SOILS OF THE DPIF
HORTICULTURAL RESEARCH BLOCK
TI TREE

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Conservation Commission of the Northern Territory
Alice Springs  NT  0871

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SLR-A3234
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**SLR-A3234**
SUMMARY

Six soil units have been mapped and described in the DPIF Horticultural Research Block, Ti Tree.

The units have been differentiated on the basis of the texture characteristics of soil profiles down to a depth of 2.0m. Unfortunately there are no readily visible surface soil attributes to aid their field identification. An apparent continuity of profile characteristics exists between the units, associated with an increasing depth of coarse-textured material overlying a medium-textured horizon, and the divisions between the units are arbitrary.

Units A-C are essentially earthy sands, having little variation in texture to a depth of 1.0m, while Units D-F are red earths, exhibiting a gradual increase in clay content with depth. Throughout most of the site, surface soils are sandy loam in texture, but light sandy clay loam A-horizons also occur. A layer of laterite nodules is present at a depth of about 2.0m throughout the block.

The soils have a neutral reaction, commonly pH 6.5-7.0 at the surface and pH 7.0-7.5 by a depth of about 1.0m. They are non-calcareous and non-saline. Instantaneous infiltration rates after 5 hours range from 130mm (Unit A) to 70mm/hr (Unit F), the latter associated with a higher moisture holding capacity than the other units.

The variability of soil texture grade in the root zone throughout the block has implications for irrigation design and possibly trial layout. The presence of the laterite is also significant in view of water table problems previously encountered in association with this material on Ti Tree Farm.

ACKNOWLEDGEMENTS

The cooperation of the staff of the Horticulture Section, DPIF, and Johnny Crayford of Ti Tree assisted in the conduct of this survey. Colin Stanton and Ted Kilpatrick of the Land Conservation Unit provided valuable technical support. The hospitality of Ian and Arthur Dahlenburg is gratefully acknowledged.
INTRODUCTION

In 1988 the Department of Primary Industry and Fisheries (DPIF) purchased a virgin block of land, formerly part of Ti Tree Farm, for the establishment of a research facility to service the requirements of the expanding horticultural industry in the Ti Tree area. The 8 hectare site, located adjacent to the Stuart Highway 180 km north of Alice Springs, was cleared in April 1989, and following the development of a bore water supply work commenced on the establishment of trials involving perennial crops, principally mangoes, citrus and table grapes.

This report documents an investigation requested by the Horticulture section, DPIF, to describe the soils of the research block with the objective of providing background information for the planning of land use and management strategies on the site. The information should have direct application in the design of irrigation systems and the interpretation of trial results.

Soil surveys specifically describe the nature of the land resource, highlighting its physical capabilities or limitations where appropriate. They do not interpret the suitability of the land for the establishment of certain crops or the use of particular management practices. An experienced horticulturalist is in the best position to interpret the findings of this survey in terms of the horticultural potential of the land at Ti Tree.

SURVEY METHODOLOGY

The soils of the research block have been classified into soil units and mapped on the basis of profile descriptions recorded at 44 sites on a 50m grid layout within the 8 hectare site. This represents a sampling intensity of 5.5 sites/hectare which is appropriate for a mapping scale of 1:2000 based on Australian soil survey conventions (Gunn et al. 1988). The effective mapping resolution at 1:2000 scale is about 0.2 hectares. Interpretation of the mapping of a larger than this is not recommended without acquiring site information at a higher intensity as the soils exhibit a high degree of variability due to factors outlined elsewhere in this report.
Field survey activities were conducted in December 1988, prior to the clearing of native vegetation, and completed in May–July 1989. Soil profiles were examined in pits 2.5 m deep excavated at 13 sites, and with Jarret hand auger borings to a depth of 2.0 m throughout the remainder of the grid. Soil attributes were recorded at each site according to the criteria of McDonald et al (1984). Determinations of infiltration rate were conducted on representative areas of each soil unit in February 1990, according to the methodology of Jackson et al (1967).
RESULTS

1. The Physical Environment

The study site is almost level, having a modal fall of about 0.5% to the north-east, parallel to the direction of flow of the Woodforde River channel, which lies 2km to the west. The land has no appreciable microrelief or drainage features, and is best described as comprising part of an extensive sandplain.

