

This Soil Information 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. Advice 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: **Benio**

### Overview

Benio soils occupy about 5000 ha on the higher parts of the downlands north of Gore and high terraces of the Waimea plain. These soils are formed in a thin layer of loess overlying old and strongly weathered gravelly alluvium. Benio soils are typically moderately well drained shallow soils with gravelly subsoils. They are suited to pastoral farming, with forestry established on some areas.

### Physical properties

Benio soils have moderately deep rooting depth and moderate plant available water, and are limited by the subsoil gravel. The soils are moderately well drained, but are slowly permeable in the subsoil. Textures are heavy silt loams in the topsoil, and silty clay in the subsoil. Topsoil clay content is 30–40%, and slightly to moderately gravelly. Subsoils are typically very to extremely gravelly.

### Fertility properties

Topsoil organic matter levels are 5–6%, profile P retention values 25–40%, pH values are moderate but low (<5.2) in the subsoil. Cation exchange values are medium with base saturation decreasing to low in the subsoil. Reserves of phosphorus and potassium are low with moderate levels of sulphate sulphur in the subsoil. Soils respond well to lime and phosphate with developing potassium requirements. Micro nutrient levels are generally adequate although boron responses in brassicas and molybdenum responses in legumes can occur.

### Associated and similar soils

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

- Waikoikoi: No gravel within 90cm; poorly drained with a fragipan
- Chatton: Well drained, with no gravelly layers above 45cm depth

Some soils that have similar properties to Benio soils are:

- Kaweku: Occur on intermediate terraces; only moderately weathered gravel
- Wairaki: Occur on high terraces and fans from the Takitimu mountains
- Oteramika: Occur on shoulder and side slopes in central and southern Southland, where loess has been eroded away



*Benio profile*

## Sustainable management indicators

**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
<b>Structural compaction</b>	moderate	These soils have a moderate vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles.
<b>Nutrient leaching</b>	severe	These soils have a severe vulnerability to leaching to groundwater. This rating reflects the good drainage and low total available water.
<b>Topsoil erodibility by water</b>	slight	Due to the clay content, the topsoil erodibility of these soils is slight. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
<b>Organic matter loss</b>	slight	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).
<b>Waterlogging</b>	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage, but slow subsoil permeability.

## General landuse versatility ratings

**Note:** The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive land use. 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.

### BnU2 (Benio undulating moderately deep) and BnU3 (Benio undulating shallow)

#### Versatility evaluation for soil BnU2, BnU3

Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Root growth restriction in subsoil
Arable	Moderate	Risk of short-term waterlogging and vulnerability to leaching
Intensive pasture	Moderate	Root growth restriction in subsoil and vulnerability to leaching
Forestry	Moderate	Limited rooting depth and root growth restriction in subsoil

### BnR3 (Benio rolling shallow)

#### Versatility evaluation for soil BnR3

Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Root growth restriction in subsoil
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Root growth restriction in subsoil and vulnerability to leaching
Forestry	Moderate	Limited rooting depth and root growth restriction in subsoil

### BnH3 (Benio hilly shallow)

#### Versatility evaluation for soil BnH3

Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Limited rooting depth and hilly slopes

### Management practices that may improve soil versatility

- Tile drains to assist drainage. Stony subsoils may prevent mole installation.
- Care with intensive grazing to minimise pugging when soils are excessively wet.
- Management of nutrient applications that minimise leaching losses.