Taxonomy (great groups)

The Canadian system of soil classification is a hierarchical system in which classes are conceptual (SCWG 1998). Taxa are defined on the basis of observable, measurable soil properties that reflect processes of soil genesis and environmental factors (climate, relief, parent rock, biota and weather). This classification system features five levels of generalization: soil order, great group, subgroup, family and series. Orders reflect the nature of the soil environment and the effects of the dominant soil-forming processes. Great groups are subdivisions of an order based on differences in the strengths of dominant processes.

In the study area, mineral soils are classified as (1) humic gleysols and gleysols, (2) melanic, eutric, sombric and dystric brunisols, (3) humic, ferro-humic and humo-ferric podzols, while (4) organic soils are subdivided into fibrisols, mesisols and humisols. This classification provides a means of establishing relationships between different kinds of soil and their properties and environments, and determining their suitability for various uses. Taxonomy is used in this atlas in the contexts of, *inter alia*, fertility group definition and determination of the vulnerability of soils to ferric clogging.

Gleysols include all mineral soils with properties denoting water saturation and intense reduction conditions, either periodic or continued over an extended period of time. Those conditions are reflected in the presence in the subsoil (depth <50 cm) of a matrix that is grey to blue in colour, or the presence of distinct to prominent mottling. Gleysols (Bg horizon) are commonly found in flat land or depressions, but they also occur on gentle slopes. The agricultural productivity of these soils is low if drainage is not improved. Two gleysolic great groups occur in the southeastern part of the Montreal plain: gleysols and humic gleysols (Table 1).

Table 1. Differentiation criteria for gleysolic great groups

Gleysol	**Humic gleysol**	**Luvic gleysol**
Ah horizon absent or thin (<10 cm) or Ap horizon <15 cm Organic C <2% (e.g. Saint-Hyacinthe series)	Ah horizon thick (≥10 cm) or Ap horizon ≥15 cm Organic C ≥2% (e.g. Saint-Urbain series)	With Btg horizon Ordinarily with Ahe or Aeg horizon

SCWG 1998

Brunisols are usually characterized by subsoil (Bm horizon) that is brownish in colour, or sometimes displays various weakly expressed colours with minor accumulations of aluminum and iron (Bfj) or clay (Btj). Most brunisols are well drained to imperfectly drained (Table 2). The moisture balance of brunisols is ideal for agricultural production.

Table 2. Differentiation criteria for brunisolic great groups

Melanic brunisol	**Eutric brunisol**	**Sombric brunisol**	**Dystric brunisol**
Ah or Ap horizon (≥10 cm) pH* of B horizon ≥5.5 (e.g. Sainte-Hélène series)	Ah absent or thin (<10 cm) pH of B horizon ≥5.5 (e.g. Comtois series)	Ah or Ap (≥10 cm) pH of B horizon <5.5 (e.g. Charlemagne series)	Ah absent or thin (<10 cm) pH of B horizon <5.5 (e.g. Saint-Alexandre series)

*pH (0.01 M $CaCl_2$), SCWG 1998

Podzols are soils that have formed on coarse- to medium-textured, acid parent materials. The subsoil (Bf, Bhf or Bh horizon), which is reddish-brown to black, is the result of an accumulation of amorphous material, mainly iron and aluminum bound to organic matter (Table 3). These soils frequently display aluminum toxicity and have great phosphate-fixing capacity.

Table 3. Differentiation criteria for podzolic great groups

Humic podzol	**Ferro-humic podzol**	**Humo-ferric podzol**
Bh ≥10 cm thick	Bhf ≥10 cm thick	Bf or Bhf +Bf ≥10 cm thick
Organic C ≥1%	Organic C ≥5%	Organic C from 0.5 to 5%
Fe pyrophosphate <0.3%	Fe + Al pyrophosphate ≥0.6% (≥0.4% in sands)	Fe + Al pyrophosphate ≥0.6% (≥0.4% in sands)
Org. C/Fe pyro. ≥20 (e.g. Achigan series)	Org. C/Fe pyro. <20 (e.g. Du Mont series)	(e.g. Sainte-Sophie series)

SCWG 1998

Organic soils are soils composed of organic materials (≥17% organic C). They include most of the soils commonly known as peat, muck, or bog and fen soils. Most organic soils are saturated with water for prolonged periods and are frequently found in poorly and very poorly drained depressions. Fibrisols (e.g. Sainte-Victoire series), mesisols (e.g. Cousineau series) and humisols (e.g. Nobel series) are the three great groups of organic soils that were mapped in the study area. Fibrisols are composed largely of slightly decomposed organic material of identifiable botanic origins. Mesisols are at a stage of decomposition intermediate between fibrisols and humisols. Humisols are at the most advanced stage of decomposition; most of the material is humified with few identifiable fibres.

The map shows the taxonomic great groups that were identified in the study area. In the southeastern part of the Montreal plain, gleysols cover nearly 90% of the mapped area, while podzols account for 8% and brunisols and organic soils approximately 1% each. Humic gleysols predominate in the mapped area, followed by gleysols, especially in Saint-Hyacinthe County. Podzols occur mainly in Richelieu County, on the sandy terraces of the Lanoraie delta, in Verchères County, on the sandy terrace of the Bois de Verchères, on the Monteregian Hills and along the ravines of the northern section of the Yamaska River. Brunisols occur near Sainte-Julie and on Mount Saint-Bruno. Organic soils are found in depressions, mainly in the peat bogs of Saint-Dominique and Saint-Bruno, in the Sainte-Madeleine Channel, and in the anastomosed channels of the Lanoraie delta, between Contrecœur and Sorel.