Soil name: Arthurton

Overview

Arthurton soils occupy about 12,100 ha on terraces and downlands of northern Southland and west Otago. They are formed in wind deposited loess derived from greywacke and schist rocks. Arthurton soils are imperfectly drained and have a deep rooting depth, high water holding capacity, and have light silt loam textures with P-retention between 20 and 40%. They are used for pastoral grazing with limited cropping. They are high producing soils currently used for intensive sheep and dairy production with some cropping. Rainfall is evenly spread, although these soils can be seasonally dry over the summer.

Arthurton profile

Physical properties

Arthurton soils have a deep rooting depth and high plant available water, meaning there is no significant physical barrier to root growth. The soils are imperfectly drained and may have restricted aeration during wet periods. The compact subsoil is slowly permeable, which may cause short-term waterlogging after heavy rainfall. Texture is light silt loam in all horizons, with topsoil clay content of 20–30%. Arthurton soils are typically stone free, although the moderately deep phases have gravel between 45 and 90cm depth that may restrict rooting depth and lower the available water status to moderately high.

Fertility properties

Topsoil organic matter levels are 5–7%; P-retention values are 20–40%, pH values are moderate down the profile and mostly above 5.6. Cation exchange values are moderate to low, with similar base saturation values. Available magnesium and potassium and reserve phosphorus are low. Subsoils have moderate levels of sulphate sulphur. Micro-nutrient levels are generally adequate.

Associated and similar soils

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

- Waikoikoi: moderately deep to deep; poorly drained due to fragipan
- Crookston: well drained equivalent of the Arthurton soil
- Jacobstown: poorly drained floodplain soil due to a high groundwater table

Some soils that have similar properties to Arthurton soils are:

- Wyndham: similar soil but has loamy silt subsoil textures; formed in near-source loess adjacent to the Mataura river, between Gore and Waimahaka
- Woodlands: imperfectly drained Brown soil of the Southland plains; has P-retentions of 30–80% and yellow-brown colours throughout the profile
- Aparima: imperfectly drained Brown soil with a fragipan, associated with Pallic soils (Pukemutu series) on the Southland plains, west of the Oreti River.

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
Structural compaction	severe	These soils have a severe vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the imperfect drainage, light silt loam texture and low P-retention.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, high water-holding capacity and slow subsoil permeability.
Topsoil erodibility by water	moderate	Due to the light silt loam texture, the topsoil erodibility of these soils is moderate. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	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).
Waterlogging	moderate	These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slowly permeable subsoil.

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.

ArU1 (Arthurton undulating deep) and **ArU2 (Arthurton undulating moderately deep)**

Versatility evaluation for soil ArU1, ArU2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction.
Arable	Moderate	Inadequate aeration during wet periods; vulnerability of topsoiol to structural degradation by cultivation or compaction.
Intensive pasture	Moderate	Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction.
Forestry	Moderate	Vulnerability of topsoil to structural degradation by compaction; vulnerability to sustained waterlogging.

ArR1 (Arthurton rolling deep): as above, except that the versatility rating for arable landuse is reduced to 'Limited' because of the main limitation of rolling slope.

ArH1 (Arthurton hilly deep)

Versatility evaluation for soil ArH1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Hilly slope
Arable	Unsuitable	Hilly slope
Intensive pasture	Limited	Hilly slope
Forestry	Moderate	Vulnerability of topsoil to structural degradation by compaction; hilly slope

Management practices that may improve soil versatility

- Careful management after heavy rainfall and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and vehicular traffic should be minimised during these periods.
- Installation and maintenance of subsurface mole and tile drainage will reduce the risk of short-term waterlogging
- If compaction occurs, aerating at the correct moisture condition and depth can be of benefit.