ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

MINOR

Subject: Sericulture

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	II	1	Biology And Physiology Of Mulberry	3	3
			Biology And Physiology Of Mulberry Practical Course	2	1
	III	2	Cytogenetics And Breeding Of Mulberry	3	3
			Cytogenetics And Breeding Of Mulberry Practical Course	2	1
	IV	3	Cytogenetics And Breeding of silkworm	3	3
			Cytogenetics And Breeding of silkworm Practical Course	2	1
		4	Silkworm Seed Production And Seed Organization	3	3
			Silkworm Seed Production And Seed Organization Practical Course	2	1
III	V	5	Vanya Sericulture (Non Mulberry) Sericulture	3	3
			Vanya Sericulture (Non Mulberry) Sericulture Practical Course	2	1
		6	Organic Farming And Mechanization	3	3
			Organic Farming And Mechanization Practical Course	2	1

SEMESTER-II

COURSE 1: BIOLOGY AND PHYSIOLOGY OF MULBERRY

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: GEOGRAPHIC DISTRIBUTION OF MULBERRY AND GENOTYPES : 8Hrs.	
1	History of Sericulture
2	World Raw Silk Production
3	Employment Potentiality
4	GermPlasm and Cultivated Varieties of Mulberry .
Unit-2: CLASSIFICATION &TAXONOMY : 10Hrs	
1	Systematic Position Of Mulberry in Plant Kingdom
2	Morphology and Characteristics of Mulberry Leaf,Branches and Roots
3	Floral biology of Mulberry
4	Morphology and Characteristics of Flowers and Seeds
Unit-3: ANATOMY OF MULBERRY: 8Hrs.	
1	Types of Tissue Systems
2	Anatomy of Root (Primary & Secondary Structures)
3	Anatomy of Stem (Primary & Secondary Structures)
4	Anatomy of Petiole and leaf.
Unit-4: PHYSIOLOGY OF MULBERRY 10Hrs.	
1	Importance of physiology in agriculture. Plant-water relations: Structure, properties and functions of water; concept of diffusion, osmosis and water potential; Water balance of plants: Water in soil; Water absorption and translocation in plant; soil-plant-atmosphere continuum; Theories explaining water translocation.
2	Transpiration: Significance of Transpiration; transpiration in relation to crop productivity, Stomatal physiology, Concept of water use efficiency.
3	Photosynthesis: Brief Account of Photosynthesis- Mechanism of carbon fixation by C_3, C_4 and CAM pathway and their significance in relation to leaf quality and productivity-Chemical Composition of Mulberry leaf.
4	Respiration: Significance; Respiratory metabolism, Alternative respiration, Factors regulating respiratory rates. Seed dormancy and viability: Basic concepts, seed germination and seedling vigour. Stress Physiology: Plant responses to abiotic stresses; Key concepts and definition; acclimation and adaptation mechanisms.
Unit-5: GROWTH REGULATORS 9Hrs.	
1	Plant Growth and Development: Concept of plant growth and morphogenesis; Growth and yield parameters and their measurements.
2	Hormones and plant growth regulators in modulating crop growth
3	Physiological importance of Auxins, GA, Cytokinin, ABA, Ethylene, Brassinosteroids and strigolactones
4	Applications of growth regulators in Agriculture &Sericulture.

SEMESTER-II

COURSE 1: BIOLOGY AND PHYSIOLOGY OF MULBERRY

Practical Credits: 1 2 hrs/week

1. Taxonomy: Botanical description of Mulberry of Family: Moraceae.
2. Anatomy:
   - oT.S. primary and secondary roots.
   - oT.S of stems of Mulberry.
   - oT.S of Leaf.
   - oT.S of petiole.
3. Physiology
   A. Apical Dominance
   B. Separation of Chlorophyll Pigments

References: ipni.org(International Plant name Index)

