

# Government Degree College (Autonomous) Baramulla

SEMESTER – 2nd  
/ MINOR COURSE

MAJOR

Subject: BOTANY

Title: Plant Ecology and Taxonomy

Course Code: BBO22C201

CREDITS (4+2): THEORY – 04, PRACTICALS -02)

Contact hours: 64(T) + 64(L)

Part 1: Theory = (4 CREDITS)

## Course Objectives:

*To impart understanding to students about the basics of ecology and different types of ecosystems and factors affecting their composition as well as to acquaint them about the classification criteria of different classes of plants.*

## Learning Outcomes:

*After thoroughly understanding the course the student should be able to:*

- *Understand the basic concept of Ecology and associated abiotic and biotic factors affecting the composition of different kinds of ecosystem.*
- *Students should be able to identify, classify the different classes of plants on the bases of phenetic characters etc.*

## Unit 1: Ecology, Ecological Factors and Plant Communities (16 Lectures)

Introduction to ecology; soil - origin, formation and composition, soil profile; water - states of water in the environment, precipitation types; light and temperature as ecological factors; adaptation of hydrophytes and xerophytes, Plant communities - characteristics; ecotone and edge effect; succession - processes and types.

## Unit 1: Ecology and Phytogeography (16 Lectures)

Structure; energy flow; trophic organization; food chains and food webs; ecological pyramids, primary productivity; biogeochemical cycling of carbon, nitrogen and Phosphorous. Phytogeography - biogeographical zones of India, concept of endemism.

## Unit 3: Plant Taxonomy and Classification (16 Lectures)

Introduction to Plant taxonomy; types of classification - artificial, natural and evolutionary; Classification systems - Bentham and Hooker (upto series), Angiosperm Phylogeny Group (AGP) (upto order level).

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**Numerical Taxonomy** - OTUs, character weighing and coding, Cluster analysis; phenograms and cladograms (definitions and differences). Role of herbarium and botanical garden, important herbaria and botanical gardens of the world and India.

## Unit 4: Identification and Nomenclature (16 Lectures)

Flora, identification Keys: single-access and multi-access; taxonomic evidences from cytology, phytochemistry and molecular data; taxonomic hierarchy – ranks, categories and taxonomic groups; Botanical nomenclature - principles of ICN; binominal system of nomenclature, typification, author citation, valid publication, principle of priority.

### Books Recommended:

1. Chapman, J.L. and Reiss, M.J. (1997). Ecology: Principles and Applications. Cambridge University Press, London.
2. Colinvaux, P. (1993). Ecology. John Wiley, New York.
3. Dash, M.C., 1993. Fundamentals of Ecology. (1993). Tata McGraw Hill Publishers Company, Ltd.
4. Odum, E. P., and Barrett, G.W. (2004). Fundamentals of Ecology. Brooks, Cole.
5. Molles, M.C. Jr. (1999). Ecology: Concepts and Applications. WCB/McGraw-Hill Company, London.
6. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India, 8<sup>TH</sup> Edition.
7. Singh, J.S., Gupta. S.R. & Singh, S.P. Ecology, Environmental Science and Conservation. S. Chand Publishing Company.
8. Simpson, Michael, G. (2006). Plant Systematics. Elsevier, California, USA.
9. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford and IBH Pvt. Ltd., New Delhi 3<sup>rd</sup> Edition.
10. Singh, V., Pande, P.C. & Jain, D.K. (2010). Diversity and Systematics of Seed Plants. Rastogi Publications, Meerut, India.
11. Pandey, A. K., and Kasana, S. (2021). Plant Systematics. CRC Press.
12. Stace, Clive A. (1991). Plant Taxonomy and Biosystematics. Cambridge University Press.

## Part 2: Laboratory Course (2 Credits)

### Course objectives:

- To make students to easily understand the importance and types of ecosystems.

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- To aware students about descriptions of different types of families using basic taxonomic tools.

