Mother Teresa Women's University
Kodaikanal

1. Advances in Pest Management

UNIT 1

Natural determinants of growth and metamorphosis. Insect behavior and physiological interpretations: Mating, Oviposition, Parental care. Genetic control of insect pests and recent advances. Pheromonal and hormonal pest control of insect pests.

UNIT 2

Ecological Pest Management. Components of Biological control. Biodiversity of biocontrol agents: Parasitoids, Predators and microbial agents. Biology and habitat of BCA. Mass production of BCA. Utilization of BCA in Biological Pest Control. Advances in Integrated Pest Management.

UNIT 3

Crop resistance to pest insects: Pest suppression by harmonious, coordinated and fortuitous biological means. Insecticides: Organic insecticides, mode of action of insecticides, metabolism of insecticides. Haemolymph proteins of insects and sex specific proteins of insects.

UNIT 4

Industrial Entomology: Sericulture: Commercial Silk Production, Recent Trends, Marketing. Apiculture: Modern methods of bee keeping, Role in pollination and crop yield. Lac culture: New Trends in lac culture, Marketing. Insect as a human food: Insect Diversity, preparation of food, marketing.

UNIT 5

Insect hormones and pheromones: Chemistry and functions of hormones and pheromones. Bioluminescence in insects: Light producing organs and biochemistry of light production. Insect development: Embryonic and post embryonic development: Morphological, biochemical and physiological basis. Insect parasitism, Insect host parasite relation and crop pest biocontrol agents interactions.

Recommended Reading:

1. Agrochemicals and Pest Management By T. V. Sathe: 2003
2. Molecular Entomology By J. H. Law: 1987
3. The Principles of Insect Physiology By U. B. Wigglesworth
4. Biological Insect Pest Suppression By Coppel and Martins: 1971
5. Insect Pest Predators By Sathe and Bhosale: 2001

6. Insect Predators and Pest Management By Patil and Sathe: 2003
7. Biological Pest Control By Sathe and Bhoje 2000
8. Indian Pest Parasitoids By Sathe et al., 2001
9. FAO Manual on Sericulture: Vol. No. 2
10. Introduction to Sericulture By Ganga and Chetty
11. Text Book of Applied Entomology Vol. 2 By K. P. Srivastava
12. Physology of Insecta Vol 1 to 5 By Morris Rockstein
13. Comprehensive Insect Physiology, Biochemistry and Pharmacology Vol. 1 to 12 By Kerkut and Gilbert
14. Modern Entomology By D. B. Tembhare
15. Entomology By Gillot, C.
16. Imms General Text Book of Entomology By Richards and Davis
17. Cotton pests and biocontrol agents by T.V.Sathe and G.S.Margaj . 2001. DPH, NewDelhi.
18. Insects Pest Management Ecological Approach by T.V.Sathe and Jyoti Oulkar. 2010. DPH,NewDelhi

2. Biodiversity

UNIT 1

Biodiversity Science: Concept & definition, scope and constraints of biodiversity science. Evolution of biodiversity, factors promoting high diversity, global biodiversity.

Measures of Biodiversity: Diversity indices, information statistic indices, biodiversity values.

UNIT 2

Species Diversity: Species inventory, history and origin, species richness, future of species diversity studies, threats to species diversity. Taxonomical, Biological, Ethological, Biochemical and Molecular Approaches.

UNIT 3

Genetic Diversity: Nature and origin of genetic variation, methods based on DNA chromosomes and determinants of genetic diversity.

Ecosystem Diversity: Classification, Measuring ecosystem diversity, megabiodiversity centers, hot spots.

UNIT 4

Threats To Biodiversity: Issues relating to threats to biodiversity, approaches to combat threats to biodiversity, values and uses of biodiversity, loss of biodiversity, carbon dating.

Biodiversity and adaptation: Morphological, Physiological, Molecular.

UNIT 5

Biodiversity Conservation: Goals, In –situ and Ex-Situ conservation, role of universities and colleges in conservation, biodiversity awareness programmes, biodiversity education resources, media and sustainable development. Recent Trends in insect biodiversity conservation, protection and utilization.

