Oh, Beans!

Sort, grow and get to know beans from many cultures

Gardening Connection: Students can connect to cultures all over the world by researching, planting, and eating beans.

Grade Level: Grades 4-12

Time Required: 2-4 class periods plus time for bean plants to grow.

EDUCATOR NOTE: This activity may tie in to several science standards and social studies standards.

OBJECTIVES

Students will be able to:

1. Identify a variety of bean seeds.
2. Understand the origins and cultural significance of beans.
3. Select and grow bean varieties appropriate for Kansas.

Subjects

Science
Mathematics
Social Studies
History
Art

Vocabulary

Germination
Plant Hardiness Zone

Project Connections

WET – The Rainstick

KSGC – A Tale of Two Plots
Cooking with Class
Seeds in Need

BACKGROUND

Background information taken from Purcell Mountain Farms http://www.purcellmountainfarms.com/Heirloom%20Beans.htm.

Beans are intricately woven into the fabric of human history. The first 'permanent cultures' evolved when hunter-gatherers and nomadic people began tilling the earth and developing systems of agriculture, and beans were among the first cultivated crops. This progression served as a gateway from what could be considered a 'primitive' existence into a more stabilized one, which allowed for long term living situations to be established. With the knowledge of agriculture came the domestication of animals and the art of creating tools and implements. These three things combined, altered the course of human history in an unparalleled way, and beans played an integral part.

Archaeologists in Thailand have found evidence of peas carbon dated back to 9750 BC. Evidence also exists that suggests that native people of Mexico and Peru were cultivating bean crops as far back as 7000 BC.

The use of lentils has been traced back as far as 6750 BC in parts of the present day Middle East. Chickpeas, lentils and Fava Beans have been found in Egyptian tombs that date back at least 4000 years. About the same time, (around 1500 BC) parts of present day Asia were growing and using soybeans.

In a completely different part of the world, Native Americans and Mexicans were working with the haricot bean, a diverse category that includes runner beans, kidney beans and lima beans, and its adaptability helped it to become a stable crop. It is apparent that beans were an integral part of the development of many cultures throughout the world.

The early farmers who were growing beans also grew grains (wheat, barley, millet, rice and corn). The amino acids in beans and grains complement one another in such way as to form a complete protein, which is the foundation for the growth and development of many life forms, including humans. Regional and cultural combinations such as lentils and rice, Lima beans and corn, and chickpeas (garbanzo beans) and couscous are a reflection of this correlation. The Native Americans exemplified this with their mixed cultivation of beans, corn and squash (also known as the 'three sisters'). With the onset of the age of European exploration came an increased exchange of beans and grains, as well as other potential crops, and as a result, the range of possibilities was expanded.

Beans are still an important part of world agriculture and are an essential part of a balanced diet in many countries.

Beans have been used throughout the world for thousands of years. They come in hundreds of shapes sizes and colors, are versatile and amazingly convenient because they can be dried and stored for years. Soaking beans for a couple of hours brings them back to life, activating enzymes, proteins, minerals and vitamins. Beans can be eaten raw, sprouted or cooked, ground into flour, curdled into tofu, fermented into soya sauce, tempi and miso.

MATERIALS

- A variety of dried beans or bean seeds
- Plastic bottles or cups
- Scissors
- Sand or cotton balls
- Paper towels
- Water
- Fertilizer – water soluble such as Miracle Grow can be used. Make this solution according to instructions.
- Markers
- 4 x 6” index cards
- Tape or glue

PROCEDURES

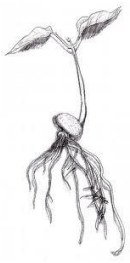
Engage
Give each lab group as many different types of bean seeds as you can find. Ask students to record observations and discuss characteristics of the various beans. Have the students categorize the seeds based on their own criteria. As a class, discuss how each group categorized their seeds.

Explore
Have each lab group guess the names of the bean seeds. Let them know that if they do not know the true name of the bean, they may invent a name appropriate to its characteristics.

