Course Code	Course Name	Credits
26BY009	PLANT BREEDING AND HORTICULTURE	04

Course Objectives

- To explain the principles of plant breeding, selection methods and hybridization.
- To explain the resistance mechanisms in plants against diseases.
- To understand the scopes and importance of horticulture.
- To study about the different types of plant propagation and various post-harvest technology for horticultural Crops.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Have detailed knowledge about breeding systems and learn the techniques of Hybridization.
- Have knowledge on the role of mutations in plant breeding.
- Evaluate and devise suitable techniques for crop improvement programmes.
- Learn the importance of horticulture – career and occupational opportunities.

Unit 1 - Introduction to Plant breeding (12 Hrs.)

Objectives, important achievements and future prospects. Domestication and evolution of cultivated plants. Centers of origin of major cultivated plants. Germplasm resources and conservation**.**

Unit 2 – Methods of Plant Breeding (12 Hrs.)

Hybridization- role and methods. Pedigree method, bulk method, backcrosses method. Heterosis, Hybrid Vigor. Inbreeding depression. Breeding for biotic (disease) and abiotic (drought) stresses.

Unit 3 - Mutation breeding (12 Hrs.)

Mutagens and crop improvement. Spontaneous and induced mutations, physical and chemical mutagens; principles and working of Gamma gardens, methods of mutation breeding, limitations of mutation breeding, achievements of mutation breeding, Role of mutations in Plant Breeding, Biotechnology in crop improvement.

Unit 4 – Introduction to Horticultural science (12 Hrs.)

Scope and importance of horticulture**.** Propagation methods- seed propagations, hybrids, apomixis, polyembryony, chimeras. Asexual method of propagations- Cutting methods, layering methods, budding methods, grafting methods, micro propagation. Hydroponics, aeroponics, and vertical farming**.** Basics of greenhouse design.

Unit 5 - Post-Harvest Technology and Entrepreneurship (12 Hrs.)

Post-harvest technology for horticultural Crops- flower and fruit packaging for transport/export, Treatments of fruits and flowers prior to shipment viz., chlorination, waxing, chemicals, bio-control agents and natural plant products. Nursery business management and agri-entrepreneurship.

Reference Books:

1. Allard, R. W. (1995). *Principles of plant breeding*. John Wiley & Sons.
2. Chahal, G. S., & Gosal, S. S. (2002). *Principles and procedures of plant breeding*. Narosa Publishing House.
3. Hartmann, H. T., Kester, D. E., Davies, F. T., & Geneve, R. L. (2018). *Plant propagation: Principles and practices* (9th ed.). Pearson.
4. Acquaah, G. (2020). *Horticulture: Principles and practices* (6th ed.). Pearson Education.
5. Bose, T. K., Mitra, S. K., & Sadhu, M. K. (2020). *Horticulture and allied topics*. Naya Udyog Publishers.
6. Schlegel, R. (2020). *Dictionary of plant breeding* (3rd ed.). CRC Press / Routledge.
7. Singh, B. P., Agnihotri, S., Singh, G., & Gupta, V. K. (Eds.). (2023). *Postharvest management of fresh produce: Recent advances*. Elsevier.
8. El-Esawi, M. A. (Ed.). (2024). *Recent trends in plant breeding and genetic improvement*. IntechOpen.
9. Singh, B. D. (2025). *Plant breeding: Principles and methods* (12th ed.). Scientific Publishers / Kalyani Publishers.