

Growing a Beanie Baby

www.ksagclassroom.org

Grade Level: 3 - 5

Academic Area(s): Science and Math

Topic(s): Measurement and Data, Plant Science



Rev. 11/15

Overview:

All plants need light and water to survive and grow. The United States leads the world in the production of soybeans, which are grown in more than 30 states, including Kansas. Soybean oil (soy oil), which is extracted from soybeans, is the most widely used vegetable oil in the world. In this activity, students will “plant” a soybean and watch it grow.

Objectives:

The student will:

1. Develop an understanding of what plants need to grow.
2. Demonstrate the importance of light and water in plant growth.
3. Compare the germination and growing rates of soybeans.

Background Information and Facts:

All of a plant’s growth is aimed at achieving maturity and being able to reproduce, even though many plants are harvested before they reach maturity. Most plants reproduce by producing seeds.

Each seed has three parts: the pericarp, endosperm and embryo. The pericarp is the seed coat, or the protective covering that surrounds the entire seed. Inside the pericarp, the endosperm, the largest part of the seed, serves as the food source for the embryo until the embryo can produce its own food. The embryo, also known as the germ, is the only living part of a seed. This is where a new plant first starts to form.

The process of producing a new plant begins when a seed absorbs moisture. The moisture softens the seed coat, which eventually cracks and allows water and air to reach the embryo. Using the food stored in the endosperm, the embryo begins growing towards warmth or sunlight.

Contents:

- Activity 1 - Beanie Baby Necklace

Worksheets:

- Beanie Baby Necklace Growth Records

Handouts:

- Soybean Growth Stages
- Parts of a Soybean Plant

Estimated Teaching Time:

- Activity 1: 20 minutes



One end of the embryo begins developing into a stem, a tube-like structure that the plant uses to move water and food from place to place as well as supporting the plant’s leaves and flowers. The other end of the seed’s embryo grows downwards, forming roots. Roots anchor a plant, allowing it to remain in one place. Soybean roots are special in that they have nodules which take nitrogen from the air and give it to the plant. Roots also absorb water and any nutrients mixed in with the water. The water and nutrients are transferred from the roots to the leaves through the stem.

The rate of plant growth is influenced by the temperature of the air and the temperature of the soil the plant’s roots are growing in. These factors, along with the amount of sunlight available to the plant, help determine when plants will be planted and when those plants will be ready for harvesting. In Kansas, soybeans are usually planted in late spring, although planting soybeans into wheat fields immediately following wheat harvest is a common practice in Kansas. In Kansas, soybeans are harvested between September and November.

The soybean plant grows in a bushy shape, rather than with straight stalks like wheat, corn or grain sorghum. Soybean plants are sensitive to changes in day length, which determines when the plants begin producing seed. Over the summer, each soybean plant can produce 60 to 80 pods and each pod holds three seeds (soybeans). The fall season brings cooler temperatures and there is less sunlight available due to the shorter days. As the plant nears harvest, the leaves dry up and drop off.

Approximately ten percent of the soybeans produced in the United States are used for human consumption, either as food products or food ingredients like soybean oil, tofu, soymilk, soynut butter, soy sauce, soy flour, soy infant formulas and soy lecithin, which is used in products like ice cream, chocolate products, and nonstick cooking sprays.

The soybean plant produces oilseeds – seeds that are rich in oil. The oil serves as a food source for the developing embryo. Oil constitutes 18 to 19 percent of the weight of a soybean. Almost all of the oil extracted from soybeans must be processed in some way before it can be considered edible. Edible oils are consumed directly, used as food ingredients and heated to cook other foods.

Worldwide, soybeans account for about one-half of the world’s edible oil production. The United States leads the world in both soybeans and soybean oil production. Soybean oil (soy oil) accounts for about 75 percent of the vegetable oil used in commercial and consumer cooking in the United States. At the supermarket, most of the cooking oils labeled “vegetable oil” are soy oil. Soy oil is also used in plastic, printing inks, lubricants, solvents, crayons, textiles, biodiesel and other consumer products.

Important Facts

A soybean plant can produce 60 to 80 pods.

Soybeans are grown in more than 30 states.

Approximately 75% of the vegetable oil in the United States comes from soybean oil.

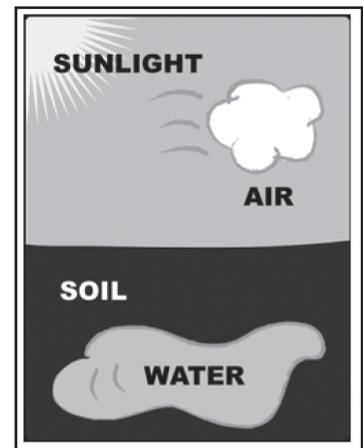
In the U.S. about ten percent of soybeans are used for human consumption.

