Crystal soil – uniform sandy and sandy loam soil in granite under wet forest

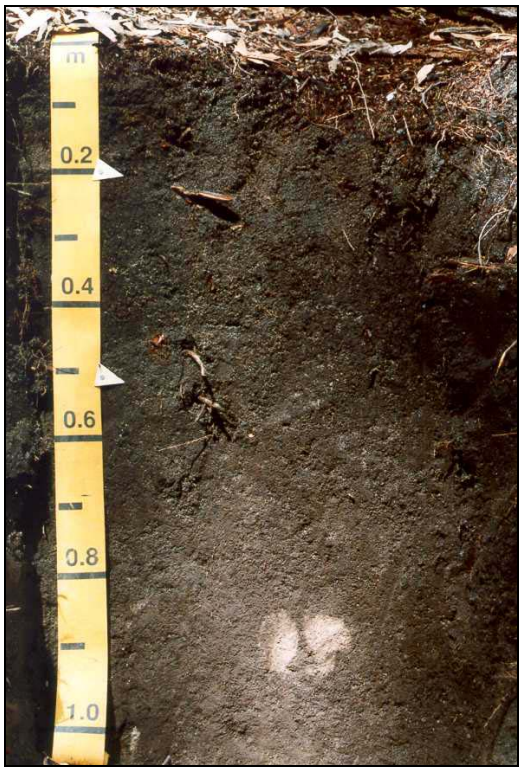
Site description

Occurrence: In northeastern lowland Tasmania where mean annual rainfall is >1200 mm
Parent Material: Colluvium from deeply weathered granite
Landform: Undulating and rolling land in hilly country
Drainage Class: Well drained (but pan at >1 m depth)
Vegetation: Wet forest dominated by *Eucalyptus regnans and E. obliqua* with an understorey of low-fertility shrubs e.g. *Monotoca glauca* and *Pultenea juniperina*

Distinguishing Soil Properties

Profile Features:

- Very thick A1 horizon, dark grey to black
- Uniform profile with sandy and sandy loam textures
- Weak strength and single grain or massive structure in all horizons



Chemical and physical features

- High nutrients and total C in surface layer (0-15 cm)
- Medium nutrients below 15 cm depth
- Permeability – rapid to moderate, limited in deep subsoils by humic accumulation (Bh horizon)
- Low capacity to retain added p (low P retention values) in upper layers

Similar soils

- Stronach soil (Forest Soils of Tasmania Soil 11.3) – gradational soils under wet forest; thinner A1 horizons and brown clayey subsoils

Soil Degradation Potential

FACTOR	RATING OF DEGRADATION POTENTIAL
Erodibility:	Moderate; moderate to high where drainage is impeded
Compaction and puddling:	Low
Mixing:	Low
Nutrient depletion:	Low
Landslides:	Slight
Flooding:	Negligible

Site Productivity

High productivity. The soil nutrients are associated with the organic matter and will be released by mineralisation after disturbance. The mineral soil, being largely composed of quartz, is likely to have low reserves of cations and P.

Soil Management

Although most areas of Crystal soil have moderate erodibility, some areas with impeded drainage have moderate to high erodibility. Erosion can occur on roadside batters – topsoils should be left intact on cleared roadside areas. Cultivation should follow the prescriptions for moderate to high erodbility soils in Table 10 of the Forest Practices Code.

Native Forest Logging and Regeneration

LOGGING AND CLEARING:
The soils are prone to degradation by erosion especially after burning. Matting and cording should be used on snig tracks.
PREPARATION FOR REGENERATION:
Burning will be required for regeneration.
SILVICULTURAL CONSIDERATIONS:
Normal Code-conforming operations will achieve high production.

Suitability for Plantations

Highly suitable for plantations due to high site productivity and readily worked soils. Large granite boulders may be limiting in places.
CLEARING: Dozer clearing must be done using a rake blade.
CULTIVATION: The weak strength of the soils (except for deep subsoil layers) means that ripping is unnecessary. Cultivation should be along the contour or by spot methods.
FERTILISER TREATMENT: The soils are fertile but normal N and P fertilising at planting is probably required. Cultivation will result in substantial mineralisation of the organic matter in the surface layers. As most nutrient reserves are in the organic matter of the soil rather than in the mineral components second or subsequent rotations may experience nutrient deficiencies and require additional fertiliser.

Profile

Authors: M. D. Laffan and P.D. McIntosh
Date: 1 June 1999
Location: On northwest side of Lottah road, north of Crystal Creek Road, over culvert.
Map reference: Sheet 5843 (Blue Tier) 583800 5436200
Landform: Toeslope of hill
Vegetation: Wet sclerophyll forest dominated by *Eucalyptus regnans*
Parent material: Granitic sands, possibly colluvial, from deeply weathered granite
Drainage: Well drained (but humic pan occurs below 1 m depth)
Slope: 11°
Aspect: East
Altitude: 400 m
Photographs: PDM 1-02-20 (site); 1-02-24 (profile)
Australian Soil Classification: **Melacic Humic Semiaquic Podosol;** soils without a Bh horizon probably fit the **Rudosol** classification

A11	0-15 cm	Very dark grey (7.5YR3/1) (moist) peaty slightly gravelly sandy loam; loose strength; weak granular structure; abundant roots; NaF 0/5.
A12	15-35 cm	Dark grey (2.5Y4/1) (moist); very dark grey (2.5Y3/1 loamy coarse sand with common fine gravels; loose strength; single grain structure; many roots; NaF 0/5.
A13	35-105 cm	Black (10YR2/1) (moist) coarse sandy loam with common fine gravels; weak strength; single grain; few roots; NaF 0/5.
A3	105-160 cm	Dark yellowish brown (10YR4/4) (moist) coarse sandy loam with common fine gravels; firm strength; massive; few roots; NaF 0/5; water-saturated.
Bh	160-170 cm	Black (7.5YR2.5/1) (moist) loamy coarse sand with common fine gravels; very firm strength; massive; NaF 1/5.
C	on	Moderately weathered granite.

Laboratory Analyses

Horizon	Depth (cm)	pH (H_2O)	Total C (%)	Total N (%)	C/N	Total P (mg/kg)	Citrate-dithionite Fe (%)	P retention (%)	Water stable aggregates (%)
A11	0-15	3.8	25.5	0.77	33	469	0.05	0	42
A12	15-35	4.2	2.6	0.16	16	69	0.05	5	41
A13	35-105	4.5	2.8	0.23	12	202	0.09	15	33
A3	105-160	4.7	2.0	0.14	14	185	0.12	19	n.d.
Bh	160-170	4.7	2.2	0.14	16	207	0.59	36	n.d.

Analytical methods were those of Blakemore et al. (1987), Laffan et al. (1996) and Rayment and Higginson (1992), except that total C was analysed by the Walkley/Black digestion method.

Erosion of road batters in Crystal soils

References

Blakemore, L. C.; Searle, P. L. and Daly, B. K. 1987. Methods of chemical analysis of soils. *New Zealand Soil Bureau Scientific Report 80.*

Laffan, M. D. and Hill, R. 1996. A method for assessing the erodibility of Tasmanian forest soils. *Australian Journal of Soil and Water Conservation* 9: 16 – 22.

Rayment, G. E. and Higginson, F. R. 1992. Australian Laboratory Handbook of Soil and Water Chemical Methods. Incarta Press, Melbourne. 330 p.

Acknowledgements

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Citation

Laffan, M.D. and McIntosh, P.D. 2002. Crystal soil. *Tasmanian forest soil fact sheet no. 22.* Forest Practices Board, Hobart and Forestry Tasmania, Hobart. 4 p.

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