

Editorial

The goals of plant breeding are to produce crop varieties that boast unique and superior traits for a variety of agricultural applications

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EDITORIAL NOTE

Plant breeding is the science of changing the traits of plants in order to produce desired characteristics. It has been used to improve the quality of nutrition in products for humans and animals. The goals of plant breeding are to produce crop varieties that boast unique and superior traits for a variety of agricultural applications. The most frequently addressed traits are those related to biotic and abiotic stress tolerance, grain or biomass yield, end-use quality characteristics such as taste or the concentrations of specific biological molecules (proteins, sugars, lipids, vitamins, fibers) and ease of processing (harvesting, milling, baking, malting, blending, etc.). Plant breeding can be accomplished through many different techniques ranging from simply selecting plants with desirable characteristics for propagation, to methods that make use of knowledge of genetics and chromosomes, to more complex molecular techniques (see cultigen and cultivar) [1].

Genes in a plant are what determine what type of qualitative or quantitative traits it will have. Plant breeders strive to create a specific outcome of plants and potentially new plant varieties. It is practiced worldwide by individuals such as gardeners and farmers, and by professional plant breeders employed by organizations such as government institutions, universities, crop-specific industry associations or research centers.

International development agencies believe that breeding new crops is important for ensuring food security by developing new varieties that are higher yielding, disease resistant, drought tolerant or regionally adapted to different environments and growing conditions. started with sedentary agriculture and particularly the domestication of the first agricultural plants, a practice which is estimated to date back 9,000 to 11,000 years [2].

Initially early farmers simply selected food plants with particular desirable characteristics, and employed these as progenitors for subsequent generations, resulting in an accumulation of valuable traits over time. Grafting technology had been practiced in China before 2000 BCE. By 500 BCE grafting was well established and practiced. Gregor Mendel is considered the "father of genetics". His experiments with plant hybridization led to his establishing laws of inheritance. Genetics stimulated research to improve crop production through plant breeding. Modern plant breeding is applied genetics, but its scientific basis is broader, covering molecular biology, cytology, systematics, physiology, pathology, entomology, chemistry, and statistics (biometrics) [3].

It has also developed its own technology. One major technique of plant breeding is selection, the process of selectively propagating plants with desirable characteristics and eliminating or "culling" those with less desirable characteristics. Another technique is the deliberate interbreeding (crossing) of closely or distantly related individuals to produce new crop varieties or lines with desirable properties. Plants are crossbred to introduce traits/genes from one variety or line into a new genetic background.

For example, a mildew-resistant pea may be crossed with a high-yielding but susceptible pea, the goal of the cross being to introduce mildew resistance without losing the high-yield characteristics. Progeny from the cross would then be crossed with the high-yielding parent to ensure that the progeny were most like the high-yielding parent, (backcrossing) [4]. The progeny from that cross would then be tested for yield (selection, as described above) and mildew resistance and high-yielding resistant plants would be further developed. Plants may also be crossed with themselves to produce inbred varieties for breeding.

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