

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2022
'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

(As per New Education Policy 2020)

Syllabus: Botany

Name of the Course: B.Sc. I (Sem. I & II)

(Syllabus to be implemented from June 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Three Majors in First Year structure as per NEP-2020 Approved in For AC Meeting on 18/04/2024

4- Year Multidisciplinary UG Program with DSC as a Major (4 -Year Bachelor of Science(Honors)/(Honors with Research))

Level/ Difficulty	Sem	Faculty			Generic/ Open Elective GE/ OE	Vocational and Skill Enhancement Courses (SEC/VSC)	Ability Enhancement Course (AEC), IKS, VEC	Field Project/ RP/CC/Internship/Appre nticeship/ Community Engagement & Services	Credits	Cumulati ve Credits
		Major		Minor						
		DSC	D S E							
4.5 100-200	I	Algae,Fungi and archegoniate DSC1-1 (2+2)#				SEC1 (2) Biofertilizer	L1-1(2) IKS (2) General IKS VEC1(2) (Constitution of India)	CC1 (2)	22	44 UG Certificate (44)
		DSC2-1(2+2)#								
		DSC3-1 (2+2)#								
	II	Plant Ecology and Taxonomy of Angiosperm DSC1-2(2+2)#			GE1/ OE1(2) Horticul ture	SEC 2 (2) Mushroo m Cultivatio n	L1-2(2) VEC2(2) (Environmental Studies)	CC2 (2)	22	
		DSC2-2 (2+2)#								
		DSC3-2(2+2)#								
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										
5.0/20 0	III	DSC1-3 (2+1)	---	DSC2-3 (2+1)	GE2 / OE2 (4)	VSC1 (2) (Discipline Specific to Major)	L2-1 (2)	FP1/CEP1(2)	22	44 UG Diploma (88)
		DSC1-4 (2+1)	---	DSC-2-4 (2+1)						
	IV	DSC1-5 (2+1)	---	DSC2-5 (2+1)	GE3/ OE3 (4)	VSC2 (2) (Discipline Specific to Major)	L2 -2(2)	FP1/CEP2 (2)	22	
		DSC1-6 (2+1)	--	DSC2-6 (2+1)						
Exit option: Award of UG Diploma in Major with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major₁										

5.5/300	V	DSC1-7 (3+2)	DSE1-1 (2+1) or DSE1-2 (2+1)	----	----	VSC3 (2) (Hands on Training related to DSE)	IKS 2 (2) (related to major subject)	--	22	44 UG degree (132)
		DSC1-8 (3+2)								
		DSC1-9 (3+2)								
	VI	DSC1-10 (3+2)	DSE1-3 (2+1) or DSE1-4 (2+1)	----	---	VSC4 (2) (Hands on Training related to DSE)		FP/CEP/OJT (2)	22	
		DSC1-11 (3+2)								
		DSC1-12 (3+2)								
Total Credi ts 3 Yrs	66-8#	6	12 +8# 20	10	12	16	10	132		

Exit option: Award of UG degree in Major with 132 Credits OR Continue with Major

6.0/40 0	VII	DSC1-13 (4+2)	DSE1-5 (4+2)	Research Methodolo gy (4)	-----	----	----	---	22	44 UG Honours Degree in Main faculty (176)
		DSC1-14 (4+2)								
	VIII	DSC1-15 (4+2)	DSE1-6 (4+2)	----	-----	----	OJT/In-house Project/ Internship/ Apprenticeship (4)	22		
		DSC1-16 (4+2)								
Total 4 Yrs	90-8#	18	12+8#+4	10	12	16	14	176		

Award of Bachelor of Science Honors., (B.Sc. Honors.) degree with Major and Minor(176 credits)

or

6.0/40 0	VII	DSC1-13 (4)	DSE1-5 (4)	Research Methodolo gy (4)	-----	----	----	Research Project (6)	22	44 UG Honours with research Degree in Main faculty (176)
		DSC1-14 (4)								
	VIII	DSC1-15 (4+2)	DSE1-6 (4)	----	-----	----	Research Project (6)	22		
		DSC1-16 (4+2)								
	Total 4 Yrs	86-8#	14	12+8#+4	10	12	16	10+12	176	

