



# HARVEST LESSONS

THIS MONTH'S THEME:

## DRY BEANS

*Lesson Plan*



HARVEST LESSONS ARE A FUN WAY FOR K-4 CLASSROOMS TO EXPLORE, TASTE AND LEARN ABOUT EATING MORE FRUITS AND VEGETABLES EVERY DAY.

## ACTIVITY SUMMARY

| ACTIVITY                              | GRADE LEVEL | CURRICULUM CONNECTION  | TIME   |
|---------------------------------------|-------------|--|--------|
| Introduction                          | all         | <b>Literacy:</b> speaking, listening<br><b>Science, social studies:</b> evaluating claims to determine whether they are true | 10 min |
| Taste Test                            | all         | <b>Literacy:</b> speaking, listening<br><b>Math:</b> measurement, graphing/tallying responses                                | 20 min |
| #1: Bean Observation & Identification | all         | <b>Science:</b> classification, observation  | 15 min |
| #2: Creating a Bean Timeline          | 3-4         | <b>Social studies:</b> comparing the past and the present<br><b>Literacy:</b> reading & listening comprehension              | 15 min |
| #3: Mapping the History of Beans      | 3-4         | <b>Social studies:</b> geography, past and present   | 20 min |
| #4: Bean Literature                   | all         | <b>Literacy:</b> listening comprehension   | 20 min |
| #5: Bean Dissection                   | all         | <b>Science:</b> structure & function of living things  | 20 min |
| #6: Making Living Bean Necklaces      | all         | <b>Science:</b> structure & function of living things  | 10 min |
| #7: How Dry Beans Grow                | 3-4         | <b>Social studies:</b> comparing the past and the present<br><b>Writing:</b> informative/explanatory text                    | 30 min |



*(activity summary, continued)*

| ACTIVITY              | GRADE LEVEL | CURRICULUM CONNECTION  | TIME                             |
|-----------------------|-------------|--|----------------------------------|
| #8: Bean Art          | all         | <b>Art:</b> textures, mosaics  | 20 min,<br>plus dry-<br>ing time |
| #9: Three Sisters Tag | all         | <b>Social studies:</b> Native Americans<br><b>Physical education, health:</b> movement | 20 min                           |

## INTRODUCTION

ALL GRADES

### 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. Beans have tons of protein, which is great for your muscles and fills you up.**

True!

**2. Beans contain almost no fiber.**

False, they have lots of fiber which is good for your digestive system & heart.

**3. Beans have lots of iron just like meat.**

True. Iron helps your blood carry oxygen to your whole body. So, not having enough iron makes you tired, because your body has to work harder to get oxygen.

**4. Beans have almost as much potassium as a banana, cup for cup.**

True. One cup of beans has 20% of the potassium you need in a day, and one cup of bananas has 23%. Potassium is important for your cells, heart and muscles to work properly, and also helps keep your blood pressure healthy. If you don't get enough potassium, your muscles get cramps!

**5. Beans have a lot of fat in them, just like nuts and seeds.**

False. Even though beans are the seed of a bean plant, they actually are low in fat, while some other seeds like sunflower seeds or peanuts are higher in fat. Sunflower seeds & peanuts are still healthy but don't have as much fiber and are higher in calories.

*Ask these focusing questions throughout the lesson:*

- What is the part of the plant that we eat?
- What color is it?
- How does it help our body?
- Where does it originate?



*(introduction, continued)*

## TASTE TEST

After the introduction, select appropriate activities to precede or follow the taste test. Refer to **Harvest Lesson Activities to Use Again and Again** as well as the activities described below.

Some of our favorite bean recipes are black bean brownies and black bean salsa. The black bean brownies will probably need to be made ahead of time, but the students can prepare the black bean salsa quickly in class. You'll have to soak and then cook the beans ahead of time for whatever recipe you choose, so be sure to plan ahead. Many students may never have prepared dry beans before, so you might want to discuss and/or model how to soak beans, and teach students the steps in cooking dry beans.

