



**FACULTY OF AGRICULTURAL SCIENCES  
AND ALLIED INDUSTRIES**

**DR. SUHEL MEHANDI  
ASSISTANT PROFESSOR  
GENETICS & PLANT BREEDING  
GPB 321, CROP IMPROVEMENT II (RABI CROPS)**

## Method of Plant Breeding in Self Pollinated Plants

### Mass Selection

**Mass Selection:** Mass selection is a simplest, common and oldest method of crop improvement, in which large number of plants of similar phenotype are selected and their seeds are harvested and mixed together to constitute the new variety.

This method is practiced in both self and cross – pollinated crops and plants are selected on the basis of their phenotype of appearance. Therefore, selection is done for easily observable characteristics such as plant height, ear/type, grain colour, grain size, etc. The original population would have been a mixture of several pure lines and the plants selected from it would be homozygous. But the variety developed through mass selection would have a considerable genetic variation and consequently, further mass selection or pure line selection may be done in such a variety.

Generally, the plants selected in mass selection are not subjected to progeny test. There are two methods of mass selection.

**1) Hallets Method (1869):** In this method the crop is grown under the best environmental conditions and maximum amounts of water and fertilization to given and then mass selection practised.

**2) Rimpar Method (1867):** In this method the crop is grown under ordinary condition or unfavourable conditions with minimum water and fertilizers and the mass selection is practised. It is more effective and easily applicable.

**Application of Mass Selection:** In self pollinated crops, mass selection has two major applications.

- i) Improvement of local varieties
- ii) Purification of existing pure line varieties.

**i) Improvement of Local or Desi Varieties:** The local varieties are mixtures of several genotypes, which may differ in flowering or maturity plant height, disease resistant etc. Many of these plants type would be inferior and low yielding, such plants will be eliminated through mass

selection and local variety would be improved without adversely affecting its adaptability and stability. Because the new variety would be made up of the most of the superior plants type present in the original local variety.

#### **ii) Purification of Existing Pureline Varieties:**

Pure lines tend to become variable with time due to mechanical mixtures, natural hybridization, mutation etc. therefore, it is necessary that the purity of pure line varieties be maintained through regular mass selection.

Mass selection is generally important and practiced in cross-pollinated crop and has the only limited application in self pollinated crop.

#### **Procedure of Mass Selection:**

**First Year:** A large number of phenotypically similar plants are selected at the time of harvest on the basis of their vigour, plant type, disease resistance and other desirable characteristics. Few hundred to several thousand plants are selected. The unit of selection may be plant, head of seed. The selected plants are harvested and seed mixed together to grow next generation. Selection of too more plants should be avoided in the first year.

**Second Year:** The composite seed is planted in a preliminary yield trial along with standard variety as a check. If this method is used for purification of old mixed variety from which the selection was made, should also be included as a check. Observe the phenotypic characters critically. The best performances are retained and others are discarded.

**Third to Sixth Year:** The superior strains are evaluated for their performance in co-ordinated yield trails at several locations, first in an initial evaluation trail (IET) for one year, if found promising promoted to uniform variety trail (UVT) for two or more years. Only promising one is identified for release as new variety.

**Seventh Year:** Promising strain may be released for cultivation by multiplication and distribution to the farmer for general cultivation. If recommended by central variety release committee.

**Advantages of Mass Selection:**

1. Since large numbers of plants are selected, the variety developed through mass selection is more widely adapted than pure lines.
2. It is easiest, simplest and quickest method of plant breeding because there is no controlled pollination, no progeny testing and prolonged yield trials as well as it is more of an art than a science.
3. Mass selection retains considerable genetic variability and hence variety can be improved after few years by another mass selection.
4. The breeder can develop more time to another programme as it is less demanding method.
5. Used for improving wind local variations to meet the immediate need of the farmers.

**Disadvantages of Mass Selection:**

1. The varieties developed by this method show variation and are not uniform as pure lines hence less preferred by the farmers than pure lines.
2. In the absence of progeny test, it is not possible to determine whether the selected plants are homozygous for specific characters. Similarly, whether phenotypic superiority of selected plants is due to environment of the genotype can't be determined.
3. The varieties developed by mass selection are more difficult to identify than pure lines in seed certification programme.
4. It utilizes the variability already present, in the population hence, it can't generate new genetic variability.
5. It is not useful for improvement in quantitative characters, such as yield because phenotypic and environmental effects can't be separated out.
6. Improvement is short lived, since the variety produced is a mixture of different genotypes, hence, required to be repeated every year in cross-pollinated crops.