# Harvest of the Month

THIS MONTH'S THEME: **WHOLE GRAINS**

Harvest lessons are a fun way for K-4 students to explore, taste and learn about eating more fruits and vegetables every day.

## Activity Summary

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<td>15 min</td>
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TRUE OR FALSE?

Begin with a fun interactive true or false activity. When a statement is true, students will stand up. When they believe a statement is false, they will sit down.

1. All grains start out as “Whole Grains”. True. All grains that are planted begin as Whole Grains up until they are refined. Refining grain is a process that removes 1 or more key parts of the grain (bran, endosperm and germ).

2. You can plant wheat in the garden while there is still frost in the spring. False. Wheat can easily be damaged in its early stages of growth by frost, a thin white layer of ice that occurs on the ground in cool temperatures. This can harm wheat crops in their early stages of growth.

3. Grains have been used by cultures for thousands of years. True. Grains have been used in cultures around the world since 9,000 B.C.E! This is thousands of years before the pyramids were built. Whole grains are consumed in many ways in different countries. For example, many Asian countries cook with rice while European countries usually cook with pasta. Today, many types of grain can (and do) grow in Vermont!

4. You can plant refined grains in a garden. False. In order for a grain plant to grow, the seed needs to be intact, with all its original components to grow.

5. Everyone can eat grains. False. Some people are allergic to a protein called Gluten and this means they can only eat certain types of grains that do not have the protein (like Quinoa, Millet, Rice, Corn, Oat).

Ask these focusing questions throughout the lesson

How have grains been used in other cultures?
What parts are missing from refined grains?
Why is a whole grain healthy for us?
What conditions would a wheat plant prefer to grow in?
A WHOLE HISTORY OF GRAINS

MATERIALS
- Most Productive Growers of Wheat Worksheet (see appendix)
- Map of the world (see appendix)
- Productive Growers of Wheat Answer Key (see appendix)
- Anatomy of Grain Worksheet (see appendix)
- Pencils

PREPARATION
Not all grades will be able to do the Productive Growers of Wheat Worksheet. For K-3, consider showing them the answer key and explain what countries grow the most wheat!

PROCEDURE
1. Ask students, “how long do you think humans have been eating grains?” Explain to students that humans have eaten grains since 9,000 BCE, which was not hundreds, but thousands of years before the pyramids were built!
2. Over time, grains have been used to make many products and because of this, they have become a staple in many cultures. Products like pasta, chips, cereal, bread and tortillas can all be traced back to a grain crop.
3. Refined grains, however, did not come into use until the 1800s. Ask students if they have heard of the word “refined” & what does it mean? The process of refining grains removes the germ and bran.
   a. Show students the 'Anatomy of a Grain' worksheet; briefly explain that refining removes some components inside a grain. They will learn more in the next activity.
4. Then, in the 1900s, grains started to become enriched, which is a process that adds nutrients to the grain after it has been refined. Levels of Iron and B-Vitamins are normally increased after a grain is enriched. Ask, “why might enriching a grain be helpful to us?”
5. In terms of growing grain, Vermont hasn’t grown wheat on a large scale since the 1800’s. During this time, farmers were planting as much as 40,000 acres (equal to 36,300 football fields)!
6. Today, North Dakota grows the most wheat, planting over 7 million acres each year. In total, the United States plants 45 million acres of wheat, which is larger than the entire state of New York!
PROCEDURE

7. Even though the United States grows a lot of wheat, there are still countries that grow more than us! The U.S actually grows the 4th most wheat in the entire world.

8. Explain that China is the world's largest producer of wheat (134 million tons), followed by India, Russia, U.S, France, Australia, Pakistan, Ukraine and Germany.
   a. If your students are old enough, hand out a 'Growers of Wheat' worksheet, otherwise, point out the countries as you announce them using the answer sheet.

PRODUCTIVE GROWERS OF WHEAT ACTIVITY

1. Explain to students that they must use the coordinates given to find each country in the word bank. If they do not know what country the coordinate is in, have them make their best guess.

2. To give an example of using coordinates, have students find 0° on the top of the map. If they have the coordinates 100° East, move left or right following the compass on the map. If they have a North or South coordinate, move up or down from the 0° on the sides of the map.

3. Some coordinates will fall in between the numbers on the map and that is fine! Have students make their best guess to where the coordinate will fall. Review the map once everyone is done.
WHOLLY WHOLE GRAINS

MATERIALS
- Mason jar
- Felt
- Cotton Balls
- Ping Pong Ball
- Optional - Dry Erase Board
- Optional - Dry Erase Markers

PREPARATION
Have the Whole Grain model assembled before beginning the lesson (see below).

PROCEDURE
Students will learn about the components & nutrients in whole grains. For this, you will need an example model of a whole grain, in this case we use a Wheat Berry. To make this, wrap a brown piece of felt around a large mason jar. Inside of the jar, place 1 ping pong ball & fill the rest with cotton balls.
WHOLE GRAIN MODEL PARTS

- **Bran (felt):** Is the thick, outer shell of the grain which protects the seed. It has most of the Fiber & some B-Vitamins. These help our heart and our bodies' ability to digest food.

