

Genetics and Plant Breeding

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ABSTRACT

Plant breeding uses principles from a variety of sciences to improve the genetic potential of plants. The process involves combining parental plants to obtain the next generation with the best characteristics. Breeders improve plants by selecting those with the greatest potential based on performance data, pedigree, and more sophisticated genetic information. Plants are improved for food, feed, fiber, fuel, shelter, landscaping, eco-systems services and a variety of other human activities. Plant Breeding is the art and science of the genetic improvement of plants.

Keywords: Plant breeding; Genetic potential, Food crops, Genotypes

ROLE OF PLANT BREEDING

Plant breeding is needed to enhance the value of food crops, by improving their yield and the nutritional quality of their products, for healthy living of humans. Breeding is needed to augment the nutritional quality of food crops. Crop production will be affected by many changes in its climatic, agronomic, economic, and societal contexts [1].

HISTORY OF PLANT BREEDING

In the mid-1800s Gregor Mendel outlined the principles of heredity using pea plants and thus provided the necessary framework for scientific plant breeding. As the laws of genetic inheritance were further delineated in the early 20th century, a beginning was made toward applying them to the improvement of plants.

OBJECTIVES OF PLANT BREEDING

1. Increased yield Majority of our breeding programmes aims at increased yield. This is achieved by developing more efficient genotypes. The classical examples are utilization of Dee Gee Woo Gen in rice and Norin10 in wheat. Identification and utilization of male sterility [2].
2. Improving the quality: Rice-milling, cooking quality, aroma and grain colour-wheat-milling and baking quality and gluten content. Pulses-Protein content and improving sulphur containing amino acids-oilseeds-PUFA content.
3. Elimination of toxic substance: HCN content in jowar plants. Lathyrigen content in *Lathyrus sativus* (HN oxalylamine alanine

BOAA), Erucic acid in Brassicas, Cucurbitacin in cucurbits.

4. Resistance against biotic and abiotic stresses.

Biotic stress: Evolving pests and diseases resistant varieties there by reducing cost of cultivation, environmental pollution and saving beneficial insects [3].

Abiotic stress: It is location specific problem. Soil factors and edaphic factors some times poses severe problems. Breeding resistant varieties is the easy way to combat abiotic stress [4].

- Change in maturity duration-Evolution of early maturing varieties
- Improved agronomic characters-Production of more tillers-E.g. Rice, Bajra
- Reducing the plant height to prevent lodging-Rice
- Photoinsensitivity-Red gram, sorghum
- Non-shattering nature-Green gram, Brassicas
- Synchronized maturity-Pulses, cotton, cowpea.
- Determinate Growth habit-determinate growth-Pulses
- Elimination or introduction of dormancy-Groundnut

METHODS OF PLANT BREEDING

- Selection: Selection is the most ancient and basic procedure in plant breeding
- Hybridization: The most frequently employed plant breeding

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technique is hybridization

- Polyploidy: Most plants are diploid
- Induced mutation

ADVANTAGES OF PLANT BREEDING

- Improved quality, such as increased nutrition, improved flavor, or greater beauty
- Increased yield of the crop
- Increased tolerance of environmental pressures (salinity, extreme temperature, drought)
- Resistance to viruses, fungi and bacteria
- Increased tolerance to insect pests

DISADVANTAGES OF PLANT BREEDING

- It can lead to loss of species variety
- It does not have control over genetic mutations
- It brings about discomfort to animals
- It can create offspring with different traits
- It could create a genetic depression
- It poses some environmental risks

CONCLUSION

Plant breeding, defined as cultivar development based on genetically-enhanced breeding materials and assisted by deep understanding of genetic processes at the molecular level, has a vital role to play in tomorrow's agriculture, especially in tomorrow's

new crop agriculture.

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