Soil pH

Study materials (write this articles in your Practical Khata and keep blank in result section)
For 4th SEM Gen
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What is Soil pH ? :

Soil pH is a measure of soil acidity or alkalinity. It is an important indicator of soil health. It affects crop yields, crop suitability, plant nutrient availability, and soil micro-organism activity which influence key soil processes. Soil pH can be managed by measures such as applying the proper amount of nitrogen fertilizer, liming, and cropping practices that improve soil organic matter and overall soil health.

Soil pH is determined by the concentration of hydrogen ions (H+). It is a measure of the soil solution's (soil water together with its dissolved substances) acidity and alkalinity, on a scale from 0 to 14 (Figure 1). Acidic solutions have a pH less than 7, while basic or alkaline solutions have a pH greater than 7. By definition, pH is measured on a negative logarithmic scale of the hydrogen ion concentration [H+], i.e., pH = -log [H+]. Therefore, as hydrogen ion concentration (and acidity) goes up, pH value goes down. Also, because pH is a logarithmic function, each unit on the pH scale is 10 times more acidic than the unit above it. For example, a pH 6 solution has a 10 times greater concentration of H+ ions than a pH 7 solution, and a 100 times higher concentration than a pH 8 solution.

Inherent Factors Affecting Soil Ph:

Inherent factors affecting soil pH such as climate, mineral content and soil texture cannot be changed. Natural soil pH reflects the combined effects of soil-forming factors (parent material, time, relief or topography, climate, and organisms). The pH of newly formed soils is determined by minerals in the soil's parent material. Temperature and rainfall control leaching intensity and soil mineral weathering. In warm, humid environments, soil pH decreases over time in a process called soil acidification, due to leaching from high amounts of rainfall. In dry climates, however, soil weathering and leaching are less intense and pH can be neutral or alkaline. Soils with high clay and organic matter content are more able to resist a drop or rise in pH (have a greater buffering capacity) than sandy soils. Although clay content cannot be modified, organic matter content can be changed by management. Sandy soils commonly have low organic matter content, resulting in a low buffering capacity, high rates of water percolation and infiltration making them more vulnerable to acidification.

Soil pH Management:

Soil pH is affected by land use and management. Vegetation type impacts soil pH. For example, areas of forestland tend to be more acidic than areas of grassland. Conversion of land from forestland or

grassland to cropland can result in drastic pH changes after a few years. These changes are caused by a loss of organic matter, removal of soil minerals when crops are harvested, erosion of the surface layer, and effects of nitrogen and sulfur fertilizers. Addition of nitrogen and sulfur fertilizers can lower soil pH over time. Measures that limit or correct acidification

- Liming to raise the pH of an acid soil.
- Applying nitrogen and sulfur according to crop needs
- Apply N fertilizer in appropriate amounts, in a timely manner (relative to crop uptake) and use of good irrigation management to minimize nitrate-N leaching
- Diversified crop rotations to interrupt acidifying effects from N fertilizer application
- Applying irrigation water, manure, and other organic materials that have a high content of calcium or magnesium bicarbonates
- Use of continuous no-till, cover crops, applications of solid manure, and diverse rotations with high-residue crops in order to increase organic matter content and improve soil buffering capacity to limit changes in pH.

Determinatio of Soil pH

Procedure:

1. Take clean test tube & pour distilled water upto 5 ml. mark.
2. Put 2gm. Of soil to the test tube with the scoop provided.
3. Add 0.5 gm.(1 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. 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.

Result:

p H of our Sample soil is -------