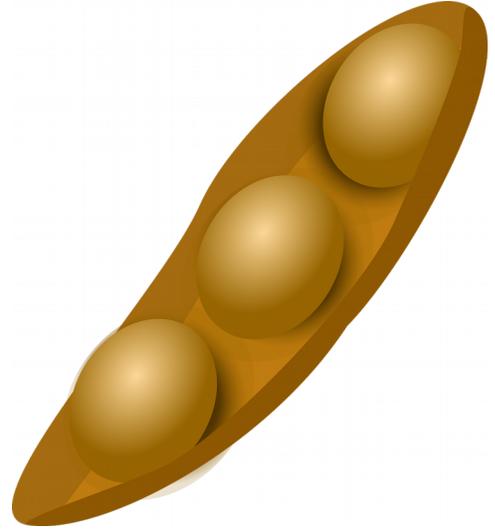


Soy, the Super Bean

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening program*

OVERVIEW: This soybean lesson will show students how the abundant protein of soybeans is included in our diets as well as the myriad of other ways soybeans are used in our daily lives. It introduces legumes and their ability to enrich soil with nitrogen. And there's also a quick trip through the history of soybeans – including Henry Ford's soybean car!



GRADES: K-5

OBJECTIVES: The student will be able to:

- Name a number of food and non-food products that soybeans are used to make.
- Explain how soybeans can replace nitrogen in the soil.
- Explain the meaning of “crop rotation.”

PROCEDURE:

show and discusses the New Jersey Agricultural Society power point presentation Soy, The Super Bean, available to download from the Learning Through Gardening Teacher Tool Box: <http://www.njagsociety.org/teaching-social-studies-in-the-garden.html>.

Optional: the book *Full Of Beans, Henry Ford Grows a Car*, by Peggy Thomas.

Optional: Materials to make soybean ink and/or soybean lip balm (see below).

EVALUATION:

The student will list various products made from soybeans.

The student will write a paragraph or essay, or explain verbally how soybeans and bacteria work together to replenish nitrogen in the soil and why this important to farming.

Extensions:

Read a book about soybeans such as *Soybeans In the Story of Agriculture* or *Soybean A-Z*, both by Susan Anderson and JoAnne Buggey.

As homework, ask students to find and make a list of products in their kitchen pantries that contain soy.

In small groups, students do further research on the work of George Washington Carver and Henry Ford with soybeans.

New Jersey Learning Standards

Science: K: LS1.C 1: LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS2.A

Social Studies: K-2:6.1.2.Geo.GI.1, 6.1.2.EconEM.1,2; 6.1.2.EconNE.1
3-5:6.1.5.GeoHE.2, 6.1.5.EconEM.1, 2; 6.1.5.EconNM.4, 6

English Language Arts: K:W.K.2,3 1:W.1.2,7 2:W.2.2,4,8
3:W.3.2.A-D, W.3.4,8 4:W.4.2.A-E, W.4.4,8
5: W.5.2.A-E; W.5.4,8

How to Make Soy Ink

Printing ink was originally made from petroleum oil, which must be pumped from far underground. Then about 45 years ago, newspaper companies began to experiment with using a renewable resource, and it was discovered that soy made a good base for ink. Not only was it renewable, it provided brighter colors and made recycling easier because the ink was easier to remove.

MATERIALS (for a class of 24)

small paper cups
2 teaspoons soybean oil
1 teaspoon soy lecithin
3 teaspoons (3 packages) unsweetened Kool-aid
or other powdered drink (adds color to the ink)
 $\frac{1}{4}$ cup plus 1 tablespoon water
Sticks or spoons for stirring
Bowl or other container for mixing
Paper
Q-tips and/or rubber stamps



Note: The soy oil does not mix well with water until the lecithin is added. Soy lecithin is used for mixing fats and oils with water. Lecithin is commonly found in chocolate candy and salad dressing.

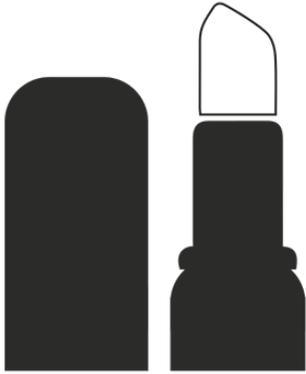
PROCEDURE:

Mix the water with the unsweetened powdered drink mix in a bowl.

Add 2 teaspoons soy oil and 1 teaspoon soy lecithin and stir vigorously until any lumps are gone. *(You can show students how the oil and water don't mix well until the lecithin is added.)*

Divide ink into small cups for use by small groups of students. Use Q-tips to write with the ink on paper or use rubber stamps, if available, to stamp images.

How to Make Soybean Lip Balm



MATERIALS: *(for a class of 24)*

Small paper cups

$\frac{1}{2}$ cup beeswax pellets *(Read about beeswax below.)*

1 cup soybean oil

Small saucepan

Stove top or other heat source

PROCEDURE:

Place the beeswax pellets in a small saucepan. Heat on low-medium heat. Stir until all beeswax is melted. Add soybean oil to the melted beeswax, stir and remove from heat. Pour 1 tablespoon into each small cup.

Let solution sit until it hardens to a soft solid. Use fingertip to transfer the lip balm from cup to lips, or remove paper cup and use the wax cylinder to coat lips.

What is beeswax?

A beehive is filled with little rooms called cells where the bees raise their young and store pollen and honey for the winter. These small cells each have six sides – they are hexagons. The bees make these cells out of beeswax.

A bee has special parts on its underside, called glands, that produce wax. When the worker bees eat honey, these special wax-producing glands change the sugar into wax. Bees must eat eight ounces of honey for every one ounce of wax they produce. The wax appears as small flakes on the bees' underside. The bees must chew the wax in order to soften it, so they can shape it into cells. Beeswax is used in many products, including skin lotions, dental floss, jelly beans, gummy bears, candles, and medicines