SOIL ACIDITY
- AN INTRODUCTION

WHAT IS SOIL ACIDITY?

Soil acidification is a natural process accelerated by agriculture. It is primarily caused through the leaching of nitrates from nitrogen fertiliser or organic matter and removal of cations in harvested grain, hay and stock moved off the farm.

The effect of acidity, or low pH, on surface soils (0 - 10 cm) is different compared to the subsurface soil layers (10 - 30 cm). The main effect of low pH in the surface soil is on nitrogen fixation by legume-rhizobia symbiosis and on the availability of nutrients.

In sub-surface layers, low pH causes an increase in the solubility of aluminium, which is toxic to plant roots, resulting in restricted root growth and poor access to moisture and nutrients *(Gazey et al 2013)*.

Soil acidity is estimated to cost broadacre agriculture approximately $498 million per year in lost production in WA alone *(Herbert 2009)* or about nine per cent of the average annual crop. It is one of the few soil constraints (particularly subsurface constraints) that can be treated with appropriate management.

BENCHMARK TARGET

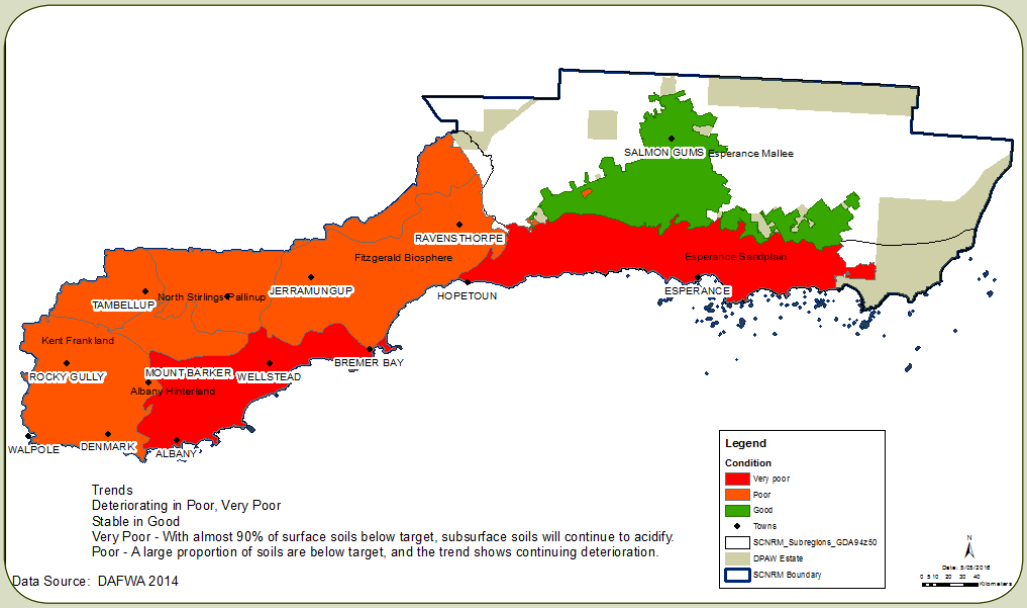
- Top soil pH > 5.5 and sub-soil pH > 4.8 (DAFWA recommendation).
- 90 per cent of farming businesses on the South Coast test surface and subsoil pH across their farms by 2020.
- 85 per cent of farmers are applying, or planning to apply, some form of lime as part of a soil acidity management program across their farms by 2020.
- 90 per cent of farming businesses are testing, or planning to test their lime for neutralising value and particle size by 2020.

CURRENT POSITION on the SOUTH COAST

The acidity of soils is poor to very poor across the majority of agricultural land in the South Coast NRM region.

The sandplain soils of the Albany hinterland and Esperance area are in very poor condition.

The Esperance Mallee soils are generally more calcareous and alkaline in nature and are considered in good condition, with the remainder of the region considered in poor condition.



