



MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

PG - COURSES – AFFILIATED COLLEGES

Course Structure for M.Sc. Botany

(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards)



Semester-IV				
Part	Subject Status	Subject Title	Subject Code	Credit
3	Core	PLANT PHYSIOLOGY	ZBOM41	4
3	Core	PLANT ECOLOGY AND CONSERVATION BIOLOGY	ZBOM42	4
3	Core	APPLIED BIOTECHNOLOGY	ZBOM43	4
3	Practical	PLANT PHYSIOLOGY AND APPLIED BIOTECHNOLOGY	ZBOL41	2
3	Practical	PLANT ECOLOGY AND CONSERVATION BIOLOGY + ELECTIVE	ZBOL42	2
3	Core	ELECTIVE (A) – MEDICINAL BOTANY AND DIETETICS	ZBOE41	3
3	Core	PROJECT	ZBOL4P	8



Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. Scheme for internal Assessment:

Maximum marks for written test: **15 marks**

3 internal tests, each of **1 hour** duration shall be conducted every semester.

To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks and Seminar for 5 marks

The break up for internal assessment shall be:

Written test- 15 marks; Assignment -5 marks; Seminar-5 Marks Total - 25 marks

B. Scheme of External Examination

3 hrs. examination at the end of the semester

A – Part : 1 mark question two - from each unit

B – Part : 5 marks question one - from each unit

C – Part : 8 marks question one - from each unit

➤ **Conversion of Marks into Grade Points and Letter Grades**

S.No.	Percentage of Marks	Letter Grade	Grade Point	Performance
1	90 - 100	O+	10	Outstanding
2	80 - 89	O	9	Excellent
3	70 - 79	A+	8	Very Good
4	60 - 69	A	7	Good
5	55 - 59	B+	6	Above Average
6	50 - 54	B	5	Pass
7	0 - 49	RA	-	ReAppear
8	Absent	AA	-	Absent

➤ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma (GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➤ **Classification**

- First Class with Distinction : CGPA \geq 7.5*
- First Class : CGPA \geq 6.0
- Second Class : CGPA \geq 5.0 and $<$ 6.0
- Third Class : CGPA $<$ 5.0



Plant Physiology

Prerequisite:

Basic knowledge of plant physiology gained in undergraduate programme

Objectives:

- To develop understanding in the mechanisms of functioning of plant cells
- To acquire basic knowledge in physiological processes
- To acquire knowledge on impact of environmental factors on physiological process

Outcome:

- Gain knowledge in functioning of cells
- Gain knowledge in crossroads of cell metabolisms
- Acquire knowledge in stress factors and their role in physiological processes

UNIT – I

Water and Plant relations – Water potential, solute potential, pressure potential, soil water relationship. Absorption and transport of solutes (Active and Passive). Translocation of organic solutes. Phloem loading and unloading. Importance of Macro and Micronutrients. Transpiration – mechanism of stomatal movement - starch sugar interconversion theory and ion transport and stomatal regulation.

UNIT – II

Photosynthesis – Photosynthetic pigments – Light harvesting complexes PS I and PS II. Photo oxidation of water. Mechanism of electron and proton flow through photosynthetic transport chain - 'Z' – scheme. Mechanism of ATP synthesis. C₃, C₄ and CAM Pathways.

UNIT – III

Plant respiration – Glycolysis, citric acid cycle and mitochondrial electron transport oxidative phosphorylation. Beta oxidation – Glyoxylate cycle. Nitrogen metabolism – Biological nitrogen – mechanisms of nitrate uptake and reduction – ammonia assimilation.

UNIT – IV

Physiological role and mechanism of action of cytokinins, ethylene and abscisic acid. Growth retardants – Morphactins and Brassinosteroids. Photoperiodism and vernalizations – flower induction and development. Phytochrome - structure, properties and physiological role. Physiological role and bio chemical change of senescence and Abscission.



UNIT – V

Stress physiology – classification of stress – biotic and abiotic stress factors. Stress effects – morphological, biochemical, physiological changes associated with stress due to salinity, water, radiation, heavy metals, drought. Heat shock proteins – stress resistance.

