20. BREEDING AND BIOTECHNOLOGY

Learning Objectives

At the end of this lesson the students will be able to:

- ❖ Define and discuss the steps and methods involved in plant breeding.
- ❖ Know the crop varieties produced by crop improvement.
- ❖ Understand animal breeding and its implications.
- ❖ Point out the differences between inbreeding and out breeding.
- ❖ Know what is hybrid vigour and its importance.
- ❖ Identify the steps involved in genetic engineering.
- ❖ Understand the practical applications of DNA fingerprinting.
- ❖ Gain knowledge on gene therapy.
- ❖ Know the importance of stem cell technology

Important Notes and Points

- ⌗ Dr. G. Nammalvar (1938-2013) was a Tamil agricultural scientist, environmental activist and organic farming expert. He founded Nammalvar Ecological Foundation for Farm Research and Global Food Security Trust (NEFFFRGFST-Vanagam) to create public awareness about the benefits of organic farming.
- ⌗ Dr. Mankombu Sambasivan Swaminathan is an Indian scientist known for his leading role in India’s Green Revolution. His research on potato, wheat, rice and jute are well known plant breeding experiments. Due to his efforts the wheat production increased from twelve million tonnes in 1960's to seventy million tonnes now. He is aptly called as the “Father of Indian Green Revolution”.

- Gamma garden or Atomic garden is a concept popularised after World War II for the peaceful use of atomic energy for crop improvement. This is a type of induced mutation breeding where radioactive sources particularly gamma rays from Cobalt-60 or Caesium-137 are used to induce desirable mutations in crop plants.
- **Cross breed of fowls:**

  White Leghorn X Plymouth Rock → Hybrid fowl - yield more eggs
- **Cross breed of cows:**

  Developed by mating the bulls of exotic breeds and cows of indigenous breeds.

  Brown Swiss X Sahiwal →Karan Swiss - yield 2-3 times more milk than indigenous cows.
- Plasmid is the small circular double stranded DNA molecule found in the cytoplasm of bacterial cell and separated from chromosomal DNA. It can replicate independently.
- **Restriction enzymes** recognises a specifi c base pair sequence (palindromic sequence) in DNA called as restriction site and cleaves the phosphodiester bond within DNA.
- Eli Lilly and Company, United States, in 1979 first started commercial production of human insulin by using rDNA technology.