

5. Study of soil samples at least from two different localities/ sites with respect to their texture and pH and correlate plants found thereof.

Date : / /

Aim : To study different soil samples from different localities for their physical properties.

Principle :

The soil is uppermost layer of the earth which has humus and numerous living organisms along with their dead remains that sustains the life of plants.

A productive soil generally has approximately 40% minerals, 10% organic matter (derived from dead remains of the organisms), 25% water and 25% air.

The soil may have different sized particles which can be classified as clay (less than 0.002mm in diameter), silt (0.002 - 0.02mm), fine sand (0.02 - 0.2mm), coarse sand (0.2 - 2mm) and gravel (more than 2mm).

The soil may be sandy, sandy loam, loam, silty loam, clayey loam and clayey. Most of the soils contain mixture of sand, silt and clay in different proportions.

Study of soil texture/ type :-

Soil texture is the grain of soil depending upon the nature and composition of its particulate matter. Besides texture, there are other parameters for study of soil such as moisture, porosity water holding capacity, pH, soil microflora, humus, etc. Study of soil texture is one of the important parameters for various purposes, e.g. agriculture, construction, mining, etc.

Requirements :-

Digger, polythene bags, lens, meshes of different pore size for soil samples (sieves), clean glass jar with tight fitting lid, measuring cylinder, distilled water, etc.

Procedure :-

Collect the soil samples from different sites and bring them to the laboratory. With the help of hand lens examine the soil samples. Shift the soil samples on the meshes of different sizes and record the different sizes of the particles found. Now take a measuring cylinder of 250 ml. Fill it with 200 ml of water and add about 50g of soil sample in it, cap it and shake the glass jar vigorously.


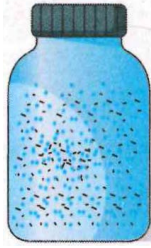
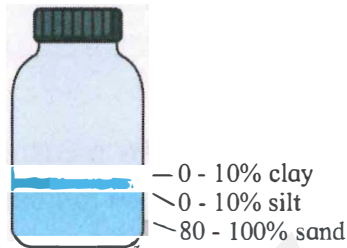
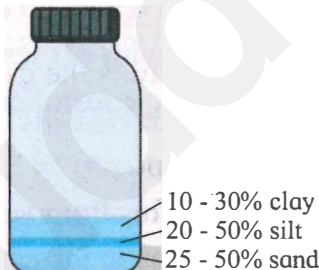
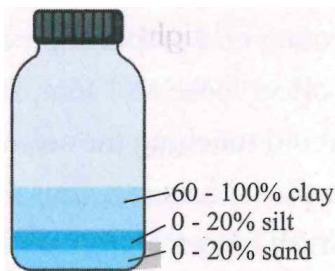
1. Take distilled water in a the clean dry Jar (A). Mix soil samples in separate jars (B, C, D, etc). Shake it vigorously. Allow it to stand for 10 - 15 minutes.

Observation :-

Measure the thickness of different layers according to different sized soil particles. From bottom to the top, we can observe the layer of coarse sand, fine sand, silt, clay then water and floating humus on the surface.

Calculate approximate percentage of each type.

1. Observe and note the comparative thickness of layers formed in each jar and classify the soil as per guidelines given ahead.

Clean water jar A		Water + Soil jar B, C, D	
Types of Soil		Example of Test jar	
<p>Sandy soils are very common near the mountain foothills, along rivers, streams and certain coastal areas. Sandy soils are composed of approximately 80-100% sand, 0-10% silt and 0-10% clay, by volume. Sandy soils have poor water holding due to very low organic content. This indicates that percentage of sand component is always more.</p>		<p>Sandy soil</p> 	
<p>Loamy soils are also common in valleys and flat areas (flood plains), or around the rivers and streams. Loam soils are comprised of approximately 25-50% silt and 10-30% clay by volume. Loam soils are somewhat heavier than sandy soils, but also have poor water holding capacity due to very low organic content. Loam soils show thicker layers of silt and sand as well</p>		<p>Loamy soil</p> 	
<p>Clayey soils are very common in certain areas, particularly around urban areas. Clay soils are typically comprised of approximately 0-20% sand, 0-20% silt and 60-100% clay by volume. Clay soil are heavy and difficult to work when dry. Overall, the clay soil is comparatively poor in sand and silt components.</p>		<p>Clayey soil</p> 	

Type of soil and its correlation with the plants found –

In case of well watered garden soil, Mesophytes are found.

In dry desert soil, usually xerophytes are found.

Halophytes are seen in saline soil.

