Karmaveer Bhaurao Patil University, Satara

Yashavantrao Chavan Institute of Science, Satara

B. Sc. II (Plant Protection) As Per NEP-2020

With effect from Academic Year 2023-2024

Karmaveer Bhaurao Patil University, Satara

Yashavantrao Chavan Institute of Science, Satara

Bachelor of Science (B. Sc.) Part -II: Plant Protection

1. TITLE: **Plant Protection**

2. YEAR OF IMPLEMENTATION: **2024 - 2025**

3. **PREAMBLE:**

The B. Sc. Plant Protection course under autonomy will be effective from the academic year 2024 - 2025. It has been prepared to keep in view the unique requirements of B. Sc. Plant Protection students as per NEP-2020. The contents have been drawn up to accommodate the widening horizons of the discipline of biological sciences. The emphasis is to provide students with the latest information along with due weightage to the concepts of Plant Protection so that they can understand and appreciate the current interdisciplinary approaches in the study of plant sciences and their role in societal development. The course content also lists new practical exercises so the students get hands-on experience with the latest techniques that are currently in use. The course will also inspire students to pursue higher studies in Plant Protection and botany to become entrepreneurs, and enable students to get employed in plant-based industries like Seed agrochemical industries.

4. General Objectives of the Course:

i. To impart knowledge of Plant Protection is the basic objective of this course.

ii. To develop a scientific attitude among the students and to make the students open-minded, critical, and curious.

iii. To develop skills in practical work, experiments, and laboratory materials.

iv. To understand scientific terms, concepts, facts, phenomenon, and their relationships.

v. To make the students aware of the Agro-industry and the environment.

vi. To enable the students to acquire knowledge of plants (crops) and related subjects to understand nature and the environment to fulfill basic needs like food, fodder, and clothing.

vii. To develop the ability for the application of acquired knowledge to improve agriculture and related fields to make themselves self-reliant.

5. DURATION: 01 year

6. PATTERN: CBCS Semester

7**. MEDIUM OF INSTRUCTION:** English

8. STRUCTURE OF COURSE:

Course Structure as per NEP-2020

Level	Sem.	Subject - 1 Major				Subject - 2 Minor		Subject - 3 GE / OE		VSEC		AEC, VEC, IKS			OJT, FP, CEP, CC, RP				Total	Non - CGPA
		DSC		DSE						VSC	SEC	AEC	IKS	VEC	CC	FP	CEP	OJT /Int/App /RT		
		T	P	T	P	T	P	T	P											
4.5	I	4	2	---	---	4	2	4	2				2		2	---			22	
	II	4	2	---	---	4	2	4	2		2		---	2		---			22	DEGG
5	III	4	4	---	---	2	2			2	2	4	---	2					22	
	IV	4	4	---	---	2	2			2	2	4	---		2				22	
5.5	V	4	2	4	2	---	---	---		4			---		2	2	2		22	
	VI	4	2	4	2	---	---	---		2					2	2		4	22	IIC
6	VII	8	2	8		4	---	---		---		---	---			---			22	
	VIII	8	2	8		---	---	---		---		---	---			---		4	22	
Total		**40**	**20**	**24**	**4**	**16**	**8**	**12**		**10**	**6**	**8**	**2**	**4**	**8**	**4**	**2**	**8**	**176**	
		88				**24**		**12**		**16**		**14**			**22**					

1) THIRD SEMESTER

Sr. No.	Subject Title	Theory					Practical	
		Course No. &Course Code	Title of Course	No. of lectures per week	Credits		No. of lectures Per week	Credits
1.	Plant Protection (Major)	Course – I BPPT 231	Plant Pathology	4	4	Practical Major- III BPPP233	4	2
		Course - II BPPT 232	Major Crops, Methods of Integrated Plant Protection			Practical Major - IV BPPP 234		
2.	Plant Protection (Minor)	Course – I - BPPT235	Plant Health Management	2	2	Practical Course - I BPPT236	4	2
3.	Vocational Skill Course (VSC)	Course – I - BPPVSC I	Biofertilizer Production -	4	4	Practical Course - I	4	2
	Skill Enhancement Course (SEC)	Course – I BPPSEC 2	Sustainable Agricultural Practices -	4	4	Practical Course - I BBPT	4	2
4.	Value Education Course (VEC)	Course – I BPPVEC 2	Environmental Studies in Plant Protection	3	2	--	--	--
5						--	--	--

2) FOURTH SEMESTER

Sr. No.	Subject Title	Theory					Practical	
		Course No. &Course Code	Title of Course	No. of lectures per week	Credits		No. of lectures Per week	Credits
1.	Plant Protection (Major)	Course – III-BPPT 241	Insect Pests and their Management	4	4	Practical Course - II- BBPP243	4	2
		Course –	Weeds and					

		IV-BBPT 242	Their Management					
2.	Plant Protection (Minor)	Course – III-BPPT 245	Weed Management in Horticultural Crops	2	2	Practical Course – II-BPPP246	4	2
P	Vocational Skill Course (VSC)	Course – III VSC Course – IV	Post Harvest Management	4	4	Practical Course - II-	4	2
4.	Skill Enhancement Course (SEC)	Course - I SEC	Soil and Water Management	3	2	--	--	--
5	Cocurricular Course (CC)	CC			2	--	--	--

2) Structure and titles of Courses of B. Sc. Course

B. Sc. II Semester III

Plant Protection (Major)

Course I BPPT 231: Plant Pathology

Course II BPPT 232: Major Crops, Methods of Integrated Plant Protection

Practical Course BPPP 233: Practicals Based on Theory Courses I

Practical Course BPPP 234: Practicals Based on Theory Courses II

Plant Protection (Minor)

Course I BPPT 235: Plant Health Management

Practical Course BPPP236 **:** Practical based on Theory Course I

Vocational Skill Course (VSC)

Course I BPPVSC: Biofertilizer Production

Practical Course BPPVSC : Practical based on Theory Courses I

Skill Enhancement Course (SEC)

Course I BPPSECT: Sustainable Agricultural Practices

Practical Course BPPSECP: Practical based on Theory Course I

Value Education Course (VEC)

Course I BPPVEC: Environmental Studies in Plant Protection

English Course :

B. Sc. II Semester IV

Plant Protection (Major)

Course VII BPPT 241: Insect Pests and their Management

Course VIII BPPT 242: Weeds and their Management

Practical IX BPPP 243: Practicals based on Theory Courses VII..

Practical IX BPPP 244: Practicals based on Theory Courses VII.

Plant Protection (Minor)

Course III BBPT245 : Weed Management in Horticultural Crops

Practical II BBPP246 **:** Practical based on Theory Courses ….