Reference Books

1. Bid Well, R.G.S. 1980, Plant Physiology. Academic Press, New York.
2. Datt, S.C. 1989, Plant Physiology. Central Book depot, Allahabad – 48.
3. Develin, R.M. 1990. Plant Physiology. Reinhold Publishers Corp, New York.
4. Jacob, W.P, 1979, Plant Hormones Plant Development.
5. Noggle, G.R and Fritz, G.J, 2002 – second edi. Introductory Plant Physiology PHI learning Pvt Ltd., New Delhi.
6. Salisbury, F.B and Ross, C. 2000, Plant Physiology John Wiley & sons, New Delhi.
7. Sinha, R.K. 2007, Modern Plant Physiology. Narosa Publishing House Pvt,Ltd. New Delhi.
8. Srivastava, H.S. 2013, Plant Physiology. Rastogi Publications, Meerut, India.
9. Verma, V. 2007, A Text Book of Plant Physiology. Ane Books, New Delhi.
10. Jain, V.K. 2017. Fundamentals of Plant Physiology. S Chand and Company Limited.
11. Park S Nobel 2020 Physicochemical and Environmental Plant Physiology, Elsevier Science
12. Kochhar, S.L. and S.K. Gujral 2020 Plant Physiology. Cambridge University Press.

Links

1. https://www.youtube.com/watch?v=c72_Xbj-Jpw
2. <https://www.youtube.com/watch?v=AQf3gKTCffs>
3. <https://www.youtube.com/watch?v=la92f3Lh55Y>
4. <https://www.youtube.com/watch?v=oG7WNO5vM3I>
5. <https://www.youtube.com/watch?v=dg9ZUT2cILO>

Practicals

1. Determination of water potential by gravimetric method.
2. Estimation of Photosynthetic pigments with reference to age (young and mature)
3. To determine the Chl.a/ Chl.b ratio in C3 and C4 plants.
4. Estimation of proline in normal and stressed leaves.
5. Effect of pH on membrane permeability.
6. Effect of temperature on membrane permeability.
7. Effect of detergents on membrane permeability.



Plant Ecology and Conservation Biology

Prerequisite:

Basic knowledge in Environmental science gained from undergraduate programme

Objectives:

- To gain advanced knowledge about plants and their environment
- To acquire wide knowledge about environmental issues
- To understand and implement effective measures in biodiversity conservation programmes

Outcome:

- Acquisition of knowledge about environmental science
- Acquisition knowledge about the role of man in protecting the environment
- Acquisition knowledge about biodiversity conservation and participation in conservation activities.

UNIT- I

Aim and scope of Ecology - Methods of studying plant community, Ecosystem: Types - Terrestrial - Cropland and Aquatic ecosystems - fresh water, marine, estuarine and mangroves with special reference to trophic structures. Succession - causes, patterns - xeroseres and hydroseres

UNIT - II

Environmental resources – natural – forest resources with special reference to TamilNadu and India. Land resources – water and wild life, Major biomes of the world.

Energy resources: utilization - Renewable and Non-renewable energy resources. Environmental Laws and Education.

UNIT - III Environmental issues - pollution - Causes, consequences and control measures of Air, water, soil and thermal pollution.

Soil erosion, deforestation, conservation and disaster management - Floods, Earth quake, Cyclones, Tsunami and Landslides.

UNIT - IV

Biodiversity - definition, scope and constraints, Levels of biodiversity (genetic, species and ecosystem), measures, values use and loss of biodiversity, threats to biodiversity. Phytogeography: Dispersal and migration barriers hypothesis, Continental drift hypothesis, Land - Bridges hypothesis, Age and Area hypothesis,



UNIT - V

Conservation Biology: current practices in conservation - Ecosystem approaches - Species based approaches–Social approaches - Chipko Movement, Narmada Bacho Andolan. In situ conservation (Protected area, Afforestation, Social Forestry, Agro Forestry, Biosphere Reserves, National Parks, Sanctuaries and Sacred Groves) and ex situ conservation (Botanical Gardens, Cryopreservation, Gene Banks, Seed Banks, Pollen Banks, DNA Banks). Role of organizations in Biodiversity management - IUCN, BSI, NBPGR and WWF.

