

Fueled by Soybeans

Grade Level(s)

Middle School

Estimated Time

45 minutes

Purpose

Students will explore the history of Ford Motor and discover how soybeans play a large role in the production of cars today.

Materials

- From crop to car PowerPoint PDF
- “What am I” PowerPoint
- Intro video link <https://www.youtube.com/watch?v=jGlwECujJsA>
- Soybean plastic:
 - Small paper cups
 - Craft sticks
 - Cornstarch
 - Water
 - Soybean oil (vegetable oil)
 - Microwave
- Soybean sort activity file:///C:/Users/MHibbs/OneDrive%20-%20Farm%20Bureau%20Management%20Corp/Desktop/Full_of_Beans_Worksheets.pdf
- Additional STEAM ideas
 - Build a car <https://sites.google.com/view/fordaitc/steam?authuser=0>
 - Uses of Soybean PowerPoint <https://grownnextgen.org/media/pages/curriculum/meet-the-bean/soybeans-are-everywhere/3971984025-1583247770/uses-of-soybeans.pdf>

Vocabulary

Henry Ford: Henry Ford (July 30, 1863 – April 7, 1947) founder of the Ford Motor Company and chief developer of the assembly line technique of mass production. By creating the first automobile that middle-class Americans could afford, he converted the automobile from an expensive curiosity into an accessible conveyance that would profoundly impact the landscape of the 20th century.

Ford Motor Company: Commonly known as Ford, is an American multinational automaker that has its main headquarters in Dearborn, Michigan.

Biodiesel: Form of diesel fuel derived from plants or animals.

legume: a leguminous plant (member of the pea family), especially one grown as a crop.

Interest Approach – Engagement

“What am I” PowerPoint

Background - Agricultural Connections

Seventy-five million acres of U.S. farmland are used to grow one of the most versatile crops—soybeans! Soybeans first arrived in the United States in 1765 and were planted in Georgia by British colonist Samuel Bowen. Today, soybeans are grown predominately in the Midwest, which includes top soybean-producing states Illinois, Iowa, and Minnesota. During the summer, this **legume** is a bright green, leafy plant that transforms to bright yellow in the fall. One soy plant produces about eight pods that contain three or four beans each.

Believe it or not, soybeans find their way into almost everything! George Washington Carver is credited for discovering the value of oil and protein found in soybeans. Because of their high oil and protein content, soybeans are especially useful in manufacturing various products from food to biodiesel. Soybean oil is used in food products such as margarine, salad dressings, and cooking oil. It can also be found in industrial products such as biodiesel fuel and plastics. **Lecithin** (extracted from soybean oil) is a natural emulsifier and lubricant used in products like pharmaceuticals and protective coatings. After the extraction of soybean oil, the remaining parts can be processed into various edible soy protein products or used to produce soybean meal for livestock feed.

Henry Ford, the founder of Ford Motor Company, was told by his mother at a young age, “Do something useful.” Besides building the *Model T* and transforming the automobile industry, Henry Ford also made an impact on agriculture and soybean production. After the Great Depression hit, Henry Ford was determined to help farmers. After years of research, he discovered that soybeans were the answer. He created a new market for farmers and kept hundreds of Michigan soybean farmers busy. Soon, Henry Ford was incorporating soybeans into every aspect of his life, including paint, plastics, food, and clothing. However, he wanted to do more—he wanted to *drive* soybeans. In 1934, Henry Ford started using soy-based paint on his cars, and by 1935 he was boasting that a bushel of soybeans goes into every Ford car. In 1941, Henry presented his soybean plastic car to the world. It was lightweight and fuel-efficient; however, when the United States entered WWII, production of the soybean plastic car came to a halt. Today, soybeans are still used extensively by Ford Motor Company. More than 32,000 soybeans are used to make some of the 300 pounds of plastic that go into every Ford vehicle.

Procedures

1. Introduce the history of Ford with the From Crop to Car presentation.
2. Soybean plastic
 - Have students recall what Henry used soybeans for in his cars. Discuss that today they'll be making their own soybean plastic, similar to what Henry used.
 - Give each student a paper cup and craft stick and have them add the following:
 - A. 1 Tablespoon of cornstarch
 - B. 1 Tablespoon of water
 - C. 1/8 tsp of soybean (vegetable) oil
 - Mix with the craft stick until cornstarch is dissolved
 - Microwave paper cups for 20-30 seconds. Once the plastic cools to a warm but not hot temperature, students can knead the plastic into a shape. Leave it out for 24 hours to solidify.
 - Ask them to think about the other products that may contain soybeans.
3. Sorting soybeans review
 - Give each student a copy of the product cards sheet and a pair of scissors.
 - Have students cut on the dotted lines to create the cards.
 - Sort the product cards into contains soybeans and does not contain soybean categories.
 - Review the answers:

Contains- margarine, glue, carpet, biodiesel fuel, sunscreen, car wax, cosmetics, rubber, crayons, paint, engine oil, mayonnaise, candles, medicine, soap, ink, fire extinguisher foam

Does not contain-Jell-O, iron, cotton, t-shirts, paper
 - Ask the students the following questions
 - A. Did any of these products surprise you?
 - B. Are soybeans an important crop for farmers to grow? Why?

Organization Affiliation

Lessons adapted by Morgan Hibbs (Linn County Farm Bureau) from the American Farm Bureau Foundation for Agriculture Full of Beans Educator's Guide.

Agriculture Literacy Outcomes

T3.3-5.b. Diagram the path of production for a processed product, from farm to table.

T5.3-5.c. Explain how agricultural events and inventions affect how Americans live today.

T5.3-5.f. Understand the agricultural history of an individual's specific community and/or state.

T4.6-8.e. Explain how and why agricultural innovation influenced modern economic systems.

T5.6-8.a. Consider the economic value of agriculture in America.

Iowa/ Common Core Standards

SS.5.25. Develop a claim about the past and cite evidence to support it.

SS.5.24. Explain probably causes and effects of historical developments.

SS.6.15. Distinguish how varying economic systems impact a nation and its citizens.

SS.6.18. Explain how changes in transportation, communication and technology influenced the movement of people, goods, and ideas in various countries.

SS.7.18. Explain and evaluate how economic decisions affect the wellbeing of individuals, businesses and society.