RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

AFFILIATED TO

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Syllabus

(2022-2023)

Under CBCS

Two Year Degree Program Botany

Department of Botany

M.Sc.-II

Semester-III and IV

Syllabi Approved by the Board of Studies in Botany

With Effect from, June 2022

SEMESTER: III

Course No.	Course code	Core Course Title	L/ P	Marks		Total	Credits
				Internal Evaluation	External Evaluation		
BOCC-9	P-ANS-372	Angiosperms Systematics	60	40	60	100	04
BOCC-10	P-MOB-373	Molecular Biology	60	40	60	100	04
BOCC-11	P-PBG-374	Plant Biotechnology and Genetic Engineering	60	40	60	100	04
BODSE-1	P-PLP-375	Plant Pathology-I/Genetics-I/Plant Biotechnology- I	60	40	60	100	04
BOLC-IX	P-LAC-376	Lab course on Angiosperms Systematics	15	20	30	50	02
BOLC-X	P-LAC-377	Lab course on Molecular Biology	15	20	30	50	02
BOLC-XI	P-LAC-378	Lab course on Plant Biotechnology and Genetic Engineering	15	20	30	50	02
BOLC-XII	P-LAC-379	Lab course on Plant Pathology-I/Genetics-I/Plant Biotechnology- I	15	20	30	50	02
	P-SEM-380	Students Seminars-III				25	01
Total						**625**	**25**

SEMESTER: IV

Course No.	Course code	Core Course Title	L/P	Marks		Total	Credits
				Internal Evaluation	External Evaluation		
BOCC-13	P-CPB-468	Cytogenetics and Plant Breeding	60	40	60	100	04
BOCC-14	P-PLN-469	Immunology, Plant Nanotechnology and Forensic Botany	60	40	60	100	04
BODSE-2	P-PLP-470	Plant Pathology-II / Genetics-II / Plant Biotechnology-II	60	40	60	100	04
BODSE-3	P-PLP-471	Plant Pathology-III / Genetics - III/ Plant Biotechnology-III	60	40	60	100	04
BOLC-XIII	P-LAC-472	Lab course on Cytogenetics and Plant Breeding and Immunology, Plant Nanotechnology and Forensic Botany	15	20	30	50	02
BOLC-XIV	P-LAC-473	Lab course on Plant Pathology-II and Plant Pathology-III	15	20	30	50	02
PROJECT	P-PRW-474	Project (Dissertation/Review writing		40	**60**	100	04
	P-SEM-475	Students Seminars-IV				25	01
					Total	**625**	**25**
Grand Total of Marks and Units of all Semesters						**2500**	**100**

BOCC=Botany Core Course, BODSE-Botany Discipline Specific Elective, BOLC=Botany Laboratory Course, L/P=Lectures / Practical

S.N. Shinde
Chairman
Board of studies in Botany
Rajarshi Shahu Mahavidyalaya (Autonomous), Latur.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR M. Sc. Second Year

Semester –III

BOTANY

BOCC-IX: Angiosperms Systematics

Lectures – 60 Maximum Marks – 100 Credits:04 **Course Code: P-ANS-372**

Objectives:

1. To understand the plant identification key concept and application.
2. Provide knowledge to distinguish species on morphology and anatomy basis.
3. They will be able to perform sectioning of various ovules.
4. Able to develop approach for embryology study.

Course Outcomes

1. Understand the systems of classification of angiosperms, nomenclature and interdisciplinary approaches
2. Recognize members of the major angiosperm families by identifying their diagnostic features and economic importance.
3. Provide lab based training in writing short species description and illustration.
4. Understanding of plant morphology, terminologies and identifying morphological peculiarities.

Credit – I: Morphology of Angiosperms-I (15L)

1. Root and its modifications.

2. Stem and its modifications.

3. Leaf: Typical leaf (Hibiscus), Types, Phyllotaxy, Venation and modifications.

4. Inflorescence and its types.

5. Flower: Types of flower, Calyx, Corolla, Androecium and Gynoecium. Floral formula and Floral diagram.

Credit - II: Modern Trends in Taxonomy and Classification (15L)

1. Aims, principles and practices in taxonomy. Botanical Nomenclature: Brief history, Scientific name ICN, Principles, Taxonomic hierarchy.
2. Taxonomy in relation to morphology and anatomy.
3. Overview of pre- and post-Darwinian systems of classification.
4. Artificial systems of classification - Linnaeus.
5. Natural system of classification - Bentham and Hooker.
6. Phylogenetic systems of classification – Takhtajan.

Credit- III: Study of Families-I (15L)

(Systematic position, general characters, distinguishing features, floral formula, floral diagram and economic importance).

A) Polypetalae:

1. Ranales -Annonaceae.
2. Malvales- Malvaceae.
3. Geraniales- Rutaceae.

4.PassifloralesCucurbitaceae.

B) Gamopetalae:

1. Rubiales – Rubiaceae,.
2. Personales Bignoniaceae.
3. Lamiales –Verbenaceae

Credit - IV: Study of Families-II (15L)

(Systematic position, general characters, distinguishing features, floral formula, floral diagram and economic importance).

A) Apetalae:

1.Curvembryae – Amarantaceae.

2. Unisexuales -Euphorbiaceae.

B) Monocotyledonae:

1.Microspermae- Orchidaceae.

2. Epigynae – Musaceae.

3. Coronarieae –Commelinaceae.
4. Nudiflorae – Typhaceae.

Reference Books:

1. Agashe, S.N. 1995. Paleobotany, Oxford and IBH Publ. Co. Pvt. Ltd, New Delhi.
2. Bhojwani, S.S. and Bhatnagar, S.P. 1984. Embryology of Angiosperms.Vikas Publ. House, New Dehli.
3. Briggs, David. 2009. Plant microevolution and Conservation in Human-influenced Ecosystems. Cambridge University Press.
4. Cooke, T. 1903-1908. The Flora of Presidency of Bombay, Vol. I-III.
5. Cronquist, A. 1981.An Integrated System of Classification of Flowering Plants. Columbia University Press, New York.
6. Cronquist, A. 1988. The Evolution and Classification of Flowering Plants (2nded.) AllenPress, U.S.A.
7. Davis, P. H. and V. H. Heywood 1991.Principles of Angiosperm Taxonomy.Today andTomorrow Publications, New Delhi.
8. Eames A.J. 1961. Morphology of Angiosperms, McGraw Hill Book Co.
9. Erdtman, G. 1966. Pollen Morphology and Plant Taxonomy of Angiosperms (An introduction to Palynology I), HafnerPub.Co. London.
10. Fahn, A. 1979. Plant Anatomy, Pergamon Press, London.
11. Hickey, M. and King, C. 2000. The Cambridge Illustrated Glossary of Botanical Terms. Cambridge University Press, UK.
12. Hutchinson, J. 1959. Families of Flowering plants. Clarendon Press, Oxford.
13. Jain S.K. and Rao R.R. 1976.Handbook of Field and Herbarium Methods, Today and Tomorrow Publishers, New Delhi.

