RAMA UNIVERSITY

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GPB 321, CROP IMPROVEMENT II (RABI CROPS)

Method of Plant Breeding in Self Pollinated Plants

Hybridization

Hybridization: Different type's steps involved selection procedure after hybridization. Pedigree method, def pedigree record, procedure, merits and demerits. Hybridization is one of the methods for developing new variety by crossing two lines or plants having unlike genetic constitution or it is the mating or crossing of two plants or lines of dissimilar genotype in order to combine desirable characters from both the parents. The chief objective of hybridization is to create genetic variation. When two plants having unlike genetic constitution are crossed, the genes from both the parents are brought together. Segregation and recombination produce many new gene combinations in F2 and the subsequent generation. The degree of variation produced by hybridization in the segregating generation depends upon the number of heterozygous genes in the F1, and this depends upon the number of gene for which two parents differ. The aim of hybridization may be transfer of one or few qualitative characters, the improvement in one or more quantitative character or the use of F1 as a hybrid variety.

These objectives are grouped into two classes.

1) Combination Breeding: The main aim of combination breeding is the transfer of one or more characters into a single variety, from other varieties. These characteristics may be governed by oligogenes or Polygenes.

2) Transgressive Breeding: Transgressive breeding aims at improving yield or its contributing character through transgressive segregation. Transgressive segregation is the production of plants in F2 generation that are superior to both the parents for one or more characters.

Types of Hybridization Based on the taxonomic relationship of the two parents, hybridization may be classified into two broad groups.

1) Intervarietal Hybridization: The parents involved in hybridization belong to the same species. In crop improvement programme this type of hybridization is commonly used Eg crossing of two varieties of wheat or other crops. The Intervarietal crosses may be simple or complex depending upon the number of parents involved.

a) Simple Cross: In simple cross, two parents are crossed to produce the F1. The F1 is self to produce F2 or is used in a back cross programme. E .g A X B F1 (AX B)

b) Complex Cross: More than two parents are crossed to produce the F1 hybrid, which is then used to produce F2 or used in back cross. The cross is also known as convergent cross, because it brings genes from several parents into a single hybrid. E.g A, B, C (Three Parents) A X B F1: (A X B) X C = Complex hybrid (AX B) X C Ex: Four Parents (A, B, C, D) A X B C X D Complex hybrid (A X B) X (C X D) Ex. Eight parent (A, B, C, D, E, F, G, H) A X B C X D E X F G X H F1: (A X B) X (C X D) X (E X F) X (G X H)

Complex hybrid < (AX B) X (C X D)> X <(E X F) X (G X H)>

2) Distant Hybridization: The parents involved belong to the different species of the same genus or of different genera. When two different species of the same genes are crossed known as inter specific hybridization.

Ex. Sugarcane varieties have been developed by crossing Saccharum oficinarum X Saccharum barberi, while in cotton *G. arboreum* X *G. hirsutum*. When two different species belongs to different genera known as Intergeneric hybridization. Ex. Triticale is developed by crossing Triticum aestivum X secale cereal (Rye). Generally the objectives of such crosses are to transfer one or few characters, like disease resistance.

Steps Involved in Hybridization

The process of hybridization involved following steps:

i) Choice of the Parents
ii) Evaluation of the parents
iii) Selfing of parents
iv) Emasculation
v) Bagging
vi) Tagging
vii) Pollination
viii) Harvesting
ix) Threshing, drying and storage etc.