SOLAPUR UNIVERSITY, SOLAPUR.

M.Sc. Part- II Botany

Revised Syllabus

(Semester pattern.)

To be implemented from

June 2012.

Solapur University, Solapur

M.Sc. Part- II Botany

(Semester-III and IV)

Syllabus to be implemented from June 2012

Semester-III

Sub. Code	Paper No.	Title of the paper	Marks.
Bot.113	Paper-IX	Plant Embryology and Palynology	100
Bot.114	Paper-X	Cytogenetics, Plant Breeding and Genetic Engineering	100
Bot.115	Paper-XI	Advances in Plant Metabolism and Biochemistry	100
Bot.116	Paper-XII	Physiology of plant growth and development	100
Bot-117	Practical-V	Paper-IX and X	100
Bot-118	Practical-VI	Paper-XI and XII	100

Semester-IV

Sub. Code	Paper No.	Title of the paper	Marks.
Bot.119	Paper-XIII	Phytogeography and Conservation Biology	100
Bot.120	Paper-XIV	Plant Tissue Culture, Green House Technology and Hydroponics	100
Bot.121	Paper-XV	Environmental Plant Physiology	100
Bot.122	Paper-XVI	Crop Physiology	100
Bot-123	Practical-VII	Paper-XIII and XIV	100
Bot-124	Practical-VIII	Paper-XV and XVI (Including project work)	100

©Distribution of the Marks for the Entire M.Sc.Course

©Each Theory paper carries 100 Marks.

©Each Practical carries 100Marks

©©M. Sc.Part -I, Total Marks (Theory=800+Pract=400) =1200

©M. Sc.Part –II, Total Marks (Theory=800+Pract=400) =1200

Total Marks=2400

Semester-III

Paper Bot. 113(Paper-IX)

Plant Embryology and Palynology

Embryology: **Lectures**

Unit-1Gametophytes in Angiosperms- Brief outline of development of Male and Female Gametophyte. **2**

Unit-2:-Ultrastructure of Male Gametophyte- Vegetative Cell, Generative Cell, Pollen Wall, Pollen Tube; Abnormal Male Gametophytes and their Features. 3

Unit-3:-Ultrastructures of Female Gametophyte- Synergids, Egg, Antipodals, Central Cell. Pollen- Pistil Interaction and Control of Fertilization- Structure of Stigma and Style, Pollen Tube Growth, Chemotropism, Incompatibility, Pollen Wall Proteins, Stigma Surface Proteins, Post Pollination Events, Fertilization, Methods to Overcome Incompatibility, Significance of Pollen Pistil Interaction. 6

Unit-4:-Experimental Embryology- Technique for Anther, Ovary, Nucellus, Endosperm and Embryo Culture and their Significance. 5

Unit -5:-Apomixis- Diplospory, Apospory, Causes, Consequences and Significance of Apomixes 4

Unit-5:-Polyembryony- Classification, Causes, Experimental Induction and Practical importance

Palynology:

Palynology- Scope and Branches with Special Reference to:-

Unit-1:-Palynotaxonomy- Pollen Morphology and Plant Taxonomy with reference to Gymnosperms and Angiosperms. 2

Unit: 2-Melittopalynology- Bee colony, foraging behaviuor of bees, unifloral & Multifloral honey, application in crop productivity 4

Unit -3:-Aeropalynology- Principles, techniques, pollen analysis, pollen and spore Allergy, plants causing pollen allergy, allergic properties of pollen, pollen calendar and importance 4.

