

Melanic Soil

New Zealand Soil Classification (NZSC) orders



Otago
Regional
Council

Description

Melanic soils in Otago form on limestone and volcanic rocks and have deep dark coloured topsoil (giving the order its name) and good structure. They are resilient to degradation and are mostly highly versatile and productive soils but are at risk of nutrient loss.

They make up around 2% of soils in Otago.

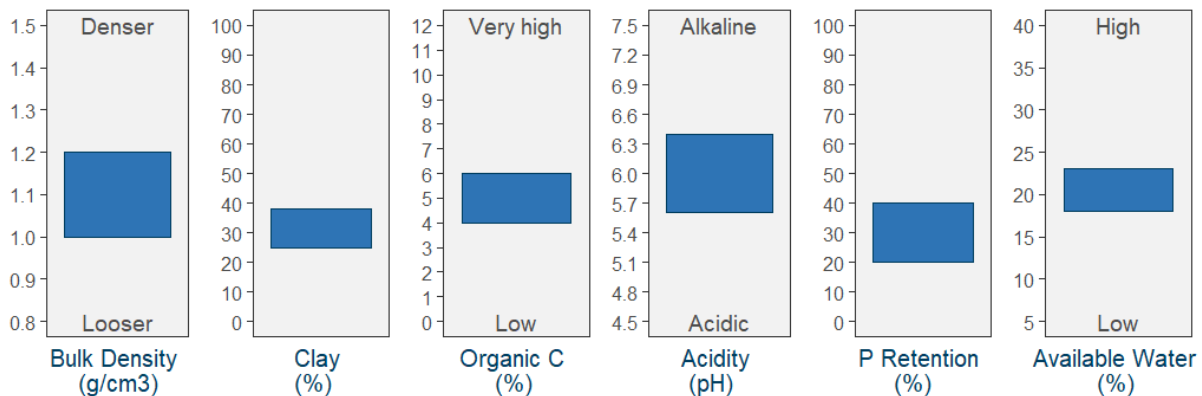
Key characteristics

- ▶ **Parent material** Limestone, marble, calcareous and mafic rock
- ▶ **Drainage** Well
- ▶ **Fertility** High
- ▶ **Rooting depth** Deep unless Rendzic



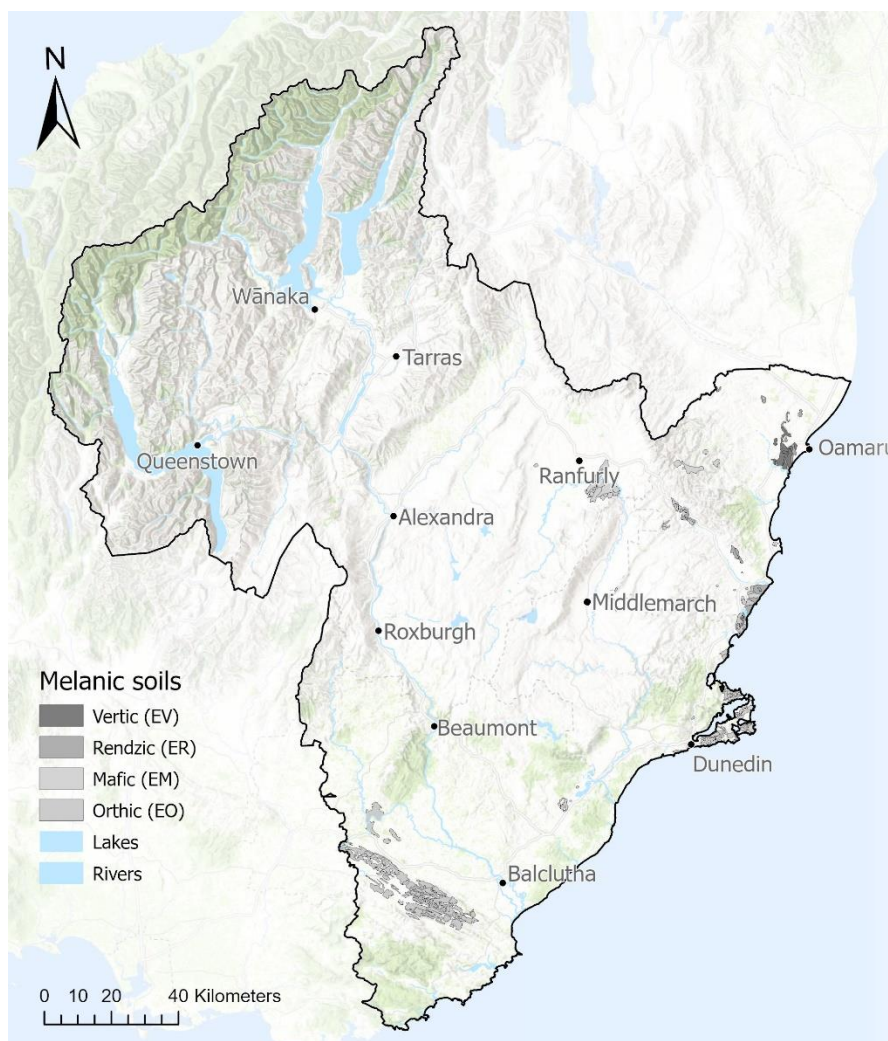
[1]