## **Course Outcomes:**

*On completion of course, the student should be able to*

- *Understand the different parameters of our ecosystem*
- *Should be able to evaluate frequency and importance value index of species in different ecosystems.*
- *Should be able to give taxonomic description of different angiosperm families.*

## **Section A: Ecosystem and Phytogeography**

1. To determine minimum number of quadrats required for the reliable estimate of density in a grassland.
2. To study frequency and importance value index of species in a grassland.
3. To estimate bulk density and porosity of grassland and forest soils.
4. To determine moisture content and water holding capacity of grassland and forest soil.
5. Determination of pH and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
6. To estimate transparency, pH and temperature of different water bodies

## **Section B: Plant Taxonomy and Classification**

1. Preparation of identification keys from the available specimens.
2. Taxonomic description of the following families: Malvaceae (*Malva/Althea*), Asteraceae (*Helianthus/Taraxacum*), Fabaceae (*Trifolium/Lathyrus*), Solanaceae (*Solanum/Datura*), Apiacea (*Daucus/ Coriandrum*), Poaceae (*Avena/Poa*).
3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

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SEMESTER – 2<sup>nd</sup>

Skill Enhancement Course (SEC)

Subject: BOTANY

Title: Commercial Mushroom Cultivation – II

Course code: BBO22S202

Credits (2+2): Theory: 2, Practical: 2

Contact hours: 40 (T) + 40 (L)

## Part 1: Theory = (2 CREDITS)

**Objectives:** *To impart knowledge to students about the diversity, identification and cultivation of mushrooms growing in the region and to acquaint them about the nutritional and medicinal value of mushrooms*

**Learning Outcomes:** *After thoroughly understanding the course the student should be able to:*

- *Learn the basic skills how mushrooms can be cultivated on waste organic matter using well sophisticated techniques inside the laboratories.*
- *Understand how mushroom cultivation could turn a student into independent entrepreneur.*
- *Understand how mushroom can add the nutrient value of our diet and to understand their medicinal value as well.*

### UNIT- I

Culture preparation of mushrooms: Methods of culture preparation, pure culture preparation, methods of culture preservation, limitations in culture preservation

Spawn and spawning: Forms of spawns (liquid and substrate/grain spawn), preparation of spawn, mother spawn, spawn formulations and commercial spawn, problems in spawn production, diagnostics and solution, methods of spawning.

**(20 Contact hours)**

### UNIT- II

Compost and composting: Methods of composting, role of composting in mushroom cultivation, composting for white button and oyster mushroom cultivation, qualities of good compost; Casing and casing material used in mushroom cultivation

Production and crop management of Button mushroom and Oyster mushroom; harvesting of mushroom, identification of right stage of mushroom harvest, methods of harvesting. Diseases and environmental stress management in mushroom cultivation

**(20 Contact hours)**

**Books recommended:**

1. Ahlawat, O. P., And R. P. Tewari. Cultivation Technology Of Paddy Straw Mushroom (Volvariella Volvacea). Vol. 36. India: National Research Centre For Mushroom, 2007.
2. Alexopoulos, C.J. And Mims, C.W. 2002. Introductory Mycology. 5th Edition. John Wiley And Sons, New York.
3. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley And Sons(Asia), Singapore. 4<sup>th</sup> Edition.
4. Chang, Shu-Ting, And William Alfred Hayes, Eds. The Biology And Cultivation Of Edible Mushrooms. Academic Press, 2013.
5. Singh, Manjit, Et Al. "Mushrooms: Cultivation, Marketing and Consumption." Mushrooms: Cultivation, Marketing and Consumption. (2011).

**Part 2: Laboratory Course (2 Credits)****Course objectives**

- *The students should understand the economic importance of mushrooms*
- *To aware students about in vitro culturing of mushrooms*

**Course Outcomes**

*On completion of course, the student should be able to*

- *Generate the revenue and to become self-independent*
- *To understand the importance of mushrooms in our daily life*

**PRACTICALS (2 CREDITS)****(40 Contact hours)**

- Preparation of culture
- Preparation of spawn and spewing
- Methods of culture preservation.
- Preparation of different composts, materials required for different types of compost.
- Quality testing of compost, Casing and casing material
- Identification of right stage of harvesting mushrooms.
- Identification of various biotic and abiotic stresses in button mushroom cultivation.

