

Corn: An A-mazing Plant

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives

Teacher

1. Guide students in a discussion on corn production.
2. Help students understand the history of corn production.

Students

1. Locate and label the states on a U.S. map that make up the Corn Belt
2. Become familiar with the parts of the corn kernel.
3. Recognize products made from corn used in their daily lives.
4. Be able to distinguish, through dissection, the four different parts of a corn kernel.

Michigan Content Standards: (Social Studies) 4-G2.0.1; 4-G2.0.2; 5-U1.4.1; 5-U2.1.2; 6-H1.2.2; 6-W2.1.2; 6-W3.1.1; 6-W3.1.3; 6-G2.2.2; 6-G1.2.1; 6-G2.1.1

Introduction

The Corn Belt is a group of states producing most of the corn in the United States. Illinois, Iowa, Nebraska and Minnesota produce 50 percent of all the corn grown in the United States. Other major corn-growing states include Indiana, Wisconsin, Michigan, South Dakota, Kansas, Missouri, Kentucky and Ohio. These 12 states make up the Corn Belt.

Corn is the major feed grain grown by farmers in the United States, leading all other crops in value and volume of production. Corn is a major component in foods like cereals, peanut butter and snack foods.

An ear of corn has an average of 16 rows with 800 kernels. 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 natural moisture.

Farmers grow corn on every continent of the world except Antarctica. Hybrid varieties of corn have been developed to adapt to specific growing conditions and locations worldwide. Hybrids are the offspring produced by breeding plants of different varieties.

One hundred years ago, starch was basically the only product resulting from corn refining and the rest of the kernel was thrown away. Today, there are uses for every part of the kernel – even the water in which it is processed. The corn seed (kernel) is composed of four main parts: the endosperm, the pericarp, the germ, and the tip cap. The endosperm is most of the dry weight of the kernel. It is also the source of energy for the seed. The pericarp is the hard, outer coat that protects the kernel both before and after planting. The germ is the living part of the corn kernel. The germ contains genetic information, vitamins and minerals that the kernel needs to grow. The tip cap is where the kernel was attached to the cob.

Corn can be made into fuel, abrasives, solvents, charcoal, animal feed, bedding for animals, insulation, adhesives and more. The kernel is used as oil, bran, starch, glutamates, animal feed and solvents. The silk is combined with other parts of the corn plant to be used as part of animal feed, silage and fuels. Husks are made into dolls and used as filling materials. The stalk is used to make paper, wallboard, silage, syrup and rayon (artificial silk).



Materials Needed

- “A Brief History of Corn” handout
- “A Golden Nugget” handout
- Corn kernels
- Map of the United States
- Table knife for each group
- Container of water to soak corn

Activity Outline

1. Discuss the background information with the students.
2. Using a map of the United States, have students identify which states are part of the Corn Belt.
3. Hand out “A Brief History of Corn.” Have students take turns reading paragraphs out loud to learn about the history of corn, its uses, development and growth.
4. Soak some kernels overnight. Then give each student several kernels of corn. Pass out table knives and allow the students to dissect the kernels. Allow time to make observations. The handout, “A Golden Nugget” will be helpful during the dissection and discussion.

Discussion Questions

1. Who used corn in ancient times?
2. What are some of the ways corn is used today?
3. Where is corn mostly grown in the United States?
4. How have the uses of corn changed over time?
5. What are parts of the corn kernel called, and how are these parts useful?



Related Activities

1. Have students cut pictures from newspapers, magazines and/or food labels to create a collage depicting the by-products derived from corn (examples: corn oil, cereal, candy, etc.)
2. Ask students to bring corn products to the classroom. Check ingredients on the label.
3. Prepare corn dishes, such as a corn casserole, grits, corn muffins, chocolate covered popcorn, etc., and have a corn feast.
4. Students could collect a variety of corn recipes. Have the students sort the recipes into logical categories, illustrate and combine into a class cookbook.
5. Hold a “Corn Kernel Counting Contest” and have the students try to guess how many kernels are in a jar or a bag. This could be done with kernels of popcorn, dried feed corn, or seed corn. Have students prepare posters or slogans during the contest which identify the number of kernels on a single ear of corn, in a one-pound bag, in a single bushel, etc. Challenge students to see how many other relationships they can think of and to express them creatively.
6. Read to the class: *Corn Belt Harvest* by Raymond Bial. A photographic essay of producing corn in the Corn Belt in the 1990s. Or *The Story of Corn* by Peter Limburg.
7. The lesson “Food and Fiber Products” located in the science section of this curriculum guide.
8. The lesson “From Corn to Plastic” located in the science section of this curriculum guide.

A Brief History of Corn

Since ancient times, corn has played an integral role in human history. Corn is a grass, native to the Americas. The exact origin of the grain remains unknown, but tiny ears of corn have been discovered at ancient village sites and in tombs of early Native Americans. Evidence of corn in central Mexico suggests its presence there as long as 7,000 years ago, where it was domesticated from wild grass. Cultivated corn is known to have existed in the southwestern United States for at least 3,000 years. To the Aztecs and the Incas, corn was a staple of their diet that provided flour and vegetable dishes for their meals. Here in the United States, many of the various Native American tribes have traditionally grown corn – also known as maize – and used it for both food and utilitarian purposes. Corn was so important to some Pueblo tribes of the Southwest that it was considered one of the three sacred foods (along with beans and squash), so sacred that some groups even worshipped it. Indeed, Native American mythology is rich with stories involving corn and important religious events. Many eastern tribes shared their knowledge of corn production with the early European settlers, an act which saved many pioneers from starvation.