Vocational Skill Course (VSC)

Course BPPVSC: Post Harvest Management

Practical II: Practicals Based on Theory Courses

SEC (Skill Enhancement Course)

Course I BPPSEC: Soil and Water Management

CC (**Cocurricular Course)** CC

3) OTHER FEATURES:

A) LIBRARY:

Reference books, Textbooks, journals, and Periodicals are available in Institute and Departmental Library. (Separate reference lists are attached along with the respective course syllabus)

B) EQUIPMENT:

a) Computer, LCD projector, visualizer, smart board

b) Laboratory Equipments and Chemicals:

1. All Chemicals required for plant pathological experiments
2. Microscope with a digital camera
3. Digital weighing balance
4. pH meter
5. Microtome
6. Autoclave
7. Hot Air Oven
8. Incubator
9. Refrigerator
10. Seed Dresser

11 Hand Refractometer

SEMESTER - III

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Syllabus to be introduced from June 2024

Bachelor of Science (B. Sc.) Part - II

Plant Protection (Major)

Semester-III

Course II (BPPT 231)

Plant Pathology

Course objectives:

The Students will be able to

1. Understand the basic knowledge about Crop diseases.
2. Imbibe the knowledge of mechanism of plant infection.
3. To impart the knowledge about the agricultural crop diseases.
4. To impart the knowledge about management of crop diseases and pathophysiological and skills.

Credits (2)	**Theory Paper I (BPPT 231) Plant Pathology**	**No. of hours (30)**
Credit –I **Unit-I:**	**Concept of Plant diseases** **1.1** Definition and concept of disease, 1.2 Terminologies in Plant Pathology: Host, pathogen, pathogenecity, pathogenesis, symptoms, infection, inoculum, incubation period, Etiology, susceptibility, immunity, hypersensitivity, resistance, Disease Cycle, hypertrophy, hyperplasia. 1.3 Classification of plant diseases: 1.4 Based on a) Pathogens, b) Symptoms, c) Severity of disease; sporadic, epidemic and epiphytotic, d) Transmission of pathogens through seed, soil, air and insects. 1.5 Types of culture media & Sterilization methods. 1.6 Methods of studying plant pathogens: Koch's Postulates.	**(…)**

Credit –1 **UNIT II**	**Mechanism of Penetration and Plant infection**	**(…)**
	2.1 Mechanism of Penetration and infection. 2.2 Mode of infection and Factors affecting infection	
Credit –1 **UNIT III**	**Study of selected plant diseases w.r.t symptoms, causal organisms and disease management.**	**(…)**
	* Little leaf of Brinjal * Yellow vein mosaic of Okra (Bhendi) * Citrus canker * Powdery mildew of Gerbera * Rust of soybean * White Rust of Crucifers * Brown rust of Wheat * Grain smut of Jowar * Tikka disease of Groundnut	
Credit –1 **UNIT IV**	**Management of crop diseases**	**(…)**
	4.1 Mechanical method: Eradication; 4.2 Chemical method: Classification of fungicides based on chemical nature and mode of action; Study of properties, formulation, mode of action and uses of Carbendazim and Benomyl; 4.3 Cultural technique 4.4 Biological method of disease management.	

Course Outcomes:

The students will be able to

1. describe the basic concepts of plant protection, and explain basic terminologies used in plant protection.
2. explain the mechanism of plant infection and the mode of infection of plant diseases.
3. describe the factors affecting infection, and explain the agricultural crop diseases.
4. explain the Management of crop diseases, and describe the pathophysiological skills.

References:

1) Bilgrami KS, Textbook of Modern Plant Pathology, New edition, New Delhi (1990)
2) Aneja KR, Experiments in Microbiology Plant Pathology and Tissue Culture, New Age International (P) Ltd. Publishers, New Delhi (2005)
3) Mehrotra RS and Aggarwal A, Fundamentals of Plant Pathology, McGraw-Hill

Education Pvt. Ltd., New Delhi (1980)

4) Jain VK, Laboratory Manual of Plant Pathology, Oxford Book, Calcutta (2009)
5) Agrios G.N, Plant Pathology, (5^{th} Edn.), Academic Press, San Diego (2005)
6) Butler & Edwin, Plant Pathology, , Macmillan & Co. (1949)
7) Chattopadhyay SB, Principles and procedures of plant protection, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (1987)
8) Baruah HK, Text Book of Plant Pathology, Oxford and IBH Publ. Co., New Delhi (1984)

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Bachelor of Science (B. Sc.) Part - II

Plant Protection (Major)

Semester-III V

Course II (BPPT 232)

Major Crops, Methods of Integrated Plant Protection

Course Objectives:

The students should be able to…

1. understand the concept and importance of plant protection
2. study the gross morphology and the Agronomy of Agricultural Crops.
3. gain the knowledge about different methods of Plant Protection.
4. impart Knowledge about the advanced methods of Plant Protection.

Credits(2)	Theory Course II (BPPT 232)	No. of hours (30)
Unit I	**Introduction of plant protection and study of crops** **Introduction and importance of Plant Protection; Study of Agronomical practices about the following crops :** Cereal Crops – Jowar, Oil seed crop– Groundnut, Pulse Crop – Gram, Cash crop - Sugarcane	**(7)**
UNIT II	**Study of Horticultural Crops** Study of agronomical practices about the following crops: Fruit crops – Mango, Vegetable crops –Brinjal, Spices –Chilli,	**(8)**

	Floriculture – Marigold;Eco-friendly Agricultural practices: Green manuring Biofertilizers and their types,	
UNIT III	**Methods of plant Disease management** IDM – Integrated Disease Management; **Cultural methods –**Tillage, crop rotation, trap crops, fertilizer applications; **Mechanical methods** – Field sanitization, Hand picking, **Physical methods** – Heat and soil solarisation; **Chemical methods** –Brief account and uses of Bactericides, Fungicides, Insecticides, Nematicides, Acaricides, Molluscicides, and Rodenticides	**(7)**
UNIT IV	**Management of crop diseases** **Biological methods** –Biological control of Insect pests and crop diseases; **Legal methods** – Plant quarantine in India; Crop resistance – Uses of resistant varieties and their examples.	**(8)**

Course Outcomes:

The students will be able to…

1. describe the concept and importance of plant protection.
2. get knowledge about gross morphology and agronomy of floricultural crops and fruit crops
3. apply knowledge of different methods of plant protection.
4. understand the concept of integrated disease management.

References :

1. Reddy S.R., 2011. Principles of Agronomy. Kalyani Publishers, Ludhiana, India.
2. Panda S.C., 2006. Agronomy. Agribios Publication, New Delhi.
3. Rao V.S., 2006. Principles of Weed Science. Oxford and IBH Publishing Co., New Delhi, India.

4. Denckla T., 2004. Gardener's A – Z to Growing Organic Food. Storey Books, England.

5. Tompkins P., and Bird C., 2004. Secrets of the Soil. Rupa Publisher Pvt Ltd., New Delhi.

6. Sankaran S., and V.T., Subbiah Mudliyar, 1991. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.

7. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore.

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Bachelor of Science (B. Sc.) Part - II

Plant Protection (Major)

Semester-III

Practical Course -I (BPPP 233)

Course Objectives:

The Students should be able to…

1) familiarize the students with general plant pathological equipment and pathological procedures (Preparation of culture media, GM crops, IDM, etc.)
2) learn the preparation of Soil Samples for laboratory analysis.
3) understand the relationship between the parasitic plants and their host.
4) impart the knowledge about integrated disease management.

