

MAHATMA GANDHI UNIVERSITY

B.Sc. BOTANY PROGRAMME

Semester IV

Course-4

BO4B04U

ANATOMY AND REPRODUCTIVE BOTANY OF ANGIOSPERMS

(Theory: 54 hours; Practical: 36 hours) (Theory Credit 3, Practical Credit1)

Course Objectives

1. This course aims to impart an insight into the internal structure and reproduction of the most evolved group of plants, the Angiosperm.
2. Identifies role of anatomy in solving taxonomic and phylogenetic problems.
3. Understand the structural adaptations in plants growing in different environment.
4. Understand the life cycle pattern of Angiosperms.
5. Understand the morphology and development of reproductive parts.
6. Get an insight in to the fruit and seed development.

ANATOMY

(Theory: 36 hours. Practical: 27 hours,)

Module-1

2 hours

Scope and importance of Plant Anatomy

Interdisciplinary applications: - Histotaxonomy, Histochemistry, Pharmacognosy, Physiological Anatomy, Ecological Anatomy, Evolutionary trends in plant anatomy

Module -2

6 hours

Study of Cell wall: Gross structure of primary and secondary cell walls, simple and bordered pits. Structure and function of plasmodesmata.

Submicroscopic structure of cell wall- Cellulose, micelle, micro fibril and macro fibril.

Different types of Cell wall thickening in tracheary elements

Extra cell wall thickening materials: - Lignin, cutin, suberin and callose.

Origin of cell wall; Growth of Cell wall- Apposition and intussusceptions – cavities & ducts, schizogenous & lysigenous developments

Non living inclusions in plant cell: - Reserve food materials -carbohydrate (starch), protein (Aleurone grain) and lipids (fats and oil);

Secretory products- pigments, enzymes and nectar.

Metabolic byproducts: - tannin, gums, resins, essential oils, mucilage, latex, mineral crystals and alkaloids

Module-3

7 hours

Tissues

Meristematic tissue- definition, structure, function and classification

Apical organization and theories; Shoot apex- Apical cell theory, Histogen theory and Tunica-Corpus theory.

Root apex - Histogen theory and Korper- Kappe theory.

Permanent Tissue: - Structure and function of simple and complex tissues.

Distribution and function of mechanical tissues in plants.

Plant fibres-economic importance.

Secretory tissues: - a). External secretory tissue- glands and nectaries, b). Internal secretory tissues- laticifers.

Module-4

7 hours

Tissue System- Structure and Function in root, stem and leaves.

a) Epidermal Tissue System- Epidermis, Cuticle, Trichome, Stomata, Bulliform cells, Cork and Silica cells.

b) Ground Tissue System- Cortex, Endodermis, Pericycle, Pith and Pith rays.

c) Vascular Tissue System- Different types of vascular bundles and their arrangement in root and stem

Module-5.

3 hours

Vascular cambium: - Development, structure and function, Activity of cambium, role of cambium in budding, grafting and wound healing.

Module-6.

8 hours

Normal secondary growth in dicot stem and root.

Wood anatomy- basic structure, heart wood, sap wood, hard wood, soft wood, growth rings and dendrochronology, porous and non porous wood, ring porous and diffuse porous wood, tyloses, knots.

Wood rays: Structure and cell types, uniseriate and multiseriate rays; heterocellular and homocellular rays.

Reaction wood- Tension wood and compression wood.

Properties, defects and seasoning of wood.

Stem thickening in monocots.

Periderm: Structure and development- phellum, phellogen, phelloderm, bark, polyderm, rhytidome and lenticel.

Module-7.

3 hours.

Anomalous secondary structure: *Bougainvillea* stem, *Bignonia* stem and *Dracaena* stem.

Practicals 27 hours

1. Cell types and tissues.
2. Non living inclusions – starch grains, cystolith, raphides, aleurone grains.
3. Primary structure of stem root and leaf-Dicots and Monocots.
4. Stomatal types: - anomocytic, anisocytic, paracytic, diacytic and grass type.
5. Secondary structure of dicot stem and root.
6. Anomalous secondary structure of *Bougainvillea* stem, *Bignonia* stem and *Dracaena* stem.

Reproductive Botany (Theory-18 hrs. Practical -9 hrs,)

Module-1 2 hours

Introduction: - General account and interdisciplinary relevance of embryology , embryology in relation to taxonomy; experimental embryology.

Module-2 2 hours

Life cycle of Angiosperms.

Floral morphology- parts of flower; androecium-morphology and types of anthers; gynoecium- morphology and types of carpel and types of placentation.

Module-3 4 hours

Structure and development of anther, microsporogenesis, development of male gametophyte, dehiscence of anther, structure of pollen, pollen germination, pollen tube growth and pollen viability.

Module-4 3 hours

Structure and development of ovule, megasporogenesis, embryosacs-monosporic (polygonum type), bisporic (Allium type) and tetrasporic (Peperomia type). Structure of mature embryo sac.