Recommended readings:

1. An advanced Textbook on Biodiversity by K.V.Krishnamurti.
2. Biodiversity and biotechnology by Ray and Ray.
3. Biodiversity by Mandal and Nandi
4. Advancement in insect biodiversity by Rajiv K.Gupta.2004.
5. Biotechnological approaches in Entomology by T.V. Sathe 2008.
6. Molecular Entomology by J.H. Law 1987.

3. Physiology of Reproduction

UNIT- 1

Reproductive System: Male reproductive system. Role of epididymis in Male fertility. Female reproductive System. Capicitation of aparmatozoa in the Female. Birth control - Natural, Artificial and Environmental components, Aging and reproductive system.

UNIT- 2

Development and Inheritance: Development during pregnancy. Biology of Myometrium and Cervix. Prenatal Diagnostic test and advantages and disadvantages. Endocrinology of Pregnancy and Parturition, control of parturition. Physiology of Lactation inheritance.

UNIT- 3

Reproductive Technology: Artificial insemination, semen analysis sperm preparation for ICSI. Invitrofertilization. (IVF). Cryopreservation. H.Y. Antigen and Sex Determination,

UNIT- 4

Pheromones and Reproduction: Signalling, Chemical communications.

UNIT - 5

Endocrinology and reproduction: Pituitary hormones.Thyroid metabolic hormones. Male sex hormones. Female sex hormones. Physiological, Biochemical and Molecular Approches in above. Pregnancy and Neonatal Physiology.

Recommended Reading:

1. Devis A., Blakely A. and Kidd C. 2001. Human Physiology, Harcourt Publishers Limited, Churchill, Livingstone.
2. Elder K. and Dale B. 2000. In vitro fertilization 2nd (Ed), Cambridge University Press.
3. Guyton A.C. 1986. Textbook of Medical Physiology 7th (Ed), W.B. Saunders Company Igaku / Saunders.
4. Guyton A.C. 1992. Human Physiology and Mechanism of Diseases 5th (Ed), W.B. Saunders Company Igaku / Saunders.
5. Kessel R.G. 1998. Basic Medical Histology, Oxford University Press New York.
6. Mcardle W., Katch V. and Katch F. 1986. Exercise Physiology, Lea and Febiger, Philadelphia
7. Sherwood L., Klandorf H. and Yancey P. 2005. Animal Physiology from Genes to Organisms, Thomson Learning Academic Resource Centre.
8. Tortora G. and Grabwski S. 1993. Principle of anatomy and Animal Physiology, Harper Collins College Publishers.

4. Toxicology

UNIT –I

Scope of Toxicology: History, Definition, Disciplines of toxicology. General concept of toxicology. Toxicants and their classification. Cardio toxicants, Immunotoxicants : Types, Biochemical and Molecular mechanisms.

UNIT –2

Environmental pollution and public health: Principal consequences of Environmental pollution. Impact of Air, Water and Soil Pollution on Human Health: Physiological, Biochemical and Molecular components. Air, water and soil pollution. Radioactive and noise pollution: Physiological and Molecular interpritation. Bioaccumulation and Biomagnification.

UNIT – 3

Pesticide Metabolism: Toxic metals – Principal of metal toxicity, important toxic metals, effect on human and animals. Toxicity tests – Based on number and condition, Based on exposure period, Acute toxicity test, Chronic toxicity test, toxic effects.

UNIT – 4

Toxicological testing methods: Behavioral, respiratory, Kidney, Liver, Skin fuction tests. Metabolism of Pesticides of following group : Chrorinated Hydrocarbons, O.P., Carbamates, Dinitrophenols, Synthetic pyrathroids and Biopesticides.

UNIT – 5

Dose-response relationship: Selection of doses, Types of dose-response relationship, cumulative response, threshold limt. Mode of action of toxicants – Protein, Lipid and Carbohydrates at cellular level. Modifying factors of toxicity of xenobiotic chemical. Biotransformation of toxicants – oxidation, reduction, hydrolysis, conjugation reaction.

