

BREEDING

Charles Darwin expressed the view: “It's not the strongest species that survive, nor the most intelligent, but the most responsive to change”. Two further phrases originate from Darwin's theory of evolution.

1. The Survival of the Fittest. The means of natural selection.
2. The Survival of the Species. The importance for the evolution that species survive.

The world of the living is under the influence and control of two very powerful forces. One of the two is the natural desire to multiply (survival of the species), and is based on In-Breeding or Line Breeding.

Simple organic forms, more often than not, multiply by division. Cells divide, normally into two identical cells. Occasionally, an individual new cell, responsive to change, will evolve and differ indistinctly from other previous cells in order to survive. Life forms of today evolved over a period of tens of millions of years from the primitive forms of yesterday.

Plants:

Since the beginning of the civilization, humans practiced plant breeding and our knowledge improved considerably over the years. To produce the desired characteristics, in the past, plants with the required desirable characteristics were selected for the breeding program.

Today plant breeding is a sophisticated initiative. The aim to change the traits of plants can only be achieved by highly sophisticated, complex methods in labs, and with the use of genetics, chromosomes, etc. We can create almost anything, including dangerous to our health “monsters”. I don't support the creation of genetically modified plants, especially genetically modified food crops.

Flowers:

Flowers are the seed-bearing part of a plant and consist of the reproductive organs, Stamens (male) and/or Carpels (female). The reproductive organs are surrounded by petals and sepals and the biological function of the flower is to attract cross pollinators and influence the reproduction. After fertilization, the flower's ovary will develop into a seed containing fruit or seedpod.

Types of flowers.

Type A: Bisexual: Stamen and Carpel exist in the same flower.

Type B: Unisexual: A flower is either “Male” (has only Carpel) or “Female” (has only Stamen). Two options: **Option 1:** ALL flowers of a plant are either “Male” or “Female”. For example: Catasetum and Pistachio Nuts. **Option 2:** Some flowers of a plant are “Male”, and some are “Female”. The two types of flowers co-exist. For example: Pumpkin

Type C: Sex-Switching: Plants with flowers that change during the day are also common. The sex of the flowers switches from “Male to Female” or “Female to Male” at different times of the day. For example: Avocado.

Type D: A-sexual (Sterile).

Homozygous and Heterozygous.

A plant with two copies of the same “allele”, (AA or aa), is homozygous for that trait.

A plant that has a copy of two different “alleles”, (Aa), is heterozygous.

Homozygous plants with desirable traits can be produced from heterozygous starting plants, if a haploid cell, with the alleles for those desirable traits can be produced and then used to make a doubled haploid. Subsequently, the doubled haploid will be homozygous for the desired traits.

Hybrid.

The word “hybrid” refers to crosses between two different species. There is no useful term that distinguishes different types of hybridization, such as crosses between species. Unofficially, the term “Primary Hybrid” is used by agriculturalists for crosses between two species of the same genus, and the term “Inter-Generic Hybrid” is used for crosses between plants of different genera.

In-Breeding or Line Breeding.

Inbreeding is the deliberate mating of two parents who are related to each other

1. Self-pollination or Selfing: Some species or hybrids are self-pollinating. For example: Phaius
2. Cross pollination: Both parents derive from flowers of the same plant.
3. Cross breeding: Parents come from flowers of the same species/hybrids that originate from different plants.

Plants have two copies of any given gene, one representing the “Male” and the other the “Female”. When the two are related, the two genes in the new life form, are identical copies contributed by the common ancestor. The higher the inbreeding coefficient is the more likely this is to happen. In nature, it occurs naturally in the form of self-pollination.

Line breeding almost equals inbreeding. It refers to a mating within a specific breed in which a certain number of genetic lines are available.

There is no clear distinction between the two terms and there is no formal definition to separate the two. Linebreeding can reduce the genetic diversity of a population and problems associated with the small gene pool may appear i.e. increase in genetic disorders, sterility, etc. Because the number of foundation ancestors is limited, all species trace back to one of very few ancestors and all pure breeding is inbreeding. Note: The term “Inbreeding” isn’t used when referring to matings where common ancestors do not occur within five-generations.

Out-Breeding or Out-Crossing: Flowers may facilitate outcrossing (fusion of sperm and eggs from different individuals in a population)

1. **Out-Breeding – Hybrids:** Parents originate from different species or hybrids.
2. **Out-breeding – Primary Hybrids:** Parents originate from different species but from the same genus.
3. **Out-breeding – Intergeneric Hybrids:** Parents originate from species and/or hybrid of different genera.

Outbreeding or Outcrossing is a term used when two unrelated individuals are crossed to produce progeny. It is exactly the opposite of “In-Breeding or Line Breeding”. In outcrossing, it is obvious that all individuals are distantly related to a common ancient progenitor and if an existing trait carries throughout a population, than all individuals can have that trait.

Cross Breeding: The intention of crossbreeding is to create offspring that share the traits of the lineages of both parents. In plant breeding terminology, the term crossbreed or Crossbred is uncommon as it refers to an organism with purebred parents of two different breeds, varieties, or populations. Imprudent crossbreeding can produce life forms of inferior quality and can dilute a gene pool to the point of extinction.

PS: All expressed views are the views of the author. You don't have to agree with everything.