

SO1: Hypocalcic, Duric, Red Sodosol

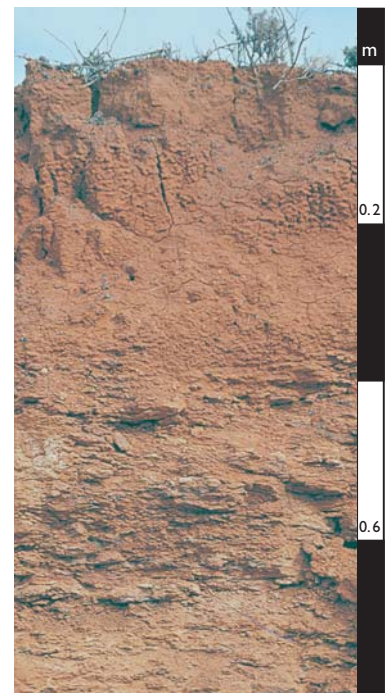
General description of the soil

A slightly calcareous, sodic, texture-contrast soil underlain by a red-brown hardpan at shallow depth.

Distribution:	Irregular but widespread occurrence in the central and southern parts of the Australian arid zone.
Typical land use:	Sparse grazing by sheep.
Common variants:	The red-brown hardpan may occur in a wide range of other soils including Kandosols, Tenosols, Dermosols and Chromosols. The hardpan occurs at variable but mostly shallow depths (<0.5 m).
World Reference Base:	Endopetric Plinthosol.
Other names:	Red and Brown Hardpan Soils.

Environment and location of the example profile

Landform:	Gently undulating plain.
Parent material or substrate:	Hardpan has formed in alluvial/colluvial material.
Drainage class:	Moderately well-drained.
Surface condition:	Platy and vesicular surface crust with 20–50% ferruginous rounded gravels (<40 mm).
Site disturbance:	Minor.
Native vegetation:	Tall open shrubland of <i>Acacia aneura</i> (Mulga), <i>Acacia brachystachya</i> and <i>Maireana astrotricha</i> (Bluebush).

