

Investigate the impact of soil pH on plant growth

Subject(s): Science

Grade(s): 8

Key Stage(s): 3

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

Scope and Sequence Statement

- Interactions within food chains and food webs
- Carbon cycle and decomposition
- Micro-organisms: helpful and harmful roles
- Human impact on ecosystems and the environment
- Gathering, processing and analysing data
- Science as human endeavour

How it is Addressed in the Activity

- Students observe how soil pH affects plant growth, influencing the base of food chains by impacting plant health and productivity in the garden.
- Students indirectly explore soil chemistry's effect on microbial activity that influences nutrient cycling and carbon availability for plants.
- Students consider how soil pH affects microbial communities that support nutrient uptake, affecting plant health and growth.
- Students investigate how soil management practices, including pH adjustment, influence sustainable food production and environmental health.
- Students design a fair test, collect quantitative data on plant growth under varying soil pH conditions, and analyse trends to evaluate their hypothesis.
- Students reflect on real-world applications of soil chemistry knowledge in agriculture and gardening to improve crop yields and maintain soil health.

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.

Lesson Instructions

Materials

- 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

Steps

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

2. Plant the seeds

- Sow an equal number of seeds in each bed, ensuring similar spacing and depth.

3. Water and maintain

- Water the plants regularly, ensuring equal amounts across all beds.
- Monitor and maintain soil pH levels by re-testing weekly and adjusting as needed.

4. Record observations

- Measure plant height, number of leaves, and overall plant health weekly.
- Take photos and describe visual differences between plants in different pH conditions.

5. Analyse results

- Compare growth rates, leaf size, and plant colour across different pH levels.
- Identify which pH level produced the healthiest plants.

Discussion 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?

Conclusion

Students will conclude by summarising how soil pH influences plant growth and discuss practical ways to maintain soil health in kitchen gardens.