

# [Plant breeding](https://assignbuster.com/plant-breeding/)

Mankind has selectively bred plants for thousands of years with the   
aim of improving their quality. Experimenting with cereal crops, breeders   
have aimed to enhance their yield of grain, the quality of their flour, and   
their resistance to disease and drought. With other plants, breeders have   
tried to improve the perfume and color of the flowers.

Improvement of plants, particularly food crops, is obviously important   
and genetics has contributed to a better understanding of the benefits and   
disadvantages of particular breeding programs. Many cereal crops such as   
corn are now planted largely as hybrid seed, produced by outbreeding   
between different inbred varieties. The vigour of the hybrid plant is   
probably a major contribution to the increased corn output in the United   
States. This increased output represents a major achievement for applied   
genetics. In 1929 practically no hybrid corn was grown among the 100   
million acres of corn in the United States. But by 1970 the vast   
majority of 67 million acres was planted with the hybrid variety, yielding   
twice as much corn.

Plant breeders have a definite advantage over animal breeders, because   
they can often produce fertile varieties - indeed, new species - by   
crossbreeding between species. This is because hybrids are often polypoid.

Polyploidy, as we know, can occur naturally in the wild. Some species of   
cotton that we grow are polypodies that probably arose originally by   
accidental crosses between different species of cotton.

But breeders do not have to rely on accidents. They can attempt to   
produce fertile polypodies by crossbreeding between different species. One   
early attempt to produce another hybrid species was made in 1927 by the   
Russian geneticist G. D. Karpechenko, who crossbred two quite distantly   
related species, a radish and a cabbage. Each species has eighteen   
chromosomes (nine pairs); the hybrids had the same number (nine radish   
chromosomes and nine cabbage chromosomes) and were sterile. However, some   
polyploids arose by chance. These had thirty six chromosomes (nine pairs   
of radish, and nine pairs of cabbage), and were fertile. Unfortunately,   
the hybrid was not commercially successful because as luck would have it,   
the plant had the leaves of a radish and the roots of a cabbage!   
Breeders can artificially encourage polyploidy by treating the hybrids   
that result from crossbreeding between species with a chemical called   
colchicine obtained from autumn crocuses. This chemical allows the   
chromosomes to reproduce, but prevents the formation of two separate cells.

The number of chromosomes in the nucleus is therefore doubled. Several of   
these new polyploid varieties promise to be very useful. For example, a   
new hybrid cereal, called triticale, produced by crossbreeding rye with   
species of wheat, adds rye's resistance to cold winters to the usual   
properties of wheat.

Recent breeding programs have led to highly inbred wheats. Much of the   
genetic variability, that accumulated over nine thousand years of wheat   
cultivation, is missing from present day varieties. If a new disease   
should arise, or if the climate were to change suddenly, much of the wheat   
might be damaged and lost. So it is a good idea to introduce other genes   
into wheat by outbreeding. One way of doing this is to crossbreed the   
inbred varieties with their wild relatives, which may be resistant to   
viruses, insects, or drought. For this reason, some wheat breeders believe   
it is essential to conserve some stocks of primitive wheat in seed banks,   
from which they will be able to take a transfusion of genes, if and when   
the need arises.

Varieties of the same species of the cabbage family have been   
selectively cultivated for their differing features of taste and   
appearance. Some varieties became hard headed, like a modern cabbage, some   
made masses of flower buds, as in cauliflower and broccoli, and some made   
clusters of leaf buds, as in Brussels sprouts.