

# Testing Acidity & Alkalinity of Soil

*\*with bonus experiments in lemonade!*

**GROW**  
OBSERVATORY



The acidity or alkalinity of soil, measured on a scale called pH, is fundamental to many soil functions including microbial activity, uptake of nutrients and plant growth. Testing the pH of your soil is a first step to understanding which plants might grow well there. In nature, different soils have different pH levels depending on their parent rock and the conditions they have developed under. For example, chalk soils and those from limestone rocks tend to be alkaline (high pH of 8-9) whereas those that develop under peat bogs and in upland areas tend to be more acidic (low pH around 4-5). For gardening, we tend to prefer soils that are neutral - around pH 7 - as these suit a wide range of food plants.

## How do you find out what pH your soil has?

You could use litmus paper which changes colour depending on the level of acidity or alkalinity in your soil, make your own pH indicator from red cabbage, or make lemonade!



## Soil testing with indicator paper

Field scientists use a pH meter to test soil pH. Although these give a good level of precision, they can be quite expensive. Indicator paper - often called litmus paper or pH strips - offers a cheaper but reliable way to test soil pH. You can usually buy a few hundred strips for 1. The strips are placed in liquid and change colour in response to acid or alkaline conditions according to the colour scale provided.

1. Take a handful of your soil, removing any large stones or debris, and place in a clean container.
2. Add water - ideally distilled water which has a neutral pH of 7 so won't affect your reading. If not, then use rainwater since this is what falls on your garden anyway. Add a cup full of water so that your mixture is runny.
3. Leave the soil and water for 30-60 minutes.
4. If you have one you can use a coffee filter to separate the liquid from the soil particles. If you don't have one, you can rinse the soil off your strip in the next step using distilled or rain water.
5. Dip a pH strip in the soil liquid for 30 seconds and then match the colour against the chart provided with it to read your pH.  
[Note that the colour may change if the strip dries out].



You can also use a pH strip to test your rainwater alone. If it is more acidic than your soil sample, your soil might be slightly more alkaline than you think.

## Making your own indicator

Red cabbage water is also a pH indicator that changes to different colours depending on the alkalinity or acidity of a substance.

1. Use some of the red cabbage leaves that you have discarded when cooking; 2-3 leaves chopped up, should be plenty. Boil them in a cup or two of water - enough to cover the cabbage leaves - for about 5 minutes. Don't let it boil dry.
2. Allow the cabbage water to cool completely (about 15 minutes)
3. Put your soil sample(s) into small containers - as many as you want to do tests with. White or clear ones will allow you to best see the colour. Small bottles or dishes will be fine. Keep an empty one for the cabbage water by itself so you can compare the colour.
4. Add a dessert spoon of the red cabbage water to your soil sample, stir and leave for about 10 minutes, then check the colour change (it might happen more quickly, depending on the pH).
5. If it goes pink, your soil is acidic, if it goes blue-green, it is alkaline.

# TIP



You can try this with other plant indicators like beetroot, blackberries, raspberries, copper beech leaves, or onion skins.

- If you have pH papers or red cabbage indicator left over, you can:
  - Test different areas of soil in your garden to see if the pH varies
  - Test the reaction for known acids like lemon juice or vinegar and for known alkalines like soap and sodium bicarbonate (sold in food shops as bicarbonate of soda or "baking soda")
  - Share them with your friends, family and neighbours so they can test their soils



Recipe:

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### INGREDIENTS:

1. Lemon
2. Lavender flowers, leaves or dried
3. Sugar
4. Water

## Making colour-changing lemonade!

After all that hard work, here's a fun little treat you might enjoy. If you make lemonade with lavender, you can see for yourself what happens when an alkaline liquid meets an acidic liquid. The colour change works best with lavender flowers, but also works with lavender leaves and dried lavender.

### Steps:

*Note: All amounts are approximate; when we made it, we reused pickle jars (about a litre). Vary the quantities based on how sweet, tart or flowery you would like the lemonade to taste.*

*First, collect lavender flowers, leaves and/or dried lavender - about 18 flowers, a few stems of leaves or a couple tablespoons of lavender. Place them in the jar, and pour over boiling water until the jar is half full. (You are essentially making lavender tea.) Add sugar to taste - start with 85 g and add more if you need it. Let this cool as you prepare the lemons.*

*Juice your lemons. Four lemons should make about 200 ml of juice. Add the yellow lemon juice to the blue/green lavender liquid - suddenly it turns pink! This is the result of the alkaline lavender water meeting the acidic lemon juice.*

*Put this in the refrigerator to cool, and enjoy after a long gardening session in the sun!*

