

# The Evolution of Maize (Corn)

Objective: Students will be able to understand that people can affect the development of plant traits through a process called artificial selection. Students learn to plant corn seedlings.

Materials: corn seedlings, example of decorative corn and regular corn, picture example of corn and teosinte, clip boards, colored pencils, paper,

Preparation: Gather materials,

## Background

The history of modern-day maize begins at the dawn of human agriculture, about 10,000 years ago. Ancient farmers in what is now Mexico took the first steps in domesticating maize when they simply chose which kernels (seeds) to plant. These farmers noticed that not all plants were the same. Some plants may have grown larger than others, or maybe some kernels tasted better or were easier to grind. The farmers saved kernels from plants with desirable characteristics and planted them for the next season's harvest. This process is known as selective breeding or artificial selection. Maize cobs became larger over time, with more rows of kernels, eventually taking on the form of modern maize.



The identity of maize's wild ancestor remained a mystery for many decades. While other grains such as wheat and rice have obvious wild relatives, there is no wild plant that looks like maize, with soft, starchy kernels arranged along a cob. The abrupt appearance of maize in the archaeological record baffled scientists. Evolution was generally thought to occur gradually through minor changes. Why did maize appear so suddenly?

The earliest events in maize domestication likely involved small changes to single genes with dramatic effects. That the small changes had dramatic effects also explains the sudden appearance of maize in the archaeological record. These examples show us that evolution doesn't always involve gradual change over time – it can be dramatic change quickly.

Later changes in the evolution of modern maize involved many genes (perhaps thousands) with small effects. These minor changes occurring due to artificial selection, include the following:

- Types and amounts of starch production
- Ability to grow in different climates and types of soil
- Length and number of kernel rows
- Kernel size, shape, and color
- Resistance to pests



Local groups of farmers selected for characteristics that they preferred, and that worked best in their particular environment. Over thousands of years, selective breeding generated the broad diversity of corn varieties that are still grown around the world today.

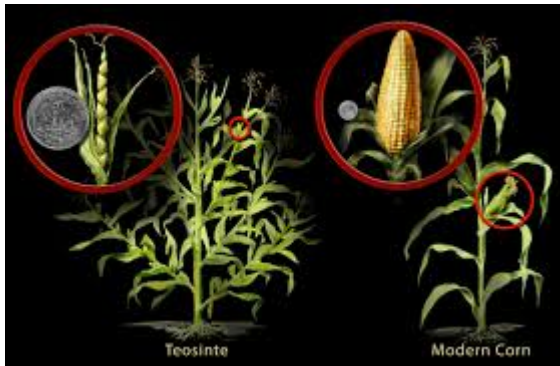
<http://learn.genetics.utah.edu/content/selection/corn/>

*Genetic Science Learning Center, "The Evolution of Corn," Learn.Genetics, 22 June 2014,*

*<<http://learn.genetics.utah.edu/content/selection/corn/>> (21 April 2015)*

#### Lesson:

1. Plant corn starts or seeds into the garden, traditionally planted with squash and beans (3 sisters). Ask students what does this plant look like? (a grass if your planting starts). It is considered a grain.
2. At the table show students examples of different types of corn (as different looking as possible). Ask the students if they think they know what it is? How do the examples look the same? And how do they look different? This is a comparison of traits. Are the examples from the same plant and had the same parents? (No. different varieties) Are they the same kind of plant? (Yes – corn.)
3. Now show them the pictures of teosinte and the comparison with corn. Teosinte is the original corn plant. What are the main differences between teosinte and corn? (Teosinte is bushy, corn has one main stalk. There are many more kernels on corn in rows and they don't have a strong seed coat.)
4. How can that be? Ask students if they think it is possible that corn came from teosinte? How? (farmers instead of nature played an important role in transforming corn)
5. Show students the picture displaying more primitive corn to more modern corn. How could farmers have created such a difference in the crop? Farmers, instead of eating the best seeds, saved the seed with desirable traits to plant the following year and thereby developed a diversity of corn. A corn variety that grew best in one area may not have grown best in another climate/region and farmers would need to continue selecting the best seeds for their environment.



Compare natural selection with artificial selection:

Nature selects plant or animal traits that allow survival and reproduction. = Natural Selection

Nature would not have selected corn traits because the thick husk and the strong hold the seeds have on the cob make seed dispersal ineffective.

In artificial selection, people are choosing the traits that they want.

Are Natural and Artificial selection choosing the same type of traits (survival)? (Not necessarily) Artificial selection is choosing whatever the farmer fancies. Corn would not have survived in nature because seeds are strongly attached to the cob and covered by a strong husk. These traits would not help it in nature, but were traits the farmers wanted. Farmers selected those traits to create a crop good for eating and storing.

Extension:

If you could create any kind of corn, what traits would you select for? What would your corn look like, taste like, smell like, feel like or sound like? Do you want the sweetest corn, or corn that is bright red? Do you want small corn or really big corn? Would your corn withstand cold temperatures?

Draw and describe your perfect ear of corn. Can you describe the parent corn plants?

