Guiding Question: How can diverse food systems meet the needs of a growing human population?

This **Learning Source** and accompanying **Build Competencies** activities encourage students to explore factors that influence food systems and address challenges in the production of food. Students are encouraged to identify connections between decisions that farmers make about crop production and the different journeys that the crop might take through a food system cycle.

This **Learning Source** provides starting points and information to investigate:

- Food systems and beyond
- Diversity of food systems
- Organic food systems
- Local food systems
- Traditional food systems
- Sustainable food systems

Introduce this learning experience by challenging students to consider why and how too much food and too few food options are both important challenges for food systems. Have students share what they know and/or have learned about food system and discuss questions such as the following.

- How can choices you make about what you eat have an impact on food systems?
- What do you think influences the choices people make about the foods they eat?
- What challenges do you think affect the food system and the types of food produced? (Guide students to consider challenges such as the impact of climate change on agriculture and the influence that agriculture has on climate change; the use of inputs like fertilizers and pesticides in food production; the dependence on fossil fuels in different stages of the food system; the level of waste in the food system, etc.)
- How do you think changes in one element of a food system can affect other elements?
- How do you think more food can be produced more efficiently and/or sustainably? What role can plants have in more sustainable food systems?
- How is a food system part of or function as a living system?

Build Competencies: Assessing Crop Production

Students follow the journey of a crop plant through the food system and assess how different types of food systems might change the journey; explore how to grow wheat in a garden.

This handout includes activities that support competencies, literacy and numeracy, and weblinks to online resources that can support student learning.

Assess

Look for evidence of understanding of the following concepts:

- Food systems
- Organic food systems
- Local food systems
- Traditional food systems
- Sustainable food systems

For a formative assessment, assess students' understandings of the concepts of plant uses, varieties, resource management, sustainability and systems in the **food system cycle diagrams** of a crop plant they create in the **Build Competencies** activity. Have students apply their understandings by illustrating the connections between two or more different food systems.

Additional Research or Background Sources

Consult teacher or student background sources such as the examples that follow to further explore, enrich or expand activities for this guiding question. Student research sources are also provided in **Build Competencies** handouts.

Crop Life Canada provides an infographic What does it take to feed 35 million Canadians and send food around the world? at https://helpingcanadagrow.ca/wp-content/uploads/2016/01/CropLife_Factsheet_Grow.pdf that provides an overview of several aspects related to sustainability and the food system. Encourage students to consider the perspectives represented in the infographic from Crop Life Canada.

A video that explores some of the benefits of crop protection and biotechnology for a growing population can be found at https://www.youtube.com/watch?v=Jh5ysppoJhI&t=105s.

An Overview of the Canadian agriculture and agri-food sector is provided by Agriculture and Agri-Food Canada at https://agriculture.canada.ca/en/canadas-agriculture-sectors/overview-canadas-agriculture-and-agri-food-sector. Statistics can be selected and shared with students and matched to different components of the food system.

If students are interested in exploring the challenge of food waste further, the Let's Talk Science website provides information, a video, infographic and statistics in Environmental Impact of Wasted Food at https://letstalkscience.ca/educational-resources/stem-in-context/environmental-impact-wasted-food.

A blog written by members of the American Society of Agronomy and Crop Science Society of America provides information on the connection between plants and nutrition in What are the types of crops based on nutrition? at https://sustainable-secure-food-blog.com/2019/08/07/what-are-the-types-of-crops-based-on-nutrition/.

The Jane Goodall Institute of Canada provides a webpage focused on Sustainable Food at https://janegoodall.ca/our-work/roots-and-shoots/sustainable-food/, which includes an initiative focused on sustainable food systems.

Additional information and discussion questions are provided in the carousel slide for this guiding question in the **food** DIVERSITY section of the **LEARN** webpage.

Click on the carousel slide to open and explore the following content.

- Food system influences
- Waste and the food system

Find **Science 7 and 8** learning outcomes supported by this learning experience on the following page.

