‘Red soils’ classified as Ferrosols and also known as Krasnozems

Ferrosols are Tasmania’s most intensively farmed soils, and support the majority of the state’s potato and vegetable production, a large proportion of the dairy industry, as well as significant areas of poppy, cereal, beef and sheep production. This is no coincidence. The characteristics of Ferrosols, along with a cool temperate climate, make them a prized farming resource. The rich red soils of Tasmania are limited in their extent. They predominantly occur on the north-west coast, with only limited areas around Scottsdale and Ringarooma, from Deloraine to Hagley and in isolated pockets near Campbell Town and in the upper Derwent Valley (see Fig.1 below). Similar soils are found in eastern Australia from North Queensland to Victoria. These soils have been known as Krasnozems and are now classified as Ferrosols.

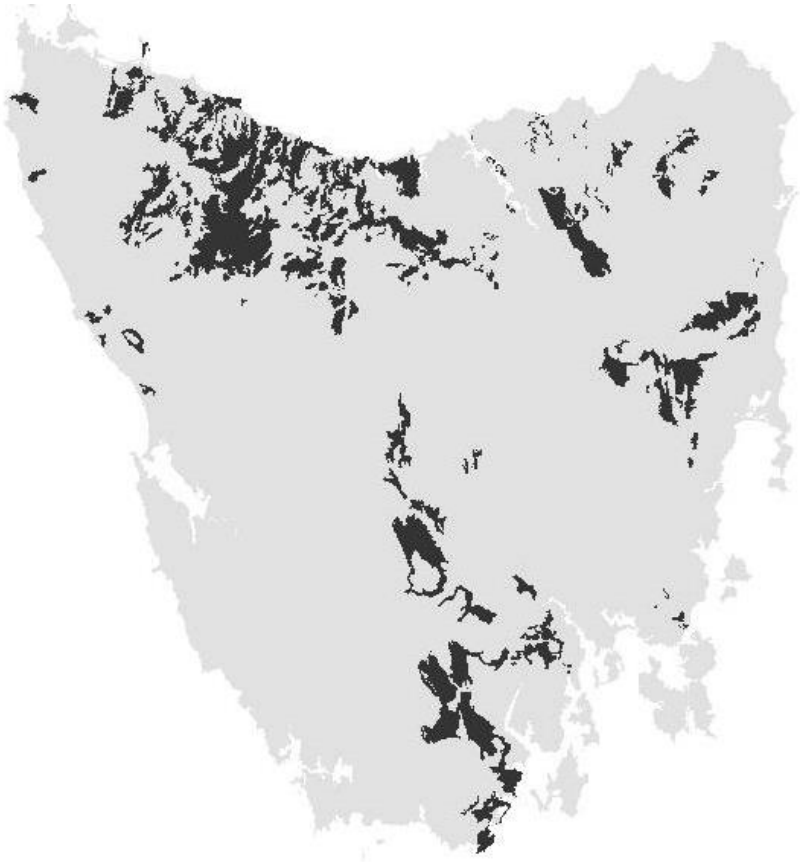

Figure 1. Map of Ferrosol distribution in Tasmania.

Ferrosols are characterised by : red to brown colours, strongly developed structure, high clay content (40 - 80 %), acid pH, and are derived from basalt volcanic rock. Ferrosol topsoils typically contain 35-50% clay, and the proportion increases steadily to 80% or more in the subsoil. In spite of the high iron content, the dominant clay mineral is kaolinite, which by itself is fairly unreactive. There are usually also smaller amounts of other clay minerals like illite and montmorillonite.

Ferrosols in Tasmania have taken 20 - 50 million years to form and so have been exposed to strong weathering processes. Rainfall has leached most of the nutrients out of these soils and

the remaining mineral particles are simply structured kaolin clays plus iron and aluminium oxides. These soils have high iron contents giving them their rich red and brown colours, relatively stable structure, and imparting distinctive chemical properties, such as “fixing” phosphate when applied as fertiliser. The P “fixation” capacity of Ferrosols is amongst the highest of any soils in Australia, and can mean that P fertiliser must be applied in large amounts or in narrow bands to maximise plant growth. Good agronomic properties and high rainfall on these soils has ensured that plant growth has been prolific for thousands of years giving rise to some of the highest topsoil organic matter levels of any soils in Australia.

Climate sequence in north-west Tasmania

Ferrosol properties change with distance from the coast in north-west Tasmania.
These changes are associated with changes in climate. This is represented by the 4 soils:
Burnie, Lapoinya, Yolla & Oonah soils (Figs. 2 and 3).