1. Bongale, U.D (1995) Fertilizers in mulberry cultivation. Pushpa Sree Publications, Thalaghattapura, Bangalore.
2. Dokuhon, Z.S (1998). Illustrated Textbook on Sericulture. Oxford & IBH publishing Co, Pvt. Ltd, New Delhi, Calcutta.
3. Guptta, R.K & Mittal, R.K (1983) Bibliography of Indian Weeds. Associated Pub. Co. New Dehli.
4. Hasao Aruga (1994) Principles of Sericulture (Translated from Japanese) Oxford & IBH publishing Co, Pvt. Ltd, New Delhi.
5. Hortmann and Kesler (1993) Plant Propagation, principles and practices. Prentice Hall, Hemel Nemstead.
6. Krishnamurthy, N. (1981) Plant growth substances including application in Agriculture. Tata McGraw Hill Pub. Co. Ltd. New Delhi.
7. Shankar, M.A (1998) Handbook on mulberry Nutrition, Multiplex, Bangalore.
8. Subba Rao, N.S (1998) Biofertilisers in Agriculture. Oxford & IBH Pub. Co, Pvt. Ltd, New Delhi.
9. A text Book on Mulberry Crop Protection. Govindaiah, V.P Gupta, D.D Sharma, S. Rajadurai and V. Nishitha Naik, Published by Central Silk Board, Bangalore-68, India. 2005.
10. Rajanna L, Das P.K, Ravindra S, Bhogesha K, Mishra R.K, Singhvi N.R, Katigar R.S and Jayaram H. Mulberry Cultivation and Physiology.2005
11. .Sericulture Manual – 1 (Mulberry cultivation) (1972)Food and Agriculture Organization of the United Nations, Rome.
12. Lecturers on Sericulture-Edited by G.Boraiah, SBS Publishers Distributors, BANGALORE
13. Comprehensive Sericulture Manual-M.Madan Mohan Rao, B.S.Publications, HYDERABAD.
14. Patti sankethika vignana sasthram-Developed by APSSRDI, Kirikera
15. Pattu parisrama-Telugu academy
16. Photosynthesis and plant physiology

SEMESTER-III

COURSE 2: CYTOGENETICS AND BREEDING OF MULBERRY

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: EMBRYOLOGY OF MULBERRY	8Hrs.
1	Microsporogenesis- Development of microspores- Megasporogenesis- Development of megaspores.
2	Fertilization- Fruit seed development
3	Embryo Development
4	Polyembryony- Parthenogenesis- Parthenocarpy
Unit-2: CYTOLOGY:	10Hrs
1	Cytological aspects of Mulberry
2	Cell and its organelle- Chromosomes & Structure and function of DNA
3	Cell Division-Mitosis
4	Cell Division- Meiosis
Unit-3: GENETICS	8Hrs
1	Pre- and Post-mendelian concepts of heredity, Mendelian principles of heredity. Types of dominance, epistatic interactions with examples
2	Germplasm sources, geographical distribution and exploration -Conservation and role of germplasm in crop improvement
3	Multiple alleles, Pleiotropism, Sex determination and sex linkage, sex limited and sex influenced traits, Inheritance of economic characters (quantitative and qualitative characters). Objectives and pre-requisites of breeding-
4	Centers involved in crop improvement programme of host plants of silkworms. Inheritance of economic characters (quantitative and qualitative characters). Objectives and pre-requisites of Breeding
Unit-4: BREEDING OF MULBERRY	10Hrs.
1	Methods of Breeding, viz., Introduction and Acclimatisation, Methods of Selection in Mulberry. Hybridization, Heterosis Breeding, Breeding Methods for Self and Cross Pollinated crops, Backcross, Population Improvement
2	Mutation breeding- polyploid breeding
3	Breeding for resistance to biotic and abiotic factors - drought, diseases, pests, salinity and alkalinity
4	Breeding for leaf quality. Evaluation and statistical approach for yield test in mulberry. Varietal multiplication and dissemination
Unit-5: BIOTECHNOLOGY IN MULBERRY	9Hrs.
1	Concept of Plant Biotechnology- History of Plant Tissue Culture and Plant Genetic Engineering; Scope and importance in Crop Improvement – Totipotency and Morphogenesis
2	Nutritional requirements of *in-vitro* cultures; Techniques of i*n-vitro* cultures; Micro-propagation, Anther culture, Pollen culture, Ovule culture, Embryo culture, Endosperm Culture and its applications
3	Genetic engineering: Restriction enzymes; vectors for gene transfer- Gene cloning, direct and indirect method of gene transfer, Transgenic plants and their applications
4	Blotting techniques- DNA finger printing, DNA based markers- RFLP, AFLP, RAPD, SSR and DNA probes. Marker-assisted selection and its recent advances

SEMESTER-III

COURSE 2: CYTOGENETICS AND BREEDING OF MULBERRY

Practical Credits: 1 2 hrs/week

1. Micro and megasporogenesis and fertilization in mulberry,squashing and smearing techniques in Mulberry.
2. Karyomorphology and idiogram in some host plants of silkworms.
3. Identification of different Mulberry genotypes
4. Requirements for plant tissue culture laboratory; Techniques in plant tissue culture; Media components and preparations, Sterilization techniques and Inoculation of various explants; Aseptic manipulation of various explants; Callus induction and Plant regeneration; Micro- propagation of important crops, Anther, Embryo and Endosperm culture; Hardening/ Acclimatization of regenerated plants;

