Soil Quality Monitoring in Estuarine Ecosystem

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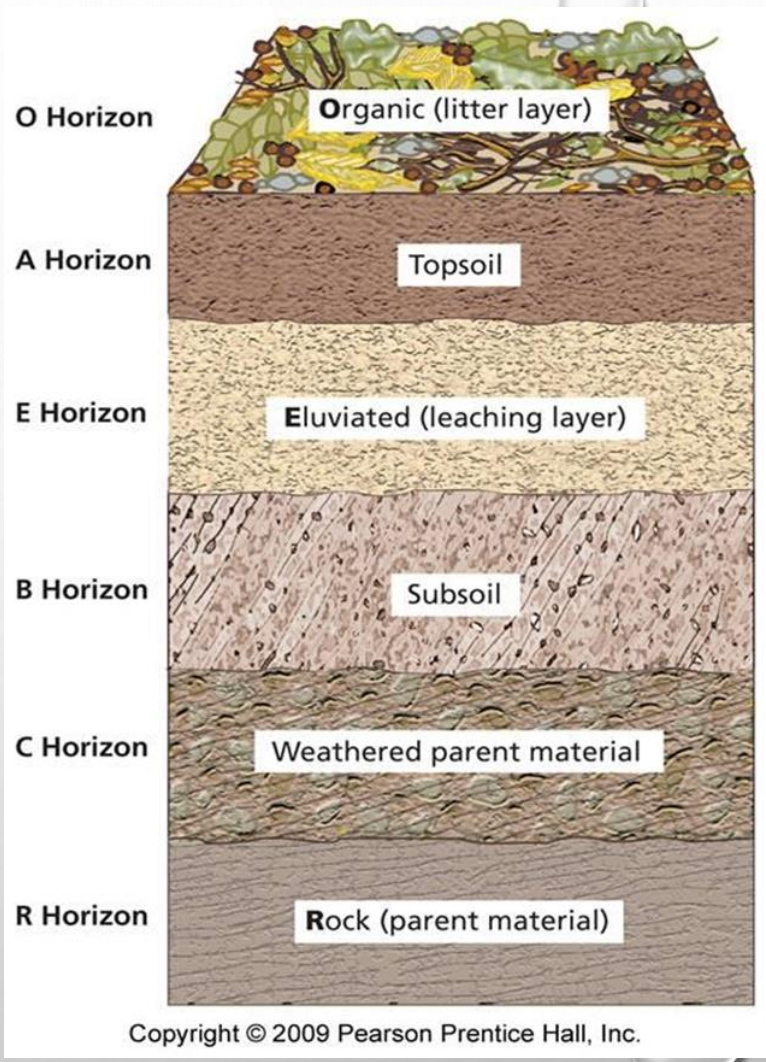
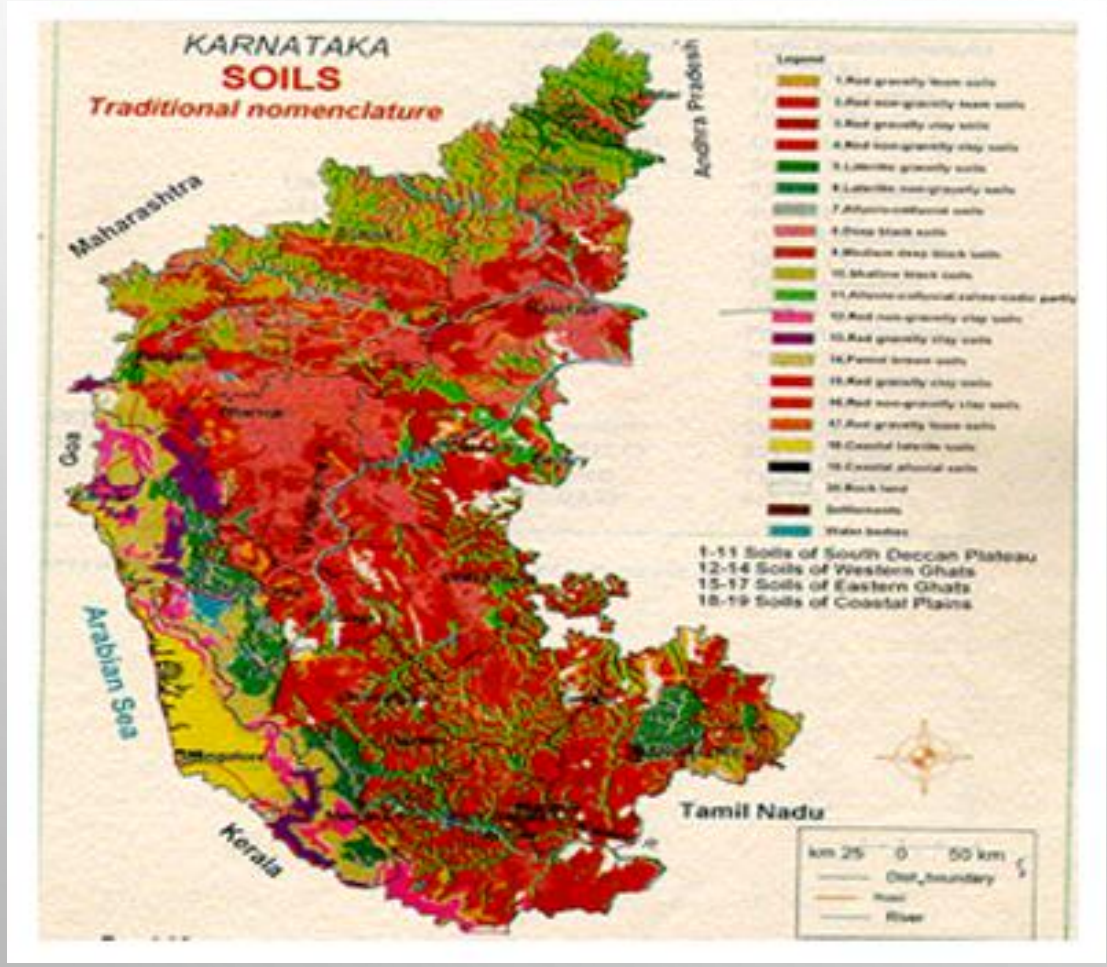
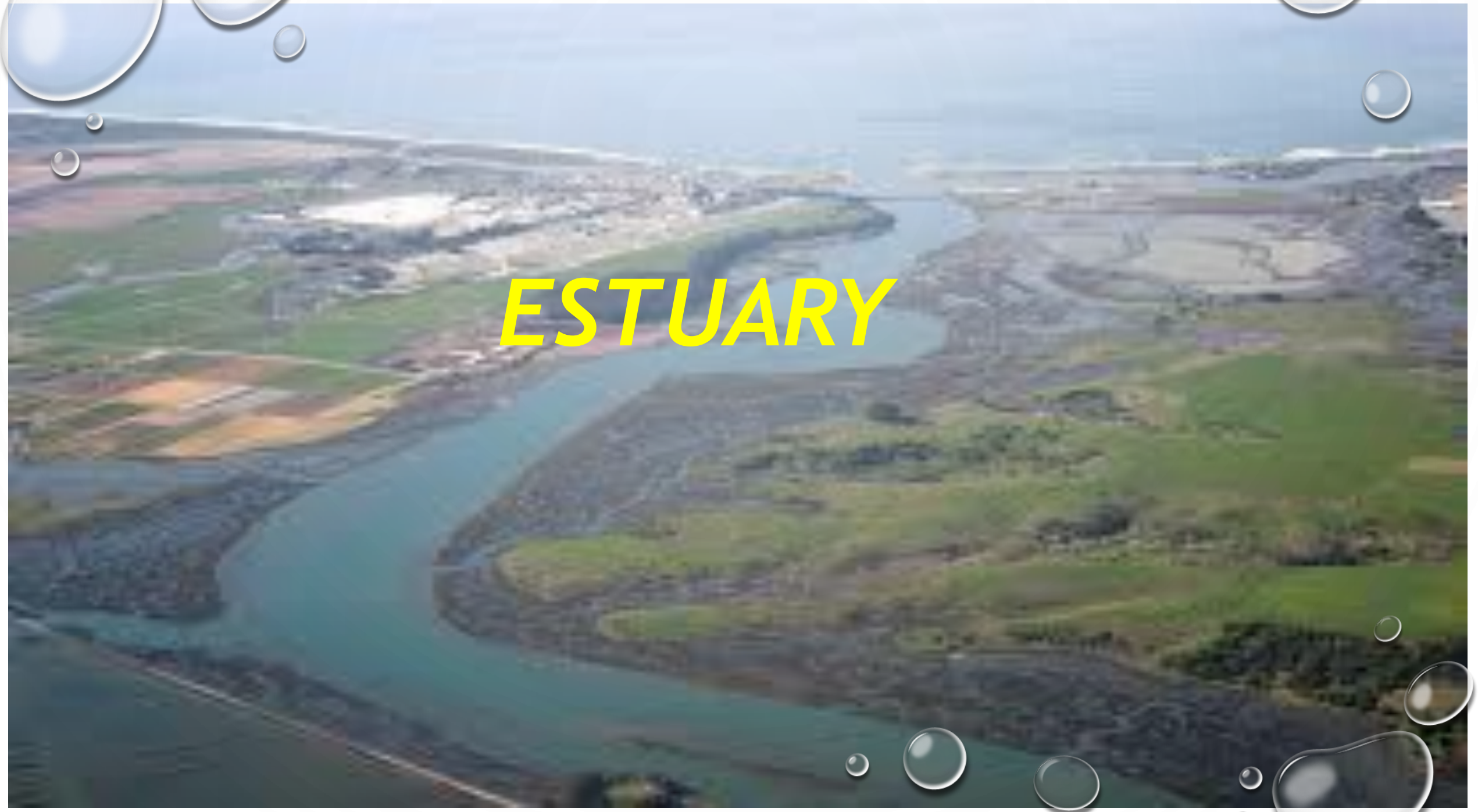
SOIL

