

Anekant Education of Society's
Tuljaram Chaturchand College of Arts, Science and Commerce,
Baramati
(Autonomous)
SYLLABUS (CBCS) FOR S.Y.B.Sc.BOTANY(w.e.f.June,2023)
AcademicYear2023-2024

Semester	Paper Code	Paper Title	Credit
III	USBT 231	Taxonomy of Angiosperms	03
	USBT 232	Plant Physiology	03
	USBT 233	Practical based on USBT 231and USBT 232	02
IV	USBT 241	Anatomy and Embryology	03
	USBT242	Plant Ecology	03
	USBT 243	Practical based on USBT 241and BOT242	02

Class : S. Y. B.Sc. (Semester-III)
Paper Code : USBT231
Paper :I Title of Paper : Angiosperms Taxonomy
Credit :3 Number of lectures: 48

A) Learning Objectives:

1. To study the comparative account of plant families.
2. To give knowledge of identification of plants and their nomenclature.
3. To understand Classification systems of angiosperms.

B) Learning Outcome:

1. Development of experts in identification of flowering plants.
2. Conservation of biodiversity.
3. Creating awareness on importance of Taxonomist in Life Sciences.

Credit-I (14L)

1. Introduction to Plant Taxonomy: (4L)

Definition, scope and importance, objectives, Identification, classification, nomenclature
Concept of Systematics.

2. Systems of classification: (7L)

Types of systems with their merits and limitations- a) Artificial system- Carl Linnaeus, b) Natural system-Bentham and Hooker, c) Phylogenetic system-Engler and Prantl.

3. Taxonomic literature: (3L)

Flora, monograph, manuals, journals, periodicals, references books.

Credit-II (13L)

4. Sources of data for Systematics: (6L)

Morphology, Anatomy, Cytology, Phytochemistry, Molecular biology.

5. Botanical Nomenclature: (7L)

History, Binomial nomenclature, ICN–principles, Rules of nomenclature, Coining of generic names and specific epithets. Ranks and endings of taxa names, Principle of priority, Effective and valid publications, Single and double authority citation, *Nomina conservanda*.

Credit-II (21L)

6. Study of Plant Families (13L)

Study of following families with reference to systematic position, salient features, floral formula, floral diagram and any five examples with their economic importance - Annonaceae, Meliaceae, Myrtaceae, Rubiaceae, Solanaceae, Apocynaceae, Euphorbiaceae and Amaryllidaceae.

7. Computer in taxonomy: (8L)

Concept of herbarium, advantages and limitations, Digital/e-herbarium and its advantages

QR code generation. Concept and overview of APG system.

References :

- 1) Almeida, M.R. 1996, 1998, 2001a, 2001b, 2003a, 2003b 2009. Flora of Maharashtra. Vol. 1(Ranunculaceae to Connaraceae), 294 pp.; Vol. 2(Fabaceae to Apiaceae), 372 pp.; Vol. 3a(Rubiaceae to Ehretiaceae)300 pp.; Vol. 3b(Cuscutaceae to Martyniaceae) 301–464 pp.; Vol. 4a(Acanthaceae to Balanophoraceae)278 pp.; Vol. 4b(Bischofiaceae to Ceratophyllaceae) 279–399 pp. and Vol. 5a(Hydrocharitaceae to Typhaceae) 1–245 pp.St. Xavier's College, Mumbai.
- 2) Angiosperm Phylogeny Group (2016) An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society 181: 1–20.
- 3) Douglas E. Soltis, Pamela E. Soltis, Peter K. Endress and Mark W. Chase, 2005. Phylogeny and Evolution of Angiosperms. Sinauer Associates, Inc., Publishers, Sunderland, USA.
- 4) Ian J. Kitching, Peter L. Forey, Christopher J. Humphries and David M. Williams, 1998. Cladistics: The Theory and Practice of Parsimony analysis (2nd Ed.). The Oxford University Press.
- 5) Radford, A.E., W.C. Dickinson, J.R. Massey and C.R. Bell. 1974. Vascular Plant Systematics, Harper & Row, New York.
- 6) Salemi, M. and A.-M. Vandamme (Eds.) 2003. The Phylogenetic Handbook. A Practical Approach to DNA and Protein Phylogeny. Cambridge University Press.
- 7) Simpson, Michael George. 2006. Plant systematics. Elsevier Academic Press.
- 8) Singh, Gurcharan. 2019. Plant Systematics: An Integrated Approach, Fourth Edition. CRC Press.
7. Singh, N.P., Karthikeyan, S., Lakshminarasimhan, P. & Prasanna, P.V. (2000) Flora of Maharashtra State: Dicotyledons Vol. I. Botanical Survey of India, Calcutta, 898.
- 9) Singh, N.P., Lakshminarasimhan, P., Karthikeyan, S. & Prasanna, P.V. (2001) Flora of Maharashtra State (Dicotyledones). Vol. 2. Botanical Survey of India, Calcutta, India, 1080.
- 10) Stevens, P. F. (2001 onwards). Angiosperm Phylogeny Website. Version 9, June 2008 [and more or less continuously updated since]. <http://www.mobot.org/MOBOT/research/APweb/>
- 11) Stuessy Tod F. 2002. Plant taxonomy. The systematic Evaluation of comparative data. Bishen Singh Mahendra Pal Singh, Dehra Dun.
- 12) Stuessy, Tod F., 2009. Plant taxonomy: the systematic evaluation of comparative data (2nd ed.). New York: Columbia University Press.
- 13) Taylor, D. V. and L. J. Hickey 1997. Flowering plants: Origin, evolution and phylogeny CBS Publishers a Distributors New Delhi.
- 14) Walter S. Judd, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens and Michael