Text Books

1. Agrawal, K.C. 1987. Environmental Biology. Agro-botanical Publications, India.
2. Ignacimuthu, S. 2013. Environmental studies. MJP Publishers, India.
3. Sharma, P.D. 2019. Ecology and Environment 13th edition, Rastogi Publications.

References

1. Ambasht, R. S. 1974. A Textbook of Plant Ecology. 3rd ed. Students' Friends Co. Varanasi, India.
2. Billings, W. B. 1965. Plants and the Ecosystem. Wardsworth Publishing Co. Inc., Belmont.
3. Kershaw, K. A. 1973. Quantitative and Dynamic Plant Ecology. Edward Arnold Publishers Ltd., London.
4. Kormandy, E. J. 1978. Concepts of Ecology. 2nd ed. Prentice Hall of India Pvt. Ltd., New Delhi.
5. Krishnan Kannan, 1997. Fundamentals of Environmental Pollution. S. Chand and Co. Ltd., New Delhi.
6. Levitt, J. 1980. Responses of Plants to Environmental Stresses. Acad. Press, New York.
7. Odum, E. P. 1971. Fundamentals of Ecology. W. B. Saunders & Co., Philadelphia, USA.
8. Odum, E. P. 1975. Ecology. 2nd ed. Oxford & IBH Publications, New Delhi.
9. Puri, G. S. 1960. Indian Forest Ecology. Vol. I & II. Oxford & IBH Publications, Delhi.
10. Vashista, P. C. 1974. A Textbook of Plant Ecology. Vishal Publications, Jullunder.
11. Cain, S. A. 1944. Foundation of Plant Geography. Harper & Brothers, New York.
12. Mani, M. S. 1974. Ecology and Biogeography of India. Dr. W. Junk Publishers, the Haque.
13. Frankel, O. H., Brown, A. H. D. and Burdon, J. J. 1995. The Conservation of



- Plant Diversity. Cambridge University Press, London.
- 14.17. Heywood, V. H. 1995. Global Biodiversity Assessment. UNEP, Cambridge University Press, London.
 - 15.18. Cardinale, B.J., Primack, R.B., Murdoch, J.D. 2019. Conservation Biology, Oxford University Press
 - 16.19. Sharma P D 2017. Ecology and Environment, Rastogi Publications.
 - 17.20. Tony Juniper 2019 The ecology book – big ideas simply explained. Dorling Kindersley Limited.
 - 18.21. Begon, M and CR Townsend 2020 Ecology : from individuals to ecosystem, Wiley

Links

1. <https://www.youtube.com/watch?v=lqxNQpajdpQ>
2. https://www.youtube.com/watch?v=_5q8hzF9VVE
3. <https://www.youtube.com/watch?v=8ceDE01iWLE>
4. https://www.youtube.com/watch?v=b6Ua_zWDH6U
5. <https://www.youtube.com/watch?v=3juNzNiWt00>
6. <https://www.youtube.com/watch?v=Ic-J6hcSKa8>

Practicals

1. Vegetation Analysis (Quadrats and line transects) - Raunkaier's frequency diagram dominance and density in a given area and Shannon - Weaver's measures of species diversity index.
2. Water analysis - Dissolved oxygen - Carbonate and bicarbonate. Water hardness – Calcium and Magnesium, Chemical Oxygen Demand and Primary productivity (Winkler's method).
3. Estimation of oxidized organic matter in the soil by Walkle Black method.
4. Study the Interpretations of the following
 1. Ecosystem types
 2. Different seric stages.
 3. Endemism
 4. Conservation of biodiversity
 5. Vegetation types of India.
 6. Environmental pollution impact study



Applied Biotechnology

Prerequisite:

Basic knowledge on biotechnology and its applications gained during undergraduate programme.

Objectives:

- To train the students in advanced level of biotechnological principles and techniques.
- To understand the process, development of tissue culture through micropropagation and impact of transgenic plants.
- To develop the skill in pollution abatement through Biofuel production

Outcome:

- Gain knowledge in tissue culture and micropropagation in crop improvement programme.
- Acquire knowledge in the transgenic molecular pharming.
- Acquire knowledge in bioremedial measures in pollution control and biofuel production.