Unit: 4:-Palaeopalynology- Principles, microfossil recovery, theory and techniques, Microfossils and oil exploration. 3

Unit: 5:-Agropalynology- Pollen storage, viability and pollen germination and their Significance. 3

Practicals based On Paper Bot. 113(Paper-IX)

1. Study of Development and Ultra structure of Male and Female Gametophyte with the help of Slides and Microphotographs.
2. Study of types of styles - Solid, Hollow, Filamentous. Types of Stigmas- Dry and Wet Stigmas and their Sub types.
3. Study of new apomicts (any two) and polyembyrony.
4. Study of different types of embryos (monophonic, bisporic and tetraspopric).
5. Pollen germination *in situ* condition.
6. Determination of Pollen Germination Percentage in Vitro conditions.
7. Study of Pollen Morphotypes and their Significance in Taxonomy. (At Least Six Examples)
8. Honey Analysis. (Unifloral and multifloral).
9. Study of Allergic Plants and their Pollens.
10. Study of Pollen Fertility by TTC or Acetocarmine Methods.

Reference Books:-

Embryology and Palynology

1. Bhojawani, S.S. And S.P. Bhatnagar, 1998. The Embryology of Angiosperms.
2. Johri, M.B. 1984. Embryology of Angiosperms.
3. Maheshwari, P. 1950. An Introduction to the Embryology of Angiosperms.
4. Maheshwari, P. 1963. Recent Advances in the Embryology of Vascular Plants.
5. Johri, B.M. 1963. Experimental Embryology of Vascular Plants.
6. Shivanna, K.R. And B.M.Johri, 1989. The Angiosperm Pollen; Structure and Function.
7. Stanley, R.G & F.L. Linkens, 1974.Pollenl; : Biology, Biochemistry Management
8. Shivanna K.R. And N.S. Rangaswamy, 1992. Pollen Biology, a Laboratory Manual.

9. Cunningham, D.D.1873. Microscopic Examination of Air.

10. Erdtman, G. 1988. Pollen Morphology and Plant Taxonomy.

11. Fageri, K. And J. Inversen, 1964. Text Book of Pollen Analysis.

12. Gregory, P.H. 1973. Microbiology of Atmosphere.

13. Heslop-Harrison, Y.1971.Pollen Development and Physiology.

14. Moor, P.D. et.al. 1989. Pollen Analysis.

15. Nair P.K.K.1996. Essentials of Palynology.

16. Nair P.K.K. 1964 Advances In Palynology.

17. Tilak, S.T.1989. Airborne Pollen and Fungal Spores.

18. Malik C.P Physiology of sexual reproduction in flowering plants.

19. Mulcamy D.L. et.al, Biotechnology and ecology of pollen.

20. Davis, G.L Systematic embryology of angiosperms.

21. Nair, P.K. Recent advances in pollen spore research vol I, II and III.

22. Raghavan, V. Experimental embryogenesis in vascular plants.

Paper Bot -114(Paper-X)

Cytogenetics, Plant Breeding And Genetic Engineering

Lectures

Unit; 1:-Genome organization in prokaryotes and eukaryotes- size and structure of genome in viruses, plasmids, bacteria, yeast and higher organisms. Variation in genome size and its organization in prokaryotes, eukaryotes and organelles. Architectural differences of the genome. 10

Unit 2:-Organization of gene in prokaryotes and eukaryotes- structure and organization of the gene in plasmid, viruses, bacteria and eukaryotes. Gene conversion, amplification, mobile genetic elements and their significance. Gene families. 8

Unit 3:-Genetic Recombination and Genetic Mapping- Independent Assortment and Crossing Over, Recombination, Molecular Mechanism of Recombination, Role of Rec A and Rec B,C,D Enzymes. Proteins Involved in Eukaryotic Recombination, Recombination Nodules, Site Specific Recombination, Chromosome Mapping, Linkage Groups, Genetic Markers-Conventional and Molecular Markers Used in Construction of Molecular Maps. Correlation of Genetic and physical maps, somatic cell genetic-an alternative approach to gene mapping. 10

Unit 4:-Modern methods of plant breeding- Somaclonal variations,

Somatic hybridization-protoplast isolation, fusion and regeneration, hybrids. 4

Unit 5:-Genetic engineering of plants- aims and methods for devolvement of transgenics,

Agrobacterium- a natural genetic engineer, t-DNA mediated genetic transformation. 4

