

Investigating the impact of soil pH on plant growth

Subject(s): Science, Agriculture

Grade(s): 7- 8

Learning intention(s)

Students will investigate the impact of soil pH on plant growth in a school kitchen garden. They will develop skills in scientific inquiry by designing a fair test, collecting and analysing data, and evaluating how soil chemistry influences food production and sustainability.

Mapping to curriculum

Strand(s):

- Science – Life and Living
- Agriculture – Introduction to Soil

Sub strands

Science

- 7.12 Ecosystems
- 8.5 Plant processes and marine ecosystems

Agriculture

- 7.5 What is soil?
- 8.4 Soil Physical properties
- 8.8 Soil Biological Properties.

Learning outcome (s)

Science

- 7.12.1 Know that an ecosystem is made up of living and non-living things that interact with each other in a particular area
- 8.5.7 Understand that the different ecosystems support different types of organisms

Agriculture

- 7.5.2.1 Explain the importance, functions and uses of soil
- 8.4.2 Understand soil PH
- 8.5.3.1 explain soil nutrients and the nutrient cycle
- 8.8.1 Show skills in preparing soil for growing and transplanting pulse crops

Lesson Instructions

Materials/resources

- 6 small garden beds or large pots
- Soil pH test kit (or pH probe)
- Vinegar (to lower pH)
- Baking soda solution (to raise pH)
- Watering can
- Ruler (for measuring plant growth)
- Gardening gloves
- Notebook for observations
- Lettuce/spinach/basil seeds

Aim

To determine how different soil pH levels influence the germination and growth of leafy greens in a school kitchen garden.

Hypothesis

If the soil pH is too acidic or too alkaline, then plant growth will be negatively affected because plants prefer a specific pH range for optimal nutrient absorption.

Key Vocabulary

Acidic: to have properties of acid or containing acids

Alkaline: to have properties of an alkali or containing alkali

pH: a scale that measures how acidic or alkaline a substance is

Optimal: the best or most favorable situation

Activity 1: Description

1. Prepare the soil

- Test the pH of the soil in each garden bed or pot and record the initial values.
- Adjust the soil pH in different beds:
 - Neutral (control): Leave one bed as it is
 - Acidic: add vinegar to low pH
 - Alkaline: add baking soda solution to raise pH
 - Additional beds: modify pH to different levels (e.g., pH 5, 6, 7, 8, 9)
- Wait 24 hours before planting the seeds
- Sow an equal number of seeds in each bed, ensuring similar spacing and depth.

Activity 2: Description

2. Water and maintain the plants

- Water the plants regularly, ensuring equal amounts across all beds.
- Monitor and maintain soil pH levels by re-testing weekly and adjusting as needed.
- Measure plant height, number of leaves, and overall plant health weekly.
- Take photos and describe visual differences between plants in different pH conditions.
- Compare growth rates, leaf size, and plant colour across different pH levels.
- Identify which pH level produced the healthiest plants.

Task(s)

Years 7 and 8

Facilitate a class discussion to respond to the following questions:

- What is the optimal pH range for growing leafy greens?
- How does soil pH affect nutrient availability for plants?
- How might farmers and gardeners use this information in real-world agriculture?
- What could be the environmental impact of soil pH imbalances?

Year 8

After the class discussion (outlined above), ask the students to write two paragraphs in their exercise books summarizing how soil pH influences plant growth and discuss practical ways to maintain soil health in kitchen gardens.