Recommended Reading :

1. Albert,A. 1960. Selective Toxicity, Wiley, New York.
2. Ariens,E.J., Simonis, A.M. and Offermerier, J. 1976. Introduction to General Toxicology.
3. Boyland, E. and Goulding, R. 1968. Modern Trends in Toxicology, Butterworths, London.
4. Butte, G.C. (Ed) 1978. Principal of Ecotoxicology. SCOPE 12,ICUSSCOPE, John Wiley and Sons, New York.
5. Carsons, R. 1962 Silent Spring. Houghtan Mifflin, Boston .
6. Casarett, L.J. and Doull, J. 1980. Toxicology, A Basic Science of Poisons, 2ed. The Macmillian Co., New York.
7. Duffs,J.H. and Worth Howard, G.J. 1996. Fundamental Toxicology for Chemicals. Royal Society of Chemistry, Cambridge (U.K.).
8. Fairhall, L.T. 1969. Industrial Toxicology, Hafner Publishing Co., NewYork.'

9. Frank C. Lu. 1985. Basic Toxicology (Fundamentals, Target Organs and Risk Assessment). Hemisohere Publishing Corporation,Washington.
10. Pande, K., Shukla, J.P. and Trivedi, S.P. 2006. Fundamentals of Toxicology, New Central Book Agency (P) Ltd, Kolkata, India.

5. Cell Biology

UNIT 1

Compartmental diversity within the cell and its maintenance: Molecular mechanisms of vesicular transport. Maintenance of compartment identity. Bioenergetics: Cellular metabolisms, Energy transformations. Molecular Motors: P - loop N TPase super family, Myosins, Kinesin & Dynein, A rotary motor (in bacteria).

UNIT 2

Signal transduction pathways in cell: G-proteins, Cyclic AMP, Ca+2 as messenger, Protein kinases. Ionic basis of membrane excitability: Ionic channels, Electrical properties of membrane. Control of gene expression: Organization of gene, Role of gene regulatory proteins, Role of DNA-binding proteins, Chromatin structure & control of gene expression.

UNIT 3

Garbage disposal unit inside the cell: Lysosomes, Peroxisomes. Cell and Defense: Cellular basis of immunity, SER and Biotransformation.(Biotics & xenobiotics). Cell renewal: By simple duplication, By stem cells, By pluripotent stem cells. Cell death: Apoptosis Type I, Apoptosis Type II.

UNIT 4

Evolution of cellular organization of life: First form of life, RNA world, DNA world, Prokaryotic & Eukaryotic cellular evolution. Genomics and Evolution: Principles of genome annotation. Evolution of macromolecular sequences: Building phylogenetic trees, Phylogenetic, cladistics and ontology.

UNIT 5

Proteomics and Drug designing: Conceptual models of protein structure, Three dimensional structure classification and protein function, Structural alignment, Pharmainformatics & drug designing.

Recommended Readings:

1. Molecular cell biology by Lodish, Baltimore et al.
2. The cell: A molecular approach- Cooper
3. Cell and molecular biology by Gerald Karp
4. The cell by Bruce Albert

6. Advances in Fisheries and Aquaculture

UNIT 1

Freshwater Resources and their Conservation: Proper use of freshwater resources. Restoration of freshwater ecosystem. Large man-made lakes: Present controversy in India. Management of ponds & Village tanks. Lakes and Reservoirs: Important physico-chemical processes. Evolution of ecosystem.

UNIT 2

Eutrophication of aquatic systems: Causes, consequences and control. Important parameters & indicators. Eutrophication of flowing waters. Potential of fishing and fish production in the freshwaters. Role of fish in human nutrition.

Freshwater fisheries: Riverine fisheries of India. Reservoir fisheries and its potential in India. Craft and gears used in inland fisheries. Extension program and Fishermens co-operative societies.

UNIT 3

Riverine fisheries and pollution problems. Biological monitoring of pollutants in aquatic ecosystems. Fisheries resources of large lakes and reservoirs. Management and conservation. Fish Byproducts and Marketing.

UNIT 4

Aquaculture: Recent advances in Inland Fisheries developments in India. Polyculture of Indian and Exotic carps. Culture techniques for freshwater prawns. Culture of brackishwater finfish and shellfish and their economics. Aquaculture: Marketing and Economics in India.

UNIT 5

Major capture fisheries & their potential in India: Coastal fishery. Off shore fishery. Crustacean fishery. Molluscan fishery.

Recommended readings :

1. Prasad B. (1962)- The wealth of India- Fish and Fisheries . CSIR, New Delhi
2. Lanham (1962)- The Fishes. Columbia Uni. Press. New York.
3. Central Marine Fisheries Institute, Bulletin 32& 33, Cochin, India, 1982.

