Soil name: Otaitai

Overview

Otaitai soils occupy about 2000 ha on coastal land at Colac Bay and between Riverton and Invercargill. They are formed in windblown sand, occur in the interdune hollows and sandy flats of the sand dunes. Otaitai soils have deep rooting depth, moderate available water capacity, and sandy textures. Present use is pastoral grazing with sheep and beef cattle. Climate is cool with regular rain.

Soil classification

NZ Soil Classification (NZSC): Typic Sandy Gley; stoneless; sandy
Previous NZ Genetic Classification: Yellow-brown Sand

Classification explanation

The NZSC of Otaitai soils has been redefined from the previous classification, as their poor drainage is consistent with Gley soils, rather than Recent soils. Otaitai soils are poorly drained due to a high water table, and typically stone free, and have sandy textures to 90cm depth.

Soil phases and variants

Identified units in the Otaitai soils are:

- Otaitai undulating deep (OiU1): has no gravel within 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Otaitai undulating deep (OiU1). Values for other phases and variants can be taken as being similar. Where they differ significantly they are recorded with a separate versatility rating.

Associated soils

Some soils that commonly occur in association with Otaitai soils are:

- Riverton: well drained soil formed on accumulating sand dunes; little subsoil development
- Otatara: well drained soil formed on stable sand dunes; subsoil shows significant B horizon development.
- Grasmere: poorly drained accumulating soil of the Oreti river flood basin; has clayey textures

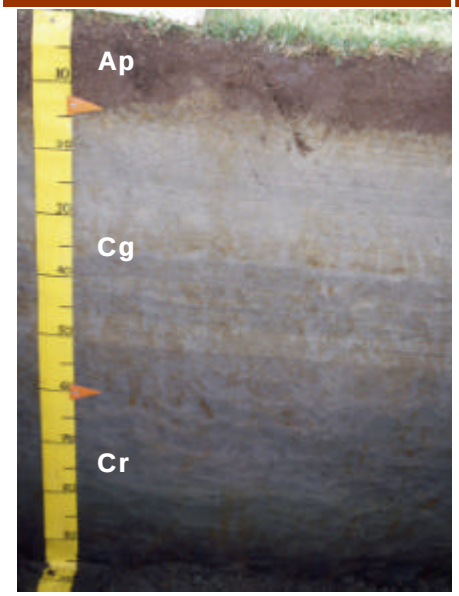
Similar soils

Some soils that have similar properties to Otaitai soils are:

- Otakau: poorly drained accumulating soil of the Oreti river coastal flood basin; has silty upper horizons overlying sandy subsoils
- Dacre: poorly drained accumulating soil of river and minor stream floodplains throughout southern Southland; typically has silty textures
- Jacobs: poorly drained saline soil of the estuarine zone

Typical profile features

The following is a 'generic' or composite profile description representing the most common combination of characteristics for this soil type. The actual profiles for which descriptions and data are available are listed at the end of this Technical Data Sheet.

Otaitai profile	Horizon	Depth (cm)	Description
	Ap	0–13	Brownish black sand; very weak soil strength; weakly developed very fine polyhedral structure; abundant roots
	Cg	13–60	Greyish yellow sand; common dull yellow mottles; very weak soil strength; single grain structure; few roots
	Cr	60–90+	Grey sand; common dark brown mottles; weak soil strength; single grain structure; few roots

Key profile features

Otaitai soils have 10–20 cm deep topsoils that have a weakly developed structure. The subsoil of unconsolidated sand shows no structural development. Grey colours and mottles occur throughout the subsoil, reflecting the high water table and poor drainage of these soils.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–13	Moderate	*Rapid*	Sand	Gravel free
Cg	13–60	Moderate – High	*Rapid*	Sand	Gravel free
Cr	60–90+	Moderate – High	*Rapid*	Sand	Gravel free

Profile drainage: Poor

Plant readily available water: *Moderate*

Potential rooting depth: Deep

Rooting restriction: Subsoil aeration may be limiting in some soils

Key physical properties

Otaitai soils have a deep rooting depth and moderate plant available water. These may be limited by the poor aeration for periods of the year. Permeability is estimated as rapid due to the sandy texture throughout the profile. Topsoil clay content is about 3%, and the soils are typically stonefree.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–13	Moderate	Low	Low	High	Low	Moderate	Very low	Moderate
Cg	13–60	Very high	Very low	Very low	Very high	High	Very low	Very low	Low
Cr	60–90+	Very high	Very low	Very low	Very high	Low	Very low	Very low	Low

Additional chemical properties (as a profile average)
Electrical conductivity: very low in all horizons

Key chemical properties

Topsoil organic matter levels are about 6%; P-retention values 5-20% and pH moderate (mid 5s) but very high in the subsoil (>pH7.5). Cation exchange values are low and base saturation high because of the salty marine influence. Available calcium and potassium levels are low and magnesium and sodium levels moderate. Reserve phosphorus levels are low. Micronutrient levels are generally adequate. This soil has low nutrient retention capability because of minimal structure and clay content. The soils appear to be non-saline.

Vulnerability to environmental degradation

Note: the vulnerability ratings given in the table below are generalised and should not be taken as absolutes for this soil type in all situations. The actual risk depends on the environmental and management conditions prevailing at a particular place and time. Specialist advice should be sought before making management decisions that may have environmental impacts. Where vulnerability ratings of Moderate to Very severe are indicated, advice may be sought from Environment Southland or a farm management consultant.

Vulnerability factor	Rating	Vulnerability compared to other Southland soils
Structural compaction	very severe	These soils have a very severe vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the poor drainage, low clay and P-retention levels.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the poor drainage, offset by the modearte water holding capacity and rapid permeability.
Topsoil erodibility by water	severe	Due to the very low clay content, topsoil erodibility in these soils is severe. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	severe	Vulnerability to long-term decline in soil organic matter levels is partly dependent on soil properties and highly dependent on management practices (e.g., crop residue management and cultivation practices).
Waterlogging	severe	These soils have a severe vulnerability to waterlogging during wet periods. This rating reflects the poor drainage.

General landuse versatility ratings for Otaitai soils

Note: The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive landuse. These ratings differ from those used in the past in that sustainability factors are incorporated in the classification.

Refer to the Topoclimate district soil map or property soil map to determine which of the soil symbols listed below are applicable, then check the versatility ratings for that symbol in the appropriate table.

OiU1 (Otaitai undulating deep)

Versatility evaluation for soil OiU1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Limited	Inadequate aeration during wet periods; vulnerable to structural degradation by compaction and cultivation
Arable	Limited	Inadequate aeration during wet periods; vulnerable to structural degradation by compaction and cultivation
Intensive pasture	Limited	Vulnerable to structural degradation by compaction and cultivation
Forestry	Limited	Inadequate aeration during wet periods; vulnerable to structural degradation by compaction and cultivation

Management practices that may improve soil versatility

- Organic matter levels should be carefully maintained and enhanced
- Long-term intensive cultivation should be carefully managed to minimise structural degradation
- Management of nutrient applications that minimise leaching losses
- Careful management when paddocks are cultivated to minimise water and wind erosion. If a fine tilth is created these situations are aggravated.

Soil profiles available for Otaitai soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
OiU1	JT8	21	✓	✓	✓	✓

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