The regional geological setting is described by Evans (1972), but available publications provide no detail of the nature of the local landscape at a scale relevant to the purposes of this report. However the interpretation of soil pit observations in conjunction with small scale black and white aerial photography (CAG4095 Alcoota R.3 Nos. 61, 63 1:80,000 scale) suggests that the landscape comprising the research block consists of 3 elements:

i) Red earth soils associated with a lateritic surface;

ii) Coarse-textured soils derived from alluvium, which mostly buries the red earths;

iii) Sandy surface soils which have formed through the modification of the alluvium by aeolian processes.

(i) Red earth soils associated with a lateritic surface

During the long cycle of geologic erosion that occurred in the Tertiary Period (60-2 million years ago), an almost level erosional surface, known as a peneplain, developed throughout central and northern Australia. Concurrently the land surface was deeply-weathered by warm, humid climatic conditions, culminating in the formation of laterites (Mabbutt, 1967). A typical laterite profile of the Tertiary peneplain consists of a medium-textured red earth soil 2-3m in depth overlying a layer of pisolithic laterite (i.e. nodular ironstone), usually 1-2m in thickness. This merges with depth into a deep pallid zone of white kaolinized clay, which eventually grades into weathered bedrock. Extensive areas of this lateritic land surface remain exposed throughout central Australia, usually supporting a groved woodland of mulga (Acacia aneura).

Soil pit observations indicate that the substrate throughout the research block is a pisolithic laterite, which was detected at depths ranging from 1.7m to 2.5m.
The log of Borehole RN 14881 (Power and Water Authority, Alice Springs) records pallid zone material (non-porous light yellow to light grey sandy clays with fine to medium sized angular and subangular quartz grains) between the depths of 6m and 24m. Sandstone was encountered below a depth of 24m. The borehole information provides insufficient detail to determine whether or not the pisolithic laterite is cemented at depth, or if it is a detrital deposit rather than formed in situ.

A stratigraphic interpretation of the soil profile observations suggests that the medium-textured red earth derived from the laterite has been truncated and buried at various depths throughout the block, and is exposed at the soil surface over only a limited area. The original red earth surface was probably stripped and dissected by prior channels of the Woodforde River and associated streams. Where the full depth of soil remains it exhibits a gradational profile, sandy clay loam in texture at the surface, tending to a light clay within a depth of about 1.5m.

(ii) Coarse-textured soils derived from alluvium

The extensive sandplain to the east of the Woodforde River (including the research block) exhibits faint fluvial patterns on small scale black and white aerial photography. These features define the distributary channels of prior floodouts which were active during relatively high rainfall periods of the Pleistocene (2 million-10,000 years ago), and their associated alluvial deposits almost completely bury the original lateritic surface.

Within the research block, alluvium appears to have infilled the truncated lateritic red earth with various depths of material, reforming an almost level surface. It is a uniform deposit, light sandy clay loam in texture, without apparent layering or horizon development, but commonly with fine gravelly inclusions. It has weathered to a red soil with an earthy fabric.

(iii) Sandy surface soils of aeolian origin

During the late Pleistocene, cyclical fluctuations in climate resulted in periodic phases of extreme aridity in central Australia, the most recent and the most intense peaking in the interval 18000-16000 years before present (Bowler, 1976). Coarse-textured alluvial surfaces were modified by wind-action during these phases, which were characterised by very low
rainfall and lack of plant cover together with high average wind velocities. This modification would have involved the erasure of recent and the most intense peaking in the interval 18000-16000 years before present (Bowler, 1976). Coarse-textured alluvial surfaces were modified by wind-action during these phases, which were characterised by very low rainfall and lack of plant cover together with high average wind velocities. This modification would have involved the erasure of microrelief and the sorting of surface soils through sand movement and the winnowing out of fine material. This would conceivably have resulted in a surface layer of predominantly coarse and fine sand particles with a loamy sand texture. However, surfaces have a higher clay content, mostly sandy loam in texture. Bioturbation, principally by termites, involving the excavation of soils from deep in the profile and their mixing with the sandy surface material, provides a likely mechanism for the incorporation of clay into the surface horizon.

This interpretation of the sequence of soil-landscape development is summarised in Figure 1.

2. PRE-EXISTING FLORA

In most arid environments, differences between soils are clearly expressed by the vegetation associations they support.