14. Johri, B. M. 1984. Comparative embryology of Angiosperms. Ind. Nat. Sc. Acad. New Delhi.

15. Jones, S. B. and Luchinger A.E. 1986. Plant Systematics 2ndedn, McGraw Hill Book Co.

16. Judd Walter S., Campbell, C. S., Kellogg, E. A., Stevens, P.F. and M. J. Donoghue. 2008. Plant Systematics- A Phylogenetic Approach. Sinauer Associates, INC, Publishers. Sunderland, Massachusetts, USA.

17. Kubitzki, K. 1977. Flowering Plants Evolution and Classification of Higher Categories. Plant Systematics – Evolution Supplement I.

18. Kuijt J. 1969. The biology of parasitic flowering plants. California University Press.

19. Lawrence, G. H. M. 1951. Taxonomy of Vascular Plants. Oxford and IBH Publ. Co. Pvt. Ltd. New Delhi.

20. Mabberly, T. J. 1997. The Plant Book 2ndedn Cambridge University Press, Cambridge.

21. Maheshwari, P. 1985. An Introduction to Embryology of Angiosperms. Tata McGraw Hill, New Delhi.

22. Manilal, K. S. and M. S. Muktesh Kumar [ed.] 1998.A Handbook of Taxonomic Training. DST, New Delhi.

23. Naik, V. N. 1984. Taxonomy of Angiosperms. Tata McGraw-Hill, New Delhi.

24. Nair, P.K.K. 1966. Pollen morphology of Angiosperms. Periodical Expert Book Agency, New Delhi.

25. Paech, K. and M.V. Tracey. 1956. Modern Methods of Plant Analysis. Vol-I &II. Springer- Verlag.

26. Quicke, Donald L. J. 1993. Principles and Techniques of Contemporary Taxonomy. Blakie Academic & Professional, London.

27. Radford A.E. 1986. Fundamentals of Plant Systematics, Harper and Row N Y.

28. Sharma A.K. and A. Sharma. 1980. Chromosome Technique: Theory and Practices(3rded.) Butterworths, London.

29. Shivanna, K.R. and N.S. Rangaswamy.1992. Pollen Biology- A Laboratory Manual. Springer – Verlag.

30. Simpson, M.G. 2010.Plant Systematics. Elsevier, Amsterdam.

31. Singh G. 2004. Plant Systematics, 2ndedn, Oxford and IBH, New Delhi.

32. Sivarajan, V.V. 1984. Introduction to Principles of Plant Taxonomy, Oxford and IBH, New Delhi.

33. Smith, P. M. 1976. The Chemotaxonomy of Plants, Edward Arnold Pub. Ltd.

34. Sporne, K. R. 1974. Morphology of Angiosperms, Hutchinson University Library, London.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR M.
Sc. Second Year Semester –III
BOTANY
BOCC-X: Molecular Biology

Lectures – 60 Maximum Marks – 100 Credits:04 **Course Code: P-MOB-373**

OBJECTIVES:

1. To acquire good knowledge about molecular biology
2. To acquire good knowledge about chemistry of active constituents of medicinal plants.
3. To know the techniques of Molecular biology.
4. Develop understanding about inheritance Biology.
5. Solve problems independently on Genetic disorder.
6. To understood Gene related diseases & its control.
7. To prepare karyotype and Ideogram and their significance.

Course Outcomes:

1. Discuss the most significant discoveries and theories through the historical progress of biological scientific discoveries, and their impacts on the development of molecular biology.
2. Explain the fundamental principles of phylogeny and Systematics of the living world, with the application of the principles of classification.
3. Compare the structure of eukaryotic cells with the structure of simpler prokaryotic cells and with the structure of viruses.
4. Differentiate the main types of prokaryotes through their grouping abilities and list their characteristic and differentiating properties.

Credit- I: DNA structures &topology (15L)

1. DNA structure Types of base pairing, unusual structures, topology, split gene. pseudogene, overlapping gene, cryptic gene Jumping gene (transposons).

2. Melting and renaturation of DNA, Cot curves and kinetic complexity of DNA. Organization of genomes (from whole genome sequences), repetitive and unique sequences, C-value paradox.
3. Chromosome organization, centromeres, telomeres, specialized chromosomes.
4. Initiation, elongation and termination of DNA replication, molecular machinery of DNA replication in Prokaryotes.
5. DNA damage and repair.

Credit- II: RNA structure and processing: (15L)

1. RNA structure – Modified bases, pairing, secondary structure.
2. Transcription units, RNA polymerases, initiation, elongation and termination of transcription in eukaryotes, proof reading.
3. RNA processing – Processing of t-RNA, r-RNA and m-RNA and m-RNA localization.
4. Non-coding RNAs, ribozymes and riboswitches.

Credit- III: Protein Synthesis: (15L)

1. Protein synthesis – The genetic code, t-RNA charging, ribosomal organization. Initiation, elongation and termination of protein synthesis in prokaryotes. Antibiotics used in inhibition of protein synthesis. Proof reading.
2. Post-translational processing of proteins, protein modifications.
3. Proteases. Ubiquitination and degradation of proteins by proteasomes.

Credit - IV Regulation of gene expression: (15L)

1. Regulation of transcription – i) Operons, repressors and inducers (Catabolic and Anabolic)
   ii)positive and negative control.
   iii) regulation of lytic and lysogenic cycles in phages.
2. Regulation of gene expression at translational and post-translational level.

