



VISION FOR 2020



**CENTRAL SILK BOARD
CENTRAL MUGA ERI RESEARCH & TRAINING INSTITUTE
MINISTRY OF TEXTILES: GOVT. OF INDIA
LAHDOIGARH-7857000, JORHAT, ASSAM**

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PREAMBLE

Sericulture in India is the pivotal sector for ensuring sustainable development of poor farmers and woman folk and also for the alleviation of poverty. It is the key sector for generating employment opportunities for the majority of the population. During the first decade of the 21st century, two contrasting trends have been noticed i.e. India is being recognized as the global power in the key economic sectors with consistent high economic growth and its slow growth observed in the agricultural sector. Indian agriculture contributes to 8% global agricultural gross domestic product to support 18% of world population on only 9% of world's arable land and 2.3% of geographical area. Nearly one-third of the country's population lives below poverty line, and about 80% of our land mass is highly vulnerable to drought, floods and cyclones.

On the brighter side, India possesses substantial biodiversity — nearly 8 % of the world's documented animal and plant species are found in our country. Conservation of natural resources, maintenance of biological wealth and acceleration of agricultural growth are considered of paramount importance in the present context as well as of the future.

Central Muga Eri Research & Training Institute is the pioneer R&D institute in Muga and Eri sericulture for both on-farm and post cocoon sector. This institute was established as a rural based institute for all the North Eastern states and parts of West Bengal for upliftment of livelihood of poor farmers through Vanya sericulture. Today, China and India together produced about 98% of the world production during 2012.

The purposes of the Vision Statement is to set an ambitious and realistic goal for CMER&TI, Lahdoigarh and its nested units and to outline a broad path of the activities, so that by the coming 20 years the institute may able to deliver substantial role for the growth of vanya silk industry with economic and social development of the region and in generating a knowledge base for future use.

This vision will provide a statement of our mission that reflects our values and commitments for the next 20 years and outlines a strategic plan for societal upliftment in the field of Muga and Eri sericulture. We wish to give to the nation tomorrow's largest producer of muga and eri silk in the world. The vision will encompass the issues related to R&D, training & extension, technology dissemination, infrastructure development and societal out-reach.



SERICULTURE SCENARIO

Sericulture in Assam is a sustainable farm based economic enterprise positively favouring the rural poor in the unorganized sector because of its relatively low requirement of fixed capital and higher returns of investment. Benefit cost ratio of sericulture is highest in comparison to other agricultural cash crops in the country. The additional income derived from Sericulture activities enables these farmers to meet their regular needs especially during the "No return" lean agriculture seasons. All the 4 known commercial varieties of silk are produced in Assam though emphasis has been to the 2 exclusive silk varieties of Muga and Eri in the context of competitiveness in the current business scenario. Production of Muga raw silk is mostly localized in Assam. The state is also a major producer of Eri silk (65%). The muga silk production has increased from 99 MT during 2005-06 to 148 MT by 2013-14. Eri silk production has also been increased from 690 MT during 2005-06 to 4237 MT by 2013-14.

The pre-loom sector in Assam alone provides livelihood to nearly 1.85 lac families. Sericulture activities have a significant gender dimension as more than 65% of the people obtaining livelihood from it is women. At present the silk sector begun to evolve as a viable economic activities capable of providing sustained livelihood.



During recent years, a few significant technological and managerial breakthroughs have been achieved in the silk sector in Assam. Private silkworm egg (DfIs) producing enterprises have been established in the rural areas, spinning and reeling machines developed, yarn producing units spread out all over the State, specific eri and muga looms evolved, textures and products refined and supply chain linkages established. A number of young entrepreneurs have also emerged, who have brought the traditional silk-products to Global Market with a modern touch.

Indeed the silk sector is slowly emerging from its household confines to the threshold of commercial activity. But the scale of operations is yet to meet minimum industrial standards. A lot more needs to be done for the re-organization of this sector on commercial lines.

The National and International demand for eri and muga fabric is high. Though the tide of the cocoon outflow from the State has somewhat been stemmed, complete value addition to this important farm sector product of the State is still not adequate. The turnover of the silk industry can increase at least six times if the farm produce is completely converted into finished products. With blends, even this can further multiply. Such a turnover will lead to a significant rise in employment opportunities in the State.

