BLACK CRACKING CLAY

General Description: *Self-mulching, seasonally cracking black clay, becoming browner and calcareous with depth and grading to a coarsely structured heavy clay*

Landform: Flats and gentle slopes

Substrate: Coarsely structured heavy clay with slickensides

Vegetation: Grassland

Type Site:

Site No.:	CH077	1:50,000 mapsheet:	6627-3 (Willunga)
Hundred:	Willunga	Easting:	275050
Section:	243	Northing:	6094150
Sampling date:	30/05/95	Annual rainfall:	565 mm average

Old almond orchard on gentle slope. Self-mulching surface which cracks on drying

Soil Description:

Depth (cm)	*Description*
0-10	Black well structured highly calcareous clay (cracks when dry). Abrupt to:
10-35	Black and greyish brown finely structured highly calcareous heavy clay. Gradual to:
35-70	Dark grey and dark brown finely structured highly calcareous heavy clay with up to 10% soft carbonate. Diffuse to:
70-120	Dark grey and dark brown very coarsely structured highly calcareous heavy clay with up to 10% soft carbonate and slickensides (indicating seasonal cracking). Diffuse to:
120-170	Brown and olive mottled very coarsely structured highly calcareous heavy clay with up to 10% soft carbonate and slickensides.

Classification: Epicalcareous-Endohypersodic, Self-mulching, Black Vertosol; non-gravelly, medium fine / medium fine, very deep

Summary of Properties

Drainage: The heavy clay has low permeability and parts of the profile are likely to remain wet for a several weeks after heavy rain. Under summer irrigation the soil is unlikely to become saturated with normal irrigation practices because of its very high water storage capacity. From 70 cm the clay has significantly increased exchangeable sodium and magnesium which create highly unfavourable physical conditions. Deep drainage through these layers is not possible.

Fertility: The natural fertility of black clays is very high, but because of their high productivity, phosphorus and zinc deficiencies are common due to high product removal. There are no apparent deficiencies at this site, although trace elements were not measured.

pH: Alkaline throughout.

Rooting depth: 170 cm in pit, but few roots below 70 cm.

Barriers to root growth:

Physical: The tight subsoil clay presents a slight barrier, but under optimal moisture conditions this should not be a problem.

Chemical: Salt levels are low, but boron and exchangeable sodium are high from 120 cm. Boron concentrations of more than 3 mg/kg affect most horticultural crops, and exchangeable sodium percentages of between 15 and 25 are marginally toxic.

Waterholding capacity: 150 mm plus - very high. Clay soils have very high wilting points (ie they store large quantities of water which is not readily available to plant roots). Keeping water up to plants on clay soils is often difficult.

Workability: Good, but surface tends to be sticky when wet. High calcium saturation (80%) and high organic carbon assists in maintaining a friable surface condition.

Erosion Potential: Low.

Laboratory Data

Depth cm	Particle size analysis				pH H_2O	pH $CaCl_2$	CO_3 %	EC1:5 dS/m	ECe dS/m	Org.C %	Avail. P mg/kg	Avail. K mg/kg	SO_4 mg/kg	Boron mg/kg	CEC cmol (+)/kg	Exchangeable Cations cmol(+)/kg				ESP
	Coarse sand	Fine sand	Silt	Clay												Ca	Mg	Na	K	
Row	-	-	-	-	7.7	7.6	1.7	0.17	0.47	2.7	34	572	13	2.3	34.4	27.81	3.53	0.75	2.23	2.2
0-10	2	20	19	55	7.8	7.7	3.7	0.19	0.83	3.2	27	816	20	2.7	34.2	32.35	2.46	0.49	2.76	1.4
10-35	2	16	15	58	7.9	7.8	8.6	0.21	0.69	1.7	11	384	32	2.0	35.1	29.23	4.60	0.44	1.58	1.3
35-70	-	-	-	-	8.0	7.8	11.9	0.31	1.11	0.9	4	279	113	3.0	30.3	21.74	9.16	0.96	1.15	3.2
70-120	-	-	-	-	8.5	8.1	11.7	0.41	1.45	0.7	<4	276	123	8.2	30.7	13.70	14.60	3.35	1.15	10.9
120-170	-	-	-	-	8.8	8.2	10.5	0.60	1.52	0.5	<4	255	76	15.7	30.4	8.45	15.68	6.15	1.12	20.2

Note: Row sample bulked from 20 cores (0-10 cm) taken from the tree/vine lines around the pit.
DTPA trace element analyses from row sample (mg/kg): Cu = 5.8, Zn = 6.8, Mn = 11
CEC (cation exchange capacity) is 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.

Further information: DEWNR Soil and Land Program