Reference books:

1. Genes IX– Benjamin Lewin, Jones and Bartlett, 2008
2. Genes X– Benjamin Lewin, Jones and Bartlett, 2011
3. Molecular Biology of the Cell – Alberts, B, Bray, D, Raff, M, Roberts, K and Watson JD,
4. Garland Publishers, 1999.
5. Principles of Biochemistry – Lehninger, W.H. Freeman and Company, 2005
6. E.J. Dupraw – 1970: Cell and Molecular Biology; Academic Press, London
7. De Robertis and De Robertis – 1997: Cell and Molecular Biology (VIII); B.I.
8. Waverly Pvt. Ltd., New Delhi C. P. Swanson, T. Merz, and W.J. Young – 1982: Cytogenetics; Prentice – Hallof India Pvt. Ltd., New Delhi P. C.L. John (Ed.) – 1981: The cell cycle; Cambridge University press
9. Benjamin Lewin: Genes – VI, VII and VIII; Oxford Press.
10. R. A. Chapoldi 1977: Membrane proteins and their interactions with lipids;
11. Marcel Dekker, inc. N. York
12. A. N. Mortonosi (Ed.) – 1985: The enzymes of Biological Membrames Vol. I, II
13. and III; Plenum press, New York
14. Watson and others – 2004: Molecular Biology of the gene (V); pearses Educatias, Inc India

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

BOCC-XIV: Plant Biotechnology Genetic Engineering

Lectures – 60 Maximum Marks – 100 Credits: 04 **Course Code: P-PBG-374**

Objectives

1. To know the molecular aspect.
2. To study Agrobacterium mediated gene transfer.
3. To know the DNA sequencing.
4, To know the tissue culture techniques.

Course Outcomes

1. To understand the steps involved in recombinant DNA technology.
2. To explain the construction of DNA & c DNA library and their applications
3. To understand principles of animal culture, media preparation
4. To explain Invitro fertilization and embryo transfer technology
5. To describe meristem culture and Clonal propagation of plants on a commercial scale
6. To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins
7. To describe commercial production of fuels, microbial enzymes
8. To explain the microbial degradation of pesticides, Bioremediation& Bio fertilizers

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Credit I: Plant tissue culture: (15L)

1. History of plant tissue culture.
2. Laboratory condition requirement.
3. Tools and techniques for tissue culture.
4. Culture media and their constituents
5. Types of culture (Anther, callus, Micropropagation) and application of tissue culture.
6. Somaclonal variation and its significance.
7. Protoplast culture and somatic hybridization.
8. Cryopreservation.

Credit II: Recombinant DNA technology and gene cloning (15L)

1. Introduction to recombinant DNA technology.
2. Enzymes used in recombinant DNA technology.
3. Recombinant technology and gene cloning.
4. Use of vectors in cloning- Plasmids, cosmids, BACs and YACs.
5. DNA Sequencing methods (Maxum Gillbert, Sangers, Pyrosequencing and Next generation sequencing).

Credit III: Gene libraries and Screening of recombinants (15L)

1. Genomic and cDNA libraries – choice of vectors and construction.
2. RNA Interference mechanism, synthesis and its application. Virus Induced Gene Silencing(VIGS).
3. Concept of genomics and proteomics.
4. Concept of Human genome Project (HGP).

Credit IV: Genetic transformation of plant (15L)

1. Agrobacterium: Ti and Ri plasmids, transfer of DNA into host by Agrobacterium, mechanism of integration of DNA into plant genomes, vectors for chloroplast transformation, vectors for marker-free selection.
2. Transformation technique -Agrobacterium-mediated transformation, Factors affecting on Agrobacterium-mediated transformation.
3. Molecular markers and their applications.

References:

1. Recombinant DNA – Principles and Methodologies. Greene JJ and Rao VS, Marcel Dekker, New York, 1998.
2. Principles of gene manipulation. Primrose SB, Twyman RM and Old RW, 6th Edition,

Blackwell Science, Oxford, 2001

3. Differentially expressed gene in plants. Hansen and Harper, Taylor and Francis Ltd. London, 1997.
4. Engineering plants for commercial products and applications. Eds. Collins GB and Shepherd RJ, NY Acad. Of Science Publishers 1996.
5. DNA markers. Eds. Caetano-Anolles and Gresshoff, Wiley-VCH Publishers, NY, 1998
6. Introduction to Bioinformatics. Attwood, T.K., Parry-Smith, DJ, Addison Wesley Longman, Harlow, Essex, 1999.
7. Bioinformatics. Westhead, DR, Parish JH and Twyman, RM, BIOS Scientific Publishers Ltd., Oxford, 2003
8. Bioinformatics – Sequence and genome analysis. D.W. Mount, CBS Publishers, New Delhi, 2003
9. Collins GB and Shepherd RJ Eds., 1996, Engineering plants for commercial products and application. , NY Acad. Of Science Publishers
10. Senson CW Edt, 2002, Essentials of Genomics and Bioinformatics, Wiley-VCH Publishers, NY,
11. Charlwood B.V. and Rhodes MV Edt. 1999, Secondary products from plant tissue culture. Clarendon Press, Oxford.
12. Dicosmo F and Misawa M, Edt 1996, Plant cell culture: Secondary metabolism towards industrial application, CRC press, Boca Raton ,N.Y.
13. Ramawat K G and Merillon J M, Edt.,1999 Biotechnology: Secondary metabolites, Oxford IBH Publishing Co., New Delhi

14. Buchanan BB, Grussem Wand Jones RL, 2000, Biochemistry and molecular biology of plants , IK International Pvt Ltd. New Delhi

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –III

BOTANY

DSE-I: Plant Pathology-I

Lectures– 60 Maximum Marks – 100 Credits:04 **Course Code: P-PLP-375**

Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To understand the principles and concept in plant pathology.
3. To understand the relationships between pathogens and plants.
4. To become familiar with terms and references used to diagnose plant disease.
5. To learn the basic biology of major groups of plant pathogens.
6. To explain the concept of plant disease and disease pyramid.

Course Outcomes:

1) The general bases of plant diseases caused by biotic and abiotic agents;
2) Major infective crop diseases with severe economic impact; The measurement of disease symptoms.
3) Principle of disease control in according to the recent legislation of integrated or biological disease management.