**Here is our favorite black bean salsa recipe, followed by a recipe for healthy brownies:**

## COOKING SUPPLIES

- Bowl to assemble the salsa
- Spoon for mixing
- Measuring spoons
- Measuring cups
- Cutting board and kid-safe crinkle cutter if chopping vegetables in class
- Sample cups or small plates to serve the salsa
- Spoons or tortilla chips for each student to eat the salsa

## BLACK BEAN SALSA

### INGREDIENTS

1 cup cooked black beans  
Half of an avocado, diced (optional)  
1 tomato, chopped  
1 cup cooked corn  
1 lime  
1 tsp red wine vinegar  
Half of an onion, chopped  
Salt  
Pepper  
Fresh cilantro, chopped (optional)

### DIRECTIONS

Simply chop, measure and mix ingredients. Then eat up!



*(introduction, continued)*

## REALLY AWESOME BLACK BEAN BROWNIES

### INGREDIENTS

2 cups cooked black beans (unsalted)  
2 large eggs  
1/2 cup honey  
2 Tbsp cocoa powder  
2 tsp vanilla extract  
1/3 cup coconut oil (can be substituted with butter)  
1/2 cup cocoa powder  
2 Tbsp tapioca starch or corn starch  
1 tsp cinnamon  
1/2 salt  
1/3-1/2 cup chocolate chips

### DIRECTIONS

Using a food processor, blender or immersion blender, puree together the beans, eggs, honey, 2 Tbsp cocoa powder, vanilla and coconut oil or butter. Sift together the rest of the cocoa powder along with the tapioca or corn starch, cinnamon and salt. Mix in the chocolate chips.

Grease a small pan and bake in a preheated oven at 350 degrees for 15 to 20 minutes. Allow to cool, then cut into squares. Store in a sealed container in fridge or freezer. They are also great cold!

***See the Harvest Lesson Activities to Use Again and Again for more information and ideas on running successful taste tests and see other Harvest of the Month materials for more recipes to use in taste tests and in school lunches.***



## ACTIVITY #1 (15 MINUTES)

ALL GRADES

### BEAN OBSERVATION & IDENTIFICATION

#### MATERIALS

- Plastic cups
- Paper plates or plastic bowls - one for each group of 4 students
- A mixture of locally grown beans
- A copy of the Bean Variety Key for every group (or just one to project) (see appendix)
- Paper and coloring supplies (pencils, colored pencils)

#### PREPARATION

Gather supplies. Place a mixture of beans in each cup/plate/bowl. Print copies the Bean Variety Key - preferably in color. You may want to laminate the copies of the key to reuse.

#### PROCEDURE

Begin by telling students, "There are over 4,000 different kinds of beans! Today we're going to observe & learn about some of the kinds that grow in VT." Pass out the containers with beans and the bean keys to each group of students. Instruct students to take one bean, then observe their bean, figure out what kind it is using the key, and then draw a scientific drawing (detailed, realistic, with labels) that includes the name of the variety.

For older students (3rd & 4th graders), have them read the description of their type of bean, and remember one fact to share. Give students 5 or 10 minutes to observe and draw. Then call on some students to share the name of the bean they chose to observe, what they noticed about it, and, for older students a fact they learned about that variety by reading the description. If time allows, and students seem engaged, you can go through each type of bean, showing the picture or passing around an example, and discussing what makes that variety unique.

## ACTIVITY #2 (15 MINUTES)

GRADES 3-4

### CREATING A DRY BEAN TIMELINE

#### MATERIALS & PREPARATION

Print out and cut apart the Dry Bean History Facts (see appendix). Also keep a copy of the facts for yourself as a key. Mix them up and place in a bag, hat or basket. You may want to glue each fact to an index card to make them easier to shuffle & more durable. Or, you could laminate them.

#### PROCEDURE

Give one fact about the history of dry beans to groups of 2 or 3 students. Have students read the fact to/with their group members. Then, have them share out their fact to the whole



*(activity #2, continued)*

group. Ask the class to figure out which order the facts go in, and have them stand with their fact & team in a human timeline to show the order they believe is correct. Let students lead the discussion as much as possible, but be prepared to facilitate - this may be a difficult task for some classes, both in terms of the academic skills and the social skills (working as a team).