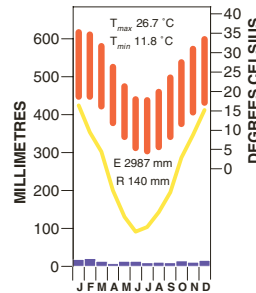


Near Coober Pedy, South Australia

Site location



Site climate



Soil morphology

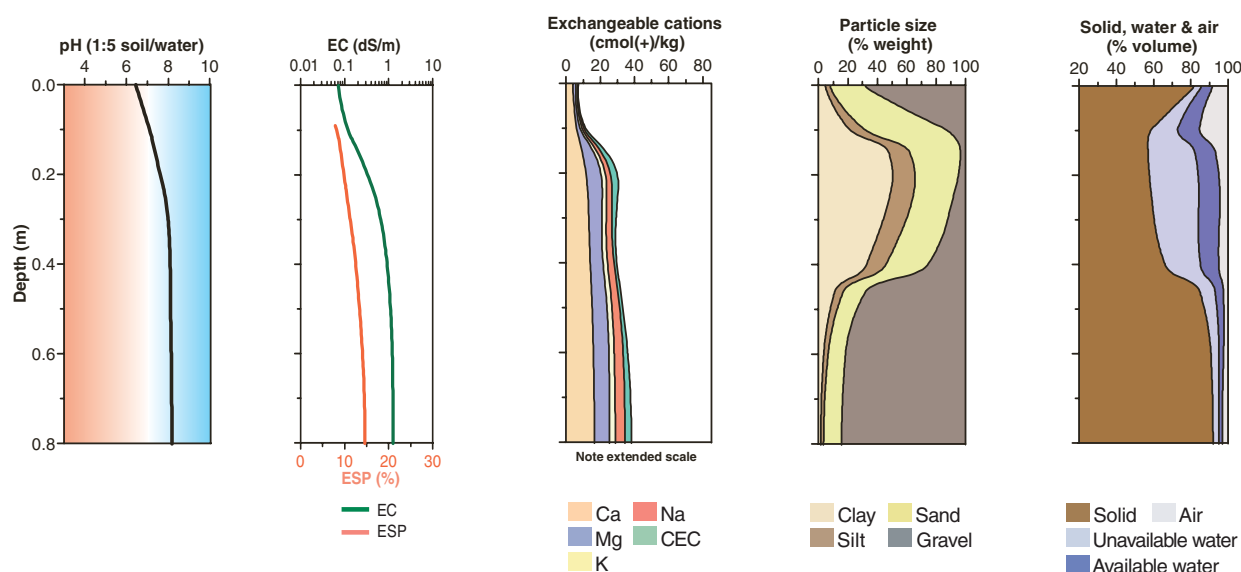
Horizon	Depth (m)	Colour	Mottles	Texture	Structure			Consistence	Coarse fragments	Segregations	Boundary
					Grade	Shape	Size				
A11	0.00–0.01	dark red (2.5YR 3/6)	–	loamy sand	vesicular platy surface crust	–	–	coherent (moist) brittle (dry)	20–50% ferruginous rounded gravel (2–20 mm) on and embedded in the soil surface	–	sharp
A12	0.01–0.09	dark red (2.5YR 3/6)	–	loamy sand	massive	–	–	firm (moist)	20–50% ferruginous gravel (15 mm)	–	clear
A2	0.09–0.12	red (2.5YR 4/6) reddish yellow (5YR 6/6 d)	–	sandy clay loam	massive to weak	platy	20–40 mm	firm (moist)	<2% ferruginous gravel (2–6 mm)	–	sharp
B21	0.12–0.23	dark red (10R 3/8)	–	light clay	weak parting to strong	prismatic parting to angular blocky	2–5 mm	coherent (moist and dry)	–	–	diffuse
B22	0.23–0.43	dark red (10R 3/6, 3/8)	–	clay loam	massive to weak, parting to moderate	prismatic parting to angular blocky	3–12 mm	firm (moist)	<2% ferruginous rounded gravel (<8 mm)	2–10% carbonate nodules (2–10 mm) slightly calcareous*	sharp
hardpan	0.43–0.80	dark red (2.5 YR 3/6)	–	–	platy (to 15 mm) red brown hardpan	siliceous coatings on plate surfaces	–	extremely hard (moist and dry)	siliceous coatings on plate surfaces	minor thin bands of carbonate, increase in vesicles and manganese stainings with depth	–

* Fine earth fraction

Soil chemical and physical properties

Horizon	Sample Depth (m)	pH H ₂ O ^A	pH CaCl ₂ ^C	Elect. Cond. dS/m ^A	CaCO ₃ %	Org. C %	Extr. P mg/kg	Tot. P %	Tot. K %	Cation exchange properties ^D cmol(+)/kg						ESP % ^A	Bulk dens. Mg/m ³	Particle size % ^K				
										Ca	Mg	K	Na	H+Al	CEC			ECEC	CS	FS	Silt	Clay
A11	0.00–0.01	6.2	6.1	0.06							3.4	2.5	1.0	0.2		7			43	39	10	10
A12	0.01–0.09	6.8	6.4	0.04							2.4	1.7	0.8	0.3		5			54	34	7	7
A2	0.09–0.12	7.3	6.5	0.04							3.5	2.1	0.9	0.8		8			49	29	11	12
B21	0.12–0.23	7.5	7.0	0.11							14.8 ^G	7.8 ^G	2.9 ^G	3.3 ^G		34 ^G			15	11	16	61
B22	0.23–0.30	8.2	7.9	0.59	3						14.2	7.1	2.5	3.2		30			15	11	20	57
B22	0.30–0.43	8.2	7.9	0.94	3						13.3	7.0	2.5	3.5		28			21	18	18	45
HP	0.43–0.60	8.1	7.9	1.23	1						15.9	8.7	3.0	4.7		34			51	23	10	20
HP	0.60–0.80	8.2	8.0	1.31	<1						16.8	8.6	3.3	5.7		38			80	13	4	7

Key profile properties



General qualities of the soil

Infiltration:	Slow due to crust.
Available water store:	Small due to gravel and hardpan.
Permeability:	Moderate above the hardpan.
Physical root limitations:	Hardpan restricts roots to fractures.
Erosion hazard:	Sheet erosion may occur if surface coarse fragments are disturbed.
Nutrient availability:	Probably low except for base status.
Toxicities:	High salinity in the B22 increasing to extreme in the hardpan.



Red-brown hardpan exposed by stripping of the ancient landscape near Coober Pedy, South Australia

Acknowledgements: Soil image, soil description and laboratory data: CSIRO Land and Water. Profile RBH104. Landscape image: Malcolm Wright, CSIRO.