Unit 6:-Hybridoma technology. **2**

Unit 7:-IPR (Intellectual property right) - concept, importance, ecological risk and ethical concerns. **2**

Reference Books:-

1. Benjamin Lewin- Genes VIII-,
2. James Darnell, Harvey Lodish and David Baltimore- Molecular Cell Biology.
3. Albert et.al.-Cell Molecular Biology.
4. C.J.Avers-Genetics.
5. Strickbergr- Genetics.
6. E.J.Gardner- Principles of Genetics.
7. J.Jahier- Techniques of Plant Cytogenetic.
8. Sharma A.K. & Sharma A – Chromosome: Theory and Practice.
9. Genetics – P.K.Gupta 2010
10. Genetics classical to modern - – P.K.Gupta 2008
11. Genetics – Verma and Agrawal -2008
12. Cytogenetics evolution biostatistics and Plant Breeding – Shukla and Chandel
13. Cell Biology ,Genetics ,Molecular biology ,evolution and ecology - – Verma and Agrawal -2008
14. The world of cell – Backer and Klein Smith (Pearson publication)/
15. Biotechnology - Satyanarayana.
16. Biotechnology –R.C.Dubey
17. Biotechnology –P.K.Gupta.

Practicals Based On Paper Bot-114(Paper-X)

1. Karyotype Studies in Plants using photographs and slides.
2. Banding Studies-“O” Banding in *Allium cepa*.
3. Isolation of DNA.
4. Meiotic Studies in Structural Hybrids.

5&6 Genetic Problems on Mapping of the Genes in Higher Organisms.

7 Culture of *Agrobacterium tumefaciens*.

8 *Agrobacterium* Mediated Genetic Transformation of Plants.

9 Submission of Application for Patent.

10 Demonstration of Elisa.

11 &12 Protoplast Isolation, viability testing, Fusion, and Regeneration.

Paper Bot- 115(Paper-XI)

Advances in Plant Metabolism and Biochemistry

Unit: 1 - Integration of major metabolic pathway in plants an overview 2

.Unit:2- Photosynthesis – ultrastruture of chloroplast and light harvesting complexes , Energy transduction in photosynthesis , photosynthetic electron transport , ATP synthesis , photosynthetic pathway C3 , C4 and CAM and their subgroups , C3 & C4 intermediates, regulation of Rubisco, PEP case and PCR cycle ,photorespiration and its significance. 9

Unit: 3- Carbohydrate metabolism - photosynthetic carbon partitioning, regulation of sugar and starch biosynthesis, and degradation of cellulose. 3

Unit: 4- Respiration – regulation of glycolysis, pentose phosphate pathway and TCA cycle, modern concept of electron transport chain in plant mitochondria, alternate oxidase, respiratory inhibitors, Gluconeogenesis. 7

Unit: 5- Organic acid metabolism – metabolism and role of malic acid, oxalic acid and ascorbic acid. 4

Unit: 6- Secondary metabolism – overview of Secondary metabolism and Secondary metabolites shikimic acid pathway, biosynthesis of aromatic amino acids. 5

Unit: 7- Phosphorus metabolism – Forms of phosphate in soil and plants, mechanism of P uptake, factors controlling P uptake, role of pyrophosphates in plant metabolism.Vam and P nutrition. 5

Unit;8- Sulphur metabolism- Forms of Sulphur in soil and plants, sulphate uptake and reduction, biosynthesis of Sulphur containing amino acids and their role - cystein, methionine, and glutathione. 5

Reference Books

1. Sinha S.K. Sane P.V. Bhargava S.C. And Agraval P.K 1990. Proceedings of International congress of plant physiology vol I& II.
2. Smith H. 1975. Phytochrome and Photomorphogenesis.
3. Steward F.C. 1976. Growth and Organization in Plants.
4. Stumpf P.K. & Conn.E. 1980. The Biochemistry of Plants: A Comprehensive Treatise.
5. Tiaz L. And Zieger, F. 1998. Plant Physiology.
6. Wilkins M.B. 1976. Physiology of Plant Growth and Development.
7. Annual Reviews of Plant Physiology and Molecular Biology.
8. Indian Journal of Plant Physiology.
9. Journal of Experimental Botany.
10. Physiologia Plantarum Sweden.
11. Plant Physiology (Bethedsa U.S.A