#Out of the three major courses in the first year, one major (comprising 4 credits for the 1st semester and 4 credits for the 2nd semester) will transition into a minor starting from the second year. Consequently, 8 credits will be reallocated from the major course credit count and added to the minor credit count, thereby meeting the requisite credit criteria for the minor

PAH SOLAPUR UNIVERSITY, SOLAPUR
Certificate course in Botany (As per NEP 2020)

Semester – I

Course Code	Title of Papers	Distribution of Marks for Examination			Total credit
		CA	UA	Total	
DSC1-1 (2+2)	Algae, Fungi and Archegoniate	20	30	50	2
DSC1-2 (2+2)		40	60	100	4
DSC1-3 (2+2)		40	60	100	4
PRDSC1-1 (2)	Practical based on DSC1-1	20	30	50	2
SEC 1 (2)	Biofertilizer	20	30	50	2
L1-1 (2)	English	20	30	50	2
IKS (2)	General IKS	20	30	50	2
VEC1 (2)	Constitution of India	20	30	50	2
FP/RP/CC	NCC/NSS/Culture/sports/Social activities	20	30	50	2
Total Marks + Credit for Semester - I		220	330	550	22

Semester - II

DSC1-1-2 (2+2)	Plant Ecology and Taxonomy of Angiosperm	20	30	50	2
DSC1-2-2 (2+2)		40	60	100	4
DSC1-3-2 (2+2)		40	60	100	4
PRDSC1-2	Practical based on PRDSC1-2	20	30	50	2
OE-2 (2)	Horticulture	20	30	50	2
SEC 2 (2)	Mushroom Cultivation Technology	20	30	50	2
L1-2(2)		20	30	50	2
VEC2(2)	(Environmental Studies)	20	30	50	2
FP/RP/CC	NCC/NSS/Culture/sports/Social activities	20	30	50	2
Total Marks + Credit for Semester - II		220	330	550	22
Total Marks + Credit for Semester - I		220	330	550	22
Total Marks + Credit for Semester - II		220	330	550	22
Total Marks and Credit		440	660	1100	44

COURSE INTRODUCTION:

The new curriculum of B.Sc. in Science (Botany) offers essential knowledge and technical skills to study plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core, elective and vocational papers with significant inter-disciplinary components. Students would be exposed to cutting-edge technologies that are currently being used in the study of plant life forms, their evolution, and interactions with other organisms within the ecosystem.

Students would also become aware of the social and environmental significance of plants and their relevance to the national economy. B.Sc. The Botany Programme covers academic activities within the classroom sessions along with practical concepts at laboratory sessions. Infield, outstation activities and projects would also be organized for real-life experience and learning. Candidates who have curiosity in plant kingdom, ecosystem, love exploring exotic places and wish to work as researchers or professions like Botanist, Conservationist, Ecologist, etc. can choose B.Sc. Botany course.

Program outcomes (Pos):

Transformed curriculum shall develop educated outcome-oriented candidature, fostered with discovery- learning, equipped with practice & skills to deal practical problems and versed with recent pedagogical trends in education including e-learning, flipped class and hybrid learning to develop into responsible citizen for nation building and transforming the country towards the future with their knowledge gained in the field of plant science.

PO1	CBCS syllabus with a combination of general and specialized education shall introduce the concepts of breadth and depth in learning.
PO2	Shall produce competent plant biologists who can employ and implement their gained knowledge in basic and applied aspects that will profoundly influence the prevailing paradigm of agriculture, industry, healthcare, and environment to provide sustainable development.
PO3	Will increase the ability of critical thinking, development of scientific attitude, handling of problems and generating solutions, improve practical skills, enhance communication skill, social interaction, and increase awareness in judicious use of plant resources by recognizing the ethical value system.
PO4	The training provided to the students will make them competent enough for doing jobs in Govt. and private sectors of academia, research, and industry along with graduate preparation for national as well as international competitive examinations, especially UGC-CSIR NET, UPSC Civil Services Examination, IFS, NSC, FCI, BSI, FRI etc.
PO5	Certificate and diploma courses are framed to generate self- entrepreneurship and self-employability, if a multi exit option is opted.
PO6	Lifelong learning is achieved by drawing attention to the vast world of knowledge of plants and their domestication.

