
Canadian
Geography 1202

Soil

Understanding 2.1.3

Soil

- **Soil is one of the most important natural resources on earth.**
- **It covers much of the earth's surface and varies over different areas.**
- **Climate has a significant impact on soil, together they determine the natural vegetation of a region.**



Four Main Components Of Soil

1. Minerals

- Are created when rock is broken down over long periods of time. The rock is weathered by rain, cold, glaciation, etc over time and eventually sand, silt, or clay is formed.
- This process expose nutrients/minerals needed by plants to grow
Example: Calcium, Potassium

2. Humus/Organic Material

- Is the decayed remains of plant and animal life. Bacteria in the soil breaks down this organic matter, releasing nutrients into the soil.
- Humus gives the soil its dark color.

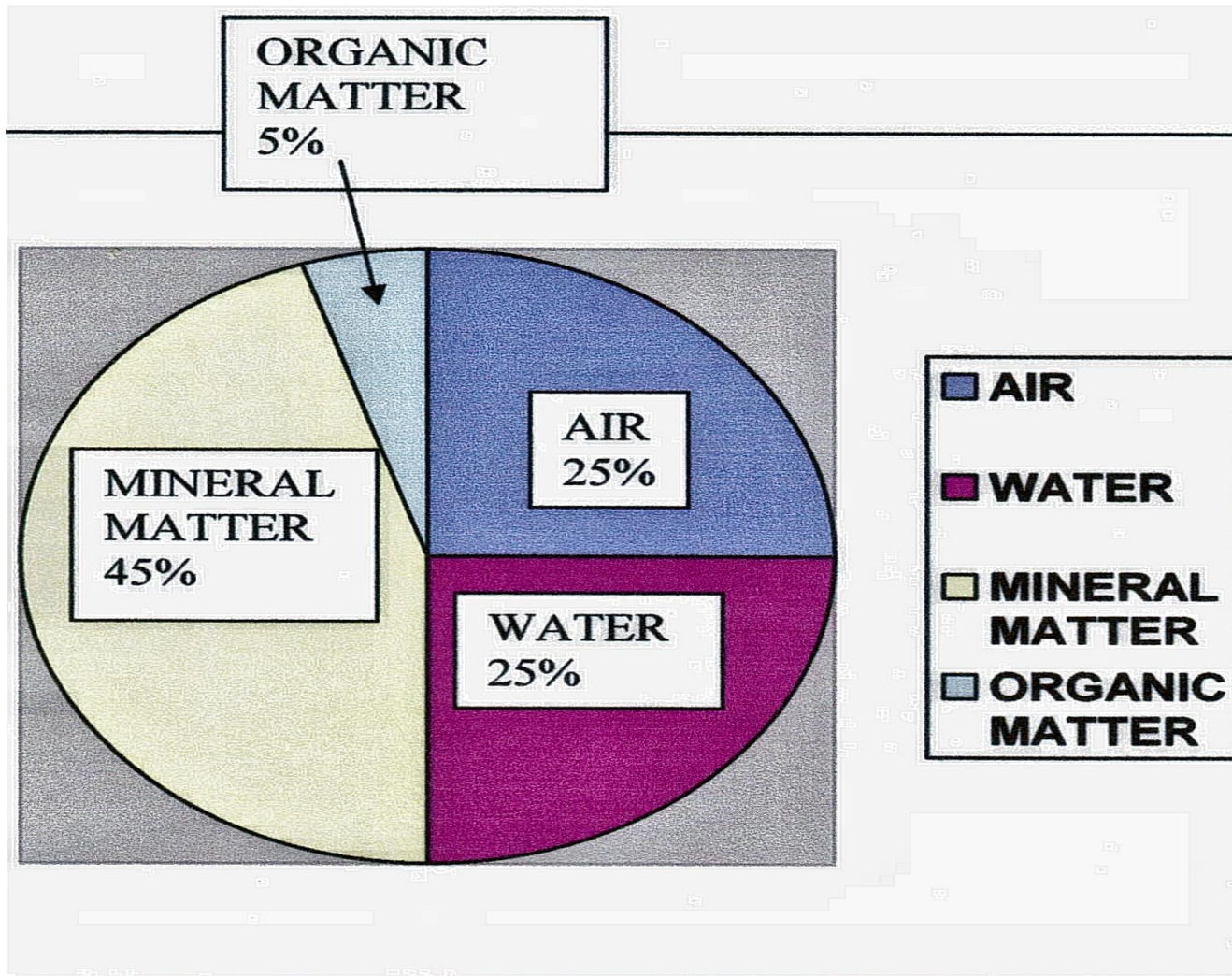
3. Air

- Is necessary because plants need air around their roots.
- Soil contains air pockets which are produced by humus.
- Burrowing animals, worms, insects, etc. also create air pockets.

