Maximise crop production in a school garden

Subject(s): **Science, Mathematics**

Grade(s): **8**

Key Stage(s): **3**

Learning intention(s)

Students will investigate, design, and implement strategies to maximise crop production within a given garden plot by applying principles of sustainable agriculture, efficient resource use, and innovative gardening techniques. They will develop problem-solving, critical thinking, and teamwork skills while exploring real-world applications of food production and environmental sustainability.

Mapping to curriculum: Scope and sequence, linked to the activity

Science

- Plant biology and growth requirements
  - Students investigate plant needs (light, water, nutrients) and factors influencing growth to inform garden design and crop selection.
- Soil science and environmental sustainability
  - Students explore soil health, fertility improvement, natural pest control, and sustainable gardening practices in their plot design.
- Scientific inquiry and experimentation
  - Students research, test, and evaluate different gardening techniques through planned experiments and data collection on yields.

Mathematics

- Measurement and data collection
  - Students measure plot dimensions, plant spacing, water usage, and crop yields to analyse production efficiency.
- Geometry and spatial reasoning
  - Students plan garden layouts considering area optimisation, including concepts of perimeter, area, and volume in planting design.
- Data analysis and interpretation
  - Students compare crop yields from different methods, analyse data trends, and draw conclusions to refine their gardening strategy.
- Problem solving and reasoning
  - Students use critical thinking to design innovative solutions like vertical gardening or hydroponics to maximise production.

Science and Mathematics

- Application of real-world contexts
  - Students connect garden management to real-world farming practices, environmental conditions, and sustainability principles.

Created by Faculty of Education, The University of Melbourne 2025
Project Lead: Rhonda Di Biase: dibiaser@unimelb.edu.au
With support from Melbourne Climate Futures, The University of Melbourne

Lesson Instructions

Challenge Overview: Your school has a designated garden plot, and your mission is to design and implement a system to maximise crop production within the given space. You will need to research, plan, and test different strategies to improve yield while considering factors like soil health, water usage, plant selection, and sustainability.

Key Considerations

- How can you optimise space to grow more crops?
- What methods can improve soil health and fertility?
- How can you ensure efficient watering and drainage?
- Which crops are best suited for the climate and soil conditions?
- What role do companion planting and crop rotation play?
- How can natural pest control methods be integrated?

Student Questioning

To guide your thinking and design process, consider these questions:

1. What do plants need to grow successfully?
2. How can we measure the success of our garden (e.g., yield, plant health, sustainability)?
3. What innovative gardening techniques (e.g., vertical gardening, hydroponics) could help increase production?
4. How do environmental factors like sunlight, temperature, and rainfall affect crop growth?
5. What real-world farming practices could be adapted for a small school garden?
6. How can we make the garden sustainable and environmentally friendly?
7. What unexpected challenges might arise, and how can we adapt our design to overcome them?

Design and Experimentation Process

- **Research:** Investigate gardening techniques, plant needs, and soil improvement strategies.
- **Plan:** Sketch a layout of your garden and select appropriate crops.
- **Prototype and Implement:** Set up small test plots with different techniques and compare results.
- **Evaluate and Improve:** Measure crop yield, analyse what worked best, and refine your design.

Outcome

Present your findings in a report or presentation, showcasing your garden plan, results and recommendations for future improvements.

Created by Faculty of Education, The University of Melbourne 2025
Project Lead: Rhonda Di Biase: dibiaser@unimelb.edu.au
With support from Melbourne Climate Futures, The University of Melbourne