- **Endosperm (cotton balls):** Is the middle of the grain. This provides carbohydrates & protein, giving us energy. We use cotton because this part is very soft and easy to eat. This is what white flour is made of.

- **Germ (ping pong ball):** Is the inner part of the grain that sprouts when the grain is planted. It has antioxidants, vitamin E, B vitamins & healthy fat.

- **Husk (not shown):** All of these are located inside an inedible husk, which protects these parts. This is separated from the whole grain before it can be eaten. (note: not shown in the model)

PROCEDURE:

1. Start by telling students that the definition of a grain is the edible seed of some grasses and other plants. Then ask students, “what are some different types of grains?” (wheat, corn, barley, oats, rice, etc.)

2. Explain that every grain begins as a “whole grain”. Each grain is made of the same 3 parts (Bran, Endosperm, Germ) & each contains nutrients that help our body.

3. Explain each part using the Whole Grain Visual (see description of parts, next page).

4. As a rule of thumb, at least half of the grains we eat should come from whole grains. (Make Half Your Grains Whole!)

5. Ask, “How do you know you’re eating whole grains?” (ingredient lists will use the word "whole" on them, like "whole wheat").

6. Explain that we eat whole grains when all 3 parts of the grain are present. Refined & enriched grains are not considered whole grains because the germ and bran have been removed.
MAPLE CORNBREAD

YIELD: 4-6 servings

MATERIALS

- 1-1/4 cups all-purpose flour
- 1 cup yellow corn meal
- 1/3 cup granulated sugar
- 1/3 cup maple syrup
- 1 teaspoon salt
- 1 tablespoon baking powder
- 1-1/4 cup milk
- 1/3 cup canola oil

DIRECTIONS

1. Preheat the oven to 350 F.
2. Grease two 8-inch pans (or 1 large pan).
3. In a large bowl, stir together cornmeal and flour. Add baking powder, baking soda, & salt to the mixture.
4. In another bowl, beat sugar, maple syrup, milk, and oil.
5. Mix wet ingredients with dry, until just combined.
6. Bake for 20-30 minutes or until the toothpick (or knife) comes out clean.
MILLING ABOUT THE GRAIN

MATERIALS
- Sturdy Table
- Grain Mill
- Corn Kernels or Wheat Berries
- Small Bowl
- Paper Plates
- Spoons

PREPARATION
Setup the grain mill on a sturdy table before starting the lesson. Count enough paper plates/spoons so that each student can taste the flour.

PROCEDURE
1. Ask students, “have you ever heard the word ‘refined’ & what does it mean?”
   Explain that this is a process of removing the germ & bran from the grains. This involves using a grain mill, which grinds the grains, though some flours do contain the whole grain (e.g. whole wheat flour, or rye flour)
2. With corn kernels or wheat berries, allow students to grind the kernels (limit 3 TBSP each). Catch the ground corn in a bowl.
3. Optional: Set flour to the side to taste test.
4. Ask students, “why are grains refined if it removes the nutrients?”
   a. Grains are refined because it increases the shelf life of grains and grain products. There are natural oils in the bran and germ that can go rancid over time. Whole grain flours are best stored away from light and in a cool place.
   b. Items made with refined grains have a softer texture. For instance refined wheat flour is made with the endosperm only, which is light in color and very soft. Common refined grain products include pasta, white bread, & white rice.
   c. Whole grain items have more nutrients and a more coarse texture. Whole grain flours and products are often stored in a fridge or freezer to increase shelf life.
ACTIVITY #5 (20 MINUTES)  
ALL GRADES

GRAIN MATCH-UP

MATERIALS:
- Pictures of Grains (See appendix)
- Pencil
- Paper

DIRECTIONS
1. Explain to students that they will need to match different types of grains with their correct plants. Create 3 different groups or hand each student their own picture if the group is small enough.
2. Students will match their grain name with the correct plant photo and seed photo of their grain plant. As an alternative, you can give students the grain plant picture and have them match it to the name.
3. An adult may be needed to help guide them through the matching.

ANSWER KEY
Plant Photos Appendix page 18 - Barley (2), Whole Grain Corn (4), Millet (6), Wild Rice (7), Oats (3), Popcorn (5) Brown Rice (1)

Seed Photos Appendix page 19 - Barley (A), Whole Grain Corn (B), Millet (C), Wild Rice (D), Oats (E), Popcorn (F) Brown Rice (G)
WHERE'S MY WHOLE GRAIN

MATERIALS

- Food Labels of grain products (see appendix or bring your own)
  - Bread, taco shells, chips, crackers, rice, pasta, grains, etc
- Whole Grain labels (see appendix or bring your own)
  - Whole wheat bread, wheat germ, multi-grain crackers, whole wheat pasta, etc.
- Pencil
- Paper

PREPARATION

Bring in labels or products from the store that vary in grain content. Try to find labels of store products that students may be eating, even if they aren’t the healthiest. There are also labels in the appendix if it is easier to print out prior to the lesson.