UNIT – I

Biotechnology – scope, types, potentialities and constraints. Tissue Culture: Single cell and suspension culture, Production of haploids, detection and identification, and uses of haploids. Micropropagation - virus elimination, secondary metabolite production, encapsulated seeds - Application of plant tissue culture in agriculture and crop improvement.

UNIT – II

Outline of Genetic engineering - transposons as vectors - gene cloning - cloning in eukaryotes. Promoters and terminators - Agrobacterium derived promoters - 35S promoters of CaMV, inducible and tissue specific promoters. Importance of promoters. Amplification of genes by PCR. Gene transfer methods in plants - vectors - Ti and Ri plasmids of Agrobacterium.

UNIT – III

Transgenic plants resistant to Virus, Fungi, Bacteria, Pest, Insects and Herbicides - Transgenic plants with improved quality traits - Flavr Savr tomato, Golden rice, Arctic apple. Improved varieties in Floriculture. Transgenic plants for molecular pharming. Biodegradable plastics.

UNIT – IV

Biomining – Bioleaching, Biorecovery of metals, Biodegradation, Biosensors and



Biochips, Bioremediation types - In situ and ex situ, future strategies and challenges.
 Enzyme technology - large scale production of fungal enzymes -extraction and purification methods involved - application of fungal enzymes in different industries.
 Immobilization of enzymes – applications.

UNIT – V

Bio-fuels from all kinds of plants. Biotechnology and healthcare- Gene therapy – types, methods and applications. Genetically engineered Humulin. Production of antibodies, vaccines and monoclonal antibodies - applications.

Text Books

1. Dubey, R.C. 2006. Text Book of Biotechnology. S. Chand and Company Ltd.
2. Satyanarayana, U. 2008. Biotechnology. Books and Allied (P) Ltd, Kolkata.
3. Vijaya Ramesh, K. 2004. Environmental Microbiology, MJP Publishers

References

1. Chawla, H.S. 2002. Introduction to Biotechnology. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
2. Razdan, M.K. 2003. An Introduction to Plant Tissue Culture. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
3. Das, H.K. 2005. Text book of Biotechnology. Wiley Dream tech India Pvt. Ltd., Delhi.
4. Slater, A., N.W. Scott, and Flower, M.R. 2010. Plant Biotechnology: The genetic manipulation of plants. Second edition, Oxford University Press.
5. Kumar, V. 2012 “Biodiesel from Algae” LAP Lambert Academic Publishing
6. Thieman, W.J and M.A. Palladino 2009 Introduction to biotechnology, second edition, Dorling Kindersley India Pvt. Ltd.
7. Isil Aksan Kumaz 2015 Techniques in Genetic Engineering, CRC Press.
8. Marcel Kuntz 2018 Transgenic Plants and Beyond Elsevier Science
9. Hasanuzzaman, M, MNV Prasad 2020 Handbook of Bioremediation – Physiological, Molecular and Biotechnological Interventions. Elsevier Science.

Links

1. <https://www.youtube.com/watch?v=dg9ZUT2cILO>
2. <https://www.youtube.com/watch?v=JtkhHIG3nx4>
3. <https://www.youtube.com/watch?v=xuwV3ywCxW8>
4. <https://www.youtube.com/watch?v=T-q1BaFci5I>
5. <https://www.youtube.com/watch?v=gJd0MeECLHA>
6. <https://www.youtube.com/watch?v=wPwQYHrTC8A>



Practicals:

1. Preparation of MS medium.
2. Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of Tobacco, Datura, Brassica.
3. Study of Anther, Embryo and Endosperm culture, Micropropagation, Somatic embryogenesis and artificial seeds
4. Study of methods of gene transfer. Isolation of Plasmid DNA, Restriction digestion and gel electrophoresis of plasmid DNA, Agrobacterium - mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.
5. Study of steps of genetic engineering for production of Golden rice, Arctic apple.
6. Production of biofuels from algae, Mass cultivation of algae, Spirulina- SCP production.