Program specific objectives (PSOs):

B.Sc. I Year Certificate Course in Basic Botany

- This certificate course will provide knowledge on various fields of basic Botany.
- The syllabus is prepared to enable students for competitive exams in frontier areas of plant sciences.
- Students will be able to know about cryptogamic and phanerogamic plant groups

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and technology
As per NEP 2020
Semester - I Subject - Botany
Paper I: Algae, Fungi and Archegoniate
Objectives and Outcomes
(Credits: Theory 2 +Practical 2)

Unit 1: Algae and Fungi

1.1 Introduction

Objective: To get the knowledge about the Introduction, characters, classification, and economic importance of algae

Outcome: Students will be able to understand characters, classification, economic importance of algae

1.2 Chlorophyta

Objective: To get the knowledge about the general Characters of Chlorophyta division, occurrence, classification, Thallus organization & reproduction of *Spirogyra*

Outcome: Students will be able to understand about the division Chlorophyta along with its one example of *Spirogyra* in detail.

1.3 Phaeophyta

Objective: To get the knowledge about the general Characters of Phaeophyta division, occurrence, classification, Thallus organization & reproduction of *Sargassum*

Outcome: The students will be able to understand in detail about the division Phaeophyta along with its one example of *Sargassum* in detail.

1.4 Objective: To get the knowledge about the characters, classification of fungi

Outcome: Students will be able to understand characters, classification of fungi

1.5 Zygomycotina

Objective: To understand about general characters of Zygomycotina, occurrence, classification, Thallus organization & life cycle of *Mucor*.

Outcome: The students will be able to understand the general characters division of Zygomycotina with detail study of *Mucor*

1.6 Economic importance of fungi

Objective: To understand economic importance of fungi

Outcome: Students will be able to understand the economic importance of fungi and its importance in day-to-day life.

Unit 2: Archegoniate

2.1 Introduction of Archegoniate

Objective: To get Knowledge about Introduction & general characters of Archegoniate

Outcome: Students will be able to get a detail idea about Archegoniate

2.2 Bryophytes

Objective: To get the knowledge about the Bryophytes, its general characters,

classification and life cycle along with suitable example *Riccia*

Outcome: Students will be able to understand the Bryophytes and life cycle of *Riccia* with its economic importance.

2.3 Pteridophyta

Objective: To get knowledge about the general characters of Pteridophytes, classification and life cycle along with suitable examples *Selaginella*.

Outcome: The students will be able to understand about the Pteridophytes and life cycle of *Selaginella* with its economic importance.

2.4 Gymnosperms

Objective: To get the knowledge about the general characters of Gymnosperms, classification and life cycle along with suitable examples *Cycas*

Outcome: The students will be able to understand about the Gymnosperms and life cycle of *Cycas* with its economic importance.

2.5 Economic importance of Gymnosperm

Objective: To understand economic importance of **Gymnosperm**

Outcome: Students will be able to understand the economic importance of **Gymnosperm**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and technology
As per NEP 2020
Semester I Subject Botany
DSC1 (1): Paper I: Algae, Fungi and Archegoniate
(30 L) (Credits: Theory 2 + Practical 2)

Unit-1:	ALGAE & FUNGI	15 L
1.1	Introduction, General Characters, And Classification of Algae (As Per Smith-1955) up to Class. Economic importance of algae	(3 L)
1.2	Chlorophyta: General Characters Study of <i>Spirogyra</i> - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages)	(3 L)
1.3	Phaeophyta: General Characters Study of <i>Sargassum</i> - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages)	(3 L)
1.4	General Characters, Classification of Fungi up to Class (As per Ainsworth)	(2 L)
1.5	Zygomycotina: General Characters Study of <i>Mucor</i> : Occurrence, Classification, Thallus Organization, Life Cycle (Excluding Developmental Stages)	(3 L)
1.6	Economic Importance of Fungi	(1 L)
Unit 2	ARCHEGONIATE	15 L
2.1	Introduction, General Characters of archegoniate	(2 L)
2.2	Bryophytes: General Characters, and Classification (As Per G. M. Smith) Study of <i>Riccia</i> - Occurrence, Classification, Thallus Structure (External and Internal) and Reproduction (Excluding Development). Economic Importance of Bryophytes	(4 L)
2.3	Pteridophytes General Characters and Classification Up to Class (As Per G. M. Smith) Study of <i>Selaginella</i> : Occurrence, Classification, Morphology of Sporophyte, Anatomy (Stem) and Reproduction (Excluding Development). Economic Importance of Pteridophyte	(4 L)
2.4	Gymnosperms: General Characters and Classification (As Per Sporne) Study of <i>Cycas</i> : Occurrence, Classification, Morphology (Sporophyte, Coralloid Root), Anatomy of Leaflet and Reproduction.	(4 L)
2.5	Economic Importance of Gymnosperm	(1 L)

