



knowledge to grow

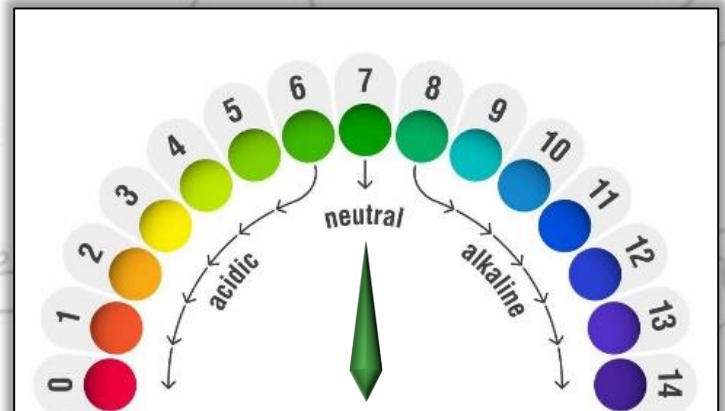


What is Soil pH?

Soil pH is considered a “master variable” that influences most chemical processes in the soil and therefore is of major significance when assessing soil health. Specifically, soil pH is a measure of the concentration of hydrogen ions of the soil solution.^{1,2} Water in soil contains hundreds of dissolved organic and inorganic substances so it is more accurately called the soil solution.³ The important role of the soil solution is that it serves as a constantly replenished, dilute nutrient solution that provides dissolved nutrients elements like calcium and potassium to plant roots.³

The complete pH scale ranges from 0 to 14 with 7 being neutral. Below 7 pH becomes increasingly acidic and above 7 pH becomes increasingly basic (also called alkaline).¹ The scale is logarithmic so for every 1 unit of pH decrease, the hydrogen concentration increases 10 times.^{2,3} For example, if the pH of a soil is 4, then it has 1,000 times more hydrogen ions in the soil solution than a soil with a pH of 7.²

Generally, plants take up nutrients only if they are dissolved in water, so pH influences the solubility of plant nutrients and other elements in the soil, which influences their availability to plants.² Some nutrients are more soluble at high pH, others at low pH, and others at ranges in between.² Unfortunately, increased solubility of some elements can become problematic. For example, the increased solubility of aluminum and manganese at low soil pH levels can become toxic to plants.² Soil pH levels can also have direct and indirect impacts on the activity of soil organisms that build soil structure, cycle organic matter, and some of which are able to perform nitrogen fixation in the nodules on the roots of legumes.²



Soil pH is measured on a scale from 0 to 14. Pure water is neutral so when measured on a pH scale it registers as a 7. As pH decreases it becomes increasingly acidic. Battery acid has a pH of 0. As the pH increases it becomes more alkaline. Drain cleaner has a pH of 14. Soil pH has a major influence on nutrient solubility.



Overall, the key factor influencing the natural soil pH is the geological materials that the soil has formed from, which is called the soil parent material.² However, there are many natural and human factors that also result in soil pH changes. If large amounts of ammonium-containing fertilizers are applied to soil it can drop the soil pH.² Whereas, naturally decaying organic matter releases organic acids that can also make soil more acidic.² Typically, most growers will face challenges with soil pH at some point. For the most part, the pH problem is usually decreasing soil pH.^{2,4}

Plant species differ in their requirements and tolerance of soil pH conditions. However, all plants generally have specific pH ranges at which they perform best.² Whether you're growing field crops or trying to achieve a vivid, lush green lawn, one of the very first parameters that must be included as part of any soil health testing regime is a measure of soil pH. One of the rewarding things about monitoring soil pH is that quick changes, like liming, can be made to correct problems.⁴ Since soil pH is a variable that is naturally changing in soil and has such a strong impact on plant performance and growth it is a very important variable to measure and monitor. As such, monitoring and managing soil pH is one of the first steps in good soil management.²

References:

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4. Brown, Christine et al. (Eds). *Agronomy Field Guide for Crops Publication 811*. Ontario Ministry of Agriculture, Food, and Rural Affairs. Queen's Printer for Ontario, 2017.