



INVESTIGATING SEED VARIABLES

TEACHER GUIDE



**PRACTICAL
ACTIVITY**

Students will learn how variables such as seeding depth and density can affect the growth rate of grain, oilseed, and pulse plants. They will undertake a practical investigation to determine the optimal seeding depth for their chosen plant, and analyse how this type of data could be used to improve yield rates and increase profitability on a broader scale.

LEARNING OBJECTIVE

Students plan and conduct an investigation into the effect of seeding depth on germination rates and the overall health of a grain, oilseed, or pulse plant.

SUCCESS CRITERIA

Students record and analyse data to draw a conclusion on the optimum depth to plant their chosen type of seed.

YEAR LEVEL

7–10



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ACTIVITY**

LEARNING AREAS AND AUSTRALIAN CURRICULUM CONTENT

DESIGN & TECHNOLOGIES

Analyse how food and fibre are produced in managed environments and how these can become sustainable ([AC9TDE8K04](#))

Analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures ([AC9TDE8K02](#))

Analyse how people in design and technologies occupations consider ethical, security and sustainability factors to innovate and improve products, services and environments ([AC9TDE10K01](#))

Analyse the impact of innovation, enterprise and emerging technologies on designed solutions for global preferred futures ([AC9TDE10K02](#))

SCIENCE

Investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering ([AC9S9H02](#), [AC9S10H02](#))

Develop investigable questions, reasoned predictions and hypotheses to explore scientific models, identify patterns and test relationships ([AC9S7I01](#), [AC9S8I01](#))

Develop investigable questions, reasoned predictions and hypotheses to test relationships and develop explanatory models ([AC9S9I01](#), [AC9S10I01](#))

Plan and conduct reproducible investigations to answer questions and test hypotheses, including identifying variables and assumptions and, as appropriate, recognising and managing risks, considering ethical issues and recognising key considerations regarding heritage sites and artefacts on Country/Place ([AC9S7I02](#), [AC9S8I02](#))

Plan and conduct valid, reproducible investigations to answer questions and test hypotheses, including identifying and controlling for possible sources of error and, as appropriate, developing and following risk assessments, considering ethical issues, and addressing key considerations regarding heritage sites and artefacts on Country/Place ([AC9S9I02](#), [AC9S10I02](#))

Select and use equipment to generate and record data with precision, using digital tools as appropriate ([AC9S7I03](#), [AC9S8I03](#))

Select and use equipment to generate and record data with precision to obtain useful sample sizes and replicable data, using digital tools as appropriate ([AC9S9I03](#), [AC9S10I03](#))

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PRACTICAL ACTIVITY

SCIENCE (cont'd)

Select and construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information ([AC9S7I04](#), [AC9S8I04](#))

Select and construct appropriate representations, including tables, graphs, descriptive statistics, models and mathematical relationships, to organise and process data and information ([AC9S9I04](#), [AC9S10I04](#))

Analyse data and information to describe patterns, trends and relationships and identify anomalies ([AC9S7I05](#), [AC9S8I05](#))

Analyse and connect a variety of data and information to identify and explain patterns, trends, relationships and anomalies ([AC9S9I05](#), [AC9S10I05](#))

Analyse methods, conclusions and claims for assumptions, possible sources of error, conflicting evidence and unanswered questions ([AC9S7I06](#), [AC9S8I06](#))

Assess the validity and reproducibility of methods and evaluate the validity of conclusions and claims, including by identifying assumptions, conflicting evidence and areas of uncertainty ([AC9S9I06](#), [AC9S10I06](#))



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PRACTICAL ACTIVITY

RESOURCES

- ✓ **Worksheet 1:** Background Information
- ✓ **Worksheet 2:** Planning the Investigation
- ✓ **Worksheet 3:** Conducting the Investigation
- ✓ **Worksheet 4:** Analysing the Investigation
- ✓ **Worksheet 5:** Technology Over Time
- ✓ **Teacher reference sheet:** Seed Planting Guidelines



INVESTIGATION MATERIALS AND EQUIPMENT (per group)



- ✓ 4 x large containers (e.g. 50 L plastic storage tubs) filled with soil OR 4 x 1 m x 1 m quadrats in garden/agriculture plot



- ✓ Soil (if using containers)



- ✓ 10–40 seeds (students choose a grain, oilseed, or pulse from the **Super Seed Kit**)



- ✓ Ruler (provided in the **Super Seed Kit**)



- ✓ Gardening trowel



- ✓ Watering can and water

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INSTRUCTIONS

1. As a class, discuss the terms **seeding depth** and **seeding density**. Ask students to share their understanding of these terms and consider how they relate to crop production.
2. Distribute **Worksheet 1: Background Information**. Students read the information provided and highlight key facts. Reconvene as a class to discuss key learnings.
3. Organise students into smaller groups in preparation for the practical task. Each group will choose a grain, oilseed, or pulse from the **Super Seed Kit** to examine in a seeding depth investigation. Distribute **Worksheet 2: Planning the Investigation** to each group. Students will plan an investigation into how seeding depth affects the germination rate and overall health of their chosen plant. Refer to the **Seed Planting Guidelines** teacher reference sheet for an overview of the seeding requirements for each of the seeds provided in the kit.
4. Assist students to consider and record:
 - the aim of the investigation
 - a hypothesis/prediction of the outcomes
 - the independent variables, dependent variables, and controls used to ensure a fair test is conducted.
5. Allocate a practical lesson for students to prepare and set up their scientific investigation. Provide each group with **Worksheet 3: Conducting the Investigation**, which outlines the materials and equipment needed for the investigation. Assist students to follow the methodology in order to set up their investigation.
6. Over a period of 8–10 weeks, allocate regular and consistent time for students to measure, collect, and record data and results. Students should create a table to record the height of the plant (cm) and time (days) to monitor the growth of each seed before calculating averages. Once the investigation is complete, assist students to present their results in a graph.
7. Upon completion of the investigation, provide students with **Worksheet 4: Analysing the Investigation**. Allocate time for each group to report to the class on their findings and analysis of their investigation.
8. As a concluding activity, provide students with **Worksheet 5: Technology Over Time** to examine how technology has developed to assist with seeding depth accuracy. Students read the information provided and highlight key facts.

OPTIONAL EXTENSION ACTIVITY

Support students to design their own investigation examining the effect of seeding density on their chosen plant. Students should develop an investigation question, devise a plan, and record the method, materials, and equipment needed to undertake the investigation. Results and analysis should follow the same format as the seeding depth investigation.