References:

Text Books:

1. Pattu parisrama-Telugu academy
2. Photosynthesis and plant physiology New Central Book Agency Pvt. Ltd., Kolkata
3. A.V.S.S. Sambamurty (2007) Molecular Genetics,Narosa Publishing House,New Delhi
4. S. C. Rastogi (2008) Cell Biology,New Age International (P) Ltd. Publishers, New Delhi
5. P. K. Gupta (2002) Cell and Molecular biology, Rastogi Publications, New Delhi
6. B. D. Singh (2008) Genetics,Kalyani Publishers, Ludhiana
7. Cooper, G.M. & R.E. Hausman (2009) The Cell – A Molecular Approach, A.S.M. Press, Washington
8. Becker, W.M., L.J. Kleinsmith& J. Hardin (2007) The World of Cell, Pearson, Education, Inc., New York
9. De Robertis, E.D.P. & E.M.F. De Robertis Jr. (2002) Cell and Molecular Biology, Lippincott Williams & Wilkins Publ., Philadelphia
10. Robert H. Tamarin (2002) Principles of Genetics, Tata McGraw –Hill Publishing Company Limited, New Delhi.
11. Gardner, E.J., M. J. Simmons & D.P. Snustad (2004) Principles of Genetics, John Wiley & Sons Inc., New York
12. Micklos, D.A., G.A. Freyer & D.A. Cotty (2005) DNA Science: A First Course, I.K.International Pvt. Ltd., New Delhi Lecturers on Sericulture-Edited by G.Boraiah, SBS Publishers Distributors, BANGALORE
13. Comprehensive Sericulture Manual-M.Madan Mohan Rao, B.S.Publications, HYDERABAD.
14. Patti sankethika vignana sasthram-Developed by APSSRDI, Kirikera
15. Pattu parisrama-Telugu academy
16. Photosynthesis and plant physiology
17. Shantharam, S. and Montgomery, J.F (1999) Biotechnology, Biosafety and Biodiversity, Science Publisher, Inc. USA.
18. Sharma, A.K and Sharma, A (1970) Chromosome Technique: theory and Practice. Butterworth and Co., London University Park Press, Baltimore.
19. Singh, B.D (1990) Plant Breeding. Principle and Methods. Kalyani Publishing Co., New Delhi

SEMESTER-IV

COURSE 3: CYTOGENETICS AND BREEDING OF SILKWORM

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: CYTOLOGY	8 Hrs
1	Utlra Structure Organization of Cell Organells-Golgi complex/Endoplasmic Reticulum/Nucleus/ Nuclear Envelop/Mitochondria /Chloroplast/Lysosomes / Ribosomes
2	Somatic Cell division-Mitosis
3	Reproductive Cell division-Meiosis
4	Chromosome Number in Mulberry and Non-Mulberry Silkworms.
Unit-2: GAMETOGENESIS&SEX DETERMINATION	10Hrs
1	Oogenesis
2	Spermatogenesis and Fertilization.
3	Structure and Chemical Composition of Chromosome and Nucleic acids- Types of Chromosomes
4	Sex determination in Silkworms- Role of Z and W Chromosomes
Unit-3: DEVELOPMENTAL BIOLOGY	8 Hrs
1	Structure of a Typical Insect Egg
2	Membrane Organization of Egg
3	Development of Polarity, Cleavage, Blastoderm and Blastokinesis
4	Appendage formation and Organogenesis of Silkworm
Unit-4: GENETICS	10Hrs.
1	Concepts and principles of genetics- Laws of inheritance- Introduction/ Gene and Environment Phenocopy/Interaction of genotype with environment and Special reference to silkworms
2	Linkage-Linkage Maps/Linkage groups
3	Crossing Over- factors influencing crossing over
4	Parthenogenesis with reference to silkworm-types and methods, induction of parthenogenesis-Merits and limitations
Unit-5 BREEDING OF SILKWORM	9Hrs.
1	Aim of Breeding, Inbreeding, Out breeding, Inbreeding Depression-Consequence of Homozygocity-Cross Breeding
2	Silkworm improvement through mass selection, pure line selection, bulk method, back cross method and line breeding.
3	Hybridization- Heterosis, genetic basis for Heterosis, Manifestation of heterosis/ Heterosis in different crossing systems.
4	Mutation Breeding-Polyplody Breeding/ Sex Limited races - General and specific combining ability

