

VARIATION, THE BASIS OF PLANT BREEDING

Plants differ in many ways. It may be safely generalized that no two plants are exactly alike, even though we may limit our observations to a single species like corn. Upon casual examination we may be impressed with the similarity of the plants within a field of hybrid corn. However, if we should compare adjacent plants of hybrid corn in minute detail and make precise measurements of the separate plant parts, we would find that individual plants differ in many respects.

Variations among plants of a particular crop species are of two kinds:

- variations due to *environment*, and
- variations due to *heredity*.

ENVIRONMENTAL VARIATIONS are variations in the size, shape, color, composition, or development among plants responding to different intensities of an environmental stress. Environmental variations may be observed by comparing plants in a genetically uniform population. This type of variation is not heritable and it has no significance in terms of selection for next generation. i.e plants showing stunted growth when they are under the shade of some tree or plants on the border of field showing high vigor as compared to more competitive plants in the field.

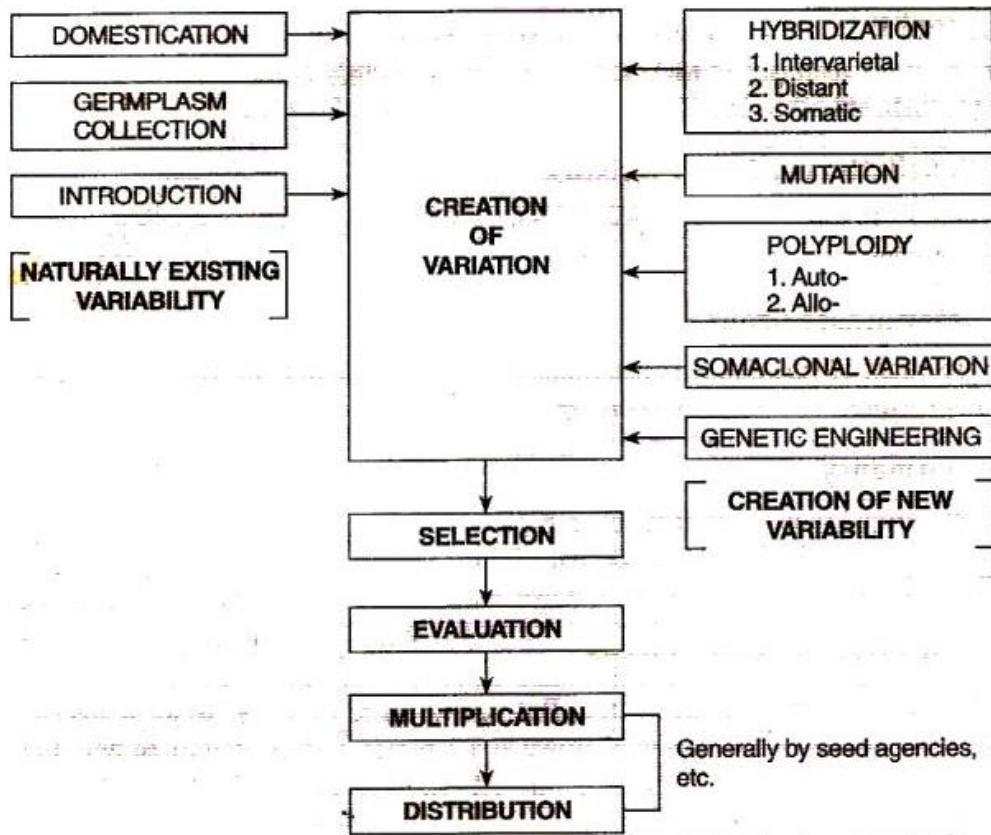
HEREDITARY VARIATIONS are variations that result from heritable causes and are transmitted to the next generation (progeny). Plant breeder needs heritable variation to start breeding process.

If heritable variation is present plant breeder starts selecting the desirable plants from the available variation on the basis of breeding objective, but if the variation is not present or if it is not sufficient to select the plants on the basis of breeding objective then there is a **need to create variation**.

CREATION OF VARIATION

Collecting Variation by Natural Resources

Artificial Creation of Variation



Collecting Variation from Natural Resources

Natural Variation can be collected from many resources and then included in the breeding program in many ways as mentioned below

Domestication is the process of bringing wild species under human management.

Any wild plant in the natural environment can be source of variation. The wild plants living in natural environment without the influence of human might have some valuable traits that are not present in the cultivated plants. i.e. wild cotton or wheat plants may have the resistance against biotic and abiotic stresses which is not present in cultivated plants.

Germplasm Collection: Germplasm is any kind of propagation material that is used to grow next generation of crop plant e.g. seed or vegetative parts like cuttings or buds.

Breeder collect germplasm from various sources like gene banks, world banks, gene pools so that variation can be attained by collecting different variant germplasm.

Introduction: means taking a genotype or group of genotypes into a new area where they were not grown before. Introduction of new varieties also contributes towards the variation as new introduced genotypes have different traits. Introduction can be of two types

Primary Introduction: if new introduced variety is well adapted to local environment it is directly released for general cultivation without any selection.

Secondary Introduction: if new introduced variety is not well adapted to local environment it has to be subjected to selection for desirable adapted types before it is released for general cultivation.

Acclimatization: or acclimatisation (also called acclimation or acclimatation) is the process in which an individual organism adjusts to a change in its environment (such as a change in altitude, temperature, humidity, photoperiod, or pH), allowing it to maintain performance across a range of environmental conditions.