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Plant breeding techniques towards genetic diversity

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DESCRIPTION

Plant breeding is the science of altering the traits of plants in order to yield desired characteristics. It has been used to develop the quality of nutrition in goods for humans and animals. The objectives of plant breeding are to yield crop varieties that brag unique and superior traits for a variety of agricultural uses. The most often addressed traits are those correlated to biotic and abiotic stress tolerance, grain or biomass yield, end-use quality characteristics such as taste or the concentrations of definite biological molecules (proteins, sugars, lipids, vitamins, fibres) and ease of processing (harvesting, milling, baking, malting, blending, etc.). Plant breeding can be performed through many different techniques ranging from simply selecting plants with necessary characteristics for propagation, to methods that make usage of knowledge of genetics and chromosomes, to more complex molecular techniques. Genes in a plant determine what type of qualitative or quantitative traits it will have. Plant breeders struggle to create a specific outcome of plants and possibly new plant varieties, and in the course of doing so, narrow down the genetic diversity of that variety to a specific few biotypes. It is practiced worldwide by individuals such as gardeners and farmers, and by expert plant breeders employed by organizations such as government institutions, universities, crop- specific industry associations or research centres. International development agencies believe that breeding new crops are vital 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.

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 allied individuals to produce new crop varieties or lines with desirable properties. Plants are crossbred to introduce traits/genes from one variability 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). 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. Pollinators may be omitted through the use of pollination bags.

Classical breeding relies largely on homologous recombination between chromosomes to generate genetic diversity. The classical plant breeder may also make use of a number of in vitro technique such as protoplast fusion, embryo rescue or mutagenesis to generate diversity and produce hybrid plants that would not exist in nature.Modern plant breeding may run-through techniques of molecular biology to select, or in the case of genetic modification, to insert, desirable traits into plants. Use of biotechnology or molecular biology is also known as molecular breeding. Sometimes many different genes can influence a desirable trait in plant breeding. The usage of tools such as molecular markers or DNA fingerprinting can plot thousands of genes. This permits plant breeders to screen large populations of plants for those that hold the trait of interest.

The screening is based on the presence or absence of a certain gene as dogged by laboratory procedures, rather than on the visual identification of the expressed trait in the plant. The purpose of marker assisted selection, or plant genome analysis, is to recognize the location and function (phenotype) of various genes within the genome. If all of the genes are identified it hints to genome sequence. All plants have varying sizes and lengths of genomes with genes that code for different proteins, but many are also the similar. If a gene's location and function is identified in one plant species, a very analogous gene likely can also be found in a similar location in another related species genome.

CONCLUSION

Local agricultural systems and genetic diversity are advanced and supported by crop improvement, which participatory crop improvement (PCI) plays a large role. PPB is improved by farmer's knowledge of the quality required and assessment of target environment which affects the effectiveness of PPB. Plant tissue culturing can produce haploid or double haploid plant lines and generations. This decreases the genetic diversity taken from that plant species in order to select for desirable traits that will increase the skill of the individuals. Using this method decreases the necessity for breeding multiple generations of plants to get a generation that is similar for the desired traits, thereby saving much time over the natural variety of the same process homozygous for the preferred traits. Furthermore, two different homozygous plants created in that way can be cast-off to produce a generation of F1 hybrid plants which have the benefits of heterozygosis and a greater range of possible traits. Thus, an individual heterozygous plant chosen for its desirable characteristics can be transformed into a heterozygous variety (F1 hybrid) without the necessity of vegetative reproduction but as the result of the cross of two homozygous/doubled haploid lines derived from the originally selected plant.