KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – V
DSE – Seri – I (Elective - I)
Mulberry and Silkworm Crop Protection

Theory	-	4 hours/week	- 4credits	Theory {Internal marks – 20}
				Theory {External marks - 80}
Practicals	-	3 hours/week	-1credit	Practical:{External marks – 25}

Objectives

1. To study the incidence, symptoms and damage caused by pests and diseases of mulberry & silkworm.
2. To acquaint with management of pest and diseases through different methods to prevent crop loss (in mulberry and rearing).

UNIT – I:- Sampling of Diseases / Sample

Collection of diseases form Mulberry, Identification, Isolation, culturing and preservation of pathogen of mulberry; disease scoring scale – calculation of disease index percentage and severity, significance of crop protection.

Mulberry diseases & its management

- Introduction and importance of mulberry diseases
- Fungal disease:- mulberry leaf and stem diseases – incidence, symptoms
- Root rot – incidence, symptoms, casual organism, life cycle of pathogen and management and incidence, symptoms.
- Viral, bacterial, nematode diseases of mulberry- occurrence, symptoms, casual organisms, and its management.
- Nutritional disorders in mulberry - symptoms and remedial measures

UNIT – II Mulberry pests:-

- Pests, predators and parasites.
- Definition - mulberry pest and its classification.
- Mulberry pests:- leaf eating cater pillars, mealy bugs (tukra), leaf rollers, jassids, thrips, scale insects, beetles, grass hoppers, sap suckers - occurrence, symptoms, nature of damage and integrated crop measures,
- Mulberry predators - nature of damage & management.
- Integrated Pest Management.

UNIT – III Silkworm diseases:-

- Introduction – mode of infection, classification of silkworm diseases.
- Protozoan disease (Pebrine) – occurrence, symptoms, casual organism, life cycle and management.
- Bacterial disease of silkworm – occurrence, types symptoms, casual organism, predisposing factors, mode of infection, prevention and control measures.
- Viral disease (grasserie) – occurrence, types, symptoms, casual organism, mode of infection – management.
- Fungal disease (muscardine) – occurrence, types, symptoms, casual organism, mode of diseases and management,
- Diseases of non mulberry & its management.

UNIT – IV Pests and Predators of Silkworm:-

- Dermestid beetles – life cycle, factors responsible, Indian uzifly, nature of damage and prevention / control measures.
- Predators of Silkworm:- Cockroach, ant, lizards, rodents, birds – systematic position, nature of damage and control measures.
- Integrated pest management:- physical, chemical and biological control methods.
- Pest and predators of non mulberry and their management.

REFERENCE BOOKS: -

1. Govindaiah Gupta, V.P, D. Rajadurai, S & Nishitha Naik (2005) A text book on mulberry crop protection, Central Silk Board, Bangalore.
2. Govindan R and T.K. Narayanaswamy (1998) principles and silkworm pathology mulberry and silkworm crop protection.
3. Jolly M.S., Sen S.K., Sonwalker, N. and Prasad G.K, (1979) Sericulture Manual – 4 Non mulberry silk, Food and Agricultural Services Bulletin 15/4 food and Agricultural Organization of the United Nations Rome.
4. Khan, M.A., Anil dhar., Zeya, S.B. and Trag, A.B (2004) Pests and Disease of Mulberry and their management. Bishan Singh, Mahendra Pal Singh Publishing.
5. Lu Yup Lian (1991) silkworm disease FAO Agricultural Services Bulletin 73/4 FAO of the United Nations Rome.
6. Nataraju B and Balavenkatasubbaiah (2008) silkworm diseases and their management, under block 2, Silkworm disease and pest management in crop protection INGOU, New Delhi.
7. Singh R.N and Saratchandra, B (2011) sericulture entomology A.P.H Publishing Corporation, New Delhi.
8. Singh R.N, Samson, M.V and Datta R.K (2000) Pest management in sericulture. Indian Publishers House Pvt. Ltd, New Delhi.
9. Tribhuvan Singh and Pramod Kumar Singh (2013) Mulberry crop protection, Discovery Publishing House Pvt. Ltd. New Delhi.