Soil is a thin layer of earth's crust which serves as a natural medium for the growth of plants.

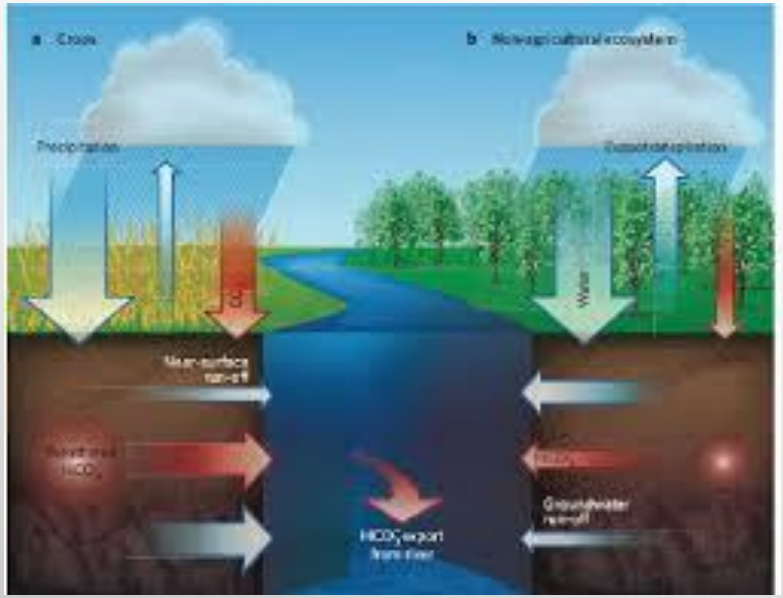


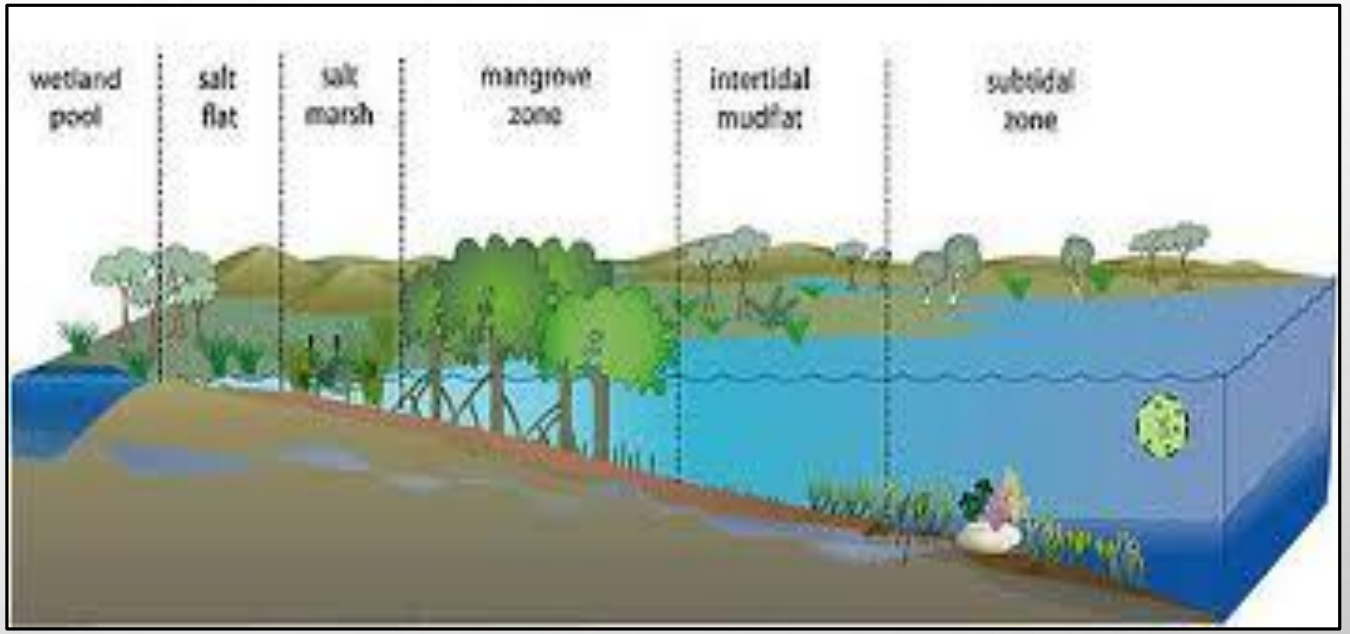
Types of soils in Karnataka




ESTUARY

Estuary a semi enclosed coastal body of water , which has a free connection with the open sea, and within sea water is measurably diluted with freshwater derived from land drainage




wetland pool
salt flat
salt marsh
mangrove zone
intertidal mudflat
subtidal zone

Soil sample collection

Sampling Method

Analytical methods for estimation of properties and available nutrients

I.	Physical Tests

Determination of Soil Colour