18 to 19 percent of a soybeans weight is oil.

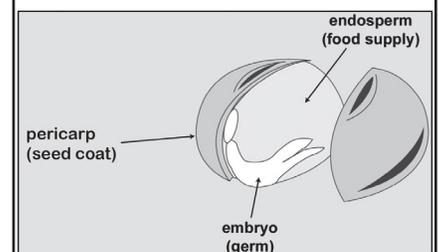
The United States is the number one producer of soybeans and soybean oil.

In the U.S. about 10 percent of soybeans produced are used for human consumption.

Plant Growth Factors



Soybean Seed Parts





Cotyledon: the part of a plant's embryo that stores food used during germination and supports a developing plant until it is capable of producing its own food; either remains in the seed or emerges following germination depending on the plant species.

Edible Oil: an oil fit for consumption, especially by humans.

Embryo: the only living part of a seed; the part of a seed where a new plants begins to form. (Germ)

Endosperm: the largest part of a seed; serves as the food source for the seed's embryo until the embryo can produce its own food.

Lecithin: a naturally-occurring substance found in plant and animals tissues that has properties that prevent ingredients in a mixture from separating, maintains an even distribution of ingredients in a dough mixture and is used to prevent sticking.

Oilseed: a plant that produces seeds that are rich in oil, like soybean, sunflower, canola, cotton and flax; the oil is extracted primarily from the plant's seeds, rather than other parts of the plant.

Pericarp: the protective covering that surrounds an entire seed. (Seed Coat)

Pod: an elongated seed vessel that splits open on both sides hen ripe.

Nodule: small swelling on the roots of soybeans and other legumes that contains helpful bacteria.

Root: the underground portion of a plant that draws food and water from the soil, stores plant food and anchors a plant in place.

Seed: the part of a plant that contains the embryo, which can grow into a new plant.

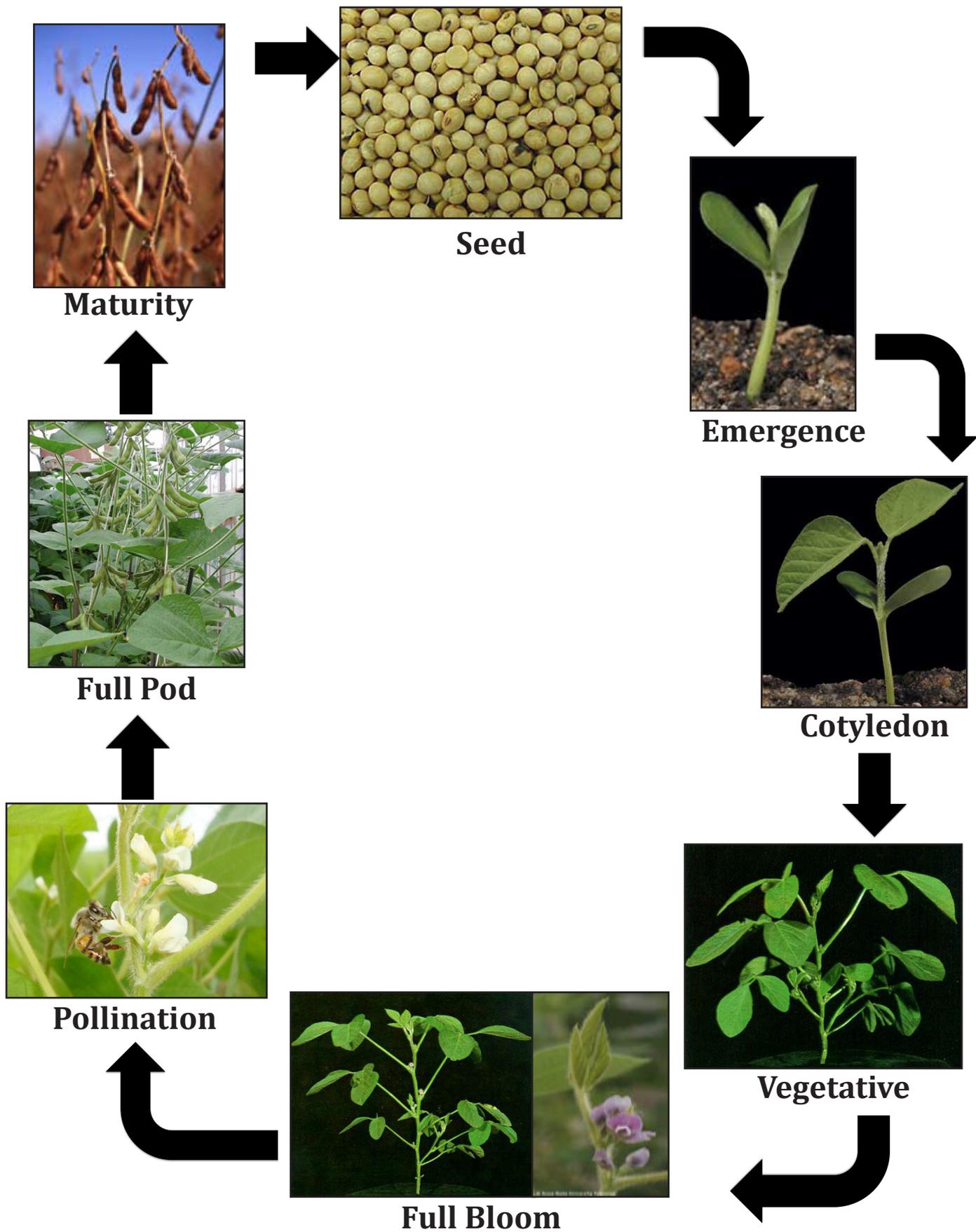
Soybean: an annual plant belonging to the bean family of plants that grows in a bushy shape and produces an edible bean but is categorized as an oilseed.

