Soil name: Colac

Overview

Colac soils occupy about 3,100 ha on floodplains, basins and low marine terraces between Colac Bay and Orepuki. They are organic soils formed into peat overlying silty loess and some fine alluvium. The soils have very poor drainage and extreme acidity that severely restricts the growth of most crops. Many peat swamps are only developed around the edges, with areas of deeper peat partially or not developed. Fringe areas that are partially developed are used for pastoral grazing by sheep and beef cattle. Climate is cool with regular rain and a prevailing south west to west wind.

Soil classification

NZ Soil Classification (NZSC):	Mellow Mesic Organic; deep, mossy and fibriform; loamy peat.
Previous NZ Genetic Classification:	Organic soils

Classification explanation

The NZSC of Colac soils is consistent with the previous classification. The soils are formed in very poorly drained deep peat with an organic matter content of at least 30%. The peat is moderately decomposed, such that the origin of the mossy and fibrous plant material can partly distinguished.

Soil phases and variants

Identified units in the Colac soils are:

- Colac undulating deep (CoU1): 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, Colac undulating deep (CoU1). 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 Colac soils are:

- Waihoaka: strongly leached Podzol formed into deep loess
- Te Waewae: moderately well to imperfectly drained Brown soil formed into deep loess
- Riverton: recent sand dunes

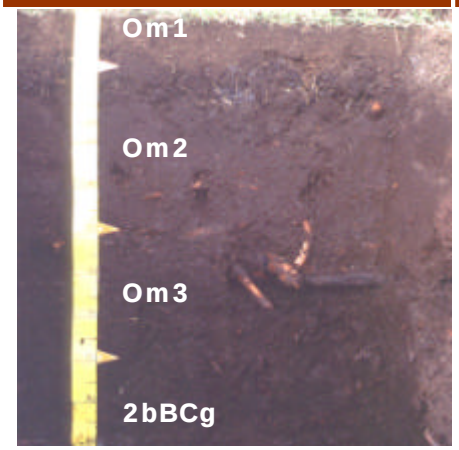
Similar soils

Some soils that have similar properties to Colac soils are:

- Invercargill: very similar to Colac soils, occurs on more inland locations and overlies alluvium rather then loess
- Otanonomo: weakly decompsed peat, formed on raised bogs

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.

Colac profile	Horizon	Depth (cm)	Description
	Om1	0–14	Dark reddish brown peat; weak soil strength; moderately developed blocky structure; abundant roots
	Om2	14–49	Very dark reddish brown peat; weak soil strength; massive structure; common roots
	Om3	49–79	Brownish black peat; weak soil strength; massive structure; few roots
	2bBCg	79–90+	Dark brown peat-stained silt loam; weak soil strength, weakly developed medium blocky structure; no roots

Key profile features

Colac soils typically have no topsoil, although developed peats under pasture do show 10–30cm of peaty textured topsoil development. The profile as a whole is dominated by dark coloured moderately to strongly decomposed organic material. Tree roots and branches are also commonly buried throughout the soil.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Om1	0–14	Very Low	—	—	Gravel free
Om2	14–49	Very Low	—	—	Gravel free
Om3	49–69	Very Low	—	—	Gravel free
2bBCg	69–90+	Moderate – High	—	Silt loam	Gravel free

Profile drainage: Very poor

Plant readily available water: *Moderately high*

Potential rooting depth: Shallow

Rooting restriction: Very poor aeration and extreme acidity

Key physical properties

Colac soils in the natural state have shallow rooting depth that is limited by the very poor aeration and extremely acid subsoils. Soils that have been developed will have a deeper rooting depth, depending on the degree to which the aeration and acidity have been improved. Colac soils have moderately high plant available water and very low bulk densities. The texture is dominated by organic material, with silty layers common below 45cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Om1	0–14	Very low	Very low	Very high	Low	Low	Very high	Very low	High
Om2	14–49	Very low	Very low	Very high	Low	Low	High	Very low	High
Om3	49–69	Very low	Very low	Very high	Very low	Very low	High	Very low	Very high
2bBCg	69–90+	—	—	—	—	—	—	—	—

Key chemical properties

Topsoil organic matter levels are extremely high at 50–90%; P-retention values variable but are generally very low. pH values are very low (< 5.0). Deeper horizon pH values fall as low as pH 4.0. Cation exchange values are very high and base saturation values low. Available and reserve levels of major and micronutrients are very low except for magnesium and sodium.

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	minimal	These soils have a minimal vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the very high organic matter levels.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the very poor drainage and good water-holding capacity.
Topsoil erodibility by water	minimal	Due to the very high organic matter levels, the topsoil erodibility of these soils is minimal. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	minimal	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 very poor drainage.

General landuse versatility ratings for Colac 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.

Colac undulating deep (CoU1)

Versatility evaluation for soil CoU1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Inadequate aeration
Arable	Unsuitable	Inadequate aeration
Intensive pasture	Limited	Inadequate aeration; subsoil acidity
Forestry	Unsuitable	Inadequate aeration

Management practices that may improve soil versatility

- Ditches to allow water drainage. Subsurface mole and tile drains are unsuitable because of variable sinking of land over time and lack of soil structure to retain mole drains.
- Liming to raise soil pH, and adequate fertiliser.

Soil profiles available for Colac soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
CoU1	176/75/1	40	✓			

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