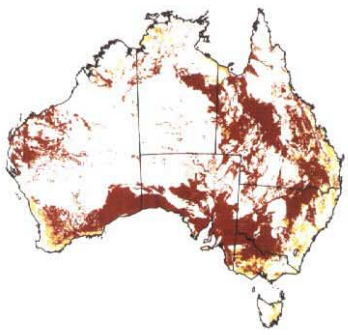
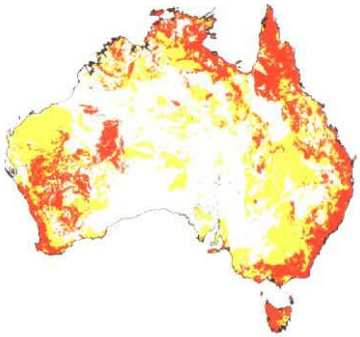
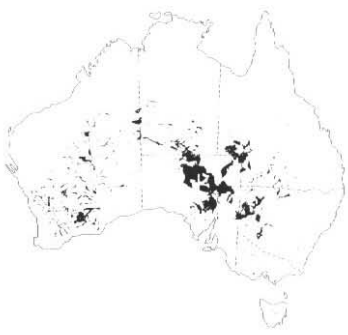


Managing Sodic, Acidic and Saline Soils

Pichu Rengasamy and John Bourne
Cooperative Research Centre for Soil & Land Management

Cooperative Research Centre for Soil & Land Management

Postal address: PMB 2,

Glen Osmond 5064

Telephone: 61 8 8303 8670, Facsimile: 61 8 8303 8699

Email: crcslm@adl.soils.csiro.au

WWW: http://www-crcslm.waite.adelaide.edu.au

Acknowledgements:

Grains Research & Development Corporation for funding research.

Land and Water Research Development Corporation for their contribution to printing costs.

M. Penfold, Gypsum Industry Association of South Australia

M. Frost, Limestone Association of Australia

Design: M Fiebig, CRC for Soil & Land Management

Printed: Hyde Park Press

ISBN: 1 876 162 84 8 CRCSLM/SAS/8/97

Land & Water Resources Research & Development Corporation

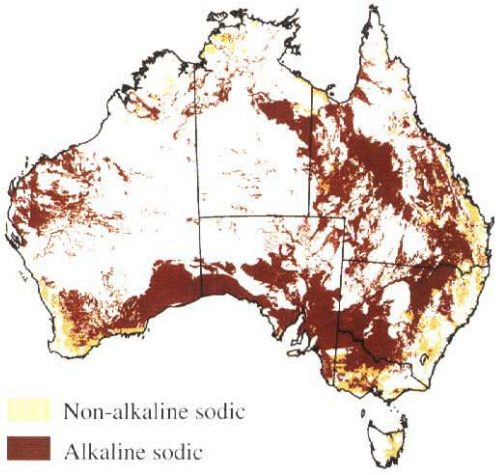
Important note for readers:

This publication is a summary of our current understanding of how best to manage sodic, acidic and saline soils. It results from our interpretation of data from ongoing research and therefore the information in this booklet must be seen as interim findings still in development which may be refined or varied as a result of continuing research. We do not and nor do any of the contributors to this publication hold this information to be true or final without risk. Readers who act on this information in this booklet do so at their own risk.

Have you one or more of these problems ?

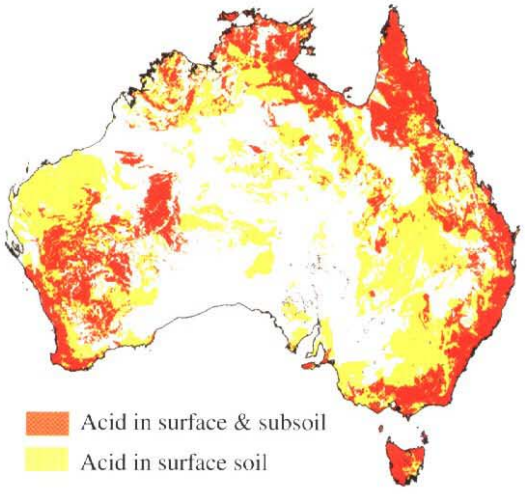
Sodic soils - 30% of land area

- These soils contain a higher than desirable amount of sodium attached to the clay particles.
- When in contact with water, sodic soils swell and also disperse into tiny fragments. On drying these tiny fragments block the soil pores.
- Sodic soils are difficult to manage, are often hard-setting, and are susceptible to waterlogging, poor aeration and erosion.
- Gypsum helps control the problem by providing calcium to replace sodium. Lime also provides calcium but is much less soluble and generally much slower in being effective.



