

## BIOLOGY IN ENGLISH

### Artificial selection produced modern corn

**C**orn, also known as **maize** (*Zea mays*), represents one of the most remarkable plant-breeding achievements in the history of agriculture. Today, modern society literally reaps the benefits of corn as a domestic product. Corn is an important food source for both humans and livestock. Corn is a component of over 3000 grocery products, including cereals, corn syrup, cornstarch, ice cream, soft drinks, chips, snack foods, and even peanut butter. It is also used in making glue, shoe polish, ink, soaps, bags and synthetic rubber. Recently, corn has been in the news as a source of ethanol to fuel our vehicles.

Modern corn bears little resemblance to its ancient ancestor, an inconspicuous wild grass called *teosinte* from southern Mexico. Teosinte is a drought-tolerant grass that produces reproductive spikes fairly close to the ground. Each spike is filled with two rows of small, triangular-shaped seeds enclosed in a tough husk. Each seed is encased and protected by a hard shell (**figure 1A**). Ancient peoples discovered

that teosinte was a source of food and began selecting spikes to plant near their homes, close to irrigation systems. Thus, between 4000 and 3000 B.C., the hand of **artificial selection** began to shape the evolution of corn. The use of teosinte spread across Mesoamerica, opening the door for further development.

Archaeologists have uncovered corncobs distinctly different from teosinte at a 5400-year-old site in the highlands of Oaxaca in southwestern Mexico. The corncob was only an inch long and possessed four rows of kernels, compared to an average corncob today that has 16 rows and 800 kernels. The attachment of kernels to the cob and the loss of the hard coat surrounding each kernel made corn even more dependent upon humans and susceptible to artificial selection. In order to be planted for the next season, healthy kernels had to be identified and removed from the cob. And since corn kernels lacked a tough outer coat, they had to be stored in a cool, dry place. Early farmers chose corn with the most desirable characteristics to plant each season.

Experimental hybridization soon followed, and many varieties were developed. By A.D. 1070, corn had reached North America and was being grown by the Iroquois in New York.

By the time Columbus visited the Americas, corn was being grown in a number of environments. Columbus even commented on the fields of corn and its great taste. We now know that corn is an *allotetraploid*, meaning it is  $4n$ . Hybridization must have been followed by doubling of the chromosomes, accounting for why the ears of corn are now so large (**figure 1B**).

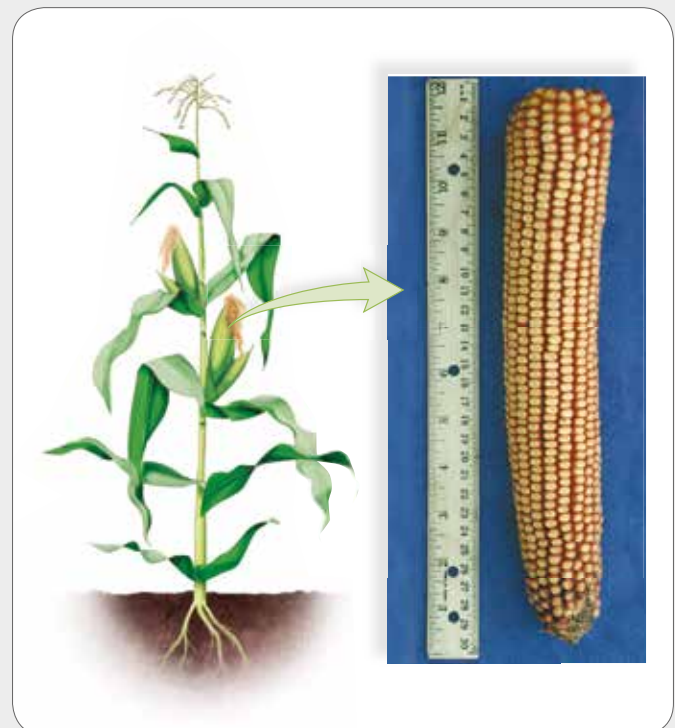
Today, there are hundreds of varieties of corn, representing the greatest diversity of any crop in the world. Corn can be found growing in high mountain regions or hot sunny areas, and on every continent except Antarctica. The height of a corn plant can vary from less than a meter to over 6 meters, and it can mature in 2 to 15 months. The ears of corn can vary in length from 12 to 115 cm.

#### ANSWER

Two plants are both hybrids, but only one of the plants is sterile. The other plant self-fertilizes to produce a larger fruit than either parent. Explain.



**Figure 1A** Teosinte (*Zea mexicana*) produces ears containing only a few tough kernels.



**Figure 1B** The modern corn (*Zea mays*) produces ears containing many edible kernels.