

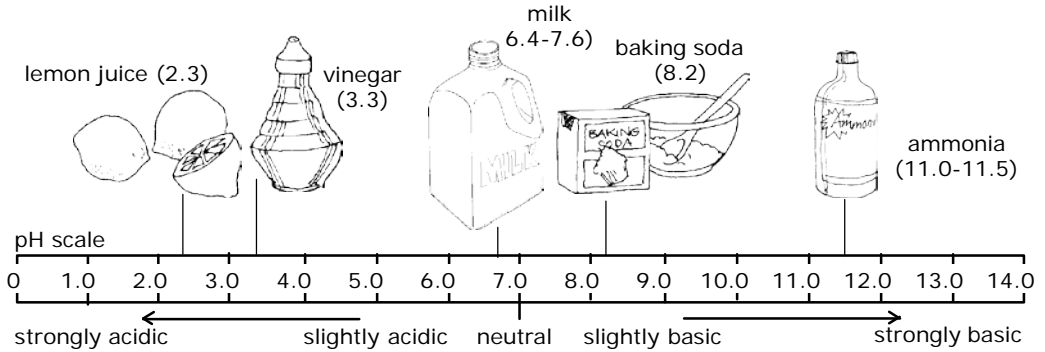
SOIL pH Science Page

WHAT IS SOIL pH?

Some substances, like lemon juice, are acids. Acids have a sour taste. Other substances, like aspirin, are bases. Bases have a bitter taste. Substances that are neither acidic nor basic are said to be neutral.

The pH of a substance, such as soil, is a measure of how acidic or basic it is. The pH scale goes from 0 to 14. The halfway point, pH 7, is neutral. A pH value below 7 is acidic; a pH value above 7 is basic.

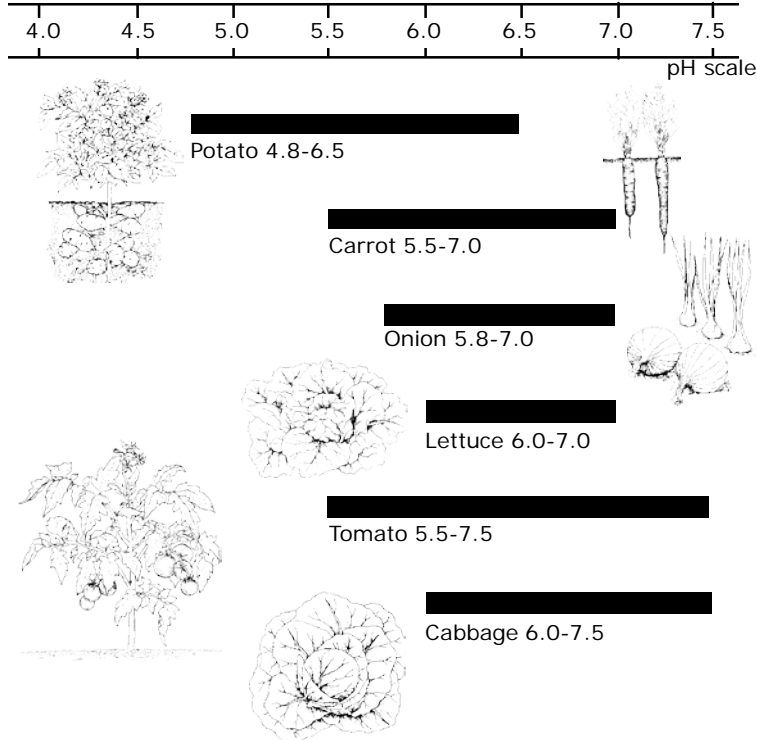
Each time you move one unit lower on the pH scale, acidity increases ten times. For example, a pH of 6 is ten times more acidic than a pH of 7.



WHY IS SOIL pH IMPORTANT?

Soil pH is important because it affects the health of plants. Before a nutrient can be used by plants, it must be dissolved in soil water. Most plant nutrients dissolve when the soil is slightly acidic. Many plants do well at a pH range of about 6 to 7.

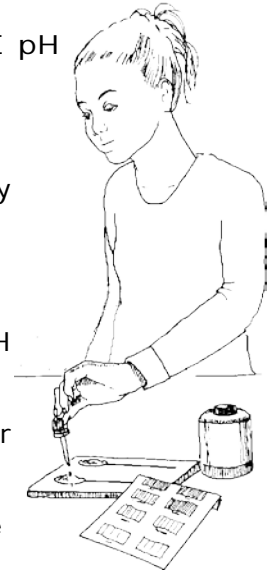
Soil pH levels for best growth of common vegetables



When soil is acidic, minerals, such as iron and manganese, dissolve in soil water. In small quantities, these minerals help plants to grow. However, when the soil is too acidic, these minerals become so abundant that they can harm, or even kill, plants.