7. Environmental Biology

UNIT 1

Population Ecology: Properties of Population – Density, Natality, Mortality. Population age distribution. Population growth. Cyclic Oscillations in Population. Carrying Capacity of Population. Environmental resistance.

Wildlife: Causes of threatening the wildlife. Wildlife distribution in India. Endangered fauna from India. Protected areas – National Parks, Sanctuaries & Biosphere reserves. Wildlife protection Act 1972. Wildlife management techniques. Special wildlife conservation projects- Project tiger, Crocodile breeding project, Musk deer breeding project & Gir lion sanctuary project.

UNIT 2

Natural Resources: Classification of resources. Need of conservation of natural resources. Renewable natural resources – Water, Fishery, Wildlife, Forest & Grass lands. Non-renewable natural resources – Top Soil, Land, Mineral resources. Conservation of water resources.

Human Ecology: Man and his environment. Humans impact on nature. Degradation of environment due to – Mining, Industries, Agriculture & Urbanization.

Environmental problems: Global warming, Eutrophication. Socio-economic aspects of environmental problems.

UNIT 3

Limnology: Types of aquatic ecosystems – Fresh water & Marine water. Zonation in marine ecosystem – Littoral, Limnetic & Profendal zones. Physico-chemical parameters of aquatic ecosystem – pH, Temperature, Dissolved Oxygen, Dissolved Carbondioxide, Nitrates, Phosphates & Hardness. Planktons forms – Freshwater & marine water. Conservation of aquatic ecosystems.

UNIT 4

Biodiversity: Introduction – Species diversity, Genetic diversity & Ecosystemic diversity. Economic importance of biodiversity. Priorities of biodiversity conservation.Need of biodiversity conservation. Conservation of biodiversity. Biodiversity hot spot from India. i) Conventions on biodiversity.

Toxicology: Toxicity evaluation methods. Bioaccumulation and biomagnification of pollutants in aquatic ecosystem. Resistance development in organisms to pollutants.

UNIT 5

Limiting Factors: Lebigs law of minimum. Shelfords law of tolerance. Combined concept of limiting factors. Limiting factors – Radiation, Water, Temperature, Gases, Soil biogenic salts. Fire, Anthropogenic factors.

Environmental Education & Sustainable Development: Formal education system. Non-formal education systems. Importance of environmental education in solving environmental problems. Role of NGO in minimising environmental crises. Concept of sustainable development. Resource conservation & sustainability. Sustainable use of natural resources.

Recommended readings:

1 Usher –Biological management and conservation
2 Hanson- Animal Diversity
3 Saharaia- Wildlife in India
4 Duffy- Grassland Ecology and Wildlife management
5 Odum- Fundamentals of Ecology

8. Trends in Sericulture

UNIT 1

Eri Silk Production: Historical account. Caster cultivation. Pests and diseases of caster. Seed technology of Philasomia ricini. Rearing Technology for Philasomia ricini. Pests and diseases of P. ricini

UNIT- 2

Tropical Tasar Sericulture: Historical account. Tasar silkworm food plants. Pests and diseases of tasar silkworm. Eco-races and diversity of tasar silkworms. Seed Technology of worms and pests and disease of Antharaea mylitta.

UNIT 3

Muga Sericulture: Historical account. Food plants of Antharaea assama and their cultivation Pests and diseases of A. assama food plants. Seed Technology. Rearing Technology of worms and pests and diseases of worms.

UNIT 4

New Trends in Bivoltine mulberry silkworm: Scope. Seed Technology.Rearing Technology.
Structure and development of silk gland: Silk synthesis and factors controlling silk synthesis. **Silk Technology:** Reeling and weaving of mulberry silk. Reeling and weaving of non mulberry silk.

UNIT 5

Newer Trends in Sericulture: Mulberry silkworm hybrids: Scope and Status. Use of DNA recombinant Technology. Use of RELF Technology in Sericulture. Use of PCR Technology in Sericulture. Geomagnetism and silk production. Vermiwash use in sericulture for crop productivity. Sericulture and epidemiology: Asthama/Bronchitis. AIDS. Allergy etc.