Major Sericultural Resources and Current status in the State:

A) No. of Govt. Farms/Centres:

Institute	Eri	Muga	Mulberry	Others	Total
Seed farm/ Grainage	26	22	12	5	65
VGR/ECC/CMG (Plantafion centre)	95	70	111		276
Commercial grainage		1	1		2
Reeling/Spinning unit	25	14	26		65
Training institute				1	1
Total	146	107	150	6	409

B) Areas under plantation in Govt. Farms/Centres:

Nature of Institute	No. of Institute	Total Area (In Hectares)	Area under Plantation (In Hectors)	Vacant land (In Hectares)
1) Eri Seed Grainage	26	183.043	19.088	63.95
2) Eri Concentration Centre	95	344.76	202.74	142.02
3) Mulberry Farm	12	121.39	33.38	88.01
4) Collective Mulberry Garden	III	556.018	341.378	376.232
5) Muga Seed Farm	22	344.76	202.74	142.02
6) Som Plantation in VGR	70	1453.02	788.14	426.06
Total	336	3288.41	1860.986	1427.42

Out of the total area of 1860.986 Hectares under plantation, the plants in 745 Hectares are very old and un-productive.

Areas under Plantations in other than Govt. Farms:

Category	Areas (Ha.)
Eri	6725
Muga	5465
Mulberry	3109
Total	15299

Families involved in Sericulture activities

The total number of families involved in Sericulture activities category-wise in Pre-cocoon and Post-Cocoon sectors are as follows -

i) Pre-Cocoon

Category	No. of family
Eri	132033
Muga	23543
Mulberry	29715
Total	185291



ii) Post-Cocoon

Category	No. of family
Eri	2464
Muga	3502
Total	6066



The number of families as shown in the above table, involved in Pre-Cocoon activities in Mulberry category is not regular rearers of Mulberry. This is due to irregular quantum of seed supply.

In addition to the 2564 families, as shown in the above table, involved in Post-Cocoon activities of Eri spinning, there are about another 44,254 eri spinners who spins eri yarn with drop spindle.

As regards number of families involved in Post-Cocoon activities of Mulberry, it is difficult to provide correct data since most of rearers dispose-off their products in Cocoon-stage and a few reel their cocoons in the 26 Govt. Reeling Units.

PRESENT R&D SCENARIO

The Central Silk Board, Ministry of Textiles, Govt. of India has established one full fledged research institute (Central Muga Eri Research & Training Institute) at Lahdoigarh, Jorhat during 1999. The institute has a good number of qualified scientists, laboratories and host plants' vegetation covering around 40 acres.

In order to boost the production of muga silk, several technological achievements have been made in the field of host plant improvement, silkworm rearing, silkworm seed technology, management of pests and disease and post cocoon technology during last few years. Some important technologies are highlighted below:

- Development of high yielding dwarf variety of muga host plant "Som" i.e. Godadhar.
- Propagation of muga host plants through seed and vegetative means.

- Cultivation and management of host plants through application of inputs, agronomical and cultural practices.
- Development of prophylactic / control measures against plant diseases and pests.
- Development of muga silkworm seed technologies like, i) Seed cocoon preservation to overcome unfavourable winter, ii) low temperature preservation of eggs for delayed hatching and synchronization of rearing, iii) synchronization of moth emergence, iv) determination of optimum coupling period, v) multiple coupling of male moth, vi) method of egg incubation for uniform egg hatching, *etc.*
- Muga silkworm rearing technologies include, i) Chawki rearing on bush plantation, ii) use of box type mountage for spinning of cocoons, iii) development of prophylactic measures against diseases and pests of muga silkworm.
- Standardization of stifling and cooking of muga cocoons for enhancing silk recovery.
- Introduction of improved muga reeling machine for production of quality raw silk.
- Product diversification in muga through design development, blending and finishing treatment.

