



Connecting Grains to Food



Students will demonstrate their knowledge of food literacy and British Columbia agriculture concerning cereal grains by engaging in a hands-on flour grinding activity. Following this, they will create presentations to educate their classmates on one of four topics related to cereal grains.

Subject Levels/ Suggested Grade

Food Studies 9-12

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Grade and Subject	Curricular Competencies	Content Connections
Food Studies 9	Complex tasks require different technology and tools at different stages	health, economic, and environmental factors that influence availability and choice of food in personal, local, and global contexts
Food Studies 10	Complex tasks require different technology and tools at different stages	<p>food trends, including nutrition, marketing, and food systems</p> <p>simple and complex global food systems and how they affect food choices, including environmental, ethical, economic, and health impacts</p>
Food Studies 11	Experiment with a variety of tools, ingredients, and processes to create and refine food products	<p>meal and recipe design opportunities</p> <p>components of recipe development and modification, including:</p> <ul style="list-style-type: none"> - ingredients - functions - Proportions - temperatures - preparation methods <p>issues involved with food security</p>
Food Studies 12	<p>Observe and research the context of a meal and/or recipe preparation task or process</p> <p>Experiment with a variety of tools, ingredients, and processes to create and refine food products</p>	complex meal and recipe design opportunities

Teacher Background

What are grains?

Grains are the seed heads of grass plants. Major grain categories worldwide are wheat, rice, corn, barley, oats and rye. All of these, except rice are grown in large quantities in Canada.

Grain crops are also known as cereal crops, and the word “cereal” stems from “Ceres,” the Greek goddess of farming.

After being harvested, dried grains are more durable than other staple foods, such as starchy fruits and tubers. This durability has made grains well suited to meeting the world’s food needs, because they can be mechanically harvested, transported by rail, or shipped and stored for long periods.

Where are cereal grains produced? How much do we grow?

Wheat, barley, oats and rye are the primary cereal crops grown in British Columbia. Significant production is in place as well for canola as an oilseed. Small amounts of flax, canary seed, mustard, sunflowers, and soybeans are also produced. About 85% - 90% of B.C.’s grain is grown in the Peace River region. Grains are also grown in the North Okanagan, Cariboo/Nechako, and Kootenay regions, Lower Mainland/Fraser Valley and on Vancouver Island.



How are grains produced?

Grain crops are generally planted in the spring and harvested in August and September. Some farmers (about 5%), plant winter wheat in September or October, which is harvested in late July and early August.

Most grain producers use a no-till technique for planting their crops. Grain is planted with a machine that cuts a slice in the ground, drops in a seed, then covers it. This technique saves energy and labour, because it reduces the amount of time that the farmer has to work the field.

When the crop ripens, it is harvested using a combine that separates the seeds from the chaff and straw. Wheat, for example, is ready for harvest when it is about 1m high and its colour changes from green to golden. One head of wheat contains 30 to 65 kernels of grain. Harvested grain is stored in granaries, and may require drying or cooling, as it is important to maintain a specific moisture level and temperature to ensure that it does not become mouldy.

How is grain used?

Ground grain is called flour. The most common type of flour in Canada is wheat flour, which is used to make bread, pizza dough and pastries. A special kind of hard wheat,

called durum wheat, is used to make pasta. We also eat whole grains, which is found in porridge or oatmeal.

Grains for animal consumption are produced in feed mills throughout BC.

Grains are a good source of nutrients. In wheat, the endosperm contains starch, the bran contains minerals and vitamins, and the embryo contains protein, fat, and vitamins.

Materials:

- *Cereal Grains Poster*
- Wheat berries
- Steel cut oats
- Dry cob of corn
- Tortilla chips
- Granola bar
- Flour
- Flour Mill (coffee grinder or blender works too)
- Bowls
- Student Handouts
 - *Grains Project Checklist*

Introduction:

- Ask: *Do you know any grains? Can you think of any ways you eat them at home or at school?*
 - Grains are the seed heads of grass plants. Major grain categories worldwide are wheat, rice, corn, barley, oats and rye. All of these, except rice are grown in large quantities in Canada.
 - Grain crops are also known as cereal crops, and the word “cereal” stems from “Ceres,” the Greek goddess of farming.
 - Ways we eat them could include: oats, rye, wheat, millet, barley, rice, corn, cookies, crackers, bread, pasta, granola bars, cakes, rice, pastries, buns, etc.
- Show students the *Cereal Grains Poster* and have them make some observations about the plants and share them with the whole group.

