Soil Quality:

We frequently test soil to determine its suitability for agricultural, environmental or engineering purposes. Often these tests are on-going as part of a monitoring program. One can test:

Physical properties (texture, infiltration, aeration, temperature).
Chemical properties (organic matter, nutrients, pH, salinity, clay type),
Biological properties (microbial biomass, mineralizable substrate).

Identifying soil types and soil structure:

As a farmer, you will need to know the differences between different soil types and structures. There are 5 main types of soil:

- sandy and light silty soils
- medium soils
- heavy soils
- chalk and limestone soils
- peaty soils

Good soil structure is very important for agriculture, as it can:

- increase crop yields
- improve the quality of crops and grassland
- reduce the risk of environmental damage - such as water pollution, risks of drought and flooding

If you have poorly structured soil on your land, this can also cause problems, including:

- patchy germination of grass or crops
- poor growth and greater vulnerability to disease

- poor drainage - which can lead to increased runoff, erosion and diffuse pollution of watercourses
- surface capping - which can make it hard for plants to grow and can also cause runoff and erosion

Characteristics of well-structured and poorly structured soils:

	Topsoil	**Subsoil**
Well structured	Plenty of spaces or pores between the aggregates. You can easily crumble moist soil clumps between your thumb and finger.	Larger blocks or clumps than the topsoil, with many vertical cracks or channels. It can easily be broken apart when moist.
Poorly structured	Dense aggregates of soil with few pores. You will find it hard to break the clumps apart even when the soil is moist.	Also dense and may form a hard pan with few pores or cracks in the soil. Below the pan, the soil structure may be satisfactory, or the compaction may go deeper into the subsoil.

Concepts of Soil Genesis:

- ***Principle of Uniformitarianism***

Geologic principle stating that processes occurring today also occurred in the past.

- ***Simultaneous soil forming processes:***

Many processes occurring at once

- ***Pedogenic regimes***

  Distinctive combination of climate, geology, and landforms produce distinctive soils. Soils are a function of climate, organisms, relief, parent material, and time.

- ***Soil succession:***

  Present day soils represent a continuum of changing soil properties and soil forming process.

- ***Climate change and soil age:***

  Most soils are no older than the Pleistocene epoch and have experienced climate and vegetation regimes that differ from today.

- ***Soils are clay factories:***

  Weathering of primary minerals and formation of clay minerals is hallmark of landscape stability and soil formation.

- ***Complexity:***

  Soil formation is result of many interacting factors that occur over space and time.

Soil Morphology – Color:

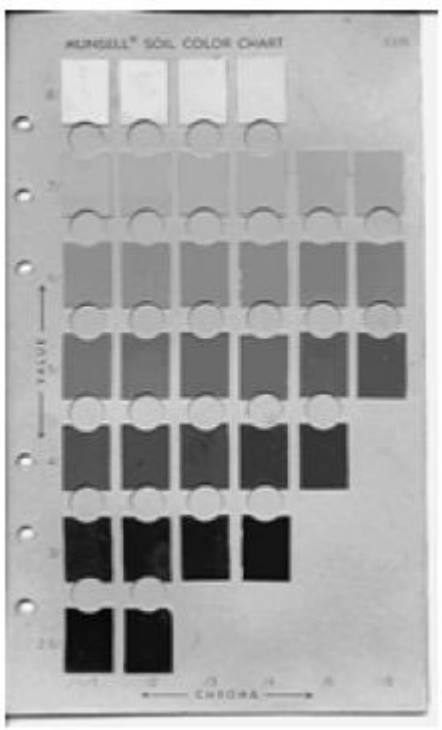
Munsell System: Quantitative system that measures visual differences in color characteristics.

Three components of Munsell:

1. Hue – dominant spectral color – related to the wavelength
   - Usually yellow and red hues (Y, YR, R).
   - Blues and greens for waterlogged or "gleyed" soils (B, BG, G).
2. Value – darkness or lightness – function of the amount of reflected light.

- High value – light colored.
- Low value – dark colored

3. Chroma – purity of color – dilution by gray.
   - High chroma – relatively pure color
   - Low chroma – less pure – diluted by gray



Soil Morphology – Texture:

- Texture – proportions of sand, silt, and clay.
  - Organic matter does not affect soil texture – but it does affect structure.

- Measured on the < 2 mm fraction - the "fine earth fraction"
  - Sand 2.0 mm – 53 µm
  - Silt 53 µm – 2 µm
  - Clay < 2 µm

Soil Morphology – Structure:

- Aggregation or physical organization of soil sand, silt, and clay particles into larger structures.
- Structures have repeatable planes of weakness between individual aggregates;

Planes of weakness persist through time – at least one wetting and drying cycle.

- Naturally occurring structures are called “peds” –chunks left after plowing are called “clods”.