Mulberry and silkworm crop protection

Practicals - DSE – Seri - 1 Semester - V 3 hrs/week 1 credit 25 marks

1. Studies of fungal disease of mulberry (free hand sectioning), staining and temporary mounting.
2. Collection of diseased samples of mulberry leaf / root and their identification and preservation, identification of fungal, bacterial pathogen, mineral deficiencies symptoms in mulberry and their remedial measures.
3. Pests of mulberry – collection, identification and preservation / mounting.
4. Studies on common insect pests of mulberry - leaf eating caterpillars, scale insects, mealy bugs, thrips, jassids, leaf roller and grass hoppers.
5. Morphological features of pebrine infected silkworm eggs, pupa and moth – isolation and microscopic examination. Staining of spores (giemsa staining).
6. Preparation of media and cultivation of bacteria,
   Characterization of bacteria, 1) Morphological: Shape, endospore stain, capsule stain
   2) Cultural growth in different carbon sources (Media)
   3) Biochemical Tests – Catalase, IMVC, Nitrate reductase
7. Staining and study of symptoms of bacterial diseases of silkworm – microscopic examination and identification of pathogens.
8. Identification / visual examination of silkworm larva infected with NPV, CPV and kenchu – collection and Microscopic examination of polyhedral bodies – staining polyhedral
9 Study of silkworm larva, pupa and moth infected by fungal disease – collection, staining and microscopic examinations.
10. Fungicide / pesticides – forms, formulation and application
11. Studies on India uzifly and dermestid beetle - identification of maggot, pupa, adult and silkworm larva infected by uzifly.
12. Visit to different mulberry garden in different districts for field study.

KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – V
DSE – Seri – I (Elective - 2)

Silkworm Extension and Economics

Theory	-	4 hours/week	-4credits	Theory {Internal marks – 20}
				Theory {External marks - 80}
Practicals	-	3 hours/week	-1credits	Practical-(External marks – 25)

Objectives

1. To understand the importance of extension, different methods for effective diffusion of innovations.
2. To understand the extension services.
3. Workout the economics of mulberry, rearing, silk reeling and grainage.

UNIT – I

Meaning, objective and importance of sericulture extension principles, functions and concepts of extension education; extension programme, concept and principle, role of extension of personal and farmers in programme planning and transfer of technology. Technology dissemination, Sericulture extension :- technology transfer – concept components; appropriate and affordable technology for sustainable rural development: scope & role of sericulture extension in rural development.
Communication:- Functions, models, elements, concepts and implications.
Extension programme management, sericulture developments through plans.

UNIT – II

Extension teaching methods adopted in sericulture, use of audio visual aids in sericulture; Training – meaning, principle, method and training programme in sericulture, sericulture – popular and scientific articles in magazines and journals. Adoption and diffusion of innovation. TOT: meaning and system, role of extension in TOT
Sericulture extension system:- extension system of C.S.B, state governments, voluntary organization and Universities.

UNIT – III

Economic - Principles of economics, micro and macro economics, classification of costs – explicit and implicit fixed, variable, marginal, average, profits – gross and net. Advantages & characteristics of sericulture, scope of sericulture in India –vis-à-vis other agricultural crops – income and employment generation.

UNIT – IV

Economics of mulberry production under rainfed and irrigated systems, comparative economics of mulberry production under traditional and improved practices. Economics of silkworm egg production in Government and private grainages; Economics of cocoon production for commercial purpose, comparative economics of cocoon production under traditional and improved methods of silkworm rearing. Economics of raw silk production in charaka, cottage basin and multi end-reeling units.

Credit system & microfinance: SHG – opportunity of SHG in sericulture: Micro-finance, role and importance of public distribution system.

REFERENCE BOOKS:-

1. Adavi Reddy (1978) Extension education, Sri Laxmi Press, Bapatla.
2. Bansil D.C (2002) Agricultural statise in India (4^{th} edition) CBS Publishers and Distributors, New Delhi.
3. Carver, T.N (1911) principles of rural economic year.
4. Desai V. (1990) A study of rural economic, FAO Agricultural extension manual.
5. Dhote, A.K (1989) Sericulture extension and management, National Council of education research and training, New Delhi.
6. Govindan R; Chinnaswamy A.P. Krishnaprasad N.R. Reddy D.N.R (200) Non mulberry sericulture silk technology and sericulture economics & extension Vol-3 Proceeding of NSTC 1999 UAS, Bangalore.
7. Krishi kosh. Egranth.ac.in/display bits stream handle = 1/5810048919
8. Ramana, D.V (1987) Economics of sericulture and silk industry in India, Deep & Deep Publication, New Delhi.
9. Tribhuvan Singh, Madan Moham Bhat and Mohammad Ashaf Khan (2009) sericulture extension: Principle & Management APH Publishing Corporation, New Delhi.
10. Taylor (1961) Agriculture Extension. Worldwide institution and force of change.

Silkworm Extension and Economics

Practicals **3hours/week** **1credit** **25marks**

1. Visit to a village to study about sericulture activity.
2. Visit to a village to study level of education of the sericulture feedback on the visit.
3. Sericulture activities like preparation of audio visual aids – charts, hangouts, pamphlets – arranging and conduction of panel discussion with sericultures (Rearers, reelers & mulberry cultivars).
4. Visit to rearers house, CRC, TSC, KSMB, KSIC cocoon markets, silk exchange and research institutes & panel discussion with concern person.
5. Identification of byproducts of sericulture industry.
6. Utilization of these byproducts in the industry.
7. Preparation of economic models – mulberry cultivation, silkworm rearing, silkworm egg production & silk reeling.

KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – V
Seri Biotechnology
General Elective (Compulsory)

Theory	4 hours/week	4credits	100 marks

Objectives

1. Acquire the knowledge on biotechnological aspects and its application which can be applied for crop improvement.
2. Gain knowledge on biotechnological tools for improvement of silkworm.

UNIT – I

Introduction:- Scope and importance of plant biotechnology.
Growth in relation to morphogenesis: cell and organ differentiation: concept of totipotency, Micro propagation; multiple shoot formation, synthetic seed in mulberry, Somatic hybridization: isolation of protoplast; regeneration of plants & genetic modification of protoplast.

UNIT – II

Screening of disease resistance in mulberry & gene transfer methods in plants; target cells for transformation, gene transfer techniques.
Transgenic plants and their role in crop improvement, molecular farming and regulated gene expression, transformation of chloroplast genome (cg) in higher plants using Agro bacterium and particle gene.
Patenting transgenic organisms & isolated genes.

UNIT – III

Silkworm cell culture – composition & preparation of media and maintenance of cultures.
Tissues and organ culture, tissues grafting.
Polymerase chain reaction; Application in sericulture
Application of biotechnology in silkworm – new textile fibers – improvement of silkworm strains & markers.

UNIT – IV

A brief account of transgenic animals – silkworm transgenesis, application of silkworm transgenesis, piggy bac transposon, red fluorescent protein, expression in *Bombyx mori*.

Immune response against bacterial & viral diseases in silkworm: inducible anti bacterial and antiviral proteins in silkworm.

BMNPV vector – life cycle, biotechnological application for large scale synthesis of recombinant proteins.

IPR, patenting and bioethics

REFERENCE BOOKS:-

1. Asakura T., Mille, T., (2013) Biotechnology of silk, Springer Science & Business media.
2. Glick, B.R, Pasternak, J.J (2003) Molecular Biotechnology - Principles and applications of recombinant DNA, ASM press, Washington.
3. Murray, D.R (1991) Advanced methods in plant breeding Biotechnology: CAB International Wallingford, oxon, United Kingdom.
4. Russel, P>J (2009) Genetics – A Molecular approach III edition, Benjamin Cummings.
5. Venkatesh Kumar, and Shyam Kumar, V (2011) Application of Biotechnology in sericulture, Stadium Press (India) Pvt Ltd.

KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – VI
D SE – Seri – II
Vanya Sericulture
(Elective - I)

Theory	4hours/week	4credits	Theory {Internal marks – 20}
			Theory {External marks – 80}
Practicals	3hours/week	1credit	Practical marks – 25

Objectives

1. To understand the distribution and status of vanya silk production.
2. To study the procedure involved in cultivation of host plants, rearing, reeling and egg production techniques.
3. To acquaint knowledge about economics of vanya sericulture.

UNIT – I

Vanya silk in India – Importance, scope, demand and impact of vanya silk on tribal socio economic conditions.

Host plants of vanya silkworms and its botanical description.

UNIT – II

Package of practices for established primary host plants, diseases and pests of host plants of vanya silkworms & their management.

Planning for egg production and rearing of tasar, eri and muga including disinfection and hygienic practices to be maintained.

UNIT – III

Morphology and life cycle of vanya silkworms, egg production technology – selection & preservation of seed cocoons, moth emergence, synchronization, pairing and de pairing of moths, ovi position, handling and packing of eggs.

Rearing of vanya silkworms: traditional and improved techniques, feeding, bed cleaning, care during moulting, mounting, harvesting and marketing of cocoons.

Diseases and pests of non mulberry silkworm and their management.

UNIT – IV

Reeling of tasar and muga cocoons, spinning of eri cocoons, selection, cooking, reeling, marketing of raw silk.

Economics of vanya silkworms, byproducts of vanya sericulture and value addition through utilization.

REFERENCE BOOKS:-

1. Jolly M.S., Sen, S.K., Sonwalker, N and Prasad G.K (1997) Sericulture manual 4 – Non mulberry silks. Food and Agricultural services Bulletin 15/4. Food and agricultural organisation of the United Nations, Rome.
2. Chowdhury, S.N. (1998) Muga culture, Central Silk Board, Bangalore, India.
3. Dokuhon, Z.S (1998) Illustrated text book on sericulture, Oxford & IBM Publishing Co. Pvt Ltd, Calcutta.
4. Jolly, M.S Chowdhury, 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.
6. Thangavelu, K; Chakraborty, A.K; Bhagawati, A.K and ISA MD/(1998) Handbook of Ericulture, CSB, Bangalore.
7. Chaudury, S.N. (1982) Eri Silk Industry, Directorate of Sericulture & weaving, Govt. of Assam, Gauhati, Assam.

