

Understanding Life Systems Growth and Changes in Plants

Lesson 2 – Germinating Seeds

Learning Goals:

By the end of this lesson, students will understand how seeds germinate and develop into a plant.

Expectations met with this lesson:

The Ontario Curriculum, Science and Technology (Grade 3)

2.3 germinate seeds and record similarities and differences as seedlings develop

Preparation:

- Optional – Provide students with a workbook that they can use as a Classroom Gardens Journal.
- See *Scientific Experiment* section for a list of required materials.

Vocabulary

Suggest making a word wall for students using the following vocabulary.

Hypothesis – a researcher's best guess about the answer to the research question

Seed Coat - the hard protective outer layer of the seed.

Embryo - the tiny plant resting (dormant) inside the seed that will grow into the adult plant.

Food Store (Endosperm) - a supply of nutrients (food) that is stored inside the seed. The seed will use these nutrients as a source of energy until the young plant is able to produce its own food (through photosynthesis).

Germination – the growth of a seed into a young plant. The embryo will rest inside of the seed until the conditions are right for germination.

Class Discussion:

Ask students using the socratic method:

1. What is a seed?

Answer:

- A seed is the part of a plant seed that contains a dormant (sleeping) baby plant that can grow into a new plant.
- Seeds are made up of three different parts:
 - i. EMBRYO - the baby plant resting (dormant) inside the seed which will emerge and grow into a new plant once conditions are suitable
 - ii. FOOD STORE (ENDOSPERM) - a supply of nutrients (food) to feed the baby plant until the plant has developed leaves and is able to produce its own food through photosynthesis.
 - iii. SEED COAT - protects the embryo until growing conditions are perfect and it is time for the seed to germinate (sprout).

To reinforce structure of the seed, provide students with the following Seed Worksheet.

Seed Worksheet_Teacher Copy (provided)

Seed Worksheet_Student Copy (provided)

2. How are seeds dispersed?

Answer:

- Seeds can be dispersed in many ways:
 - blown by the wind (like dandelion seeds or maple “helicopters)
 - float on water
 - carried by birds, bees, insects and even in the fur of animals (eg. burs)
 - eaten by animals and then deposited in their waste (poop)
 - humans plant seeds in order to be able to harvest their own food crops.

Seeds remain in a resting state (dormant) until growing conditions are perfect.

3. What does a seed need in order to germinate (sprout / begin to grow)?

Answer:

- For a seed to germinate and grow into a plant, the seed needs:
 - oxygen (from the air)
 - water
 - the right temperature
 - the right amount of light

4. How does a seed develop (grow) into a plant?

Answer:

- The germination sequence:
 - i. the seed will absorb water and begin to swell
 - ii. the seed coat will split open
 - iii. the first roots will emerge from the seed and begin growing into the soil
 - iv. the young plant emerges from the seed, pushing through the soil until it emerges from the soil and begins growing towards the sunlight.

To reinforce the concepts discussed thus far – share the following video with students.

video link: [How Does A Seed Become a Plant?](#)

5. Are seeds important for human life on Earth?

Answer:

- Yes.

6. How are seeds important to human and other animal life on Earth?

Answer:

- Seeds
 - are an important part of food production for human and other animal life on earth.
 - produce plants, which in turn produce food.
 - are also an important source of food for humans and other animals.

7. What are some examples of seeds that are a food source for humans?

Answer:

- Students' answers will likely include common seeds such as: sunflower seeds, pumpkin seeds, sesame seeds, etc.
- Fun Fact - Did you know that rice, wheat and nuts are all seeds?

Discuss with students that many seeds are also used to produce many types of oils that humans eat and cook with.

Ask students if they can think of some examples of oils that are produced from seeds.

Answer:

- Some examples include sunflower oil, sesame, peanut oil, etc

Fun with Seeds!

Scientific Experiment: Bean in a Jar

(modified from source: <https://www.wcrf-uk.org/eat-move-learn/grow-it/bean-plant>)

Materials:

- ✓ Classroom Gardens journal
- ✓ 3 bean seeds (any kind)
- ✓ 1 clear glass jar
- ✓ paper towel or napkin
- ✓ Spray bottle or spoon
- ✓ Water
- ✓ 1 small pot (optional)
- ✓ potting soil (optional)

Learning Objectives:

- i. Allow the students the opportunity to form a hypothesis, test a hypothesis, perform an experiment and observe and record observations.
- ii. To demonstrate how seeds germinate and grow into a seedling.
- iii. To observe root, stem and first leaf development of a seedling.

1. Form a Hypothesis

Have students form a hypothesis by asking the following research question:

→ What comes first the roots or the stem?

Write students' hypotheses on the board OR have the students record their hypothesis in their Classroom Gardens journal or electronic format as appropriate.

2. Set Up

The teacher will demonstrate the experiment. Have students assist the teacher by taking turns reading instructions (procedure) aloud and following along.

Encourage students to duplicate the experiment at home (with the help and supervision of an adult) by following the instructions provided.

1. Soak the bean seed in water for 1 hour.
2. Add a small amount of water to your jar, swirl it around and then dump it out. Leave the jar wet (do not dry it).
3. Roll up your paper towel (or napkin) and place it inside your jar, pressing it against the glass.
4. Gently place your bean seeds inside your jar, placing it between the paper towel and the glass.

5. Place the jar on a sunny windowsill.
6. Gently moisten the paper towel daily (using a spray bottle or a spoon). Be careful not to add too much water.

3. Observations & Discussion

Each day, the teacher will allow students the opportunity to observe (in person, or virtually as appropriate), discuss and record observed changes.

Have students share/discuss the changes they have observed throughout the experiment.

Record student observations on the board OR have the students document observed changes in Classroom Gardens journal or electronic format as appropriate.

Have students draw a picture of their developing seedling daily in their Classroom Gardens journal. Label each picture with the Day and any important and relevant observed changes/details.

For example:

Picture #1: Labelled Day 3 – Roots emerge from the seed.

Picture #2: Labelled Day 5 - a tiny stem emerges from the seed.

Picture #3: Labelled Day 9 – first tiny leaves emerged.

Note: The above is for demonstration purposes only, days may vary.

4. Form a Conclusion

Once the class has successfully carried out the experiment to completion, have students form a conclusion by answering the original research question. (What comes first, the roots or the stem?)

Have students record their conclusion in their Classroom Garden journal or in electronic format, as appropriate.

Optional: Once your seedling has developed a stem and leaves you can transplant it into a pot on a windowsill (in winter) or sunny place outdoors (when the spring temperatures are warm enough). Water your plant regularly.

Visual Arts

[How to Draw a “Growing” Plant](#)

Additional Seed Activity (for Home)

- Encourage students to help make dinner at home, with the help of an adult.
- Have students find and observe how differently the seeds of different plants / fruit can look.
- Have students share/discuss their findings with their peers in class.
- Discuss findings with students.
- Record student observations on the board OR have the students document observed changes in Classroom Gardens journal or electronic format as appropriate.

Sources:

[Germination](#)

[Seed Germination](#)

[Germination For Kids](#)