12 Bidwell R.C.S. 1979. Plant physiology.

13 Boner J. and Varner J. E. 1976. Plant Biochemistry.

14 Edwards G. Walker D.W. 1983. C3-c4 mechanism and cellular environmental regulation of photosynthesis.

15 Govindjee 1982. Photosynthesis vol I & II.

16 Hopkins W.C. 1995. Introduction to plant physiology.

17 Krishnmoorthy H.N. 1992. Physiology of plant growth and development.

18 Marschner, H.W. 1986. Mineral nutrition of higher plants.

19 Miller P. 1973. Phytohemistry vol I, II & III.

20 Moore T.C. 1974. Research experiences in plant physiology, a laboratory manual.

21 Mukherjee, S.P. and Ghosh A.N. 1996. Plant physiology.

22 Noggle G.R. & G.J. Fritz. 1990. Introductory plant physiology II Ed.

23 Randhir Singh & Sawhney S.K. 1988. Advances in frontier areas of Plant Biochemistry.

24 Sadasivan and Manikkam 1996. Plant Biochemical methods.

25 Salisbury F.B. & Ross C.W. 1992. Plant physiology IV Ed.

Practicals Based On Paper Bot- 115(Paper- XI)

1. Estimation of Chlorophylls and Carotenoids Chl a/ Chl b Ratio from C3 and C4 plants
2. Measurement of Rate of Respiration (In Germinating Seeds).
3. Study of Enzyme Glycolate Oxidase.
4. Determination of Co2 Compensation Point.
5. Estimation of Sucrose and Starch.
6. Estimation of Oxalic Acid.
7. Estimation of Ascorbic Acid.
8. Estimation of Polyphenols.
9. Estimation of Phosphorus in Different Plants Parts.
10. Study of Enzyme Polyphenol Oxidase.
11. Estimation of Sulphate.
12. Detection and estimation of secondary metabolites.

Paper Bot- 116(Paper:-XII)

Physiology of plant growth and development

Lectures

Unit: 1-Growth and Photomorphogensis-

A brief idea about development of plant organs-root stems, leaf and flower.

Phtyochrome & cryptochrome- discovery, properties, role and mechanism of action. **7**

Unit: 2-Physiology of pollination and pollen stigma interaction. 3

Unit: 3:-Senescence of leaves and petals- mechanism, biochemical changes and 5

Programmed cell death.

Unit: 4:-A brief outline of physiology of seed development & seed germination. 5

Unit: 5:-Post harvest physiology- ripening of fruits and its regulation, metabolism of stored seeds and leafy vegetables. **4**

Unit: 6:-Plant growth regulators- a brief idea about discovery and possible mechanism of action of triacontanol, Brassinosteroids, salicylic acid, jasmonates, polyamines & morphactins. **6**

Unit: 7:-**A brief idea about role of growth retardants-** CCC, Paclobutrazol, Maleic hydrazide and TIBA. 4

Unit: 8:-Secondary messengers and signaling in plants cells. 3

Unit: 9:-A brief idea about role of tissue culture and mutants in physiological studies. 3

Reference Books

(Bot -116):