Expected ranges of Melanic topsoil (0-10 cm) key properties². *C is carbon, P is phosphorus.*



Vulnerabilities

| | | |
|----------------------------|------------|--|
| ▶ Structural damage | Low | Well-formed structure with strong aggregates means Melanic soils are very resilient to structural damage, but continuous cropping can develop plough pans. |
| ▶ Nutrient loss | N | Medium N leaching loss is a risk in the shallower soils (Rendzic). |
| | P | Medium Risk of bypass flow is high in summer after rainfall when soil shrinkage can occur due to the high clay content. |
| ▶ Erosion | Low | Naturally not erosion prone but increased risk of wind and water erosion following ploughing and intensive use. If left exposed on slopes can erode more easily. |
| ▶ Waterlogging | Low | Low risk due to the good structure and freely draining characteristics of Melanic soils. |



Occurrence

Melanic soils are highly associated with underlying rock types in Otago, occurring exclusively on limestone and mafic volcanic rock (e.g., basalt) where they are exposed at the ground surface. Where other parent materials have covered these rocks (loess, colluvium) Melanic soils are not formed.

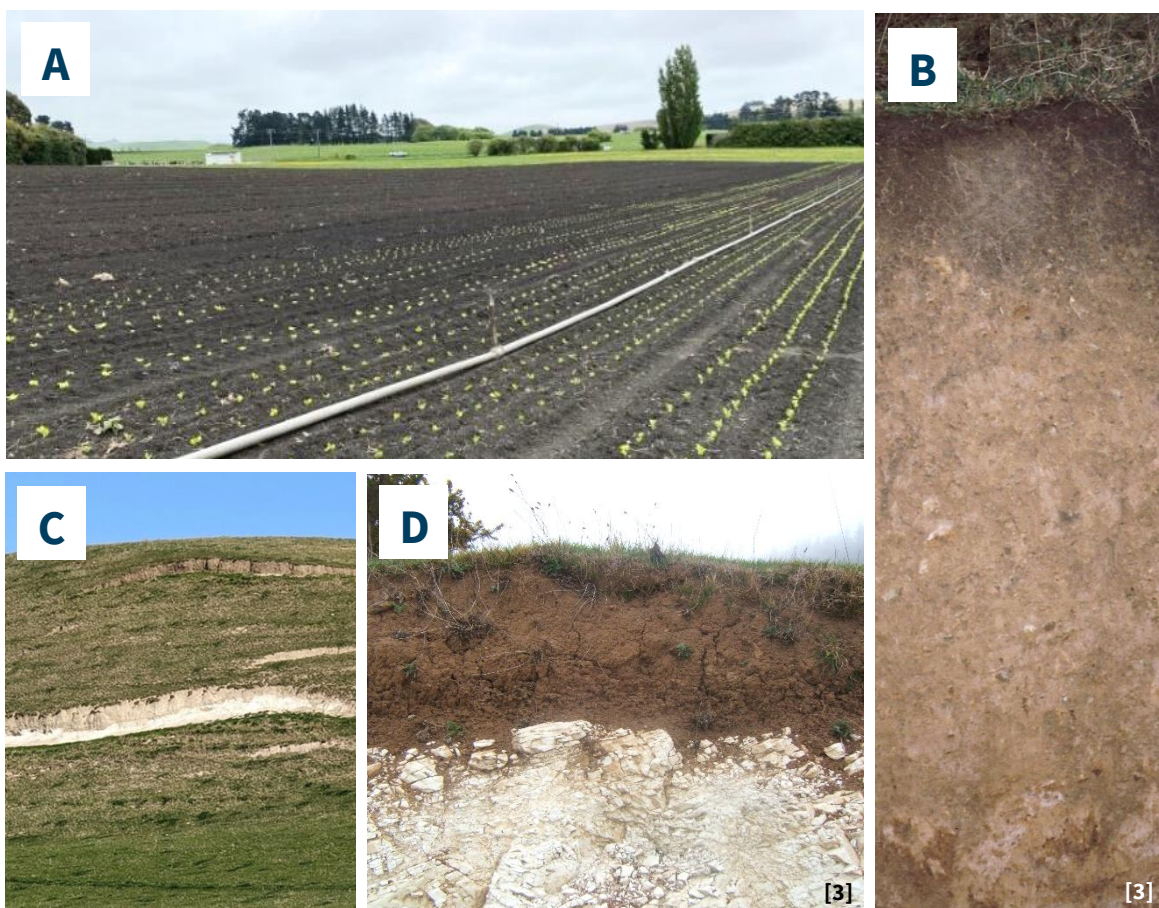
The map shows the regional extent of the different NZSC groups of Melanic soil. For more detailed mapping see page 4.

