

**Rayat Shikshan Sanstha's
YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE,
SATARA**

(AN AUTONOMOUS COLLEGE)

Reaccredited by NAAC with 'A+' Grade

Bachelor of Science

Part - II

Plant Protection

Syllabus

To be implemented w .e. f. June, 2022-23

Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

Syllabus introduced from June 2022

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

Botany (Plant Protection)

Semester: III

BBPT 301 Plant Pathology

Course objectives: 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=4	Theory Paper I (BBPT 301) Plant Pathology	No. of hours per unit/ credits
Credit –I Unit-I:	<p style="text-align: center;">Concept of Plant diseases</p> <p>1.1 Definition and concept of disease,</p> <p>1.2 Terminologies in Plant Pathology: Host, pathogen, pathogenecity, pathogenesis, symptoms, infection, inoculum, incubation period, Etiology, susceptibility, immunity, hypersensitivity, resistance, Disease Cycle, hypertrophy, hyperplasia.</p> <p>1.3 Classification of plant diseases:</p> <p>1.4 Based on a) Pathogens, b) Symptoms, c) Severity of disease; sporadic, epidemic and epiphytotic,</p>	12

	<p>d) Transmission of pathogens through seed, soil, air and insects.</p> <p>1.5 Types of culture media & Sterilization methods.</p> <p>1.6 Methods of studying plant pathogens: Koch's Postulates.</p>	
Credit –1 UNIT II	Mechanism of Penetration and Plant infection	06
	<p>2.1 Mechanism of Penetration and infection.</p> <p>2.2 Mode of infection and Factors affecting infection</p>	
Credit –1 UNIT III	Study of selected plant diseases w.r.t symptoms, causal organisms and disease management.	16
	<ul style="list-style-type: none"> * 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	11
	<p>4.1 Mechanical method: Eradication;</p> <p>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;</p> <p>4.3 Cultural technique</p> <p>4.4 Biological method of disease management.</p>	

Course Outcomes: Students are able to:

1. Understand concepts of plant protection.
2. Understand basic terminologies used in plant protection.
3. Understand Mechanism of plant infection. mode of infection of plant disease
4. Imbibe the agricultural crop diseases. Management of crop diseases., the pathophysiological skills.

References:

1. Bilgrami KS, Textbook of Modern Plant Pathology, New edition, New Delhi (1990) Unit I
2. Aneja KR, Experiments in Microbiology Plant Pathology and Tissue Culture, New Age International (P) Ltd. Publishers, New Delhi (2005). Unit II
3. Mehrotra RS and Aggarwal A, Fundamentals of Plant Pathology, McGraw-Hill Education Pvt. Ltd., New Delhi (1980). Unit III
4. Jain VK, Laboratory Manual of Plant Pathology, Oxford Book, Calcutta (2009)
5. Agrios G.N, Plant Pathology, (5thEdn.), Academic Press, San Diego (2005)
6. Butler & Edwin, Plant Pathology, , Macmillan & Co. (1949). Unit III
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). Unit IV

Botany (Plant Protection)
Semester: III
(BBPT 302) Plant Pathology

Learning objectives: Students will able to

1. Understand concept and importance of plant protection.
2. Study gross morphology & agronomy of agricultural crops.
3. Understand the different methods of plant protection.
4. Imbibe the knowledge about the recent methods of plant protection.

Credits=4	Theory Paper I (BBPT 302) Plant Pathology	No. of hours per unit/credits
Credit –I Unit-I:	Introduction of plant protection and study of crops	12
	Introduction and importance of plant protection; Study of agronomical practices with reference to following crops: Cereals – Jowar, Oilseed crops –Groundnut, Pulse crops – Gram, Cash crops – Sugarcane	
Credit –1 UNIT II	Study of horticultural crops	06
	Study of agronomical practices with reference to following crops: Fruit crop – Mango, Vegetable crops –Brinjal, Spices –Chilli, Floriculture – Marigold; Eco-friendly Agricultural practices: Green manuring Bio fertilizers and its types, Biofungicides, Biopesticides /Bioinsecticides	

Credit –1 UNIT III	Methods of plant disease management	16
	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 Rhodenticides	
Credit –1 UNIT IV	Management of crop diseases	11
	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.	

Learning outcomes: Students are able to:

1. Understand concept and importance of plant protection and describe gross morphology and agronomy of agricultural crops Floricultural crops and fruit crops
2. Study the different methods of plant protection.
3. Understand the concept of integrated disease management.
4. Explain the development of crop resistance.

PRACTICAL COURSE
BBPP 303 Weeds and their management

Course Objectives: Student will be able to:-

1. Understand fundamentals of plant pathology, how to study any disease and pathogen.
2. Understand the knowledge of study of any plant pathogen.
2. To aware and teach students about technique used to determine amino acids by paper chromatography.
3. To aware and teach students about determination of sucrose percentage by hand refractometer.
4. Understand agronomic studies of crops
5. To enlighten students with the knowledge of eco-friendly sustainable agriculture.

