

# Soil management following drought

## Abigail Jenkins

Soils Advisory Officer, Extensive Industries Development, Wollongbar

### Introduction

The principal aim after rain should be to establish either pasture or crop as a groundcover on your bare paddocks as quickly as possible. This is especially important on the red soils, but is also important for the clays.

After drought, many soils will be in a different condition to what is considered to be their 'normal' condition. Some will be bare and powdery on the surface, some will be further eroded by wind or water, and some will have higher levels of nitrogen (N) and phosphorus (P) than expected.

Loss of effective ground cover (due to grazing or cultivation) leaves the soil highly prone to erosion by wind and water. Research by the former Department of Land and Water Conservation's Soil Services showed that erosion due to drought-breaking rain can make up 90% of the total soil loss in a 20–30 year cycle.

Following a drought, available N and P levels in the soil are generally higher than in a normal season. However, most of the N and P is in the topsoil, so if erosion strips the topsoil much of this benefit is lost.

### Soil structure and erosion

Cracking black, grey and brown clays can develop wide and deep cracks during drought. Generally speaking, their structure is as good as it is ever likely to be.

On the other hand, the structure of non-cracking red loam soils generally deteriorates during drought. Topsoils can become very dry and powdery; in this state they are highly vulnerable to erosion.

A useful strategy is to sow your most erodible paddocks early to make use of available nutrients. Planting grazing oats will provide good surface cover quickly. Reserve your less erodible paddocks

for your main winter crop. (See Primefact 364 *Grazing management following drought*.)

Consider the benefits of retaining pasture, rather than cropping, for those paddocks in reasonable condition. The strategy selected should be in line with your property management plan.

Controlling weeds by spraying, rather than cultivation, will retain some surface ground cover, but to create some surface roughness to improve infiltration of water and reduce wind and water erosion, you may need to cultivate initially. If this is the case, do this as early as you can when the soil is moist but not too wet or too dry. Use a ripper or chisel plough, and cultivate on the contour to catch maximum rainfall and reduce run-off.

Try to confine machinery traffic to narrow laneways, and keep stock off wet soils. Uncontrolled machinery traffic and stock trampling are major factors in causing the structural degradation, and subsequent erosion, of soils.

A good time to apply gypsum to sodic clay soils is when the soil is cracked. When rain falls it will move the gypsum into the strongly cracked soil to maintain good infiltration after the cracks have closed.

Where necessary, in order to reclaim eroded areas or prevent further erosion, contour furrows or soil conservation earthworks should be constructed and then vegetated quickly. These will reduce and slow run-off, limit the movement of soil and organic matter, and decrease the sedimentation and nutrient contamination of dams and waterways. (Refer to the NSW Department of Lands' Soil Services [www.lands.nsw.gov.au](http://www.lands.nsw.gov.au)).

### Soil nutrition

In paddocks that were sown but failed to produce a crop, soil nitrogen levels are likely to be higher than usual for two reasons.

1. Most of the nitrogen incorporated before sowing the failed crop will still be available, provided the crop was not grazed, or cut for hay.



2. Mineralisation of nitrogen (conversion to plant-available forms) increases markedly once it rains.

As a consequence, weeds are likely to grow rapidly after rain and need to be controlled, preferably by spraying. If cultivation is used, soils are more exposed to erosion. For further information see Primefact 365 *Weeds – a threat to drought recovery*.

Despite high soil N levels, starter fertiliser and some side dressings may still be required; consult your agronomist, and refer to Primefact 366 *Winter cropping following drought* for more information.

As in a normal season, soil testing for plant-available phosphorus is advisable to help you decide how much phosphate fertiliser you need. This is an important decision: too little reduces plant growth and yields, too much wastes your money and may have damaging effects on the environment.

For more information on fertilisers, see Primefact 366 *Winter cropping following drought*.

### Long-term soil management

Conservation farming practices and the efficient management of fertilisers are two important ingredients for long-term sustainable, profitable production. Such measures help you prevent or slow down soil erosion and other soil-degrading processes, and are part of your defence against drought.

*Some important conservation farming practices*

- Use minimum tillage or no tillage, and direct drilling.
- Retain stubble on the surface for as long as is practicable; if burning is necessary, wait until the main period of high erosion risk has passed.
- Use herbicides, rather than tillage, to control weeds during fallows.
- Use crop/pasture rotations that include well-managed perennial pastures and legumes.
- For irrigated row cropping, use permanent, raised beds.
- Confine machinery traffic as much as possible.
- Improve grazing management to minimise soil compaction and maintain adequate surface cover, particularly during droughts.
- Increase topsoil organic matter levels, for example, stubble incorporation or mulching, and including pastures in crop rotations.
- Judiciously apply lime and/or gypsum to acid soils and sodic clay soils.
- Promote vigorous plant growth generally, through sound soil, crop and water management practices.

### *Guidelines for efficient fertiliser management*

As far as possible, match the supply of nutrients, principally nitrogen and phosphorus, to the needs of the plant, through soil and/or plant tissue testing and improved timing of fertiliser application.

- Incorporate (rather than broadcast) fertiliser wherever possible.
- Do not broadcast fertiliser on bare soil, especially when storms are likely.
- Do not fertilise close to or across dams or waterways.
- Store fertiliser under cover on impervious or compacted soil away from dams and waterways, and divert run-off from higher ground around fertiliser stockpiles.
- Keep records of fertiliser usage, and calibrate spreading equipment to reduce the likelihood of overuse.

### Further information

- Drought recovery  
[www.dpi.nsw.gov.au/reader/drought](http://www.dpi.nsw.gov.au/reader/drought)
- Soil management guides, including SOILpak series  
[www.dpi.nsw.gov.au/reader/soil-management-guides](http://www.dpi.nsw.gov.au/reader/soil-management-guides)
- Soil acidity (including liming)  
[www.dpi.nsw.gov.au/reader/soil-acid](http://www.dpi.nsw.gov.au/reader/soil-acid)
- Various NSW Department of Primary Industries print publications on soils.
- NSW Department of Lands – Soil services
- Natural resource management NSW – Soils in NSW (Department of Planning, Infrastructure and Natural Resources, DIPNR)
- DIPNR soil publications

### Further assistance

- NSW Department of Primary Industries, Soils Advisory Officers and District Agronomists
- NSW Department of Lands, Soil Services Officers
- DIPNR Natural Resources, Advisory Officers
- Landcare specialists and coordinators.

### Acknowledgment

This Primefact is based on information contained in an earlier NSW Agriculture (now NSW DPI) publication, the *Drought Recovery Guide*.

---

© State of New South Wales  
through NSW Department of Primary Industries 2007

ISSN 1832-6668

Replaces Agnote DPI-355

Check for updates of this Primefact at:

[www.dpi.nsw.gov.au/primefacts](http://www.dpi.nsw.gov.au/primefacts)

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (January 2007). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

Job number 7194