STAGE 3: BECOMING PLANT EXPERTS

In this stage, students will become plant experts! Students will have the opportunity to discuss where their food comes from (food origins), learn plant characteristics, basic needs, how they get energy from the sun, and environmental conditions affecting them. Planting seeds, tracking their growth and accounting for plants needs will give them an opportunity for real-life application!

Lesson 1 - Where Does Our Food Come From?
Lesson 2 - Parts of a Plant
Lesson 3 - What a Plant Needs to Grow
Lesson 4 - Planting Your Seeds (CORE LESSON)

Lesson 4 - Planting Your Seeds

This lesson will give your students the practical experience of growing the foods they will use to make their granola bars from seed! Students will design a fair test and design their own plant investigation.

Learning Goals

- Notice that plants have distinct characteristics.
- Identify similarities and differences among the various types of plants grown.
- Understand the basic needs of plants and energy.
- Consider different ways plants are grown for food.
- Discuss examples of environmental conditions that may threaten plant and animal survival.

Materials Needed

- Lesson Slides
- STEMterprise Seed Kits **OR** Planting pots, growing medium, 2 types of seeds
- Investigation Planning Worksheet (one per group)
- Observational Journal Sheet (one per student)
- Optional: device for taking photos of plants (camera, phone)

Time Frame: 40min

Curriculum Expectations

Science & Technology Curriculum
Strand A STEM Skills

- A1.2 Use a scientific experimentation process and associated skills to conduct investigations
- A1.5 Communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

Science & Technology Curriculum
Strand B Life Systems

- B2.1 Describe the basic needs of plants, including the need for air, water, light, heat, nutrients, and space, and identify environmental conditions that may threaten plant survival
- B2.2 Identify different parts of plants, including the root, stem, flower, stamen, pistil, leaf, seed, cone, and fruit, and describe how each part contributes to plants' survival within their environment
- B2.3 Describe changes that different plants undergo in their life cycles
- B2.4 Describe ways in which a variety of plants adapt and/or react to their environment and to changes in their environment

Mathematics Curriculum
Strand C Algebra

- C4 Apply the process of mathematical modelling to represent, analyze, make predictions, and provide insight into real-life situations

Strand D Data

- D1.2 Collect data through observations, experiments, and interviews to answer questions of interest that focus on qualitative and quantitative data, and organize the data using frequency tables

Media Links (embedded in the slides)

- An Entire Growing Season in 1 minute (corn) https://www.youtube.com/watch?v=ex0iCu1ZJw4&t=86s
- Variables https://youtu.be/yYMPbKbK1yo

STEMterprise Teaching Notes

Slide 5: Learning Goals	• Notice that plants have distinct characteristics. • Identify similarities and differences among the various types of plants grown. • Understand the basic needs of plants and energy. • Consider different ways plants are grown for food. • Discuss examples of environmental conditions that may threaten plant and animal survival.
Slide 6: Minds ON!	Watch the video of corn growing on a farm. Ask students, what do you notice? What do you wonder? Is there any learning from previous lessons that they can apply?
Slide 7: Growing Our Ingredients	Explain: We are going to grow our own granola bar ingredients from seeds so we can see what we learned coming to life in the classroom. Explain: There are many different grains grown in Ontario and that are found in foods and products that we use every day! Ask: Does anything on this picture surprise you?

Slide 8-11: Growing Our Ingredients	Explain: Seeds are little packages of life. Inside them is everything needed to make a new plant under the right conditions. Explain: We will be growing Oats, Soybeans and Wheat. These are the grain ingredients that could possibly be used in granola bars. Explain: We will keep a journal and conduct an investigation to explore the conditions that a plant needs to grow well. We will see which of our plant ingredients will grow fastest and win the great ingredient race! Use slide 11 as a refresher on what a plant needs to grow – water, light, space, air and nutrients.
Slide 12: A Fair Test	Use the presentation to discuss the meaning of a fair test and why it is important. A fair test is a controlled investigation that compares two things. For a test to be fair, or well-controlled, we have to make sure that only one thing (called a variable) is changed and everything else is kept the same.
Slide 13: Variables	A variable is anything that can affect the results we are observing or measuring. Watch the video on variables - https://youtu.be/yYMPbKbK1yo