Credits (2)	Practical Course- I (BPPP 233) **(Practicals based on Theory Courses I)**	No. of hours (60)
	1-5.Study of the following diseases in crops concerning host, causal organism, symptoms, and management : 1. Yellow vein mosaic of Okra (Bhendi), 2. Little leaf of Brinjal, Citrus canker, 3. Rust of Sugarcane, 4. White rust of Amaranthus / Crucifers, 5. Rust of Wheat, Rust of Soybean, 6. Grain smut of Jowar, 7. Tikka disease of Groundnut, 8. Powdery mildew of Gerbera 6-7. Sterilization and Preparation of PDA culture medium. 8-9. Soil dilution technique- Serial Dilution, Isolation, Inoculation and identification of soil fungi. **10.** Separation of amino acids from healthy and diseased plants using paper chromatography technique.	

	11. Determination of sucrose percentage by Hand refractometer in Sugarcane and Grape.	

Course Outcomes:

The students will be able to

1. 1describe the basic concepts of plant protection, and explain basic terminologies used in plant protection.
2. explain the mechanism of plant infection and the mode of infection of plant diseases.
3. describe the factors affecting infection, and explain the agricultural crop diseases.
4. explain the Management of crop diseases, and describe the pathophysiological skills.

References:

1 .Bilgrami KS, Textbook of Modern Plant Pathology, New edition, New Delhi (1990)

2 .Aneja KR, Experiments in Microbiology Plant Pathology and Tissue Culture, New Age International (P) Ltd. Publishers, New Delhi (2005)

3 .Mehrotra RS and Aggarwal A, Fundamentals of Plant Pathology, McGraw-Hill Education Pvt. Ltd., New Delhi (1980)

4 Jain VK, Laboratory Manual of Plant Pathology, Oxford Book, Calcutta (2009)

5 Agrios G.N, Plant Pathology, (5^{th} Edn.), Academic Press, San Diego (2005)

6 .Butler & Edwin, Plant Pathology, , Macmillan & Co. (1949)

7 Chattopadhyay SB, Principles and procedures of plant protection, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (1987)

8 HK, Text Book of Plant Pathology, Oxford and IBH Publ. Co., New Delhi (1984)

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Bachelor of Science (B. Sc.) Part - II

Plant Protection (Major)

Semester-III

Practical Course -II(BPPP 234)

Course Objectives:

The students should be able to…

1. understand the concept and importance of plant protection
2. study the gross morphology and the Agronomy of Agricultural Crops.
3. gain the knowledge about different methods of Plant Protection.
4. impart Knowledge about the advanced methods of Plant Protection.

Credits (2)	**Practical Course - II (BPPP 234)** **(Practical based on Theory Courses)**	**No. of hours (60)**
	1. Agronomic studies of the following crops with reference to gross morphology for crop identification and agronomic conditions- 1. 1 .Cereal Crops – Jowar, 2. Oil seed crop– Groundnut, 3. Pulse Crop – Gram, 4. Cash crop – Sugarcane. 5. Fruit crops – Mango, 6. Vegetable crops –Brinjal, 7. Spices –Chilli, 8. Floriculture – Marigold; 9. .Eco-friendly agrobiochemicals: Green manuring: Sunhemp and Delchi; 10. Biofertilizers: Azolla and Nostoc; Biopesticides: Azadirachtin and Pyrethrin.	

	11. Tour report /Excursions/ Visits to Agricultural institutes/ Polyhouse	

Course Outcomes :

The students will be able to :

1. identify diseases with symptoms and by nature of damage.
2. study of any plant pathogen by different techniques
3. understand agronomic conditions of crops .
4. .determine amino acids by paper chromatography

References:

1. Jain V., 2009. "Laboratory Manual of Plant Pathology". Oxford Book, Calcutta.
2. Havlin J., Beaton J., Tisdale S., & Nelson W., 2006. "Soil Fertility and fertilizers". 7th Ed. Prentice Hall.
3. Agrios G., 2005. "Plant Pathology". (5thEdn.), Academic Press, San Diego.
4. Aneja K., 2005. "Experiments in Microbiology Plant Pathology and Tissue Culture". New Age International (P) Ltd. Publishers, New Delhi.
5. Brady N., & Weil R., 2002. "The Nature and Properties of Soils". 13th Ed. Pearson Edu.
6. Yawalkar K., Agrawal J., & Bokde S., 2000. "Manures and Fertilizers". Agri-Horti Publ.
7. Prasad R., & Power J., 1997. "Soil Fertility Management for Sustainable Agriculture". CRC Press.
8. Mehrotra R., and Aggarwal A., 1980. "Fundamentals of Plant Pathology". McGraw-Hill Education Pvt. Ltd., New Delhi.
9. Reddy S.R., 2011. Principles of Agronomy. Kalyani Publishers, Ludhiana, India.
10. Panda S.C., 2006. Agronomy. Agribios Publication, New Delhi.
11. Rao V.S., 2006. Principles of Weed Science. Oxford and IBH Publishing Co., New Delhi, India.
12. Denckla T., 2004. Gardener's A – Z to Growing Organic Food. Storey Books, England.
13. Tompkins P., and Bird C., 2004. Secrets of the Soil. Rupa Publisher Pvt Ltd., New Delhi.
14. Sankaran S., and V.T., Subbiah Mudliyar, 1991. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
15. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore

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Bachelor of Science (B. Sc.) Part - II

Plant Protection (Minor)

Semester-III

Theory Course -I (BPPP 235.)

Plant Health Management

Course objectives:

The students should be able to…

1. understand the basic knowledge about plant health management.
2. update the knowledge of agricultural crop management.
3. acquire the knowledge to develop need based crop health management protocols.
4. to develop communication in regard of plant protection management.

Unit	Theory Course (BPPT 235) Plant Health Management	No. of hours per unit/ credits
UNIT I	**Plant Health Care** 1.1 Introduction, Meaning of plant health, Scope and Importance. 1.2 Key determination of plant health Care. 1.3 Plant health care equipments, Products, Fertilizers, field station Visual. 1.4 Aids, and Plant health care Apps. 1.5 Plant health pyramid and Plant health diagnosis.	**(8)**
UNIT II	**Plant Nutrition management** 2.1 Plant nutrients, roles and deficiencies. 2.2 Nutrient Antagonism. 2.3 Tips for manitaning plant health. 2.4 Nutrient management.	**(7)**
UNIT III	**Soil Health Care & Sustainable agriculture** 3.1 Soil profile: Concept and analysis. 3.2 Soil properties and status of soil health. 3.3 Types of soil, Soil nutrients and Plant health. 3.4 Soil health card: Concept, analysis and importance. 3.5 Rhizosphere dynamics for sustainable agriculture.	**(8)**
UNIT IV	**Measures of Plant Health Care** 4.1 Measuring key indicators for plant growth and productivity. 4.2 Insects an an indicator of plant health. 4.3 Ready reckoner for plant protection. 4.4 Plant disease diagnosis.	**(7)**

Course Outcomes:

The students will be able to…

1. become a part of Human Resource for both in public and private sector, covering areas of plant protection technology and Plant Health Care Management.
2. become field programmes trainer to the common people.
3. provides documentation services in regard of plant protection management.
4. understand importance of plant health care .