HOW DO YOU MEASURE THE pH OF SOIL?

Many liquid dyes change color when they come into contact with acids or bases. You can measure the pH of a soil by saturating the soil with dye for a few minutes, and observing the color of the liquid.



HOW DO YOU CHANGE THE pH OF SOIL?

You can add substances to soil to make them more or less acidic.



You can add lime or wood ash to acidic soils to make the soil less acidic.

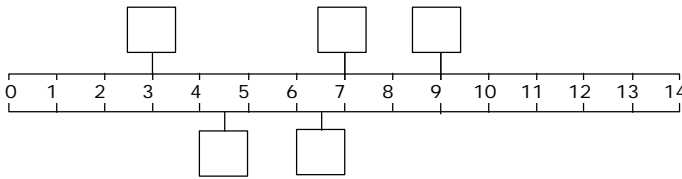


You can add sulfur or peat moss to basic soils to make the soil more acidic.



PUZZLE

Here is a pH scale. Use the letter key below to label the scale:



- A Neutral pH
- B pH ten times more acidic than 4
- C pH 100 times more basic than 7
- D soil pH suitable for most vegetables
- E pH of a soil with toxic levels of iron, aluminum, and manganese



TRY THIS

TEST THE pH OF SOIL

What you need

- * 2 cups of red cabbage, chopped
- * 1 cup of water
- * vinegar
- * baking soda
- * 1 tablespoon of dry soil samples to test
- * stove or hot plate
- * pot with lid
- * strainer
- * white dish
- * tablespoon
- * eyedropper



What to do

1. Boil a cup of water in a pot. Add the cabbage leaves. Cover the pot, and boil until the water turns dark purple.
2. Strain the cabbage water through a strainer and set it aside to cool. You are going to use this cabbage water to measure soil pH.
3. Put a couple of tablespoons of the cabbage water in a white dish. Add 1/8 teaspoon of baking soda. What color does the cabbage water turn? Then add some vinegar, a drop at a time, until the cabbage water turns another color. What color does it turn?
4. Place about a half teaspoon of a soil sample on a clean white dish. Add fresh cabbage water a drop at a time until the soil is just saturated. Do not flood the soil. Move the dish slightly from side to side for about one minute to allow the cabbage water to react with the soil.
5. Tip the dish so that a drop of the cabbage water will flow from the soil. Note the color of this cabbage water.

Conclusion

Red indicates the soil is too acidic for most crops; blue or green indicates it is too basic; purple or slightly bluish-purple indicates the soil is just right. Does the pH of your soil sample indicate that the soil is suitable for crops?



SPOTLIGHT ON RESEARCH

Plants can change the pH of soil

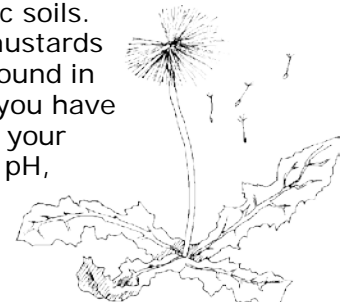
Grapes are grown in a wide variety of soils in New York State. Farmers wanted to know how soil pH affects the growth of grape vines, so an experiment was conducted to find out. The experiment consisted of seven soil pH treatments. Seven 25-gallon plastic pots were filled with soil from the grape vineyards. Scientists adjusted the soil pH with limestone or sulfur. The original soil pH was 5.2. Ground sulfur was used to create three soil pH treatments more acidic than 5.2. Limestone was used to create three soil pH treatments more basic than 5.2.

Scientists discovered grape plants grew worse in soil with pH below 4.5 compared with grape plants in soils with pH between 5 and 7.5. Interestingly, scientists also discovered the pH of the soil around the roots of grapes planted at pH 4.0 increased to pH 4.5. And the pH of the soil around the roots of grapes planted at pH 7.0 decreased to pH 6.5. Somehow the roots of the grapes changed the soil pH to make it more favorable!

Source: Bates, T.R., Lakso, A.N., Dunst, R., Throop, P., and Goffinet, M. (2001). The response of young 'Concord' grapevines to soil pH. Lake Erie Grape Research. Department of Horticultural Sciences, Cornell University Vineyard Laboratory, 412 East Main St., Freedom, NY 14063. <<http://lenewa.netsync.net/public/Bates/Bates4.htm>>

Weeds may serve as soil pH indicators

Some weeds, such as sorrels, docks, dandelions, and Queen-Anne's-lace, grow in poor, acidic soils. Other weeds, such as mustards and thistles, are often found in soils with a high pH. If you have these weeds growing in your garden, change the soil pH, and many of these weeds may leave on their own!



dandelion



RIDDLE

Why did the cabbage water turn red?

Answer: Because it saw the salad