



SCIENCE

10

SUBJECT AREA: SCIENCE 14
GRADE: 10



GENERAL LEARNER OUTCOMES

Unit D: Investigating Matter & Energy in the Environment

Students will:

Describe how the flow of matter in the biosphere is cyclical along characteristic pathways and can be disrupted by human activity



SPECIFIC LEARNER OUTCOMES

Students will:

- Assess the impact of modern agricultural technology on the natural pathways of recycling matter
- Identify and assess the needs and interests of society that have led to technologies with unforeseen environmental consequences





ASSESSMENT

Students will provide evidence of learning by:

Choosing a Canadian agricultural product:

- Identifying and assessing the impact of modern agricultural technology used for the agricultural product
- Describing how the needs and interests of society led to technologies with unforeseen food waste consequences
- Making suggestions to help overcome those food waste challenges specific to their chosen product
- Presenting and explaining their findings to their peers



MATERIALS

[Modern Agriculture Effects Part 1](#) (6:18 min)

[Modern Agriculture Effects Part 2](#) (4:12 min)

[Modern Agriculture Alternatives](#) (7:08 min)



LEARNING RESOURCES

- Alberta Education Programs of Study



FOOD WASTAGE

FOOD LOSS

Agricultural
production and
harvest

Processing

FOOD WASTE

Distribution
and retail

Restaurants
and catering

Domestic
consumption

As indicated by Wikipedia, "A nutrient cycle (or ecological recycling) is the movement and exchange of organic and inorganic matter back into the production of matter." At the food production level, this natural movement is disrupted by human activity, thus causing unforeseen environmental consequences, as well as food waste. Technological advancements of modern agriculture have improved affordability of food, increased the food supply, ensured better food safety and increased sustainability. With the same amount of total input, the average farm in 2011 produced twice as much output as it did in 1961. Unfortunately, negative effects, including food waste, are also a result of these advancements.

View and Discuss:

Have students look for:

- Effects of modern agricultural technology on the natural pathways of matter being recycled
- Environmental consequences of modern technologies needed for farming
- Make suggestions to help overcome food waste challenges

[Modern Agriculture Effects Part 1](#) (6:18 min)

[Modern Agriculture Effects Part 2](#) (4:12 min)

[Modern Agriculture Alternatives](#) (7:08 min)



As suggested by the Government of Canada, current opportunities to reduce food loss in the food production sector include:

- Research and measurement to better understand the significance and causes of food loss for specific commodities (VCMI, 2019).
- Continued research to reduce losses and recycle waste – for example projects that support the development of new crops and/or varieties better adapted to extreme weather events, pests and diseases.
- Identify solutions and develop guidance based on a value chain perspective (VCMI, 2019).
- Address agricultural labour shortages (VCMI, 2019) and evaluate the viability to complement harvesting labour with automation strategies.
- Analyze opportunities for process and business improvements within farming and harvest companies, (VCMI, 2019) including improved forecasting methods to better predict market requirements.
- Educate and raise awareness in order to change attitudes of industry and consumers regarding the aesthetic appearance of fruits and vegetables. Federal grading requirements could be clarified to distinguish grades attributed for quality purposes from grades attributed for safety purposes (IICA Canada and Laval University, 2018).
- Support growers associations and extension services to disseminate and promote ways to avoid/reduce food loss, including the modernization of the on-farm sorting/grading and storage facilities.



TEACHER INSTRUCTIONS

FOOD WASTAGE

Technological advancements in agriculture have a positive effect on food sustainability but also have environmental consequences.

In this assignment, students will choose a Canadian agricultural product and complete the following:

- Identify and assess the impact of modern technology used for the crop on the natural pathways of recycling matter.
- Describe how the needs and interests of society led to technologies with unforeseen food waste consequences.
- Make suggestions to help overcome food wastage challenges specific to their crop.

Working with a partner, students will follow assignment criteria and present their findings to their peers via Google Slides.



Agricultural practices carried out by humans have a positive effect on food sustainability but also have environmental consequences. Natural pathways of recycling matter have been affected and problems such as soil erosion, contamination of groundwater and food wastage are some of the issues. Food wastage is the focus of your assignment.

In this assignment you will choose a Canadian agricultural product and complete the following:

- Identify and assess the impact of modern technology used for your chosen agricultural product on the natural pathways of recycling matter. What modern farming practices used on your crop may cause problems?
- What needs and interests of society led to technologies with unforeseen food wastage consequences (e.g., improved affordability of food and aesthetic appearance of the crop)?
- What are natural or environmental causes of food waste involved in the production of your chosen agricultural product?
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- Make suggestions to help overcome the food waste challenges specific to your agricultural product (e.g., covering crops and crop rotation).
- Present your findings to your peers via Google Slides.



STUDENT ASSIGNMENT

FOOD WASTAGE

Slide outline:

1. Title page.
2. Introduction of agricultural product.
3. Impact of modern technology used for your chosen agricultural product on the natural pathways of recycling matter.
4. Needs and interests of society that led to technologies with unforeseen food waste consequences.
5. List natural or environmental causes of food waste involved in the production of your chosen agricultural product.
6. Suggestions to help overcome the food waste challenges specific to your agricultural product.
7. Bibliography:
 - URLs must be collected for information and pictures. Use the bibliography slide to post URLs as your research progresses.
 - Insert audio and/or video to further explain slide content when needed (maximum time for presentation is 15 minutes).



Unit D: Investigating Matter & Energy in the Environment

"FOOD WASTAGE"



Objectives	Excellent	Proficient	Satisfactory	Limited
<p>Title Page</p> <p>Slide includes your group names and an eye-catching image.</p>	Fully captures the attention of the audience. Topic has a clear focus.	Captures the attention of the audience. Topic is focused.	Few audience members seem interested. Topic focus is vague.	Audience is not captured. No topic focus.
<p>Preparation</p>	Students created a clear plan and carefully chose roles and tasks for each team member. They managed their time well and worked together to share the workload.	Students had a rough plan and tasks for each team member. They generally managed their time and worked together to share the workload.	Students would have benefitted from more defined role and task assignments as well as overall better time management.	Students did not create a clear plan or assign roles and did not manage their time well.
<p>Organization</p> <p>Introduction (title slide), body content and bibliography.</p>	Presented findings in an organized manner and interesting sequences that were easy to follow.	Presented findings with some degree of organization and a logical sequence that the audience could follow.	Information and graphics are placed haphazardly throughout.	Audience cannot understand the presentation because there is no sequence and information is disorganized.
<p>Information</p>	Students showed a comprehensive understanding of the topic. Their information was accurate and well researched and their assignment was well supported by facts.	Students showed an understanding of the topic. Their information was accurate and their assignment was supported by facts.	Students showed some understanding of the topic, but their research was incomplete and/or their assignment was not supported by facts.	Students demonstrated little or no understanding of the topic. They did not appear to have done much research and their assignment was not supported by facts.
<p>Presentation</p>	Presentation included 13–15 slides. Information on slides was kept short and students expanded on information in attached videos and/or audio.	Presentation included 11 slides. Information on slides contained many sentences and the group had some difficulty explaining ideas beyond the information in the slides and attached videos.	Presentation included 9–10 slides. Information on slides contained many sentences and the group had difficulty explaining ideas beyond the information in the slides and attached videos.	Presentation included less than 9 slides. Information on slides contained many sentences, and group did not expand on information presented in the slides.