

Testing Soil pH Using pH Tester

Measurement of pH in soil is very common as it affects the relative availability of soil nutrients. If the pH is not within an acceptable range, growth will be curtailed and erosion potential is increased. The ability of the soil to provide adequate nutrition to the plant depends on four factors:

- the amount of various essential elements present in the soil
- their forms of combination
- the processes by which these elements become available to plants
- the soil solution and its pH

The amount of various elements present in the soil depends on the nature of the soil and on its organic matter content since it is a source of several nutrient elements. Soil nutrients exist both as complex, insoluble compounds and as simple forms usually soluble in soil water and readily available to plants. The complex forms must be broken down through decomposition to the simpler and more available forms in order to benefit the plant. These available forms are summarized in Table A. The pH value is a measure of acidity or alkalinity. The effect of pH on availability of essential elements is shown below.

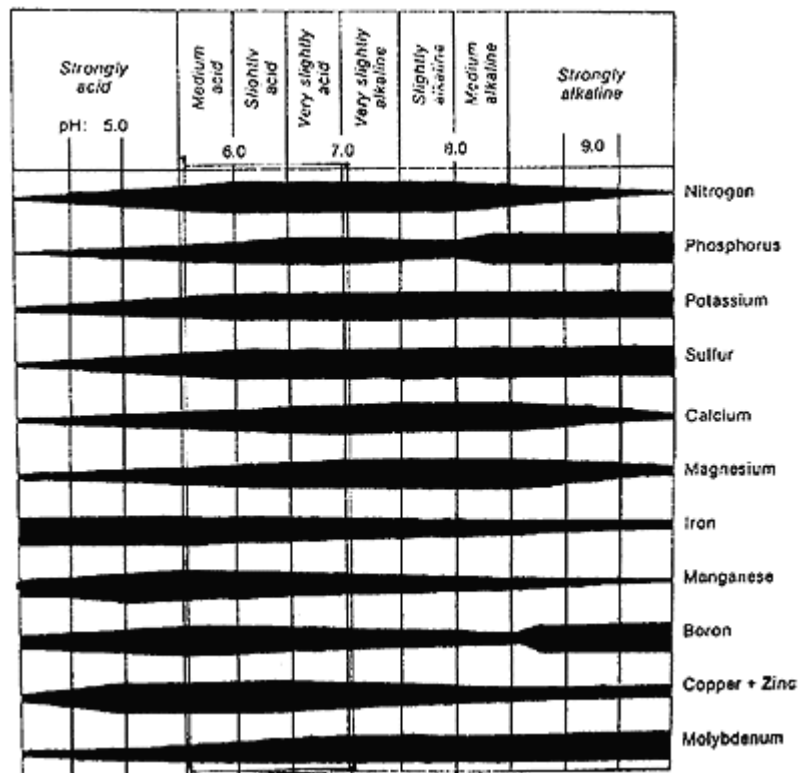


Table A The effect of soil pH on availability of plant nutrients (From Hunger Signs in Crops, edited by H.B. Sprague, 1964, pg. 18)

Iron, manganese and zinc become less available as the pH is raised from 6.5 to 7.5 or 8.0. Molybdenum and phosphorus availability, on the other hand is affected in the opposite way, being greater at the higher pH levels. At very high pH values the bicarbonate ion (HCO_3^-) may be present in sufficient quantities to interfere with the normal uptake of other ions and thus detrimental to optimum growth. When inorganic salts are placed in a dilute solution they dissociate into electrically charged units called ions. These ions are available to the plant from the surface of the soil colloids and from salts in the soil solution. The positively charged ions (cations) such as potassium (K^+) and calcium (Ca^{2+}) are mostly absorbed by the soil colloids, whereas the negatively charged ions (anions), such as chloride (Cl^-) and sulphate (SO_4^{2-}) are found in the soil solution.

Soil Sample Preparation

1. Scoop up loose soil samples with a clean, dry plastic jar. Avoid touching the soil with your hands to prevent contaminating the sample.
2. Remove any stones and crush any clumps of soil to prevent breaking the delicate pHScan glass electrode bulb.
3. Fill up your sample soil up to 3/4 and add distilled water to the jar. Cap the jar tight and shake it vigorously a few times. Let the mixed sample stand for 5-10 minutes to dissolve the salts in the soil.
4. Prepare to log your test result in your data book for later reference.
5. Remove the caps of the jar and your pHScan. Dip the pHScan electrode into the wet soil slurry and turn the tester on. Take the reading when it stabilizes.
6. Press HOLD button to freeze the displayed pH measurement. Record the pH reading in your data book.
7. Press HOLD button again to release the reading.
8. Rinse your pHScan tester in clean water between each use.

Calibrate the pHScan tester using the instruction provided in the packaging box.

Soil pH Data from pHScan

The pH test value in this procedure is accurate to ± 0.5 pH or better (usually ± 0.2 pH). The soil sample preparation and test procedure is adapted from accepted laboratory methods. Soil pH testing in the field gives small differences between tests. Using the 0.1 pH resolution pHScan 1 minimizes these differences.

Most soil pH measurement cannot achieve ± 0.1 pH accuracy, even with elaborate laboratory procedures and expensive pH instruments. Usually, soil pH data for many applications do not require testing for better accuracy than a few tenths of a pH or ± 0.5 pH in some instances. pHScan 1 easily meets requirements for soil pH testing, and is very economical to use in places where many samples and tests are taken.

Use of Data

Use this soil pH test data when consulting with authorities from your local agricultural extension office, local growers associations, university agronomy/agriculture on soil pH. You must consult these agencies before putting chemicals on soil to correct soil pH, and for finding the cause of soil pH problems. You can consult reference books, papers and pamphlets.

Recommendations for Best Results

Prepare and run at least three tests of the same soil sample to confirm results. Minor ($< \pm 0.5$ pH) or no differences between readings indicate good technique and high confidence in results. Larger differences ($> \pm 0.5$ pH) require more testing and consulting with the authorities mentioned above. Compare your test results with secondary soil pH references available from these test authorities. Confirm good technique and accuracy of your test results with these agencies.