4. Water

- Needed for plant growth
 - Water is also necessary to complete the physical and chemical processes that help break down the rock and decaying organic materials
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Soil Pie: Components of Soil



Important Terms

Humus

- The soil substance that forms from decomposed animal and plant life.
- Dark portion of the soil.
- Supplies nutrients to plants and preserves moisture for plant growth.

Leaching

- A continual downward movement of water through the soil.
 - As the water moves down, it dissolves the chemical nutrients out of the soil. The soil that remains is unable to support plant life.
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Important Terms

Eluviation (caused by leaching)

- Is the transport of soil material from upper layers of soil to lower levels by downward precipitation of water across soil horizons.

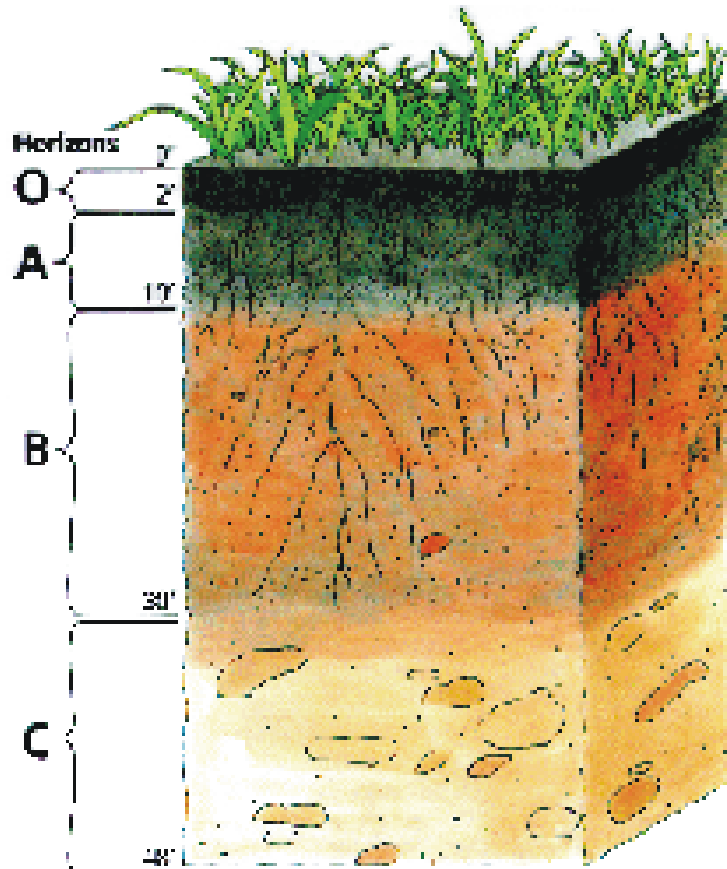
Capillary Action

- The movement of moisture upwards in soil that carries minerals closer to the surface.
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Soil Profile

- A **soil profile** is a cross section of a soil showing the different horizons(layers) from the bedrock up to the surface.
 - Minerals are added to the soil from the bedrock and organic matter is added from the surface from decaying plant material. A typical soil profile has three layers or horizons: A, B, and C.
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Soil Profile



“A” Horizon

- Rich in organic material especially near surface
- Dark brown or black
- Often called “Topsoil”