Credits II	Based on Paper 301	No. of hours per unit/ credits
Credit I	<p>1-5.Study of following diseases in crops with reference to host, causal organism, symptoms and management. Yellow vein mosaic of Okra (Bhendi), Little leaf of Brinjal, Citrus canker, Rust of Sugarcane, White rust of <i>Amaranthus</i> / Crucifers, Rust of Wheat, Rust of Soybean, Grain smut of Jowar, Tikka disease of Groundnut, Powdery mildew of <i>Gerbera</i></p> <p>6-7. Sterilization and Preparation of PDA culture medium.</p> <p>8-9. Soil dilution technique- Serial Dilution, Isolation, Inoculation and identification of soil fungi.</p> <p>10. Separation of amino acids from healthy and diseased plants using paper chromatography technique.</p> <p>11. Determination of sucrose percentage by Hand refractometer in Sugarcane and Grape.</p>	
	Based on Paper 302	
Credit I	12-17. Agronomic studies of following crops with reference to gross	

	<p>morphology for crop identification and agronomic conditions-Jowar, Groundnut, Gram, Sugarcane, Mango, Brinjal, Chilli, Gerbera. 18-19.Eco friendly agrobiochemicals: Green manuring: Sunhemp and Delchi; Biofertilizers: Azolla and Nostoc; Biopesticides: Azadirachtin and Pyrethrin. 20. Tourreport /Excursions/ Visits to Agricultural institutes/ Polyhouse</p> <p>Agronomic studies of following crops with reference to gross morphology for crop identification and agronomic conditions-Jowar, Groundnut, Gram, Sugarcane, Mango, Brinjal, Chilli, <i>Gerbera</i>.</p> <p>18-19.Eco friendly agro-bio-chemicals: Green manuring: Sun hemp and Delchi; Biofertilizers: <i>Azolla</i> and <i>Nostoc</i>; Biopesticides: Azadirachtin and Pyrethrin.</p> <p>20. Tour report /Excursions/ Visits to Agricultural institutes/ Polyhouse</p>	
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Learning outcomes: Students will be able to

1. Understand about identification of diseases with symptoms and by nature of damage.
2. Study of any plant pathogen by different techniques
3. Understand amino acids by paper chromatography.
4. Understand sucrose percentage by hand refractometer
5. Understand agronomic conditions of crops
6. Understand eco-friendly methods of Crop management.

Semester: IV

BBPT 401: Insect pests and their management

Course objectives: Students are able to

1. Understand concept of entomology.
2. Study identification of agronomical pests.
3. Understand the different methods of management of insect pests.
4. Study formulations of insecticides.

Credits=4	SEMESTER-IV	No. of hours per unit/ credits
Credit –I Unit-I:	Introduction to insect pests	10
	Definition and losses(qualitative and quantitative) caused by insect pests; General characters of insect Classification of insect pests based on Nature of damage, Mouthparts, Metamorphosis	
Credit –1 UNIT II	Study of insect pests	10
	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 Stored grain pests and their management with reference to scientific name, Marks of identification, Nature of damage, Life cycle, management in the following: Rice weevil, Pulse beetle	
Credit –1 UNIT III	Management of Insect pests	15
	Principles of insect pest control; Classification of insecticides based on mode of entry – stomach, contact, systemic, Mode of action – Respiratory, Nervous; Chemical nature Inorganic and Organic : Sulphur and Organophosphates; Plant origin insecticides: Azadirectin, Pyrethrin and Nicotine; Nature of formulation – Dusts, Granules, Wettable powder ,Emulsifiable	

	concentrates; IPM-Integrated Pest Management	
	Recent trends in pest management	10
Credit –1 UNIT IV	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.	

Learning outcome: Students will able to

1. Understand the identification and classification of agricultural pests
2. Understand agricultural pests; explain the identification of stored grain pests.
3. Study different methods of management of insect pests. Explain formulations of insecticides.
4. Understand recent trends in pest management, explain the precautionary measures used during pesticide application.

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Semester: IV

Theory Paper IV (BBPT 402) Weeds and their management

Course objectives: Students will be able to

1. Study about weeds.
2. Understand identification and morphology of agronomical weeds.
3. Understand about the different methods of management of weeds.
4. Study laboratory techniques.