1 Bidwell R.C.S. 1979. Plant physiology.

2 Boner J. and Varner J. E. 1976. Plant Biochemistry.

3 Edwards G. Walker D.W. 1983. C3-c4 mechanism and cellular environmental regulation of photosynthesis.

4 Govindjee 1982. Photosynthesis vol I & II.

5 Hopkins W.C. 1995. Introduction to plant physiology.

6 Krishnmoorthy H.N. 1992. Physiology of plant growth and development.

7 Marschner, H.W. 1986. Mineral nutrition of higher plants.

8 Miller P. 1973. Phytohemistry vol I, II & III.

9 Moore T.C. 1974. Research experiences in plant physiology, a laboratory manual.

10 Mukherjee, S.P. and Ghosh A.N. 1996. Plant physiology.

11 Noggle G.R. & G.J. Fritz. 1990. Introductory plant physiology II Ed.

12. Randhir Singh & Sawhney S.K. 1988. Advances in frontier areas of Plant Biochemistry.
13. Sadasivan and Manikkam 1996. Plant biochemical methods.
14. Salisbury F.B. & Ross C.W. 1992. Plant physiology IV Ed.
15. Sinha S.K. Sane P.V. Bhargava S.C. And Agraval P.K 1990. Preceding Of International congress of plant physiology vol I& II.
16. Smith H. 1975. Phytochrome and Photomorphogenesis.

17. Steward F.C. 1976. Growth and Organization in Plants.
18. Stumpf P.K. & Conn.E. 1980. The Biochemistry of Plants: A Comprehensive Treaties.
19. Tiaz L. And Zieger, F. 1998. Plant Physiology.
20. Wilkins M.B. 1976. Physiology of Plant Growth and Development.
21. Annual Reviews of Plant Physiology and Molecular Biology.
22. Indian Journal of Plant Physiology.
23. Journal of Experimental Botany.

Practicals based on Paper Bot- 116 (Paper-XII)

1. Comparative growth study of etiolated and light grown seedlings and analysis of Photosynthetic pigments
2. Study of change in nitrate reductase activity during leaf senescence.

3&4. Hormonal and chemical regulation of leaf and Petal senescence. (Kinetin / ethephon /SA/Kcl/CaCl2)

5. Pigment changes during ripening of tomato fruits.
6. Study of enzyme acid phosphates during ripening of fruits.
7. Study of changes in respiration rate during ripening of fruits
8. Effect of different chemical compounds on pollen germination.
9. Effect various PGRS and retardants on seedling growth.
10. Effect of growth retardants on plants.
11. Study of changes in starch & sugars during fruit ripening of Banana / Guava.
12. Study of changes in acidity and TSS (total soluble solids) during grape ripening.

Semester- IV

Paper Bot -119(Paper –XIII)

Phytogeography and Conservation Biology

	Lectures
Unit: 2:-Principles, concept and importance of Plant geography.	**2**
Unit 4:-Relationship of geography to plant distribution, patterns of distribution, Phytogeographical regions of India.	**4**

Unit 3:-Biodiversity-Age and area hypothesis, endemism, RET plants, hotspots,

Western ghat vegetation, mangrove vegetation of India. **10**

Unit 4:-Ex-situ conservation of biodiversity-concept, need and methods –polyhouse, seed banks, gene banks, cryopreservation and biotechnology. **6**

Unit 5*:-In situ* conservation- Afforestation, Social forestry, Agroforestry, Botanical gardens, Biosphere reserves, National Parks, Sanctuaries, Sacred Groves and Sthalvrikshas . **10**

Unit:6:-Intensification of agriculture and forest policies.- , biological diversity act 2002, forest conservation act, wildlife protection act, international conventions-Washington convention on trade of flora and fauna(1933), international biodiversity year 2010, role of NGO's in conservation of biodiversity **8**

Reference Books

1. Nayar M.P.1996. Hot Spots of Endemic Plants of India, Nepal and Bhutan. Tropical Botanical Gardens and Research Institute, Palode, Keralal.
2. Atmedallah, M. And M.P. Nagar, 1989. Endemic Plants of The Indian Region, Vol I, Botanical Survey If India.
3. Sunge, Hugh (Ed) 1980. The Biological Aspects of Rare Plant Conservation.
4. V. P. Agarwal, 1990-Forests in India.
5. M.P. Singh, S. Chinnamani, R.N. Trivedi-1993-Social Forestry & Environment.
6. A.P. Dwivedi, 1992. Agroforestry, Principles& Practices.
7. Mishra & Singh – Flora of India Series- 4, Endemic & Threatened Flowering Plants of Maharashtra.
8. M.P. Nayar, A.P.R. Sastry (Edited By)- Red Data Book Of India Plants, Vol. 3, BSI Publication

9 Nayar M.P.1996. Hot Spots of Endemic Plants of India, Nepal and Bhutan. Tropical Botanical Gardens and Research Institute, Palode, Keralal.

