PRACTICAL NOTE BOOK

SOIL TEST

A soil test is a scientific analysis conducted to assess the composition and properties of soil. It involves collecting soil samples from a particular area and subjecting them to various laboratory tests to determine the soil's characteristics. Soil testing provides valuable information about the soil's fertility, nutrient content, pH level, organic matter content, texture, and structure.

Here is a general description of the different aspects that are typically evaluated in a soil test:

Nutrient Analysis: Soil testing helps determine the availability and levels of essential nutrients in the soil, such as nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, and various micronutrients. This information is vital for determining the soil's fertility and determining the appropriate fertilizer requirements for optimal plant growth.

pH Level: Soil pH indicates the soil's acidity or alkalinity and affects nutrient availability. Most plants prefer a slightly acidic to neutral pH range (around 6 to 7), but some plants have specific pH requirements. Soil tests measure the pH level to assess whether it falls within the suitable range for the desired plantings.

Organic Matter Content: The organic matter in soil influences its structure, water-holding capacity, nutrient retention, and biological activity. Soil tests determine the organic matter content, which helps evaluate soil quality and its ability to support healthy plant growth.

Soil testing provides valuable information to farmers, gardeners, and land managers, helping them make informed decisions about soil management, nutrient application, and plant selection. By understanding the soil's characteristics, necessary amendments can be made to optimize plant growth, prevent nutrient deficiencies or excesses, and promote sustainable agricultural practices.

PRECAUTIONS FOR SOIL SAMPLES COLLECTION

Collecting soil samples correctly is crucial to obtain accurate and representative results from soil testing. Here are some precautions and best practices to consider when collecting soil samples:

1. Sampling Equipment: Use clean and non-reactive tools for sampling, such as a stainless-steel shovel or soil probe. Avoid tools made of brass, bronze, or galvanized materials, as they can contaminate the soil sample.

2. Sampling Depth: Determine the appropriate sampling depth based on the purpose of the analysis. For example, for agricultural purposes, samples are usually taken from the topsoil layer.

3. Sampling Pattern: Divide the area you want to test into zones that have similar soil characteristics, such as texture, colour, and land use history. Take multiple sub-samples from each zone, and then mix them together in a clean container to create a composite sample for that zone.

4. Avoid Contamination: Be cautious not to contaminate the soil samples during the collection process. For instance, do not touch the soil with bare hands and avoid contact with unnecessary surfaces.

5. Sample Size: Collect enough sub-samples from each zone to ensure a representative composite sample. Typically, collecting 10 to 15 sub-samples per zone is recommended.

6. Labelling: Clearly label each sample with information such as the location, depth, date, and any relevant details about the area, including the type of crop or plant grown there.

7. Avoid Rainy Conditions: Sampling in wet or rainy conditions can lead to inaccurate results as it may affect the soil's properties.

8. Keep Records: Maintain detailed records of the sampling process, including the methods used and any potential issues encountered.

9. Dispose of Waste Properly: If you generate any waste during the sampling process, dispose of it according to local regulations.

PREPARE SOIL SAMPLES FOR SOIL TEST

The following procedure are followed to prepare soil samples:

1. Gather the necessary tools: You will need a clean bucket, a soil probe or shovel, and a clean plastic bag or container for collecting the soil sample.

2. Determine the sampling area: Identify the area from which you want to collect the soil sample. It's important to consider factors such as soil type, vegetation cover, and land use history. If you have different areas with distinct characteristics, sample each area separately.

3. Remove any debris: Clear away any surface debris, such as rocks, sticks, leaves, or grass, from the sampling area. This ensures that your sample represents the soil's composition accurately.

4. Collect the soil sample: Use a soil probe or shovel to collect soil from multiple spots within the sampling area. Take samples at a consistent depth, typically 6 to 8 inches (15 to 20 centimeter) deep. For lawns or gardens, take samples from several locations and mix them together in the clean bucket to obtain a composite sample.

5. Remove stones and roots: Once you have collected the soil samples, remove any stones, roots, or large clumps that could interfere with the testing process. Break up larger clumps of soil and ensure that the sample is well-mixed.

6. Air-dry the sample: Spread the soil sample on a clean surface, such as a tray or newspaper, and allow it to air-dry naturally. Avoid using artificial heat sources, as they can alter the soil's properties. The sample should be dry enough to crumble easily but not excessively dry or powdery.

7. Package the sample: Once the sample is dry, place it in a clean plastic bag for soil sampling. Seal the bag tightly to prevent any moisture loss or contamination.

8. Label the sample: Clearly label the bag with information such as your name, the sampling location, the date, and any other relevant details. This ensures that the sample can be identified accurately. Sample are ready for testing.