PROCEDURE

1. Ask, “who looks at food packages at the store? What have they seen on the package?” In order for us to find out if a food is made with whole grains, we have to go to the back of the box/package and find the “Ingredients Label”.
2. Explain to students that they will be handed different grain products and they must determine if their food product is made of whole or refined grains.
3. Place students into groups of 3-5 & give each group a food label.
4. Give students a few minutes to look at the labels.
5. Ask each group to determine whether or not their food contains whole grains. How can you tell? If the label doesn’t have the words whole grains, do you think the food could be made with whole grains? Which labels are healthiest?
6. Explain to students that even though a product says “natural”, “multi-grain”, “100 percent wheat” in the name, it does not always mean they are whole-grain foods. If you want to be absolutely sure, check the Ingredients Label on the back!
EDUCATOR NOTE: Products made with whole grains will usually contain the word whole in the ingredient list. That may show up as: whole wheat, whole spelt, whole bulgur, whole barley, etc. Other types of whole grains that won't have the word whole but are left in their whole form include: oats, brown rice, wild rice, quinoa, and millet.

Ingredient labels that list wheat flour without the word "whole" means whole wheat flour was refined and is no longer a whole grain. The word enriched means some B vitamins and iron were added back to the refined flour.

RESOURCE:
Check out the Whole Grains Council website and their "Whole Grains A to Z" and "What's a Whole Grain?" pages for more information.
WHOLE GRAIN LITERATURE

Check out these books about whole grains to read to your students:

**Corn is Maize by Gail Gibbons:** This book is full of information about corn; how it is grown, how it is harvested, to corn history and its many uses. It is a great introduction to the versatile and ubiquitous plant.

**Bread is for Eating by David & Phillis Gershator:** This book celebrates the traditional bread making process and production from South American. It is a great way to show students how a grain is turned into bread products.
AN ODE TO GRAINS

MATERIALS

- Varieties of grains
  - Rice, Corn, Barley, Wheat Berries, Spelt, Oats
- Paper Bags
- Pencil
- Slips of paper (pre-cut)

PREPARATION

Display different types of grains around the classroom. Each grain should be next to a paper bag with the name of that particular grain written on it. Place small slips of paper and pencils by each bag. Make sure you know how many students are in the class. You will need at most 3 slips of paper per student.

PROCEDURE

1. Instruct students they will be using their senses to experience these grains and will write a poem about each one. But there's a catch! For each grain type, every student will write 1-3 words describing how the grain looks, smells, feels and sounds (If they would like to, carefully shake the grains.) One slip of paper will contain one word (3 words = 3 slips of paper).
2. Split the students evenly among the amount of grains you have. Each group will begin the activity at one grain. Once everyone has written their 1-3 words for that grain, they will move to the next grain and repeat this until all groups have written words for every grain. In the beginning, have the group give examples of descriptive words they could use.
3. When all the students have gone through every grain, assign each group a bag. The group must then make a poem using ALL the words in their bag. The words can be in any order and they cannot add to the pile of words. Encourage the groups to be as creative as possible!
4. After 5 minutes, have students volunteer to present their poem to the class. Once everyone has gone, ask the students what they thought of the activity. What was difficult? What was fun? How can we make it more creative?
ACKNOWLEDGMENTS
The following people contributed to this lesson plan: Colton McCracken, Maisie Anrod, Esmé Forbes, Maire Folan, Sharon Palmer, and Emma Richmond-Boudewyns.

Resources used to develop this lesson plan include:

- USDA MyPlate: Grains
- Academy of Nutrition and Dietetics: What is a Whole Grain?
- USDA Economic Research Service: Wheat
- Oldways Whole Grains Council
- Harvard School of Public Health: Whole Grains
- Harvard College, Food and Fun Afterschool: Go for Whole Grains
1) 40.0 degrees North, 115.0 degrees East

2) 48.0 degrees North, 2.0 degrees East

3) 29.0 degrees North, 76.0 degrees East

4) 52.0 degrees North, 120.0 degrees West

5) 35.0 degrees North, 100.0 degrees West

6) 60.0 degrees North, 62.0 degrees East

7) 20.0 degrees South, 140.0 degrees East

8) 48.0 degrees North, 32.0 degrees East

Country Word Bank
United States, Ukraine, Australia, India, China, Russia, France, Canada
ANATOMY OF GRAIN (for activity #1)
GRAIN MATCH-UP CARDS (for activity #5)

- Millet
- Popcorn
- Oats
- Brown Rice
- Barley
- Wild Rice
- Whole Grain Corn
WHOLE GRAIN INGREDIENTS LABEL (for activity #6)

Above: wheat crackers
Below: cereal