BROWN CLAY

General Description: *Brown to grey brown light clay, becoming more clayey, grey mottled and calcareous with depth. Red sandy lenses occur throughout the profile, gypsum often present below 100 cm.*

Landform: Murray River flats.

Substrate: Clayey river sediments (Coonambidgal Formation), with variable gypsum deposits between 100 and 200 cm.

Vegetation:

Type Site: Site No.: MR008

1:50,000 sheet:	7029-4 (Renmark)	Hundred:	Out of Hundreds
Annual rainfall:	265 mm	Sampling date:	27/09/04
Landform:	Murray River flats		
Surface:	Firm, cracks when dry, with no stones		

Soil Description:

Depth (cm)	*Description*
0-10	Brown friable light clay with weak granular structure. Clear to:
10-19	Brown firm massive medium clay. Clear to:
19-32	Brown firm slightly calcareous medium clay with strong angular blocky structure. Clear to:
32-65 *	Brown hard highly calcareous medium heavy clay with weak coarse prismatic (breaking to strong medium angular blocky) structure and 10-20% fine carbonate segregations. Diffuse to:
65-100 *	Yellowish brown and light brownish grey mottled weakly structured hard highly calcareous heavy clay. Diffuse to:
100-145	Light yellowish brown and grey mottled weakly structured firm highly calcareous heavy clay. Diffuse to:
145-170	Light olive grey and light yellowish brown mottled weakly structured firm highly calcareous heavy clay with 2-10% gypsum crystals, and 2-10% fine carbonate segregations.

* These layers include yellowish red sandy lenses.

Classification: Epicalcareous-Endohypersodic, Epipedal, Brown Vertosol; non-gravelly, fine / very fine, deep

Summary of Properties

Drainage: Imperfectly to moderately well drained. The heavy texture throughout can cause saturation of parts of the profile for a week to several weeks following heavy or prolonged rainfall (or irrigation).

Fertility: Inherent fertility is high, as indicated by the high clay content and the exchangeable cation data. Concentrations of all tested elements are high.

pH: Alkaline throughout.

Rooting depth: 145 cm in pit, but few roots below 65 cm.

Barriers to root growth:

Physical: The heavy texture impedes root growth from 32 cm downwards. The high wilting point of the surface soil restricts water availability, so maintaining adequate moisture levels in the upper root zone is a major management issue.

Chemical: Moderate salinity and sodicity in all subsurface layers, and high boron levels from 65 cm restrict optimum root development. These constraints probably prevent excessive vegetative growth which would otherwise occur in such a highly fertile soil.

Water holding capacity: (Estimates for potential root zone of irrigated crops)

Total available: 70 mm
Readily available: 35 mm

Seedling emergence: Fair, depending on the degree to which the surface sets down.

Workability: Fair, due to the sticky nature of the soil when wet, and its high strength when dry.

Erosion Potential

Water: Low.

Wind: Low.

Laboratory Data

Depth cm	pH H_2O	pH $CaC1_2$	CO_3 %	EC 1:5 dS/m	ECe dS/m	Org.C %	Avail. P mg/kg	Avail. K mg/kg	Cl mg/kg	SO_4-S mg/kg	Boron mg/kg	Trace Elements mg/kg (EDTA)				Sum cations cmol (+)/kg	Exchangeable Cations cmol(+)/kg				ESP
												Cu	Fe	Zn	Mn		Ca	Mg	Na	K	
0-10	8.3	7.5	1	0.27	1.46	1.64	91	922	125	23.1	1.6	44.4	92	13.7	530	29.9	17.8	8.27	1.47	2.4	4.9
10-19	8.3	7.6	1	0.67	4.67	0.69	19	344	585	103	0.6	10.8	81	4.80	556	28.0	16.6	8.07	2.29	0.98	8.2
19-32	8.2	7.7	2	1.34	9.46	0.43	10	369	1479	246	0.7	5.44	38	1.70	430	30.8	17.5	9.73	2.67	0.94	8.7
32-65	8.3	7.8	4	1.91	9.54	0.21	6	386	1687	526	2.1	2.96	19	0.49	58.0	34.7	16.6	12.1	4.94	1.05	14.2
65-100	8.6	8.0	3	2.02	9.98	0.17	8	385	1760	596	7.4	2.52	22	0.38	61.9	33.7	12.8	11.8	8.16	1.01	24.2
100-145	8.6	8.0	3	2.16	10.0	0.27	10	425	1554	895	9	2.63	24	0.72	61.3	36.1	14.5	11.0	9.51	1.14	26.3
145-170	8.0	7.8	2	2.88	9.28	0.10	11	409	872	3397	8.9	2.54	36	1.25	310	36.9	21.9	8.62	5.32	1.08	14.4

Note: Sum of cations, in a neutral to alkaline soil, approximates the CEC (cation exchange capacity), a measure of the soil's capacity to store and release major nutrient elements.

ESP (exchangeable sodium percentage) is derived by dividing the exchangeable sodium value by the CEC, in this case estimated by the sum of cations.