REQUIRED EQUIPMENTS FOR SOIL TEST

1. Electronic Compact Balance. Model No. BL-P3/6002 (Eco Star)

Soil Test Kit Model No. A/O Includes:

2. Polythene sheet, Polythene bag and Polythene funnel.
3. High density polythene beaker (50 ml and 100 ml).
4. Vials with rubber stopper with markings for 2 ml, 4 ml, 5 ml and 10 ml.
5. Measuring cylinder (10 ml and 100 ml) and Washing brush.
6. Small test tube (length about 4 cm).
7. High density polythene scoop (2 gm and 5 gm).
8. Filter paper 9 cm diameter.
9. Normal Dropper and Graduated dropper.
10. Polythene wash bottle.
11. Syringe (2 ml capacity) with needle.
12. Glass rod and Glass marking pencil.
13. **Container No. 1:** Dropping polythene bottle containing Indicator No. 1 solution.
14. **Container No. 2:** Dropping polythene bottle containing indicator No. 2 solution.
15. **Container No. 3:** High density polythene container containing Barium Sulphate.
16. **Container No. 4:** High density polythene bottle containing 500 ml solution for Phosphate estimation.
17. **Container No. 5:** High density polythene container containing about Darco G 60.
18. **Container No. 6:** High density polythene bottle containing 100 ml solution for Phosphate estimation.
19. **Container No. 7:** Glass bottle containing 25 ml solution for Phosphate estimation.
20. **Container No. 8:** Glass bottle containing Hydrochloric acid.
21. **Container No. 9:** Polythene bag containing Zinc dust.
22. **Container No. 10:** High density polythene bottle containing 500 ml solution for Potassium estimation.
23. **Container No. 11:** High density polythene bottle containing 100 ml solution for Potassium estimation.
24. **Container No. 12:** Glass bottle containing 25 ml solution for Potassium estimation.
25. **Container No. 13:** Glass bottle containing 50 ml solution for Nitrate nitrogen estimation.
26. **Container No. 14:** High density polythene bottle containing 25 ml solution for Ammoniacal nitrogen estimation.
27. High density polythene bottle containing 500 ml distilled water.
28. Colour chart.

PHOTOGRAPHS OF SOIL COLLECTION, SAMPLE PREPARATION AND SOIL TESTING

Plate 1: Collection of Soil Samples from College Ground on 19/06/2023

Plate 2: To Prepare Soil Samples for Soil Test on 03/07/2023

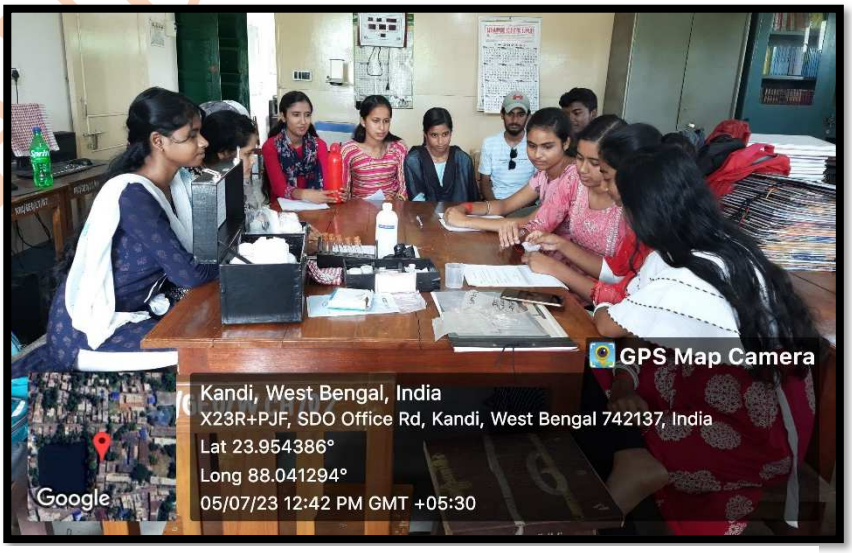

Plate 3: pH Test by using Soil Kit (Model A/O) on 05/07/2023

DETERMINATION OF SOIL pH
i.e., Acidity or Alkalinity

Procedure:

1. Take clean test tube & pour distilled water up to 5ml. mark.

2. Put 2 gm. of soil to the test tube with the scoop provided.

3. Add 0.5 gm. (I spoonful) of barium sulphate from Container No. 3.

4. Allow the test tube to stand for 20 minutes with occasional shakings.

5. Add 5 drops of indicator No. 1 from Container No. 1 to the above, close the mouth of the tube with a clean rubber stopper and shake the contents thoroughly. Allow the soil to settle down completely.

6. Compare the colour of the upper liquid in the test tube with the Colour Chart No. 1 and find out the nearest match which will indicate its pH.

7. If the colour of the upper liquid in the test tube indicates pH near 6 then repeat the whole experiment using indicator No. 2 instead of indicator No. 1 and match the colour of the upper liquid with the Chart No. 2.