- J. Donoghue, 2007. Plant Systematics: A Phylogenetic Approach, Third Edition. Sinauer Associates, Inc., Publishers, Sunderland, USA.
- 15) Yadav S.R. and Sardesai M.M. - Flora of Kolhapur District. Shivaji University, Kolhapur.

IMPORTANT WEBSITES

THE FAMILIES OF FLOWERING PLANTS-L.Watson and M.J.Dallwitz

<https://www.delta-intkey.com/angio/index.htm>

ANGIOSPERM PHYLOGENY WEBSITE, version14.

<http://www.mobot.org/MOBOT/research/APweb/>

THE PLANTS OF THE WORLD ONLINE PORTAL

<http://www.plantsoftheworldonline.org/>

INTERNATIONAL PLANT NAME INDEX (IPNI)

<https://www.ipni.org/>

TROPICOS

<https://www.tropicos.org/home>

BIODIVERSITY HERITAGE LIBRARY

<https://www.biodiversitylibrary.org/>

BOTANICUSDIGITAL LIBRARY

<https://www.botanicus.org/>

INTERNET ARCHIVE- DIGITAL LIBRARY

<https://archive.org/>

DATABASE OF PLANTS OF INDIAN SUBCONTINENT

<https://sites.google.com/site/efloraofindia/>

BOTANICAL SURVEY OF INDIA

https://bsi.gov.in/content/1416_1_FloraofIndia.aspx

FLOWERS OF INDIA

<http://www.flowersofindia.net/>

eFLORAS OF WORLD

<http://www.efloras.org/>

Class : **S. Y. B. Sc. (Semester - III)**
Paper Code: **USBT 232**
Paper : **II** Title of Paper: **Plant Physiology**
Credit : **3** Number of lectures: **48**

A) Learning Objectives:

1. To understand physiology of plants.
2. To study the physiological processes occurring in plants.
3. To get idea about functioning of instruments.

B) Learning Outcome:

1. Development of expertise in plant physiology.
2. Development of expertise in instrumentation.
3. Creating entrepreneurs for enhancing yield with the use of growth hormones.

Credit - I (15L)

1. Introduction to Plant Physiology : (3L)

Brief history, Scope and applications of plant physiology.

2. Plant – Water relations: (8L)

Structure of cell and types of tissue – cellular and organism level. Membrane structure (Fluid Mosaic Model), permeability and aquaporins.

Diffusion – Definition, factors affecting diffusion, importance of diffusion in plants

Osmosis – Definition, types of osmosis- endosmosis and exosmosis, types of solutions – hypotonic, hypertonic and isotonic, , concept of osmotic pressure (OP), turgor pressure (TP), wall pressure (WP), Diffusion pressure deficit (DPD), relation between OP, TP and DPD, role of osmosis in plants.

Plasmolysis – Definition, mechanism, deplasmolysis, significance of plasmolysis.

Imbibition – Concept, mechanism and significance.

3. Absorption of water: (4L)

Role of water in plants, Concept of water potential and capillary water.

Mechanisms of water absorption (Accepted mechanism only).

Factors affecting on rate of water absorption.