10 Atmedallah, M. And M.P. Nagar, 1989. Endemic Plants of The Indian Region, Vol I, Botanical Survey If India.

11 Sunge, Hugh (Ed) 1980. The Biological Aspects of Rare Plant Conservation.

12 V. P. Agarwal, 1990-Forests in India.

13 M.P. Singh, S. Chinnamani, R.N. Trivedi-1993-Social Forestry & Environment.

14 A.P. Dwivedi, 1992. Agroforestry, Principles& Practices.

15 Mishra & Singh – Flora of India Series- 4, Endemic & Threatened Flowering Plants of Maharashtra.

16 M.P. Nayar, A.P.R. Sastry (Edited By)- Red Data Book Of India Plants, Vol. 3, BSI Publication

Practicals Based On Paper Bot- 119(Paper-XIII)

1. To study field vegetation with respect to stratification, canopy cover and composition.
2. To show hot spots, phytogeographical regions and distribution of endemic plants in the map of India.
3. Study of plants included in agroforestry and social forestry.
4. Study of vegetation analysis by satellite imagery.
5. Visit to NGO's working in the field of conservation.

6&7. Dispersal of fruits and seeds and migration studies.

8. Collection and storage of seeds for seed banks.
9. Mapping of endemic plants or trees or regions with the help of GPS.
10. Study of density of vegetation by quadrat method –agro field.
11. Study of Quantitative estimation of plant biodiversity.
12. Study of wild species suitable for human health and industries.

Paper Bot- 120(Paper-XIV)

Plant Tissue Culture, Green House Technology and Hydroponics

Lectures

Unit: 1:-Plant tissue culture- Objectives and goals of plant tissue culture, laboratory design and development, operation and management. 4

Unit ;2:-Tissue nutrition- Basic principles of in vitro culture, factors influencing morphogenesis 2

Unit: 3:-Media preparation and handling- Sterilization methods, equipments And apparatus, procedures of media preparation and stock solutions. **4**

Unit: 4:-Plant regeneration and plant propagation – Meristem culture/ axillary Bud culture, protocols and schedules of observation. **5**

Unit: 5:-Callus culture- somatic embryogeny, cell suspension culture, cell line And bioreactors 6

Unit: 6:-Organ culture- Anther culture, Isolation of haploids & its significance. Embryo culture**.** , embryo rescue. 5

Unit: 7:-Synthetic seed- Concept method and applications. 2

Unit: 8:-Greenhouse technology- Construction, operation, maintenance and Management. 4

Unit: 9:-Factors governing the greenhouse management- light, temperature, Fertilization, humidity, pest and disease control. 5

Unit: 10:-Hydroponics- Definition, technique, applications. **3**

Reference books:

1. Dodds J.H. & Roberts L.W. (1985): Experiments in Plant Tissue Culture.
2. Camborg O.L. And Philips G.C. (1996): Plant, Tissue and Organ Culture Fundamental Methods.
3. Dixon, R.A. (1985): Plant Cell Culture. A Practical Approach.
4. Narayanaswamy S. (1997): Plant Cell and Tissue Culture.
5. Evans et. al. (1983): Hand Book of Plant Cell Culture Vol. I, II, III.
6. VASIL T.K. (1984): Cell Culture And Somatic Cell Genetics of Plant Vol. I. Laboratory Procedures And Their Applications
7. Bhojwani S.S. And Razdan N.K.(1983): Plant Tissue Culture, Theory And Practice: Elsevier Public
8. Street H.E. (1974): Tissue Culture.
9. Reinert J. And Bajaj Y.P.S. (1976): Plant Cell, Tissue And Organ Culture
10. Thorpe T.A. (1981): Plant Tissue Culture.
11. Nelson P.V. (1973) Greenhouse, Operation and Management.
12. Prasad Kumar- Greenhouse Management for Horticultural Crops.