Uses of Corn

Along with wheat and rice, corn is one of the world's major grain crops. It is the largest grain crop grown in the United States. Corn has been used as a foodstuff for humans (about 9 percent of each crop), as well as for livestock (about 64 percent of each crop). Corn has found its way into a wide variety of American foods including corn kernels, corn meal and other food products such as: cooking oils, margarine, and corn syrups and sweeteners (fructose). Corn is an excellent source of carbohydrates.

Corn cobs have been used as a soft-grit abrasive and to provide furfural, a liquid required in the manufacturing of nylon fibers. Corn has been used as a source for producing biodegradable plastics. Additionally, ethanol (a type of renewable fuel made from corn) has shown the possibility of becoming a major "new" fuel for the world's automotive industry. From foods of the past to fuels of the future, this highly diverse crop has played a major role in human civilization.

Corn Development and Growth

As miraculous as the many uses for corn may be, the way corn develops and grows is equally fascinating. A single seed (or kernel) of corn may produce a plant which yields more than 600 kernels of corn per ear. To understand the vast amount of seed produced by corn plants, consider the following example: A single kernel can produce a plant that will contain at least 600 kernels per ear. On one acre of land, anywhere from 22,000 to 35,000 individual plants may be grown. If each plant produces at least one ear of corn, the yield will be 13,000,000 kernels of corn from that single acre. (In general, hybrid corn is developed to produce from one to two ears per plant.) A 400-acre farm would then yield over five-billion kernels from its production. In addition, U.S. corn yields have increased 125 percent since 1950.

A Golden Nugget

Endosperm

The endosperm is approximately 82 percent of the kernel's dry weight. It is the source of energy and protein (starch) for the germinating seed. There are two types of endosperm, soft and hard. In the hard endosperm, starch is packed tightly together. In the soft endosperm, the starch is loose. When corn dries in the field before the harvest, the moisture causes the soft endosperm to collapse and form a dent in the top of the kernel.

Pericarp

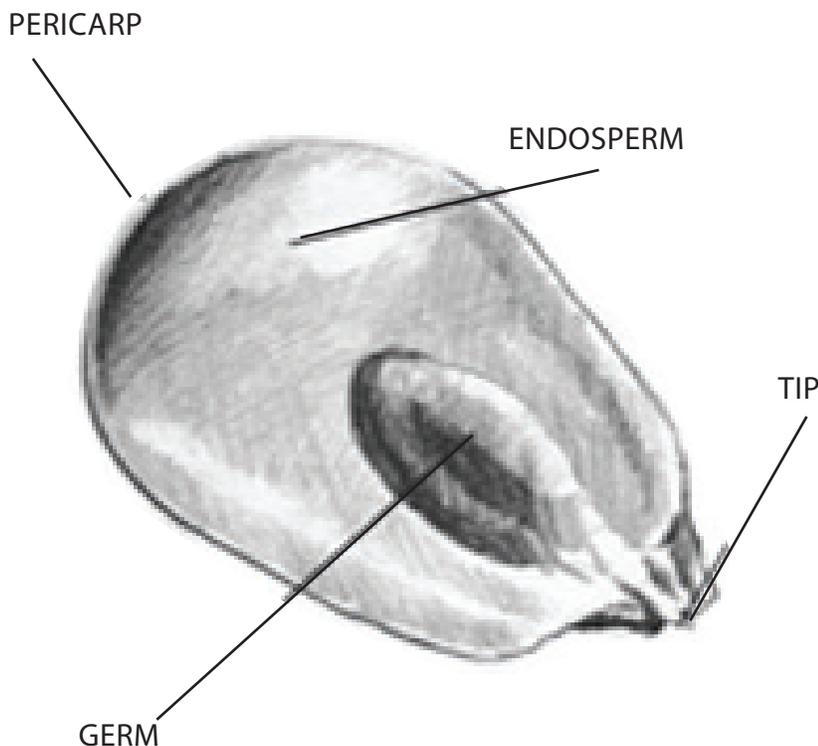
The pericarp is the outer covering of the kernel that protects it from deterioration. It resists water and water vapor and is undesirable to insects and microorganisms.

Tip Cap

The tip cap is the only area of the kernel not covered by the pericarp. It was the attachment point of the kernel to the cob. It is the major entry path into the kernel.

Germ

The germ is the only living part of the corn kernel. It contains the essential genetic information, enzymes, vitamins, and minerals for the kernel to grow into a corn plant. About 25 percent of the germ is corn oil. Corn oil is the most valuable part of the corn kernel because of the amount of linoleic fatty acid (polyunsaturated fat) and its bland taste.



Corn Components

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| Starch | 61.0% |
| Feed | 19.2% |
| Oil | 3.8% |
| Water | 16.0% |