Soil chemistry plays an important role in the availability of nutrients to the plant. Acidity or alkalinity (basicity) of the soil solution determines availability of nutrients. Some understanding of this process is necessary for meeting the challenges of growing high-quality crops most efficiently. A lack of knowledge in this area may cause plant producers to incorrectly assess plant problems and spend unnecessary time and money trying to resolve them. Some of the symptoms of incorrect acidity or alkalinity in the soil may appear to be problems associated with diseases and other pests. Proper monitoring of irrigation water and soil allows growers to understand what is going on below the surface of the soil so that symptoms can be handled properly.

Soil pH is a measure of the amount of acidity or alkalinity (basicity) that is present in soil solution (soil and its interaction with water). This can directly affect the solubility and uptake of nutrients by plant roots. Many plants are adaptable to a range of soil pH usually from 5.5 to 7.5. Roots are able to alter their micro-environment and extract nutrients that are present in the soil. Some plants such as azaleas, blueberries, and pines grow optimally at a lower pH. A key factor in understanding the pH of soil solution is to be able to measure it properly.

There are many meters available to measure pH. These range from a simple pen type meter to a laboratory bench type model. The prices of meters can range from $100-$800 depending upon the sophistication and accuracy of the model. There are even strips of paper that give colors corresponding to pH. Accurate pH measurement and consistent results can only be achieved by using correct procedures.

**Checklist of Procedures. (Hanlon, E.A. CIR1081)**

This procedure uses a 20-cc (~25- g) soil scoop and 40 mL of water to obtain a 2:1 water-to-soil ratio. However, sample pH may also be affected by contaminated water, by microbial activity if
samples are allowed to sit for several hours before determining pH, or by improper scooping tech-
niques. It can also be affected by type and how the test water was stored. Use the same consistent
procedure each time you test! This is extremely important to have consistent results.

A. Standard Solutions
Obtain commercial standard buffer solutions of pH 4.00 and 7.00 for meter calibration.

B. Sample Handling and Preparation
The soil sample should be air-dried and passed through a 2-mm sieve.

C. Soil Procedure for a 2:1 pH test
1. One scoop of soil to a 3-oz plastic cup using a 20-cc (~25- g) scoop.
2. Add 40 mL of water (distilled or de-ionized water) to each cup using an automatic pipette or
suitable volumetric container. Stir with a glass rod and let the sample sit for 30 min. *(Remember
to use the same type of water each time you test!)*
3. Calibrate the pH meter according to the instructions with meter. It is best to calibrate with at
least two buffer solutions (pH 4.0 and pH 7.0).
4. Stir the sample again immediately before measuring the l pH. Do not place the electrode(s) di-
rectly in the sand layer at the bottom of the cup. The electrode(s) should be positioned in the solu-
tion just above the sand layer. Sometimes measurements must be repeated three times to ensure
accurate results.
5. Record pH to the nearest 0.1 pH unit.
6. Properly triple rinse electrode(s) with distilled or de-ionized water after each use and before
testing another sample.

Precautions
Soil pH can be affected by placement of the irrigation drip tubes or spray stakes and the
distance from the watering zone. Remember to sample where the roots are located and sample the
area approximating the soil conditions the roots are experiencing. Make sure a homogenous sam-
ple is used.

Use distilled or de-ionized water when measuring pH of sample. Distilled water comes
from a distillation process to remove ions that can change pH. De-ionized water is usually proc-
essed through resin filtration that removes ions and causes the water to be extremely reactive
(Think of the analogy, nature abhors a vacuum.). Either water should be stored for a limited time
and in an air-tight container. Use fresh water each time you test because water pH changes over
time. Make sure that you test the pH of the test water before you start. Water that is close to pH
7.0 is the best. pH can vary within a sample; even within the soil slurry above the soil in a sample.
Also, pH measurements can be affected by temperature, moisture, organic particles, environment, microbial activity, and can change over time.

Check pH electrode(s) along with batteries in the meter to ensure proper calibration. Weak batteries can result in faulty pH readings. Calibrate your pH meter frequently. It is best if this is done prior to each use. After calibration of meter, do not reuse standardized buffer solutions and do not store electrode(s) dry. Store electrode(s) in fluids (either buffer solution 4 or 7, tap water, or best to use pH storage solution) but do not use de-ionized water as this will pull ions from electrode(s) and cause failure.

References


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