Practicals Based On Paper Bot- 120(Paper-IV)

1. Designing of plant tissue culture laboratory.
2. Media preparation.
3. Sterilization techniques.

4. Callus culture, organogenesis and suspension culture.
5. Meristem culture.
6. Somatic embryogenesis.
7. Techniques of hardening.
8. Encapsulation of embryos.
9. Green house design sketching.
10. Demonstration of watering and nutrient supply system in greenhouse.-Drip irrigation sprinklers.
11. & 12. Study of technique of Hydroponics.

Paper Bot- 121(Paper-XV)

Environmental Plant Physiology

Lectures

Unit: 1:-Introduction- Concept of stress & types of stress, plastic strain & elastic strain, stress injury, avoidance, resistance, endurance, & escape. **3**

Unit :2:-Water stress- Effect of water stress on plant metabolism, drought restiance mechanisms in plants, role of pralines and other osmolites, induction of drought resistance. 6

Unit: 3:-Salt stress- Salinity and sod city, types of salinity, causes of soil salinization, a brief account of distribution of salt affected soils in India, effect of salt stress on plant

Metabolism, mechanism of salt tolerance in higher plants, reclamation of saline soils. **5**

Unit: 4:-Water logging- Causes of water logging, nature of water logging injury, mechanism

of flooding tolerance. **3**

Unit: 5:-Ion stress- Heavy metal toxicity - iron, manganese and zinc, effects of soil acidity on plants& phytoremidation. **4**

Unit: 6:-High and low temperature stress- Effect of high and low temperatures on plants

Metabolism, mechanisms of heat and cold tolerance. **4**

Unit: 7:-Radiation stress- Effect of ultraviolet radiations on plants, photo inhibition and

Mechanisms of UV tolerance. 2

Unit: 8:-Pollution stress- Effect of air pollutants (SO_2, NOx and Ozone) on plant metabolism.

3

Unit: 9:-Oxygen toxicity in plants- Free radicals and their scavenging. **3**

Unit: 10:-Effect of elevated CO_2 concentration on plant metabolism & productivity. **2**

Unit: 11:-Biotic stress- Effect of fungal infection on plant metabolism and mechanism of Disease resistance, allelopathy- concept, plant, plant interactions, auto toxicity & allelochemicals. **5**

Reference Books

1. Fageria N.K. 1992. Maximizing Crop Yield.
2. Gupta U.S. 1975. Physiological Aspects of Dry land Farming.
3. Kozlowski T.T. 1984. Flooding and Plant Growth.
4. Rice E.L. 1982. Allelopathy (Physiological Ecology)
5. Sharma S.K. & Gupta I.S. 1986. Physiological Aspects of Dryland Farming.
6. Turner N.C. & Kramer P.J. 1980. Adaptations of Plants to Water and High Temperature Stress.
7. Yawalkar & Agrawal, Manures and Fertilizers.
8. Evans L.T. 1972. Crop Physiology.
9. Levitt J. 1980. Responses of Plants to Environmental Stresses. Vol. 1 And 2.
10. Indian Journal of Plant Physiology. New Delhi.
11. Agros Annual Review of Plant Physiology. Jodhpur.
12. Environmental Plant Physiology.
13. Cherry J.H. 1989. Environmental Stress in Plants. Biochemical & Physiological Mechanisms.
14. Journal of Experimental Botany.
15. Environmental Plant Physiology.