References :

1. **Chand G. 2018.** Plant Health Management, New India Publishing Agency- Nipa.
2. **Jain V.K.. 2020.** Fundamentals of Plant Physiology, S. Chand Publications.
3. **Gupata V. K. 1996.** Integrated Disease Management and Plant Health, Scientific Publishers Journals.
4. **Sood B.S. 2002**. Mineral Nutrition of Plants, Medtech Publishers.
5. **S. Mohandas. 2005**.Introduction to Soil Science.| Kalyani Publishers.
6. **Sai Prasad S. V. 2007**. Soil Science, New Vishal Publication.
7. **Krishan K. Verma. 2008**. Practical manual on fundamentals of plant physiology, Kalyani, Publishers.
8. **Manju Bala. 2010**. Practical in Plant Physiology and Biochemistry, Scientific publications.
9. **Vijay Yadav. 2007**. A Colour Handbook on Practical Plant Pathology, India Publishing Agency.
10. **Laird Liz. 2019**. Principles of Soil Science, Laxmi Publications; Fourth edition.
11. Practical Manual of Soil Science, Vijay Kumar, BRILLION Publishing.
12. E-sources: **https://niphm.gov.in/** **https://students.cfaes.ohio-state.edu/plant-health-management**
13. **https://agricoop.nic.in** **https://plantpath.caes.uga.edu/undergraduate/minor/certificate- plant-health-management.html**

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Bachelor of Science (B. Sc.) Part - II

Plant Protection (Minor)

Semester-III

Practical Course -I (BPPP 236.)

Plant Health Management

Course objectives:

The students should be able to…

1. understand the basic knowledge about plant health management.
2. update the knowledge of agricultural crop management.
3. acquire the knowledge to develop need based crop health management protocols.
4. to develop communication in regard of plant protection management.

Practicals based on Plant Health Management

Credits	Practical Course- I (BPPP 236.) (Practical based on Theory Courses I Plant Health Management)	No. of hours
	1. Study of typical healthy plant. 2. Study of plant heath care equipments and Products. 3. Study of field station Visual Aids and Plant health care Apps 4. Study of plant nutrition (Role and deficiencies) 5. Study of plant disease diagnosis. (Any two) 6. Study of biochemical analysis of crop plant with reference to Protein content. 7. Study of amino acids form healthy and infected crop plants. 8. Study of rhizosphere dynamics 9. Study of physicochemical properties of soil samples (Any two) 10. Visit the Agricultural institute/Soil Analysis laboratory/Plant analysis laboratory. 11. Field diagnosis of plant diseases. 12. Field diagnosis of plant insect pests.	

	13. Field diagnosis of plants due to mineral deficiencies. 13. Study of some Symptoms and their cause.- Wilt and leaf spot 14. Study of Nematode disease. 15. Study of symptoms and their cause due to insect pests. 16. study of symptoms and their cause due to the virus. 17. Study of factors responsible for deficiencies. 18. Study of different types of pesticides. 19. Study of different types of chemical fertilizers. 20. Study of different types of biofertilizers.	

Course Outcomes:

The students will be able to…

1. become a part of Human Resource for both in public and private sector, covering areas of plant protection technology and Plant Health Care Management.
2. become field programmes trainer to the common people.
3. provides documentation services in regard of plant protection management.
4. understand importance of plant health care.

References :

1. **Chand G. 2018.** Plant Health Management, New India Publishing Agency- Nipa.
2. **Jain V.K.. 2020.** Fundamentals of Plant Physiology, S. Chand Publications.
3. **Gupata V. K. 1996.** Integrated Disease Management and Plant Health, Scientific Publishers Journals.
4. **Sood B.S. 2002**. Mineral Nutrition of Plants, Medtech Publishers.
5. **S. Mohandas. 2005**.Introduction to Soil Science.| Kalyani Publishers.
6. **Sai Prasad S. V. 2007**. Soil Science, New Vishal Publication.
7. **Krishan K. Verma. 2008**. Practical manual on fundamentals of plant physiology, Kalyani, Publishers.
8. **Manju Bala. 2010**. Practical in Plant Physiology and Biochemistry, Scientific publications.
9. **Vijay Yadav. 2007**. A Colour Handbook on Practical Plant Pathology, India Publishing Agency.
10. **Laird Liz. 2019**. Principles of Soil Science, Laxmi Publications; Fourth edition.
11. Practical Manual of Soil Science, Vijay Kumar, BRILLION Publishing.

12. E-sources: **https://niphm.gov.in/** **https://students.cfaes.ohio-state.edu/plant-health-management**
13. **https://agricoop.nic.in** **https://plantpath.caes.uga.edu/undergraduate/minor/certificate- plant-health-management.html**

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Bachelor of Science (B. Sc.) Part - II

Plant Protection Semester-III

BPPT-VSC-II

Biofertilizer Production

Course Objective:

The students will be able to…

1) familiarize the students with

2) imparts the knowledge about

3) understand the Knowledge about

4) explain the knowledge about

Credits (2)	**Practical Course -I (BPPP VSC -II)** **(Practicals based on Theory Courses)**	**No. of hours (60)**
	1. study of soil fertility Analysis. 2. Study of types of biofertilizers. 3. Study of preparation of farm yard manures. 4. Study of methods of composting. 5. Study of preparation of vermicompost, vermiculture, and vermiwash. 6. Study of preparation of jeevamrut as a biofertilizer. 7. Study of the preparation of Beejamrut for seed treatment. 8. Study of equipment used for the production of biofertilizers. 9. Study of isolation of rhizobium from root nodal. 10. Study of isolation of azosprillium from the plant. 11. Study of isolation of azotobactor from soil root. 12. Study of isolation and culture of bacillus thuringenesis. 13. Study of mass production of VAM. 14. Study of isolation and inoculation of soil microorganisms by serial dilution method. 15. Study of mass multiplication of blue-green algae. 16. Study of isolation of blue-green algae from soil.	

	17. Study of mass multiplication of azolla. 18. Study of preparation of Dashaparni ark as a biopesticide. 19. Study of Green Manures as a biofertilizer. 20. visit to industry	

Course Outcomes:

The Students will be able to…

1) explain the types of biofertilizers used in the field.
2) Discuss the importance of biofertilizers in increasing the production rate.
3) apply the knowledge of the production of biofertilizers
4) demonstrate the use of biofertilizers in the field.

References :

1. http://www.saiplatform.org/sustainable-agriculture/definition
2. **Raja N. (2013).** Biopesticides and biofertilizers: eco-friendly sources for sustainable agriculture. J Biofertil Biopestici, vol.4 (1).
3. **Soer 2015** — The European environment — state and outlook 2015
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Syllabus to be introduced from June 2024

Bachelor of Science (B. Sc.) Part - II

Plant Protection (Minor)

Semester-III

Skill Enhancement Course (SEC)

Practical Course -I &II(BPPP SEC.)