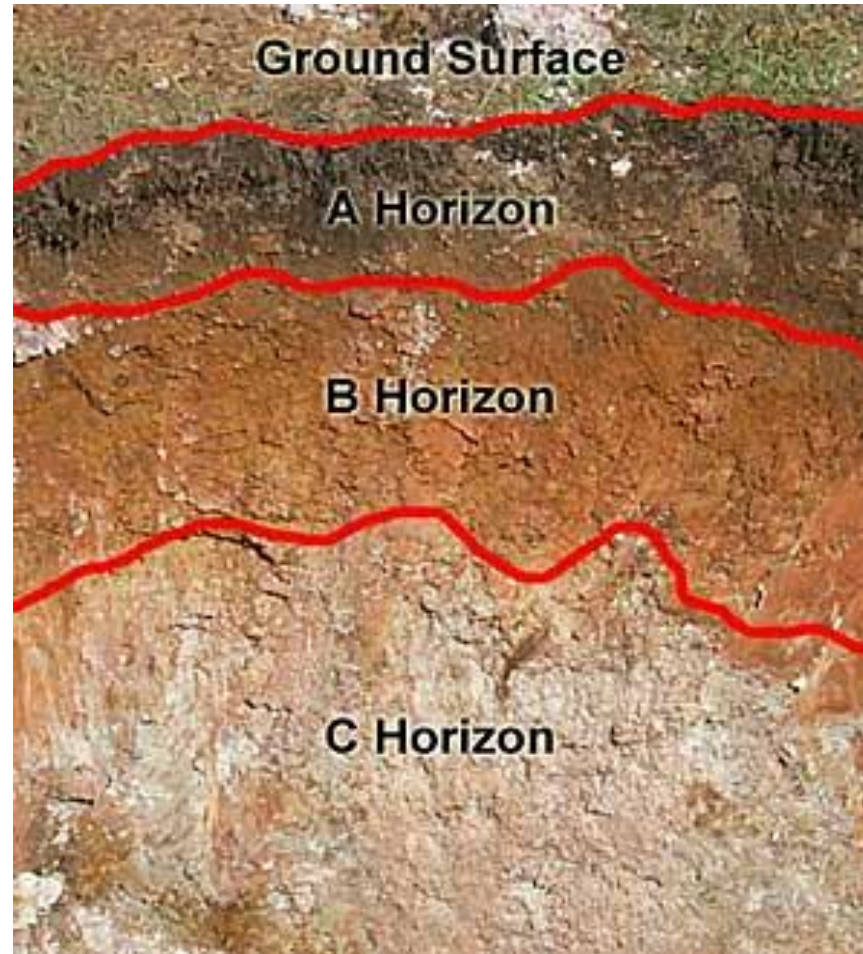
“B” Horizon

- Combined mineral and organic level
- Light brown in color
- Often called “Subsoil”

“C” Horizon

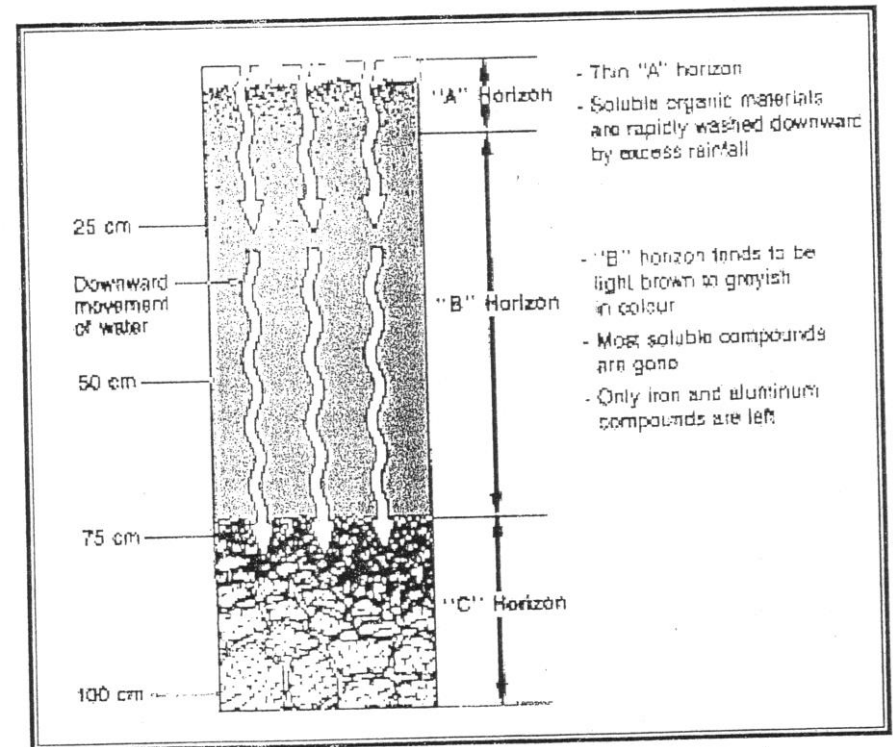
- Mineral materials from which soil is made.
- Usually bedrock or glacial deposits
- Often called “Parent Material”

