

Improving liming recommendations

Time to Lime

Subsurface soil sampling allows more precise liming recommendations

(Avon Catchment Council subsoil sampling subsidy recipients received these improved recommendations)

Site	pH 0-10 cm	pH 10-20 cm	pH 20-30 cm	Lime (t/ha) recommended over 10 years
1	5.5			1-3
1	5.5	5.0		1-2
1	5.5	5.0	5.0	1
2	5.5			1-3
2	5.5	4.2		2-4
2	5.5	4.2	5.0	3
3	5.5			1-3
3	5.5	4.2		2-4
3	5.5	4.2	4.2	4

Acid soil not detected by topsoil sampling alone

Subsurface samples allow refinement

1 t/ha would have been too low!

More lime to treat deeper acid profile

The best use of lime is achieved when you know where, and how much to apply. Soil sampling and testing to monitor the pH of the soil profile identifies priority areas to allow the lime budget to be targeted to achieve the best economic return.

The sites below use actual figures from one paddock with sandy soil. Sites 2 & 3 are common throughout the wheatbelt.

Good pH throughout profile Site 1

At this site, the soil has a pH of 5.5 in the topsoil and 5 in the subsurface layers. If only the topsoil is sampled, the recommendation will be to apply 1-3 t/ha of lime over 10 years. Sampling the 10-20 cm layer as well allows refinement of the recommendation to 1-2 t/ha and also sampling the 20-30 cm layer allows further refinement to 1 t/ha. In this case, **1 t/ha is sufficient to treat on-going acidification** due to farming and keep the topsoil pH above 5.5, preventing subsurface acidity developing. Rather than apply 2 or 3 t/ha at this location, the lime dollar could be better targeted to areas that require more lime.

Good topsoil, acid midsoil, good subsoil Site 2

At this site, the soil has a pH of 5.5 in the topsoil, a band of acid soil (pH 4.2) at 10-20 cm and pH 5 at 20-30 cm. With only knowledge of the topsoil pH, liming at 1-3 t/ha over 10 years will be recommended, as for site 1. If the 10-20 cm pH is also known, a more accurate recommendation of 2-4 t/ha of lime can be made; 1 t/ha will be insufficient to treat the very acid 10-20 cm layer. The recommendation can be refined to 3 t/ha if the 20-30 cm is sampled as well. For this site, appropriate treatment of the band of acid soil by applying 3 t/ha lime will have good potential to show measurable economic benefits within 5 years, depending on rainfall. Alternatively, insufficient lime application can lead to acidity developing further down the soil profile.

Good topsoil, acid subsurface layers Site 3

At this site, the topsoil pH is 5.5, and both the 10-20 and 20-30 cm layers have soil pH of 4.2. As for sites 1 & 2, sampling only the topsoil leads to a liming recommendation of 1-3 t/ha over 10 years. Adding a 10-20 cm sample gives a 2-4 t/ha liming recommendation, as for site 2. Knowing the pH of the 20-30 cm soil as well allows a more accurate recommendation of 4 t/ha. Soils that are very acid throughout the subsurface can take many years to ameliorate. Monitoring the pH over this time allows further refinement of liming recommendations and indicates when less acid tolerant crops and pasture species become an option.

Knowing your soil pH profile allows you use your liming dollars more efficiently by applying more lime where necessary rather than a lower rate over whole paddocks. Adding too little lime does not treat subsurface acidity. Guessing how much lime to apply from only topsoil samples can lead to inadequate lime application. Yield will continue to be lost as pH continues to decline.

Eighty percent of topsoils in the Avon River Basin have soil pH less than 5.5 and many are well below 5. Initial rates of 2 t/ha are needed to raise topsoil pH to 5.5; the above rates will then correct subsurface acidity.

Add value to your soil sampling

- Sample at 10-20 cm & 20-30 cm as well as topsoil
- Account for soil-type variability
- Record sample locations by GPS
- Monitor by re-sampling every 3-4 years

You can't guess or predict the subsurface pH based on the topsoil pH, the only way is to sample the profile and measure.



The darker orange colour of the universal indicator stain shows that the 10-20 cm layer is more acid in the untreated plot (right) but does not give an accurate value.

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