



## Plant Breeding

### DID YOU KNOW?

Seed banks around the world save millions of varieties of crop seeds. These seeds contain genes that plant breeders use to develop new crops.



### PLANT BREEDING BY SELECTING SEEDS

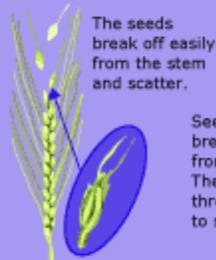
As ancient farmers grew their crops, they noticed which ones had desirable traits — like bigger fruits. They knew that planting the seeds from crops they liked produced crops with similar traits.

Over thousands of years of selecting seeds, the quality of the crops improved.



Wild grain seeds break off the plant and scatter widely. Because farmers cannot easily collect scattered seeds, they selected for plants that held on to their seeds until harvest.

ear of wild wheat



The seeds break off easily from the stem and scatter.

ripe ear of domesticated wheat



Seeds do not break off easily from the stem. The stem must be threshed, or beaten, to separate the grain.

Selecting seeds from corn with bigger ears led to larger ears over the centuries.

wild maize

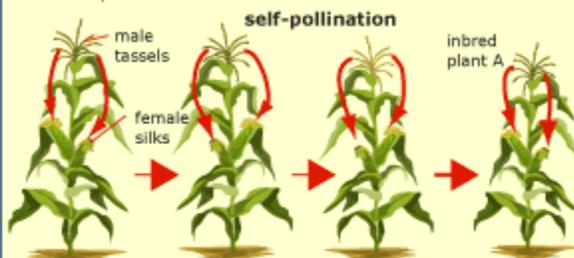


modern maize

### PLANT BREEDING BY CROSSING DIFFERENT VARIETIES

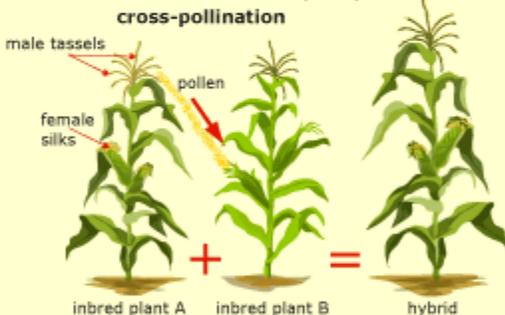
In the early 1900s, scientists began working with farmers to develop better crops. Here is how plant breeders cross two varieties to produce a "hybrid" variety.

A plant with a desirable trait, such as high yield, is mated with itself. Pollen from the male parts of the plant is used to fertilize the female parts of the same plant. After several generations of self-pollination, the offspring are very similar and have the desirable trait.



Another plant with another desirable trait, such as disease resistance, is mated with itself over several generations.

The two varieties are mated with each other. The offspring, called a hybrid, carries the desirable traits of both varieties. Hybrid plants grow vigorously, but plants grown from hybrid seeds do not yield as much. So farmers do not save seeds of hybrid plants.



Plant breeders have developed an amazing diversity of new crops — varieties with more nutrients, and the ability to resist diseases, grow in poor soils, and produce higher yields.

represents 1 metric ton



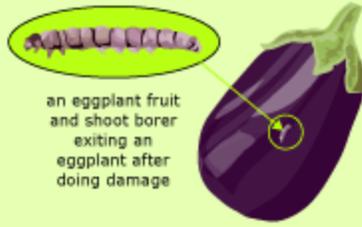
Average U.S. corn yield per hectare in 1928



Average U.S. corn yield per hectare in 1998

## PLANT BREEDING BY GENETIC ENGINEERING

Recently, scientists have discovered ways to move a gene from one species to another. Genetic engineering is faster and more precise than traditional plant breeding.



A gene from a bacterium called Bt produces a chemical that is toxic to the fruit and shoot borer, an insect pest of eggplant. When scientists take the Bt gene and add it to the eggplant, the genetically modified plant resists the insect pest. If farmers use this GM seed, they can reduce the amount of insecticides they have to spray on eggplants.

Source URL: <https://www.usbg.gov/plant-breeding>