Body:

- Now that we have learned a little bit more about grains, we are going to connect them to food!
- Display the wheat berries, steel cut oats, and dried corn cob.
- Compare these grains to their processed forms:
 - Oats: Show granola bars and discuss how oats are used.
 - Corn: Show a cob of dried corn and compare it to tortilla chips.
 - Wheat: Revisit wheat and flour, discussing its uses in bread, pastries, and noodles.
- Tell students that they are going to make their own flour!

- Show a wheat berry and say:
 - *Here we have a wheat berry, which is the seed or 'fruit' of the wheat plant. It's the part of the plant that is harvested and processed to make products like flour, bread, and pasta. The wheat berry contains three main parts. Show Grain Parts Poster and talk about the three parts.*
 - *The Bran: The outer layer, which is rich in fiber and nutrients.*
 - *The Germ: The small, nutrient-packed core that can sprout into a new plant.*
 - *The Endosperm: The starchy middle part that provides energy and is the main ingredient used to make white flour.*
- Tell students:
 - *When a wheat berry is ground, it can use the whole grain (including the bran and germ) to make whole wheat flour, or the bran and germ can be removed to make refined white flour.*
- Distribute a wheat berry to each student. Let them try peeling it by hand.
- While they are peeling ask:
 - *What do you notice about the texture of the grain as you peel it? How might this affect how easily it can be processed?*
 - *Why do you think peeling the grain is an important first step before grinding?*
- Tell students that peeling by hand is time-consuming, but there's a faster way—threshing! Farmers thresh wheat because it is FASTER than peeling each kernel by hand.
- Let them try grinding the berries into flour using a flour mill, coffee grinder or blender.
 - Discuss the difficulty of manual grinding and contrast it with modern flour production (using machines and electricity).
- Labor-Intensive Nature of Manual Grinding: Highlight how much effort is required to grind wheat manually. Students will likely feel how tiring it can be after just a few minutes, even with a hand mill. Discuss how grinding flour by hand was once a daily task for families, taking hours and requiring great physical strength.
- Comparison with Modern Methods: Transition into discussing modern flour production. Explain how large industrial mills today use electricity and advanced machinery to grind wheat quickly and efficiently. Modern mills can process thousands of pounds of wheat every hour, producing huge quantities of flour with minimal manual effort.
- Automation and Efficiency: Discuss the benefits of using machines, such as consistency, speed, and cost-effectiveness. However, you can also mention the environmental and social impacts of industrial farming and milling, prompting students to think critically about sustainability.

- After they have ground the flour encourage students to touch the flour and briefly discuss the difference between whole wheat flour and refined white flour they may see at home.
- Whole Wheat Flour: After grinding, show the students the fresh whole wheat flour. Let them touch it and observe the color and texture. Explain that whole wheat flour contains all three parts of the wheat berry: the bran, germ, and endosperm. The presence of bran gives the flour a darker color and a coarser texture, and it retains more nutrients, such as fiber, vitamins, and minerals.
- Refined White Flour: Show an example of refined white flour (which is typically found in most homes or stores) and compare it with the freshly ground whole wheat flour. Explain how white flour is made by removing the bran and germ, leaving only the starchy endosperm. This process creates a finer, lighter-colored flour, but it also removes much of the nutritional value found in whole wheat.
- Nutritional Differences: Briefly discuss how refined white flour is lower in fiber, vitamins, and minerals compared to whole wheat flour. You can also mention how some refined flours are “enriched” with added nutrients, like iron and folic acid, to replace some of the lost nutrients during the milling process.
- Post the *Discussion Questions* for students to discuss with each other:

Closing:

- Have students choose one of the four projects to complete. Use the *Grains Project Checklist* to guide their planning. Ensure students are all clear on the deadlines and expectations of the project.
1. Research Project: Assign students to research the cultural or historical significance of a specific grain (e.g., wheat in ancient civilizations). They should present their findings to the class.
 - Have you ever wondered how different types of grains (like barley, oats, and quinoa) are used in different cultures around the world? How might these grains be prepared or eaten differently in other countries?
 2. Sustainability Project: Our world is growing fast, and we are running out of space. How might we solve this problem?
 - How might the way we grow, and process grains change in the future to help feed more people or to be more sustainable?
 - What role do grains play in the environment? Are there ways to grow them more sustainably to help the planet?
 3. Inventing Project: If you could invent a new grain-based product, what would it be and why? How would it be different from things we eat today?
 4. Food Connections: Ask students to bring examples of foods they cook at home made from grains to the next class. They should be prepared to explain how the grain is used in the food product.