Sustainable Agricultural Practices

Course Objective:

The students will be able to…

1) familiarize with different organic composts

2. imparts knowledge about different methods of weed control.
3. understand the Knowledge about the preparation of biofertilizers.
4. acquire knowledge about the importance of organic fertilizers

Credits (2)	**BPPT-SEC: Sustainable Agricultural Practices**	**No. of hours (60)**
	1. Visit to Organic farm to study the various components, identification, and utilization of Organic products. 2-4. Preparation of Organic Compost-Over ground compost, Pit compost, Liquid compost, and Vermicompost. 5. Preparation of Neem products and other botanicals for Pest and disease control. 6. Weed control through organic way. 7. Soil analysis: pH determination. 8. Seed bed preparation, seed selection, and seedling preparation. 9. Method of application of different types of fertilizer and Green manure. 10. Preparation of Panchagavya 11-12. Organic crop production (Rice, Coconut) 13-14. Organic crop production methods Vegetables (Any Two) 15. Organic crop production methods Fruit crop -Banana,	

	16. Organic crop production methods Fruit crop- Mango 17. Organic crop production methods- spices ginger, 18 . Organic crop production methods- spices - turmeric, 19. Preparation of enriched compost 20. Report writing on products available as biopesticides, bioinsecticides, and Biofertilizers available in nearby markets.	

Course Outcomes:

The Students will be able to…

1) explain the types of biofertilizers used in the field.
2) discuss the importance of biofertilizers for increasing the production rate.
3) apply the knowledge of the production of biofertilizers .
4) demonstrate the use of biofertilizers in the field.

Reference Books:

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Syllabus to be introduced from June 2024

Bachelor of Science (B. Sc.) Part - II

Plant Protection (BPPTVEC)

Semester-III

BPPT-VEC-II: Environmental Studies in Plant Protection

Course Objectives:

The students should be able to:

1. understand the environmental issues.
2. relate that laws are made to safeguard the environment.
3. know the importance of sustainable development.
4. correlate knowledge of sustainable development with plant sciences.

Credits (02)	VEC Course -II (BPPTVEC-II): Environmental Awareness for Plant Scientist	No. of hours (30
Unit I	**Environmental issues** 1.1Pollution (Air, Water, and Land), 1.2 Fresh-water overuse, 1.3 Natural disasters, 1.4 Fuel and Energy shortage due to overuse, 1.5 Increase in wasteland, 1.6 Biodiversity loss, 1.7 Global warming and climate change (Causes and intensity of the problem), 1.8 role of Plant Protection in creation of environmental issues	08
Unit II	**Environmental laws and ethics** 2.1 Environmental Protection Act 2.2 Wildlife Protection Act 2.3 Forest Conservation Act 2.4 Prevention and Control of Pollution Act (Air, water and Land),2.5 From unsustainable to sustainable development, 2.6Responsibilities of an Environmentally aware citizen.	07
Unit III	**Sustainable Development Goals** 17 global sustainable goals	07
Unit IV	**Role of Plant Sciences in meeting the sustainable development goals.** Examples and case srudies	08

Course Outcomes:

The students will be able to:

1. explain the causes of environmental issues
2. discuss concepts related to environmental laws and ethics.
3. discuss the sustainable development goals.
4. Compare and analyze the importance of plant sciences in meeting the sustainable development goals.

References :

1. https://fdp-si.aicte-india.org/download/HVBE_for_NEP2020.pdf
2. **Ravikrishnan A**., Environmental Science and Engineering — Anna University of technology, Tindivanam.
3. **Samant J. S.,** Environmental Studies – Shivaji University Kolhapur.
4. **Bharucha Erach**, Environmental Studies - University Grants Commission New Delhi, and Bharati Vidyapeeth Institute of Environment Education & Research, Pune.
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6. **Bharucha Erach**, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R).
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Syllabus to be introduced from June 2024

(B. Sc.) Part - I: Plant Protection (Major)

Theory Course III (BPPT 241)

Semester IV

Insect Pests and their Management

Course Objectives:

The students should be able to…

1. know the basic knowledge about classification of insect pests
2. understand the knowledge about different types insect pest and their nature of damage
3. impart the knowledge about the losses caused by insect
4. learn the knowledge about management of insect pests.

Credits (2)	**Theory Course II(BPPT 241.)**	**No. of hours (30)**
Unit I	**Introduction to insect pests** 1.1 Definition and losses(qualitative and quantitative) caused by insect pests; 1.2 General characters of insect 1.3 Classification of insect pests based on 1.4 Nature of damage 1.5 Mouthparts 1.6 Metamorphosis	**(8)**
UNIT II	**Study of insect pests** 2.1 Study of following insect pests of different crops with reference to scientific name, Marks of identification, Nature of damage, Life cycle, management in the following: Jowar – Stem borer, Sugarcane – White grub, Gram– Pod borer, Mango – Jassids, Brinjal– Fruit borer, Rose – Aphids 2.2 Stored grain pests and their management with reference to scientific name, Marks of identification, Nature of damage, Life cycle, management in the following:	**(7)**

	Rice weevil, Pulse beetle	
UNIT III	**Management of Insect pests** 3.1 Principles of insect pest control; 3.2 Classification of insecticides based on mode of entry – stomach, contact, systemic, Mode of action – Respiratory, Nervous; 3.3 Chemical nature Inorganic and Organic Insecticides : Sulphur and Organophosphates. 3.4 Plant origin insecticides: Azadirechtin, Pyrethrin and Nicotine; 3.5 Nature of formulation – Dusts, Granules, Wettable powder ,Emulsifiable concentrates . 3.6 IPM-Integrated Pest Management .	**(8)**
UNIT IV	**Recent trends in pest management** Attractants;Repellants ;Antifeedants ;Pheromones; Chemosterilants; Precautionary measures used during pesticide application	**(7)**

Course outcome:

The students will be able to…

1. understand about the losses caused by insect pest
2. realize the importance of identification of insect pests.
3. apply the advanced techniques for insect management
4. compare the chemical based pesticide and biopesticide and then apply in field .

References :

1 .LP Pedigo, ME Rice, RK Krell - 2021 - **books**.google.com

2 .Vennila, S, Birah Ajanta, Kanwar Vikas, and C. Chartopadhyay. 2016. Success Stories of **Integrated Pest Management** in **India**. Edited by. Vennila, Birah Ajanta, ...

3 .INTEGRATED PEST MANAGEMENT (IPM): CONCEPT AND APPROACHES. June 2023. Authors: Rakesh Kumar at ICAR-IARI · Rakesh Kumar. ICAR-IARI. Akshay

4 .**A.S. Atwal and G.S. Dhaliwal**: Agricultural Insect pests of South Asia and their Management

5 . **B.V. David and V.V. Rammurthy:** Elements of Economic Entomology

6 .**Manishekharan and Sudarrajan** : Pest Management in Field Crops

7 **. Pedigo L.P**.: Entomology and Pest Management

8.**Venu Gopal Rao**: Insect Pest Management.

