

Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-IV
BOTANY PAPER -4001 (Economic Botany, Horticulture and Applied Botany)

(Effective from June-2019)

Unit-1

- Paper-raw material, manufacture of paper, kinds of paper and paper products, paper industries in India.
- Natural Dyes and Narcotic Plants
- Edible mushrooms,
- Bio fertilizer
- Biodegradation
- Value of Botany in service of mankind

Unit-2

- Plant fibres- Difference between various plant fibres, structure and occurrence of fibres, economic classification of fibres, characters and their use
- Aromatic Plants and Essential oils- Fats and solvent extraction of essential oil, nature, function, uses, medicinal and industrial oils, fat and solvent extraction, camphor oil, peppermint oil, sandal wood, Jasmin, Rose, Khus, Lemon grass, Citrus oil, Clove oil.

Unit-3

- Propagation by seeds and vegetative structures, harvesting, storage and viability, germination, dormancy (seed and bud), Pre-treatments Techniques,
- Rooting of cuttings, Grafting, Budding, Layering
- Important horticultural crops of India with emphasis on Gujarat fruit/ flowers cultivation, harvest and post –harvest handling.
- Hi tech Horticulture-Propagation, postharvest storage, protection

Unit-4

- Gardening and Landscape Cultivation under cover,
- Greenhouse: advantages, construction, types, maintenance.
- Organic farming, Mulching, Composting,
- Landscaping –principles, types, planning,
- Xeri-scaping,
- Garden –features / elements, styles,
- Indoor gardening,
- Gardens of India

References books

- Bendre and Kumar; Economic Botany: Ratogi Publications
- Bor N. L.; Manual of Indian Forester: Oxford University Press
- Callow, J.A., Ford-Lloyd, B.V. and Newbury, H.J. (1997) Biotechnology and Plant Genetic Resources: Conservation and Use. CAB International, Oxon, UK.
- Chopra R. N. Glossary of Indian Medicinal plants: CSIR



- Chopra R. N.; Indigenous drugs of India: Manager of Publications
- Dastur J. F. Useful plants of India Pakistan : Taraporwala sons and co. Ltd
- E. Blatter and Walter S. Millard, 1997 Some beautiful Indian Trees, second edition : Oxford University Press.
- Eckey E.; Vegetable Fats and Oils : Reinhold Publishing corporation
- G.S.Randhawa and A.Mukhopdhyay, 1998, Floriculture in India: Allied Publishers Limited.
- Kirtikar , K. R. and Basu B.D. Indian medicinal Plants 3 Vol.
- L.H.Bailey 1958. Manual of cultivated plants :The Macmillan Company, New York.
- Maheshwari P. And Singh U, Directory of Economic Plants in India; ICAR New Delhi
- N.L.Bor and M.B.Raizada, Some beautiful Indian Climbers and Shrubs, second edition: Oxford University Press.
- S. Prasad and U.Kumar,(1998) Commercial Floriculture, Agro-botanica.
- U. Banerjee (2001) Commercial flower Production Mangal Deep Publications, Jaipur.



Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-IV
BOTANY PAPER - 4002 (PLANT BIOTECHNOLOGY AND BIOINFORMATICS)

(Effective from June-2019)

Unit I: Biotechnology

- Basic concept, Definition, Scope and Importance of Biotechnology
- Application of Biotechnology and medical biotechnology
- Benefits of Biotechnology and types of Biotechnology
- Techniques of enzyme and cell immobilization and its application in industries

Unit-II Plant Tissue Culture

- Historical Perspective: (Haberlandt, Skoog and Miller, Maheshwari and Guha)
- Equipment in Tissue culture, Composition of Media (MS), Nutrient and Hormone Requirement (role of Vitamins and Hormones); Sterilization Methods, Totipotency, Callus culture, Organogenesis and Embryogenesis

Application of Plant tissue culture

- Methods of Plant tissue culture
- Tissue Culture Application: (Hybrids, Micropropagation, Androgenesis, Virus Elimination, Secondary Metabolite Production, Crop Improvement-Haploids, Triploids and Hybrids; Cryopreservation, Germplasm Conservation)
- Somaclonal variations

Unit III Tools and Techniques of Genetic Engineering

- Recombinant-DNA technology methods, Restriction Endonucleases (History, Type and role in rDNA technology) and ligase.
- PCR and its Applications and DNA fingerprinting
- Blotting Techniques (Southern, Northern and Western)
- Gene Constructs-Marker genes, Reporter genes. Gene transfer methods –Ti plasmid, *Agrobacterium* mediated DNA transformation and Direct Gene transfer Methods: Gene Gun, Microinjection, Electroporation.