Credit- I: Introduction to Plant Pathology:

1. Scope and Importance of Plant Pathology; Contributions of E. F. Smith E. J. Butler and K. C. Mehta, in the field of plant pathology.
2. Careers in Plant Pathology, The Practice and Practitioners of Plant Pathology. Certification of Professional Plant Pathologists.
3. Aerobiology: Scope and applications of aerobiology. Airborne pathogens, Methods for detection of Aerospora**.**
4. Methods in Plant Pathology

Credit - II: Diseases of crop plants – I:

History, symptomology, causal organism, etiology and management of:

1. Rice: - Blast disease.
2. Jowar:- Leaf Spot
3. Pigeon pea:- Leaf Spot
4. Tomato: - Early Blight.
5. Bhendi: - Powdery Mildew
6. Brinjal:- Leaf Spot.
7. Chilly: - Anthracnose.
8. Bean Mosaic

Credit- III: Disease of crop plants – II:

(History, symptomology, causal organism, etiology and management of)

1. Banana: - Panama disease.
2. Grapes: - Powdery Mildew.
3. Sugarcane: - Grassy Shoot.
4. Sunflower: - Rust.
5. Groundnut: - Rust
6. Sesamum:- Leaf Spot.
7. Green gram: - Powdery mildew.

Credit- IV: Host resistance, Disease management and control of diseases:

1. Plant defenses: Non-host and host resistance.

2. Pre-existing and induced structural and chemical defenses.

3. Pathogenicity genes, avirulence genes, effector molecules.

4. Control of disease using fungicides.

5. Biocontrol agents for controlling disease.

Reference Books:

1. Agrios, G. N. 2006: Plant Pathology, 5th Edition

2. Aneja, K. R. 1993.: Experiments in Microbiology, plant pathology and Tissue culture

3. Cooke, A. A. 1981. Diseases of Tropical and Subtropical field, Fiber and oil plants

4. Gangopadhyay , S. 2004: Clinical Plant Pathology

5. Kuijit, J. 1969: The Biology of parasitic flowering plants.

6. Mahadevan, A. and R. Shridhar, 1982. Methods in physiological plant pathology

7. Agarwal A. and Mehrotra, R. S. 2012: Plant Pathology

8. Nyvall, R. F. 1979 : Field Crop Diseases Handbook

9. Paul Khurama, S. M. 1998: Pathological Problems of Economic crop plants and their management

10. Planke, J. E. ander, 1968: Disease Resistance in plants.

11. Planke, J. E. Vander. 1963: Plant Diseases Epidemics and control

12. Rangaswami, G. 1979: Diseases of crop plants in India

13. Singh, R. S. 2009: Plant Diseases, 9th Edition

14. Current and back – Volumes of following periodicals:

I. Journal of phytopathology

II. Indian journal of phytopathology III. Journal of Mycology and plant pathology

III. Annual review of plant pathology.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –III

BOTANY

Lab course IX: Based on BOCC- Angiosperms Systematics

Periods – 48 Maximum Marks – 50 Credits:02 **Course Code: P-LAC-376**

Objectives:

1. To obtain most conclusive results.
2. To provide platform to develop computational biological methods.
3. Provide knowledge to distinguish species on morphology and anatomy basis.
4. Able to develop approach for embryology study.

Course Outcomes:

1. Recognize members of the major angiosperm families by identifying their diagnostic features and economic importance.
2. Provide lab based training and writing short species description and illustrations.
3. Students are able to understand plant morphology and identify plant up to species level

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1-8. Study of at least 16 locally available families of flowering plants of genus and species family.

9. Identification of genus and species of locally available wild plants.

10. Comparative account of karyotypic analysis.

11. To study of pollen morphophytes of different family.

12. Study of fossil angiosperms of India with the help of slides and specimens.

13-16. Study of floral biology, visitations by pollinators, pollen viability, self and crosspollination, seed set of any two species.

17. Atleast two short excursion of one two days each and one long excursion of five days.

(N.B. Each short excursion corresponds to two practicals and one long excursion 6 practicals).

N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –III

BOTANY

Lab course X: Based on BOCC- Molecular Biology

Lectures – 48 Maximum Marks – 50 Credits:02 **Course Code: P-LAC-377**

Objective:

1. To know the techniques of Molecular biology.
2. Develop understanding about inheritance Biology.
3. Solve problems independently on Genetic disorder.

Course Outcomes:

1. Associate the processes that unfold in individual cell compartments as preconditions for the functioning of the cell as a whole.
2. Analyse the main structural elements and processes that participate in reproduction, growth, maintenance and regulation of the cell, thereby enabling the survival of living beings. .
3. Discuss the molecular mechanisms by which DNA controls development, growth or morphological characteristics of organisms.

1.Isolation of plasmid DNA and quantification.

2. Electrophoretic separation of plasmid isoforms

3. Restriction digestion of plasmid DNA, electrophoresis and molecular weight determination of DNA fragments.

4. Isolation of plant genomic DNA and quantification

5. Effect of temperature and alkali on absorbance of DNA – hyperchromicity

6. Separation of SSP from leguminous seed &quantitation of each fraction

7. SDS-PAGE separation of seed storage proteins from legumes.

8. Determination of molecular sizes of the globulin subunits.

9. Isolation of DNA from plants and Estimation by DPA method.

10. Isolation of RNA and Estimation of RNA by orcinol method

11.Visit to Biotechnology Research center.

12. solation of DNA from various sources

13. Determination of Electrical conduction of DNA

14. Isolation and separation of cell organelles

15. 2D- Electrophoresis technique for separation of proteins

16. Synthesis of Gold Nanoparticles by biogenic methods

17. Synthesis of Silver Nanoparticles by biogenic methods

18. Isolation of enzymes involved in biosynthesis of nanomaterials

N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –III

BOTANY

Lab course X: Based on BOCC- Plant Biotechnology

Lectures– 48 Maximum Marks – 50 Credits:02 **Course Code: P-LAC-378**

Objectives

1. To know the molecular aspect.

2. To study Agrobacterium mediated gene transfer.

3. To know the DNA sequencing.

4, To know the tissue culture techniques.

