

LESSON NOTE FOR WEEK ONE AND TWO (1\$2) ENDING 19TH SEPT, 2025.

SUBJECT: AGRICULTURAL SCIENCE.

TOPIC: SOIL TYPES AND PROPERTIES.

CLASS SS2

DATE: 8TH SEPTEMBER, 2025

Soil is defined as the uppermost layer of the earth's crust which provides support and nutrients for plant growths.

Soil types and their properties

There are four main types of soil. These are

- i) Sandy soil
- ii) Clayey soil
- iii) Loamy soil

CHARACTERISTICS/ PROPERTIES OF SANDY SOIL

1. It has large particles, are coarse- grained, loose and gritty to touch
2. It has large pore spaces between the particles.
3. It is easy to cultivate and not good for plant growth.
4. It is hot during the day and cool during the night.
5. It does not hold water easily; it is poor in plant nutrient.
6. Its diameter is 2.00 -0.20.

METHODS OF IMPROVING SANDY SOIL.

Sandy soil can be improved through the following agricultural practices;

1. **Planting cover crops:** Cover crops helps to provide shade, prevent and add more nutrients to the soil.
2. **Application of compost manure:** Compost manure helps to bind the sand particles together and also add humus to the soil.
3. **Application of farm yard manure:** This will also improve the structure of the soil as well as add nutrients to the soil.
4. **Mulching the soil:** mulching sandy soil prevent water loss through evaporation and nutrient loss by water erosion.
5. **Avoidance of bush burning:** Bush burning promotes soil erosion, kill soil organisms and removes organic matter which can contribute to the fertility of the soil.

ECONOMIC IMPORTANCE OF SANDY SOIL

1. It is good for the cultivation of few crops such as cotton, groundnut, cassava, etc.
2. It is also useful in building construction, especially its combination with cement and water in moulding block

PROPERTIES/ CHARACTERISTICS OF CLAYEY SOIL

- (a) This consists of very small, fine particles.
- (b) They are sticky when wet and could be moulded into any shape.
- (c) It is very heavy to work on but rich in nutrients.
- (d) It holds water and exclude air, its diameter is less than 0.002.

How to improve clayey soil

Clay soil can be improved through; liming, addition of organic matter.

PROPERTIES/ CHARACTERISTICS OF LOAMY SOIL

1. It has a moderate particles and size
2. It has a moderate pore space and water holding capacity
3. It has adequate amount of water and nutrient.
4. It has roughly equal proportion of sand, silty and clayey,
5. It can be easily worked or cultivated, etc.

Physical properties of the soil include soil texture, soil structure, soil temperature, porosity, soil colour, water holding capacity.

Chemical properties of the soil; this include soil PH and cation.

Soil texture: This refers to the relative proportions of the various sized particles that make up the soil sample. It is also defined as the degree of fineness or coarseness of a given soil sample. It could be determined simply by (a) feel) (b) wetting and moulding (c) sieving (d) sedimentation.

IMPORTANCE OF SOIL TEXTURE

1. It is used in the evaluation of soil ability to supply mineral nutrients.
2. It determines the type of crops to grow on the land.
3. It determines the movement of air and water in the soil.
4. It helps to determine tillage practice to be adopted by the farmer
5. It enables the farmer to know the type of soil in the farm., etc.

The name and sizes of the various soil particles are shown in the table below.

Name of particles	Range of particles in diameter(mm).
Clay	Below 0.002mm
Silt	0.002-0.02mm
Fine sand	0.02-0.2mm
Coarse sand	0.2mm
Gravel.	Above 2.0mm.

Soil structure: Soil structure is the way soil particles stick together to form aggregates. It is also defined as the way in which soil particles are arranged in a soil sample.

TYPES OF SOIL STRUCTURE

1. Single- grained.
2. Massive soil structure
3. Granular structure
4. Coherent structure
5. Crumb structure
6. Prismatic or blocky structure.

IMPORTANCE OF SOIL STRUCTURE.

1. It determines the level of fertility of the soil.
2. It prevents erosion and water logging.
3. A good soil structure promotes the activities of micro-organisms.

4. It also supports the growth of crops.
5. A good soil structure supports aeration, etc

Soil profile: This is defined as a vertical cross section through the soil, showing horizons. The horizons represent the different layers of the soil and different colour, texture and structure

THE FOUR MAJOR HORIZONS OF THE SOIL PROFILE ARE:

1. **The A-HORIZONS:** This is also called the top soil. This horizon contains more organic matter, and it is where the root of crops derives its nutrients and it is easily leached.
2. **B-HORIZONS:** The B-horizons, also called the sub-soil. It is rich in minerals which are carried or leached down by percolating water. It is suitable for the cultivation of deep-rooted crops like cocoa, rubber, etc.
3. **C-HORIZONS:** The C-horizon, also called parent materials, represents the type of materials, presents the type of material from which top-soil and sub-soil are derived. It is the parent materials which are small fragments of rocks that are unweathered and found at the bottom of the soil profile.
4. **D-HORIZONS:** The D-horizon is also called the bed rock. It represents the unweathered rock materials. This horizon is found at the bottom of the profile and they are usually of large soil particles.

