

T9.2 SOIL CLASSIFICATION

Although there are exceptions, the smallest volume of material considered to be an individual soil has a volume of one cubic metre with the shape one metre wide, one metre long and one metre deep. Each individual soil, or pedon, is unique because it has characteristics that set it apart from all other pedons, in the same way that each tree is different from all other trees.

Having set an arbitrary definition of an individual soil, classification according to some preset criteria becomes possible. The criteria can be related to the soil itself, in which case the classification is taxonomic or “natural.”¹ Sometimes it is more worthwhile to consider some intended use, in which case the classification is interpretive.² A taxonomic soil classification is based solely on soil characteristics, and separations are often made on inferred soil genesis. An interpretive classification is a prediction of how soils will respond to management. Landscape characteristics like slope steepness are usually part of interpretive classifications.

SOIL PROFILE

Taxonomic systems depend on identifying the horizons or layers exposed in a soil profile. Mineral horizons are labelled A, B or C, starting from the soil surface and working downward. The “A” horizon is a zone of organic-matter accumulation, maximum leaching or both. The “B” horizon is a zone of accumulation. The “C” horizon is relatively unaltered parent material. Organic horizons are labelled “L” (litter from leaves and twigs), “F” (fermented), “H” (humus) or simply “O.” Although not a true soil horizon, consolidated bedrock is denoted by “R.” Each master horizon can be modified by suffixes to show the process thought to be dominant in the layer (Figure T9.2.1).

TAXONOMIC CLASSIFICATION

The Canadian System of Soil Classification³ has five categorical levels arranged in a hierarchy—orders, great groups, subgroups, families and series.

Orders

There are nine soil orders, each reflecting a dominant soil-forming process. Most Nova Scotia soils belong to the Podzolic Order, having iron, aluminum and humus accumulations in the B horizon. Others belong to the Gleysolic Order (wet mineral soils), Regosolic Order (well to imperfectly drained recent alluvium) or Organic Order (accumulations of organic material more 40 cm thick and commonly very poorly drained).

Great Groups

Soil orders are broken into great groups based on differences in the strength of the dominant process. Thus, we have Ferro-Humic Podzols where humus is the major accumulation product of the B horizon and Humo-Ferric Podzols where iron accumulation is dominant.