SEMESTER-IV

COURSE 3: CYTOGENETICS AND BREEDING OF SILKWORM

Practical Credits: 1 2 hrs/week

I. SILKWORM BREEDING

1. Characteristics of silkworm breeds/ races
2. Evaluation of heterosis of different combinations
3. Individual selection and family selection
4. Identification of mutants: eggs larva and moth.
5. Maintenance of germplasm, Characterization and documentation

II. Observation and description of racial characters of egg, larva, pupa, cocoon and adult stages in different voltine groups of B. Mori.

Mutants of silkworm B.mori.

(a) Larval mutants – Usra, Zebra and Knobbed.
(b) Egg colour mutants – Red and White
(c) Egg colour mutants – White eye
(d) Cocoon colour mutants – Orange and White.

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REFERENCES:

1. CHRISTOPHER Howe. (1995). Gene Cloning and Manipulation Cambridge Univ. Press.
2. Goldsmith, M and Wilkinson, A.S. (1996) Molecular model system in Lepidopterons. Cambridge Press, London.
3. Hiratsuka. (1999) Silkworm Breeding Oxford & IBH publishing Co, Pvt. Ltd. New Delhi. Calcutta.
4. Morohoshi, S (2000) Development, and Physiology of Silkworm. Oxford & IBH Publishing Co, Pvt. Ltd., New Delhi.
5. Sreeramreddy (ed), G. (1998). Silkworm Breeding. IBM Publishers, New Delhi.
6. Strickberger, M.W.(1996). GENETICS. Prentice-Hall of India, New Delhi.
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SEMESTER-IV

COURSE 4: SILKWORM SEED PRODUCTION AND SEED ORGANIZATION

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: PRINCIPLES OF SILKWORM SEED TECHNOLOGY	8 Hrs
1	Indian sericulture scenario in egg production
2	Importance of quality silkworm seed in sericultural industry
3	Enumeration of seed legislation act.
4	Role of Central Silk Board(CSB)
Unit-2: GRAINAGES AND MANAGEMENT	10Hrs
1	Grainage introduction- Grainage system in A.P
2	Model Grainage - Grainage Equipment- description, Utilization and Maintenance
3	Management of industrial grainages. Maintenance of records in grainages.
4	Economics of egg production, factors economising the cost of production
Unit-3: SILKWORM SEED COCOON PROCESSING	8 Hrs
1	Processing of Hybrid Disease free egg layings- Disinfection of grainage - P1 Seed cocoon procurement and transportation of seed cocoons - Cocoon Sorting and Cocoon arrangements
2	Sex Separation, Moth Emergence & Synchronization of moth emergence
3	Pairing & De – pairing /Oviposition/Refrigeration of Male moths
4	Pebrine Spore Identification Test-Pupal gut examination/Moth Examination- (Individual, Sampling and Mass Moth examination
Unit-4: 3 TIER SEED ORGANIZATION	10Hrs.
1	Evolution of Seed organization-Seed areas, special features of seed areas and seed cocoon transaction
2	P3- Basic Seed Forms/Maintenance of Breeders stock
3	P2-Silkworm Seed Multiplication farms
4	P1-Parent Seed Cocoon Production Centre
Unit-5 HIBERNATION AND PRESERVATION TECHNIQUES	9Hrs.
1	Small scale production of hibernating and non-hibernating eggs in loose forms and on egg sheets.
2	Standards for quality eggs- different hibernation schedules
3	Artificial hatching - Hot and Cold Acid Treatment - Postponement of hatching by Chilling
4	Preservation and handling of eggs- Incubation of Eggs.

SEMESTER-IV

COURSE 4: SILKWORM SEED PRODUCTION AND SEED ORGANIZATION

Practical Credits: 1 2 hrs/week

1. Model grainage equipment: Wooden Stand, Bamboo tray, Ant wells, Thermometer, Hygro meter, cellules, Moth crushing set, Microscope, Acid treatment equipment.
2. Sexing of pupae and moth, Moth emergence, Preparation of loose eggs, Preparation of disease free layings.
3. Moth examination for Pebrine, acid treatment (Hot acid and cold acid treatment).
4. Identification of different types of eggs: Hybernative and Non-hybernative eggs, fertilized and unfertilized and dead eggs. Counting of eggs and hatching percentage

