Soil Analysis | Testing Soil pH


The pH of a solution is a measure of the molar concentration of hydrogen ions (H+) in the solution, and as such is a measure of the acidity or basicity of a solution. Mathematically, pH is defined as the negative logarithm expressed in molarity. While acid rain, root respiration and contributions from mineralization cause a decrease in pH, ion-exchange effects a rise in pH.

Objective

The soil pH reflects its genesis and resulting chemical properties. It thus provides information about the soil's state necessary to achieving and maintaining its optimal nutrition intake. In determining a soil's pH, students acquire methodological competences to assess a soil's quality and potential natural vegetation. Soil pH can be easily determined, both on the spot in a field or garden, or in the classroom.

Didactic-methodological legitimation

Soil is generally defined as the top layer of the earth's crust, the 'living skin of the earth'. Due to improper use possibly exacerbated by climate change, declining soil quality has had significant repercussions upon anthropogenically influenced ecosystems. Over the last few decades, soil degradation and deterioration have constituted a major global problem with significant environmental, social and economic consequences. For this very reason, soils are one of our most significant natural resources, and therefore improving the condition of soil as a resource helps to maintain its key functions in the global ecosystem: providing habitat, recycling raw materials and regulating (water) supplies. Determining a soil's pH value is a straightforward method of highlighting its vulnerability.

Students are expected both to determine pH and to establish the link between a soil's pH and its characteristics. In general, Geography occasionally fails to exploit the potential that resides in the dialogue with pedology, which is why experiments and simple physical or concrete methods may sharpen the learners' understanding of preserving soil functions within the context of sustainable use, and the prevention of threats to soil.

Advice on location

Care should be taken to choose a location that is characterized by loose soil, as the soil should be sampled from 10 cm depth. In this case, alluvial soils appear to be particularly suitable. Alternatively, soil samples can be brought to class and analyzed in full. Among the collection of samples, students can be instructed to determine the location the soil might originate from.

Literature (German):

Scheffer/Schachtschabel. Lehrbuch der Bodenkunde. Spektrum Akademischer Verlag, 16. Auflage, Heidelberg: 2010.

Gebhardt, H. Geographie: Physische Geographie und Humangeographie, 2. Auflage, Spektrum Akademischer Verlag, Heidelberg: 2011.