

Cluster 4

Can the Golden Bean Be "Green"?

Lessons:

1. Beans Give Gas (Soy Biodiesel)
2. Ink Is Ink Is Ink, Isn't It?
3. Text Criticisms: Crayons

Guiding Question:

How are soybeans used to protect the environment?

Michigan Benchmarks for Science

| Elementary | Middle School |
|------------|---------------|
| I.1.E.1 | I.1.MS.1 |
| I.1.E.6 | II.2.MS.4 |
| II.1.E.3 | III.5.MS.6 |
| III.5.E.4 | III.5.MS.5 |
| V.1.E.6 | IV.2.MS.4 |
| V.1.E.1 | |



CLUSTER 4 Beans Give Gas: Soy Biodiesel Fuel

Lesson 1

Activity:

Examine alternatives to petroleum-based fuels.

Purpose:

- Stimulate awareness for the need to use renewable fuels.
- Observe technological advancements.

Vocabulary

fuel
renewable
non-renewable
resource
pollutants
petroleum
fossil fuels

Background:

See *Beans Give Gas!* in the SoyNews.



Materials:

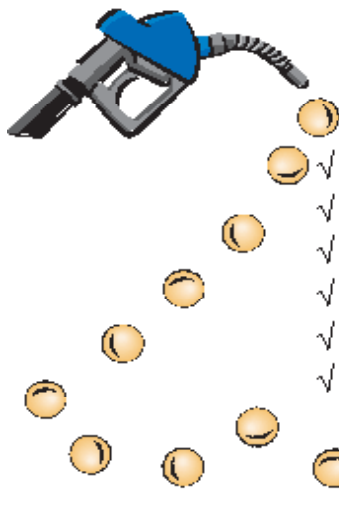
- Sample of Soy Biodiesel
- SoyNews

Time:

30 minutes

Procedure:

1. Show students the sample of Soy Biodiesel. Have them guess what it is.
2. Tell them that it is Soy Biodiesel, a renewable fuel that comes from soy oil.
3. Introduce the terms *renewable* and *non-renewable*, *petroleum*, *pollutants*, *resource*, and *fossil fuels*. Have the students define these terms by using their science text.
4. After defining the terms, have the students read "Beans Give Gas!" in the SoyNews.



Our Buses are Fueled with Soy-based Biodiesel

- ✓ Healthier for Students & Staff
- ✓ Cleaner Burning
- ✓ Less Emissions with 20% Soy (B20)
- ✓ Better for the Environment
- ✓ Renewable Resource
- ✓ Grown and Processed in the U.S.A.



Multiple school districts are burning B20
(20% soy biodiesel and 80% petro diesel)
Is your school district?

Extended Activities:

1. Take a stand. If your school district is not burning soy biodiesel, gather information for them to learn about the benefits and present it at a school board meeting.
2. Inform any local trucking or fleet companies who may not be aware of the benefits of burning biodiesel.

Ink Is Ink Is Ink, Isn't It?

Activity:

Examine an alternative to using petroleum-based inks.

Purpose:

- Stimulate awareness for the need to reduce the use of petroleum-based inks.
- Observe technological advancements.

Background:

Soy ink is made from soybean oil. The oil is purchased by ink manufacturers, blended with pigments, resins and waxes, and then sold as ink. Conventional ink is made from petroleum. Soy ink was developed in 1985, when oil was in short supply.

Soy ink is part of the "Green Movement." It produces no significant amounts of air pollutants when drying, while conventional petroleum oils do. Also, soy ink enhances the paper recycling process. When compared to oil-based inks, soy ink is easier to remove from paper pulp fibers during de-inking. Soy ink washes out of paper in water.

Soy ink was first introduced in 1987. At that time only six newspapers used it. Today, more than 3,000 use it, including 90% of the nation's daily newspapers. Besides newspapers, soy ink is used for magazines and other commercial printing. Approximately 25% of all commercial printers use soy ink.

Materials:

- SoyNews
- newspapers

Time:

15-20 minutes



Procedure:

1. Ask: How many of you have seen the soy ink logo on their hometown newspapers? Give each pair of students one newspaper page. Have them look for the logo and, if they find it, cut it out. (Students can also find the logo on SoyNews and rulers supplied).
2. In their pairs, have them think about and attempt to answer the following questions:
 - a. What is the benefit in using soy ink products?
 - b. What are inks made from besides soybeans?
 - c. Why do you think soy inks are now being used?
3. Next, have the students read "Why Soy Ink?" in the SoyNews. Have the teams compare their ideas with the reading. Answer the questions again, now that new information is available. Discuss the value and reasons for using soy ink.
4. Have the students take a piece of the newspaper to the sink and attempt to wash the ink out. Ask: Did all of the ink come off the paper? Why would it be beneficial to have the ink wash out easily? (helps in the recycling process) Compare the inks printed on other types of paper (magazines, dittos, newspaper flyers). Could the ink be removed from these types of paper? How would this make recycling more expensive and time consuming?



 **CLUSTER 4**
Lesson 3

Text Criticism---Crayons

Read the article called: "Soybeans Being Put To New Use - Crayons." Answer the following questions using the reading.

1. The purpose of this article is to:
 - a. inform people about a new product
 - b. encourage people to buy different crayons
 - c. tell about the college students
 - d. tell people how to win a contest

2. These crayons are environmentally friendly because they?
 - a. made use of petroleum products
 - b. made use of environmental names
 - c. are made from a nonrenewable resource
 - d. are made from a renewable resource

3. Why would a well-known company support these crayons?
 - a. they already make crayons
 - b. they support American products
 - c. they were looking for something to add to their line
 - d. they were receiving pressure from the students

4. The crayon has not changed for many years. Why did these students decide to replace the wax with a soybean product?

Text Criticism Answer Sheets

Crayons

1. a 2. d
3. b
4. Why did these students decide to replace the wax with a soybean product?

Rubric

- Score 3** Response demonstrates or implies a **clear and deep understanding** of three (3) of these concepts:
- plants (soybeans) are a renewable resource
 - wax crayons are made out of petroleum which is a non-renewable resource
 - some renewable resources can replace some non-renewable resources
- Score 2** Response demonstrates a **good understanding** of:
- two of the above
- Score 1** Student response demonstrates **recognition** of:
- one of the three concepts listed under a score of three
- No Score** No attempt to respond. Inappropriate writing or drawing.