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Practical based on DSC 1-1(2)

1	Study of dissecting and compound microscopes.
2	Identification of Algae (<i>Nostoc</i> , <i>Ulva</i>)
3	Identification of Fungi (<i>Yeast</i> , <i>Penicillium</i>)
4	Study of <i>Spirogyra</i> .
5	Study of <i>Sargassum</i>
6	Study of <i>Mucor</i>
7	Identification of Bryophytes (<i>Marchantia</i> , <i>Anthoceros</i>)
8	Identification of Pteridophytes (<i>Equisetum</i> , <i>Adiantum</i>)
9	Identification of Gymnosperms (<i>Araucaria</i> , <i>Thuja</i>)
10	Study of <i>Riccia</i> .
11	Study of <i>Selaginella</i> - Morphology of sporophyte and anatomy of stem,
12	Study of <i>Selaginella</i> - Reproductive structure: Strobilus, Microsporangium, Megsporangium
13	Study of <i>Cycas</i> - Morphology of sporophyte and anatomy of leaflet.
14	Study of <i>Cycas</i> - Reproductive structure: male cone, microsporophyll, microspore and megasporophyll, L. S. of ovule (permanent slide).
15	Submission (Algae/ Fungi/ Archigoniate)

SEC -1 Biofertilizer

Credits – 2 Lectures 30 Objectives and Outcomes

Unit 01: General account about the microbes used as biofertilizer

Rhizobium

Objective: To acquire skills of isolation & identification of Rhizobium fertilizer

Outcome: Students will be able to acquire skill to manufacture Rhizobium fertilizer

Azospirillum

Objectives: To acquire skills of isolation & identification of Azospirillum fertilizer

Outcome: Students will be able to acquire skill to manufacture Azospirillum fertilizer

Azotobacter

Objectives: To acquire skills of isolation & identification of Azotobacter fertilizer

Outcome: Students will be able to acquire skill to manufacture Azotobacter: fertilizer

Cyanobacteria

Objectives: To acquire skills of isolation & identification of Cyanobacteria fertilizer

Outcome: Students will be able to acquire skill to manufacture Cyanobacteria fertilizer

Applications

Objective: To learn applications of microbial fertilizers

Outcome: Students will be able to understand applications of microbial fertilizers

Unit 02: Mycorrhiza and Organic farming

Introduction, taxonomy & types of Mycorrhiza

Objective: To learn taxonomy and types of Mycorrhiza

Outcome: Students will be able to learn types of mycorrhiza its benefits as a biofertilizer

Isolation & Inoculation of Mycorrhiza

Objective: To acquire skills of isolation of Mycorrhiza

Outcome: Students will be able to acquire skills in isolation of Mycorrhiza and its applications

Organic farming

Objective: To learn about green manuring and organic fertilizers, Recycling of biodegradable municipal, use of agricultural and Industrial wastes for making fertilizers

Outcome: Students will be able to learn & think about Recycling of biodegradable municipal, use of agricultural and Industrial wastes for making fertilizers

Bio compost & vermicompost

Objective: To understand methods of preparation of bio and vermicompost

Outcome: Students will be able to acquire skills in preparation of bio and vermicompost

Applications of Bio and vermicompost

Objective: To learn about applications of bio and vermicompost in organic farming