Course Outcomes:

1 To understand the steps involved in recombinant DNA technology.

2 To explain the construction of DNA & c DNA library and their applications

3 To understand principles of animal culture, media preparation

4 To explain In-vitro fertilization and embryo transfer technology

5 To describe meristem culture and Clonal propagation of plants on a commercial scale

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Paper XIV Plant Biotechnology & Genetic Engineering

1. Sterilization Techniques.
2. Preparation of stock solutions.
3. Preparation of Media MS Medium.
4. Surface sterilization of explants.
5. Characterization of Callus.
6. Protoplast isolation.
7. Preparation of Synthetic seeds.
8. Growth characteristics of E.coli using platting & turbidiometric method.

9. To detect mutants variant of a given platting techniques.
10. Isolation of plasmid from E.coli by enzymatic method.
11. Effect of temperature and alkali on absorption of DNA: hyperchromicity
12. Isolation of RNA and its quantification.
13. Visit to Plant tissue culture laboratory.

N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –III

BOTANY

Lab course –XII: Practicals based on Plant Pathology

Periods – 48 Maximum Marks – 50 Credits:**02** **Course Code: P-LAC-379**

Objectives

1. To understand the principles and concept in plant pathology.
2. To understand the relationships between pathogens and plants.
3. To develop the awareness about the importance of plant disease in human life.
4. To explain the concept of plant disease and disease pyramid.

Course Outcomes

1) The general bases of plant diseases caused by biotic and abiotic agents.
2) Major infective crop diseases with severe economic impact.
3) The measurement of disease symptoms.

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1. Study of different equipments for sterilization (Autoclave, Laminar air flow, Incubator and Oven).

2-4. To study different staining methods.

5-18. . Symptomology, histopathology of disease given in theory

19-20. Estimation of chlorophylls, sugars and polyphenols from healthy and infected leaves.

21. Isolation and identification of plant pathogens from air over infected field

22. Use of Aerobiological technique to study fungal flora of different localities by Tilak air Sampler 23. Study of rhizosphere mycoflora from different soil samples of infected and healthy plants by serial dilution technique

24. Effect of temperature on growth of plant pathogenic fungi

25. Effect of pH on growth of plant pathogenic fungi

26. Study of Phyllosphere mycoflora of infected and healthy plants by leaf print method.

(Any Ten Practicals) N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

Theory Paper XIII: Cytogenetics and Plant Breeding

Periods – 60 Maximum Marks – 100 Credits: 04 **Course Code: P-CPB-468**

Objective

1. To understand the cell structure, function and different aspects of cytogenetical studies.
2. To study importance of plants and inculcate the importance of farming based
3. To reveal the different aspects of plant breeding.
4. To provide platform to develop the investigation abilities by using biological tools.
5. To provide training in scientific and transferable skills through modular lecture courses.

6.To provide basic knowledge to be able to sustain in upcoming green revolution.

Course Outcomes

1.Demonstrate an advanced knowledge human cytogenetics and human disease.

2. Perform human cell culture, chromosome preparations, karyotyping and FISH analysis of human chromosomes.
3. Diagnose and interpret pathology of human chromosomes (chromosome aberrations, trisomy, rearrangements etc.).
4. Understand and investigate the cause and effect of chromosome abnormalities and associated human diseases.
5. Demonstrate a professional knowledge of the cytogenetic disorders and clinical diagnosis.

Credit: I Cytogenetics-I (15L)

1. Cell division: Mitosis and Meiosis.

2 . Concept of Gene: Allele, Multiple allele, Pseudoallele, Complementation test.

3. Mendelian Principles: Dominance, Segregation and Independent assortment.

4. Extensions of Mendelian Principles: Codominance, Incomplete dominance,

5. Gene interactions (Epistatic and Non Epistatic)

6. Pleiotropy, Genomic imprinting, Penetrance, Expressivity and Phenocopy.

**Credit II: Cytogenetics-II (**15L)

1.Microbial genetics: Mapping of bacterial genome by interrupted mating.

2. Linkage and mapping in eukaryotes: Linkage and crossing over, Sex linkage , Sex limited and sex influenced characters.

3. Recombination: homologous and non-homologous including transposition,

4. Linkage maps, Lod score for linkage testing, Mapping by 3 point test cross,

5. Mapping by tetrad analysis in Yeast and Neurospora,mapping with molecular Markers.

Credit III: Cytogenetics-III (15L)

1. Extra chromosomal inheritance: Inheritance of mitochondria and chloroplast genes, Maternal inheritance and its effect.
2. Quantitative genetics- Introduction to complex traits, Polygenic inheritance. Heritability & its measurement, QTL Mapping.
3. Karyotypes and genetic disorders.
4. Structural alterations of chromosomes: Deletion, Duplication, Inversion, Translocation, Complex translocation heterozygotes, Robertsonian translocations, BA translocations and their genetic implications.
5. Numerical alterations of chromosomes: Euploidy and aneuploidy and their genetic implications.

Credit IV: Plant Breeding-

1. Plant Breeding- Introduction , Defination, History (phases), Objectives.
2. Hybridization methods in plants.
3. Mutation breeding: Types, Mutagens: Physical and chemical mutagens, Mutant types, Role of mutation in breeding.
4. Induction of polyploidy, in plant.
5. Methods of Breeding for Biotic stress (Disease resistance) and abiotic stress resistance (drought resistance).
6. Procedure for of new variety.

Selected Readings:

1. Atherly, A.G., Girton, J.R. and Mcdonald, J. F. (1999) The science of genetics.

Sauders College Pub. Fort Worth USA.

2. Burnham, C.R.(1962) Disscussions in cytogenetics. Burgess Pub. Co., Minnesota.

3. Hartl, D.L., Jones E.W.(2001). Genetics: Principle and analysis (4th edn) Jones and Barlett Pub., USA.

4. Khush, G S (1973) Cytogenetics of Aneuploids. Academic press New York, London.

5. Lewin, B. Genes VIII. Oxford, University press. New York, USA.

6. Russel, P.J. 1998. Genetics (5th edn).The Benjamin/ Cummins Pub. Co., Inc. USA.

7. Snustad, D.P. and Simmons, M.J. 2000. Principles of genetics (4th edn). John Wiley and Sons, Inc., USA.

8. Freifelder, D. (1987) Microbial Genetics.

9. Strickberger, M.W: Genetics (4th edn). Mcmillan Publishing company, New York.

10. Griffiths, A.J.F. and Gilbert, W.M (2nd edn). Modern genetic analysis. W.H. Freeman and Company, New york.

11. Singh, B.D.(2005). Plant breeding: principles and methods. 7th edn.

12. Allard, R.W.(1960). Principles of plant breeding.John Wiley and sons, Inc., New York. 13. Chopra, V.L. (2000) Plant breeding: Theory and practice 2nd edn. Oxford & IBH Pub., Co., Ltd. New Delhi.

