

## Chapter

# 2



## UNIT VII: Genetics

### Classical Genetics



### Learning Objectives

The Learner will be able to

- ❖ Differentiate classical and modern genetics.
- ❖ Understand the concepts and principles of inheritance.
- ❖ Describe the extensions of Mendelism.
- ❖ Explain polygenic inheritance and Pleiotropy.
- ❖ Analyze extra chromosomal inheritance in cytoplasmic organelles.



### Chapter outline

- 2.1 Heredity and Variation
- 2.2 Mendelism
- 2.3 Monohybrid, Testcross, Backcross, and Dihybridcross
- 2.4 Interaction of Genes
- 2.5 Polygenic inheritance in Wheat kernel colour, Pleiotropy – *Pisum sativum*
- 2.6 Extra chromosomal inheritance- Cytoplasmic inheritance in Chloroplast.
- 2.7 Atavism

Genetics is the study of how living things receive common traits from previous generations. No field of science has changed the world more, in the past 50 years than genetics. The scientific and technological advances in genetics have transformed agriculture, medicine and forensic science etc.

Genetics – The Science of heredity (Inheritance) - “Genetics” is the branch of biological science which deals with the mechanism of transmission of characters from parents to offsprings. The term **Genetics** was introduced by **W. Bateson** in 1906.

The four major subdisciplines of genetics are

1. **Transmission Genetics / Classical Genetics** – Deals with the transmission of genes from parents to offsprings. The foundation of classical genetics came from the study of hereditary behaviour of seven genes by Gregor Mendel.
2. **Molecular Genetics** – Deals with the structure and function of a gene at molecular level.
3. **Population Genetics** – Deals with heredity in groups of individuals for traits which is determined by a few genes.
4. **Quantitative Genetics** – Deals with heredity of traits in groups of individuals where the traits are governed by many genes simultaneously.

**What is the reason for similarities, differences of appearance and skipping of generations?**

Genes – Functional Units of inheritance: The basic unit of heredity (biological information) which transmits biochemical, anatomical and behavioural traits from parents to offsprings.