Soybean Oil: the oil extracted from a soybean; soybean oil is the most widely used vegetable oil in the world. (Soy Oil)

Stem: a tube-like structure that a plant uses to move water and food from place to place; also used to display the leaves, flowers and fruit of the plant.

Tofu: the soybean curd; made by curdling soy milk, straining off the liquid and pressing the remaining gel-like curds into soft, white blocks.

Vegetable Oil: a generic term for the oil obtained from oilseeds; oil made from a single ingredient or a blend of several oils from plant sources.



Seed

Emergence

Cotyledon

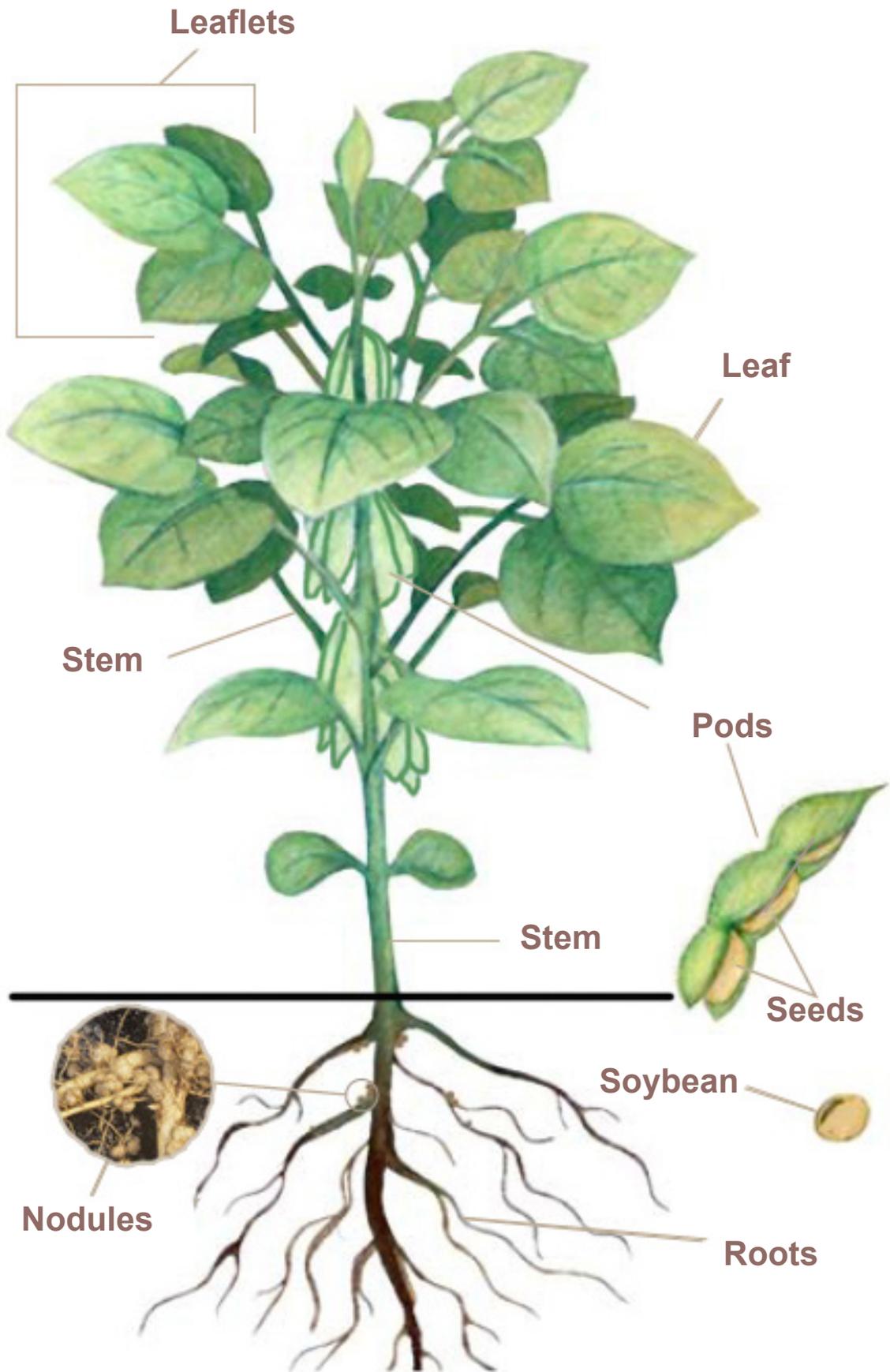
Vegetative

Full Bloom

Maturity

Full Pod

Pollination





Preparation:

1. Obtain soybeans from a local farmer, coop or county extension agency.
2. Gather remaining materials.
3. Punch holes in the top of each student's plastic bag.
4. Cut yarn that is approximately three feet long for each student.
5. Label each student's bag.
6. Copy Beanie Baby Necklace Growth Records student worksheet and student handouts (one of each per student).

Procedures:

1. Place 1/4 teaspoon of super slurper polymer into the bag.
3. Add one Tablespoon of water.
4. Gently push two soybeans into the polymer.
5. Seal the bag firmly.
6. Insert the yarn through the hole in the bag and tie to make a necklace.
7. Encourage students to keep the Beanie Baby warm by wearing the necklace under their clothes and keeping it in a warm dark place for seven to ten days. They may either wear them home and wear them back to school or wear them at school and leave them over night on a heating pad under a towel or in another warm dark place.
8. After the seeds sprout, students will plant their soybeans in a large cup of soil.
9. Students will observe the growth of the plants over five weeks.
10. They will record the height, description of the plant and a sketch of the plant once a week using the student worksheet on page 8.

Materials:

- Jewelry sized resealable plastic bags with hole punched in the top (found in craft stores or Uline)
- Super slurper polymer (found at most garden centers in plant food section)
- Water