9. Principles and procedure of plant protection : Chattopadhyay

10 . Plant Protection by Mehrotra

11.Handbook of Agriculture – IARI New Delhi

12. Agronomy by Vaidya et. Al. continental Publication

13. Agricultural paste of south east Asia by Atwal and Dahiwal

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Syllabus to be introduced from June 2023

(B. Sc.) Part - II: Plant Protection (Major)

Theory Course IV (BPPT 242.)

Semester IV

Weeds and their management

Course objectives:

The students should be able to ……

1. know the knowledge about weeds.
2. understand the knowledge of identification and morphology of agronomical weeds.
3. learn about the different methods of management of weeds.
4. impart the knowledge about laboratory techniques.

Credits 4	**SEMESTER-IV** **Weeds and their management**	**No. of hours 30**
Credit –I **Unit-I:**	**Introduction of weeds** 1.1 Weeds – Definition and losses caused by weeds; 1.2 Classification of weeds based on Ontogeny, Ecology (ecological affinities, Soil type, Habitat, cotyledon number, soil pH), 1.3 Crop association; 1.4 Reproduction and mode of dispersal of weeds; 1.5 Study of parasitic and poisonous weeds.	**(10)**
Credit –1 **UNIT II**	**Study of following weeds with reference to**	**(10)**
	Gross morphology for weed identification, Reproduction, Ecology, Dispersal, Management	

	Parthenium hysterophorus, Argemone mexicana, Celosia argentea, Euphorbia hirta, Amaranthus spinosus, Alternanthera sessilis, Cyperus rotundus, Cynodon dactylon.	
Credit –1 UNIT III	**Methods of weed management**	**(15)**
	3.1 Mechanical methods - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching; **3.2** Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action, Study of weedicides with reference to properties, mode of action, formulation and uses of i) Glyphosate ii) Gramoxane (Paraquat). 3.3 Biological methods - Weed management by bacteria, fungi and insects.	
Credit –1 UNIT IV	**Weed biology**	**(10)**
	4.1 Weed physiology after application of herbicides; 4.2 Absorption and translocation of herbicides; 4.3 Mechanism of action of herbicides with reference to photosynthesis. 4.4 Concept of herbicide resistance.	

Course outcome:

The students will be able to…

1. realize the of harmful effect of weeds on crops
2. discuss about the importance of reproduction and dispersal of weeds .
3. demonstrate application methods for weed management .
4. explain identification of agricultural weeds based on morphology

References :

1. Khuspe V.S and Subbaiah R, A Compendium of Indian Weed Science Research, Metropolitan, New Delhi (1982)
2. Subramanaian S and Ali A.M, All About Weed Control, (2nd Edn.), Kalyani Pub., New Delhi (2011)
3. Joshi N.C, Manual of Weed Control, Research Publication, Delhi (1974)
4. Gupta O.P, Modern Weed Management, Agrobios Publications, India (2011)
5. Rao V.S. Principles of Weed Science, (2nd Edn.), Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (2000)
6. Gupta O.P., Scientific Weed Management, Today and Tomorrows, New Delhi (2011)

7. Robert H.A., Weed Control Handbook Principles, (9th Edn.), Blackwell Pub., New Delhi (1990)
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Syllabus to be introduced from June 2023

(B. Sc.) Part - II: Plant Protection (Major)

Practical Course III (BPPP243..)

Semester IV

Course Objectives:

The students should be able to…

1. know the basic knowledge about classification of insect pests
2. understand the knowledge about different types insect pest and their nature of damage
3. impart the knowledge about weeds.
4. impart the knowledge of identification and morphology of agronomical weeds.

Credits=	Practical course Based on Paper BPPT 241	No. of hours
Credit –--	**1. study of general characters of insect pests** **2. Study of following insect pests with reference to scientific name, life cycle, marks of identification, nature of damage and management in thefollowing:** 3. Jowar – Stem borer, 4. Sugarcane – White grub, 5. Gram– Pod borer, 6. Mango – Jassids, 7. Brinjal – Fruit borer, 8.Rose –Thrips **Study of following stored grain pests as per above points:** 9.Rice weevil, 10.Pulse bettle. **11.** Study of any two insecticides, with reference to chemical nature, mode of action and uses. 12. Study of any two bactericides and with reference to chemical nature, mode of action and uses. 13. Study of any two fungicides with reference to chemical nature, mode of action and uses.	

	14 Study of attractants (Any one from each group). 15. Study of repellents (Any one from each group 16 Technique of collection and preservation of insect pests 17 . Study of pesticide application equipment: Sprayer and Fogger. 18. Preparation of pesticides for application (Examples).	

Course outcome:

The students will be able to…

1. understand about the losses caused by insect pest
2. realize the importance of identification of insect pests.
3. apply the advanced techniques for insect management
4. compare the chemical based pesticide and biopesticide and then apply in field .

Reference Books:

1. Entomology and **pest** management
2. 1 .LP Pedigo, ME Rice, RK Krell - 2021 - **books**.google.com
3. .Vennila, S, Birah Ajanta, Kanwar Vikas, and C. Chartopadhyay. 2016. Success Stories of **Integrated Pest Management** in **India**. Edited by. Vennila, Birah Ajanta, ...
4. .Integrated Pest Management (IPM):Concept and Approaches. June 2023. Authors: Rakesh Kumar at ICAR-IARI · Rakesh Kumar. ICAR-IARI. Akshay
5. .**A.S. Atwal and G.S. Dhaliwal**: Agricultural Insect pests of South Asia and their Management
6. . **B.V. David and V.V. Rammurthy:** Elements of Economic Entomology
7. .**Manishekharan and Sudarrajan** : Pest Management in Field Crops
8. **. Pedigo L.P**.: Entomology and Pest Management
9. **Venu Gopal Rao**: Insect Pest Management.
10. Principles and procedure of plant protection : **Chattopadhyay**
11. . Plant Protection by **Mehrotra**
12. .Handbook of Agriculture **– IARI New Delhi**
13. Agronomy by **Vaidya et. Al.** continental Publication
14. Agricultural paste of south east Asia by **Atwal and Dahiwal**

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(B. Sc.) Part - II: Plant Protection (Major)

Practical Course IV (BPPT244)

Semester IV

Course objectives:

The students should be able to ……

1. know the knowledge about weeds.
2. understand the knowledge of identification and morphology of agronomical weeds.
3. learn about the different methods of management of weeds.
4. impart the knowledge about laboratory techniques.