*See appendix for dry bean history facts for timeline.*

## ACTIVITY #3 (20 MINUTES)

GRADES 3-4

### MAPPING THE HISTORY OF BEANS

#### MATERIALS

- A copy for each student of Harvest Lessons map (see appendix)
- One copy of the Dry Beans Timeline & Mapping Directions to project, or one copy per student (see appendix)
- An atlas for each student or pair of students
- Colored pencils

#### PREPARATION

Gather materials. This activity pairs well with Activity #2: Creating a Dry Beans Timeline, so you could do that activity before or after this one.

#### PROCEDURE

Pass out copies of the Harvest Lessons map to each student. Project or pass out the Dry Beans Timeline & Mapping Directions. Instruct students to follow the directions to map the history of beans!

## ACTIVITY #4 (20 MINUTES)

ALL GRADES

### BEAN LITERATURE

Here are some books with bean connections:

**Anansi and the Pot of Beans by Bobby and Sherry Norfolk:** This story, starring the African trickster Anansi the spider, cautions kids about touching and eating hot foods, demonstrates that beans are eaten all over the world, and explains why spiders have no hair.

**One Bean by Anne Rockwell:** This book describes the life cycle of a bean. It is appropriate for young readers and provides accurate yet accessible information about planting and observation. It would pair well with making bean necklaces!



*(activity #4, continued)*

**Bean** by David M. Schwartz: This nonfiction book also describes the life cycle of a bean, with photographs showing each stage.

**A Bad Case of the Stripes** by David Shannon: The main character in this book is a little girl who loves lima beans but won't eat them because she wants to fit in. She is so worried about what others think of her that she comes down with a bad case of the stripes. The bean connection in this book is minor but it has beautiful illustrations and a great message about being yourself.

**Jack and the Beanstalk - many versions:** While the connection to eating beans and how beans grow isn't very strong in this well-known fairy tale, you could fit it in if you wanted.

**See the Harvest Lesson Activities to Use Again and Again for information and ideas on how to engage students in reading about healthy foods.**

## ACTIVITY #5 (20 MINUTES)

ALL GRADES

### BEAN DISSECTION

#### MATERIALS

- One copy of the Parts of a Seed diagram to project (see appendix) or one copy for each student
- A bean for each student, plus a few extra
- A jar or bowl filled with water for soaking the beans ahead of time
- Toothpicks for students to use to break apart the seed
- Paper towels, napkins or plates for each student to dissect their bean on
- Paper and coloring supplies

#### PREPARATION

Gather materials. Soak beans in water for a few hours, or overnight. They will double in size. You might want to save a dry bean to show students so they can see the difference.

#### PROCEDURE

This activity could be preceded by the Little Sprout activity in Shelburne Farms' Project Seasons, which is an interactive way to teach the parts of a seed. Whether or not you do this activity, be sure to explain the parts of a seed, and what each part does for the plant. Project and/or pass out copies of the Parts of a Seed diagram, and ask students to guess what each part does. Then explain or affirm the actual function of each structure.

- **Seed coat:** Protects the seed, like a raincoat or winter jacket protects us from bad weather.
- **Endosperm:** Food for the baby plant.
- **Embryo:** The baby plant. This word refers to any baby before it is born - you may have heard it before in reference to humans in their mother's womb, or chicks growing inside an egg.



*(activity #5, continued)*

- **Root:** Part of the embryo. The root sucks up water and nutrients, like a straw.
- **Cotyledons:** Another part of the embryo. The first leaves of the plant, which will make food for it once it sprouts, because it uses up the energy in the endosperm when it is sprouting.

Once students have learned about the parts of a seed, pass out a soaked bean, a toothpick, a plate, paper towel or napkin, and drawing supplies to each student. Ask them to dissect the seed (open up and look inside), find all the parts you discussed, and make a labelled drawing of what they find. You may want to show students to open the seed along one side - that is often the easiest way to find all the parts. However, you can also just let them try on their own and figure out what works. While students are dissecting, walk around and ask them about what they notice. If they have trouble finding the parts, you can show them, or show two options and have them guess which one is the correct one.

After all students have dissected a bean and made a scientific drawing, ask students to clean up their work areas. If time allows, you can have some or all of the students share their drawings, and/or what they noticed (did anything surprise them about how the bean looked, or about any of the parts?).