Result :

No.	Soil samples	Colour	Texture	% of sand	% of silt	% of clay	Type of soil
1.	Crop field	BLACK	Clayey	9%	11%	80%	Fertile
2.	Garden	BROWN	Clayey	22%	40%	38%	Fertile

Sample Oral question :

- Q. 1. What is soil?
- Q. 2. What is humus?
- Q. 3. Enlist the different types of particulate components of soil.
- Q. 4. What is Pedology?
- Q. 5. What determines the pH of soil?
- Q. 6 Which type of soil has minimum water holding capacity?
- Q. 7 What are the factors which determine water holding capacity of the soil?

Study of pH :

Introduction :

Soil pH is a measure of the acidity or alkalinity of the soil. A pH value is actually a measure of hydrogen ion concentration, in a logarithmic scale. Strong acid medium has a low pH and a high hydrogen ion concentration. Alkaline medium has high pH values and low hydrogen ion concentration. Most soils have pH values between 3.5 and 10. In higher rainfall areas, the natural pH of soils typically ranges between 5-7, whereas in drier areas, the range is 6.5-9. Soils with pH values of 6.5 to 7.5 are referred as 'more or neutral'. Those soils with pH less than 6.5 are acidic, and soils with pH less than 5.5 are considered strongly acidic. Acid sulphate soils, which occur in low-lying coastal areas, can have extremely acidic pH values (pH less than 4).

Requirements :

Soil samples from various sites, funnel, filter paper, pH papers of different range, distilled water, beaker, plastic jar with cap, plastic tray, pestle or any other suitable grinding tool, etc.

Procedure :

Collection and preparation of sample

1. Collect loose soil samples in a clean, dry plastic jar.
2. Avoid touching the soil with your hands to prevent contaminating the sample.
3. In the laboratory, pour this sample in a plastic tray.
4. Crush bigger clumps with the help of porcelain or glass pestle.
5. Mix your soil sample with distilled water (1:1 ratio) in a clean glass jar to form a suspension.
6. Cap the jar tightly and shake vigorously a few times.
7. Allow the mixed sample to stand for 5-10 minutes so the salts in the soil sample can dissolve in the distilled water.
8. Remove the cap of the jar.
9. Dip the paper in it for a second, holding it with a clean dry forceps (avoid touching with your fingers).

Observation :

1. Observe the change in colour.
2. Match the resultant colour against colour code on the colour strip.

Observation table-

No.	Soil sample	pH
1.	Sample – A	7
2.	Sample – B	4

Result :

- pH value of soil sample A is 7 hence it is 'neutral'.
- pH value of soil sample B is 4 hence it is acidic.

Questions

1. What is soil?

The soil is the uppermost layer of the earth with humus and numerous living organisms along with their dead remains that sustains the plant life.

2. How soils are classified ?

The various types of soil are -

Sandy,
Sandy loam,
loam,
silty loam,
clayey loam and
clayey.

3. Enlist the components of soil.

A typical productive soil contains - minerals,
organic matter (dead remains of plants and animals),
water and
air.

4. Why soil pH and soil texture are given importance in the study of soil ?

Soil pH is a measure of acidity or alkalinity of the soil. Soil texture is an important parameter for agriculture construction, mining etc.

Q. 5 Explain the correlation between the living plants (living organisms) and soil pH.

Soil pH is important to the living plants because it determines the availability of essential nutrients. At a soil pH 6.5, maximum nutrients are available to the plants.

Activity

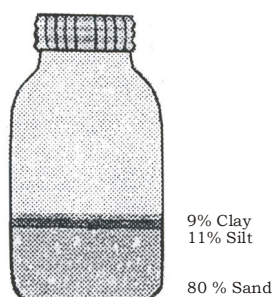
1. Find out and enlist different types of plants found in different types of soils, with respect to

the particulate matter	pH

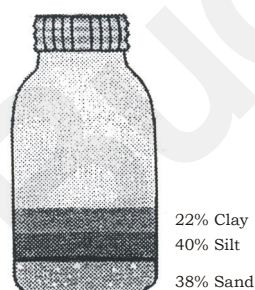
Multiple Choice Questions

1. Plants grow in saline soil are known as
a. Xerophyte
b. **Halophytes**
c. Epiphytes
d. Mesophytes
2. Which of the following soil type has more water holding capacity ?
a. sandy soil
b. loam soil
c. **clay soil**
d. both sandy and loam soils
3. What is the percentage of sand in clay soil ?
a. **equal to silt**
b. equal to clay
c. more than silt
d. both a and c
4. Which of the following branch is deals with the study of soil ?
a. palantology
b. **pedology**
c. phytology
d. cytology
5. is considered as pioneer community in xerarch ?
a. Planktons
b. Algae
c. **Crustose lichen**
d. Foliose lichens

Draw the diagram of layers of particulate matter as observed by you at the time of practical and comment on the type of soil in the samples you have studied.



Clayey soil



Clayey soil

Remark and Signature of Teacher