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

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REFERENCE

1. Anon. (1972). Manual on Sericulture.. Vol. II Silkworm Rearing FAO, Agriculture Services. Bulletin No. 72/2,Rome, Italy.
2. Narasimhanna and Ullal (1978). Handbook of silkworm egg production, CSB Publications,
3. Ullal and Narasimhanna (1978). Handbook of practical sericulture, CSB Publications, Bangalore.
4. Wang San-Wing (1994). Silkworm seed production Vol. III Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
5. Narasimhanna. M.N. (1998). Manual on Silkworm egg Production. CSB., Govt. of India, Bangalore
6. Silkworm egg production, (Translated from Japanese), (1997), Oxford & IBH Publishing Co. New Delhi.
7. Tazima, Y. The silkworm egg.
8. Chapman, R.F. (1992). The Insects: Structure and functions.
9. Agrell, I.P.S (1964). Physiological and Biochemical changes during insect development. Academic Press, NewYork.
10. Counce S.J. (1973). The Causal analysis of Insect embryogenesis, Academic Press. New York.
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SEMESTER-V

COURSE 5: VANYA SERICULTURE(NON MULBERRY) SERICULTURE & VALUE ADDITIONS

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: STATUS OF VANYA SILKS AND STATISTICS OF SERICULTURE INDUSTRY-	8 Hrs
1	Global production of non-mulberry silks, their scope and impact on the socio-economic conditions of tribals.
2	Distribution of non-mulberry silk yielding insects and non-insects and their classification.
3	Different types of voltinism and characterisation of different stages of tropical and temperate tasar, eri and muga silkwoms.
Unit-2: HOST PLANT CULTIVATION OF VANYA SILKWORMS	10Hrs
1	Host plants of vanya silkworms- Distribution and Economic importance.
2	Taxonomy and systematics of non mulberry silkworm host plants- Botanical description of primary & Secondery host plants of tasar, eri and muga silkworms *viz*., terminalia, quarcus, Som and Soalu and castor, tapioca and kessaru.
3	Cultivation practices of primary food plants of Tasar,Muga &Eri Silkworms - *Terminalia arjuna, T. tomentosa. Shorearobusta*)- *Persia (machilus)bombycina; Litseapolyantha*-castor and kessaru- Cultivation practices of secondary food plants -Cassasva, Payam, Tapioca, Kesseru),
4	Pests and diseases of food plants of Tasar Muga and Eri and their managment
Unit-3: REARING &EGG PRODUCTION TECHNOLOGY OF VANYASILKWORMS	8 Hrs
1	Traditional and improved methods of temperate and tropical tasar, eri and muga silkworm rearing.
2	Egg production technology of Non Mulberry Silkworms
3	Natural enemies and other problems in non-mulberry silk cocoon production
Unit-4: COCOON REELING AND ECONOMICS OF VANYA SERICULTURE	10 hrs
1	Cocoon Reeling and spinning of vanya silkworms
2	Marketing of Non mulberry silk cocoons.
3	Economics of tasar, eri and muga culture.
4	Recent developments in non-mulberry sericulture
Unit-5 GENERAL ACCOUNT OF BY PRODUCTS/VALUE ADDED PRODUCTS IN SERICULTURE 9Hrs.	
1	Value added products from mulberry Sector Mulberry induces fairness, Pharmaceutical Therapeuticvalue of mulberry: Stem, Root, Fruit, Medicinal values of mulberry.
2	Value added products from silkworm Rearing Sector Value addition to silkworm pupae-Paints and Varnishes/ Utility of silkworm pupae as food and medicine/ As an animal feed/Silkworm pupa as astronaut food/ Silkworm Pupal Oil
3	Silk reeling waste utilization for value addition and sericin and its use-use of sericin in cosmetics/Sericin-A Bio-Molecule of value/Sericin as a textile finishes to silk.
4	Grainage wastes and value addition-Versatile fashionable Handicrafts from silk waste. Non-mulberry sericulture waste utilization for value addition-Spun silk, Jharcrafts/ importance of silk quilts, by products from vanya silks and its utility.

SEMESTER-V

COURSE 5: VANYA SERICULTURE(NON MULBERRY) SERICULTURE & VALUE ADDITIONS

Practical Credits: 1 2 hrs/week

Study of host plants and life stages of different non-mulberry silkworms.

Natural enemies of non-mulberry silkworms. Rearing of non-mulberry silkworms (eri & tasar).

Field visit for collection of non-mulberry silkworm stages.

