Variety Testing Definitions

For definitions and details about **crop genetic purity tests** that are commercially available, please visit: http://qgene.elexa.nl/Types%20of%20tests.htm

Zygosity is the degree of similarity of the alleles for a trait in an organism.

Most eukaryotes have two matching sets of chromosomes; that is, they are diploid. Diploid organisms have the same loci on each of their two sets of homologous chromosomes, except that the sequences at these loci may differ between the two chromosomes in a matching pair and that a few chromosomes may be mismatched as part of a chromosomal sex-determination system. If both alleles of a diploid organism are the same, the organism is homozygousat that locus. If they are different, the organism is heterozygous at that locus. If one allele is missing, it is hemizygous, and, if both alleles are missing, it is hemizygous, and, if both alleles are missing, it is nullizygous.

The DNA sequence of a gene often varies from one individual to another. Those variations are called alleles. While some genes have only one allele because there is low variation, others have only one allele because only that allele can function properly. Any variation from the DNA sequence of that allele will be fatal in the embryo, and the organism will never survive to be born. But most genes have two or more alleles. The frequency of different alleles varies throughout the population. Some genes may have two alleles with equal distribution. For other genes, one allele may be common, and another allele may be rare. Sometimes, one allele is a disease-causing variation while the other allele is healthy. Sometimes, the different variations in the alleles make no difference at all in the function of the organism.

In diploid organisms, one allele is inherited from the male parent and one from the female parent. Zygosity is a description of whether those two alleles have identical or different DNA sequences. In some cases the term “zygosity” is used in the context of a single chromosome.[1]

Types

The words homozygous, heterozygous, and hemizygous are used to describe the genotype of a diploid organism at a single locus on the DNA. *Homozygous* describes a genotype consisting of two identical alleles at a given locus, *heterozygous* describes a genotype consisting of two different alleles at a locus, *hemizygous* describes a genotype consisting of only a single copy of a particular gene in an otherwise diploid organism, and *nullizygous* refers to an otherwise-diploid organism in which both copies of the gene are missing.

Homozygous

A cell is said to be homozygous for a particular gene when identical alleles of the gene are present on both homologous chromosomes.[2] The cell or organism in question is called a *homozygote*. True breeding organisms are always homozygous for the traits that are to be held constant.

An individual that is *homozygous-dominant* for a particular trait carries two copies of the allele that codes for the dominant trait. This allele, often called the “dominant allele”, is normally represented by a capital letter (such as “P” for the dominant allele producing purple flowers in pea plants). When an organism is homozygous-dominant for a particular trait, the genotype is represented by a doubling of the symbol for that trait, such as “PP”.

An individual that is *homozygous-recessive* for a particular trait carries two copies of the allele that codes for the recessive trait. This allele, often called the "recessive allele", is usually represented by the lowercase form of the letter used for the corresponding dominant trait (such as, with reference to the example above, "p" for the recessive allele producing white flowers in pea plants). The genotype of an organism that is homozygous-recessive for a particular trait is represented by a doubling of the appropriate letter, such as "pp".

Heterozygous

A diploid organism is heterozygous at a gene locus when its cells contain two different alleles of a gene.[3] Heterozygous genotypes are represented by a capital letter (representing the dominant allele) and a lowercase letter (representing the recessive allele), such as "Rr" or "Ss". The capital letter is usually written first.

If the trait in question is determined by simple (complete) dominance, a heterozygote will express only the trait coded by the dominant allele, and the trait coded by the recessive allele will not be present. In more complex dominance schemes the results of heterozygosity can be more complex.

What is the difference between homozygous and heterozygous?

Humans contain two copies of each gene, one from the father and one from the mother, which sometimes are referred to as the alleles of a gene. If a mutation occurs in just one copy of the gene, then that individual is considered heterozygous. On the other hand, if both copies of a gene are mutated then that individual is homozygous genotype.

Majority of hereditary disorders are harmful if both copies or alleles of a gene are affected, which means protein products from both genes may fail to operate properly. In such cases immediate medical attention is needed so the function of a defected protein can be restored through medication. In heterozygous genotypes one copy of the gene is healthy and can produce fine proteins thus these individuals are usually not affected and are considered just carriers. However, in a few hereditary disorders heterozygous individuals may suffer from a milder version of the disease.

Homozygous vs Heterozygous

If we assign a letter such as B to a dominant genetic or hereditary trait then b will be a defective allele. So, if homozygous genotypes are represented by **BB** (normal) and **bb** (affected) and heterozygous genotypes are represented by **Bb** (carrier genotype).Below are examples and probabilities of children born to parents with different genotypes:

Parents	BB x BB	**Two healthy parents**
Children	100% BB	All children will be normal
Parents	BB x Bb	**One healthy and one carrier parent**
Children	50% BB, 50% Bb	Children could be half normal and half carrier
Parents	Bb x Bb	**Two carrier parents**
Children	25% BB, 50% Bb, 25% bb	25% of children could be normal, half carrier, and another 25% could be affected (mutant)
Parents	BB x bb	**One healthy and one affected parent**
Children	100% Bb	All children will be carriers
Parents	bb x bb	**Two affected parents**
Children	100% bb	All children will be affected mutants