Subgroup

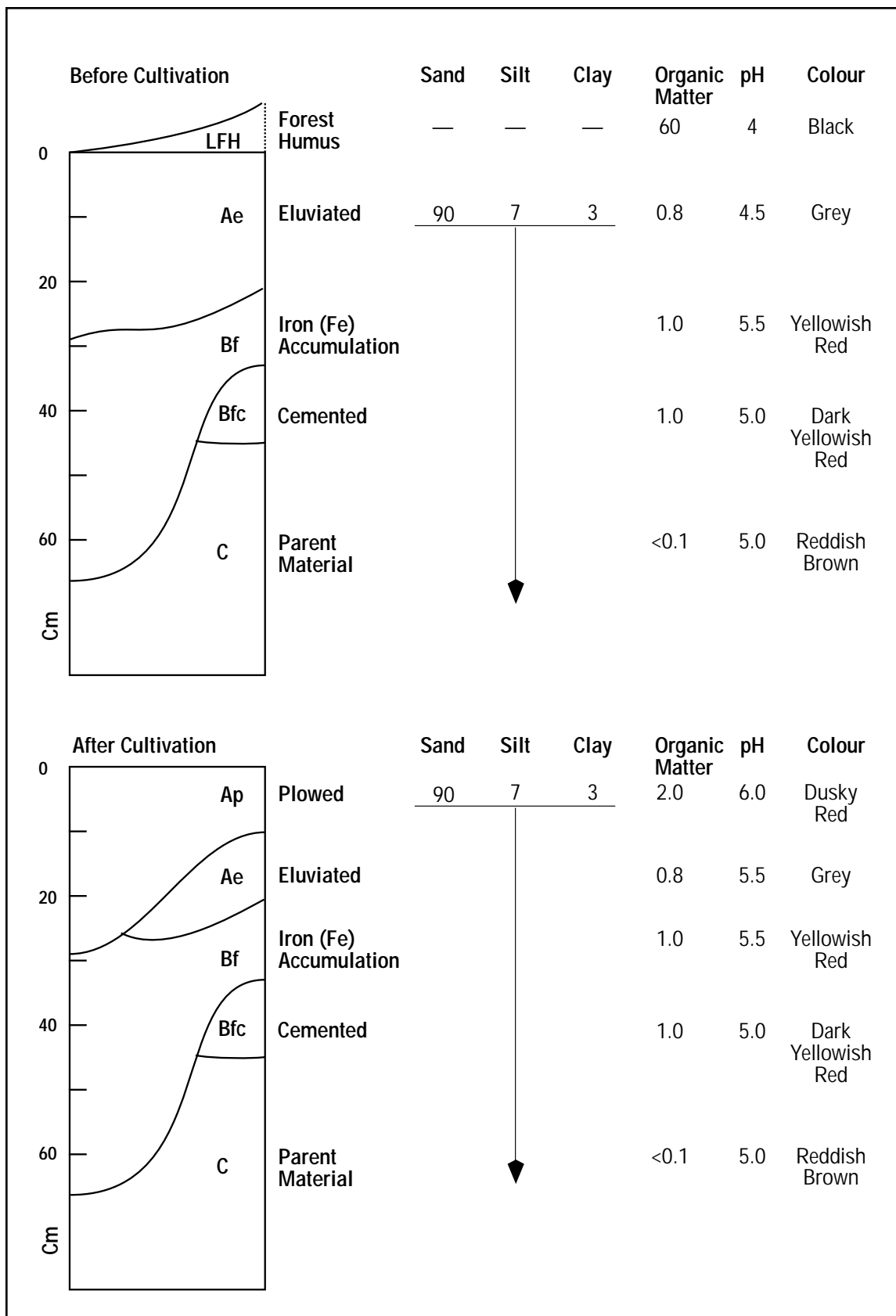
The next taxon is the subgroup, which indicates the degree of conformity to the central concept of the great group. The presence of ortstein layers (iron and organic cementation, usually in very sandy soils), fragipans (clay cementation, usually in medium-textured soils) are examples of subgroups recognized in Nova Scotia.⁴

Families

Subgroups are further subdivided into families, based on particle size of the parent material, mineralogy, reaction, depth, and soil climate.

Soil Series

The final subdivision is the soil series, differentiated on detailed features, like horizon thickness. Soil series are given local geographic names, e.g., Pugwash. Soils that have developed from similar parent material but differ because of drainage condition belong to the same catena, e.g., Pugwash-Debert-Masstown or Falmouth-Queens-Kingsville. The series names form the basis of soil-map unit names used in soil-survey reports. However, it is important to distinguish between the taxonomic series, which is “pure,” and the map unit, which usually contains soils of different taxa. A generalized soil map of Nova Scotia is shown in Figure T9.2.2.⁵



T9.2
Soil
Classification

Figure T9.2.1: Cornwallis soil (ortstein Humo-Ferric Podzol) before and after cultivation.

County and regional soil survey reports are available from the NS Dept of Supply and Services, Information Services, PO Box 550, Truro, B2N 5E3. An index map is available at no charge.

INTERPRETIVE CLASSIFICATION

Interpretive soil-classification systems are ratings based on an intended use, the Canada Land Inventory (CLI) for Agriculture being one example. The CLI is a seven-class system, where Class 1 is the best and Class 7 the worst. "Best" is defined as the ability to successfully grow a wide range of commercial crops. As the range of crops becomes narrower, or more inputs are required, or yields become poorer or less reliable, the Class is poorer. There are thirteen subclasses, denoted by a letter, to describe the kind of limitation present. The best soils in Nova Scotia⁵ are Class 2 because of adverse climate, denoted by 2C. Common soil limitations in the province are shallow rooting depth (D), stoniness (P), adverse topography (T), wetness (W), lack of moisture (M) and low fertility (F). About 375 000 hectares (7 per cent) of the province has potential for general agriculture as defined by Classes 2 and 3.