Slide 14: Planning Your Investigation	Hand out the Investigation Planning Worksheets. Explain to students that they will be working in their business groups to carry out an investigation on conditions plants need to grow. You will have just had a quick refresher about these conditions (slide 11) Students should start by brainstorming what variables they could keep the same or change. Possible answers are type of compost, planting depth, amount of water, size of pot, position in classroom (to keep light and temperature constant).
Slide 15: Planning Your Investigation	Using the Investigation Planning Worksheet, students will discuss what they want to learn and make some decisions about their investigation. In your business groups: **Step 1: Decide on your research question.** • What would you like to learn? **Step 2: Agree on a plan for your investigation.** • What will you keep the same? What will you change (the variable)?
Slide 16: Make a Prediction	Ask students to predict which ingredient they think will grow the fastest/tallest and why. **Step 3: Write down your prediction.** • Which plant do you think will grow fastest? Why? • Which plant do you think will grow tallest? Why?

Slide 17: **What Will We Grow?**	This is the beginning of the planting activity. Educators can order free seed kits to use with this step. While supplies last at https://goodineverygrain.ca/ontario-farming-stemterprise/ **If you do not have oat, soybean or wheat seeds, or you have old seeds, please contact: web@gfo.ca to see if supplies are still available.**
Slide 18: **Collect Your Supplies**	This slide can be updated with the supplies you have accessible.
Slide 19: **Action 2: Plant a Seed**	Model planting each of the ingredient seeds by following the directions. Discuss the best place in the classroom to keep the plants to help them grow. **Tips:** • Some cups are perforated (previous stock). • Keep the puck intact–don't remove the netting or break it apart. • Some classes are growing one seed per cup per student, while others are growing enough for their business group. Either works • If you are following the lesson plan (you can veer off any time!), you will need 2 cups/pucks/seeds per business group.

Slide 20: **Observational Journals**	As their plants grow, ask students to complete a regular ingredient journal using the activity sheet. Students should be encouraged to observe their plants closely and draw detailed, labelled diagrams at each stage. Model measuring length accurately and ask students to record the height of their plants at each stage. Use the presentation to teach the appropriate scientific vocabulary to label and describe their diagrams . Students could also take a photo each day to create a time lapse video of their plants' growth.
Slide 21: **Conclusions**	Once the plants have grown ask students to consider the questions on the presentation: • Explain what you found and why you think it happened. • Which ingredient grew fastest? • Which ingredient grew tallest? • What did you notice about the directions the plants grew? • Was your investigation a fair test? • How could you improve it next time?
Slide 22: **Wrap Up**	Ask students to think of one word that summarizes the lesson for them. The word might be about something they have learned, how they felt about the lesson, a question or a celebration. Students can share the word with a partner, or with you!

Slide 23: **Check In – What's Next?**	Congratulations! This is the last lesson of stage 3. Your class can now move onto the next stage (if you are doing them in order).

Assessment Resources. Coming soon!
Please check the STEMterprise webpage at https://goodineverygrain.ca/ontario-farming-stemterprise/

Plant Observation Journal

Date we planted our seeds: _____

Type of seed(s) that we planted:

Seed #1: _____

Seed #2: _____

Our research question:

_____

_____

_____

_____

_____

Describe your investigation

_____

_____

_____

_____

_____

Our Plant Observations

Observation # _____

Date _____

Draw your plants

Seed #1 _____

Seed #2 _____

What do you notice? What do you wonder?

_____

_____

_____

_____

_____

Investigation Planning

My research question
Things I will keep the same:
One thing I will change:
What I will measure:
My prediction:

Seed Journal

Observation 1 **Date:**_____ **Plant Height:**_____ **Description:**	**Observation 2** **Date:**_____ **Plant Height:**_____ **Description:**	**Observation 3** **Date:**_____ **Plant Height:**_____ **Description:**
Observation 4 **Date:**_____ **Plant Height:**_____ **Description:**	**Observation 5** **Date:**_____ **Plant Height:**_____ **Description:**	**Observation 6** **Date:**_____ **Plant Height:**_____ **Description:**