| NZSC group | %* | Description ² | Management considerations ² |
|----------------|----|--|--|
| Vertic | 6 | Are clayey with high capacity for shrink-swell. | Have particularly high shrink-swell behaviour which maintains their soil structure despite intensive use. Relatively high resistance to structural damage unless organic matter is depleted. Continuous cropping can lead to a plough pan. |
| Rendzic | 9 | Have limestone or calcareous rock at shallow depth. | Usually shallow and on slopes. They may be used for pasture, trees, or crops that do not require mechanised operations. Truffle cultivation is a possibility. The shallow depth means they dry out in summer and can lack soil water. |
| Mafic | 31 | Formed on dark, base-rich igneous or sedimentary rock. | Generally, have higher levels of iron oxides which may impart higher soil structural stability than other Melanic soil groups. Prone to slip erosion and have low fertility. |
| Orthic | 53 | Other Melanic soils. | Highly versatile soils that are productively used for cropping and vegetable growing. |

*Extent of each group as a percentage relative to all Melanic soils in the Otago region.

In the region

Orthic Melanic soils are the most extensive of the Melanic groups and are located northeast of the Catlins in the Kaihū Range, in pockets near Clinton and around Conical Hill at the confluence of the Pomahaka and the Waipahi rivers. There are some Orthic Melanic soils along the coast south of Palmerston and near Morrison's. Mafic Melanic soils are found on the Otago Peninsula, Clarendon and in pockets between Palmerston and Waipiata either side of the Waihemo/Shag river. Rendzic Melanic soils are found in pockets near Palmerston, in the Shag valley and in smaller areas south and west of Oamaru. Vertic Melanic soils are found exclusively southwest of Oamaru. Coast of North Otago and pockets in the Shag, Kakanui and Waipiata



A Vegetable growing on the dark topsoil of a Vertic Melanic soil near Oamaru. **B** Mafic Melanic soil profile showing the dark topsoil and high subsoil clay content. **C** A Rendzic Melanic soil profile exposed on a slope. **D** Cutting of an exposed Rendzic Melanic soil overlying limestone.

Sustainable management

| | |
|----------------------------------|---|
| ▶ Erosion & Structure | Maintain vegetation cover, no-till crop establishment and wind breaks can reduce erosion. Avoid working and grazing (or only lightly) when the soil is wet and build organic matter. |
| ▶ Nutrients | It is recommended to always work with the 4Rs for fertiliser management: <i>right place, right time, right rate and right product</i> . Find out more information on fertiliser management here . |
| ▶ General | For general guidelines on sustainable soil management you can find some useful links here . |

Soil maps

► Fundamental Soil Layer

| | |
|-----------------|---|
| Owner | Manaaki Whenua Landcare Research |
| Recommended use | Use at larger scales for general overview |
| Coverage | 100% |
| Scale | 1:50,000 |
| Soil naming | NZSC |
| Development | Will be replaced by S-map |
| Link | soils-maps.landcareresearch.co.nz |



► growOTAGO

| | |
|-----------------|---|
| Owner | Otago Regional Council |
| Recommended use | Only use where S-map not available |
| Coverage | 100% Otago (by lowland and upland) |
| Scale | 1:50,000 |
| Soil naming | Old regional soil series names |
| Development | Not planned |
| Link | maps.orc.govt.nz/OtagoMaps/ |



► S-map

| | |
|-----------------|---|
| Owner | Manaaki Whenua Landcare Research |
| Recommended use | Best available map. Use where present |
| Coverage | ~30% of Otago |
| Scale | 1:50,000 |
| Soil naming | New S-map series names and NZSC |
| Development | Mapping ongoing |
| Link | smap.landcareresearch.co.nz/ |



For the te ao Māori of oneone (soil), including kaupapa Māori, history, and soil names, you can find more information [here](#).

Contact

For any questions you may have contact: science.enquiries@orc.govt.nz

Note - This Infosheet generalises typical average properties of the specified soil order and groups. 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. Expert advice should be sought before making decisions on individual farms. The characteristics of the soil at a specific location may differ from those described here. The vulnerability ratings given in the table on page 1 are generalised and should not be taken as absolutes for this soil in all situations. The actual risk depends on the environmental and management conditions prevailing at a particular place and time.

References

- [1] Manaaki Whenua - Landcare Research 2023. The New Zealand SoilsMapViewer. https://doi.org/10.26060/9vfvz_hw43. Photos reproduced with permission. Rendzic Melanic soil profile.
- [2] Hewitt, A.E., Balks, M. R., and Lowe, D.J., 2021. The Soils of Aotearoa New Zealand. Chapter 7 Melanic Soils. Springer International Publishing.
- [3] New Zealand Society of Soil Science and Manaaki Whenua - Landcare Research photo library. Photos reproduced with permission.

