SOIL YOUR UNDIES CHALLENGE

Soil pH Testing
Parent/teacher information sheet

Testing the Acidity and Alkalinity of Soil

What do we do?

1. Have participants collect a small amount of soil from where you have buried your undies. You will only need a 5c piece worth of soil for the test.
2. Explain that pH (potential hydrogen) is a scale used to quantify the acidity or alkalinity (basicity) of a substance. See below for further information.
3. Have participants place their small sample of soil onto the white laminated card provided.
4. Using the pipette and Universal pH indicator, have participants place around five drops of the Universal pH indicator onto the soil. Use less if the soil looks as though it is become saturated and 'swimming' in the solution.
5. Give the soil and indicator a mix if it is not combining easily.
6. Using the pop-stick, scoop up a small amount (just to cover the tip of the stick) of barium sulfate, and carefully sprinkle this over the moistened soil.
7. You will see a colour start to emerge. Using your pH colour chart, match up the colour of your soil with the colours on the card and read the corresponding number. That is your soil pH!
8. Be sure to write this on your data collection sheet for Checkpoint 3.
9. As an extension see if soil from different areas measure different pH (eg under trees vs open spaces).
10. Discuss the results, and relate pH back to soil health (including nutrient availability) and agriculture.

What do my results mean?

Soil acidity and alkalinity, otherwise known as soil pH, is an essential measure when looking at our soils. pH testing looks at the power of hydrogen and hydroxide ions in a substance or solution, and can be used in many facets of our day to day life. Here we will just focus on its relevance to soil health. pH is measured on a special scale, called a logarithmic scale, from 0 to 14, with 7 being neutral. The lower the pH (<7), the more acidic something is, the higher the pH (>7), the more alkaline or basic something is. This logarithmic scale means a soil with a pH of 4 has 10 times more acid than a soil with a pH of 5, and 100 times more acid than a soil with a pH of 6.

A well-maintained soil pH will ensure the health of a soil is preserved, resulting in happy plants, happy soil biota and happy us! If soil pH is too acidic, or too alkaline, important nutrients are locked away. A low pH in topsoil will also reduce microbial activity, which can affect many things, including how our undies degrade! Plant growth and most soil

processes, including nutrient availability and microbial activity, are favoured by a soil pH range of 5.5 – 8.

Further information

Acid soil, particularly in the subsurface, will also restrict root access to water and nutrients. In very acid soils, all the major plant nutrients (nitrogen, phosphorus, potassium, sulphur, calcium, manganese and also the trace element molybdenum) may be unavailable, or available in insufficient quantities. However aluminium, which is toxic to roots, becomes MORE soluble. Plants can show deficiency symptoms despite adequate fertiliser application.

Low pH in topsoil's will also affect microbial activity, most notably decreasing legume nodulation. The resulting nitrogen deficiency may be indicated by reddening of stems and petioles on pasture legumes, or yellowing and death of oldest leaves on grain legumes. Rhizobia bacteria are greatly reduced in acid soils. Some pasture legumes may fail to persist due to the inability of reduced Rhizobia populations to successfully nodulate roots and form a functioning symbiosis.

Soil acidification is a natural process which can be accelerated by agriculture. A main cause of soil acidification is inefficient use of nitrogen, followed by removal of alkalinity by yield. If nitrate is not taken-up by plants, it can leach away from the root zone leaving behind hydrogen ions thereby increasing soil acidity. Most plant material is slightly alkaline and removal by harvest or grazing leaves residual hydrogen ions in the soil. Over time, as this process is repeated, the soil becomes acidic. Major contributors are hay, especially lucerne hay and legume crops. Alkalinity removed in animal products is low, however, concentration of dung in stock camps adds to the total alkalinity exported in animal production.