## ACTIVITY #6 (10 MINUTES)

ALL GRADES

### MAKING LIVING BEAN NECKLACES

#### MATERIALS

- A small, resealable plastic bag for each student
- Permanent markers to write names on bags
- Half of a paper towel for each student
- 1-2 beans for each student
- Access to running water to dampen the paper towels
- A hole punch
- Yarn/string (preferably colorful)

#### PREPARATION

To streamline this activity, you can cut lengths of yarn ahead of time (one per student, long enough to make a comfortably-sized necklace for students that age), and punch holes in both of the top corners of each plastic bag, above the seal. However, students can do this if you have time. If students are going to do the cutting and hole-punching, it will be helpful to have multiple hole punchers, balls of yarn and pairs of scissors.

#### PROCEDURE

Start by asking what part of the plant a bean is. It is a seed. Explain that they will each get to sprout their own bean in a living bean necklace. Next, ask students, "What do seeds need to sprout?" As they come up with ideas, show what each part of the necklace helps.



*(activity #6, continued)*

- **Water:** We'll use a wet paper towel! It should stay wet if the bag is sealed, but students should keep an eye on it, because the seed will absorb some of the water.
- **Warmth:** We'll keep the seeds close to our body, or hanging in a warm window. With our bean necklace, we can tuck our bean necklaces under our sweaters next to our body (98.6 degrees)
- **Sun/Light?** Actually, in order to sprout, the seed will not need light! In order to grow and make food for the plant (photosynthesis), the sprouted bean will eventually need light
- **Soil?** Actually, in order to sprout, the beans do not need soil. Soil contains important nutrients for the plant to grow all the way into a whole plant, and helps give the roots a sturdy home. However, the seed has enough nutrients inside it to sprout.

Hand out a bag, paper towel and two beans to each student. Have children write their name on their bag, or help younger children. Have students wet their paper towel, fold it up and place it in the bag with the bean, making sure the bean is visible. Hole punch the top of the bags (above the seal) and give each child a piece of yarn to thread through. Students help each other tie on the necklaces – for Kindergarteners, you might want to tie loops of string to each bag in advance, depending on class size. Instruct students to keep their necklaces on/in a safe place for the next 2-5 days to see what happens. It's alive!

Ask students to make and/or write predictions about how long it will take for their bean necklace to sprout. What will it look like at dinnertime? What will it look like tomorrow? Kindergarteners can draw a picture. If time permits, students can also write 1-3 reasons that beans are healthy.

## ACTIVITY #7 (30 MINUTES)

GRADES 3-4

### HOW DRY BEANS GROW

#### MATERIALS

- A set of photo cards or each group of 4-5 students that depict either growing beans the old-fashioned way, or the modern way
- One copy of the How Dry Beans Grow Key for your own reference. Give half the groups sets of "Old-fashioned" cards, and half "Modern" cards. A plastic bag or paper clip to hold each set together.

#### PREPARATION

Print the cards out, preferably in color. You may want to laminate them. Cut them apart and mix them up. Place in bags or clip them together. Be sure they are mixed up!! Students will be trying to put them in the correct order.



*(activity #7, continued)*

## PROCEDURE

Students will organize cards with pictures of the steps it takes to get from a bean seed to a meal. They'll work in groups of three to put the cards in an order that makes sense. Half of the groups will use cards representing how beans were grown 100 years ago, and half will use cards representing how beans are grown in an industrial/modern setting that uses big tractors.

After each group has done their best to put the cards in order, the whole class will review what it takes to get from a seed to a meal in each set of cards/time period. Correct students if they put cards in the wrong order, and go over what the vocabulary means (plow, winnow, etc.). See the How Dry Beans Grow Key for more information.

Then discuss differences in agriculture today & 100 years ago. Ask students, "What is the same about the two different ways of growing beans? What is different?"

To close the activity, ask students to brainstorm about, "Why did and do people grow beans?" (Nutritious, easier/less expensive source of protein than meat, eggs and dairy, store well, add nitrogen to the soil, delicious!)

## ACTIVITY #8 (20+ MINUTES)

ALL GRADES

## BEAN ART

### MATERIALS

- Card stock or construction paper
- Pencils and erasers
- Non-toxic glue
- Lots of beans of all different colors (preferably sorted by color)

### PREPARATION

Gather materials. Distribute/arrange materials so all students can easily access them.