Credit-II (17L)

1. Ascent of sap: (5L)

Introduction and definition. Theories of ascent of sap, Vital theories: Jamin– Chame theory and Bose theory, Physical force theories: a)Capillary theory, b) Imbibitional theory, c)Atmospheric pressure theory.

Transpiration pull or cohesion-tension theory, evidences and objections.

Factors affecting on ascent of sap.

2. Transpiration: (7L)

Definition, Types of transpiration –cuticular, lenticular and stomatal.

Structure of stomata, Mechanism of opening and closing of stomata –Steward’s hypothesis, active K⁺ transport mechanism, Factors affecting the rate of transpiration, Significance of transpiration Antitranspirants, Guttation, Exudation.

3. Seed dormancy and germination: (5L)

Definition and types of seed dormancy, Factors causing seed dormancy, Methods to break seed dormancy, metabolic changes occurs during seed germination.

Credit- III (16L)

4. Plant growth and plant growth regulators: (8L)

Introduction, Phases of growth and plant growth curve. Measurement of growth-Arc auxanometer, Bose Cresco graph, fresh and dry weight method, Factors affecting on growth, Plant Growth Regulators- Introduction and definition, Specific practical applications of auxins, cytokines, gibberellins, ethylene and abscisic acid.

5. Physiology of flowering: (8L)

Photoperiodism – Concept, definition, short day plants, long day plants and day neutral plants, Phytochrome- properties, Pr to Pfr interconversion, role of phytochrome in flowering of SDP and LDP Phytohormones and initiation of flowering. Applications of photoperiodism.

Vernalization – concept and definition, mechanism of vernalization, applications of vernalization, devernalization.

References:

- 1) Jain, V.K. 2000: Fundamentals of Plant Physiology, S.Chand & Co, New Delhi.
- 2) Verma, V. 2007: Text Book of Plant Physiology, And Books India, New Delhi.
- 3) Nobel, P.S. 2009. Physicochemical and Environmental Plant Physiology.4th edition Academic Press, UK.
- 4) Taiz, L. and Zeiger, E. 2006. Plant Physiology. 4th Edition. Sinauer Associates, Sunderland, Massachusetts, USA.
- 5) Salisbury F.B. and Ross C.B. 2005. Plant Physiology. 5th Edition. Wadsworth Publishing Co. Belmont CA.
- 6) Helgi O'Pik, Stephen A. Rolfe, Arthur J. Willis. 2005. The Physiology of Flowering Plants, Cambridge University Press, UK.
- 7) Kirkham, M.B. 2004. Principles of Soil and Plant Water Relations. Elsevier, Amsterdam, Netherlands.
- 8) Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. 1997. Plant Metabolism. 2nd Edition. Longman Group, U.K.
- 9) Fitter, A. and Hay, R.K.M. 2001. Environmental Physiology of Plants. Academic Press, UK.
- 10) Press, M.C., Barker, M.G., and Scholes, J.D. 2000. Physiological Plant Ecology, British Ecological Society Symposium, Volume 39, Blackwell Science, UK.

Class : **S.Y. B.Sc. (Semester-III)**

PaperCode : **USBT 233**

Paper : **III**

Title of Paper : **Practical based on USBT 231 and USBT 232**

Credit : 2

Number of Practicals:12

A) Learning Objectives:

1. To understand physiology of plants.
2. To study the physiological processes occurring in plants.
3. To get idea about functioning of instruments.

B) Learning Outcome:

1. Development of expertise in plant physiology.
2. Development of expertise in instrumentation.
3. Awareness on enhancing yield with the use of green house.

Practicals:

- 1) Tools of taxonomy (01P)
- 2) Description of flowering plant in botanical terms (02P)
- 3) Plant identification–key to groups upto family (01P)
- 4) Study of plant families(any six) (03P)
- 5) Study of plasmolysis insuitable plant material (01P)
- 6) Determination of Diffusion Pressure Deficit(DPD). (01P)
- 7) Determine rate of transpiration under different conditions of Sunlight, Shade and wind(01P)
- 8) Demonstration Experiments. (Compulsory Practical): Curling Experiment, Imbibition in seeds, Arc Auxanometer, Effect of auxins on rooting, Transpiration pull, Spectrophotometer, Portable leaf area meter, Conductivity meter, Centrifuge (01P)
- 9) Assessing seed viability by TTC method (01P)

Note :

1. *Study Tour is compulsory.*
2. *Submission of botanical excursion report and herbarium of at least five correctly identified local dominant plants is compulsory.*