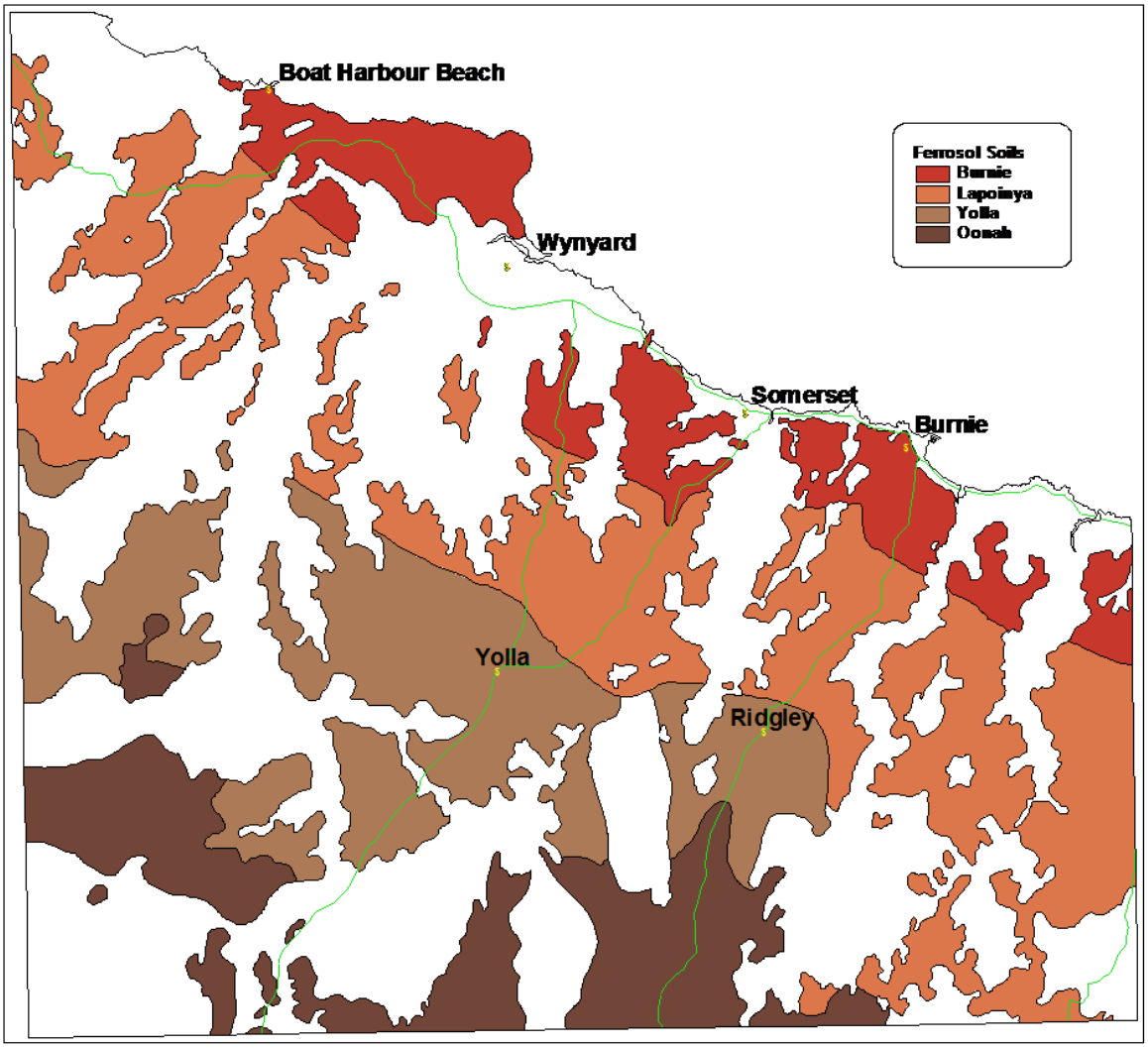

Figure 2. Map showing distribution of Burnie, Lapoinya, Yolla and Oonah soils on the north-west coast of Tasmania. (Stephens, C. G. 1937, Basalt Soils of Northern Tasmania. CSIRO Bulletin 108. Soil Survey of part of the Burnie District (Emu Bay Estate).

The soil changes which occur with increasing distance from the coast and increasing rainfall (Fig. 4) include: colours change from red to brown (see picture below), depth to weathered parent material becomes shallower, stoniness increases, pH becomes more acid, organic matter level increases & nutrient storage ability (cation exchange capacity) increases (Fig. 5).