Extensions:

- Art Project: Have students create posters or diagrams of the grain life cycle, from planting to harvest and food production and then display the posters in the classroom.
- Plan a Field trip:
 - Use [Farm Explorer BC Map](#) for local farm suggestions
 - [Loutet Farm Visits](#)
 - [AG Adventures](#) in Abbotsford (Pencil Patch) or Kelowna (Helen's Acres)

Links:

- Loutet Farm Visits: <https://ediblegardenproject.com/teach/>
- Farm Explorer BC Map: <https://farm-explorer-bc-bcaitc.hub.arcgis.com/>
- Ag Adventures: <https://www.bcaitc.ca/ag-adventures>

CEREAL GRAINS

WHEAT



RYE



MILLET



OAT



BARLEY



RICE



CORN



GRAIN PARTS

THE BRAN

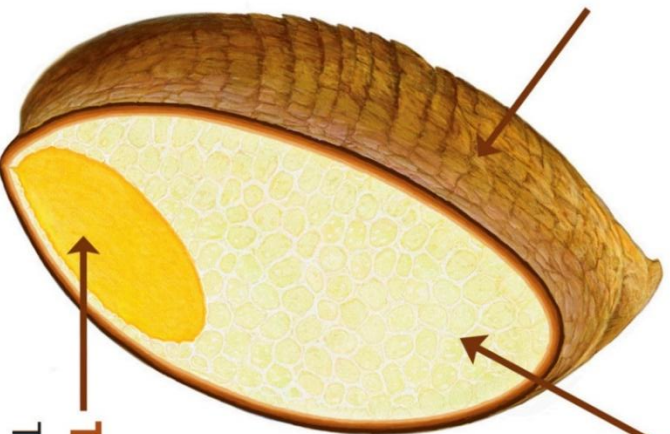
The bran is the multi-layered outer skin of the edible kernel. It contains important antioxidants, B vitamins, and fiber.

THE ENDOSPERM

The endosperm is the germ's food supply, which provides essential energy to the young plant so it can send roots down for water and nutrients, and send sprouts up for sunlight's photosynthesizing power. The endosperm is by far the largest portion of the kernel. It contains starchy carbohydrates, proteins and small amounts of vitamins and minerals.

THE GERM

The germ is the embryo which has the potential to sprout into a new plant. It contains many B vitamins, some protein, minerals, and healthy fats.



Discussion Questions

- *How do you think this process of peeling and grinding compares to the way flour is made in large factories?*
- *Do you think the flour we've made today would be similar to store-bought flour? Why or why not?*
- *What do you think are the advantages or challenges of grinding flour this way, versus using industrial machinery?*

Discussion Questions Answer Key

- *How do you think this process of peeling and grinding compares to the way flour is made in large factories?*

Threshing by hand is like the factory process, as both methods involve separating grain seeds from the stalks and chaff. However, factories employ specialized machinery to thresh, which strikes the plants to release the seeds. Once the seeds are extracted, they can be processed into flour using state-of-the-art machines. This saves a lot of time and labour.

- *Do you think the flour we've made today would be similar to store-bought flour? Why or why not?*

Freshly milled flour stands apart from store-bought options in several ways. A key distinction lies in its nutritional profile; freshly milled flour preserves all components of the grain, including the bran, germ, and endosperm. In contrast, store-bought flour is often finely ground and may be missing some of these essential parts to maintain a consistent texture.

- *What do you think are the advantages or challenges of grinding flour this way, versus using industrial machinery?*

- *Milling your own flour gives you greater control over the ingredients, enabling you to choose the specific grains you wish to use and decide if you want to incorporate any additives.*

Grains Project Checklist

Name: _____

Choose one of the four topics ☐

- Research Project
- Sustainability Project
- Invention Project
- Food Connections

Research Project ☐

- Research the cultural or historical significance of a specific grain (e.g., wheat in ancient civilizations).
- *Have you ever wondered how different types of grains (like barley, oats, and quinoa) are used in different cultures around the world?*
- *How might these grains be prepared or eaten differently in other countries?*

Sustainability Project ☐

- Our world is growing fast, and we are running out of space. How might we solve this problem?
- *How might the way we grow, and process grains change in the future to help feed more people or to be more sustainable?*
- *What role do grains play in the environment? Are there ways to grow them more sustainably to help the planet?*

Inventing Project ☐

- If you could invent a new grain-based product, what would it be and why?
- How would it be different from things we eat today?

Food Connections ☐

- Ask students to bring examples of foods they cook at home made from grains to the next class. They should be prepared to explain how the grain is used in the food product.

Have you? ☐

- Decided how you will present the project? Canva, Google Slides, poster, etc.
- Answered the questions outlined above?
- Found or created images to enhance your written information?
- Noted the due date as set by the teacher and class?

Any other items to note:

Grains Project Due Date:_____