Outcome: Students will be able to learn about of applications of bio and vermin compost in organic farming

SEC 1: Biofertilizer (2 Credit - 30L)

Unit 1: General account about the microbes used as biofertilizer (15L)

- **Rhizobium:** isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis.(4L)
- **Azospirillum :** isolation and mass multiplication – carrier-based inoculant, associative effect of different microorganisms.(4L)
- **Azotobacter:** classification, characteristics – crop response to Azotobacter inoculum, maintenance, and mass multiplication.(4L)
- **Cyanobacteria** (blue green algae), Azolla and Anabaena association, nitrogen fixation, factors affecting growth, blue green algae, and Azolla in rice cultivation.(2L)
- **Applications of microbial fertilizer & their significance.** (1L)

Unit 02: Mycorrhiza and Organic farming. (15 L)

- **Mycorrhiza:** Mycorrhiza association, types of mycorrhiza association, taxonomy, occurrence and distribution, phosphorus nutrition, growth, and yield – colonization of VAM(3L)
- **Isolation and Inoculum:** Isolation and Inoculum production of VAM, and its influence on growth and yield of crop plants.(3L)
- **Organic farming:** Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes(3L)
- **Bio compost and vermicompost:** bio compost making methods, types, and method of vermicomposting(4L)
- Application of Bio and vermicompost (2L)

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General IKS (2- Credit)

Semester: II
DSC 1-2: Plant Ecology and Taxonomy of
Angiosperm

Objectives and Outcomes
Credits: (Theory – 2 + Practical – 2)

Unit 1: Plant Ecology

- 1.1 Objective:** To get the knowledge about the introduction, basic concept, levels of organization
Outcome: The students will be able to understand about the basic concept, levels of organization
- 1.2 Objective:** To get the knowledge about the Climatic Factors
Outcome: The students will be able to understand about the Climatic Factors- Light, Temperature, Humidity, Wind & Rainfall
- 1.3 Objective:** To get the knowledge about the Edaphic Factors
Outcome: The students will be able to understand about the Edaphic Factor- soil, its origin, formation and components
- 1.4 Objective:** To get the knowledge about the Ecological Adaptation- hydrophytes
Outcome: The students will be able to understand about the Morphological, anatomical, and Physiological adaptations in hydrophytes
- 1.5 Objective:** To get the knowledge about the Ecological Adaptation- xerophytes
Outcome: The students will be able to understand about the Morphological, anatomical, and Physiological adaptations in xerophytes
- 1.6 Ecological succession**
Objective: To get the knowledge about the Ecological succession
Outcome: The students will be able to understand about the Ecological succession

Unit2: Taxonomy of Angiosperm

- 2.1 Objective:** To get knowledge about aim and principles of taxonomy
Outcome: The students will be able to understand about aim and principles of taxonomy
- 2.2 Objective:** : To get knowledge about general characters of angiosperms
Outcome: The students will be able to understand about general characters of angiosperms, primitive and advanced characters of flower
- 2.3 Objective:** To understand different types of classification and its merit & demerits
Outcome: The students will be able to understand about different types of classification and its merit & demerits
- 2.4 Objective:** To understand Principles of ICBN, Nomenclature of plants
Outcome: The students will be able to understand Principles of ICBN, Nomenclature of plants
- 2.5 Objective :**To get knowledge about botanical gardens of India
Outcome : The students will be able to understand about culcutta botanical garden and Lead botanical garden Kolhapur
- 2.6 Study of Angiosperm families**
Objective: To study morphological & reproductive characters of 4 families
Outcome: The students will be able to understand characters of family

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Faculty of Science and technology
As per NEP 2020
Semester I Subject Botany
DSC 1(2): Paper II: Plant Ecology & Taxonomy of
Angiosperm
(30 L) (Credits: Theory 2 + Practical 2)

