# Advanced Plant Technology Program Vocabulary

Below you'll find a list of words (and their simplified definitions) that our researchers use on a daily basis.

## A

**Abiotic stress** (noun): Stress brought on by a non-living source. Drought, excess salt, and cold are all examples of abiotic stressors.

**Agroecology** (noun): The study of the ecology within a field of crops.

**Agroecosystem** (noun): The ecosystem within a field of crops.

**Allele** (noun): One of two or more different versions of a gene. For example, a gene may control petal color in roses, but the different types of the gene produce different colors. "*Chocolate, vanilla, and strawberry are all ice-cream, but they're all different versions of ice-cream"*

**Amino acid** (noun): The building blocks of proteins. There are 20 common amino acids.

## B

**Biodiversity** (noun): The diversity of living organisms in an environment.

**Bioinformatics** (noun): The science of developing methods and computer software to understand biological data. The software is used to analyze and interpret the data. "*We can create a program that correlates the number of flowers produced to the amount of available nutrients in the soil."*

**Biotic stress** (noun): Stress brought on by living sources. Insects, herbivores, and bacteria are all examples of biotic stressors.

## C

**Cell** (noun): The smallest unit of a living organism. Usually microscopic.

**Chromosome** (noun): A strand of DNA that contains genes. "*Humans have a total of 46 chromosomes, 23 donated from each parent."*

**Congeneric** (adjective): Belonging to the same genus.

**Cultivar** (noun): A combination of the words "cultivated variety". A cultivar is a plant that has been specifically bred by humans. *"The 'Honeycrisp' apple is a cultivar developed by the Horticultural Research Center at the University of Minnesota."*

## D

**Deoxyribonucleic Acid (DNA)** (noun): The molecule that codes for most of the genetic instructions used to build an organism. DNA is formed by two strands twisted into a double helix shape.

**Domestication** (noun): Process by which humans breed select organisms for desired traits. *"Modern corn is domesticated from the wild grass Teosinte."*

## E

**Ecology** (noun): The study of how organisms relate to each other and their physical environment.

**Exon** (noun): A portion of DNA or RNA the codes for a protein. (opposite of **intron**)

## F

**F1 generation** (noun): The "F" stands for "**filial**". The F1 generation or F1 hybrids are the first generation descendants of a specific cross. *"The seeds that developed by crossing plant A and plant B are the F1 generation."*

## G

**Gene** (noun): A section of the genetic code that determines a trait. Many sections of DNA do not determine a trait and are called "junk DNA".

**Genetics** (noun): The study of genes and their effects on individuals.

**Genome** (noun): All of the genetic material an organism possesses.

**Genome-wide association study (GWAS)** (noun): An examination of the genetic variation between individuals (see **SNP**s) to see if the variation is associated with a trait.

**Genomics** (noun) The study of all the genetic material an organism posses. A broader study compared to genetics since junk DNA and other forms of DNA are analyzed as well.

**Genotype** (noun): The set of alleles (alternate forms of genes) that make up an organism. *"Steve's genotype shows that he has one allele for brown eyes one allele for blue eyes. Steve's phenotype, however, only shows brown eyes."*

**Germplasm** (noun): A collection of genetic resources (live specimens, seeds, cuttings, sperm, or egg cells, pollen, etc.) maintained for the purpose of preserving genes. Germplasm collections are also used in breeding programs. *"The Svalbard Global Seed Vault is one of the largest germplasms in the world with about 400,000 seed samples"*

## H

**Herbaceous** (adjective): A non-woody plant.

## I

**Intron** (noun): A portion of DNA or RNA the doesn't code for anything. (opposite of **exon**)

## K

**Karyotype** (noun): A picture of an organisms chromosomes, where the chromosomes have been grouped, arranged and numbered by size and shape.

## L

**Landrace** (noun): An already cultivated or domesticated plant or animal species that has developed further by adapting to a specific geographic location. The word "race" in landrace refers to taxonomic race. For example, if a group of domestic horses escape and adapt to life in the wild, over time their population could develop into a landrace.

