

RESEARCH GLOSSARY





Genetics is the science of heredity and variation. Genomics is a discipline of genetics that encompasses gene mapping, gene sequencing and determining gene function. Genotyping is the application of genomic information to develop new traits and products.

In 1997, NCGA spearheaded the National Plant Genome Initiative (NPGI), which sequenced the corn genome and other plant genomes. The draft of the corn genome sequence was completed in 2008. The next phase of the project is to apply genomic knowledge to improve plant performance in the field. Scientists are using genotyping as an important tool to develop new products and traits.

GENERAL TERMS

Amino acids – a group of 20 naturally occurring molecules that are combined to make proteins

Biotechnology – the scientific and industrial use of living organisms

Carbohydrates – molecules that are made up of sugars

Cellulose – a fibrous, complex **carbohydrate** (sugar) that is the main ingredient in cell walls

Cytoplasm – the mixture of water, proteins, fats, sugars and salts found outside the nucleus of a cell

DNA – the four primary **nucleotides** (A, T, C, G) that with sugar are the primary components of the double helix

Intellectual property – all patent applications, patents or trade secrets that make up proprietary information

mRNA – a single stranded **RNA** molecule

Nucleus – a membrane bound compartment found in cells that contains most of the cell's genetic information

Oligonucleotide – a short string of **nucleotides**

Polymerase Chain Reaction (PCR) – a process that reproduces a specific stretch of **DNA**, going from very few copies to millions of **DNA** copies

Proteomics – the study of protein function and structure

RNA – ribonucleic acid

GENETICS

Allele – an alternate form of a **gene**

Base – a single **nucleotide**

Base pair – the bonded structure between two complementary **nucleotides** (A-T) or (C-G)

Chromosome – a complex **DNA** chain that contains genetic information

DNA base pair – the bonded structure between two complementary **nucleotides** (A-T) or (C-G) on different **DNA** strands

Dominant gene – a **gene** whose **phenotype** is expressed when it is present in only one copy

Gene – the unit of inheritance consisting of a **DNA** sequence

Nucleic acids – **DNA** or **RNA** molecules composed of **nucleotides**

Nucleotides – the basic structure of **DNA** and **RNA** consisting of a **nucleotide**, phosphoric acid and a sugar

Phenotype – the observable characteristics of an individual

Polymorphism – differences between **DNA** sequences

Recessive gene – a **gene** whose **phenotype** only is expressed when it is present in two copies

Single nucleotide polymorphism (SNP) – a single **base** change in a **DNA** sequence, such as a change in the **nucleotide** sequence GGCA to GGTA

GENOMICS

Bioinformatics – use of computer programs for searching and analyzing electronic databases of **DNA** and protein sequences.

DNA chip – spots of **DNA** arranged on a glass or silicon chip used for **nucleic acid assays**

DNA sequencing – determining the order of **DNA** bases

Functional genomics – determining the function of **gene** products

Genetic map – map giving relative distance and position of one **gene** with respect to other **genes**

Genetic polymorphism – differences between **DNA** sequences

Genome – the collection of all **genes** for an organism

Genomics – study of the genetic make-up of an organism, including **DNA sequencing**, mapping and determining function

Mutation – an alteration in **DNA** structure or sequence

GENOTYPING

Assay – a test for determining presence or absence, sequence, or composition of **DNA**, proteins or other cellular components

DNA marker- A **DNA** sequence that exists in two or more forms that can be used to **genotype** individuals

DNA profiling – The term used to describe different methods for the analysis of **DNA** to establish the **genotype** or identity of an individual

Genotype – the genetic composition of an individual

High-throughput screening – the use of robotics to run thousands of **assays** in a short time

Marker assisted breeding – plant breeding assisted by using **DNA markers**

Molecular breeding – plant breeding assisted by using **DNA markers** or protein markers

GENETIC ENGINEERING

Agrobacterium – *Agrobacterium tumefaciens*, bacterial species used for plant **transformation**

Artificial chromosome – synthetic **DNA** used to insert a **transgene(s)** into a plant cell. Artificial chromosomes are not incorporated into the plant **genome**

Biolistics – The process of introducing **DNA** into plants cells by shooting DNA-coated pellets into the cell

Genetic engineering – altering the genetic structure of an organism by adding foreign **genes** or altering or removing native **genes** through technology

Plasmid – a heritable piece of **DNA** that is not part of a **chromosome**

Transformation – the change in the genetic structure of an organism by the incorporation of new **DNA**

Transgene – modified native **gene** or **gene** from another species that is inserted into plants

Transgenics – the alteration of plant **DNA** that contains a gene from another organism

Vector – a **plasmid** used for carrying cloned **DNA**

Sources

1. A Guide to the Biopharmaceutical Lexicon 2011 Edition, Waters Corporation
2. www.biotechnology4u.com



NATIONAL
CORN GROWERS
ASSOCIATION

www.ncga.com