***Lect 4 gene frequency***

***A gene is a locus (or region) of DNA which is made up of nucleotides and is the molecular unit of heredity, genes can acquire mutations in their sequence, leading to different variants, known as alleles.***

***Allele is the variant form of a given*** [***gene***](https://en.wikipedia.org/wiki/Gene)***. the word "allele" It derives from the Greek prefix meaning "reciprocal" or "each other", a word coined by*** [***William Bateson***](https://en.wikipedia.org/wiki/William_Bateson)***, which was used in the early days of*** [***genetics***](https://en.wikipedia.org/wiki/Genetics) ***to describe variant forms of a*** [***gene***](https://en.wikipedia.org/wiki/Gene) ***detected as different*** [***phenotypes***](https://en.wikipedia.org/wiki/Phenotypes)***. Sometimes, different alleles can result in different observable*** [***phenotypic traits***](https://en.wikipedia.org/wiki/Phenotypic_trait)***, such as different*** [***pigmentation***](https://en.wikipedia.org/wiki/Pigmentation)***. the different combinations of alleles are known as genotypes, and the observable traits that result from these varying combinations of alleles are known as phenotypes.***

***In nature, some alleles are beneficial and others are not. Or an allele may become less beneficial to a population over time. Beneficial alleles tend to stay in populations, as individuals with those alleles are more likely to mate and pass them on.***

***A population is a group of sexually interbreeding individuals .***

***Allele frequency , or gene frequency is the relative frequency of an*** [***allele***](https://en.wikipedia.org/wiki/Allele) ***at a particular*** [***locus***](https://en.wikipedia.org/wiki/Locus_(genetics)) ***in a*** [***population***](https://en.wikipedia.org/wiki/Population)***, expressed as a fraction or percentage. Specifically, it is the fraction of all chromosomes in the population that carry that allele.***

***Gene frequency in a population may be changed by one of two primary types of processes – systematic or dispersive.***

***A systematic process causes a change in gene frequency that is predictable in both direction and amount.***

***A dispersive process, associated with small populations, is predictable only in amount, not direction. listed the systematic processes as***

***Selection , migration, and mutation.***

***Selection***

***Selection is the most important process for altering population gene frequencies by plant breeders***

***For selection to succeed there must be:***

***1-Phenotypic variation for the trait to allow differences between genotypes to be observed..***

***2 -The phenotypic variation must at least be partly genetic .***

***Its effect is to change the mean value of the progeny population from that of the parental population.***

***Migration***

***Migration is important in small populations. It entails the entry of individuals into an existing population from outside.***

***Because plants are sedentary, migration, when it occurs naturally, is via pollen transfer (gamete migration) migration increases variation of a population . Varia can be expanded in a breeding program through introductions (impact of germplasm) migration also minimizes the effects of inbreeding.***

***Mutation***

***Natural mutations are generally rare. A unique mutation (non-recurrent mutation) would have little impact on gene frequencies.***

***mutations are generally recessive in gene action, but the dominant condition may also be observed.***

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