Soil Profile



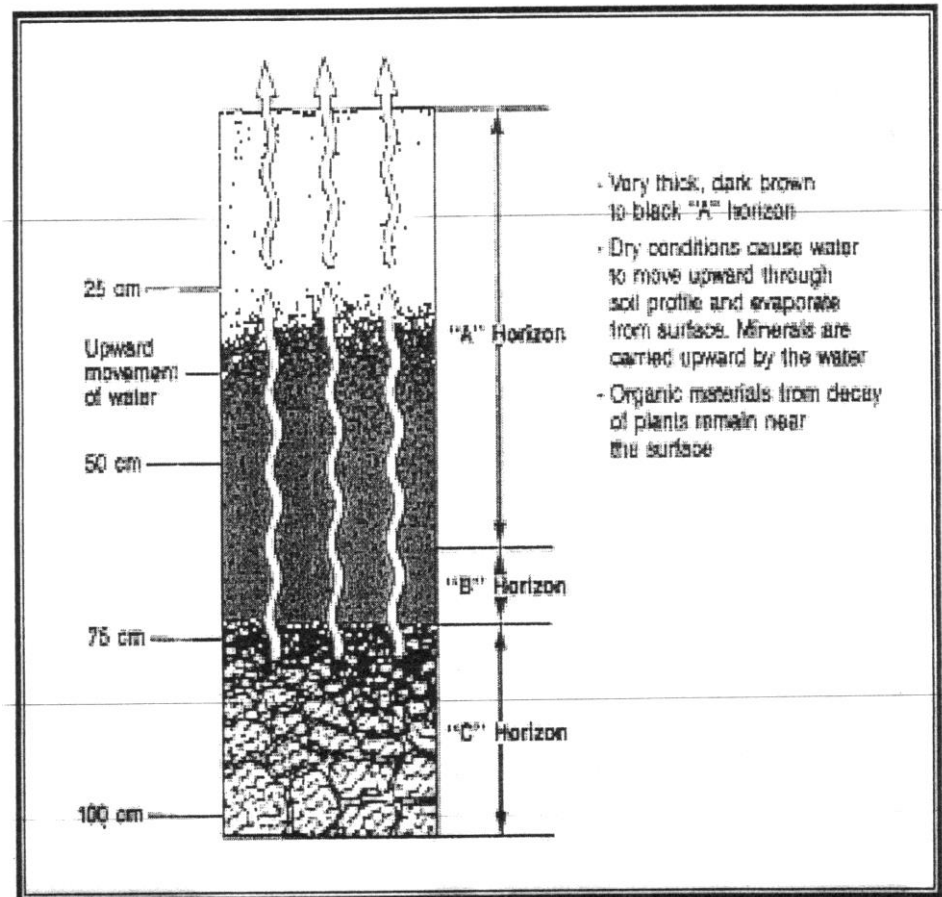
Leached Soil Profile

- If the climate is very wet, leached soils with low fertility develop.
- Water moves downward through the soil dissolving soil nutrients.
- Results in poor quality soil and a thin topsoil (A horizon).