CONSTRAINTS

a) Operational

- Non-adoption of management packages of host plants for improvement in quality and quantity of feed.
- Muga Silkworm being multivoltine in nature, 5-6 crops are reared throughout the year, of which, only two crops, namely, 'Kotia' (Autumn: October-November) and 'Jethua' (Spring: May-June) are considered for commercial production. Each commercial crop is preceded by one seed crop and each seed crop by one pre-seed crop, which usually fall in adverse climatic seasons of extreme summer and winter. Failure or low production in seed crops leads to scarcity of seed for commercial crops.
- Non-availability of quality seed for respective crops attributes to under utilization of the existing plantations.
- Use of poor quality silkworm eggs produced without adhering to the scientific methods, outdoor nature of rearing and lapses in rearing management often lead

to crop failure.

- Frequent loss of crops due to parasitoids and different silkworm diseases. Out of the 8 dreaded muga disease, only one, namely pebrine, has been controlled till date. What we call disease free layings or dfls is actually free from pebrine only and are susceptible to the other 7 destructive diseases like Grasserie, Flacherie, Muscardine etc.
- Lack of systematic integration in farming system to maximize the income.
- Low reelability (45%), non-utilization of reeling waste (40% of total silk) for conversion to yarn and fabric.
- Lack of adequate variation in finished products in view of changing taste of customers.
- Lack of knowledge about the quality of silk and fabric among reelers and weavers to compete in National and International markets.
- Market intervention and support systems are inadequate. The post-cocoon sector in muga remains traditional, primitive with low output and poor quality.
- Muga fabrics and garments remain as an attraction in local market only. It requires more national and global limelight.
- Deteriorating production environment
- Growing industrial growth other than sericulture

b) R&D

- Climate change and sericulture
- Non-availability of high yielding host plant variety suitable for different agro climatic situations
- Narrow genetic base of muga silkworm.
- Limitations for heterosis due to mono-varietal status of muga silkworm.
- Conventional rearing technique in outdoor.
- Lack of quick diagnostic technique for certification of seed/ mother moth especially for Pebrine disease.
- Low rate of fecundity.
- Lack of IPM system for host plant and silkworm protection.
- Low recovery of silk (45%).
- Higher outbreak of diseases and rate of mortality

c) Marketing of finished products

The similarity between imported Chinese Tasar and Muga in colour and apparently, texture has given rise to immense possibilities in the muga blends market.

Cheaper tasar blended with muga brings down the price of Muga fabric. Due to its increased affordability the customer base increases, thereby resulting in increased sales. Different blends with other yarn also facilitate a wide product range for targeting separate market segments. However, it depends on customers' choice & faith who are after pure silk.

When Chinese Tasar silk became available at around USD 14 a kilogram, the market began to be flooded with such muga blends. The difference was not readily discernible to the gullible customer. They took home these cheap products at the price of pure muga only to discover later, perhaps in shame and disgust, that they had not actually purchased the 'priceless' silk of their pride. Gradually more and more customers began to lose faith, so much so, that even the powerful, today, look at anything called muga in the market with grave suspicion.

VISION

Ensure higher productivity and growth in sericulture through technological innovations and sustainable sericulture and utilization of seri-based resources for mankind.

STRATEGY

A. SHORT TERM

1. Creation of a Technology Demonstration Park showcasing all the pre-cocoon related technologies for benefit of the farmers.
2. Establishment of a Seed Technological Laboratory with all facilities for production of quality silkworm eggs for the purpose of education and also for supplying eggs to the entrepreneurs.
3. Showcasing of Post Cocoon Technologies encompassing reeling of yarn to production of diversified products to suit the taste of national/ International customers.
4. Establishment of publicity hall for video conferencing, training, exhibitions *etc.*
5. Streamlining seed multiplication and seed certification

B. LONG TERM

1. Research and Development:

A. Increase in silkworm productivity:

- i) Development of new silkworm breeds for better productivity and silk quality through conventional and molecular breeding and resistance to high

temperature, high humidity and silkworm diseases like Flacherie, Grasserie and Pebrine

- ii) Establishment of indoor rearing of muga silkworm for better management along with formulation of artificial diet.
- iii) Application of juvenile hormones to increase the fecundity of muga silkworm.
- iv) Development of silkworm probiotic consortium to enhance the growth and productivity as well as to reduce bacterial infection of muga silkworm.
- v) Application of nanotechnology for silkworm improvement and disease management.