FIELD BOOK
ON
DETERMINATION OF SOIL pH USING SOIL KIT

SAMPLE NO.	SITE OF SAMPLE COLLECTION	DATE & TIME OF SAMPLE COLLECTION	DATE & TIME OF TEST	pH VALUE	REMARKS
1	College Ground	19/06/2023 12:30 PM	05/07/2023 12:30 PM	**8.5**	Strongly Alkaline

ESTIMATION OF NITROGEN

Procedure:

1. Take a clean test tube & fill it with distilled water up to 10 ml. mark.

2. Add to above 2 gm. of soil sample with the scoop provided and close the test tube with a clean stopper.

3. Shake thoroughly for 5 minutes and filter. (How to filter a solution has been explained in the text).

For Nitrate Nitrogen

Transfer 1 drop of the filtrate to a clean 2" test tube and carefully add 8 drops of solution from Container No. 13. Compare the colour with the Colour Chart No.5.

For Ammoniacal Nitrogen

Transfer 4 drops of filtrate from step 3 to another clean 2" test tube and add 1 drop of solution from Container No. 14. Compare the colour with the Colour Chart No. 6.

FIELD BOOK
ON
ESTIMATION OF SOIL NITROGEN USING SOIL KIT

SAMPLE NO.	SITE OF SAMPLE COLLECTION	DATE & TIME OF SAMPLE COLLECTION	DATE & TIME OF TEST	ESTIMATED NITRATE NITROGEN (Lbs/acre)	ESTIMATED NITRATE NITROGEN (Kg/acre)	ESTIMATED AMMONIACAL NITROGEN (Lbs/acre)	ESTIMATED AMMONIACAL NITROGEN (Kg/acre)	REMARKS
1	College Ground	19/06/23 12:30 PM	12/07/23 12:00 PM	**45**	**20.41**	**13**	**5.89**	*

* **Remarks**: Soil has high nitrate levels and low ammoniacal nitrogen levels, it indicates a specific nutrient imbalance that can impact plant growth and health.

ESTIMATION OF AVAILABLE PHOSPHATE (OLSEN'S METHOD)

Procedure:

1. Take a clean test tube.
2. Pour solution from Container No. 4 in the test tube up to 10 ml. mark.
3. Add a pinch of darco from Container No. 5 to the above test tube.
4. Add to above, 5 gm. of soil with the scoop provided.
5. Close the tube with a clean rubber stopper. Shake the contents thoroughly for 3 minutes and filter the solution. (How to filter a solution has been explained in the text).
6. Take the filtered solution up to 2 ml. mark in another test tube.
7. Pour 2 ml. of solution from Container No. 6 in the above test tube containing filtered solution.
8. Wash the inner side of the test tube with about 2 ml. of distilled water from the wash bottle. Keep it, this will be required at step No. 11.
9. Take 66 ml. of distilled water in a 100 ml. beaker.
10. Add to the beaker containing water 0.5 ml. of the solution from Container No, 7.
11. Take 1 ml. of this solution from the beaker and add it to the solution at step No. 8.
12. Shake the contents thoroughly after closing the tube with a stopper.
13. Add distilled water up to 10 ml. mark in the above test tube.
14. Compare the colour of the solution with colour Chart No. 3.

FIELD BOOK
ON
ESTIMATION OF SOIL PHOSPHORUS USING SOIL KIT

SAMPLE NO.	SITE OF SAMPLE COLLECTION	DATE & TIME OF SAMPLE COLLECTION	DATE & TIME OF TEST	ESTIMATED PHOSPHORUS (Lbs/acre)	ESTIMATED PHOSPHORUS (Kg/acre)	REMARKS
1	College Ground	19/06/2023 12:30 PM	18/07/2023 11:30 PM	**Less than 20**	**9.07**	Low

ESTIMATION OF AVAILABLE POTASSIUM

Procedure:

1. Take a clean test tube.

2.Pour in it solution from Container No. 10 up to 10 ml. mark.

3. Add 5 gm. of soil with the scoop provided to the above solution.

4. Shake the solution for one minute after closing the tube with a rubber stopper and then filter. Keep the filtrate for use at step 8.

5. Take another clean test tube.

6. Pour solution from Container No. 11 up to 2 ml. mark.

7. Add 6 drops of solution from Container No. 12 to the above without touching the side of the test tube.

8. Take 2 ml. of the solution from step 4 in a syringe.

9. Inject the solution from the syringe with force into the other solution at step 7. Turbidity will develop in the solution after five minutes.

10. Compare the turbidity with the Colour Chart No. 4.

FIELD BOOK
ON
ESTIMATION OF SOIL POTASSIUM USING SOIL KIT

SAMPLE NO.	SITE OF SAMPLE COLLECTION	DATE & TIME OF SAMPLE COLLECTION	DATE & TIME OF TEST	ESTIMATED POTASSIUM (Lbs/acre)	ESTIMATED POTASSIUM (Kg/acre)	REMARKS
1	College Ground	19/06/2023 12:30 PM	19/07/2023 11:30 PM	**350**	**158.76**	Very High