**Books recommended:**

1. Beetz, Alice E., and Lane Greer. Mushroom cultivation and marketing. ATTRA, 2004.
2. Kapoor, J. N. "Mushroom cultivation." *Mushroom cultivation*. (1989).
3. MES, MODULAR EMPLOYABLE SKILLS. "Mushroom cultivation." (2003).
4. Stamets, Paul. Growing gourmet and medicinal mushrooms. Ten speed press, 2011.
5. Suman, Balam Chand, and V. P. Sharma. Mushroom cultivation in India. Daya Books, 2007.

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Semester 1st -3rd

~~SEMESTER III-1st.~~

Open Elective Course/ Multidisciplinary

**Subject: BOTANY**

**Title: Plants for Human Welfare**

**Course code: BBO22M103**

**Credits: Theory – 03**

**Contact hours: 48 (T)**

***Course Objectives:***

*To impart the basic understanding of plants to students about economic importance, medicinal values, conservation and diversity of different classes of plants and to acquaint them about the classification, structure, morphology and reproduction.*

***Learning Outcomes:***

*After thoroughly understanding the course the student should be able to:*

- *Understand the morphological features of different classes of plants as well as their differentiation.*
- *Understand the medicinal value and food value of different classes of plants.*
- *Understand the importance of plants in our daily life and need of conservation strategies.*

## **Unit 1. Morphology of Flowering plants**

**(16 Contact hours)**

- Morphology of Root, Stem, Leaf, Flower.
- Modifications of Root, Stem, Leaf

## **Unit II. Major Food Crops**

**(16 Contact hours)**

### **Plants as food**

Origin, Morphology, cultivation and food values of

- Wheat
- Rice
- Maize

### **Plants as Spices**

Spices and condiments (Saffron, Garlic, Ginger, Saunf, Turmeric, Chilies, Cumin)

**Timber yielding plants of Kashmir-** Popular, Pinus, Juglans, Salix.

**Fruits of Kashmir:** Apple, Plum, Peaches, Almond, Walnut etc.

**Oil yielding plants of Kashmir:** Sunflower, Linseed and Mustard

## **Unit III. Medicinal Plants**

**(16 Contact hours)**

Introduction and Scope

Some common Herbal practices used to cure

- Fever
- Cough and Cold
- Worms
- Arthritis

Traditional uses of medicinal plants

- Podophyllum
- Datura
- Rheum
- Bergenia
- Atropa
- Aconitum
- Artemisia

### **Books recommended:**

1. Balick, Michael J. "Economic botany of the Guahibo. I. Palmae." *Economic Botany* 33.4 (1979): 361-376.
2. Biswas, Bidhan Ch, Amit Roy, and B. K. Sen. "Economic Botany: a bibliometric study." *Malaysian Journal of Library & Information Science* 12.1 (2007): 23-33.
3. Dar, Rafiq Ahmad, Akhila Nand Rai, and Imtiyaz Ahmad Shiekh. "*Stigmina carpophila* detected on *Prunus armeniaca* and *Prunus persica* in India." *Australasian Plant Disease Notes* 12.1 (2017): 1-4.
4. Dar, Rafiq Ahmad. *Fungal Taxonomy: A Molecular Approach*. Education Publishing.
5. Hill, Albert Frederick. "Economic botany. A textbook of useful plants and plant products." *Economic botany. A textbook of useful plants and plant products*. 2nd edn (1952).
6. Kochhar, Suraj Lal. *Economic botany*. Cambridge University Press, 2016.
7. Lewis, Walter H., and Memory PF Elvin-Lewis. *Medical botany: plants affecting human health*. John Wiley & Sons, 2003.
8. Pandey, B. P. *Economic botany*. S. Chand Publishing, 1999.
9. Verma, V. *Textbook of economic botany*. Ane Books Pvt Ltd, 2009.
10. Wickens, Gerald E. "What is economic botany?." *Economic botany* 44.1 (1990): 12-28.