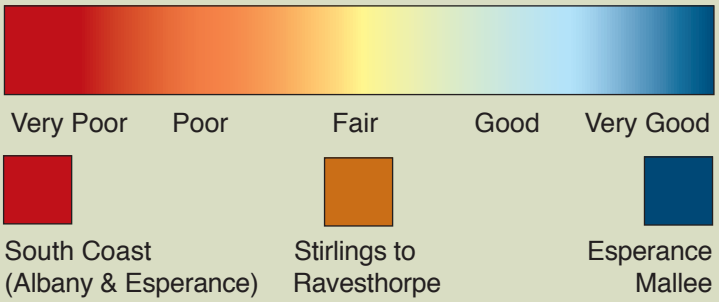
Soil pH condition summary for the South Coast NRM region.

Industry	Farmers	Per Cent of Farmers Testing Soil pH	Per Cent of Farmers Applying Lime or Dolomite
Cropping	1725	58	64
Grazing	1839	66	66
Dairy	43	n/a	n/a
Horticulture	181	87	88

Indicators of performance for soil acidity management on the South Coast. Data from 2008/09 ABARES.

TREND

Soil testing across the South Coast shows decreasing pH levels in the Albany to Esperance sandplain regions over the past few years. The Stirlings to Ravensthorpe region soil tests show variable results while the Esperance Mallee soils show stable results.



PRACTICES to ACHIEVE TARGET

Farming practices that can help improve and maintain soil pH include:

- Regularly test top and subsoil for pH.
- Apply the appropriate amount of lime (t/ha) according to your soil tests - variable rates.
- Use an appropriate incorporation method depending on desired results.
- Put lime where the most increase in condition/profit will be achieved first.
- Test your lime for neutralising value and particle size.
- Develop appropriate fertiliser programs that will reduce nitrate leaching - do not over-fertilise.

PLEASE NOTE: Unless specifically referenced, the information in this resource information sheet has been summarised from the *Report Card on Sustainable Natural Resource use in Agriculture by the Department of Agriculture and Food, Western Australia.*

For more information go to: www.agric.wa.gov.au/soil-constraints/report-card-south-west-western-australia.

REFERENCES

- Gazey C, Andrew, J and Griffin E (2013). 'Soil Acidity'. in: Report Card on Sustainable Natural Resource Use in Agriculture, DAFWA.
- Herbert, A (2009). Opportunity Costs of Land Degradation Hazards, in: South-West Agriculture Region. Resource management technical report 349, DAFWA.

FURTHER READING

- Andrew J. (2013) Improving Knowledge and Skills of Farmers of the South Coast, in: Management Practices to Reduce the Impact of Sub-soil Acidity. South Coast NRM and Precision Soil Tech. Caring for Our Country Project ID - 10SC-C80.
- Bolan N.S. & Hedley M.J. (2003) Role of Carbon, Nitrogen and Sulfur Cycles in Soil Acidification, in: Z. Rengel (Ed) Handbook of Soil Acidity, Dekker, NY.
- Cregan P.D., Hirth, J.R and Conyers, M.K. (1989) Amelioration of Soil Acidity by Liming and Other Amendments, in: A.D. Robson (ed) Soil Acidity and Plant Growth Academic Press, Marrickville, NSW.
- Davies S. Gazey C. & Galloway P. (2009) Acidification, in: Managing South Coast Sandplain Soils to Yield Potential. Bulletin 477, DAFWA, pp72-85.
- Fry J, (2015). Lime Situation Report 2015, SCNRM.
- Gazey C. (2014) Soil Acidity, DAFWA: www.agric.wa.gov.au/soil-acidity/soil-acidity-western-australia?page=0%2C1 (accessed 28 May 2015).
- Gazey, C., Davies, S. & Master, R. (2014b) Soil Acidity: A Guide for WA Farmers and Consultants, Bulletin 4858, DAFWA, GSWA (2015) Limesand and Limestone Resources of Southern WA: Geological Survey of WA, record 2015/7.
- Moore G. (2001) (ed) Soilguide: A Handbook for Understanding and Managing Agricultural Soils. DAFWA, Bulletin no 4343, South Perth.