### PROCEDURE

You could introduce this activity by discussion mosaics: "A mosaic is art made by gluing small objects of different colors to a surface to create a pattern or picture. You can make mosaics out of pieces of colored glass or stone, and hundreds of years ago, the Romans made beautiful mosaics in this way on walls and floors. Today we are going to make mosaics using different kinds of beans (on paper not on the walls)!"

Or you might want to frame the activity differently and have students focus on texture or just consider using different kinds of materials to make art.



*(activity #8, continued)*

Make sure students put their name on the back of their paper so that you can keep track of whose mosaic is whose. Go over how to use glue properly and how to share materials. Students might want to plan out their design before they start to glue. They can arrange the beans to see how they like them, or sketch with a pencil and then glue the beans over their drawing.

## ACTIVITY #9 (20 MINUTES)

ALL GRADES

### THREE SISTERS TAG

Native Americans practiced companion planting in the garden with the “Three Sisters,” which are corn, beans and squash. Each plant was a staple in Native diets, and paired in planting, they each have their role in the garden.

- Corn provides shade and a stalk for beans to grow up.
- Beans are a legume, and fix nitrogen into the soil.
- Squash has spiky leaves which protect the other plants from animals, and keeps the moisture in the soil with its leaves.

To play three sisters tag, first talk about the companion planting, and how each plant has a job and supports the others. This is a freeze tag game. Designate someone who is “it.” Upon being tagged, students will freeze in the shape of a vegetable. In order to be freed, two other students must link arms around the frozen student and repeat “CORN, BEANS AND SQUASH!” Depending on the number of students you can designate more than one person to be a tagger. Not all kids may get a chance to be it. Consider passing along these instructions to the school’s PE teacher.

## CLOSINGS

### ACKNOWLEDGEMENTS

**The following people contributed to developing this lesson plan:** Chloe Powell, Aurora Coon, Cat Buxton, Karen Ganey and Kaitlin Haskins.

## APPENDIX SEE WORKSHEETS THAT FOLLOW

## CREATING A DRY BEAN TIMELINE *Activity #2*

The earliest beans were found in Central and South America 7000 years ago. The very earliest bean was found in a cave in Peru!

Around 5000 years ago, beans traveled North to Mexico.

For thousands of years, Native Americans in North, Central and South America, including the Abenaki tribes who lived in Vermont and New Hampshire, grew beans in three sisters plantings, with corn and squash.

Europeans began exploring the New World by 1500 and came across beans growing in Central America. They wanted to grow beans back home, so they brought beans back to Europe with them along with other Native American foods.

From the 1700s into the 1900s, Boston Baked Beans, which are dry beans cooked with molasses and pork or bacon, were a very popular meal in Boston, Massachusetts. They were so popular that Boston was nicknamed "Beantown."

In the 1800s, the Vermont Cranberry Bean was bred in Vermont. It grows fast, and likes cool weather, so it does well in Vermont's climate.

In 2010, India produced the most beans of any country in the world, growing almost 5 million tons!!

In 2011, Gary Eccles, who lives in England, set the record for the most baked beans eaten with a toothpick in 5 minutes. He ate 258 beans.

Today your class learned about dry beans!

### *Activity #3*

## DRY BEAN TIMELINE & MAPPING DIRECTIONS

The earliest beans were found in South America 7000 years ago. The very earliest bean was found in a cave in Peru!

**#1: On your map, color South America green.**

Next, around 5000 years ago, beans traveled North to Mexico.

**#2: On your map shade in Mexico in orange. Next, draw an arrow from Central and South America to Mexico to show the beans going North.**