Unit IV: Introduction to Bioinformatics

- Bioinformatics: History and scope of Bioinformatics, Aim and Branches of Bioinformatics.
- Introduction to Biological databases, Classification of Biological databases based on Source and nature of data, International Nucleotide Sequence Database Collaboration (INSDC),
- National Centre for Biotechnology Information (NCBI). A brief note on NCBI Tools and Databases
- European Molecular Biology Laboratory (EMBL)- Introduction only
- DNA Data Bank of Japan (DDBJ)- Introduction only
- Protein Information Resource (PIR) Database-Introduction Only
- Concept of Sequence Alignment, Pairwise and Multiple Sequence Alignment (MSA),
- Scoring Matrices (PAM and BLOSUM),
- Global and Local Alignment

Reference books

- Nirmala, C.B., G. Rajalakshmi and Chandra karthick. 2009. Plant Biotechnology. MJP publishers, Chennai
- Chawla, H.S. 2008. Introduction to plant Biotechnology. Oxford & IBH publishing co., Pvt. Ltd. New Delhi.
- Ramawat, K.G. 2000. Plant Biotechnology, Chand & Co. New Delhi
- Adrian Slater, Nigel Scott and Mark Fowler, 2004. Plant Biotechnology – The genetic manipulation of plants – Oxford University Press.
- Chawla, H.S. 2008. Introduction to plant Biotechnology Oxford & IBH publishing co. Pvt. Ltd., New Delhi.
- Subha Rao, N.S. 2003. Soil Microbiology 4th ed. Oxford & IBH Publishing Co. Pvt Ltd. New Delhi



- Old, R. W. and S. B. Primrose. 2000. Principles of gene manipulation. An introduction to genetic engineering. 5th ed. Blackwell Science Ltd. oxford.
- Winnacker, E.N. 2003. From genes to clones. Panama publishing corporation. pvt.Ltd. New Delhi.
- Venkataraman, G.S. 1972. Algal biofertilizers and rice cultivation. Today & tomorrow's printers & publishers.
- Kannaiyaan, S. 2002. Biotechnology of Biofertilizers. Narosa publishing house, New Delhi.
- Biotechnology, 2009. V. Kumaresan. Saras Publication Pvt. Ltd.
- Advanced Biotechnology by R.C. Dubey,
- Elements of Biotechnology, 2000. P. K. Gupta
- Plant functions and biotechnology by V. Kumardan and Annie Ragland; Saras Publication
- Plat biotechnology by M. Sudhir ; Dominant publisher and distributor
- Trends in plant tissue culture and Biotechnology by L. K. Pareek; Updesh Purohit for Agrobios
- Tools and techniques of Biotechnology by Mousumi debnath; Pointer publisher
- Plant Biotechnology by S. S. Purohit; Updesh Purohit for Agrobios
- Plant Biotechnology- the genetic manipulation of Plants by Adrion slater, Nigel W. Scott and Mark R. Fowler; Oxford University Press.
- Bio-informatics by M. N. Ranga; Agrobios



Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-IV
BOTANY PAPER - 4003 (Genetics)

(Effective from June-2019)

Unit-I

- Mendel's work and laws of Heredity
 1. Law of dominant's (including Variation in dominance)
 2. Law of independent assortment
 3. Law of segregation
- Types of Genetic interaction
 1. 12:3:1- Dominant epistasis
 2. 9:3:4- Recessive epistasis (Supplementary gene)
 3. 9:6:1- Duplicate gene with cumulative effects
 4. 9:7- Complimentary gene
 5. 1:1- Duplicate dominant gene
 6. 13:3- Dominant and recessive interactions
- Multiple alleles