Once the instructor has helped students to correctly identify each bean variety, have each lab group choose one bean and create a bean seed identification card. On a 4 x 6 index card, write the name of the

bean at the top and tape a bean seed below . Make a sketch of the bean (instructor may provide them with a photograph of the whole plant) and write a short description of the identifying characteristics of the bean (shape, colors, patterns, size, texture, etc.). Have students identify the bean's scientific name, and research the origin of the bean (where did this bean come from). Students may add a drawing or photograph of the bean after it sprouts (see activity in next section).

Anasazi Bean



Description (shape, colors, patterns, size, texture):
White and maroon speckled pattern.

Origin: Cultivated by the Ancestral Puebloan, or Anasazi, peoples of the North American Southwest;

Scientific Name: *Phaseolus vulgaris L.*

Have each lab group make a "germinator" and/or growing tube (see resources section for websites with detailed instructions) for the bean they chose.

The germinator or grow tube allows the student to see the seed germinate and grow. It is probably a good idea to only plant 4 seeds per bottle and the size will vary as to whether you want to just study germination or the whole life cycle. Students may record their observations of bean growth in their journals, and/or add a drawing of the bean sprout to their bean seed identification card.

Instructor may extend this exercise into a discussion of plant biology, genetics, etc.

Explain

Now student groups will explore their bean in depth. Have students research the culture of origin, growing conditions and culinary uses for the bean and report to the whole class. Reports may include:

- How was the bean domesticated, and by what culture?
- In what part of the world was the bean first cultivated? Where is it grown today?
- How was the bean used historically (trading, art, stored for winter, dye)? How is it used today?
- Did the cultures using this bean have any stories or legends associated with it?
- What growing conditions are necessary for the cultivation of this bean?
- What nutrients does the bean contain?
- How was the bean prepared and eaten historically?
- What recipes can you find today that include this bean?

Elaborate
Have students research the growing conditions needed to cultivate their bean, and determine whether or not it can be grown in Kansas. As a class, develop a plan to plant a bean plot in the school garden with the beans that are appropriate to this growing zone. When time & season allow, plant beans in the school garden.

Have students research recipes for the beans they plan to grow (see resources section for recipe website suggestions). Have students prepare a bean dish in the classroom.

See Kansas School Gardens activity page http://www.kansasgreenschools.org/kansas-school-gardens-activities for related activities. *A Tale of Two Plots* incorporates beans into a Native American Three Sisters Garden. *Cooking with Class* provides tips and tricks for cooking in the classroom.

Evaluate
Host a bean party for your school so that students may share what they have learned. Students may share their bean reports, sample bean dishes, make bean art, and tour the bean plot in the school garden. Students may wish to incorporate cultural bean traditions into the party by including an art station to make rain sticks or mandalas (see Project WET activity, *The Rainstick* or resources section for ideas).

Extension Ideas

- Botanist Gregor Mendel used pea plants to develop breakthrough experiment in genetics. Repeat Mendel's pea plant experiment to tie into a discussion about genetics (see resources section)
- Plantingscience.org is a good place to get involved with research projects and mentoring by professionals from various fields of science.

Resources:

Nutritional Benefits of Beans
http://www.foodreference.com/html/artbeans.html

Bean Varieties and History
http://www.purcellmountainfarms.com/Heirloom%20Beans.htm

How to make a growing/germinator tube:
http://www.bottlebiology.org/
http://www.youtube.com/watch?v=YPExrF7hgP4&feature=related

Bean Recipe Ideas
http://allrecipes.com/Search/Recipes.aspx?WithTerm=beans
http://www.tasteofhome.com/SiteSearch/FacetSearchResults.aspx?search=beans&st=2&vw=1&page=1&rs=10&sort=0&searchSource=hdrbox-Recipes

Bean Cultural & Art Project Ideas
http://140.247.102.177/katsina/ceremonies.html
http://mtmoeacademy.blogspot.com/2010_01_01_archive.html

Additional Resources
http://www.bottlebiology.org/
http://www.fastplants.org/about.php
http://www.juliantrubin.com/bigten/mendelexperiments.html
http://www.plantingscience.org/