Credits (2)	Based on Paper BPPT 242	No. of hours per (60)
1. Credit ---	1. study of morphological characters for identification of weeds **Study of the following weeds regarding gross morphology for**	**20. (----)**

	identification, reproduction, dispersal, and management: 2. **Dicot weeds**: Argemone Mexicana, 3. Parthenium hysterophorus, 4. Amaranthus spinosus, 5. 5.Alternanthera sessilis, 6. Euphorbia sp., 7. Celosia argentea, 8. **Monocot weeds**: Cyperus rotundus, 9. Cynodon dactylon 10. .Estimation of seeds by seed count method *Argemone mexicana*, *Celosia argentia* or any locally available weed as per syllabus 11. Study of mode of dispersal in following weeds: *Parthenium hysterophorus*, *Tridax procumbens*, *Xanthium stromarium*, *Alternanthera* sp., *Achyranthus aspera*, *Cyanodon dactylon* 12. Study of weedicides with reference to properties, mo de of action formulation, and uses of Glyphosate and Gramoxane **Study of recent trends in pest management** 13. Attractants and Repellants ; 14. Antifeedants and Pheromones; 15. Chemosterilants; 16. Study of any two equipments used for weed management. 17. Herbarium technique in weed. 18. Survey of Weeds In Crop Fields from different habitats 19. Visit to agricultural field/ institute……..	

Course outcome:

The students will be able to …….

1. realize the importance of identification of insect pests.
2. apply the advanced techniques for insect management

3. discuss about the importance of reproduction and dispersal of weeds
4. explain identification of agricultural weeds based on morphology

Reference Book :

1. Gupta O.P, Modern Weed Management, Agrobios Publications, India (2011)
2. Rao V.S. Principles of Weed Science, (2nd Edn.), Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (2000)
3. Gupta O.P., Scientific Weed Management, Today and Tomorrows, New Delhi (2011)
4. Robert H.A., Weed Control Handbook Principles, (9th Edn.), Blackwell Pub., New Delhi (1990)
5. King L.J., Weed of The World, (1st *Edn.*), Wiley Eastern, Mumbai (1966)
6. Thakur C., Weed Science, (2nd Edn.) Metropolitan, New Delhi (1984).
7. 5 . **B.V. David and V.V. Rammurthy:** Elements of Economic Entomology
8. 6 .**Manishekharan and Sudarrajan** : Pest Management in Field Crops
9. 7 **. Pedigo L.P**.: Entomology and Pest Management
10. 8.**Venu Gopal Rao**: Insect Pest Management.
11. Principles and procedure of plant protection : Chattopadhyay
    a. . Plant Protection by Mehrotra
12. 11.Handbook of Agriculture – IARI New Delhi
13. Agronomy by Vaidya et. Al. Continental Publication
14. Agricultural paste of southeast Asia by Atwal and Dahiwa

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(B. Sc.) Part - II: Plant Protection (Minor)

Theory Course IV (BPPT245)

Semester IV

Weeds management in Horticultural crops

Course objectives:

The students should be able to ……

1. know the knowledge about weeds.
2. understand the knowledge of identification and morphology of agronomical weeds.
3. learn about the different methods of management of weeds.
4. impart the knowledge about laboratory techniques.

Credits=4	SEMESTER-IV BPPT 245. Weeds management in Horticultural crops	No. of hours per unit/ credits

Credit –I **Unit-I:**	**Introduction of weeds**	**(….)**
	1.1 Weeds – Characteristics of weeds, Definition and losses caused by weeds; 1.2 Classification of weeds based on Ontogeny, Ecology (ecological affinities, Soil type, Habitat, cotyledon number, soil pH), 1.3 Reproduction and mode of dispersal of weeds; 1.4 Harmful and Beneficial effects of Weeds. 1.5 Allelopathic effects of weeds on Crops	
Credit –1 **UNIT II**	**Study of following weeds with reference to**	**(…)**
	Gross morphology for weed identification, Reproduction, Ecology, Dispersal, Management in horticultural crops *Parthenium hysterophorus,* *Argemone mexicana*, *Cassia tora* *Datura metal* *Euphorbia geniculate* *Lantena camera* *Cyperus rotundus*, *Cynodon dactylon*.	
Credit –1 **UNIT III**	**Methods of weed management**	**(…)**
	3.1 Mechanical methods - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching; **3.2** Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action, Study of weedicides with reference to properties, mode of action, formulation and uses of 2-4 D, Glyphosate 3.3 Biological methods - Weed management by bacteria, fungi and insects.	
Credit –1 **UNIT IV**	**Weed Management in Horticultural crops**	**(….)**
	Tropical and Subtropical fruit crops: Mango, Banana ,Pineapple, Grape, Papaya, Citrus, Guava IWM (Integrated weed management)	

Course outcome:

The students will be able to ……

1. realize the importance of identification of insect pests.
2. apply the advanced techniques for insect management
3. discuss about the importance of reproduction and dispersal of weeds
4. explain identification of agricultural weeds based on morphology

References :

1. Khuspe V.S and Subbaiah R, A Compendium of Indian Weed Science Research, Metropolitan, New Delhi (1982)
2. Subramanaian S and Ali A.M, All About Weed Control, (2nd Edn.), Kalyani Pub., New Delhi (2011)
3. Joshi N.C, Manual of Weed Control, Research Publication, Delhi (1974)
4. Gupta O.P, Modern Weed Management, Agrobios Publications, India (2011)
5. Rao V.S. Principles of Weed Science, (2nd Edn.), Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (2000)
6. Gupta O.P., Scientific Weed Management, Today and Tomorrows, New Delhi (2011)
7. Robert H.A., Weed Control Handbook Principles, (9th Edn.), Blackwell Pub., New Delhi (1990)
8. King L.J., Weed of The World, (1st *Edn.*), Wiley Eastern, Mumbai (1966)
9. Thakur C., Weed Science, (2nd Edn.) Metropolitan, New Delhi (1984).
10. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=12067

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(B. Sc.) Part - II: Plant Protection (Minor)

Theory Course IV (BBPT 246)

Semester IV

Weeds management in Horticultural crops

Course objectives:

The students should be able to ……

1. know the knowledge about weeds.
2. understand the knowledge of identification and morphology of agronomical weeds.
3. learn about the different methods of management of weeds.
4. impart the knowledge about laboratory techniques.

Credits=	**Based on Paper BPPT 245**	**No. of hours per unit/ credits**
	1. Identification of Weeds. (Based on morphological characters) 2. **Study of following weeds with reference to gross**	22. **(---)**

morphology for identification, reproduction, dispersal and management:

3. **Dicot weeds**: *Argemone Mexicana,*
4. *Parthenium hysterophorus,*
5. *Amaranthus spinosus,*
6. *Alternanthera sessilis,*
7. *Euphorbia* sp.,
8. *Celosia argentea,*
9. **Monocot weeds**: *Cyperus rotundus,*
10. *Cynodon dactylon*
11. Study of following weeds with reference to estimation of seeds by seed count method *Argemone mexicana*, *Celosia argentia* or any locally available weed as per syllabus
12. Study of mode of dispersal in following weeds: *Parthenium hysterophorus, Tridax procumbens, Xanthium stromarium, Alternanthera* sp., *Achyranthus aspera*, *Cyanodon dactylon*
13. ***Study of Biological method for weed management .***
14. ***Study of horticultural crops and their weed management .***
15. Mango, Banana ,
16. Grape, Papaya,
17. .Citrus, Guava
18. **Study of weedicides with reference to properties, mode of action formulation and uses of**