In central Australia, lateritic red earths characteristically support a groved woodland of mulga in association with wire grass (Aristida inaequiglumis) and woollybutt grass (Eragrostis eriopoda), the earthy sands of alluvial origin carry a tall open shrubland of witchety bush (A. kempeana) and mulga over woollybutt and wanderrie (Eriachne aristidea) grasses, while surfaces of aeolian origin mostly support an open hummock grassland of hard spinifex (Triodia basedowii) with scattered trees and shrubs. However, within the research block, the pre-existing native vegetation did not reflect soil distribution with sufficient sensitivity to aid field identification and large scale mapping. This is because the soil of the shallow roof zone (i.e. upper 30cm) is generally uniform throughout the site probably as a result of aeolian modification. Deep soil characteristics, particularly texture had no obvious correlation with species composition. Consequently a low open woodland of dogwood (A. coriacea) with scattered native currant (Canthium latifolium), bloodwood (Eucalyptus opaca), silver cassia (Cassia artemesoides), native fuschia (Eremophila latrobei) and sandhill wattle (A. dictyophleba) over a low open hummock grassland of hard spinifex occurred
FIGURE 1: HYPOTHETICAL MODEL OF SOIL-LANDSCAPE DEVELOPMENT

1. Level plain

2. Dissection by prior channels of Woodforda River

3. Burial by coarse textured floodout deposits

4. Surface modified by wind action

Legend:
- Medium-textured red earth formed in situ from laterite
- Coarse-textured alluvium
- Pisolithic laterite
- Wind-sorted soil material
throughout the site. Other lower stratum species recorded include wire grass, woollybutt grass, parakeelya (Calandrinia balonensis) and tropical speedwell (Evolvulus alsinoides).

Scattered mulga and witchetty bush occupied areas where soil material of sandy clay loam texture lies within 0.3m of the surface. On sites where the surface texture is a sandy clay loam, the original vegetation consisted of mulga in association with woollybutt and wire grasses.

3. DESCRIPTION OF SOIL UNITS

Six soil units have been identified on the research block, differentiated on the basis of texture characteristics down the profile to a depth of 2m. Other attributes such as pH value proved to be non-diagnostic, and vary only slightly between and within the units selected. The degree of variability within each unit is consistent with the scale of mapping.

The units are best considered to be arbitrary divisions within a continuum, and appear to have a strong stratigraphic relationship, evident in Figure 2. This relationship is consistent with the concept of landscape development through the truncation of a red earth and subsequent infilling with alluvium. The textural boundary between the sandy clay loam and the light sandy clay loam would approximate the buried surface of the truncated red earth in this case.

Guidelines for interpreting soil profile information are documented in Appendix I.

A full description of each soil unit, detailing a representative soil profile and including infiltration rate curves is provided in Appendix II.

A map accompanying this report delineates the distribution of soil units at a scale of 1:2000. The map is in a "pixel" format which is the most appropriate means of portraying point data sources in the absence of other aids to the interpretation of soil unit boundaries such as suitable aerial photographs. As indicated elsewhere in this report, mapping at this scale has a minimum area resolution of about 0.2 hectares, but because of the inherent variability of soils on the site, the distribution of soil units should be interpreted as a guide only. If site specific soil information is required, profiles should be inspected with a higher sampling intensity, using a 10-20m grid spacing, for instance.
FIGURE 2  STRATIGRAPHIC RELATIONSHIP OF SOIL UNITS
(based on texture boundaries and presence of ironstone nodules)

- SANDY LOAM
- LIGHT SANDY CLAY LOAM
- SANDY CLAY LOAM
- SANDY CLAY
- IRONSTONE GRAVEL
- GRADUAL TEXTURE BOUNDARY
- COARSE FRAGMENTS
4. MANAGEMENT IMPLICATIONS

(i) Soil Variability

There is considerable variability in soil texture grade both spatially and with depth throughout the block which is not expressed in surface features or other readily identifiable traits. The range of textures likely to be encountered within 0.3m of the soil surface includes sandy loam (10-15% clay), light sandy clay loam (15-20% clay) and sandy clay loam (20-30% clay). This variability is of significance in the design of irrigation layouts as infiltration rates vary accordingly.

The variability appears to be a consequence of the truncated nature of the buried red earth. To adequately map the variability for concise irrigation or plot design purposes would require a high sampling intensity which was beyond the scope of this survey.

(ii) Impeded Drainage

McColl (1983) described a perched water table found on irrigated land used for table grape production on Ti Tree Farm. It was concluded that clays associated with a layer of ironstone gravel at a depth of 2m were impeding drainage at a time when heavy rainfalls were exacerbating high soil moisture contents resulting from excessive irrigation.