Use this activity to highlight the connection that students' learning about plant structures, growth and systems have to the food choices they have. Work with students to explore personal connections to the food choices they make. How do the interact with different food systems? What are their connections to local, global, organic and sustainable foods?

PhotoVoice is a documentary photo-based storytelling strategy that uses cameras to encourage people to explore their lived experiences and perspectives on healthy, family, community and their futures.

PhotoVoice can form a rich picture of a place or community as well as the human activities that are part of it. The PhotoVoice website at **www.photovoiceworldwide.com/what-is-photovoice/** provides a description of the international storytelling context.

> ACCOMMODATE AND/OR EXTEND LEARNING

Adapt and simplify the PhotoVoice strategy to have students explore aspects of food systems through the lens of their own environments and experiences.

Students collect photos that have meaning to them, either through their own photography or by selecting images from their research or sources. As an example, PhotoVoice projects completed by Alberta Indigenous students are shared on the Empowering the Spirit website on PhotoVoice Project at https://empoweringthespirit.ca/photovoice-project/.

- Adapt and simplify the PhotoVoice approach by asking students to select three to four photos that represent elements and factors of food systems. Encourage Grade 7 students to focus on the diversity of plants that are part of the food system; Grade 8 students can focus on the concept of systems and be encouraged to compare the stages in a food system to the processes that plants and animal use to gather food.
- Title each photo and write a description of its meaning in relation to food system concepts.
- Provide options for students to share if they are willing.

Learning Experience Six: Learning Outcomes and Competency Map

project AGRICULTURE Activity	GRADE 7 AND 8 SCIENCE	
	CONCEPTUAL KNOWLEDGE	**PROCEDURAL KNOWLEDGE**
LEARNING SOURCES How can diverse food systems meet the needs of a growing population? **BUILD COMPETENCIES** Assessing Crop Production 	**Grade 7 Unit B: Plants for Food and Fibre** 1. Investigate plant uses; and identify links among needs, technologies, products and impacts • investigate trends in land use from natural environments (e.g., forests, grasslands) to managed environments (e.g., farms, gardens, greenhouses) and describe changes • investigate practical problems and issues in maintaining productive plants within sustainable environments, and identify questions for further study (e.g., investigate the long-term effects of irrigation practices or fertilizer use) 4. Identify and interpret relationships among human needs, technologies, environments, and the culture and use of living things as sources of food and fibre • identify the effects of different practices on the sustainability of agriculture and environmental resources (e.g., identify positive and negative effects of using chemical fertilizers and pesticides and and of using organic farming practices)	**Grade 7 Unit B: Plants for Food and Fibre** Ask questions about the relationships between and among observable variables, and plan investigations to address those questions • state a prediction and a hypothesis based on background information or an observed pattern of events (e.g., predict the effect of a particular plant treatment) Analyze qualitative and quantitative data, and develop and assess possible explanations • identify strengths and weaknesses of different methods of collecting and displaying data (e.g., compare two different ways to measure the amount of moisture in soil; evaluate different ways of presenting data on the health and growth of plants)
	Grade 8 Science Unit B: Cells and Systems 1. Investigate living things; and identify and apply scientific ideas used to interpret their general structure, function and organization • apply the concept of system in describing familiar organisms and analyzing their general structure and function 4. Describe areas of scientific investigation leading to new knowledge about body systems and to new medical applications • describe ways in which research about cells, organs and systems has brought about improvements in human health and nutrition (e.g., development of medicines; immunization procedures; diets based on the needs of organs, such as the heart)	**Grade 8 Science Unit B: Cells and Systems** Ask questions about the relationships between and among observable variables, and plan investigations to address those questions • identify questions to investigate (e.g., identify questions that arise from their own observations of plant and animal diversity) Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data • organize data, using a format that is appropriate to the task or experiment (e.g., compare the structure and function of two or more organisms, using charts and drawings) Analyze qualitative and quantitative data, and develop and assess possible explanations • compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs (e.g., prepare charts that compare structures of different organisms) Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., consider a wide variety of possible interpretations of their observations of animal structures and functions; critically evaluate inferences and conclusions, basing their arguments on fact rather than opinion)