

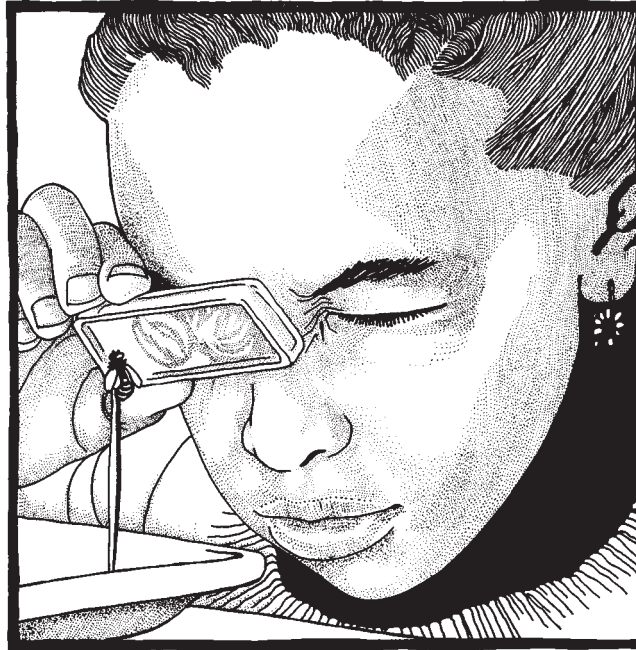
Plant Growth and Development

Narrative Summary

In this unit, students have the opportunity to observe each stage in the life cycle of a simple plant. Working with Wisconsin Fast Plants™ (*Brassica rapa*), which germinate, mature, and go to seed within a 40-day period, students plant seeds and watch the seedlings emerge. Later, they thin and transplant seedlings. As they watch their plants grow, students learn that plants need nutrients from the soil, as well as water and light, to thrive. As the unit expands to focus on the interdependence of living things, students cross-pollinate the flowers with dried honeybees. Finally, they harvest mature seeds and determine seed yields. These experiences deepen students' understanding of the characteristics of living organisms and their relationship with and dependence on their environment.

Science Content

Plant life cycles, resource needs of organisms, and environmental changes are investigated with Wisconsin Fast Plants™. Each student keeps a laboratory notebook to record the many changes, from seed to flower, of these plants. Students translate their findings and measurements into graphs. Measurement in standard units and comparisons between different groups are key to interpreting cause-and-effect relationships. Using the processes



of technological design, students design and build models of the *Brassica* plant and a bee. Students communicate their designs in a class presentation and demonstrate their knowledge of the science concepts learned in the unit.

Assessment

Students begin the unit with a brainstorming session in which they share what they know and want to know about plants. Assessments in this session and Lesson 10 are

matched with a post-unit discussion that provides tools to help evaluate student progress in understanding the plant's life cycle and learning about the anatomy of the bee. Throughout the unit, student notebooks, graphs, and record sheets can be used for assessment and evaluation. Using the record chart provided, teachers can track each student's progress in the unit by evaluating student products and skills. A sequencing activity using life cycle cards and the evaluation of a student-generated illustration of a bee are among the additional assessments found at the close of the unit.

Goals for *Plant Growth and Development*

In this unit, students observe the life cycle of the *Brassica rapa* (Wisconsin Fast Plants™). Their experiences introduce them to the following concepts, skills, and attitudes.

Concepts

- Many plants follow a life cycle that begins with growth from a seed and proceeds through the production of seeds.
- Plants have distinct stages in their life cycle.
- To live and grow, plants need light, water, and nutrients from the soil.
- Flowering plants must be pollinated in order to produce seeds.
- Many plants are pollinated by bees.
- A flower's pollen sticks to a bee, but some rubs off when the bee feeds at other flowers.
- One seed produces one plant; one plant can produce many seeds.

Skills

- Planting and caring for the *Brassica rapa*.
- Observing, describing, and recording changes in plants.
- Comparing and discussing changes occurring in plants over time.
- Measuring and recording the growth of plants.
- Using graphs to display and compare growth patterns.
- Predicting future growth from observations and measurements.
- Reading to learn more about plants.
- Communicating results and reflecting on experiences through writing, drawing, and discussion.

Attitudes

- Developing an interest in studying the life cycle of plants.
- Developing sensitivity to the needs of plants.
- Developing an awareness of the interaction between plants and animals.



Plant Growth and Development

Fundamental Concepts and Principles Addressed (K–4)

Science as Inquiry

Abilities necessary to do scientific inquiry

- Ask a question about objects, organisms, and events in an environment.
- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.
- Communicate investigations and explanations.

Understandings about scientific inquiry

- Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know.
- Scientists use different kinds of investigations, depending on the questions they are trying to answer.
- Simple instruments, such as magnifiers and rulers, provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations.
- Scientists make the results of their investigations public.
- Scientists review and ask questions about the results of other scientists' work.

Life Science

Characteristics of organisms

- Organisms have basic needs; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs are met.
- Each plant has different structures that serve different functions in growth, survival, and reproduction.

Life cycles of organisms

- Plants have life cycles that include developing into adults, reproducing, and eventually dying.
- Plants closely resemble their parents.
- Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from interaction with the environment.

Organisms and their environments

- All animals depend on plants.
- An organism's patterns of behavior are related to the nature of that organism's environment. When the environment changes, some plants survive and reproduce, and others die.

Earth and Space Science

Properties of earth materials

- Earth materials, such as soil and water, are useful in growing plants.

Science and Technology

Abilities of technological design

- Identify a simple problem.
- Propose a solution.
- Implementing proposed solutions.
- Evaluate a product or design.
- Communicate a problem, design, and solution.

Understandings about science and technology

- People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
- Scientists often work in teams with different individuals doing different things that contribute to the results.
- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things they could not otherwise see, measure, and do.

Abilities to distinguish between natural objects and objects made by humans

- Some objects occur in nature while others have been designed by people.
- Objects can be categorized into two groups, natural and designed.

Science in Personal and Social Perspectives

Science and technology in local challenges

- People continue inventing new ways of doing things, solving problems, and getting work done.

History and Nature of Science

Science as a human endeavor

- Many people choose science as a career and devote their lives to studying it. Many people derive great pleasure from doing science.

Unifying Concepts and Processes

Systems, order, and organization

Evidence, models, and explanation

Constancy, change, and measurement

Form and function