14. Jain, H.K. and Kharwal, M.C.(2003) Plant breeding: Mendelian to molecular Approaches. Navrosa Publishing House Pvt. Ltd., New Delhi.

15. Mandal, A.K. Ganguli, P.K., Banergee, S.P. (1991). Advances in Plant breeding.Vol 1 and 2, CBS Pub.& distributors.

16. Sharma, J.R. 1994. Principles and practices of plant breeding.Tata Mcgraw Hill.Pub. Co. Ltd. New Delhi.

17. Simmonds, N.W.1979 Principles of crop improvement. Longman, London and New York.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year Semester –IV

BOTANY

Paper-XI: Immunology, Plant Nanotechnology and Forensic Botany

Periods – 60 Maximum Marks – 100 Credits: 04 **Course Code: P- PLN-469**

OBJECTIVES:

1. Understand and appreciate the scope of forensic biology.
2. Understand and appreciate the scope, diversity and utility of a variety of DNA typing techniques.
3. Perform the primary technique used in Forensic DNA analysis: PCR.
4. To study Perform post-PCR Processing.
5. To Study the fundamental principles and functions of forensic science.
6. TO know the divisions in a forensic science laboratory.
7. To know the working of the forensic establishments in India and abroad

Course Outcomes

1. Design a model of Immunoglobulins
2. Apply basic techniques for identifying antigenantibody interactions.
3. Elucidate the reasons for immunization and aware of different vaccination
4. Understand the bases for the molecular structure and Nano composites
5. Understand the basics Electronic Nanomaterial Properties 6. To impart

Credit- I: Plant Nanotechnology and Its Concepts: (15L)

1. Plant Nanotechnology: An Overview on Concepts, Strategies, and Tools
2. Physical and Chemical Nature of Nanoparticles.
3. Effects of Nanoparticles on Plant Growth and Development
4. Agri-Nanotechniques for Plant Availability of Nutrients
5. Utilization of Nanoparticles for Plant Protection
6. Nanotechnology in Soil-Plant System

Credit- II: Introduction to Forensic Botany: (15L)

1. Introduction to forensic botany. Botanical evidence on legal investigations .Legal plant definition. Botanical evidence in legal investigations

2. The Use of Botanical Evidence in Criminal Investigations.

3. Evidence collection and analysis:

i. Documentation of botanical evidence

ii. Collection information needed for each botanical sample

iii. How to have botanical evidence analyzed

iv. Evidence analysis

v. Laboratory report

4. Fundamentals of wildlife forensic. Significance of wildlife forensic.

Credit- III: Immunology-I (15L)

1. Cells and molecules involved in innate and adaptive immunity.
2. antigens, antigenicity and immunogenicity
3. B and T cell epitope, structure and function of antibody molecules.
4. Generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen antibody interaction MHC molecules.
5. Antigen processing and presentation, activation and differentiation of B and T cells.

Credit- IV: Immunology-II (15L)

1. B and T cell receptors, humoral and cell mediated immune responses, primary and secondary immune responses.
2. The complement system.
3. Toll-like receptors, cell mediated effector functions, inflammation, hypersensitivity and autoimmunity,
4. Immune response during bacterial (tuberculosis), Parasitic (malaria) and viral (HIV) infections congenital and acquired immunodeficiencies,
5. Vaccines.

Reference Books:

1. L. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, New York (1988).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry,
3. APPLETON & Lange, Norwalk (1993).
4. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
5. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jersey (1993).
6. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic
7. Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
8. Edelestein A.S and Cammarata RC, Nano materials synthesis, properties and applications:
9. Michael Kohler, Wolfgang Fritzsche, Michael Kohler, Wolfgang Fritzsche,
10. Nanotechnology-An Introduction to Nano structuring Techniques Wiley (Practical)
11. Brian Robinson, Self-Assembly,IOS Press
12. Tai Ran – Hsu, MEMS and Microsystems, Design, Manufacture and Nanoscale
13. Engineering, John Wiley & Sons, 2008.
14. M. Gentili, C. Giovannella, S. Selci, Nanolithography: A Borderland between STM, EB, IB
15. and X-Ray Lithographies (NATO ASI Series), Kluwer Academic Publishers, 1994.
16. Nicholas A. Kotov, Nanoparticle Assemblies and Superstructures‖, CRC, (2006).
17. Guozhong Cao, Nanostructures &Nanomaterials Synthesis, Properties G; Z, Applications,
18. World Scientific Publishing Pvy. Ltd., Singapore 2004
19. Zheng Cui, Nanofabrication, Principles, Capabilities and Limits, Springer Science +
20. business media, New York (2008).
21. Kostya (Ken) Ostrikov and ShuyanXu, Plasma-Aided Nanofabrication: From Plasma
22. Sources to Nanoassembly, WILEY-VCH Verlag GmbH & Co. KGaA (Weinheim) (2007)
23. H. Baltimore, WH Freeman, Cell & Molecular Biology
24. Kimball T.W., Cell Biology, Wesley Pub
25. Geoffrey M. Copper, The Cell A Molecular Approach‖; 2nd Edition, ASM press, Sinauer

26. Associates, Inc., Washington, (2000)

27. Harvey Lodish, Arnold Berk, S.L Zipursky, Paul Matsudaira, David Baltimore and James

28. Daniel, Molecular Cell Biology‖; 4th Ed., W.H Freeman and company, (2000).

29. E.D.P. De Robertis, and E.M.F De Robertis, ―Cell and Molecular Biology‖. 8th Ed,

30. Lippincott Williams and Wilkins, (2001).

31. Albert Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

DSE: II Plant Pathology-II

Periods – 60 Maximum Marks – 100 Credits: 04 **Course Code: P-PLP-470**

Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To understand the principles and concept in plant pathology.
3. To understand the relationships between pathogens and plants.
4. To become familiar with terms and references used to diagnose plant disease.
5. To develop the awareness about the importance of plant disease in human life.
6. To learn the basic biology of major groups of plant pathogens.
7. To explain the concept of plant disease and disease pyramid.
8. To describe main modes of plant disease transmission.

