**VE4: Epicalcareous-Endoacidic, Self-mulching, Red Vertosol**

**General description of the soil**
A red shrink-swell, cracking clay soil that is self-mulching, calcareous in the upper part of the solum and is strongly acid and strongly sodic at depth.

**Distribution:**
Relatively large areas occur on undulating plains and rises derived from labile sedimentary rocks and transported clays in southern inland Queensland and to a lesser extent throughout northern Australia.

**Typical land use:**
 Widely used for a variety of dryland crops and grazing of native and improved pastures.

**Common variants:**
Depths and levels of carbonate, sodicity and strong subsoil acidity vary.

**World Reference Base:**
Vertic Solonchak.

**Other names:**
Red Clays and Red Cracking Clays.

**Environment and location of the example profile**

**Landform:**
Gently undulating plain.

**Parent material or substrate:**
Labile sedimentary rocks and transported clays.

**Drainage class:**
Imperfectly drained.

**Surface condition:**
Self-mulching with periodic cracking.

**Site disturbance:**
Cleared.

**Native vegetation:**
Open forest of brigalow (*Acacia harpophylla*) and belah (*Casuarina cristata*).

**Microrelief:**
Normal gilgai; 0.15 m vertical interval; profile sampled on mound.

### Site location

![Location Map]

**Site climate**

![Temperature and Rainfall Graph]

- $T_{max}$: 26.8°C
- $T_{min}$: 12.3°C
- Rainfall: 611 mm
- Evaporation: 2108 mm

### Soil morphology

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (m)</th>
<th>Colour</th>
<th>Mottles</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistence</th>
<th>Coarse fragments</th>
<th>Segregations</th>
<th>Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>0.00–0.04</td>
<td>dark brown (7.5YR 3/4)</td>
<td>–</td>
<td>medium clay</td>
<td>strong granular</td>
<td>2–5 mm</td>
<td>firm (dry)</td>
<td>–</td>
<td>2–10% carbonate nodules (2–6 mm)</td>
</tr>
<tr>
<td>B21</td>
<td>0.04–0.28</td>
<td>dark reddish brown (5YR 3/3)</td>
<td>–</td>
<td>heavy clay</td>
<td>strong angular blocky</td>
<td>20–50 mm</td>
<td>strong (dry)</td>
<td>&lt;2% rounded tabular fragments (2–6 mm)</td>
<td>–</td>
</tr>
<tr>
<td>B22</td>
<td>0.28–0.71</td>
<td>dark reddish brown (5YR 3/4)</td>
<td>–</td>
<td>heavy clay</td>
<td>strong paring to moderate angular blocky</td>
<td>50–100 mm</td>
<td>very strong (dry)</td>
<td>&lt;2% rounded tabular fragments (2–6 mm)</td>
<td>2–10% carbonate nodules (2–6 mm)</td>
</tr>
<tr>
<td>B23</td>
<td>0.71–0.90</td>
<td>reddish brown (5YR 4/6)</td>
<td>–</td>
<td>heavy clay</td>
<td>moderate lenticular structure</td>
<td>50–100 mm</td>
<td>very strong (dry)</td>
<td>–</td>
<td>&lt;2% carbonate nodules, 2–10% manganiferous veins, 2–10% gypsum crystals (all 2–6 mm)</td>
</tr>
<tr>
<td>B24</td>
<td>0.90+</td>
<td>reddish brown (5YR 4/8)</td>
<td>–</td>
<td>heavy clay</td>
<td>strong paring to moderate lenticular structure</td>
<td>100–200 mm</td>
<td>strong (dry)</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
**Vertosols**

**Soil chemical and physical properties**

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Sample Depth (m)</th>
<th>pH H₂O</th>
<th>pH CaCl₂</th>
<th>Elect. Cond. dS/m</th>
<th>CaCO₃ %</th>
<th>Org. C %</th>
<th>Exr. P mg/kg</th>
<th>Tot. P %</th>
<th>Tot. K %</th>
<th>Cation exchange properties cmol(+)/kg</th>
<th>ESP %</th>
<th>Bulk dens. Mg/m³</th>
<th>Particle size %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/B</td>
<td>0.00-0.10</td>
<td>7.4</td>
<td>0.08</td>
<td>1.8</td>
<td>0.049</td>
<td>0.686</td>
<td>13.0</td>
<td>5.6</td>
<td>2.2</td>
<td>0.5</td>
<td>27</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>B21 0.10-0.30</td>
<td>8.6</td>
<td>0.56</td>
<td></td>
<td>0.034</td>
<td>0.660</td>
<td>25.0</td>
<td>12.0</td>
<td>1.4</td>
<td>4.4</td>
<td>43</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>B22 0.30-0.60</td>
<td>8.3</td>
<td>1.60</td>
<td></td>
<td>0.017</td>
<td>0.506</td>
<td>17.0</td>
<td>14.0</td>
<td>0.6</td>
<td>7.7</td>
<td>41</td>
<td>3</td>
<td>31</td>
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<tr>
<td></td>
<td>B23 0.60-0.90</td>
<td>5.3</td>
<td>1.80</td>
<td></td>
<td>0.013</td>
<td>0.469</td>
<td>13.0</td>
<td>11.0</td>
<td>0.5</td>
<td>7.5</td>
<td>40</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>B24 0.90-1.20</td>
<td>4.8</td>
<td>1.70</td>
<td></td>
<td>0.011</td>
<td>0.451</td>
<td>12.0</td>
<td>11.0</td>
<td>0.5</td>
<td>8.2</td>
<td>39</td>
<td>21</td>
<td>39</td>
</tr>
</tbody>
</table>

* Bulk sample

**Key profile properties**

- **Infiltration:** Slow when swollen.
- **Available water store:** Moderate.
- **Permeability:** Moderate to low.
- **Physical root limitations:** None apparent.
- **Erosion hazard:** Moderate dispersion below 0.90 m aids gully erosion on slopes.
- **Nutrient availability:** Nitrogen levels are medium, phosphorus is low and potassium is very high.
- **Toxicities:** Often extremely saline below 0.30 m.

**This gilgaied landscape originally supported an open forest of brigalow (Acacia harpophylla).**

Acknowledgements: Soil image, soil description and laboratory data: Department of Natural Resources and Mines, Queensland. Arden soil, Site 11. Landscape image: George Hubble, CSIRO.