Compulsory visit to institution(s) related in the field of Biotechnology

Plant Physiology and Applied Biotechnology

Plant Physiology

Practicals

1. Determination of water potential by gravimetric method.
2. Estimation of Photosynthetic pigments with reference to age (young and mature)
3. To determine the Chl.a/ Chl.b ratio in C3 and C4 plants.
4. Estimation of proline in normal and stressed leaves.
5. Effect of pH on membrane permeability.
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Applied Biotechnology

Practicals

1. Preparation of MS medium.
2. Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of Tobacco, Datura, Brassica.
3. Study of Anther, Embryo and Endosperm culture, Micropropagation, Somatic embryogenesis and artificial seeds
4. Study of methods of gene transfer. Isolation of Plasmid DNA, Restriction digestion and gel electrophoresis of plasmid DNA, Agrobacterium - mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.



5. Study of steps of genetic engineering for production of Golden rice, Arctic apple.
6. Production of biofuels from algae, Mass cultivation of algae, Spirulina- SCP production.

Compulsory visit to institution(s) related in the field of Biotechnology

Plant Ecology and Conservation Biology + Elective

1. Vegetation Analysis (Quadrats and line transects) - Raunkaier's frequency diagram dominance and density in a given area and Shannon - Weaver's measures of species diversity index.
2. Water analysis - Dissolved oxygen - Carbonate and bicarbonate. Water hardness – Calcium and Magnesium, Chemical Oxygen Demand and Primary productivity (Winkler's method).
3. Estimation of oxidized organic matter in the soil by Walkle Black method.
4. Study the Interpretations of the following
 1. Ecosystem types
 2. Different seric stages.
 3. Endemism
 4. Conservation of biodiversity
 5. Vegetation types of India.
 6. Environmental pollution impact study

Medicinal Botany and Dietetics

Prerequisite:

Basic knowledge on Medicinal plants and its applications gained during undergraduate course.

Objectives:

- To promote good health by teaching the students about diet and nutrition.
- To educate the science of nutrition in preventing the development of disease.
- To educate on the nutritional standards and specifications for the healthy person and patient to ensure and prevent mortality due to malnourishment.

Outcome:

- Gain knowledge about nutritive diet for different age groups
- Acquire knowledge about healthy food for normal person and patient
- Acquire knowledge in dietetics to prevent mortality due to malnourishment.



Unit –I Medicinal Botany – definition, history and importance, Indian system of Medicine. Study of the following plants with reference to their Habitat, Habit, Systematic position, Morphology of their useful parts and uses of: *Tinospora cordifolia* (Root), *Acorus calamus* (Rhizome), *Tylophora asthmatica* (leaf), *Terminalia chebula* (fruit), *Plantago ovata* (seed), *Holarrhena antidysenterica* (bark) and *Aloe vera* (dried juice).

Unit – II

Source, properties and medicinal uses of some phyto oils resources - Olive oil, Castor oil, Neem oil, Coconut oil, Mentha oil and Lavender oil.

Unit - III

Dietetics - Study the vernacular names, botanical sources, morphology, chief constituents and the therapeutic value of Indian plant foods - a) rice b) wheat; c) green gram, black gram, d) banana, Guava, e) Ginger, Turmeric, f) Cumin and Pepper.

Unit – IV

Plant nutraceuticals - definition and sources. Study of plant foods (food as medicine) in the treatment and nutritional care of some selected diseases – anorexia, arthritis, constipation, diarrhoea, diabetes, psoriasis, hypertension and memory loss.

Unit- V

Plant foods as Antioxidants - Definition - types, PUFA, Probiotics, Prebiotics, Dietary fibers, Omega-3 fatty acids. Cosmeceuticals – Definition, Retinoic acid. Recommended dietary allowances – significance.

Text books:

1. S.G. Joshi, “Medicinal plants”, Oxford and IBH Company Private Ltd., New Delhi, 2000.
2. J.L. Raymond, “Krause’s Food, Nutrition and Diet therapy” , Saunders publishers, 2003.
3. Harbans Lal, “Food and Nutrition”, 2nd edition, India Binding House, U.P. 2013

References

1. K. K. Purohit and Gokhale, “Pharmacognacy”, Nirali Publications, 1999.
2. A.K. Srivatsava, “Medicinal plants”, International Book Distributors, Dehradun, 2006.
3. S.N. Yoganarashimman, “Medicinal Plants India”, Vol.2 TamilNadu, Inderline Publishing Private Ltd., Bangalore, DehraDun and Michigan, 2000.
4. S.K. Bhattachariya, Handbook on medicinal plants, pointer publishers Jaipur,



