

# [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.