortened by aluminium toxicity. Small changes in soil pH can have a dramatic impact on soluble aluminium. There is 5–15 times more aluminium at pH 4 than at pH 5, depending on soil type.

How does lime work?

Carbonate (CO₃) in lime neutralises acidity. When calcium carbonate (lime) is added to acid soil, it breaks up into calcium and carbonate ions. The carbonate joins with two hydrogen ions from the soil solution to form carbonic acid, which is unstable and breaks up into carbon dioxide and water. So the hydrogen ions that were contributing to soil acidity are now chemically bound in water.

CaCO ₃	+	2H⁺	 ->	Ca ²⁺	+	CO2	+	H ₂ O
LIME		ACID	C	CALCIUN	1		N	WATER

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*The Avon Catchment Council (ACC) has set a target pH_{CaCl₂} of 5.5 for topsoils and 4.8 for subsurface soils in the Avon River Basin by 2020. This article is produced by the Avon Catchment Council Soil Acidity Project, a collaborative project between the Department of Agriculture and Food Western Australia (DAFWA) and Precision SoilTech. The project is funded by the Avon Catchment Council with investment from the Western Australian and Australian Governments through the National Action Plan for Salinity and Water Quality. For more information on soil acidity or liming, please contact Chris Gazey, DAFWA, 9690 2000, or your advisor.









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