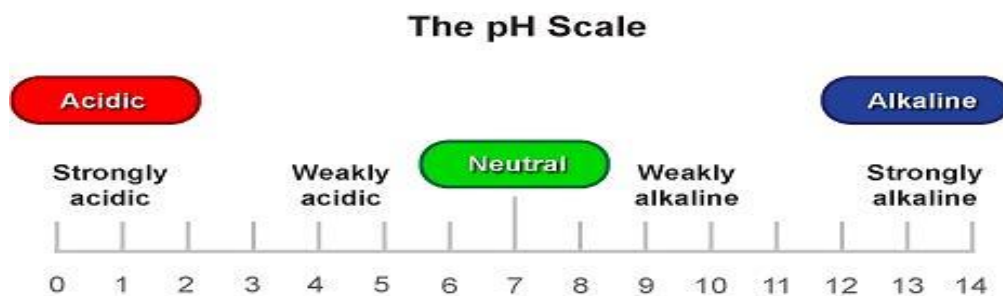


Soil pH

Soil pH is an important measurement parameter to assess potential availability of beneficial nutrients and toxic elements to plants. pH is a measure of the acidity of the water or soil based on its hydrogen ion concentration and is mathematically defined as the negative logarithm of the hydrogen ion concentration, or $\text{pH} = -\log[\text{H}^+]$, where the brackets around the H^+ symbolize "concentration".

The pH of a material ranges on a logarithmic scale from 1-14, where pH 1-6 are more acidic, pH 7 is neutral, and pH 8-14 are more basic. Lower pH corresponds with higher $[\text{H}^+]$, while higher pH is associated with lower $[\text{H}^+]$.



Soil pH is effected by both acid and base forming cations (positively charge ions) in the soil. Common acid-forming cations are hydrogen (H^+), aluminum (Al^{+3}) and iron (Fe^{+2} or Fe^{+3}). Where as common base-forming cations include Calcium (Ca^{+2}), Magnesium (Mg^{+2}), Potassium (K^+) and Sodium (Na^+). Soil tend to become acidic as a results of :1-rainwater leaching away basic ions (calcium, Magnesium, Potassium and Sodium). 2- Carbone dioxide from decomposing organic matter and root respiration dissolved in soil water to form a weak organic acid. 3- formation of strong organic and inorganic acid such as nitric and sulfuric acid from decaying organic matter and oxidation of ammonium and sulfur fertilizers.

Soil pH Determination:

A meter or probe and litmus paper can be used to measure the pH of a sample, the method of meter or probe is more accurate, but expensive. The pH meters are calibrated using special solutions, or buffers with a known pH value (pH 4, 7 and 9). Using litmus or pH paper is the simpler and less expensive way of measuring pH. This method employs special strips of paper that change color based on the pH of a sample solution. The strips come in a variety of resolutions, from simple acid vs. base comparison to a narrow resolution of pH values. These strips of paper can measure the difference 0.2-0.3 pH in a sample. Litmus paper changes color based on the sample solution is acidic or basic, turning red or blue, respectively. pH strips indicate a sample's pH by changing color as well; these colors are indicated on the package and vary for different pH ranges and manufacturers.

Measuring pH using litmus paper or pH strips:

1. Measure a volume of soil from 10 to 20 mL, or mass of soil from 10 to 20 g, and add it to a sample container. Add an equal amount of distilled water to the soil and stir for 1 minute. Let the suspension stand for 15 minutes.
2. Place a droplet of sample on the paper - be sure you drop or pour the sample over the paper rather than dipping the paper into the sample, as the latter may contaminate the sample.
3. Observe color change on the paper. If using litmus paper the paper will turn a red or pink color if the sample is acidic, while a blue paper indicates a basic sample. If using pH strips, colors corresponding to pH values should be listed on the packaging.

