

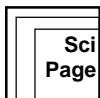
SOIL pH Teaching Tips



LEARNING OBJECTIVES

Youth will be able to

- * Explain what pH is.
- * Compare different values on the pH scale.
- * Explain how soil pH affects growing plants.
- * Explain how to change soil pH.
- * Measure soil pH using red cabbage water.



HOW TO USE THE SOIL pH SCIENCE PAGE

A good way to introduce this topic is to give youth the opportunity to taste an acid and a base. You will need Q-tips, baking soda in water, and vinegar. Label the vinegar "ACID" and the baking soda "BASE." Have youth dip a Q-tip in each liquid, and describe how it tastes. They may discover that the taste buds for bitter are concentrated at the back of the tongue, and the taste buds for sour are along the sides of the tongue. Explain that acids have a sour taste, and bases have a bitter taste. Caution youth to never touch or taste strong acids and bases. Some are so strong they can destroy skin on contact.

Make sure youth understand the pH scale, and the fact that acidity increases ten times each time you move one unit lower, and alkalinity (how basic a substance is) increases 10 times each time you move one unit higher. Ask: How much more acidic is pH 3 than pH 4? (Answer: 10 times) How much more acidic is pH 2 than pH 4? (Answer: 100 times) How much more basic is pH 10 than pH 9? (Answer: 10 times) How much more basic is pH 12 than pH 9? (Answer: 1000 times)

Youth who have studied chemistry may be familiar with the

concept of hydrogen ions. Explain that a pH reading describes the concentration of free hydrogen ions in a solution. Each pH value indicates the concentration of hydrogen ions (H^+) ten times greater than the next higher pH value. Thus, a solution of pH 5 has ten times more hydrogen ions than a solution of pH 6.

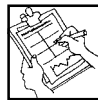
Explain that each section of the Science Page answers an important question about soil pH—why it is important, how it can be measured, and how it can be changed. Ask: Why do you think a soil pH test is the test most often performed on soil? (Answer: Soil pH has a profound effect on plant growth because it can affect the availability of plant nutrients. A soil can have all the nutrients that plants need to grow, but the pH may be too high or too low. In that case, either the nutrients will not be available to plants, or their concentration in soil water will be too high, and plants will take them up in toxic amounts.)

If you have a soil pH test kit, show it to youth. Explain that the kits are very inexpensive, and can be purchased from many garden stores. It is important to test soil before adding lime, sulfur, or other substances to change the soil pH. Most test kits give directions on how much lime or sulfur to add to the soil based on its pH.



PUZZLE

Answers (from left to right): B, pH 3 is ten times more acidic than pH 4; E, a soil with a pH of 4.5 may have toxic levels of iron, aluminum, and manganese; D, a soil pH of 6.5 is suitable for most vegetables; A, pH 7 is neutral; C, pH 9 is 100 times more basic than pH 7.



TRY THIS

The cabbage water should turn purple when baking soda is added and red when vinegar is added. The color of the cabbage water should give you an approximate measurement of soil pH. If you have a soil pH test kit, you may want to have youth compare the results they get using the two methods.

Explain to youth that not only red cabbage, but other red or purple plant pigments will change color in an acid or base. You can demonstrate this by pouring vinegar on a violet flower. It will turn from purple to red.



SPOTLIGHT ON RESEARCH

This information is from the following article:
Bates, T.R., Lakso, A.N., Dunst. R., Throop, P., Goffinet, M. "The Response of Young 'Concord' Grapevines to Soil pH." Lake Erie Grape Research. 2001. Department of Horticultural Sciences, Cornell University Vineyard Laboratory, 412 East Main St., Freedonia, NY 14063. <<http://lenewa.netsync.net/public/Bates/Bates4.htm>>.