SO5: Hypercalcic, Mottled-Hypernatric, Red Sodosol

General description of the soil

A texture-contrast soil which is strongly sodic and mottled in the upper 0.2 m of the red clayey B horizon. A strongly developed carbonate horizon (Bk) is present below about 0.40 m (i.e. Hypercalcic).

Distribution:	A common Sodosol in semi-arid southern Australia, particularly in the Mallee Region.
Typical land use:	Dryland farming.
Common variants:	These Red Sodosols may vary widely in morphology. A horizons range from sand to clay loam, and most have bleached A2 horizons; B horizon structure may be blocky rather than columnar or prismatic. Carbonate content can vary in kind and amount.
World Reference Base:	Alcalic Solonetz.
Other names:	Solodised Solonetz and Solodic soils.

Environment and location of the example profile

Landform:	Gently undulating plain.
Parent material or substrate:	Clayey sediments.
Drainage class:	Poorly drained.
Surface condition:	Loose.
Site disturbance:	Cultivation.
Native vegetation:	Mallee shrubland and woodland.

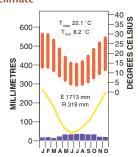
0.2 0.6 0.6

Pinaroo district, South Australia

Site location



Site climate



Soil morphology

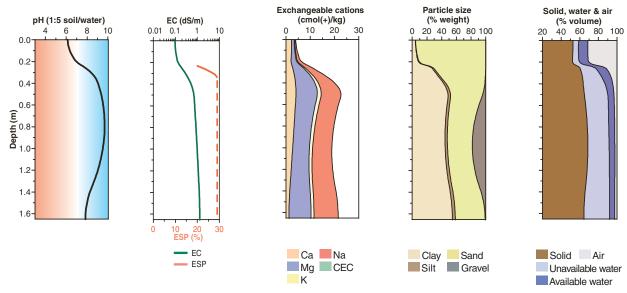
Horizon	Depth Colour		Mottles	Texture		Structur	e	Consistence	Coarse	Segregations	Boundary
	(m)				Grade	Shape	Size		fragments		
Ар	0.00-0.09	very dark greyish brown (10YR 3/2)	_	loamy sand	single grain	-	-		-	-	abrupt
A1	0.09–0.18	brown (10YR 4/3)	-	loamy sand	single grain	-	-		-	-	clear
A2e	0.18–0.23	light yellowish brown (10YR 6/4)	-	sand	single grain	-	-		-	-	sharp
B1t	0.23-0.38	yellowish red (5YR 4/8)	yellowish brown (10YR 5/8)	sandy light clay	strong	columnar	100–200 mm		-	-	gradual
B2tk	0.38-0.54	red (2.5YR 4/6)	yellowish brown (10YR 5/8)	medium clay	moderate	prismatic	2–5 mm		-	20–50% soft carbonate (>60 mm)	gradual
B3k	0.54–1.34	yellowish red (5YR 5/8)	brownish yellow (10YR 6/6)	sandy clay	massive	-	-		-	10–20% carbonate nodules (2–6 mm)	diffuse
С	1.34–1.90	red (2.5YR 4/6)	pale brown (10YR 6/3)	heavy clay	strong	prismatic	20–50 mm		-	-	

Soil chemical and physical properties

Horizon	Sample Depth	pH H₂O ^A	pH CaCl ₂ ^B	Elect. Cond.	CaCO ₃ % ^B	Org. C % ^D	Extr.	Tot. P %									Bulk dens.	l		ticle size % ^A		
	(m)			dS/m ^A			mg/kg ^A			Ca	Mg	K	Na	H+Al	CEC	ECEC		Mg/m ³	CS	FS	Silt	Clay
Ap	0.00-0.09	6.2	6.0	0.09	<1	0.8	24			2.5 ^D	0.9 ^D	0.3 ^D	0.2 ^D		3 ^D		-		62	34	<1	4
A2e	0.18-0.23	6.7	6.1	0.06	<1	0.2	5			0.9 ^D	0.4 ^D	0.1 ^D	0.2 ^D		2 ^D		-		53	44	1	3
B1t	0.23-0.38	8.8	7.2	0.22	2	0.3	3			3.7	7.3	1.0	4.5		13		35		32	32	2	34
B2tk	0.38-0.54	9.3	8.1	0.78	5	0.3	2			4.6	10.4	1.9	9.7		29		35		19	21	4	55

Horizon	Sample Depth	pH H ₂ O ^A	pH CaCl ₂ ^B	Cond.	CaCO ₃	Org. C % ^D	Extr. P	Tot. P %	Tot. K %	C% cmol(+)/kg %A dens.					-	Particle size % ^A						
	(m)			dS/m ^A			mg/kg ^A			Ca	Mg	K	Na	H+Al	CEC	ECEC		Mg/m ³	CS	FS	Silt	Clay
B3k	0.54-0.90	9.6	8.2	0.95	32	0.2	< 2			2.9	6.4	1.3	7.6		19		40					
С	1.35-1.65	7.9	7.2	1.30	1	0.1	< 2			1.1	9.3	1.2	10.1		18		55					

Key profile properties



General qualities of the soil

Infiltration:	Rapid unless the surface is water-repellent.
Available water store:	Small to very small depending on the thickness of the A horizon.
Permeability:	Very low in the B horizon.
Physical root limitations:	Dense clay subsoil may restrict roots, due to poor aeration and excessive strength.
Erosion hazard:	High when exposed by cultivation or overgrazing.
Nutrient availability:	Low organic matter. Most likely to be deficient in phosphorus, nitrogen, copper and zinc.
Toxicities:	Moderate salinity in the lower subsoil horizons and possible boron toxicity.



Aerial view of dunes and intervening swales where the soil profile occurs – west of Pinaroo, South Australia

Acknowledgements: Soil image, soil description and laboratory data: Department of Water, Land and Biodiversity Conservation, South Australia. Site MM035 from McCord (1995). Landscape image: MapLand, South Australia.