REFERENCES

1. Charsley, S.R. (1982). Culture and Sericulture. Academic Press Inc., New York, U.S.A
2. Chowdhury, S.N. (1998) Muga Culture. Central Silk Board, Bangalore, India
3. Dokuhon, Z.S. (1998). Illustrated Textbook on Sericulture. Oxford & IBH publishing Co., Pvt. Ltd. Calcutta.
4. Jolly, M.S. Chowdhuty, S.N and Sen. (1975). Non-Mulberry Sericulture in India. Central Silk Board, Bombay, India.
5. Jolly, M.S (1998). Tasar Culture. Central Silk Board, Bangalore, India.
6. Sarkar, D.C. (1998) Eri Culture. Central Silk Board, Bangalore
7. Wu Pang-Chuan and Chen Da-Chuang. (1994) Silkworm rearing. Oxford & IBH publishing Co., Pvt. Ltd. New Delhi
8. Proceedings of the 20th Congress of the International Sericulture Commission-2005. Volume-2. Published by Central Silk Board, Bangalore-68, India.
8. Hasao Aruga (1994). Principles of Sericulture (Translated from Japanese) Oxford & IBH publishing Co., Pvt. Ltd. New Delhi.

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SEMESTER-V

COURSE 6: ORGANIC FARMING AND MECHANIZATION

Theory Credits: 3 3 hrs/week

I. Theory:

Unit-1: ORGANIC FARMING	8 Hrs
1	Objectives-Organic inputs &Techniques - Organic Farming System-scope, importance and concept/ factors affecting types of Organic farming,
2	Objectives-Organic inputs &Techniques. Bio Fertilizers –Plant nutrients – Definition and Scope of Biofertilizers – Types of Bio Fertilizers –Rhizobium-Azotobacter-Cyano bacteria-Azolla-PSM-AM fungi-SSB-PGPRB- Mass Production of Bio fertilizers-Method of preparation
3	Application of biofertiizers-N2 fixing-phosphate solubilizing,Phosphate mobilizingBio fertilizers.
4	Liquid Bio fertilizers-Charecteristics-Methodology-value of Technology-Constraints in Bio fertilizer technology-Economics
Unit-2: GREEN MANURING	10Hrs
1	Green Manuring- Definition and Scope of green manuring-Green manure crops-Cropping systems-Plant species suitable for green manures.
2	Manures Vs Fertilizers –Types of Green manures
3	production of green manures
4	Application of green manures
Unit-3: VERMICOMPOST TECHNOLOGY	8 Hrs
1	Vermicompost Technology:- Definition and Scope of Vermicompost technology.
2	Types of Earth worms used in vermicomposting.
3	Methods of preparation of Vermicompost –a) At Farmers level and 2) commercial production of vermicompost.
4	Care during production of vermicompost – application of vermicompost for different crops – Vemiwash – definition , Preparation and application.
Unit-4: BIOPESTICIDES	10Hrs.
1	Biopesticides – Definition and Scope of Biopesticides .
2	Types of Biopesticides
3	Botanical origin Biopesticides -Microbial origin- Nanotech origin
4	Methods of Preparation of Bio pesticides – Application of Bio pesticides.
Unit-5 MECHANIZATION IN SERICULTURE	9Hrs.
1	Mechanization in Sericulture- Definition and scope.
2	Machines used in Moriculture
3	Machines used in Rearing of Silkworms
4	Management and maintenance of Machinery used in sericulture-Economics

SEMESTER-V

COURSE 6: ORGANIC FARMING AND MECHANIZATION

Practical Credits: 1 2 hrs/week

1. Visit of organic farms to study the various components and their utilization;

2. Preparation of enrich compost, vermicompost, Pancha Gavya, Jeevaamrutham ,Herbal pesticides

3. Bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management;

4. Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

REFERENCES

1. Hortmann and Kesler (1993) Plant Propagation, principles and practices. Prentice Hall, Hemel Nemstead.
2. Krishnamurthy, N. (1981) Plant growth substances including application in Agriculture. Tata McGraw Hill Pub. Co. Ltd. New Delhi.
3. Shankar, M.A (1998) Handbook on mulberry Nutrition, Multiplex, Bangalore.
4. Subba Rao, N.S (1998) Biofertilisers in Agriculture. Oxford & IBH Pub. Co, Pvt. Ltd, New Delhi.
5. A text Book on Mulberry Crop Protection. Govindaiah, V.P Gupta, D.D Sharma, S. Rajadurai and V. Nishitha Naik, Published by Central SilkBoard, Bangalore-68, India. 2005.