Vanya sericulture

Practicals

D SE – Seri – II (Elective - I)

3hours/week 1credit 25 marks

1. Host plants of tasar, eri and muga silkworms.
2. Identification of leaves of any two food plants of non mulberry silkworm with morphological characters & taxonomic traits.
3. Pests and diseases of primary host plants of vanya silkworms.
4. Identification of the morphological features of tasar, eri and muga silkworms (Egg, larva, pupa, cocoon and moth).
5. Egg production technology of vanya silkworms.
6. Rearing technology of vanya silkworm.
7. Cooking and reeling technology of tasar,
8. Cooking and spinning technology of eri cocoons.
9. Identification of tasar, eri and muga raw silk and wastes

KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – VI
D SE – Seri – II
Entrepreneurship Development in Sericulture
(Elective - II)

Theory	4hours/week	4credits	Theory {Internal marks -20}
			Theory {External marks-80}
Practicals	3hours/week	1credit	Practical -External marks-25

Objectives

1. To study the entrepreneurial opportunities in sericulture.
2. To gain knowledge to become an entrepreneur in various aspects of sericulture.

UNIT – I

Entrepreneurship: development programme (EDP):- Objectives of EDP, qualities of an entrepreneur and selection of a potential entrepreneur.
Project formulation (Project appraisal): Meaning and purpose, agencies interested/supporting the project, market feasibility of the project, means of finance, risk analysis.
Marketing:- Approach, demand, assessment and steps involved in marketing.

UNIT – II

Insectary facilities and equipment: Location, environmental control, building specification, furnishings and equipments.
Mass production of insect pathogens:- culturing of hosts/preparation of culture substrate, innoculation, collection of diseased cadavers, isolation, purification and storage of pathogens.
Mass production of parasitoids; culturing of host insects oviposition and emergence of parasitoids adults from hosts, collection, feeding and storage of parasitoid adults.

UNIT – III

EDP in raising mulberry sapling (Kisan nurseries)
EDP in organization of chawki rearing centers.
EDP in silkworm egg production & rearing.
EDP in silk reeling – charaka, cottage basin and multi end reeling units.

UNIT – IV

Mechanization in mulberry cultivation, silkworm egg production and silkworm rearing – activities and economics. Advances in silk reeling technology – activities and economics. Health hazard faced by sericulturists.

REFERENCE BOOKS:-

1. HisaoAruga (1994) Principles of sericulture, Oxford & IBM publishing Co. Pvt. Ltd, New Delhi.
2. Madan Mohan Rao (1999) Comprehensive sericulture manual B.S publications, Hyderabad.
3. S.S Khanka, Entrepreneurial development, S. Chand Publishing.
4. A. Nirjas, Entrepreneurial development, Sanbun publishers.
5. V.S.P Rao. Human resources management, Taxmann.
6. Philip kotle, Marketing Management, Analysis, Planning, implementing and control Repearson.

Entrepreneurship development in sericulture

PRACTICALS

DSE Seri – II (Elective - II)

3hours/week 1 credit 25 marks

1. Planning the facilities required for mulberry garden establishment.
2. Observations on insect pathogens and symptoms.
3. Observations on insect parasitoids.
4. Planning for kisan nurseries and economics.
5. Planning for establishment of chawki rearing centers.
6. Planning for establishment of silk reeling – charakas, cottage, multi end reeling units.
7. Assessment of profit – cost ratio under traditional and mechanized systems of silkworm egg production.
8. Assessment of profit – cost ratio under traditional and mechanized systems of silkworm rearing and chawki rearing centers.
9. Assessment of profit – cost ratio under traditional and mechanized systems of silk reeling units.
10. Health related problems during mulberry cultivation, rearing, egg production and reeling.

KAKATIYA UNIVERSITY
FACULTY OF SCEINCE
B. Sc (Sericulture)
Semester – VI
Project / Optional
Rural Sericulture Work Experience

Project 4 credits Viva 20 Marks + Project Evaluation 80 Marks = 100 marks

Objectives

1. To provide an opportunity to understand the rural setting in relation to sericulture.
2. To make the students familiar with socio economic conditions of the sericulturist & the real field problems.
3. Develop confidence & competency to solve the problems and also to develop self employment skills.

Activities

- Village attachment training program.
- Attachment with Govt./sericulture institution, grainages rearing and nearby reeling units run by private and Government and prepare a project report and present it in the class.
- The project may be on plant protection, soil sampling & testing, nurseries, cocoon production, transfer of technology.
- Study of structure, functioning, objectives, economics of a unit (mulberry, grainage, rearing, reeling, dyeing and printing).
- Employment & income generation through the farm.
- Skill development in all tasks of moriculture, rearing, reeling, grainage and related activities.

Thanking you

Chairperson
BOS in Sericulture