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Breeding of Self-Pollinated Vegetable Plants

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Farmers can use cultivation methods and farming techniques to increase crop yield and productivity. Varietal breeding has been successfully demonstrated in self-pollinating crops. Therefore, the main aim of breeders is to create new varieties with better performance. The purpose of this article is to discuss the various breeding methods used in self-pollinating species.

Introduction

Crop breeding is the various applications of genetic techniques to produce crops that are more resistant to diseases and have better yields, which benefits the farmers' farm. This can be done by selecting plants that are needed economically or aesthetically, first checking the matches of the selected individuals, and then selecting the right individuals to inhabit the next generation, and this selection process continues over several generations and the result is achieved. changes in cosmetics and the price of one. A plant. Therefore, many breeding methods are used to improve the results and functioning of the flora. Cultivation methods vary for self- or cross-pollinating species, and some cultivation methods are successful in self-pollinating crops. Mutation breeding, polyploid breeding, heterosis breeding and genetic modification breeding are breeding methods that are rarely used for product improvement and are called special breeding methods. The best way to choose self-pollinating varieties is pure line. Breeding methods focus on increasing the genetic potential of plants and increasing yield.

1. Plant Introduction

• According to Allard (1960), plant introduction is one of the oldest and fastest methods of crop improvement.
• Introduction may include new crops that have already been planted in the area along with relatives of that crop, or crops that are completely new to the area. This is the process of introducing crops to new areas.

2. Pure line selection

• Pure line selection is the best way to improve individual crops.
• Therefore, pure line selection is the process of separating pure lines from the mixed population.
• Child evaluation is an important part of pure line selection. Steps of pure line selection Pure line selection is divided into three steps.
• Choose native plants from different species or other mixed groups.
• Visual evaluation of a plant line
• Test yield

3. Mass Selection

• This is the earliest selection method.
• Suitable for both self-pollinated and cross-pollinated vegetable plants.

• This is the oldest method of team selection.
• Group selection, collecting seeds from the best individuals in the population (usually dozens to hundreds) and planting the next generation from mixed seeds. This process, sometimes called phenotypic selection, depends on each individual's appearance. Group selection is widely used to improve old "land" varieties (varieties passed down over a long period of time from one generation of farmers to the next) and is common in horticulture.
• Another way is undoubtedly the practice of getting rid of bad things by killing them instantly for thousands of years. Whether you save the good plants or weed out the bad ones, the results are the same: Plants are better seeded the next season.
• A modern development in broad selection is to collect an individual's best plants and then grow and compare their offspring. Poor offspring are removed and the remaining seeds are collected. It should be noted that the current selection is based not only on the appearance of the mother plant, but also on the appearance and performance of its offspring. When multiple traits with low heritability are involved, offspring selection is often more effective than phenotypic selection. However, it is worth noting that the evaluation of children requires the next generation; therefore, the gain of a selection cycle must be twice that of simple phenotypic selection to achieve increased value per period.
• Group selection, with or without child screening, is the easiest and cheapest raising method. It is widely used in raising some economically unimportant feed animal species to generate more profit.

Purpose of mass selection

• To increase the frequency of the best genotypes in the population of genetic variants.
• To purify mixed populations with different phenotypes.
• Create many new things by improving the average population.

Steps

• Select root population
• Select the best plant to grow the next generation
• Mix seeds for crop planting.
• Field evaluation.
• Many new features have been released.

4. Hybridization

• The crossing or mating of two plants of different genotypes is called hybridization.
• The seeds and offspring produced by hybridization are called hybrids or F1.
• F1 offspring obtained by individual or crossing of F1 plants and the next generation are called segregating progeny.

Types of Hybridization

According to the taxonomic relationship between the two parents, hybridization can be divided into two main groups:-

- Interspecific hybridization
- Distant hybridization

5. Pedigree Method

- The pedigree may be define as a description of the ancestors of an individual and it generally goes back to some distant ancestor or ancestors in past.
- In pedigree method, individual plants are selected form F2 and the subsequent generations, and their progenies are tested.
- **Pedigree breeding** starts with the crossing of two genotypes, each of which have one or more desirable characters lacked by the other. If the two original parents do not provide all of the desired characters, a third parent can be included by crossing it to one of the hybrid progeny of the first generation (F1). In the pedigree method superior types are

selected in successive generations, and a record is maintained of parent–progeny relationships.

- The F2 generation (progeny of the crossing of two F1 individuals) affords the first opportunity for selection in pedigree programs. In this generation the emphasis is on the elimination of individuals carrying undesirable major genes. In the succeeding generations the hybrid condition gives way to pure breeding as a result of natural self-pollination, and families derived from different F2 plants begin to display their unique character.
- Usually one or two superior plants are selected within each superior family in these generations. By the F5 generation the pure-breeding condition (homozygosity) is extensive, and emphasis shifts almost entirely to selection between families. The pedigree record is useful in making these eliminations. At this stage each selected family is usually harvested in mass to obtain the larger amounts of seed needed to evaluate families for quantitative characters. This evaluation is usually carried out in plots grown under conditions that simulate commercial planting practice as closely as possible. When the number of families has been reduced to manageable proportions by visual selection, usually by the F7 or F8 generation, precise evaluation for performance and quality begins. The final evaluation of promising strains involves (1) observation, usually in a number of years and locations, to detect weaknesses that may not have appeared previously; (2) precise yield testing; and (3) quality testing. Many plant breeders test for five years at five representative locations before releasing a new variety for commercial production.

6. Bulk Breeding

- It is also known as Mass method or population method of breeding.
- It was first used by Nilson Ehle in 1908.
- A species is grown in bulk plot (from F1 to F5) with or without selection a part of the bulk seed is used to grow the next generation and individual plant generation and individual plant selection in practiced in later generation.

7. Backcross method

- A cross between F1 and one of its parents is known as a backcross. It is proposed by Harian and pope in 1922, as a method of breeding for small grains.
- Backcross has been used for decades to transfer specific character into elite lines.
- The variety which receives gene is ‘recipient parent’ and variety which is the source of gene is called as ‘Donor parent’.
- Recipient parent is used repeatedly hence also named as ‘Recurrent Parent’. Donor parent is ‘non-recurrent parent’.

8. Mutation Breeding

- Mutation refers to sudden heritable change in the phenotype of an individual.
- In the molecular term, Mutation is defined as the permanent and relatively rare change in the number or sequence of nucleotide.
- In order words, mutation arise due to change in DNA bases.
- Mutation is mainly 2 types

➢ Spontaneous Mutation:- Mutation Occur in natural Populations.
➢ Induced mutation:- Mutation may be artificially induced by various mutagenic agents.

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