- Measuring spoons
- Soybeans (two per student)
- Yarn (thick, fuzzy yarn to prevent tangling)
- Beanie Baby Growth Records Worksheet
- Student handouts
- Potting soil
- 16 oz. clear plastic cup (one per student)

Finished Project





Name: _____

Date: _____

Instructions: Record the height of the plant, description and sketch of the plant. This should be done once a week on the same day for five weeks.

| | Height | Description | Sketch |
|--------|--------|-------------|--------|
| Week 1 | | | |
| Week 2 | | | |
| Week 3 | | | |
| Week 4 | | | |
| Week 5 | | | |



Extensions:

Social Studies:

- Research the history of soybeans and the production of soybeans in Kansas and create a timeline or write a story about the life of a soybean in Kansas.

Plant Science:

- Use the Kernel Kids lesson plan from Kansas Foundation for Agriculture in the Classroom to compare and contrast the germination and growth rates of soybeans and wheat.
- Garden in a Glove Lesson from National Ag in the Classroom located at:
http://agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=66&search_term_lp=garden%20in%20a%20glove

Health and Nutrition:

- Analyze the labels on various food products to locate different foods that contain soy.

Recommended Resources:

Kansas Foundation for Agriculture in the Classroom (KFAC):

www.ksagclassroom.org
Look for other lesson plans, resource materials and teacher training opportunities!

Exploring Plants: Kansas Crops Educator's Guide - look in the index for soybean and soybean oil.

Soybean Fun Facts:

http://www.ksagclassroom.org/teachers/lesson/fun_facts_soybeans.pdf

Other Resources/Websites:

United Soybean Board for soybean infographics and photographs:
<http://unitedsoybean.org/>

Kansas Soybean Commission and Kansas Soybean Association:
<http://kansassoybeans.org/>

Illinois Ag in the Classroom Soybean Fact Sheet:
http://www.agintheclassroom.org/TeacherResources/TerraNova/clr_soybeannews.pdf

To receive a free book – Soybeans: An A to Z Book – from the Awesome Agriculture Series, contact Kansas Soybean Commission, 1000 SW Red Oaks Pl, Topeka, KS 66615, (785) 271-1030 or www.kansassoybeans.org.