Deep soil pits throughout the research block confirmed the presence of a light clay or sandy clay above the layer of nodulous laterite, although earth from within the layer itself proved to be of lighter texture in at least one instance. It is likely that clay content will increase with depth through the laterite as the white kaolinitic clays of the underlying pallid zone are encountered. Infiltration capacity will decrease accordingly.

The electrical conductivities of soil samples taken at depths of 2.2-2.5m both above and within the laterite layer proved to be very low (Ece 0.14-0.20ms/cm), consistent with the low salinities generally expected with these soils. The elevated salinity of the perched water recorded on Ti Tree Farm is likely to have been derived from the accumulation of salts present in the irrigation water.

With efficient irrigation practices attuned to the fact that the soils are not entirely free-draining, the likelihood of a perched water table developing should be minimal.
(iii) **Soil Erodibility**

The potential for soil to erode is termed its erodibility, and is influenced by inherent soil properties, particularly texture, and land from factors such as slope, as well as land use practices.

While the flat terrain of the research block and the intensive nature of the development proposed should preclude the incidence of significant soil erosion, nuisance soil movement may still occur. The sandy loam surface texture that predominates on the site renders exposed areas susceptible to wind drift, particularly if soils have been pulverised by dry cultivation. Additionally, the surface crust that readily develops on these soils will generate rapid runoff during high intensity rainfalls. Linear surface features such as windows that concentrate and channel surface flows will initiate rilling during such events.
REFERENCES


APPENDIX I

GUIDELINES FOR INTERPRETING SOIL PROFILE DESCRIPTIONS

The description of soil profiles has been based on the attributes of field texture, soil colour, pH, fabric, structure and consistence and are presented for given depth intervals down each profile. The descriptions have been stratified on depth intervals rather than horizon boundaries as the latter are typically diffuse and indistinct within the study site. The soils have been classified according to their Australian Great Soil Group (Stace et al, 1968) and Principal Profile Form (Northcote, 1979).

(i) Soil Characteristics

Texture is a soil property determined by the proportions of sand, silt and clay particles within the soil matrix, and is estimated in the field by assessing the behaviour of a moistened soil bolus in relation to standard criteria, and in the laboratory by analytical procedures. Because the soils of the study area are derived from highly weathered parent materials, they have a low silt content (i.e. soil consists of fine clay sized particles, the final products of weathering, and sand-sized particles of minerals resistant to weathering). The range of soil textures identified in the study area includes sandy loams (10-15% clay), light sandy clay loams (15-20% clay), sandy clay loams (20-30% clay) and sandy clays (35-40% clay).

Texture is an important consideration in the horticultural use of soils since it largely determines soil permeability and moisture holding capacity. It also influences fertility as most plant nutrients are carried by clay minerals.

Soil Colour is assessed in the field by comparing a moist soil sample with a standard Munsell colour chart, which forms the basis of the colour names used in this report.

Soil pH indicates the acidity or alkalinity of the soil. A neutral soil has a pH value of 7.0, and a lower pH indicates acidity, a higher pH alkalinity. The pH values quoted in this report are field determinations based on a standard 'Inoculo' colorimetric test kit. Most soils in the research block have a neutral reaction trend, with a surface pH value of between pH 6.0 and pH 7.0, and a deep subsoil value between pH 6.5 and pH 8.0.
Soil Structure is described in terms of the degree of ped development in the soil material, as well as ped size and shape. A ped is defined as a distinctly separate soil aggregate. Coherent, porous soils with no distinct pedality which break down only into fragments are classified as having a massive structure. These predominate on the research block. However the upper 10cm of essentially massive profiles often exhibits a weakly-developed structure of platy peds associated with organic matter build-up and biological activity. The presence of a well-developed surface crust is a universal feature of regional soils and is usually the result of the physical packing of clay, silt and fine sand particles under raindrop impact rather than surface soil dispersion.

Soil Fabric refers to the arrangement of individual particles within the soil material. Non-pedal soils may have an earthy fabric, characterised by a porous, dusty appearance of the soil matrix, or a sandy fabric of closely-packed sand grains. Structured soils may have either rough-faced, porous peds with poorly-defined faces, or smooth-faced peds with distinct, lustrous surfaces.

Soil Consistence is a field measurement of the strength of cohesion within the soil. It will vary according to the moisture status of the soil, but for this report has been assessed in the dry state. The determinations are based on an assessment of the force required to break a 20mm sample with a compressive shearing force applied by thumb and fore finger. Hardpans can usually be identified by this simple technique.