- 2004.
5. A.Farooqi and B.S. Sreeramu, Cultivation of medicinal and aromatic Crops, Universities Press, 2001.
 6. R. T.Lagua and V.S.Claudio, “Nutrition and diet therapy Reference dictionary”4th edition, Jones & Barlett Learning, 1995.
 7. B.Thomas and J.Bishop, “Manual of Dietetic Practice” Edited by Jone Gandy, 4th edition, Wiley Blackwell Publishing, Oxford, UK, 2007.
 8. B.Srilakshmi, “Dietetics”, New Age International publishers, 2007.
 9. D.A.Vattem and V. Maitin, “Functional foods, Nutraceuticals and Natural Products DEStech Publications, INC, 2016.
 10. John Shi “Functional Food Ingredients and Nutraceuticals Processing Technology”, CRC Taylor and Francis Publishers, 2006
 11. M.M. Pandey, Subha Rastogi and AKS Rawat Indian Traditional Ayurvedic System of Medicine and Nutritional Supplementation, Evidence based Complementary and Alternative Medicine, <http://doi.org/10.1155/2013/376327>.2013
 12. Rachen Hartley Gentle Nutrition – A non-diet approach to healthy eating. Victory Belt Publishing. 2021.

Links

1. <https://www.youtube.com/watch?v=Kt0Lgy17I78>
2. <https://www.youtube.com/watch?v=wPwQYHrTC8A>
3. <https://www.youtube.com/watch?v=Y2I1Ld8W4eE>
4. <https://www.youtube.com/watch?v=5EGQ6XVGPm0>
5. <https://www.youtube.com/watch?v=0z47wLZ4-O4>
6. <https://www.youtube.com/watch?v=FXjVa5g8x8g>
7. <https://www.youtube.com/watch?v=8XMN0MhmoAM>
8. <https://www.youtube.com/watch?v=9zwBGmcAZ8U>

Practicals

Spotters

Identification of medicinal plants/products described in the syllabus

1. Any four medicinally important plants/ products described in the syllabus
2. Any five Indian plant foods described in the syllabus
3. Prebiotics/Probiotics/Omega-3 fatty acids



Agricultural Botany and Plant Breeding

Prerequisite:

Basic knowledge on agriculture and plant breeding applications gained during undergraduate course.

Objectives:

- To enhance the knowledge of agricultural botany and plant breeding.
- To educate the basic ideas and concepts of crop improvement
- To understand the breeding techniques and hybridization

Outcome:

- Acquire knowledge about farming in India, soil type and cropping systems
- Gain knowledge about tillage technologies involved in agriculture
- Plant breeding technologies and genetic breeding knowledge

UNIT –I

Agroclimatic zones of India. Cropping system in India – Kharif, Rabi, and Zaid. Concepts of multiple cropping, multistorey, relay and inter-cropping. Types of Farming in India. Soil profile - physical and chemical properties of soil - soil biota - classification of Indian soils - soil erosion - causes and effects - acid and sodic soils. Classification of essential plant nutrients - nutrient deficiency symptoms.

UNIT –II Tillage- Primary and Secondary tillage - Conventional tillage - Minimum tillage – Stubble mulch tillage. Weed and their management- Harmful effects of weeds- Classification of weeds – Propagation and Dissemination of weed, Methods of weed control- Mechanical, Cultural, Chemical, Biological. Integrated weed management. Herbicide – Classification - Mode of action.

UNIT – III

Water, its properties and role in plants – Irrigation - Classification of soil water - methods of irrigation. Fertilizers - Nitrogenous, Phosphatic, Potassic. Biofertilizers - Compost and farmyard manure. Biopesticides - Types of biocontrol agents – applications.

UNIT – IV

Plant breeding - Centre of origin and domestication of crop plants. Plant introduction – Quarantine measures. Selection methods - for self, cross pollinated and vegetative propagate plants. Backcross method of breeding. Hybridization- types, advantages and limitations. Seed technology, its importance. Different kinds of seeds and their seed production and processing techniques.



UNIT –V

Genetic basis of inbreeding depression, heterosis. Mutation and Polyploidy in crop improvement. Distant hybridization - Role of Biotech in crop improvement. Development of resistant varieties in drought. Cytoplasmic sterility in hybrid seed production. Antisense technology and its role in crop improvement. Somoclonal variation in crop improvement.