A relatively cooler and wetter climate than mainland Australia, i.e. less oxidizing, gives rise to more of the iron in the soils being in the form of goethite, which has a more yellow hue than the redder haematite. These changes are the result of increasing rainfall that is associated with increasing altitude. Lower rainfall (800 mm mean annual rainfall) results in haematite being formed whereas higher rainfall (1500 mm mean annual rainfall) results in goethite, a hydrated form of iron, being formed.

The very red colours in the Burnie soils may also be a relict feature remaining from when the climate was more tropical in coastal Tasmania.

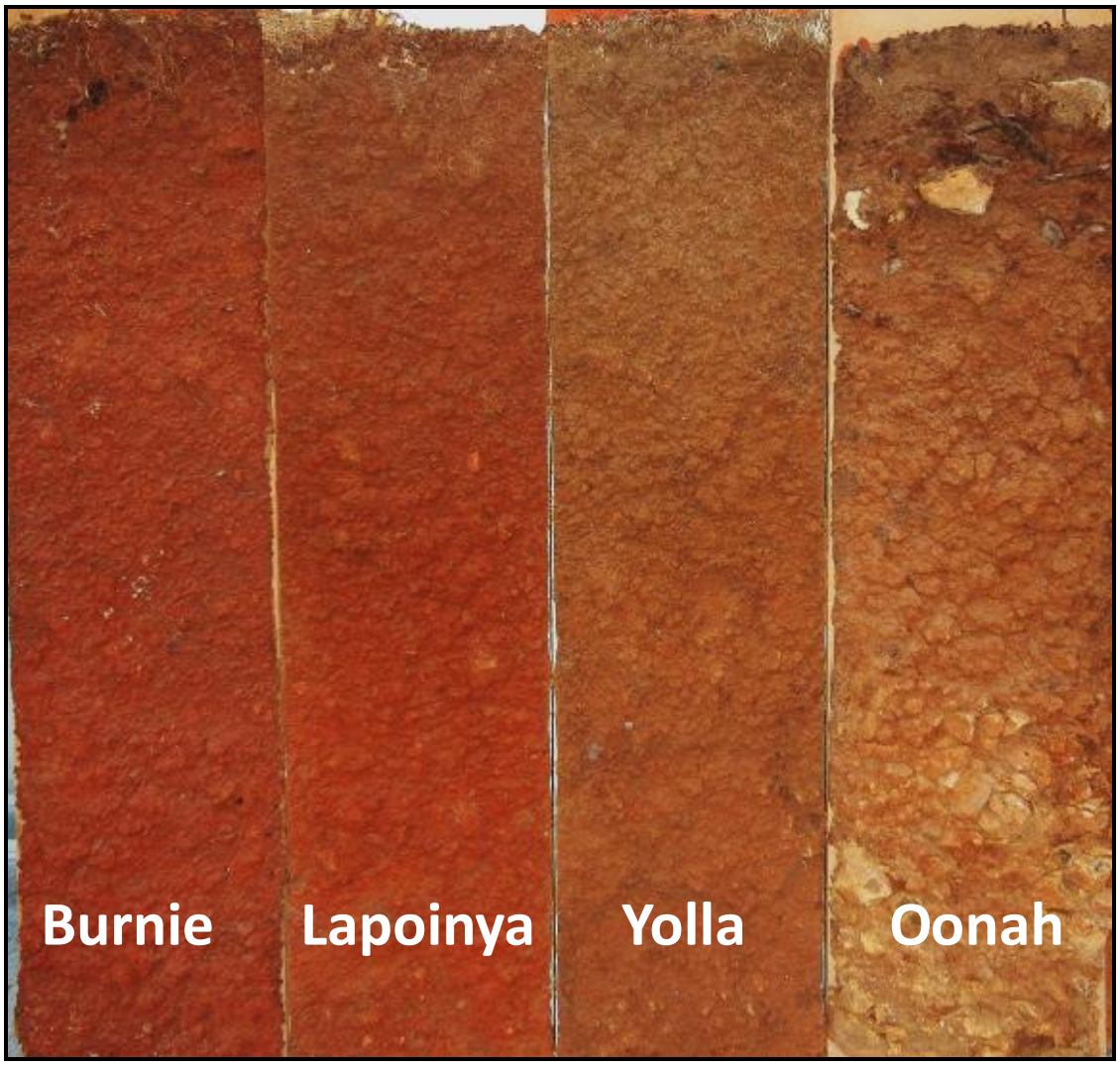

Figure 3. Profiles of Burnie, Lapoinya, Yolla and Oonah soils.