(ii) SOIL TYPES

Australian Great Soil Group - Soils within the research block are in a strict sense red earths under the classification scheme of Stace et al (1968).

Red earths are coarse or medium-textured soils having a gradual increase in clay content with increasing depth down the soil profile. In general terms they are red soils with massive structure and an earthy fabric, and are moderately well-drained. While lacking the free-drainage of sandier, uniform textured soils, the red earths have no major constraints for horticultural use.
This description best fits those profiles on the block which have a consistent increase in clay content with depth throughout the profile. However, the sandier profiles, which are interpreted here as being derived predominantly of alluvium, are essentially uniform-textured to a depth of 1.0–1.5m, and on this basis are possibly best considered to be earthy sands. Stace et al (1968) describe the earthy sands as being the uniform-textured equivalents of the red earths. In terms of horticultural use, earthy sands are likely to have a greater capacity for free-drainage than the red earths.

Principal Profile Form - This is a notation derived from a key based solely on the physical characteristics of the soil profile. The notation is accompanied by a numerical code to specify diagnostic characteristics of individual soil profiles, as defined in Northcote (1979).

All profiles recorded in the study area were of Principal Profile Form Gn 2.12.
APPENDIX II DESCRIPTION OF SOIL UNITS

SOIL UNIT A

Distinctive Features

This unit displays a deep surface texture of sandy loam, which runs to a depth of about 30-50cm. It then trends to a deep light sandy clay loam to a depth of about 1.7m. Coarse fragments were recorded at some sites in this layer. The light sandy clay loam gradually trends to a sandy clay loam at a depth of about 1.8-2.0m.

Observation Sites: D9, E1, E4, E7, E9

Great Soil Group: Red Earth/Earthy sand
Principal Profile Form: Gn 2.12
### Representative Profile

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>dark reddish brown (2.5YR 3/4); sandy loam; pH 6.0-6.5; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>10-20</td>
<td>dark red (2.5YR 3/6); sandy loam; pH 6.0-6.5; massive; earthy; very weak</td>
</tr>
<tr>
<td>20-30</td>
<td>dusky red (10.0R 3/4); sandy loam; pH 6.5; massive; earthy; very weak</td>
</tr>
<tr>
<td>30-50</td>
<td>dusky red (10.0R 3/4); sandy loam - light sandy clay loam; pH 6.5-7.0; massive; earthy; very weak</td>
</tr>
<tr>
<td>50-100</td>
<td>red (10.0R 4/6); light sandy clay loam; pH 6.5-7.0; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>100-150</td>
<td>dark red (10.0R 3/6); light sandy clay loam - sandy clay loam; pH 7.0; massive; earthy; moderately firm</td>
</tr>
<tr>
<td>150-200</td>
<td>red (10.0R 4/6) - dark red (10.0R 3/6); sandy clay loam; pH 7.0; massive; earthy; very firm</td>
</tr>
</tbody>
</table>

### Comments

Quartz fragments occur at depths greater than 50 cm at sites D9 and E9. They are of a subrounded tabular to angular tabular shape, average ...mm in thickness, with an abundance of generally 1-2%.

Site D9 has a pH value of 7.0 throughout the profile.

All sites feature a surface crust veneered with sandy deposits.
SOIL UNIT B

Distinctive Features

Unit B has a sandy loam surface texture similar to Unit A, however, this layer only runs to a depth of about 20 cm and it grades into a deeper light sandy clay loam to a depth of about 1.0-1.3 m. The trend then is to a sandy clay loam to 2.0 m. Coarse fragments were recorded in the light sandy clay loam layer.

Observation Sites:  B1, C1, D1, D2, D5, D6, D7, E5, B7, D8, A4, E6

Great Soil Group:  Red earth/earthy sand

Principal Profile Form:  Gn 2.12

SLR-A3234  20
### Representative Profile

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<th>Depth (cm)</th>
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<tr>
<td>10-20</td>
<td>dusky red (10.OR 3/4); sandy loam; pH 6.5-7.0; massive; earthy; moderately weak</td>
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<tr>
<td>20-30</td>
<td>dusky red (10.OR 3/4); light sandy clay loam; pH 6.5-7.0; massive; earthy; moderately weak</td>
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<td>30-50</td>
<td>dark red (10.OR 3/6); light sandy clay loam; pH 7.0; massive; earthy; moderately weak</td>
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<td>dark red (10.OR 3/6); sandy clay loam; pH 7.0; massive; earthy; very firm</td>
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### Comments

Fine quartz fragments are found at site D2, at a depth of 30cm, and continue in the profile until 1.5m. Shape is generally subrounded tabular to angular tabular and the abundance is about 10%.