References

1. Kanwar, J.S. (1985) Theory and Practice of Soil Fertility. ICAR Pub.
2. Pierzinsky GM, Sims TJ & Vance JF. 2002. Soils and Environmental Quality. 2nd Ed. CRC Press.
3. Tisdale SL, Nelson SL, Beaton JD & Havlin JL. 1999. Soil Fertility and Fertilizers. 5th Ed. Prentice Hall of India.
4. Troeh FR & Thompson LM. 2005. Soils and Soil Fertility. Blackwell.
5. Chand, S. (2008). Integrated Nutrient Management for Sustainable Crop Production and Soil Health, International Book Distributing Co., Lucknow, UP
6. Indian Society of Soil Science 2002. Fundamentals of Soil Science. ISSS, New Delhi.
7. Sehgal J. 2002. Introductory Pedology: Concepts and Applications. New Delhi.
8. Das. P.C. 2003 Manures and Fertilizers, Kalyani Publishers
9. SubbaRao, N.S. 2004 Soil Microbiology Oxford & IBH.
10. Magdoff F & Weil RR 2004. Soil Organic Matter in Sustainable Agriculture. CRC Press
11. A.M. Michael, 1987. Irrigation – Theory and Practice, Vikas Publishing House Pvt. Ltd., New Delhi
12. S.S. Parihar and B.S. Sandhu, 1978. Irrigation of field crops – Principles and Practices, ICAR, New Delhi
13. Lenka, 1999. Irrigation and Drainage. Kalyani Publishers, New Delhi.
14. G.H. Sankara Reddy and T. Yellamanda Reddy. 1995. Efficient use of irrigation water. Kalyani Publishers, New Delhi.
15. Gupta, O. P. 1998. Modern Weed Management. Agro Botanica Bikaner, India.
16. Subramanian, S. A. Mohammed Ali and R. Jayakumar. 1991. All about Weed Control. Kalyani Publishers, New Delhi.
17. Jaganathan.R., & R.Jayakumar. 2003. Weed Science Principles, Kalyani Publishers, New Delhi.
18. Ashton FM & Crafts AS. 1981. Mode of Action of Herbicides. 2nd Ed. Wiley Inter-Science. Mandal RC. 1990. Weed, Weedicides and Weed Control - Principles and Practices. Agro Botanical Publ.
19. Rao VS. 2000. Principles of Weed Science. Oxford & IBH.
20. Jain, K & Kharkwal, M.C. 2004. Plant Breeding – Mendelian to Molecular



- Approaches. Narosa Publishing House, New Delhi.
21. Chandrasekaran, S.N. & Parthasarathy. S.V. 1975. Cytogenetics and plant breeding (Revised Edition) Eds. Krishnaswamy. P. Varadachary & Co., Madras.
 22. Backcock., E.B. 2001 Genetics and Plant breeding. Agrobios (India), Jodhpur.
 23. V. L. 2000. Plant Breeding. Theory and Practicals (2nd edition), Oxford & IBH Publ. Co. Pvt.. Ltd., New Delhi.
 24. Sharma, J R. 1994 Principles and Practice of Plant Breeding, Tata-McGrawHill Publ. Co. Ltd, New Delhi.
 25. Singh S & Pawar IS. 2006. Genetic Bases and Methods of Plant Breeding. CBS New Delhi.
 26. Singh P. 2006. Essentials of Plant Breeding. Kalyani Publishers, New Delhi.

Practical/Demo/Spotters

1. Compare texture, porosity, capillarity of different types of soil
2. Determination of moisture and organic matter content from manures samples.
3. Emasculation and Pollen viability test
4. Soil Profile/Biofertilizers

Project

Prerequisite:

The students should be able to understand and interpret the literature in their areas of research.

Objectives:

- To provide training in scientific skills.
- To prepare students for professional training programmes or entry level jobs in any area of Botany

Outcome:

At the end of the project, students should have increased

- their capacity to think critically;
- their ability to design, analyze and execute an experiment; their confidence and ability in communication skills (in writing and oral).
- in acquiring the literature collection methods and interpreting the data of their scientific experiments etc.