B. Seed technology:

- i) Development of technology for seed cocoon preservation schedule for effective grainage in muga and eri sericulture.
- ii) Formulation of R&D project on rapid detection of pebrine for production of disease free layings.

C. Host plant improvement:

- i) Micro-propagation of high yielding varieties of muga and eri silkworm host plants.
- ii) Development of INM package with special reference to biofertilizer for silkworm host plant to reduce the chemical fertilizer dose and sustainable sericulture.
- iii) Development of high yielding promising silkworm host plants through application of biotechnological tools.

D. Disease management:

- i) In-depth study on muga and eri silkworm disease etiology and to develop modern strategy for eco-friendly disease management.
- ii) Development of transgenic line with tolerance to diseases, especially against muscardine (fungal disease), bacteriosis caused by bacteria and virosis caused by NPV/CPV.
- iii) Development of comprehensive package for prophylactic action against diseases to ensure successful crops both in commercial and seed crop seasons.
- iv) Development of rapid diagnostic technique for diseases of wild silkworms through serological and molecular technique. To develop Novel vaccine for silkworms against the diseases: Production of insect based bio-molecules by

bacterial induction in the system and further mode of their application towards the disease control in silkworms.

E. Silk as Biomaterial:

- i) Application of silk material for medical health care, optical devices, adhesive gels, etc.
- ii) Application of vanya silk biomaterial to generate primary cell and cell lines for wide range of biological/medical outcomes.
- iii) Use of vanya silk protein scaffolds in wound healing and in tissue engineering of bone, cartilage, tendon and ligament tissues.
- iv) Developing silkworm as bioreactor for producing high value proteins.

F. Environmental impact:

- i) Effort will be made to study on adverse climatic condition and global warming and their effect on silkworm, like male sterility etc.
- ii) Understanding on the climate change and silkworm behaviour
- iii) Development of diapause/hibernating strains to skip off unfavourable seed crop rearing both during summer and winter.

G. Conservation:

- i) Exploration, collection, introduction and conservation (*in-situ* and *ex-situ*) of muga and eri food plants and silkworm germplasms.
- ii) Establishment of a “Vanya Silkworm Park” in North Eastern India.
- iii) Establishment of Repository Centre for Wild Sericigenous Insects.

H. Silkworm by products:

- i) Promotion of pupal products like pupae protein powder, dry pupae, pupae pickle, protein fibre, animal food, nutritional supplements, microbial culture media supplement, food additives etc.
- ii) Identification and exploitation of high useful values of by-products from every steps in sericulture, e.g. silkworm pupae, litter, leaf remnants, excrements etc. in pharmaceutical, cosmetics, paper and cellulose, poultry, fishery and organic agriculture industries.

I. Post cocoon technology:

- i) Development of technologies for better recovery of silk from muga/eri silkworm cocoon with higher tenacity.

- ii) Refinement of existing muga reeling and eri spinning machine for better extraction of quality silk yarn.
- iii) Value addition and diversification of muga/eri silk products for wider absorption.
- iv) Production of purely organic silk and silk products.
- v) Blending of eri yarn with wool and cotton.
- vi) As being a natural polymer, vanya silk can be used for manufacture of effective base layer, thermal layer, insulator garments.

2. TRAINING & EXTENSION:

- i) Promote sericulture, as a model for maximizing value generation for farmers through unconventional crops.
- ii) To generate 60,000 nos. of trained manpower on Muga and Eri Rearing Technology, Seed Technology, Reeling and Spinning from different target groups like farmers, rearers, graineures, reelers, spinners, DOS staff etc.
- iii) Technology dissemination to 40,000 farmers on the various technologies developed by this institute time to time.
- iv) To conduct hands-on training/demonstration programme to boost up the confidence towards technology adoption.
- v) Area for plantation of muga and eri silkworm food plant will be expanded throughout the North Eastern region.
- vi) Awareness on muga and eri culture among the farmer groups, especially the youth generation by organizing Awareness meet, Exhibition, Field day, Krishimela, Seminar, Workshop etc.
- vii) Focus on skill development to achieve job oriented and woman empowerment growth.
- viii) Implementation of various developmental schemes launched by Government time to time for upliftment of sericulture throughout the country.
- ix) Establishment of International Centre for Research & Training for Vanya Sericulture.
- x) ISO certification for seed cocoon producers and private seed producers.