Credits=4	SEMESTER-IV BBPT 402 Weeds and their management	No. of hours per unit/ credits
Credit –I Unit-I:	Introduction of weeds	(10)
	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.	
Credit –1 UNIT II	Study of following weeds with reference to	(10)
	Gross morphology for weed identification, Reproduction, Ecology, Dispersal, Management <i>Partheniumhysterophorus, Argemonemexicana, Celosia argentea,</i>	

	<i>Euphorbia hirta, Amaranthus spinosus, Alternanthera sessilis, Cyperus rotundus, Cynodon dactylon.</i>	
Credit –1 UNIT III	Methods of weed management	(15)
	<p>3.1 Mechanical methods - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching;</p> <p>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).</p> <p>3.3 Biological methods - Weed management by bacteria, fungi and insects.</p>	
	Weed biology	(10)
Credit –1 UNIT IV	<p>4.1 Weed physiology after application of herbicides;</p> <p>4.2 Absorption and translocation of herbicides;</p> <p>4.3 Mechanism of action of herbicides with reference to photosynthesis.</p> <p>4.4 Concept of herbicide resistance.</p>	

Learning outcome: Students are able to:

1. Study morphology of weeds. Ecology of weeds.
2. Understand identification of agricultural weeds based on morphology.
3. Study the traditional methods of weed control. Different methods of management of weeds. Illustrate laboratory techniques.
4. Understand physiology on application of herbicides.

References:

1. Khuspe V.S and Subbaiah R, A Compendium of Indian Weed Science Research, Metropolitan, New Delhi (1982) Unit I
2. Subramanaian S and Ali A.M, All About Weed Control, (2ndEdn.), Kalyani Pub., New Delhi (2011) Unit II
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, (2ndEdn.), Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi (2000) Unit III
6. Gupta O.P., Scientific Weed Management, Today and Tomorrows, New Delhi (2011)
7. Robert H.A., Weed Control Handbook Principles, (9thEdn.), Blackwell Pub., New Delhi (1990). Unit IV
8. King L.J., Weed of The World, (1stEdn.), Wiley Eastern, Mumbai (1966)
9. Thakur C., Weed Science, (2ndEdn.) Metropolitan, New Delhi (1984). Unit I-IV

**BBPT 403 Weeds and their management
PRACTICAL COURSE**

Course Objectives: Student will be able to:-

1. Understand fundamentals of entomology, how to study and identify any insect pest.
2. Study insecticides, bactericides, fungicides attractants and repellents.
2. Understand technique of collection and preservation of insect pests.
3. Study preparation of pesticides for application.
4. Understand weeds with reference to gross morphology for identification, reproduction, dispersal and management
5. To enlighten students with the knowledge of estimation of seeds and mode of dispersal weeds


Credits II	Based on Paper 402	No. of hours per unit/credits
Credit I	<p>1-4. Study of following insect pests with reference to scientific name, life cycle, marks of identification, nature of damage and management in the following: Jowar – Stem borer, Sugarcane – White grub, Gram– Pod borer, Mango – Jassids, Brinjal – Fruit borer, Rose –Thrips</p> <p>5-6 Study of following stored grain pests as per above points: Rice weevil, Pulse beetle.</p> <p>7-8. Study of any two insecticides, bactericides and fungicides with reference to chemical nature, mode of action and uses.</p> <p>9. Study of attractants and repellents (Any one from each group).</p> <p>10. Technique of collection and preservation of insect pests.</p> <p>11. Study of pesticide application equipment: Sprayer and Fogger.</p> <p>12. Preparation of pesticides for application (Examples).</p>	
Credit I	<p>13-16 Study of following weeds with reference to gross morphology for identification, reproduction, dispersal and management:</p> <p>Dicot weeds: <i>Argemone Mexicana</i>, <i>Parthenium hysterophorus</i>, <i>Amaranthus spinosus</i>, <i>Alternanthera sessilis</i>, <i>Euphorbia</i> sp., <i>Celosia argentea</i>,</p> <p>Monocot weeds: <i>Cyperus rotundus</i>, <i>Cynodon dactylon</i></p>	

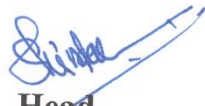
	<p>17. Study of following weeds with reference to estimation of seeds by seed count method <i>Argemone mexicana</i>, <i>Celosia argentia</i> or any locally available weed as per syllabus</p> <p>18. Study of mode of dispersal in following weeds: <i>Parthenium hysterophorus</i>, <i>Tridax procumbens</i>, <i>Xanthium stromarium</i>, <i>Alternanthera sp.</i>, <i>Achyranthus aspera</i>, <i>Cyanodon dactylon</i></p> <p>19. Study of weedicides with reference to properties, mode of action formulation and uses of Glyphosate and Gramoxane</p> <p>20. Herbarium technique in weed.</p> <p>21. Visit to agricultural field/ institute.</p>	
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Learning outcomes: Students will be able to

1. Understand identify the insect pest with the help of marks of identification and by studying life cycle pattern of any insect pests.
2. Study control insect and stored grain pests.
3. Understand collect and preserve insect pest for further study.
4. Understand formulate pesticide for application.
5. understand identify weeds by studying gross morphology and by ecology.
6. Imbibe prepare herbarium.

In charge
B. Sc. II Plant Protection


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