Chapter C2. Red brown earths

PURPOSE OF THIS CHAPTER

To describe the characteristics of red brown earths

CHAPTER CONTENTS

- appearance
- topography and vegetation
- land-use limitations and soil problems

ASSOCIATED CHAPTERS

- Part C

RED BROWN EARTHS

- Red brown earth soils have a topsoil of sandy loam to light clay loam overlying a clay subsoil.
- The lighter (coarser) textured topsoil is between 10 and 40 cm thick and varies from red to grey brown.
- The lower topsoil is called the A2 horizon. This may be bleached. The subsoil varies from yellow to red to grey.

APPEARANCE

Texture

The red brown earth soils are of duplex nature, that is, they have a layer of sandy loam to light clay loam overlying a clay subsoil. The surface loam may vary in thickness from 10 to 50 cm. Subsoils are more crumbly and coarser in texture at depth compared with the overlying, uppermost part of the subsoil.

Colour

Colour varies from red brown to light grey brown on the surface. Clay subsoils may vary from yellow to red to grey. 'Mottled' subsoils are common. Mottled refers to a mix of colours in a patchy appearance. The lower part of the loam topsoil above the clay subsoil is called the A2 horizon, and may be of bleached, white appearance. Deeper subsoils are usually yellowish or olive brown, and sometimes grey.

Structure

The topsoil (often called the 'A horizon') of a red brown earth may set very hard with few cracks upon drying, showing very little structure. This feature is known as 'hardsetting'. It occurs frequently in soils that are high in fine sand and/or silt and low in organic matter. A hard surface layer up to 1 cm thick (known as a 'crust') may form in some soils for similar reasons. Despite this, many of these soils were favourably structured before excessive cultivation damaged their structure. In some instances, nearer to sandhills and prior streams, the topsoil may be sandy and loose. Clay subsoils (often called the 'B

horizon') are of high clay content and often exhibit a coarse blocky to column-like structure.

PERCHED WATERTABLES

Waterlogging in these soils is usually caused by a perched watertable occuring directly above the subsoil during wet periods. Perched watertables are most likely where the subsoil is relatively impermeable to water (water moves through the subsoil very slowly). A bleached A2 horizon is a sign of periodic waterlogging.

TOPOGRAPHY AND ASSOCIATED VEGETATION

The natural vegetation most likely to be found on areas of red brown earths is the following:

- western grey box
- yellow box (in sandy, well-drained red brown earths)
- white cypress pine (on sandier red brown earths, usually in more elevated positions).

LAND USE LIMITATIONS AND SOIL PROBLEMS

Excessive cultivation may cause a decline in the structure of topsoils of red brown earths, resulting in poor plant growth.

Clay subsoils can be sodic and poorly structured.

Hardsetting

The topsoil of a red brown earth can be hardsetting. This condition can be aggravated by excessive cultivation. The topsoil in these soils is low in clay and largely reliant on organic matter to promote good structure. Excessive cultivation breaks down soil aggregates and lowers the organic matter content of soils, thereby damaging soil structure. A sub-angular blocky structure associated with hardsetting soils is widespread.

Structural instability and slaking

When the topsoils of red brown earths are structurally unstable, flood irrigation or heavy rainfall causes these soils to slake, forming microaggregates. Dispersion is likely if the soil is sodic and non-saline. Both dispersion and slaking will increase the soil bulk density, resulting in a number of problems for plant production:

- formation of a surface seal or crust, which reduces seedling emergence
- poor water infiltration, resulting in limited depth of wetting. This decreases plant growth, due to water shortages, if the irrigation frequency is not increased.

The subsoils (B horizons) are generally high in clay content and have a high bulk density, low permeability and high mechanical resistance to root growth. Therefore waterlogging, poor root growth and limited depth of wetting can occur in the subsoil of red brown earths. These problems are more likely when the subsoil is sodic.

Good soil management can improve the structure of the topsoil and the subsoil to allow better air and water movement and increased root growth. This may be achieved through such practices as:

- minimising cultivation, especially the use of disc implements
- increasing the organic matter content
- cultivating at appropriate soil moisture levels
- use of water application methods that wet soil slowly and hence reduce slaking, for example, micro-irrigation
- including perennial pastures in crop rotations.