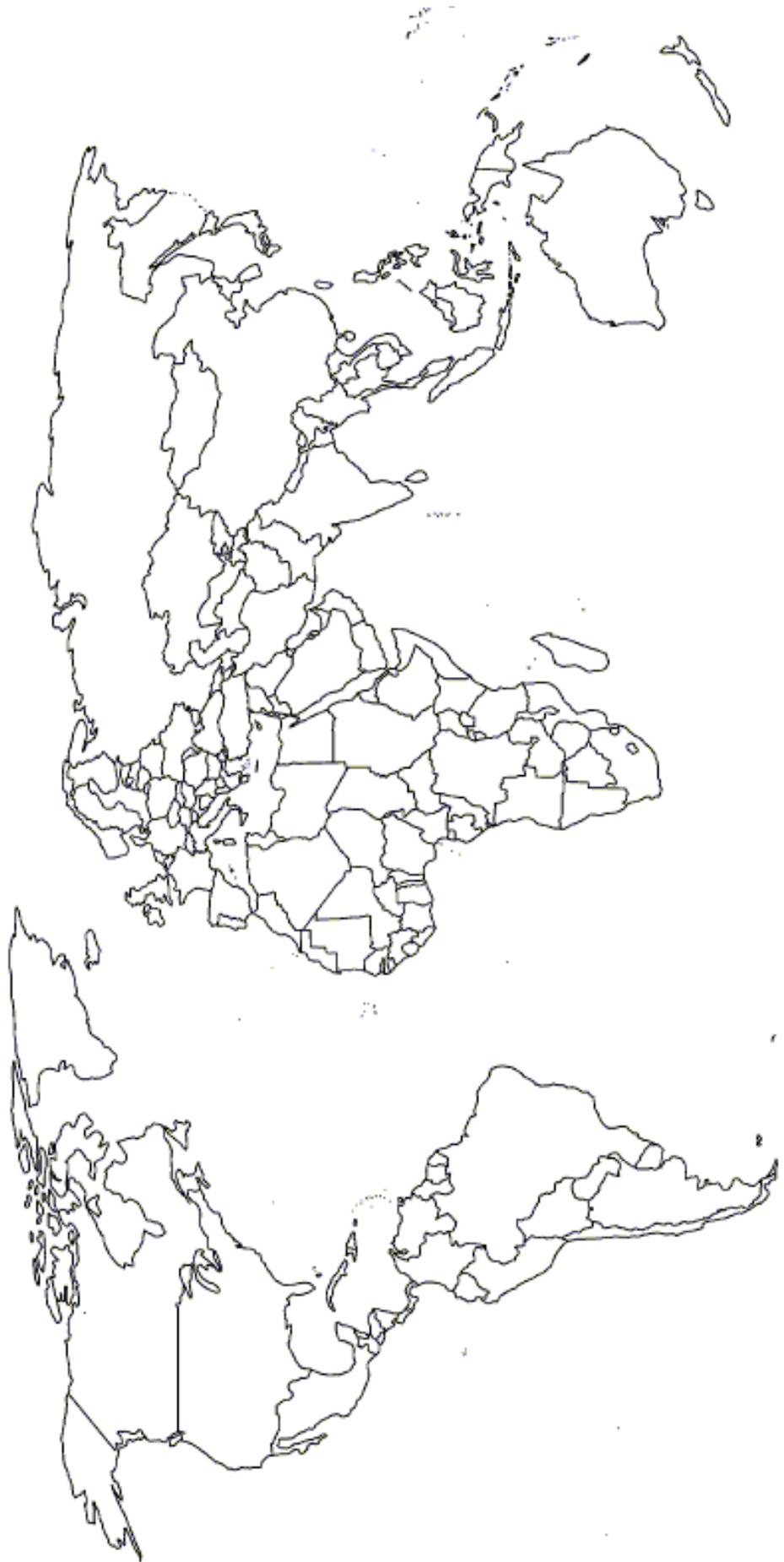
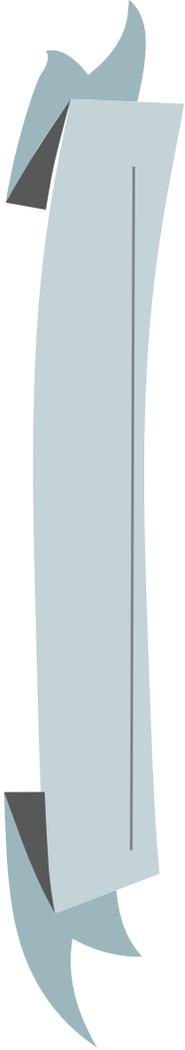
Europeans began exploring the New World by 1500 and came across beans growing in Central America. They wanted to grow beans back home, so they brought beans back to Europe with them.