**Locus**, plural **loci** (noun): A specific place on a chromosome.

## M

**Marker (genetic marker)** (noun): A DNA sequence found at a known location on a chromosome.

**Marker assisted breeding** or **selection (MAB** or **MAS)** (noun): Process by which certain specimens are selected based on the presence or absence of a genetic marker in their DNA. MAS is used often in plant breeding programs to select plants that have genes for traits of interest.

## N

**Nucleotide** (noun): The building blocks of DNA. Each nucleotide is composed of a sugar, a phosphate, and 1 of 4 nitrogenous bases. The 4 bases are: adenine (A), thymine (T), guanine (G), and cytosine (C). In a strand of DNA, the order of nucleotides is referred to as the **DNA sequence**.

## O

**Ortholog** (noun): An ortholog is a gene that is similar in different species because the species evolved from a common ancestor.

## P

**Pathogen** (noun): Agents that cause disease. Pathogens can be (but are not limited to) viruses, bacteria, fungi, or parasites.

**Phenotype** (noun): The physical traits of an individual. *"Steve has brown eyes and Tracy has blue eyes. Steve's phenotype for eye color is brown while Tracy's phenotype for eye color is blue."*

**Photosynthesis** (noun): The process by which plants convert sunlight into sugar for food.

**Phylogenetics** (noun): The study of evolutionary relationships between groups of organisms using DNA sequencing data for comparison.

**Phylogeography** (noun): The study of the processes that may be responsible for today's geographic distribution of individuals.

**Polymorphism** (noun): "Poly-" = many , "-morphism" = shape. A polymorphism is the different shape or form of something. Human ears, for example, have many different shapes. Ears are polymorphic from person to person.

**Precision agriculture** (noun): The use of satellite, GPS, weather data, soil data, etc. to make accurate decisions about planting, fertilizing, and harvesting.

**Protein** (noun): Large molecules made up of long strings of amino acids called polypeptide chains. **Amino acids** join together to form **peptides**. Peptides join to form **polypeptides**. Polypeptides join to form proteins.

## Q

**Qualitative** (adjective): Describes attributes that can be observed, but not measured on a numerical scale. Examples include gender, religious preference, and emotional state. "It has a certain *quality* to it."

**Quantitative** (adjective): Describes attributes that can be measured on a numerical scale. Examples include height, weight, and speed. "It can be *quantified* or counted."

**Quantitative Trait** (noun): A trait that can be quantified that varies widely in a population. For example, height is a trait that 1) can be measured numerically and 2) varies widely from person to person. "*Jonathan is 71 inches tall while Stephanie is 61 inches tall*"

**Quantitative Trait Loci (QTL)** (noun): A QTL is a region of a chromosome that contains genes which control quantitative traits. Researchers use **QTL analysis** to locate theses genes.

## R

**Ribonucleic Acid (RNA)** (noun): Unlike DNA, RNA is only a single strand. RNA transfers information from DNA to the part of a cell that creates proteins.

## S

**Single-nucleotide Polymorphism (SNP)** (noun): SNP is pronounced “snip”. A SNP is a place in a DNA sequence where individuals of the same species differ only in 1 base pair.
For example, the two sequences below are the same except for the SNP where adenine (A) has been replaced by thymine (T).
Spencer’s DNA sequence reads ATG**A**GCTAC
Jennifer’s DNA sequence reads ATG**T**GCTAC

**Symbiosis** (noun): A relationship between two organisms that is mutually beneficial to both. *“You scratch my back and I’ll scratch yours.”*

## T

**Transgenic** (noun): An organism is considered transgenic if it contains genes from an unrelated species that were introduced by artificial means.

## U

## V

**Vector** (noun): A DNA molecule used to insert foreign genes into a cell.

## W

**Weed** (noun): Any plant growing where it is not wanted. *“A beautiful hybrid tea rose is a weed if it’s growing in the middle of your corn field.”*

## X

## Y

## Z