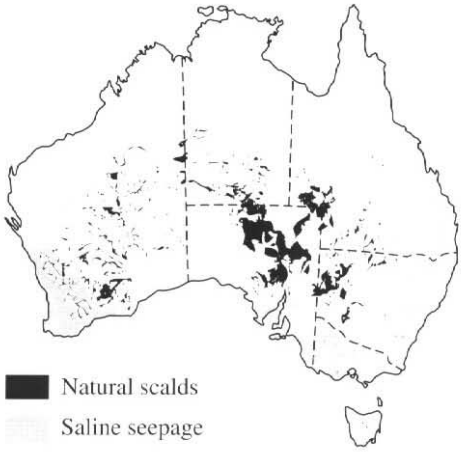
Acidic soils - 40% Of land area

- Soil acidification is a natural process that is accelerated by some farming practices.
- Acidity builds up due to excess nitrogen moving through the soil, and from nutrients absorbed by plants from the soil and exported in farm produce.
- The effects of acidity are not usually seen in crops and pastures until the soil is highly acidic and becomes costly to control.
- Lime neutralises the soil acidity.



Saline soils - 6% of land area

- Saline seepage areas are produced from rising ground water levels following changes in land use that alter water flows in a catchment.
- Dry saline scalds which occur usually in low rainfall areas, result from soil erosion exposing a naturally saline subsoil.
- Salinity build-up due to irrigation is not included in the map, but could potentially affect soils in all irrigation districts.



This manual explains:

- **a simple test to help you decide if you have a problem**
- **the best management for your situation**

A field test for Sodicity, Acidity and Salinity

- **Sodicity** is identified in the laboratory by measuring sodium levels in the soil. In the field we measure the problem caused by the sodium, that is the cloudiness or turbidity caused by soil dispersion.
- Cloudiness or dispersion of tiny particles can also be caused by mechanical breakdown of the soil, due to too much cultivation and low levels of soil organic matter.
- **Acidity** and **Salinity** of a soil-water suspension can be easily and accurately measured in the field with small pocket-sized electronic pH and electrical conductivity meters. See Figure 1.
- Sodicity, Acidity and Salinity are inter-related. For example, both acidity and salinity can affect the amount of cloudiness in a sample, and the way a sodic soil is treated .

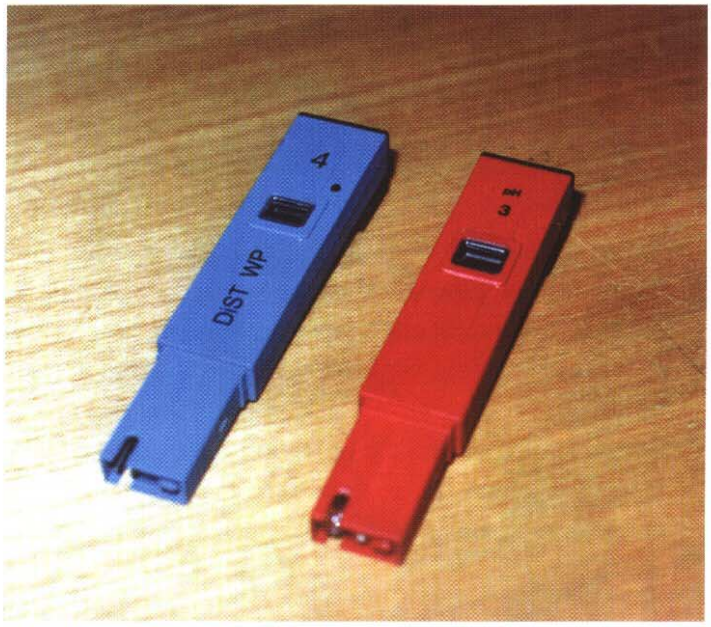


Figure 1.Electrical and pH conductivity meters suitable for use in the field

Test the surface and the subsoil separately to best understand the problem

- Take two clean buckets into the field and collect samples from both the surface and the subsoil, according to standard procedures (a 5cm soil auger would be ideal).
- Collect samples randomly from a minimum of 5 locations over a uniform 1-2 hectare representative area of the paddock, placing all the surface samples in one bucket and the subsoil samples in the other.
- If it isn't clear where the subsoil begins, take a sample from the top 10cm of the soil profile. Then take a second 10cm sample from somewhere deeper in the profile, within the range of 20-60 cm below the surface.
- Spread the soil from each bucket into a thin layer on a clean plastic sheet. Place in a well ventilated location to get it air-dry, which may take several days.
- Then if necessary break the air-dried soil down into pieces of 1cm diameter, and mix the soil in each bucket thoroughly.
- Determine the texture. Is it a sand, loam or clay? You will need to know this to help interpret your test results. This is best done by making up a small soil ball and ribboning it between your fingers. See Appendix 1.
- If there are obviously different patches of soils in the paddock, then collect another set of surface and subsoil samples from each different patch.