Other interpretive classifications are based on growing a single crop (like alfalfa), or are for a single use (like septic filter fields). These classifications follow similar rules to CLI but the criteria and class

limits change depending on critical values specific to the intended use.



Associated Topics

T12.9 Soil and Resources

References

- 1 Cline, M.G. (1949) "Basic principles of soil classification." *Soil Sci.* 67.
- 2 F.A.O. (1974) Approaches to Land Classification." *Soil Bull.* No. 22. Rome, Italy.
- 3 Agriculture Canada Expert Committee on Soil Survey (1987) *The Canadian System of Soil Classification*, 2nd ed. Agriculture Canada (Publ. 1646).
- 4 Smeck, N.E., and E.J. Ciolkosz, eds. (1989) "Fragipans: Their occurrence, classification and genesis." *Soil Sci. Soc. Amer.* (24).
- 5 Hilchey, J.D. (1970) Soil Capability Analysis for Agriculture in Nova Scotia. (*Canada Land Inventory Report No. 8*).

Additional Reading

- Beke, G.J., and J.D. Hilchey (1978) "Soils of the Appalachian Region." *The Geosciences in Canada, 1977*. Annual Report and Review of Soil Science, Canadian Geoscience Council. (*Geological Survey Paper 78-6*).

**T9.2
Soil
Classification**

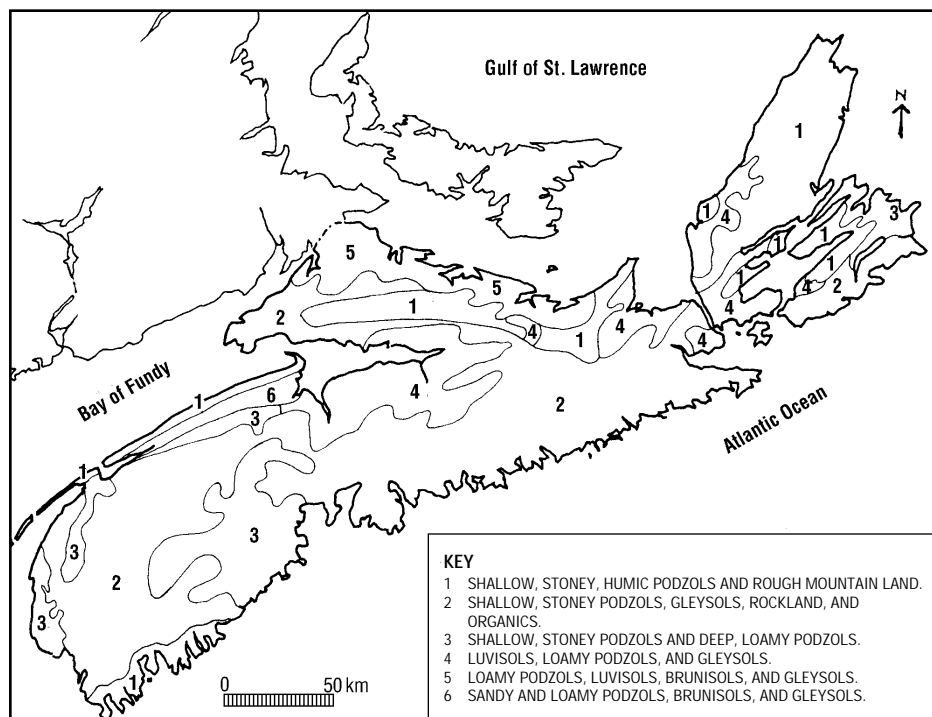


Figure T9.2.2: A generalized soil map of Nova Scotia.