3. INFRASTRUCTURE DEVELOPMENT:

- i) Extension of laboratory and administrative buildings.
- ii) Procurement of modern scientific equipments for biotechnology and biochemistry based R&D activities.

- iii) Extensive use of Information Technology.
- iv) Modernization of existing State Farms / Village Grazing Reserves for production of commercial silkworm eggs.
- v) Identification and establishment of infrastructure suitable for raising of seed crops and strengthening of existing infrastructure.
- vi) Involvement of farmers for raising seed crops and seed production.

4. AGRICULTURAL DIVERSIFICATION

Demand for high-value commodities is increasing rapidly with the rising per capita income, growing urbanization and unfolding globalization. To meet the demand of these commodities, research focus would be further strengthened to augment their production more efficiently and competitively. Along with the development of improved hybrids and varieties and management practices for raising productivity in different agro-eco-regions, consumer-preferred quality would be given high priority. Since these are perishables in nature, research and development focus would be on the entire value-chain from production and postharvest to value-addition, processing and marketing. The institute will focus to develop technologies e.g. agro-technologies that will co-exist with the sericulture for their higher income.

5. HUMAN RESOURCE DEVELOPMENT:

Improve the quality of the human resources in the region particularly in research and technical knowledge especially in the areas of the seri-bio-technology. A close interaction will be built up with the farmers, entrepreneurs, researchers, faculties and also the students' from and within the region by providing opportunity to interact with the scientists through different programmes.

Over the years the institute experiences a depletion of expert manpower due to retirement etc. A pool of experienced as well as young manpower as its core strength has to be built up immediately. The recruitment should be a continuous process by the competent authority; otherwise by the 2016-2018 the manpower will be depleted by more than 60% of its core strength.

6. INFORMATION TECHNOLOGY

- Development of KIOSK containing information starting from seed to products marketing (Total technology solution under one roof).
- Establishment of Seri-information Centre and networking.
- Use of NESAC- Satellite/ Remote sensing technology



- Use of information regarding farmer's database, requirement of eggs, seed, cocoons, price details, yarn production etc. with online information.

7. NETWORKING WITH OTHER AGENCIES (INTERNATIONAL COLLABORATION):

Collaboration between various public, private organizations and academic and research institutes in the country as well as overseas partners. The collaboration can be synergistic and beneficial for the common causes of advancement of science and technology in the area sericulture in particular and in economic development of the farmers and entrepreneurs.

STRATEGY, FRAMEWORK AND POLICIES

- Boost up the quality of human resources and to make the team of highly motivated qualified scientists area wise / subject wise at the institute
- Improve efficiency of human and financial resources and effective utilization of infrastructure.
- To facilitate accelerated dissemination of improved technologies, knowledge and information.
- Commercialization of technologies
- Promote effective and efficient management practices including monitoring and evaluation (PME), employing information and communication technology etc.
- Multi-stakeholder, multi-disciplinary, multi-institutional participatory and consortia-based research;
- Improve quality of higher education in the field of sericultural and seribiotechnology through different HRD programmes
- Enhance capacity of human resource in research for development through knowledge management, institute wise appointment and competitive promotion for overcoming new challenges
- Development of an accountable work-culture

The institute along with Central Silk Board is committed to a demand driven and technology-led revolution in the country to meet challenges of the rising demand for sericulture technologies and needs of farmers, and for ensuring sustainable farming and sericultural growth. It is envisage that innovations in sericulture and seribiotechnology would transform existing slowdown in sericulture sector into a vibrant and competitive sector by harnessing untapped opportunities in domestic and global markets. The CSB believes that sericultural research and development would augment farmers' income,

generate employment opportunities, conserve natural resources, promote exports and increase value addition for higher and inclusive growth. To sustain the benefits of research and development, the institute would sensitize and facilitate the scientists all support providing better infrastructure and environment. Further, it will also develop mechanisms to regularly monitor changes occurring at the national and international level, and will develop strategies to respond to the change for the benefit of the stakeholders.

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