

# Strategies for Enhancement in Food Production

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## Animal Husbandry

- It deals with the scientific management of livestock.
- It includes various aspects such as feeding, breeding and disease control.
- It includes cattle, goat, sheep, poultry and fish farming.
- **of farms and farm animals**
- **Dairy farm management –**
  - It is done usually for the production of milk and draught labour for agricultural work.
  - The management of dairy farm animals involves regular maintenance and cleansing of animal shelters. Animals should be kept in well-ventilated roofs.
- **Poultry farm management –**
  - It is done to meet the demands for egg and chicken. It involves the management of domestic fowls to improve the quality and productivity of egg and chicken.
  - For good production of poultry, regular cleansing of farm is of the utmost importance. Maintenance of temperature, and prevention and cure of diseases and pests are also required.
- **Breeding**
  - It increases the yield of animals, improves the quality of animal produce and produces disease-resistant varieties of animals.
- **Methods of breeding –**
  - **Inbreeding:** It is the method of mating closely related individuals of the same breed for four to six generations. It increases homozygosity and can lead to the evolution of a pure line.
  - **Outbreeding:** It is the method of mating animals of different breeds. It brings heterozygosity.
  - **Outbreeding involves three types of breeding –**
    - **Outcrossing:** It involves the mating of animals within the same breed, but they do not have any common ancestors for the last four to five generations.
    - **Cross-**

**breeding:** It involves breeding between the superior individuals of two separate breeds; for example, *Hisardale* is a variety of sheep produced by crossing between Bikaneri ewes and Marino rams.

- **Interspecific hybridisation:** It involves the breeding between the individuals of two different related species; for example, mule.
- Other breeding experiments **include artificial insemination and multiple ovulations embryo transfer technology (MOET)**. These are the best methods to perform animal breeding.
- **Artificial insemination:** Process of introducing the semen collected from the male into the oviduct of the female by the breeder
- **Multiple ovulation embryo transfer technology:** It is a technique in which super-ovulation is induced by hormone injection.
- **Apiculture:** Practice of beekeeping for the production of various products such as honey, bee wax
- It is an industry which deals with the catching, processing and marketing of fishes and other aquatic animals that are of high economic value.
- Examples of freshwater fishes are *Catla*, *Rohu*, while examples of marine fishes are *Hilsa*, *Mackerel*.

## **Plant Breeding**

- It is the process in which two genetically similar varieties are purposely crossed to produce a new hybrid variety.
- **Steps involved in plant breeding are –**
  - Collection of genetic variability
  - Evaluation of germplasm and selection of parents
  - Cross-hybridisation between selected parents
  - Selection and testing of superior hybrids
  - Testing, release and commercialisation of new cultivars

## **Applications of Plant Breeding**

- Plant breeding is one of the suitable ways to lower the dependency of plant on various insecticides.
- **Fungal, bacterial and viral pathogens affect the yield of crops.**
  - **Examples –**

rust of wheat, red rot of sugarcane

rot of crucifers

mosaic, turnip mosaic

- Disease resistance can be provided by conventional breeding, mutational breeding or genetic engineering.
- **Conventional breeding:** It includes the basic steps of screening, germplasm, hybridisation, selection, testing and release.
- **Mutational breeding:** In this method, genetic variations are created, which then result in the creation of traits not found in the parental type.
  - Mutations are induced with the help of mutagens (like chemicals) or irradiation.
- **Genetic engineering:**
  - Certain wild varieties have disease-resistant characteristics, but they are low yielding.
  - Disease-resistant genes from such varieties are introduced in high-yielding varieties through recombinant DNA technology.
- **Pest-Resistant Crops**
- Certain morphological characters and biochemical characters provide resistance from insects and pests.
- Such varieties are bred with non-resistant varieties to produce pest-resistant hybrids.
- **Examples of crop variety that provides resistance against diseases –**
  - *Pusa Komal* is a variety of cowpea which is resistant towards bacterial blight disease.
  - *Himgiri* is a variety of wheat which is resistant towards leaf and stripe rust.
- **Examples of crop variety that are resistant towards insect pests –**
  - *Pusa Gaurav* is a variety of *Brassica* which is resistant against aphids.
  - *Pusa Sawani* is a variety of *Okra* which is resistant against shoot and fruit borers.
- **Biofortification:** Process of breeding crops that have higher levels of vitamins, minerals, higher proteins and healthier fat content.

## Single cell protein and tissue culture

- Single cell protein is the alternate source of proteins for animal and human nutrition. *Spirulina* can serve as the source of food rich in proteins, fats, carbohydrates, etc.
- **Tissue culture**
  - Manipulation of plants in vitro to produce new variety of plants.
  - Apical and axillary meristems of plant are used for making virus-free plants.
- **Somatic hybridisation:**
  - It is the technique that involves the fusion of protoplasts derived from two different plant varieties. The hybrid cells are known as **somatic hybrids**.
- **Micro-propagation:**
  - It is the method of producing new plants through tissue culture in a short duration. The plants produced are genetically identical and are known as **somaclones**.