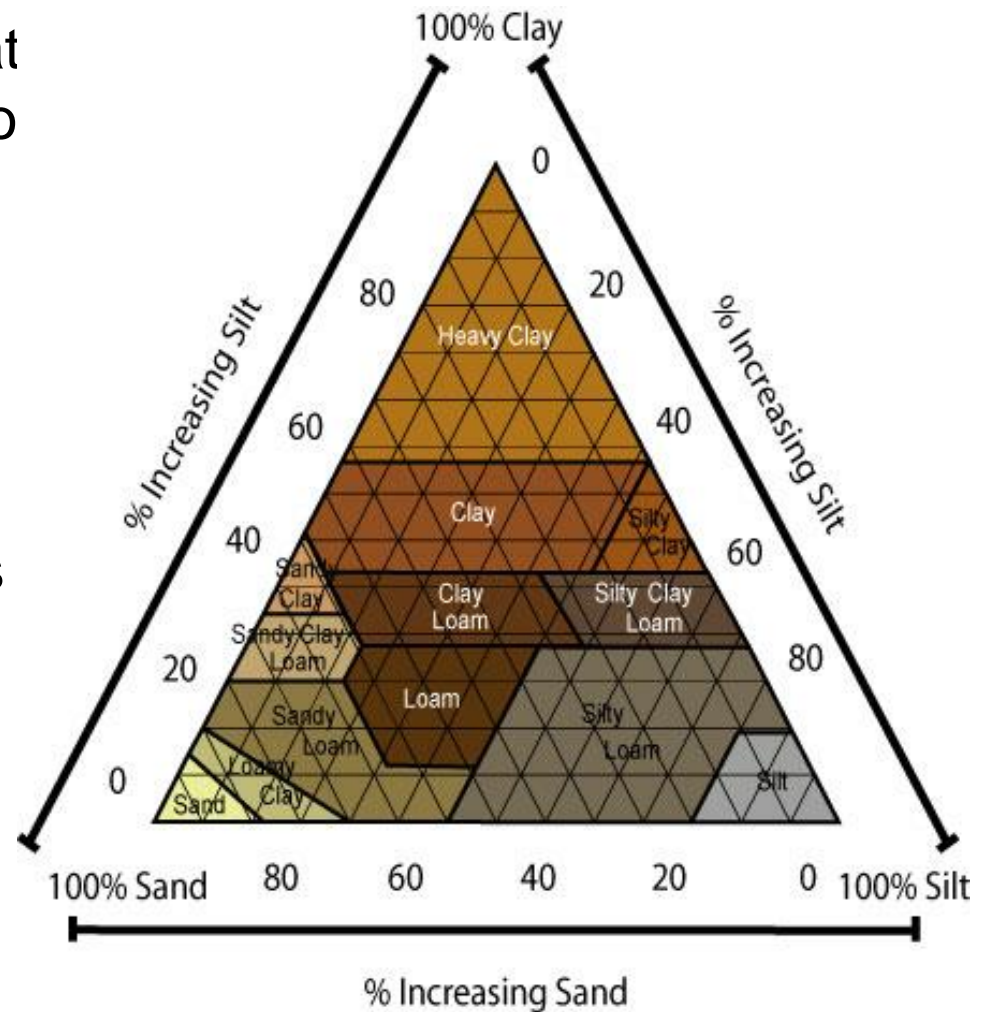
Calcified Soil Profile

- If the climate is very dry, calcified soils with low fertility develop.
- Water moves upward through the soil and evaporates at the surface leaving dissolved soil nutrients behind.
- Results in poor quality soil and thick topsoil (A horizon).



What's the best soil?

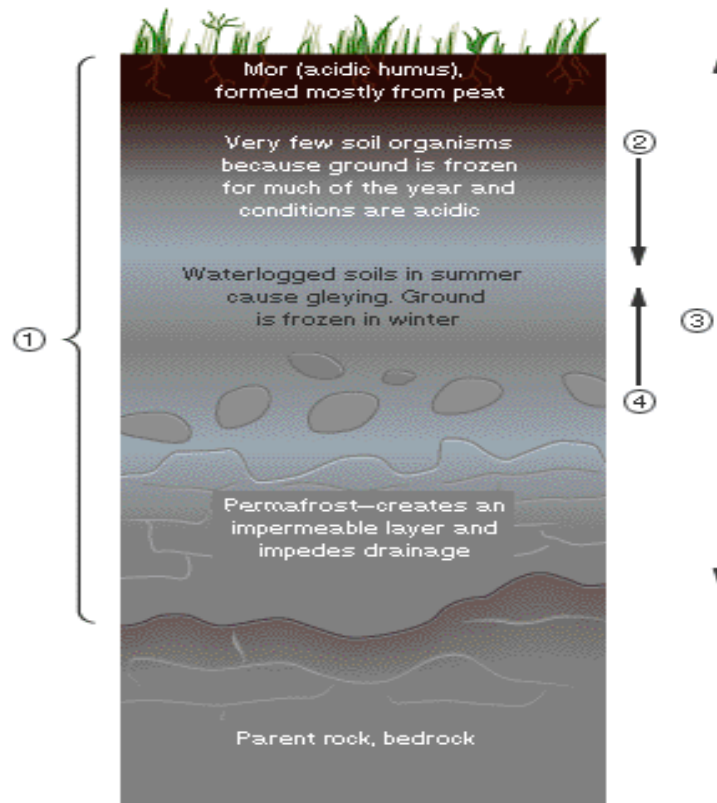
- Soil that is too sandy won't hold water, while soil that has too much clay will hold too much water.
- A soil with the right combination of sand, silt and clay is the best for agriculture.
- This soil is referred to as **loam**.



Why are tundra soils infertile?

- Soils of Canada's far north are not as rich as soils further south.
 - The subsoil (Horizon B) is permanently frozen and is referred to as permafrost.
 - During the summer the top metre of the ground called the active layer thaws, the layers underneath remain frozen and water cannot escape downwards. The surface remains waterlogged and this along with the cold climate prevent plant material from decaying quickly to form humus. The absence of air in the water-logged ground means that a true soil does not exist, and agriculture is impractical.
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Tundra Soil Profile



- ① Horizons not well developed as little mixing of the soil occurs in the absence of soil organisms
- ② Some leaching in spring after snowmelt
- ③ Soil depth about 50 cm (20 in)
- ④ Rock fragments brought to the surface by frost heave

Relationship Between Soil Fertility and Precipitation