Determination of Soil Texture

Determination of Soil Temperature

Determination of Bulk Density

Determination of Soil Moisture Content

II. Chemical Tests

Soil Reaction (pH)

Measurement of Electrical Conductivity (EC)

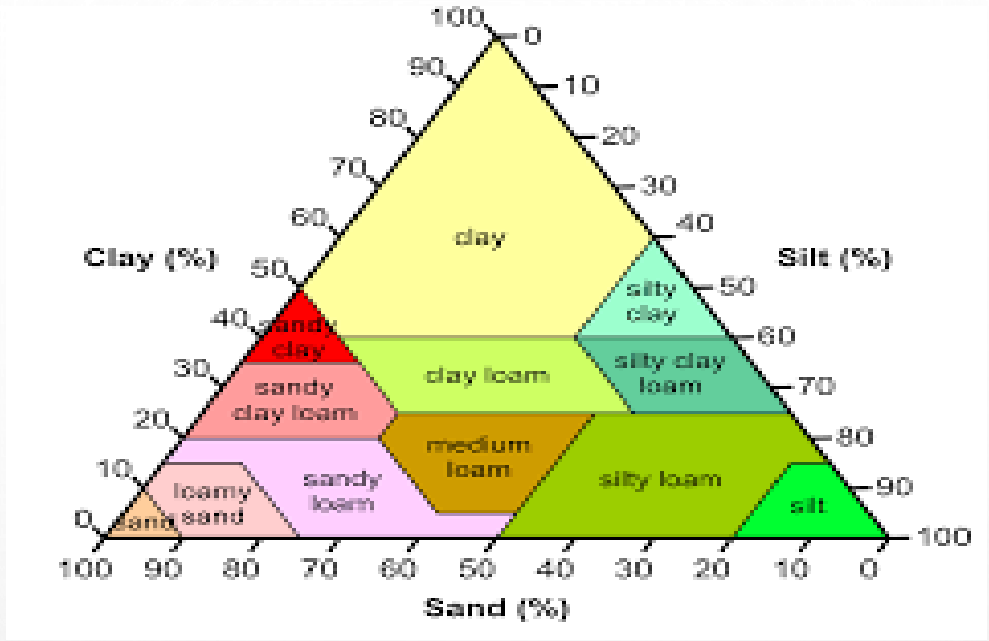
Determination of Organic Carbon

Determination of Nitrogen

Determination of Phosphorous – Olsen’s Method

Determination of Potassium on Flame Photometer

DETERMINATION OF SOIL TEXTURE


Clay (%)
Silt (%)
Sand (%)
clay
silty clay
sandy clay
clay loam
silty clay loam
sandy clay loam
medium loam
silty loam
loamy sand
sandy loam
silt
100
90
80
70
60
50
40
30
20
10
0