Unit-II

- Genetic code
Properties of the code, Codons, anticodons, Initiation codons and nonsense codons
- Cytoplasmic Inheritance
 1. Plastid inheritance in *Mirabilis* and Maize
 2. Kappa particles in paramecium
 3. Coiling of shells in snails
 4. Milk factor in mice
- Sex link inheritance

Unit-III

- Fine structure of gene and Expression of gene
- Protein synthesis:- Initiation, Elongation and Termination
- Types of regulation mechanisms
 1. Negative and positive control
 2. Catabolic repression and feedback inhibition
 3. The lac operon , the gal operon and tryptophan operon
- Genetic regulation in eukaryotes

Unit-IV

- Genetic mutation :
 - A. Change in structure of chromosome
 1. Deletion 2. Duplication 3. Inversion 4. Translocation
 - B. Change in chromosome number
 1. Monoploidy 2. Polyploidy 3. Aneuploidy
- Genetic Diseases
Metabolic block, Phenyl ketonuria, Albinism and Sickle cell anemia

Reference books

- Albert B. Bray, D Lewis, J Raff, M. Robert, K. and Walter 1989, Molecular Biology of the Cell (Second Edition) Garland Publishing Inc, New York.
- Atherly, A.G., Girton, J.R. and McDonald, J.F 1999. The Science of Genetics Saunders College Publishing, Frot Worth, USA.
- Burnham, C.R 1962. Discussions in Cytogenetics. Burgess Publishing Co. Minnesota.
- Busch, H. and Rothblum. L 1982. Volume X. The Cell Nucleus rDNA part A. Academic Press.



- Hartk D.L and Jones, E.W 1998 Genetics: Principles and Analysis (Fourth Edition). Jones and Bartlett Publishers, Massachusetts, USA.
- Khush, G.S 1973. Cytogenetics of Aneuploids. Academic Press, New York, London.
- Karp, G. 1999. Cell and Molecular Biology : Concept and Experiments. John Wiley and Sons, Inc., USA.
- Lewin, B. 2000. Gene VII. Oxford University Press, New York, USA.
- Lewis, R. 1997. Human Genetics : Concepts and Application (Second Edition). WCB McGraw Hill, USA.
- Malacinski, G.M and Freifelder, D. 1998 : Essentials of Molecular Biology (Third Edition). Jones and B. Artlet Publisher, Inc., London.
- Russel, P.J. 1998. Genetics (Fifth Edition). The Benjamin/Cummings Publishing Company IND., USA.
- Snustad, D.P and Simmons, M.J 2000. Principles of Genetics (Second Edition). John Wiley and Sons Inc., USA.
- Gardner and Simmons Snustad 2005 (Eighth Edition). Principles of Genetics, John Wiley and Sons, Singapore.
- Sariu C 2004 (Sixth Edition) Genetics. TATA McGraw-Hill Publishing Company Ltd., New Delhi.
- Ahluwalia K.B 2005 (First Edition). Genetics. New Age International Private Ltd. Publishers, New Delhi.
- Burus and Bottino 1989. (Sixth Edition). The Science of Genetics. Macmillan Publishing Company, New York (USA).
- Pawar C.B 2003 (First Edition). Genetics Vol. I and II. Himalaya Publishing House, Mumbai.
- Strickberger 2005. (Third Edition). Genetics. Prentice Hall of India Pvt. Ltd.
- Molecular biology and genetic engineering by L. M. Naraya, A. Mani, A. M. Selva Raj, N. Arumugam and Padmalatha Singh; Saras Publication
- The science of genetics by William Hexter, Henry T. Yost; Prentice Hall of India.
- Genetics by A.M. Winchester; Oxford and IBH publishing Co.
- Genetics by Karvita B Ahluwalia; Wile Eastern Limited.
- Genetics by P.S. Verma and V.K. Agrawal; S. Chand and Co.
- Principles of Genetics by Sinnott, Dunn, Dobzhansky; TMH Edition
- An Introduction to Morden Genetics by C.H. Waddington; Mangal deep publications
- Fundamentals of Genetics by Mohan P. Arora; Himalay Publication House



