

Corn an A-Maizing Plant

*Wyoming Social Studies, Science,
Language Arts*

Objectives:

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

Background:

The Corn Belt is a group of states where most of the corn in the United States is produced. Illinois, Iowa, Nebraska, and Minnesota produce 50% of all the corn grown in the U.S. 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 U.S., 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 1300 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,



Standards

Social Studies

Production, Consumption,
& Distribution: 1.1

People, Places
& Environments: 5.1, 5.4

Science

Life Systems: 1.1, 1.3

Language Arts

3 Grade:

Reading: 1.1B, 1.1C,
1.1E, 1.3A, 1.3B, 1.3D

4th Grade:

Reading: 1.1A, 1.1B, 1.1D,
1.1G, 1.1H, 1.3A, 1.3B, 1.3D

Materials

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

Estimated Time

1-2 60 Minute Sections

Grades 3-4

notes:

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).

Activity Procedures:

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, and corn 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 hand out, "A Golden Nugget," will be helpful during the dissection and discussion.

Discussion Questions:

- Who used corn in ancient times?
- What are some of the ways corn is used today?
- Where is most of the corn grown in the United States?
- How have the uses of corn changed over time?
- What are parts of the corn kernel called, and how are these parts useful?

Related Activities:

1. Discuss the importance of corn as a food source in the United States today. Pass out a copy of the Golden Treasures handout to each student. Have them list all the items they have used today that are made from corn products.
2. Make Biodegradable Corn Plastic in your classroom. Discuss the importance of utilizing biodegradable products.

Lesson Adapted from the Illinois Agriculture in the Classroom.

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 it was used 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 U.S. 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 U.S. 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. These foods include corn kernels, corn meal, and other food products such as: cooking oils, margarine, and corn syrups and sweeteners (fructose), to name a few. Corn is also 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 degradable 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 (thirteen million) 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, consider that U.S. corn yields have increased 125 percent since 1950.

*Materials Adapted from The Nature of Corn,
Publication on Environmental Impacts of Corn and Corn Products,
by the Illinois Corn Marketing Board.*

Golden Nugget

The Endosperm

The endosperm is about 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 harvest, the moisture loss causes the soft endosperm to collapse and form a dent in the top of the kernel.

The Pericarp

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

The 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.

The 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

Starch 61.0%

Feed 19.2%

Oil 3.8%

Water 16.0%