Module-5 3 hours

Pollination mechanisms and agencies of pollination; pollen stigma interaction; compatibility and incompatibility; syngamy and fusion; apomixis.

Module-6 4 hours

Development of endosperm and embryo in Dicots and Monocots; Polyembryony; Development and general structure of fruits(dry and fleshy) and seed.

Practicals 9 hours

1. Identification of C.S. of anther, embryo sac and embryo.
2. Identification of various anther types-monothealous, dithealous
3. Identification of placentation types.

4. Observation of pollen and locating pollen pore
5. Pollen germination study

Suggested Additional Topics

Applied Anatomy: Wood anatomy and identification of wood;
Wood fibres and Economic uses, Food fibers
Internal Structure of fruits, seeds and vegetables.
Cellulose fibre source and use in paper industry- Pulp and paper manufacture.
Fruit and leaf abscission
Electron microscopic structure of plant parts and their application in different branches of plant science

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MAHATMA GANDHI UNIVERSITY
B.Sc. BOTANY PROGRAMME
Semester V Course-5 B05B05U
MYCOLOGY, LICHENOLOGY AND PLANT PATHOLOGY
(Theory: 36 hours; Practical: 45 hours) (Theory Credit 2, Practical Credit 2)

Course Objectives

Enable the student to

1. Understand the diversity of fungal and lichen world and its significance.
2. Understand the various plant diseases and their impact on agriculture.
3. Familiarize with the various measures adopted to control plant diseases.

I MYCOLOGY

(Theory 24 hours; Practical : 36 hours)

Module 1

15 hours

1. Introduction , structure, reproduction, life cycle, evolutionary trends.
Classification based on Ainsworth (1973)
2. Distinguishing characters of different classes of fungi with special reference to reproductive structures and life history of the genera mentioned in each group
 - a) Myxomycotina – General Characters
 - b) Mastigomycotina – *Albugo*
 - c) Zygomycotina - *Rhizopus*
 - d) Ascomycotina
 - * Hemiascomycetes -- *Saccharomyces*
 - * Plectomycetes -- *Pencillium*
 - * Pyrenomycetes – *Xylaria*
 - * Discomycetes -- *Peziza*
 - e) Basidiomycotina
 - * Teliomycetes ---*Puccinia*
 - * Hymenomycetes—*Agaricus*
 - f) Deuteromycotina – *Fusarium*

Module 2

7 hours

1. Economic importance of Fungi –useful and harmful aspects.
2. Fungi of Agricultural importance –mycoherbicides, myconematicides , mycoparasites , Mycorrhiza –diversity , function and significance.
3. Fungal biotechnology- Fundamental principles.
Mushrooms- edible and poisonous types.
cultivation technique-Spawn production .

Cultivation of Oyster mushroom.

II LICHENOLOGY

2

hours

Module 1

General account , economic and ecological importance of lichen
Structure, reproduction and life cycle of *Parmelia*.

PRACTICALS

36 hours

1. Students are expected to identify the following types by making suitable micropreparations and make labeled sketches *Rhizopus* , *Albugo* , *Saccharomyces*, *Penicillium* , *Xylaria*, *Peziza*, *Puccinia*, *Fusarium* and *Parmelia*.
2. Isolation and culture of Oyster mushroom mycelium.
3. Preparation of bed for mushroom cultivation.
4. Staining of endomycorrhiza / fungus.
5. Isolation of fungus from dung, air ,fruits ,vegetables.
6. Slide culture technique of fungus.

III PLANT PATHOLOGY

(Theory 12 hours; Practical : 9 hours)

Module 1

4 hours

History of plant pathology, Classification of plant diseases on the basis of causative organism and symptoms , Host parasite interaction , Defense mechanism in host ,Mechanism of infection, transmission and dissemination of diseases.

Module 2

2 hours

Control of plant diseases –

Prophylaxis-quarantine measures, seed certification

Therapeutic – physical therapy , chemotherapy.

Biological control.

Module 3

5

hours

Study of following diseases with emphasis on symptoms, disease cycle and control

Bunchy top of Banana.

Bacterial blight of Paddy.

Root wilt of Coconut.

Abnormal leaf fall of Rubber .

Fungicides - Bordeaux mixture, Tobacco Neem decotion, preparation. (Brief account only)

Module 4

1 hours

Medical mycology- Mention about fungal infections of man – Fungal allergens Athlete's foot, aspergillosis, candidiasis, aflatoxin

Practicals

9 hours

Students are expected to :

1. Identify the diseases mentioned in the syllabus with respect to causal organisms and symptoms
2. Submit herbarium preparations of various stages (3stages) of any one of the diseases mentioned.
3. Students should be trained to prepare the fungicide – Bordeaux mixture, Tobacco decoction .

Suggested Additional Topics

Fungal ecology- details of fungal decomposition of organic matter , coprophilous fungi, cellulolytic fungi, lignin degrading fungi ,details of wood decay. soil fungi
Plant diseases, Role of enzymes in pathogenesis.

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