

Biodegradable Plastic from Corn

Grade Level: 1-3

Approximate Length of Activity: One class period

Objective

Teacher

1. Explain the background and uses of corn.
2. Discuss with the class the importance of biodegradable products.
3. Assist students in a plastic making activity.

Students

1. Recognize the substitution possibilities of a renewable resource (plastic from corn) for a nonrenewable resource (plastic from oil.)
2. Describe an environmental reason for using corn as a source for the production of plastics.

Michigan Content Standards: (Science) S.RS.E.1; S.RS.01.11; S.RS.02.11; S.RS.03.11; E.ES.E.4; E.ES.03.42; E.ES.03.43; E.ES.03.44

Introduction

Plastics made from nonrenewable oil products last for thousands of years in our environment because they don't break down or disintegrate. Because they do not break down, experts feel the landfills in the United States will reach maximum capacity by the year 2020.

To help alleviate this problem, researchers have invented a biodegradable plastic made with cornstarch. Plastics made with cornstarch will break down and not take up space in landfills. Plus, the added benefit is that biodegradable plastic is made with a renewable resource-corn! Corn is produced every year, unlike oil. Oil is a nonrenewable resource because we only have a certain amount of it. Once we have depleted our oil reserves it will be gone. Corn can be grown every year and is used to make more biodegradable plastic products.

Corn is the major feed grain grown by farmers in the U.S., leading all other crops in value and volume of production. Corn is also a major component in main foods like cereals, peanut butter and snack foods. An ear of corn averages 800 kernels in 16 rows. A pound of corn consists of approximately 1,300 kernels. An acre (about the size of a football field) of corn yielding 100 bushels produces approximately 7,280,000 kernels. Most of the weight of a bushel of corn is the starch, oil, protein and fiber, with some added natural moisture.

Farmers grow corn on every continent of the world except Antarctica. Hybrid varieties have been developed to adapt to specific growing conditions and locations worldwide. America exports nearly one-third of our nation's corn crop and produces over one-third of the world's corn crop.

One hundred years ago, starch was basically the only product coming from corn refining-the rest of the kernel was thrown away. Today, there are uses for every part of the kernel and even the water in which it is processed. Photographic films are made from the starch portion of corn. Corn oil and cornstarch are used to make biodegradable plastic.

Corn can be made into fuel, abrasives, solvents, charcoal, animal feed, bedding for animals, insulation, smoked meat, adhesives, etc. The kernel is used as oil, bran, starch, glutamates, animal feed and solvents. The silk is used as part of animal feed, silage and fuels. Husks are made into dolls and as filling materials. The stalk is used to make paper, wallboard, silage, syrup and rayon.

Materials Needed for 30 Students

- Microwave
- 2 cups cornstarch
- ¼ cup corn oil
- 2 cups water
- 30 resealable plastic bags
- 2 pkgs. food coloring
- Medicine droppers
- Teaspoons

Activity Outline

1. Mix 2 tablespoons cornstarch, 2 tablespoons water and 2 drops corn oil in a resealable plastic bag.
2. Add 2 drops of your favorite food coloring to the mixture.
3. Seal the bag and knead well to a uniform consistency.
4. Heat the mixture in a microwave for 20-30 seconds at a high setting. Be careful, this is hot!
5. After the product cools, students may create a shape with the biodegradable plastic.
6. Compare this biodegradable plastic substance with other plastics.

Discussion Questions

1. Why is oil a nonrenewable resource?
2. Why is corn a renewable product that we can make plastic out of?
3. What three ingredients do we need to make biodegradable plastic?
4. Name the uses of corn.

Related Activities

1. For more information and activities contact the Michigan Corn Marketing Program, 12800 Escanaba Dr., DeWitt, MI 48820, 1-888-323-6601, www.micorn.org
2. The lesson "Corny Math Facts" in the math section of this curriculum guide.
3. The lesson "The Journey of Corn with Kid Kernel" in the science section of this curriculum guide.

Book Resources

1. "Why Are All the Cars Green?" and "I Love Corn" Contact: Corn Marketing Program of Michigan, 1-800-323-6601 for copies