Unit 1:	Plant Ecology	15 L
1.1	Introduction, Basic Concept., Levels of organization	(2 L)
1.2	Climatic Factors- Light, Temperature, Humidity, Wind & Rainfall.	(2 L)
1.3	Edaphic Factor: Origin, Formation & Components of soil.	(2 L)
1.4	Ecological Adaptation: Morphological, anatomical, and Physiological adaptations in hydrophytes	(3 L)
1.5	Morphological, anatomical, and Physiological adaptations in xerophytes	(3 L)
1.6	Ecological succession – Introduction, concept & process, Hydrosere and Xerosere	(3 L)
Unit 2:	Taxonomy of Angiosperm	15 L
2.1	Introduction, Aims and Principles of Taxonomy	(2 L)
2.2	General characters of angiosperms, primitive, and advanced characters of flower	(2 L)
2.3	Types of classification: Artificial, Natural and Phylogenetic, Salient features, outline of Bentham and Hooker system of classification, Merits, and demerits	(3 L)
2.4	Principles of ICBN , Nomenclature, Binomial nomenclature of plants	(2 L)
2.5	Botanical gardens of India- Sir J. C. Bose Botanical Garden, Calcutta & Lead Botanical Garden of Shivaji University Kolhapur	(2 L)
2.6	Study of Angiosperms families: systematic position, morphological & distinguishing characters with economic importance of following families: a) Caesalpiniaceae b) Solanaceae c) Nyctaginaceae d) Amaryllidaceae	(4 L)

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Practical based on DSC 1-2(2)

1	Study of soil p ^H by Universal indicator/p ^H paper/p ^H meter
2	Study of Water holding capacity of different soil
3	Study of meteorological instruments (any three)
4-5	Ecological adaptations of Hydrophytes (<i>Hydrilla</i> , <i>Eichhornia</i> and <i>Typha</i>).
6	Ecological adaptations of Xerophytes (<i>Nerium</i> and <i>Aloe</i>).
7	Study of typical flower
8	Study of types of placentation
9	Study of types of aestivations
10	Study of floral formula and floral diagram
11	Study of plant family Caesalpiniaceae
12	Study of plant Family Solanaceae
13	Study of Plant family Nyctaginaceae
14	Study of Plant family Amaryllidaceae
15	Excursion report.

OE - I
Horticulture
Credit-2 (Lecture - 30)

Unit1: Horticulture

Objective: To Get the knowledge about the basic concepts of Horticulture

Outcome: The students will be able to understand the basic concept of Horticulture

1.2 Scope and Importance

Objective: To understand the scope and importance of horticulture.

Outcome: Students will be able to understand scope and importance.

1.3 Branches of Horticulture

Objective: To get knowledge about the various branches such as floriculture, Pomo-culture, olericulture.

Outcome: The students will be able to understand branches of floriculture Pomo-culture, olericulture

1.4 Garden Implements

Objective: To get the knowledge and understand the various garden implements essential for horticulture.

Outcome: The students will be able to understand the knowledge of various garden implements.

1.5 Potting repotting and transplanting

Objective: To get the knowledge about the Potting repotting and transplanting

Outcome: The student will be able to understand in detail about the procedure of Potting, repotting, and transplanting and they are able to remember this.

Unit 2: Plant Propagation

2.1 Introduction

Objective: To understand the knowledge of plant propagation.

Outcome: The students will be able to understand knowledge of Propagation

2.2. Sexual methods of propagation

Objective: To get the knowledge about the sexual methods of propagation

Outcome: The students will be able to understand the formation of annuals, biennales and many perennial plants by seed propagation.

2.3. Vegetative method of propagation

Objective: To get knowledge about vegetative propagation methods.

Outcome: The students will be able to understand Runners, suckers, offsets, Stolon, Tubers, bulb, Rhizome, bulbils, Corms.

2.4. Asexual methods of propagation

Objective: To get knowledge about asexual methods of propagation.

Outcome: The students will be able to understand knowledge of cutting, layering, budding, grafting.

2.5. Scope and Importance of propagation

Objective: To get the knowledge about scope and Importance of propagation.

Outcome: The students will be able to understand knowledge of scope and Importance of propagation.

