



Upper Valley Farm to School Network Community Curriculum Pilot Project

March 2014 – Beans

Overview: In this 45-minute lesson, students will learn about beans. They will discover why beans are healthy, observe different kinds of beans and learn about the different varieties of beans that grow in Vermont. Older students will investigate how beans grow now in VT and in the past, and discuss reasons why beans are an important crop and their seasonality (when they are harvested, when you can eat them, how they are stored). All students will create and taste black bean salsa and create living bean necklace. Students will write about their favorite kind of bean and why beans are healthy and make predictions about their necklace.

Focusing Questions: Why are beans healthy? What kinds of beans grow in Vermont? How do beans grow? How did people grow beans 100 years ago and how is that different from how beans are grown today?

Standards Addressed:

Common Core State Standard for Writing: Text Types and Purposes: 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization and analysis of content.

VT Standard 3.5: Healthy Choices: Students make informed, healthy choices that positively affect the health, safety and wellbeing of themselves and others. This is evident when students:

- g. Can identify and classify foods according to the Food Pyramid Guide. *

*The Food Pyramid Guide is no longer in use; we assume that this standard now refers to MyPlate, the current visual for the USDA dietary guidelines.

VT Standard 7.13: The Living World: Organisms, Evolution, Interdependence: Students understand differences among living organisms, understand the role of evolution, and recognize the interdependence of all systems that support life. This is evident when students:

- a. Identify characteristics of organisms (e.g., needs, environments that meet them; structures, especially senses; variation and behaviors, inherited and learned);

VT Standard 7.1 Scientific Method: Students use scientific methods to describe, investigate, explain phenomena, and raise questions in order to:

- Generate alternative explanations — hypotheses — based on observations and prior knowledge;
- Design inquiry that allows these explanations to be tested;
- Deduce the expected results;

- Gather and analyze data to compare the actual results to the expected outcomes; and
- Make and communicate conclusions, generating new questions raised by observations and readings.

This is evident when students:

- Ask questions about objects, organisms and events in the world around them
- Use reliable information obtained from scientific knowledge, observation and exploration;
- Use either deductive or inductive reasoning to explain observations and phenomena, or to predict answers to questions;
- Work individually and in teams to collect and share information and ideas.

If doing How Dry Beans Grow extension:

Vermont Standard 6.4: Students identify major historical eras and analyze periods of transition in various times in their local community, in Vermont, in the United States and in various locations worldwide to understand the past, the present and the relationship between the two. This is evident when students:

- Demonstrate understanding of concepts of past, present and future (e.g., create time lines, create chronologies based on narratives, compare and contrast family life, or school and community life in different periods)

Materials:

For Bean Varieties activity:

- Sample cups for each group of 4 students filled with different kinds of beans
- A bean variety key for each group of students
- Paper/card stock for each student for their journal entry
- Coloring supplies (crayons, colored pencils)

For Black Bean Salsa:

Ingredients

- 1 c cooked black beans
- 1 c cooked corn
- 1 lime
- Salt
- Pepper
- Fresh cilantro, chopped (optional)
- ½ an avocado, diced (optional)
- ½ an onion, chopped
- 1 tomato, chopped
- 1 tsp red wine vinegar

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 on

- Spoons or tortilla chips for each student to eat the salsa

For Living Bean necklaces:

- A small 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)

For the How Dry Beans Grow extension (Grades 3 & 4):

- A set of photo cards (see appendices) for each group of 4-5 students. Give half the groups sets of “Old-fashioned” cards, and half “Modern” cards

For the Bean Art extension (Grades K-2):

- Heavy paper
- Glue (Elmer’s type, enough containers for each student to use one, or put in small containers with paintbrushes for each student)
- A large bag of assorted dry beans
- A bowl for each group of students (to fill with beans)

Preparation:

Be prepared to spend about 1.5 hours preparing for this lesson. You’ll need to precook the beans and potentially the corn (if using flash-frozen raw corn), and pre-chop the vegetables (unless you have safe chopping utensils that older students can use to chop the vegetables in class). You’ll also need to punch holes in the bags, cut the yarn to length and gather your supplies.

Procedure:

Introduction (5 min):

- Today we’re going to learn about beans! To start out, I’m going to test your knowledge on why beans are healthy. Give instructions for true/false game.
 - Beans have tons of protein, which is great for your muscles and fills you up. (T)
 - Beans contain almost no fiber. (F, they have lots of fiber which is good for your digestive system & heart).
 - Beans have lots of iron just like meat. (T. Iron is a main component of the protein hemoglobin which carries oxygen around your body in your blood. So, not having enough iron makes you tired.)
 - Beans have almost as much potassium as a banana, cup for cup (T. 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).