**#3: On your map, shade Europe in blue. Then draw an arrow from Central America to Europe to show how the Europeans brought them back across the ocean with them.**

After 1500, beans spread even more throughout Asia as well as into the rest of North America. The United States is one of the top three countries producing the most beans in the world!

**#4: On your map, color the United States purple.**

# THIS MONTH'S FOOD:



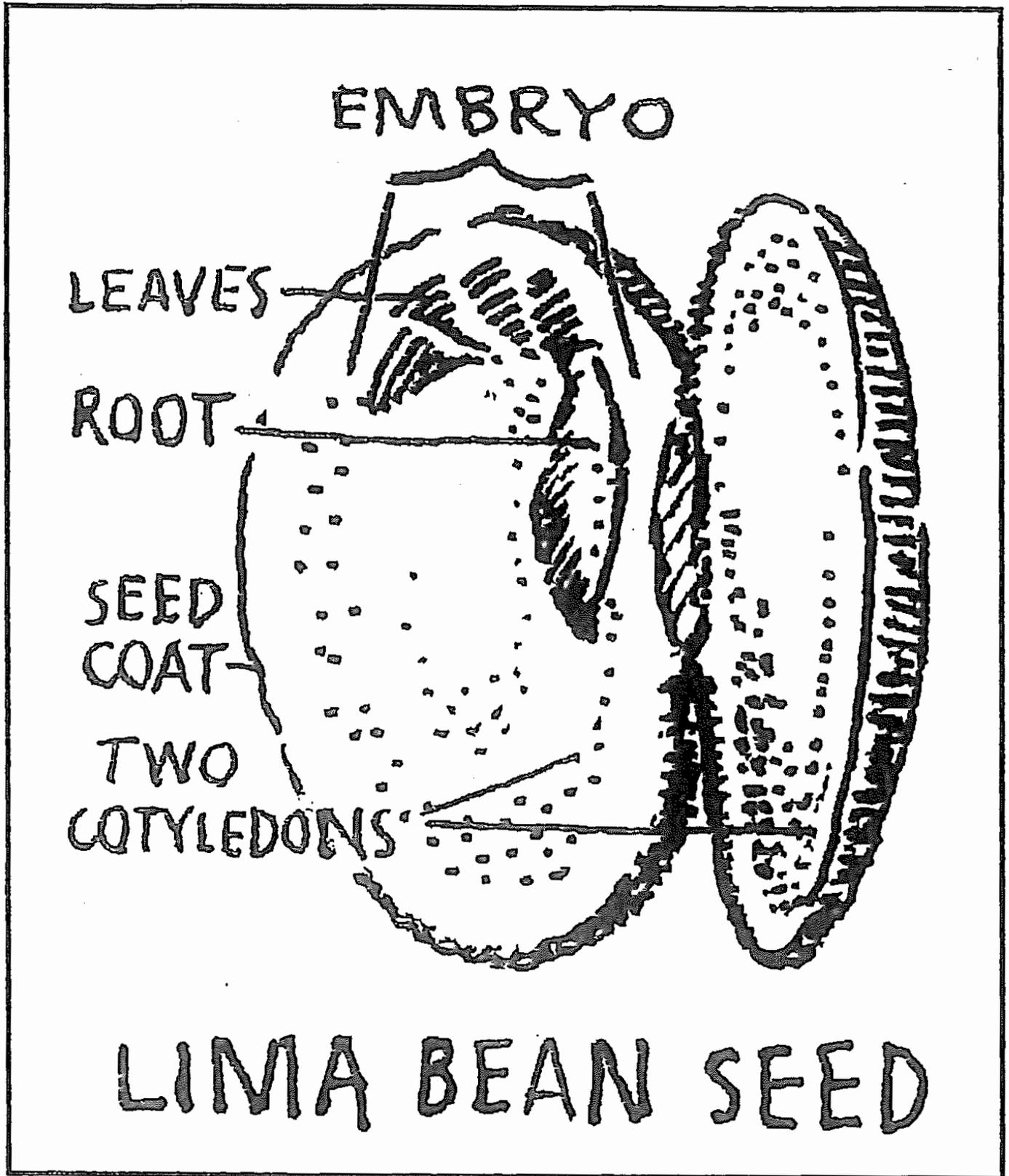


Diagram by Project Seasons