Course Outcomes

1) The general bases of plant diseases caused by biotic and abiotic agents;
2) Major infective crop diseases with severe economic impact;
3) The measurement of disease symptoms;
4) Principle of disease control in according to the recent legislation of integrated or biological disease management

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Credit-I: Introduction to Plant Pathology (15L)

1. History: Beginning of modern plant pathology; Contribution of Anton De Bray; Benedict Prevost; J.C. Kuhn; Paul Neergaard, P.H. Geregory.History of the development of plant pathology in India; plant disease clinics.
2. Disease inciting agents:
   i) Biotic agents: Bacteria, viruses, fungi, Mycoplasma, nematodes.

ii Abiotic agents: Air pollution; mineral elements, temperature, toxic effects of improperly used chemicals.

3. Symptoms of plant diseases:Symptoms caused by Fungi, Bacteria, Viruses, Mycoplasma and Nematodes.

4 Dissemination of plant pathogen:Dissemination by Air,Water,Buds, Insects, Man andtransmission of plant viruses.

5 Economic importance of plant diseases.

Credit- II: Diseases of crop plants I(15L)

Symptomology, causal organism, etiology and control measures of:-

1. Wheat: Stem rust.
2. Jowar: Head smut.
3. Arhar: Wilt.
4. Potato: Leaf spot (Cercospora).
5. Groundnut :Tikka.
6. Gram: Blight Disease.
7. Tomato: Broom rape (Orobanche).
8. Radish :Mosaic.
9. Citrus: Canker

Credit-III : Diseases of crop plants II (15L)

Symptomology, causal organism, etiology and control measures of

1) Mango: Anthracnose.
2) Pea: Rust.
3) Sugarcane: Wilt. 4) Sugarcane :Whip Smut 5) Chilly: Leaf curl. 6) Mustard: White Rust 7) Crucifers: Black rot.
8) Cucurbits: Fruit rot.
9) Sugarcane: Gummosis.
10) Giant mistletoes (Loranthus) – Mango

Credit- IV: Epidemiology and forecasting of plant diseases (15L)

1. Epidemiology and forms of epidemics:

i) Compound interest diseases, simple interest, diseases slow and rapid epiphytotics.

ii) Essential conditions of epidemics, decline of epidemics.

iii) Disease measurement, disease severity, analysis of epidemics.

2. Disease assessment and forecasting.

3. Pathogenesis**:** Penetration and entry by plant pathogen; Pre-penetration; Entry through

natural opening; Direct penetration; Entry through wounds, root hairs and buds**.**

4. Survivals of plant pathogen.
5. Effects of infection on the host:

i) Tissue disintegration. ii) Effect on growth of host. iii) Effect on reproduction iv) Effect on uptake and translocation of water and nutrients v) Effect on respiration of host.

Suggested readings

1. Agrios, G.N. (1969) Plant Pathology, Academic Press, New York.
2. Rangaswami, G. and A. Mahadevan (2001) Disease of crop plants in India, Printic Hall of India, Pvt. Ltd., New Delhi.
3. Gupta, V.K. and V.S. Paul (2001) Disease of vegetable crops. Kalyani Publ. Ludhiana,
4. Gupta, V.K. and S.K. Sharma (2000) Disease of fruit crops, Malyani Publ. Ludhiana.
5. Raychaudhari, S.P. and T.K. Nariani (1977), Virus and Mycoplasma disease of plants in India. Oxford and IBK Publ. Corp., New Delhi.
6. Bos L. (1999), Plant viruses, unique and intriguing pathogens. Backhugs Publ. Leiden.
7. Rangaswami, G. and S. Rajagopalan (1973), Bacterial plant pathology, T.N. Agri. Uni.Coimbatore.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

DSEIII: Plant Pathology-III

Lectures – 60 Maximum Marks – 100 Credits: 04 **Course Code: P-PLP-471**

Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To understand the principles and concept in plant pathology.
3. To understand the relationships between pathogens and plants.
4. To become familiar with terms and references used to diagnose plant disease.
5. To develop the awareness about the importance of plant disease in human life.
6. To learn the basic biology of major groups of plant pathogens.
7. To explain the concept of plant disease and disease pyramid.
8. To describe main modes of plant disease transmission.

Course Outcomes

1) The general bases of plant diseases caused by biotic and abiotic agents;
2) Major infective crop diseases with severe economic impact;
3) The measurement of disease symptoms;
4) Principle of disease control in according to the recent legislation of integrated or biological disease management

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Credit I: Effect of environment on pathogenesis:(15L)

1. Effect of environment, temperature, moisture, humidity, shade, wind, light, pH, O_2 and CO_2 concentration.
2. Role of Toxins in Plant pathogenesis: Pathotoxins, Vivo toxins and Phyto toxins.
3. Effect of toxins on plant tissues: Selective and non-selective toxins.

4. Seed Pathology: Scope and importance; seed health testing; methods and procedures; detection of seed borne-fungi, Bacteria and viruses. Seed bio deterioration: Biochemical changes, Morphological abnormalities, loss in germinability. Mycotoxins,fusarium toxinandaflatoxin. Control of Post-harvest spoilage of grains.

Credit- II: Diseases of crop plants-I:(15L)

Symptomology, causal organism andcontrol measures of:

1) Sorghum: Long Smut.

2) Chilly: Die back.

3) Soyabean: Charcoal rot. 4) Potato: Stem canker.

5) Tomato: Fusarium Wilt

6) Wheat: Loose Smut

7) Sugarcane: Red Rot

8) Papaya: Leaf Curl

9) Potato: Black Heart.

10)Potato/Flax: Dodder or Cuscuta.

Credit III: Diseases of crop plants II:(15L)

Symptomology,causal organism and control measures of:

1) Crucifers: Black spot.

2) Sorghum: Loose smut.

3) Bean: Rust 4)Wheat: Brown Rust.

5) Cucurbits:Powdery mildew.

6)Grapes: Downy mildew.

7) Potato: Late

Blight 8) Wheat:

Ear cockles.

9) Sugarcane:

Mosaic 10) Sandal:

Spike.