Clay
Loam
Sand
Gravel

Bulk density

$$Bulk\ density = \frac{Dry\ weight}{Wet\ volume}$$


10
20
ml

Soil pH

The soil pH is the negative logarithm of the active hydrogen ion (H^+) conc. in the soil.

It is the measure of soil sodicity, acidity or neutrality.

It is a simple but very important estimation for soils, since soil pH influences to a great extent the availability of nutrients . It also affects microbial population in soils.

Organic Carbon

Volumetric method (Walkley and Black, 1934)

Principle :

Organic carbon is oxidized with potassium dichromate in the presence of concentrated sulphuric acid.

Potassium dichromate produces nascent oxygen, which combines with the carbon of organic matter to produce CO_2.

The excess volume of $K_2Cr_2O_7$ is titrated against the standard solution of ferrous ammonium sulphate , using ferroin as indicator.

Procedure

1. Weigh 0.1 g of the prepared soil sample in conical flask.
2. Add rapidly with a burette 20 ml conc. H_2SO_4 containing Ag_2SO_4 and swirl gently until soil and reagents are mixed then more vigorously for one minute.
3. Allow the reaction to proceed for 30.
4. Add slowly 200 ml of distilled water, 10 ml of concentrated orthophosphoric acid and allow the sample to stand for 1 hrs.
5. Just before titration add 1 ml ferroin indicator into the conical flask. Titrate the excess $K_2Cr_2O_7$ with 0.5 N ferrous ammonium sulphate till the colour flashes from yellowish green to greenish and finally brownish red at the end point.
6. Simultaneously blank test is run without soil.

Total Nitrogen

(Kjeldahl Method)

(using Devarda's alloy)

Procedure

1. Weigh 1 g sample of soil. Place in Kjeldahl flask .
2. Add 0.7g Devarda's alloy and 30 ml H_2SO_4.
3. Take accurately 20–25 ml standard acid (0.1M HCl or 0.1M H_2SO_4) in the receiving conical flask so that there will be an excess of at least 5 ml of the acid. Add 2-3 drops of methyl red indicator.
4. Add 30 ml of 35% NaOH in the distilling flask
5. Heat the contents to distil the ammonia for about 30-40 minutes.
6. Remove receiving flask and rinse outlet tube into receiving flask with a small amount of distilled water.
7. Titrate excess acid in the distillate with 0.1M NaOH.
8. Determine blank on reagents using same quantity of standard acid in a receiving conical flask.

Phosphorus

Olsen's method (Olsen, et al, 1954)

Procedure :

1) Weight 2.5 gm of soil sample in conical flask, add activated charcoal.
2) Add 50 ml of Olsen reagent and shake for 20 minutes.
3) Filter the contents immediately through filter paper.
4) Pipette out 5 ml of filtrate into 25 ml volumetric flask.
5) Add 4 ml of the freshly prepared ascorbic acid and ammonium molybdate solution.
6) Shake well and keep it for 30 minutes then make the volume.
7) Prepare the standard curve using 0, 1, 2, 3, 4 & 5 ml of 5 ppm standard P solution into 25 ml volumetric flask and develop the colour using the same procedure as above.
8) Measure the absorbance and colour intensity at 882 nm after half an hour.

Potassium

Flame photometeric method
(Toth and Prince, 1949)

Procedure

1. Preparation of the Standard Curve : Atomize intermediate working standard solutions and record the readings.

2. Plot these readings against the respective potassium contents and connect the points with a straight line to obtain a standard curve.

3. Extraction: Add 25 ml of the ammonium acetate extractant to conical flask and add 5 g soil sample. Shake for 5 minutes and filter.

4. Determine potash in the filtrate with the flame photometer.

THANK YOU