

This Technical Data Sheet describes the *typical average properties* of the specified soil.

It is essentially a summary of information obtained from one or more profiles of this soil that were examined and described during the Topoclimate survey or previous surveys. It has been prepared in good faith by trained staff within time and budgetary limits. However, no responsibility or liability can be taken for the accuracy of the information and interpretations. Advise should be sought from soil and landuse experts before making landuse decisions on individual farms and paddocks. The characteristics of the soil at a specific location may differ in some details from those described here.

No warranties are expressed or implied unless stated.

Soil name: Titipua

Overview

Titipua soils occupy about 4,000 ha on stream flood plains and margins of peat swamps across southern and eastern Southland. They are formed into fine alluvium with a thin covering of peat although, under pasture, the organic matter has typically broken down into a slightly peaty topsoil. These soils are moderately deep to deep, poorly drained, and have silty to silty clay textures. Present use is pastoral grazing with sheep, dairy and beef cattle. Climate is cool temperate with regular rain.

Soil classification

NZ Soil Classification (NZSC): Peaty Orthic Gley; stoneless; clayey over silty.

Previous NZ Genetic Classification: Gley soils

Classification explanation

The NZSC of Titipua soils is consistent with the previous classification. The soils are poorly drained due to a high groundwater table, and have subsoils that show structural development. The soils are typically stone free, have silty clay to silt loam textures, and acidic subsoils with pH of less than 5.5. Titipua soils typically have gravel at greater than 90cm depth, and peaty to slightly peaty topsoils.

Soil phases and variants

Identified units in the Titipua soils are:

- Titipua undulating deep (TpU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Titipua undulating moderately deep (TpU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Titipua undulating deep (TpU1). 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 Titipua soils are:

- Tisbury: deep poorly drained soil on terraces in southern Southland; typically has silt loam topsoils, but does include soils with slightly peaty topsoils
- Pukemutu: poorly drained soil formed in loess on terraces; has a fragipan
- Woodlands: imperfectly drained soil formed in loess on terraces

Similar soils

Some soils that have similar properties to Titipua soils are:

- Dacre: moderately deep to deep soil with silty textures
- Makarewa: moderately deep to deep soil with clayey textures
- Invercargill: deep soils formed in peat

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.

Titipua profile	Horizon	Depth (cm)	Description
	AO	0–20	Brownish black silty clay; weak soil strength; moderately developed very fine to fine polyhedral structure; abundant roots
	ABg	20–53	Brownish grey silt loam; common bright brown and few greyish yellow-brown mottles; weak soil strength; weakly developed coarse prismatic structure; many roots
	Cr1	53–86	Grey silt loam; few bright brown mottles; weak soil strength; massive structure; common roots
	Cr2	86–90+	Greyish olive silt loam; weak soil strength; massive structure; no live roots

Key profile features

Titipua topsoils vary in depth from 15 to 40cm, with moderately developed structure. Subsoil structure is moderately developed grading to structureless in the lower subsoil. Topsoils are dark coloured with upper subsoil often stained by organic matter, and the dominance of grey colours throughout the subsoil reflects the poor drainage of the soils.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
AO	0–20	Very Low	<i>Moderate</i>	Silt loam	Gravel free
ABg	20–53	Low – Moderate	<i>Slow</i>	Silt loam	Gravel free
Cr1	53–86	Moderate	<i>Slow</i>	Silt loam	Gravel free
Cr2	86–90+	—	<i>Slow</i>	Silt loam	Gravel free

Profile drainage: Poor
Plant readily available water: *Very high*
Potential rooting depth: Deep
Rooting restriction: Limited subsoil aeration during sustained wet periods

Key physical properties

Titipua soils have a deep rooting depth and very high available soil water, although the rooting depth may be limited by poor aeration during wet periods due to the poor drainage and slow subsoil permeability. Texture is variable between silt loam to silty clay, and topsoil clay content varies between 15 and 50%. The soils are typically stone free, although the moderately deep phase will have gravels between 45 and 90cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
AO	0–20	Low	Moderate	Very high	Low	Moderate	Moderate	Low	High
ABg	20–53	Very low	Moderate	Moderate	Low	Very low	Moderate	Very low	Low
Cr1	53–86	Very low	Moderate	Moderate	Moderate	Low	High	Low	Low
Cr2	86–90+	—	—	—	—	—	—	—	—

Key chemical properties

Topsoil values are influenced by the peat content and are variable. Organic matter content is 18–80%; P-retention 54–75% and pH low (4.1–5.6). Cation exchange is very high, reflecting the peat influence, and base saturation low. Available calcium and magnesium levels are moderate with potassium low. Soil reserve phosphorus is low. Micronutrient levels are generally adequate.

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 minimal vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the high organic matter content, with moderate to high P-retention and clay content offsetting the poor drainage.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the slow permeability, poor drainage, and very high water-holding capacity.
Topsoil erodibility by water	slight	Due to the high organic matter content and moderate to high clay content, topsoil erodibility in these soils is slight. 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 poor drainage and slow permeability.

General landuse versatility ratings for Titipua 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.

TpU1 (Titipua undulating deep)

TpU2 (Titipua undulating moderately deep)

Versatility evaluation for soil TpU1, TpU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Arable	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Intensive pasture	Limited	Subsoil acidity; risk of short-term waterlogging after heavy rain.
Forestry	Limited	Inadequate aeration during wet periods; potential flood risk

Management practices that may improve soil versatility

- Careful management after heavy rain and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and heavy vehicular traffic use should be minimised during these periods.
- Installation and maintenance of drainage systems will lower the watertable, reducing the risk of limitations of short-term waterlogging and sustained inadequate aeration.

Soil profiles available for Titipua soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
TpU1	JT12	21	✓	✓	✓	✓
TpU1	LT16	41	✓	✓	✓	✓
TpU2	LT22	41	✓	✓	✓	✓
TpU1	UT4	14	✓	✓	✓	✓
TpU1	UT5	14	✓	✓	✓	✓
TpU1	GG/GW42	14	✓	✓	✓	

Published by Crops for Southland with financial support from Environment Southland.

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