OE - I
Horticulture
Credit-2 Lecture30

Unit 1. Horticulture:

- 1.1 Introduction (1L)
- 1.2 Scope and importance of Horticulture (2L)
- 1.3 Branches of Horticulture: Floriculture, Pomoculture, Olericulture (4L)
- 1.4 Garden Implements: Khurapi, Sickle, Secateur, Digging Fork, Garden shears, budding Knife, grafting knife, Tree pruner, garden rake, Shovel, Water can. (4L)
- 1.5 Potting, repotting, and transplanting (4L)

Unit2. Plant propagation

- 2.1 Introduction (1L)
- 2.2 Sexual method (seed propagation): annuals, biennials, and perennial plant (2L)
- 2.3. Vegetative Methods of propagation: Runners, suckers, offsets, Stolon, Tubers, bulb, Rhizome, bulbils, Corms (4L)
- 2.4 Asexual methods of propagation (7L)
- Cutting: Root Cutting, stem Cutting, leaf Cutting
- Layering: Air layering, simple layering, compound layering
- Budding: T budding, patch budding
- Grafting: whip grafting, Approach grafting
- 2.5 Scope and importance of Propagation (1L)

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SEC 2(2)

Paper I: Mushroom Cultivation

Theory: 30 hours Credits: 2

Objectives and Outcomes

Unit I

Introduction to mushroom

Objective: To get knowledge about history & importance of mushroom

Outcome: Students will be able to understand earlier history and importance of mushrooms.

Vegetative structure of mushroom

Objective: To understand the structure of mushroom, its development process.

Outcome: Students will be able to understand basic structure of mushroom, developmental process, structure of basidiocarp with its example like Agaricus

Mushroom cultivation centers in India

Objective: To analyze different mushroom cultivation centers in India

Outcome: Students will be able to analyze different mushroom cultivation centers along with they will get an idea about how mushroom cultivation takes place in commercial sectors.

Isolation of spores & media preparation

Objective: To understand isolation and media preparation process for mushroom cultivation

Outcome: Students will understand the technique of spore isolation and media preparation.

Spawn production

Objective: To provide hands on training for the preparation of bed for mushroom cultivation and spawn production

Outcome: Students will be able to understand techniques of bed and spawn production.

Unit II: Cultivation, Harvesting and Marketing

Techniques for mushroom cultivation

Objective: To understand techniques for inoculation and cultivation of mushrooms

Outcome: Students will be able to understand different techniques for substrates, composting technology, bed, polythene bag preparation, spawning - casing – Cropping.

Cultivation of Mushroom

Objective: To get knowledge about cultivation of mushrooms

Outcome: Students will be able to understand cultivation technique to grow the various mushrooms

Edible & nonedible mushrooms

Objective: To enable the students to identify edible and poisonous mushrooms

Outcome: Students will be able to understand the differences between edible & nonedible mushrooms.

Nutritional value of Mushrooms

Objective: To understand about nutritional value of mushrooms

Outcome: Students will be able to understand nutritional value of mushrooms

Mushroom production

Objective: To help the students to learn a means of self-employment and income generation

Outcome: Students will be able to learn mushroom cultivation, harvest, storage, marketing practices for self-employment and income generation

SEC 2(2)

Paper I: Mushroom Cultivation

Theory: 30 hours Credits: 2

Unit: 1 Introduction of Mushrooms

- 1.1 History and importance of mushrooms.(02 L)
- 1.2 Vegetative characters - Formation and development of Basidiocarp, structure of basidiocarp - Agaricus.(03 Lectures)
- 1.3 Mushroom research centers in India and in local environments...(02L)
- 1.4 Isolation and culture of spores, media preparation for culture...(04 L)
- 1.5 Production of mother spawn, bed spawn, multiplication of spawn -(04L)

Unit 2: Cultivation, Harvesting and Marketing

- 2.1 Inoculation Technique - Cultivation technology - Substrates, composting technology, bed, polythene bag preparation, spawning - casing – Cropping. (04 L)
- 2.2 Cultivation of button mushroom (*Agaricus bisporus*), milky mushroom (*Calocybe indica*), oyster mushroom (*Pleurotus florida*) and paddy straw mushroom (*Volvariella volvacea*)..(05 L)
- 2.3 Edible, and medicinal Mushrooms. .(02 L)
- 2.4 Nutritional value of mushrooms. Value addition in mushrooms. (02 Lectures)
- 2.5 Mushroom production - Harvest - Storage methods and marketing. (02 L)

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