- Beans have a lot of fat in them, just like nuts and seeds. (F – 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).

Bean Varieties Activity (15 min):

- 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.
- Each student gets one bean. Students observe their bean, and figure out what kind it is using bean key. Students draw a picture of their bean and write the name of the variety of bean.
- Ask some students to share their diagram & bean with the class – name, one reason it's unique. Go through each kind of bean. Alternatively, you can show examples of each kind of bean by passing them around, or by projecting them using an Elmo projector that can display images of objects.

Making & tasting black bean salsa (15 min):

- Instruct students to wash their hands
- Project the recipe for black bean salsa on the board/Smartboard, write it on the board, or hand out copies to each student
- Have students read the recipe, and help measure, add ingredients and mix. If you have more than one adult and enough cooking supplies (measuring cups and bowls), split the students into two groups and each group can make the recipe at the same time.
- Have students taste the salsa, either in a sample cup, with a clean spoon (NO DOUBLE DIPPING) or with a tortilla chip (STILL NO DOUBLE DIPPING), and vote on whether they like the recipe or not.

Make living bean necklaces (5 min):

- Hand out a bag, paper towel and 2 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 bracelets – for K, 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!
- Discuss- what do seeds need to sprout, and how can we help our "pet" beans?
 - **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.

Journal writing (5 min):

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

Extensions:

How Dry Beans Grow (15-20 min) – Grades 3 &4

- 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 3 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.
- 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 attached How Dry Beans Grow Key for more information.
- Then discuss differences in agriculture today & 100 years ago.
- Also review some interesting facts about the history of beans in the world & in New England (see background information for some facts).
- Ask, "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!)

Bean Art (20 min plus drying time) – Grades K-2

- "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)!"
- 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.

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Appendices:

1. Beans Teacher Survey
2. Bean Varieties Key
3. Black Bean Salsa Recipe
4. Beans Take Home
5. How Dry Beans Grow Photos – “Old fashioned” & “Modern” sets
6. How Dry Beans Grow Key

Background:

“Beans, Beans the Magical Fruit” (Yes beans are a fruit!)

- Beans have been cultivated all over the world for thousands of years, and are one of the earliest cultivated crops. They are an important part in diets in cultures all over the world.
- Beans are in the legume family, along with clovers, vetch, peas, and alfalfa. Members of the legume family have underground pods in their roots which fix nitrogen via bacteria into the soil. Nitrogen is a necessary nutrient for plant growth and a building block of amino acids in all living things.
- Beans are an important crop for their storage capability. If they are kept in a dry place, they can be kept stored for years. Dry beans are simply beans that are let to mature fully and dry before they are harvested.
- Beans cultivated in Northern Africa and Asia (*vicia faba*) are also known as fava beans or broad beans. Beans native to Central and South America of the species *phaseolus* were first cultivated in Mexico and Chile by two groups of people around the same time over 7000 years ago.
- When Europeans first came to the “New World” they brought beans and grains with them to find Native Americans had been cultivating their own varieties. Many of the common beans we eat today are Native American varieties.
- Native Americans grew beans traditionally alongside corn, and squash, in what is called the “Three Sisters Garden. Each member of the trio offers its own benefits for the whole garden.
 - Beans replace much needed nitrogen in the soil.
 - Corn-offers shade, uses a lot of nitrogen

- Squash offers protection from hungry animals with its large spiky vines and leaves and shades the soil to keep in moisture
- Beans typically take 55-60 days from planting to harvest, and sometimes longer for dry beans. Many varieties grow in vines, and require support. Recently developed “bush beans” require no support and produce all beans at the same time making them more convenient for larger production.
- There are over 4,000 varieties of beans in the world!

Nutrition

- Beans contain high amounts of protein, important for our muscles and growth. Protein also helps us feel full.
- Beans and other legumes strengthen the kidneys and adrenal glands.
- Beans are low in fat and contain no cholesterol or saturated fats- a good choice for your heart.
- Contain **calcium, potassium, iron, zinc, and B vitamins**
- Beans have lots of **iron** just like meat. Iron is a main component of the protein hemoglobin, which carries oxygen around your body in your blood. So, not having enough iron makes you tired, because it makes it harder for you to get the oxygen you need.
- Beans have almost as much **potassium** as a banana, cup for cup! 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.
- Beans are high in **antioxidants**, and in a USDA study of common foods, ½ cup of dry small red beans, ranked first, with more antioxidants than a cup of wild blueberries! (<http://social.popsugar.com/Health-Benefits-Common-Beans-1090505>)