A sandy deposit veneers a weak surface crust.
UNIT B SITE D2

Depth (mm) or mm/h

Accumulated infiltration rate (mm) $6T^{-0.10}$

Instantaneous infiltration mm/h $3367^{-0.30}$

Time in minutes

Average of 3 three infiltration tests
### Representative Profile

<table>
<thead>
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<tr>
<td>5-10</td>
<td>dark reddish brown (2.5YR 3/4); sandy loam; pH 6.0-6.5; massive; earthy; moderately weak</td>
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### Comments

Site C7 has a pH value of 6.5 to a depth of 20 cm, below which it tends to pH 6.0. At a depth of about 50 cm it increases to 6.5.

A veneer of coarse gritty sand partially covers a weak surface crust.
UNIT C SITE A7

Average of 3 three infiltration tests
Representative Profile

<table>
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</table>

Comments

Quartz fragments appeared at depths greater than 1.5m at sites A3, B5, B9 and C3. They generally consisted of fine gravel with subangular tabular and angular tabular shape with an abundance of 1%. Site A3 has an abundance of 10%.

Sites C3 and C4 have a pH 7.5 below a depth of 1.5m.

The surface is crusted and covered with a sandy veneer.
SOIL UNIT E

Distinctive Features

This unit has no sandy loam textures and the surface layer is a light sandy clay loam which trends to a sandy clay loam at about 30 cm. This texture runs to a depth of about 1.5 m and coarse fragments were recorded in the bottom of this layer. A sandy clay was recorded at about 1.5 m and runs to a depth of about 2.0 m.

Observation Sites: D3, B6, C6, E3, D4, B8, B3, B4, B2, A8, A1

Great Soil Group: Red earth

Principle Profile Form: Gn 2.12.
## Representative Profile

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>dark reddish brown (2.5YR 3/4); light sandy clay loam; pH 6.0-6.5; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>10-20</td>
<td>dark reddish brown (2.5YR 3/4); light sandy clay loam; pH 6.0-6.5; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>20-30</td>
<td>dark reddish brown (2.5YR 3/4); light sandy clay loam - sandy clay loam; pH 6.5-7.0; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>30-50</td>
<td>dark red (2.5YR 3/6); sandy clay loam; pH 6.5-7.0; massive; earthy; moderately weak</td>
</tr>
<tr>
<td>50-100</td>
<td>dusky red (10.0R 3/4); sandy clay loam; pH 6.5-7.0; massive; earthy; moderately firm</td>
</tr>
<tr>
<td>100-150</td>
<td>dusky red (10.0R 3/4); sandy clay loam - sandy clay; pH 7.0; massive; earthy; moderately firm</td>
</tr>
<tr>
<td>150-200</td>
<td>dusky red (10.0R 3/4); sandy clay loam - sandy clay; pH 7.0; massive; earthy; very firm</td>
</tr>
</tbody>
</table>

### Comments

Soil texture at site D4 consists of a light sandy clay loam to a depth of 1.0m. Some sites have a high pH value, D4 as high as 8.0 at 1.0m and 9.0 at 1.5m, then drops back to 7.5 at 2.0m depth. Site B6 ranges as high as pH 8.0, and site C8 as high as pH 7.5.

A surface crust veneered with coarse grit occurs throughout.
SOIL UNIT F

Distinctive Features

The surface of this unit is a sandy loam which trends to a light sandy clay loam at about 5cm. This layer is very shallow and at about 10cm runs into a sandy clay loam. A sandy clay texture was recorded at about 1.0m and extends to a depth of about 1.7m where ironstone gravel was recorded.

Observation Sites: C2, C8

Great Soil Group: Red earth

Principle Profile Form: Gn 2.12
UNIT F

Depth (mm) or mm/h

Accumulated Infiltration

Instantaneous

Time in minutes

Average of three incepts

20 40 60 80 100 120 140 160

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700

in mm/h 352T 0.88

20 40 260 280 300 320

Average of three incepts
SOIL UNIT MAP OF TI TREE WITH 50 METRE PIXELS