



MIDDLE SCHOOL  
CURRICULUM



# SOY SAVVY



SOYBEAN FARMING



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## I. Enduring Knowledge:

Because soybeans are an important crop in Wisconsin's economy, students will understand how soy plays a vital role in creating our food, fuel, and the products people use.

### Learning Targets:

1. Students will learn that soybeans are exceptionally high in protein and that the oil from soybeans is used in many products they consume.
2. Students will understand how technology can transform a simple product into many applications and uses.
3. Students will be able to name some of the products they use that have soy as a direct ingredient; they will also know that indirect uses of soy affect the availability and quality of meat products.
4. Students will know the role that Henry Ford played in developing many industrial products from soy.

## II. Teacher Background Materials:

This brief DVD shows how soybeans came to be used in many food and industrial products around the world. It also shows the relationship between science and technology and an agricultural product grown in Wisconsin.

Soybeans originated in China thousands of years ago. In the 18th century they were brought to the United States and over time their uses have expanded tremendously.

Soy is about 37% protein by weight, compared to 15-20% protein by weight in meat. They contain all eight amino acids, which are essential for human health, and they are low in trans fat and saturated fat. A small amount of soy protein improves the consistency, texture and shelf life of many processed grocery store items, which in turn has led to the development of many new food products. Soybean oil is the most widely consumed edible fat in the U.S. and is found in salad dressings, condiments, cereals, crackers, cookies and many other foods.

About 85% of the world's soybean crop is processed into soy meal that is used in animal feed. This has increased world production of meat, allowing people around the world to incorporate more meat into their diet.

Soybeans are processed by separating the oil from the bean, and then the remaining solid material is roasted into a high-protein fiber for animal feed. Technology has also enabled the development of biodegradable nontoxic products from soybeans that are environmentally friendly, such as biodiesel fuel.

In the 1930s and 1940s Henry Ford funded research into the industrial applications of soybeans. At the World Fair in Chicago in 1934 he demonstrated how biodiesel from soy could power a generator, be modeled into plastic parts and used to make auto paint. Later he even designed a “soybean car” made entirely out of soy plastic. With the onset of WWII, the project was abandoned.

Today soy is processed into paint strippers, hand cleaners, crayons, soy ink, soy-based foams used in refrigerators and coolers, soy oil lubricants, and soy-based trash and grocery bags, coffee cups and pet toys.

### Vocabulary:

1. **amino acids:** the chief components of proteins that are synthesized by living cells as essential components of a healthy diet
2. **biodegradable:** capable of being broken down especially into innocuous products by the action of microorganisms
3. **biodiesel:** a fuel made from plants
4. **emulsifier:** a food additive used to stabilize processed food
5. **nonrenewable resources:** natural resources found in a finite supply on the planet, such as oil or gas

## III. Before Viewing the Video:

Have students make a list of things that they think are made from or contain soy. Take a few minutes to go over their lists in class.

## IV. Viewing Guide:

1. Ask students to add things to their lists that were not included in the class list. (See partial list in teacher background notes.)
2. Ask students how Henry Ford helped the soybean industry grow in the United States. (He hired researchers to develop industrial products from soy; he featured soy products at the World Fair in 1934; he even made a soy car.)
3. What are the two main components of soy? (protein and oil)

## V. Discussion Guide:

Go over the Viewing Guide questions, adding products to the list and discussing the role of Henry Ford in the technological development of soy products.

## VI. Evaluation:

1. An informal assessment can be made of students' notes and participation in discussion.
2. Activities can be assessed using rubrics based on good research, presentation, and material construction.

### Suggestions for extended learning:

1. Collect food packages and look at the ingredient labels for soy products. Make a list of all the foods you eat that contain soy. Create a display of good containers.
2. Ask students to make a list of actual soy dishes they eat. For example, miso, tofu, soy sauce, soymilk, edamame, etc.
3. Prepare some dishes that contain soy. Share them with your class.
4. Research the life and contributions of Henry Ford. Prepare a poster with pictures of Ford and some of his soy-related products.
5. Visit a farm where soy is grown, or invite a farmer who grows soy to your class.
6. Research how renewable energy will affect the future. See if you can find out how soybeans are used to make fuel.
7. Research the health benefits of soy.

The following Wisconsin Student Proficiency Standards can be met by teaching *Soybean Science*:

**Geography:** “Students in Wisconsin will learn about geography through the study of the relationship among people, places, and environments.”

- **8th grade:** A.8.10

**History:** “Students in Wisconsin will learn about the history of Wisconsin ... examining change and continuity over time in order to develop historical perspective, explain historical relationship, and analyze issues that affect the present and the future.”

- **8th grade:** B.8.1, B.8.7, B.8.8

**Economics:** “Students in Wisconsin will learn about production, exchange, and consumption so that they can make informed economic decisions.”

- **8th grade:** D.8.3, D.8.4, D.8.7, D.8.11



## Wisconsin Teacher Standards which can be met with this curriculum, including rationale:

### **Standard 1: Subject matter**

This curriculum provides information not readily available in other forms. A teacher using this material will be well informed about the subject matter.

### **Standard 3: Adapt instruction**

This curriculum provides suggestions for learners with a variety of intelligences and levels of ability.

### **Standard 4: Instructional strategies**

The curriculum includes the use of technology to gain information and suggestions for using research in extending learning.

### **Standard 5: Individual and group motivation**

Both the use of prior knowledge and carefully designed group projects promote motivation for students to learn.

### **Standard 6: Verbal and nonverbal communications**

Instructional media and technology that promotes active learning are key parts of this curriculum.

### **Standard 7: Organizes and plans systematic instruction**

The curriculum is organized to support teacher knowledge, to draw on and motivate students to engage in active learning, and promotes active inquiry, collaboration, and supportive interaction in the classroom.

### **Standard 8: Formal and informal assessments**

Suggestions for a variety of assessments, both formal and informal, are offered in the curriculum.

### **Standard 10: Fosters relationships**

This curriculum could be used to create relationships with local soybean farmers through field trips or class speakers.