Credit IV: Genetic Variability (15L)

1. Genetic Variability in plant

pathogen:

i) Genetic Variability in viruses

ii) Genetic Variability in Fungi

iii). Level of variability in pathogen

iv) Loss of virulence

2. Genetics and molecular basis of host parasite interaction:

i) Evolution of parasitism.

ii) Genetics of host parasite interaction.

iii) Gene for gene relationship.

iv) Criteria for gene for gene relationship.

v) Molecular basis of host parasitic interaction.

3. Physiologic specialization: General accounts.

Suggested readings

1. Chandnivala, M. (1955). Recent advances in plant pathology, Amol Publication, Pvt. Ltd.,

2. Nurenburg, H.W. (1985) Pollution and their ecotoxicological significance, John Wiley and Sons, New York.

3. Mehrotra, R.S. Plant Pathology, Tata McGraw Hill Publication Co., Ltd., New Delhi.

4. Agrisos, G.N. Plant Pathology, Academic Press, New York and London.

5. Bilgrami, K.S. and H.C. Dubey, A text book of Modem plant pathology, Vikas Publishing House, New Delhi.

6. Nene, Y. and P.N. Thaphyal Fungicides in plant disease control II lidiv Oxford and IBH Publishing Co., New Delhi

7. Vyas, S.C. Systemic fungicides, Vol. 1 - 3, Tata Mc(Jrnw Hill Publishing Co., Ltd., New Delhi.

8. Dekker, J. and S.G. Georgopoulos (Ed), Fungicides Resistance in plnnl Protection, CARD Publications,

9. Gangawane, L.V. and JayashreeDeshpande. Pesticides and crop plnntn in India,

Ajay Prakashan, Aurangabad.

10. Holton, C.S., Fischr, C.N. Fulton, R.W., Hart, H. and S.K.A.Macallan. Plant Pathology: Problems and progess (1908 - 1958), The University of Wisconsin, USA.

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

Lab course –XIII

(Based on BOCC XII and XIII)

Periods – 48 Maximum Marks – 50 Credits: 02 **Course Code: P-LAC-472**

Objectives

1. Understand and appreciate the scope of forensic biology.

2. To Study the fundamental principles and functions of forensic science.

3. To know the divisions in a forensic science laboratory.

Course Outcomes

1. Apply basic techniques for identifying antigen antibody interactions.
2. Elucidate the reasons for immunization and aware of different vaccination
3. Understand the basics Electronic Nanomaterial Properties
4. To impart understanding on Nanoparticle based Drug Delivery.

Paper XII PRACTICALS:

1.Preparation of stains, Fixatives, preservatives and pretreatments to plant material.

2.Problems on determination of blood grouping

3.Problems based on Multiple alleles.

4.Problems based on Gene mapping.

5.Problems based on linkage.

6.Study of meiotic configuration from suitable plant material.

7.Study of chromosomal aberrations in irradiated plant material.

8.Study of Polygenic inheritance.

9.Problems of Mendelian inheritance and estimation of gene frequencies and

heterozygotic frequencies, population genetics and Linkage.

10.Neurospora tetrad analysis.

11.Linear differentiation of chromosomes through banding techniques such as

C-Banding,G-Banding and Q-Banding.

12.Floral Biology, study of Pollen Viability, germination in vitro and staining of any

two major crops.

13.Study of monohybrid and dihybrid crosses and interactions.

14.Study of quality traits in rice, cotton/wheat/soybean/Brassica.

15.Use of Colchicine for induction of polyploidy in appropriate plant material.

16.Demonstration of techniques of hybridization .

17.Effect of physical or chemical mutagens on crop plants of M1 and M2 population.

18.Visit to research institutes / Biotechnology/ Tissue culture laboratories / Agriculture Universities.

Paper XIV Plant Biotechnology & Genetic Engineering

1. Immunodiffusion test.

2. Determination of blood groups.

3. Determination of clotting time.

4. Determination of bleeding time.

5. Differential count of RBC/Leucocytes.

6. Widal test.

7. ELISA Tests.

8. Western blots.

9. RPR Test.

10. Preparation of thiolated silver nanoparticles

11. Zinc Selenide quantum dot preparation.

12. Synthesis of Iron Oxide Nanoparticle

13. Synthesis of Nickel metal nanoparticle by urea decomposition method

14. Synthesis of Zinc Oxide nanoparticle

15. To carry out microscopic examination of pollen grains.

16. To carry out microscopic examination of diatoms.

17. To cite a crime case in which diatoms have served as forensic evidence.

N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

M. Sc. Second Year

Semester –IV

BOTANY

Lab course – XIV

(Based on DSE-II and III)

Periods – 48 Maximum Marks – 50 Credits: 02 **Course Code: P-LAC-473**

Objectives

1. To understand the principles and concept in plant pathology.

2. To understand the relationships between pathogens and plants.

3. To develop the awareness about the importance of plant disease in human life.

4. To explain the concept of plant disease and disease pyramid.

Course Outcomes

1) The general bases of plant diseases caused by biotic and abiotic agents.

2) Major infective crop diseases with severe economic impact.

3) The measurement of disease symptoms.

Practicals: Based on DSE-II

1. Extraction and estimation of pigments in healthy and diseased plants.

2. Detection of sugars from healthy and infected leaves by paper chromatography.

3. Production and assay of macerating enzymes.

4. Production and assay of polygalactronase, cellulolytic enzymes, amylase.

5. Estimation of plant pigment from diseased and healthy plants

6. Detection of sugars from healthy and diseased leaves by paper chromatography.

7. Estimation of total phenol from diseased plant part.

8. Extraction and separation of alpha toxins

9-25.Symptomology, histopathology of disease given in theory.

26. Visits to fields for study of diseases.

Practicals: Based on DSE-III

1. Detection of seed borne-fungi and Bacteria.

2. Evaluation of fungicide against plant pathogenic fungi.

3. Evaluation of Bioagents against plant pathogenic fungi

4. Evaluation of antibiotics against pathogenic bacteria.

5. Extraction and estimation of pigments in healthy and diseased plants.

6. Isolation of plant pathogen from infected plant parts.

7. Preparation of nutrient agar medium and PDA.

8. Study of common effect of pollutants –So2, No and NH3 on leaves of common crop plants.

9. Estimation of protein from infected seeds.

10-25. Symptomology, histopathology of disease given in theory.

26. Visits to fields for study of diseases.

N.B: 1) Any ten Practicals

2) Several Short Excursions and at least one Long Excursion