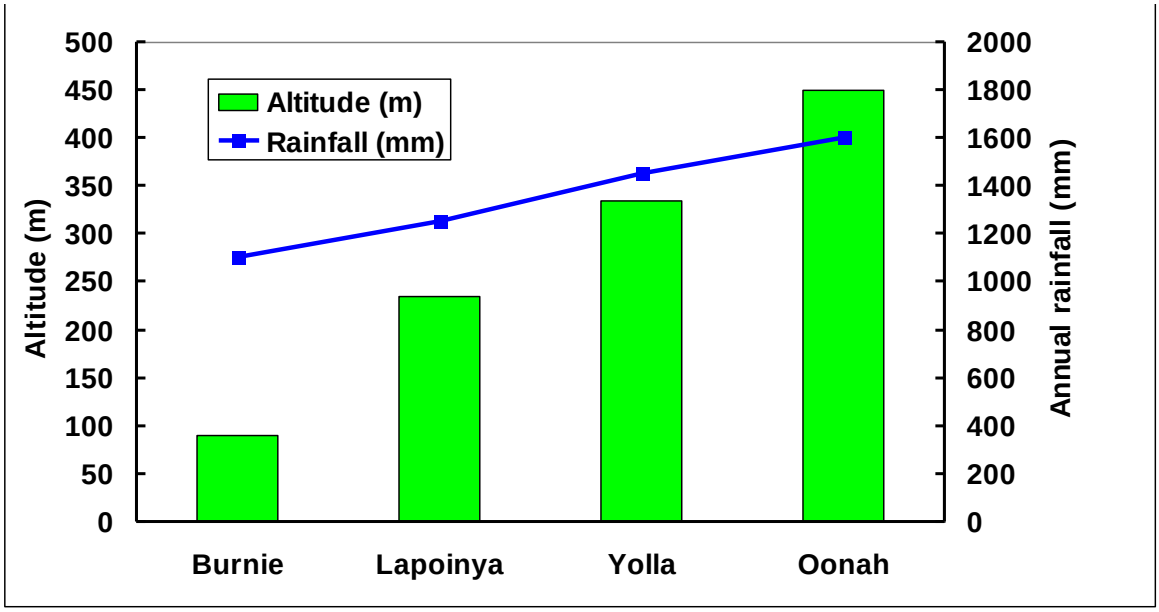

Figure 4. Changes in altitude and mean annual rainfall for Burnie, Lapoinya, Yolla and Oonah soils.

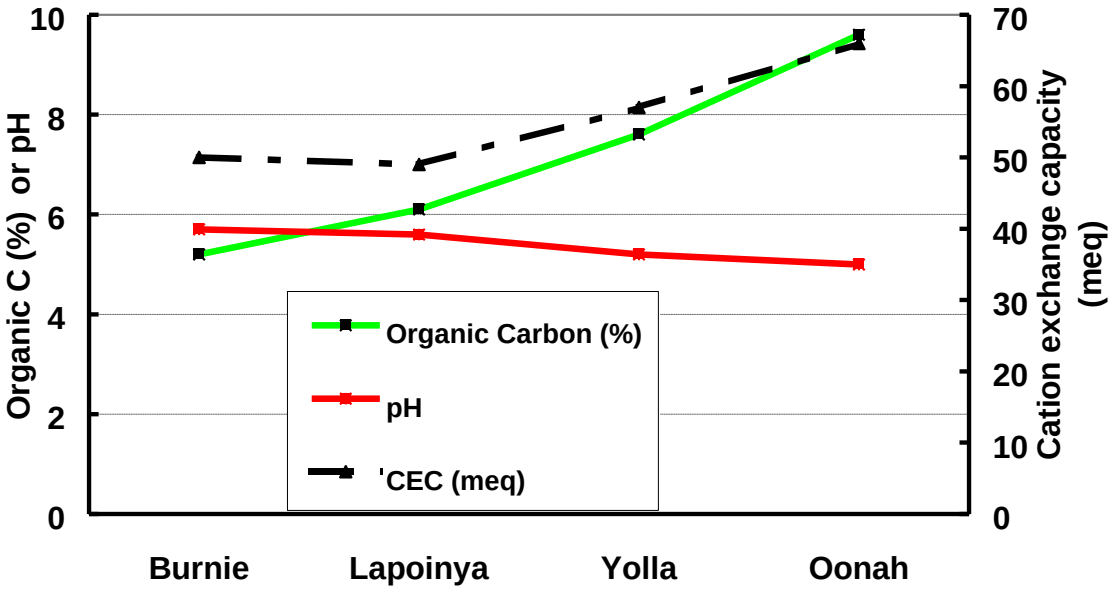

Figure 5. Changes in organic carbon, pH and cation exchange capacity for Burnie, Lapoinya, Yolla and Oonah soils (source CSIRO data base).