Glyphosate and Gramoxane

19. Herbarium technique in weed.
20. Survey of Weeds In Crop Fields from different habitats
21. Visit to agricultural field/ institute……

Course outcome:

The students will be able to ……

1. realize the importance of identification of insect pests.
2. apply the advanced techniques for insect management
3. discuss about the importance of reproduction and dispersal of weeds
4. explain identification of agricultural weeds based on morphology

References:

1. Khuspe V.S and Subbaiah R, A Compendium of Indian Weed Science Research, Metropolitan, New Delhi (1982)
2. Subramanaian S and Ali A.M, All About Weed Control, (2nd Edn.), Kalyani Pub., New Delhi (2011)
3. Joshi N.C, Manual of Weed Control, Research Publication, Delhi (1974)
4. Gupta O.P, Modern Weed Management, Agrobios Publications, India (2011)
5. Rao V.S. Principles of Weed Science, (2nd Edn.), Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (2000)
6. Gupta O.P., Scientific Weed Management, Today and Tomorrows, New Delhi (2011)
7. Robert H.A., Weed Control Handbook Principles, (9th Edn.), Blackwell Pub., New Delhi (1990)
8. King L.J., Weed of The World, (1st *Edn.*), Wiley Eastern, Mumbai (1966)
9. Thakur C., Weed Science, (2nd Edn.) Metropolitan, New Delhi (1984).
10. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=12067

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Syllabus to be introduced from June 2024

Bachelor of Science (B. Sc.) Part - I: Plant Protection (VSC)

Semester IV

Post Harvest Management

Practical Course II (BPPTVSC)

Course Outcomes:

The students will be able to…

1. understand the knowledge about losses caused during handling of fruit/vegetables
2. learn about preservation methods after harvesting fruits/vegetables.
3. acquire knowledge about different methods used for the preparation of jam/jelly.
4. learn about different diseases that occur on fruits.

Credits (2)	Practical Course II (BPPTVSC) Practicals based on Course	No. of hours 30 Hrs.
	1. Study of Impact on post-harvest losses caused during handling.	

	2. Study of a flow chart for post-harvest handling of fruits and vegetables. 3. Study of types of harvesting methods. 4. Study of methods of post-harvest handling. 5. Study of types and methods of wax application. 6. Study of types of packaging. 7. Study of storage – traditional/low-cost and modern storage methods. 8. Study of maturity index for fruits and vegetables. 9. Study of types of storage containers. 10. Study of types of handling protocol for selected fruit : a) Amla- b) Apple- c) Tomato- d) Sapota- 11. Study of post-harvest disease management. 12. Study of storage of papaya. 13. Study of preparation of jam. 14. Study of preparation of jelly. 15. Study of preparation of RTS (ready to serve), nectar (lemon juice) and papaya RTS. 16. Study of preparation of squash and syrup orange. 17. Study of preparation of tomato ketchup/sauce/puree/paste. 18. Study of layout and packing of pack house. 19. Study of layout and planning of processing unit. 20. Visit to processing unit.	

Course Outcomes:

The students will be able to…

1. know about the economic importance of fruits /vegetables.
2. identify the types of diseases that occur in fruits /vegetables.
3. update the knowledge about storage and packaging of post-harvest products.
4. Apply the knowledge about the preparation of jam/jelly.

References :

1."Post-harvest Physiology of Food Crops" by W G Burton

2. Post Harvest Technology for Cereals, Pulses and Oilseeds" by Chakraverty A

3. ."Post-Harvest Diseases and Disorders of Fruits and Vegetables: Volume 2: Vegetables" by Anna L Snowden

4. Crop Post–Harvest: Science and Technology: Principles and Practice" by Peter Golob and Graham Farrell

5. "Postharvest Technology and Food Process Engineering" by Amalendu Chakraverty and R Paul Singh

6. ."Post Harvest Technology of Horticultural Crops" by Adel Kader

Karmaveer Bhaurao Patil University, Satara

Yashavantrao Chavan Institute of Science, Satara

Syllabus to be introduced from June 2023

Bachelor of Science (B. Sc.) Part - I: Plant Protection (BPPTSEC)

Semester IV

Soil and Water Management

Practical Course II (BPPTSEC) Semester IV

Course Objectives:

The students should be able to…

1. understand the basic knowledge about Soil and water management.
2. update the knowledge of agricultural soil management.
3. acquire the knowledge about sustainable utiization of water.
4. apply the learnings to the day to day agricultural practices and life.

Credits (2)	Practical Course (BPPTSEC) Soil and Water Management	No. of hours per unit/ credits
	1. Study of agricultural soil management. 2. Identification of different types of soil erosion in India. 3. Study of physical properties of soil: soil colour and water holding capacity. 4. Study of soil types in Maharastra. 5. Study and identification of plants helping to prevent soil erosion. 6. Identification of soil horizons. 7. Study of agricultural soil analysis parameters. 8. Study of problem of Wind erosion of soil. 9. Study of types of soil waters. 10. Identification of soil and water conservation strategies. 11. Study of challenges in front of water management/conservation. 12. Study of Maharashtra Government scheme ‘Jalyukta Shivar’. 13. Study of management methods to recharge ground water level. 14. Study and scrutiny of rain water harvesting method. 15. Study of factors affecting suitability of irrigation water. 16. Study of water conservation practices in irrigation.	(30)

	17. Preaparation of irrigation plan for a rainfed agricultural field. 18. Visit to a soil and water analysis laboratory. 19. Srudy of roles and responsibilities of soil and water analyst. 20. Water conservation through adapting practical water saving habits.	

Course Outcomes:
The students will be able to…

1. explain the basic concepts of sustainable water conservation.
2. understand concept of soil conservation for sustainable development.
3. discuss about the knowledge of management of natural resources.
4. learn about soil and water conservation methods and their applications in agriculture.

References :

1. Kateja Alpana. 2019. Water Resource Management: Problems and Prospects. Rawat Publications, Rajasthan.
2. .R. Sharma and A.K. Bera. 2018. Realizing Water Resource Management in India: Localizing Governance, Geospatial Data and Enabling Environment for Development. Rawat Publications, Rajasthan.
3. Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. Soil Fertility and fertilizers. 7th Ed. Prentice Hall.
4. Prasad R & Power JF. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.
5. Yawalkar KS, Agrawal JP & Bokde S. 2000. Manures and Fertilizers. Agri-Horti Publications.
6. Miller C.E. and Turk L.M. 1972. Fundamentals of Soil Science. Biotech Books Pvt Ltd.
7. Rathinasamy A. and B. Bakiyathu Saliha. 2017. Fundamentals of Soil Science. Scientific Publishers, Jodhpur, India.
8. Das D. K. 2021. Introductory Soil Science. Kalyani Publishers, New Delhi.
9. Satyanarayana E. 2020. Glimpse of Soil Science. Narendra Publishing House.
10. Mishra B. 2007. Management of Soil Quality for Sustainable Agriculture. Satish Serial Publishing House.