Recommended readings:

1. FAO Manual on Sericulture
2. Sathe, T. V. (1998): Sericultural Crop Protection
3. Sathe, T. V. and Jadhav, A. D. (2001): Sericulture and Pest Management
4. Sathe, T. V. and Thite, S. H. (2004): Shoot Feeding and Sericultural Trends
5. Mohanti, P. K.: Tropical Cocoon Production
6. M. S. Jolly: Bivoltine Grainage for tropics
7. M. S. Jolly: Economics of Sericulture under irrigated conditions
8. CSR & TI, Mysore: Tips for successful silkworm cocoon crops
9. Sarkar, D. C. (1988): Ericulture in India (CSB, Bangalore)
10. Jolly, M. S., Sen, S. K. and Ahsan, M. M. (1974): Tassar Culture, CSTRI, Ranchi
11. Annual Report of Central Muga Research Institute, Assam

12. Ullal, S. R. (1968): Sericulture in USSR A study report, CSB, Bangalore
13. Boyer, H. W. and Nicosia, S. (1979): Genetic Engineering, NHBP, Amsterdam, New York
14. Ganga, G. and Chetty, S. J. (1997): An Introduction to Sericulture. (2nd Edition) O & IBH Publication Company Ltd. New Delhi
15. Sinha, H. The Development of India Silk Oxford and IBH Publication Company Ltd. New Delhi
16. Mohan Rao M. M. (1988): A Text Book of Sericulture BSP Publication, Sultan Bazard, Hyderabad.

9. Modern Trends in Zoology

UNIT 1

Physiology: CNS. Neuro-endocrinology. Types of endocrine glands. Classification of hormones. Mechanism of their action, Stress and adaptation. Space physiology.

UNIT 2

Biochemistry: Enzymes and coenzyme. Allosteric enzymes. Ribozyme and Abzyme. Fermentation technology. Techniques in food preservation, carbohydrates, lipids, proteins including enzymes of industrial importance, bio-sensors.

UNIT 3

Evolution: Origin of life. Concept of evolution. Theories of organic evolution. Mechanism of speciation. Origin and evolution economically important microbes, plants and animals.

UNIT 4

Population genetics: Differences between qualitative and quantitative traits. Gene and genotype frequency. Population dynamics factors affecting gene frequency and genotype frequency. Selection, migration and mutation. Variation, Causal components of genetics, Heritability, Repeatability, Selection models.

UNIT 5

Bioinformatics: Perspectives on computers an operating system. The internet and the biologist. Phylogenic analysis. Genome information.

Recommended readings:

1. Human Physiology An Integrated Approach: International Edition Latest Ed. Dee Silverthorn.
2. Biochemistry By Zubay.
3. Principles of Genetics by Gardener.
4. Stress Biology by U. Chakrqaborti.
5. Molecular Markers, Natural history And Evolution, Chapman & Hall, New York. J.C Avise.
6. Bioinformatics R. Sundaralingam V. Kumaresan.

10. Biopesticides

Unit I

Pests, Pesticides and Biopesticides: Pest problems in agriculture, Pesticides paradox: Insecticides resistance, Insect resurgence, Pesticide poisoning, Contamination of food commodities, Effect on non – target organisms.

Unit II

Predators and Parasitoids: Introduction, Historical perspective, Biological control agents: predators and parasitoids, Biological control approaches, Augmentation, conservation, integrated Biological control.

Unit III

Microbial control: Introduction, Historical perspective, Bacterial pathogens: Bacillus thuringiensis, Bacillus spaericus, Viral pathogens: Baculovisus, Fungal pathogens and protozoan pathogens.

Unit IV

Botanical pesticides: Introduction, Historical perspective, promising plant, Major botanical pesticides, insecticidal phytochemicals, Behavior and physiology affecting phytochemicals, Hormonal mimics and antagonists, pest resistance to phytochemicals. Biological origin of IPM concept, IPM: A Paradigm shift, Biotechnological approaches Sustainable pest management.

Recommended reading:

1. Ware, G. W. (2000) Pesticides: Theory and application. Freeman and Company, New York
2. Dhaliwal, G.S. and Koul, O. (2008) Biopesticides and pest management.
3. Dhaiwal, G.S. and Arora, R (2006) Integrated pest management: Concepts and approaches. Kalyani Publishers, New- Delhi.
4. Dhiwal, G.S. and Arora. R. (2006) Role of Phytochemicals in integrated pest management. Harwood Academy Publishers, Netherlands.
5. Vincent, C. (2002) Biopesticides the origin of vegetables. Lavoisier Publishers, New York.