Practicals Based On Paper Bot- 121(Paper-XV)

1. Measurement of relative water content and osmotic potential.
2. Determination of chlorophyll stability index.
3. Study of effects of Fe/Zn/Mn toxicity on plant growth and development.
4. Study of protein profile/ amino acid profile in plants under stress.

5. Study of effect of fungal infection on peroxidase activity.
6. Study of anthocyanin pigments in table & wine grapes differing in disease resistance.
7. Effect of UV radiations on anthocyanin production.
8. Study of free radical scavenging enzymes catalase / SOD.
9. Study of free proline accumulation in plants under stress.
10. Study of lipid peroxidation in stressed tissue.
11. Study of allelopathic effect on plant growth and development (allelochemicals)
12. Study of chloride and sulphate salinity stress on plant growth and development.

Paper –Bot- 122(Paper-XVI)

Crop Physiology

Lectures

Unit: 1:-Crop growth- Crop growth analysis and its applications, crop productivity, harvest Index, water use efficiency and N- use efficiency, plant growth regulators in agriculture and antitranspirants 6

Unit: 2:-Fertilizers- Types, application through soil, foliar application, organic farming and its importance. 5

Unit: 3:-Crop-weed interactions- Common weedicides their mode of action. **3**

Unit: 4:-Source- sink relationship- Phloem transport.-vegetative and reproductive phase and factors affecting source sink relationship. **2**

Unit: 5:-Reproductive development- Photoperiodism and vernalization.

Unit: 6:-A brief idea of crop physiological studies at major at research stations in India ICRISAT, IARIT, CIMAP Luck now, central soil salinity research lab Karnal, CAZRI Jodhpur, BARC, UAS, Bangalore. 2

Unit: 7:-A brief idea of physiological basis of yield in sugar cane, jowar, cotton, groundnut& whea 5

Unit: 8:-Physiology of crops with reference to following aspects-

i) Mineral nutrition of groundnut.

ii) Nitrogen fixation in chickpea.

iii) Fruit physiology of Ber, Pomegranate, Mango, lemon and grape. [any 2]

iv) Post harvest technology of grapes/ Ber/ and pomegranate w.r.t. market strategy- from field to consumer. 14

Reference Books

1 Cherry J.H. 1989. Environmental Stress in Plants. Biochemical & Physiological Mechanisms.

2 Fageria N.K. 1992. Maximizing Crop Yield.

3 Gupta U.S. 1975. Physiological Aspects of Dry land Farming.

4 Kozlowski T.T. 1984. Flooding and Plant Growth.

5 Rice E.L. 1982. Allelopathy (Physiological Ecology)

6 Sharma S.K. & Gupta I.S. 1986. Physiological Aspects of Dryland Farming.

7 Turner N.C. & Kramer P.J. 1980. Adaptations of Plants to Water and High Temperature Stress.

8 Yawalkar & Agrawal, Manures and Fertilizers.

10 Evans L.T. 1972. Crop Physiology.

11 Levitt J. 1980. Responses of Plants to Environmental Stresses. Vol. 1 And 2.

12 Indian Journal of Plant Physiology. New Delhi.

13 Agros Annual Review of Plant Physiology. Jodhpur.

14 Environmental Plant Physiology.

15 Journal of Experimental Botany.

16 Environmental Plant Physiology.

Practicals Based On Paper Bot- 122(Paper-XVI)

1. Growth analysis of any two crop plants (RGR, NAR, LAR, LAI etc).
2. Study of the effect of antitranspirants on stomatal behavior.
3. Study of the effect of source manipulation on sink capacity in any crop plant.
4. Estimation of acid invertase during ripening of sugarcane stalk.
5. Study of allelopathic effect of weed extract on germination of crop seeds.
6. Estimation of total lipids in oil seeds.
7. Study of effect of weedicide on some aspects of weed metabolism.
8. Estimation sugars in unripe and ripe fruits.
9. Visit to ware houses to study proper storage conditions for grains, seed and fruits.
10. Study of drought resistance parameters in sorghum – RWC, bound water, antioxidants.