IMPORTANCE OF SOIL PROFILE

1. It determines the level of soil fertility.
2. It helps to help the farmers to know the type of crops to grow.
3. It allows for easy penetration of roots of crops.
4. A loosely packed sub-soil also allows for easy drainage and aeration.
5. It ensures easy percolation of water, thereby preventing erosion.

Soil PH: The word of PH (pondus de Hydronium) is defined as a measure of the degree of acidity or alkalinity of the soil. It can also be described as a measure of the concentration of hydrogen(H^+) in the soil.

Causes of soil acidity.

1. Leaching: The washing down of plant nutrients below the soil beyond the reach of plant roots leaving behind hydrogen ions.
2. Use of acid fertilizers.
3. Presence of acid parent materials
4. Nutrient uptake by plants
5. Presence of Sulphur in the soil.

REMOVAL OF SOIL ACIDITY.

This can be done by the application of liming materials which are rich in calcium. Examples of liming materials include:

1. Limestone (calcium carbonate)- $CaCO_3$.
2. Slaked lime – $Ca(OH)_2$.
3. Quick lime – CaO .
4. Calcium bicarbonate- $Ca(HCO_3)_2$.
5. Wood ash
6. Dolomite or calcite.
7. Basic slag.
8. Gypsum.
9. Organic manure can also be applied to the soil to remove acidity

Soil temperature: This refers to the temperature within the soil. In other words, it is the temperature usually different from the temperature of the air above the soil.

IMPORTANCE OF SOIL TEMPERATURE

1. It affects the formation of organic matter.
2. It affects the decomposition of soil organic matter.
3. It determines seed germination and development.
4. It also affects the population of soil microbes.

COMPOSITION (COMPONENTS OF THE SOIL)

Soil contains five major components as follows; (a) mineral particles or the inorganic constituents. (b) organic matter (c) soil living organisms (d) soil air (e) soil water.

Soil mineral or inorganic constituents: These are rock fragments of various kinds, sizes and shape. They are the fragment on which the soil is built. They are sand, clay and silt. The chemical components are the macro and micro nutrients released during rock weathering.

Importance/effect of mineral matter.

1. It forms the solid part of the soil and provides support for plants.
2. It holds water and air for both plants and animal activities.
3. It is the main source of nutrients such as nitrogen, calcium etc.

Soil organic matter: Organic matter consists of the mixture of plant and animal residues in their various decomposition. They perform the following functions;

1. they help to maintain the soil structure.
2. They supply nutrient to the plants
3. They regulate the soil temperature.
4. They provide energy for activities of microorganisms in the soil, etc.

Soil organisms: The soil also contains other living organisms classified under these three groups;

- (a) Micro –flora examples are virus, bacteria, algae, fungi, actinomycetes.
- (b) Micro- fauna example, nematodes.
- (c) Meso- fauna examples include earthworm, rat, rabbits and snail.

IMPORTANCE OF SOIL ORGANISMS

1. Decomposition of organic matter.
2. Formation of humus
3. Burrowing and aeration of soil, etc.

Soil air: Air is present in the pore spaces in the soil which are not occupied by water.

THE IMPORTANCE/EFFECTS OF AIR;

1. it provides oxygen for the respiration of plant roots and living organisms.
2. Oxygen in the soil promotes easy germination of seeds.
3. It is needed in soil reactions, particularly carbon and nitrogen cycles.

Soil water: The pore spaces that are not filled with air are filled with water. Soil loses its water through evaporation from the surface, transpiration from leaves and run-off from soil surfaces.

THE IMPORTANCE OF SOIL WATER INCLUDE:

1. It dissolves plant nutrients
2. It regulates soil temperature

3. It is necessary for photosynthesis, etc.

TYPES OF SOIL WATER

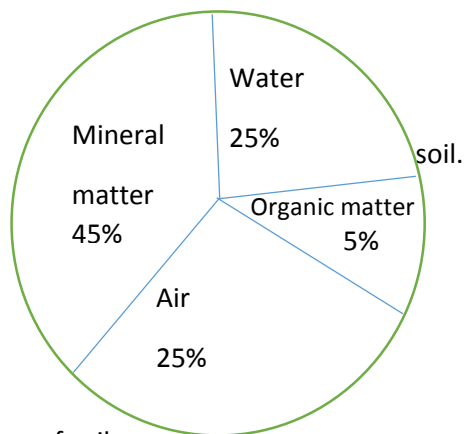
There are four major types of soil water. These are;

Hygroscopic water: This water is tightly held by the soil particles such that it is never available to the plant.

Field capacity: This is the type of water left in the soil after excess water has been drained off, following heavy rain fall. This water is available to plants.

Capillary water: This the water which rises above the water table in the soil and is held in the fine and medium pores of soil particles by surface tension. It is easily available to plants.

Gravitational water: This is the water which can drain from the soil under the influence of gravity. It is available to plants but it is often pulled down beyond the reach of the roots



Percentage of soil composition.

Evaluation.

- 1 what is soil
- 2 State five causes of soil acidity.
- 3 What is soil structure.
- 4 State three effect of soil profile.
- 5 state two properties of sandy, clayey and loamy soil.
- 6 How can sandy and clayey soil be improved
- 7 List the materials used for removing soil acidity

Assignment

Draw and label the soil profile.