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Syllabus for M.Sc. Semester-IV
BOTANY PAPER - 4004 (Angiosperm systematic Botany)

(Effective from June-2019)

Unit-I

- Principles of taxonomy and Phylogeny of Angiosperms
- Modern trends in taxonomy
- Alpha and Omega taxonomy
- General characters of the flora of India
- Theories of differentiation and Natural selection
- Plant Speciation and Isolation

Unit-II

- Plant identification
 1. Plant characters and methods of plant identification
 2. Artificial Key
- Special types of Angiosperms (1) Parasites (2) Saprophytes
- The new global taxonomy initiatives
 1. Systematic agenda-2000 and missions
 2. Systematic knowledge and value of biodiversity
 3. Taxonomy and conservation of biodiversity
- National Bureau of Plant Genetic Resources and its conservation efforts

Unit-III

- Numerical Taxonomy
- Taxonomy Relation to Embryology
- Taxonomy Relation to Anatomy
- Taxonomy Relation to Palynology
- Taxonomy Relation to Phyto-chemistry
- Remote Sensing- Principles, Components, Types and Applications.
- GIS, GPS and their importance.

Unit-IV

- Study of the following families with reference to their geographical distribution, systematic position, floral variations, uses and examples.

1. Flacourtiaceae	2. Polygalaceae	3. Burseraceae	4. Ochanaceae
5. Averrhoaceae	6. Phytolaceaceae	7. Piperraceae	8. Louraceae
9. Typhaceae	10. Utricaceae	11. Bombacaceae	12. Iridaceae
13. Moringaceae	14. Dioscoreaceae		

Reference Books

- Plant Classification by Benson, L. B.; D. C. Health Comp.
- Plant Taxonomy by Benson L. B. ; Ronald Press
- Plant taxonomy by Core E. L.; Prentice-hall Engle-wood Cliff .



- Evolution and classification of Flowering plants by Cronquist A.; Nelson New York
- Principles of Angiosperm Taxonomy by Devis P. H. And V. M. Heywood; Oliver and Boyd, Edinburgh
- Families of flowering plants by Gundersen A.; ELBS series
- The families of flowering plants Vol-I- Dicotyledon and Vol-II Monocotyledon by Hutchinson J.; Oxford University Press
- College Botany Vol-III by Mukerjee S.K. ; New central Book Agency
- An Introduction to plant Taxonomy by Jeffrey C.; Oxford university press
- Plant Classification by Benson, L. B; D. C. Heath Comp.
- Plant Taxonomy by Benson L. B. ; Ronald Press
- Plant taxonomy by Core E. L.; Prentice-hall Engle-wood Cliff .
- Evolution and classification of Flowering plants by Cronquist A.; Nelson New York
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- College Botany Vol-III by Mukerjee S.K. ; New central Book Agency




Practical-4005 (All paper sem-IV)

- Genetic problems (Mendel's law and genetic interaction)
- To Study different Instruments and media use for plant tissue culture.
- To study different Methods of Layering, Budding and Grafting (plant propagation).
- To study different fibres yielding plants.- *Hibiscus sabdariffa*, *Corchorus sp.*, *Cocos nucifera*, *Gossypium sp.*, *Musa sp.*
- To study Aromatic plants. – *Elaeocarpus sphaericus*, *Citrus reticulata*, *Cedrus deodara*, *Mentha sp.*, *Econitum heterophyllum* and *Jasminum ovalifolium*
- To study Essential oil plants.- Almond oil, Palm oil, Soybean oil, Sunflower oil, Sesame oil, Peanut oil and Olive oil
- To study classification with reason, morphological characters, floral dissection, T.S. of ovary, floral formulae and floral diagram of the following families.

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|-------------------|-------------------|-----------------|---------------|
| 1. Flacourtiaceae | 2. Polygalaceae | 3. Burseraceae | 4. Ochanaceae |
| 5. Avertroaceae | 6. Phytolaceaceae | 7. Piperraceae | 8. Louraceae |
| 9. Typhaceae | 10. Utricaceae | 11. Bombacaceae | 12. Iridaceae |
| 13. Moringaceae | 14. Dioscoreaceae | | |

Dissertation-4006


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