E-Study material
For 3rd Semester Botany Honours (CBCS)
Course Code: BC307T
Core Course VII: Genetics
Unit 1: Mendelian genetics and its extension
Topic: Incomplete dominance and Co-dominance

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Gene interaction and its types:

Bateson proposed **"Factor hypothesis"** according to which *"more than one gene may interact to produce the same character or may single gene may exert influence on the development of more than one hereditary character*" Though genes are inherited as units many interact in different patterns to produce the trait. This is called gene interaction or factor hypothesis. In other words Gene interaction is the modification of normal phenotypic expression of genes due to their alleles and non allelic genes. Gene interaction is a post mendelian discovery.

Gene interaction / modification of F_2 ratio:

Gene interaction / modification of F_2 ratio is the modification of the normal phenotypic expression of genes due to interaction of their alleles and non allelic genes thus, gene interaction is of two types viz. intragenic and intergenic.

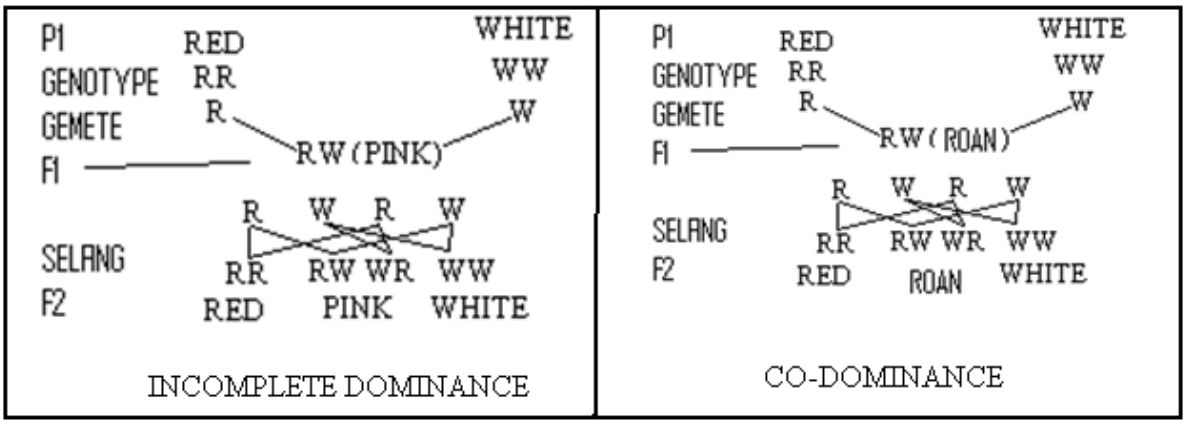
1. Intragenic or interallelic interaction:

In the intragenic or interallelic interaction, the two alleles of a gene which are present on the same gene locus on the two homologous chromosomes, react with each other in such a way that they produce an expression different from the normal dominant-recessive phenotype, e.g., incomplete dominance, codominance,

Incomplete dominance

Incomplete dominance is the phenomenon where dominant alleles do not completely express itself. So F_1 is intermediate between the expressions of

the two alleles in homozygous state. It was first reported in ***Mirabilis Jalapa* (40^{O} clock plant)** that when white flowered variety (WW) and red flowered variety (RR) were crossed, intermediate pink flowers (RW) appeared. Selfing of F_1, resulted in all three red (RR) pink flower (RW) and white (WW) in 1:2: 1 ratio. Besides *Mirabilis Jalapa* incomplete dominance is also observed in ***Antirrhinum majos* (Snap Dragon plant)**. The main objection to the Mendel's principle of genetics was incomplete dominance. This phenomenon of incomplete dominance was discovered by Correns.



Co-dominance

In co dominance, both the genes of an allelomorphic pair express themselves equally in F_1 hybrids. It is the phenomenon of two alleles lacking dominance-recessive relationship and both expressing themselves in the organism. For example when White coloured cattle (WW) are crossed with red coloured (RR) cattle F_1 exhibit Roan colour (RW) and in F_2 resulted in all three red (RR) roan (RW) and white (WW) in 1:2: 1 ratio.

Besides in Human A, B, O blood group, A and B shows co-dominance in AB blood group.