

## **Proceedings of Brainstorming Workshop on Challenges and Opportunities in Muga and Eri culture**

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The Central Silk Board (CSB) has completed its glorious 75 years, making a significant impact on rural populace as well as on Indian economy. The CSB has set an ambitious target of producing 60,000MT of silk by the year 2030. This includes Vanya silks also. Among Vanya silks, eri silk has a lot of potential in realizing the silk production target and muga silk is intricately linked with Northeast India's tradition. Towards realizing the silk production target, CSB is in the process of developing and commercializing new technologies including in Vanya silk sector.

The CMER&TI being the sole research organization to work on two economically important Vanya silkworms namely, Muga and Eri, organized a one-day brainstorming workshop on 12.03.2024 to discuss the plans for developing vanya sericulture in Northeast India as a whole. These plans will enable us to achieve silk production target by 2030. In this meeting, the past, present and future technologies for improving muga and eri silk production was deliberated and a roadmap for the coming years was chalked out with expert's opinion and panel discussion. Apart from this an interaction session including seri-experts and stakeholders was also held.

The brainstorming workshop on muga and eri culture was inaugurated by Dr. S B Dandin, Dr. Nitin Kulkarni, Dr. B K Singh and Dr. K M Vijaya Kumari. In the inaugural remarks Dr. Nitin Kulkarni, Director of RFRI Jorhat Assam, suggested taking initiatives in various areas to increase the production of eri and muga silkworm. He stressed on convergence approaches for integrated farming is very important for strengthening farmers. Some of his suggestions were: 1) Initiatives should be taken to increase the income for beneficiaries. 2) The Central Silk Board can collaborate with RFRI to identify Vanvigyan Kendra & Demonstration Centres, which will help extend the integration of Agroforestry & Sericulture. Further, Dr. S.B. Dandin suggested several measures to improve vanya sericulture in Northeast India. 1) Increasing the food plant wealth through an integrated approach with agroforestry to overcome the scarcity of host plants. 2) Steps should be taken to increase and improve the quality of silkworm seeds 3) Reeling activity should be expanded to strengthen activities beyond cocoon and silk production. Dr. B.K. Singh, Director (Retired), CMERTI, suggested adopting a

collaborative approach with stakeholders and NGOs to achieve the target of producing 50,000 metric tonnes of silk by 2030. He also advised covering all aspects of the silk industry, from cocoon to silk production. Dr. K.M. Vijaya Kumari, Director CMERTI, warmly welcomed everyone and discussed the challenges of Eri & Muga in the Northeastern region of India. She mentioned that Cocoon banks and marketing practices are still lacking in Assam and advised state governments to establish market platforms and cocoon banks. All opined that the state Departments of Sericulture should take necessary action to ensure the multiplication of muga seeds.

After the inauguration, the next session was started by a talk on major challenges in Muga and Eri Culture by Dr. Arun Kumar K.P. Scientist D, CMERTI. In this talk major challenges and opportunities in Muga and Eri culture were deliberated. Post talk discussion was held and Dr. S.B. Dandin suggested to have training of loose egg production in eri grainages of farmers as well as NGOs. He also advised CMERTI for active dissemination of technology at the field level. Dr. B.K. Singh advised for the dissemination of the technologies at the field level and focus to improve the income of the farmers. Dr. H. Dattatreya, Head of NGO suggested that DoS, beneficiaries and CSB should work together to arrive at the integrated solutions for increasing silk production. After this, Dr. Dandin gave a Keynote address on role of Agroforestry in Muga and Eri culture. He explained how convergence agriculture with muga and eri culture will help increase farm income. He explained several strategies to integrate muga and eri culture in agroforestry program that leads to efficient use of resources to increase silk production. Then, Dr. B.N. Sarkar, Scientist D, MESSO presented a talk on Seed Availability in muga ecosystem. Later, Dr. Aftab Shabnam delivered a talk on strategies to improve host plant availability in muga and eri culture.

In this workshop, an opportunity was provided to young scientists to talk about innovative ideas to address the long standing issues in Vanya Sericulture and especially in Muga and Eri culture. Mr. Sinto Anto presented a concept note on Enhancing Nitrogen Use Efficiency in Kesseru for Climate Smart Sericulture. This technique will help in identifying the superior NUE donors that can be used in the development of the superior F<sub>1</sub>s. Dr. Harisha. R. presented a concept note on characterization and evaluation of the tapioca germplasm for Sustainable Ericulture. Dr. Jigyasha presented a concept note on “Development of Double Hybrid in Eri Silkworm” in which she discussed the importance of double hybrids

in Eri silkworm that can help in increasing the production of Eri silk to 11 thousand metric tonnes by 2030. Miss Brunda presented a concept note on Management of Bacterial Flacherie using Bacteriocins in Muga silkworm, which will help in controlling the bacterial flacherie in an eco-friendly way without the use of chemicals. Dr. K. Chandrakumara presented a concept note on “Bio-prospecting of different Muga host plants to identify infochemicals eliciting differential reaction in Uzi fly”. We can expect the effective attractant/ repellent for behavioral modification of Uzi fly in Muga culture from this investigation. Dr. Kaiho Kaisa presented a concept idea on Genome-Wide Association study of pupal hibernation traits in wild muga silkworm population. Keeping in view of the pupal hibernation observed in the wild muga and non-hibernating nature in the cultivated muga this concept was drawn to study the underlying genetic mechanism corresponding to the hibernation phenotype through GWAS. Dr. Pulak Rabha talked about development of mobile application for connecting muga seed cocoon producers, graineurs, DoSs, etc to improve seed availability in muga sector. Mr. Roshan Meena presented his idea on development of flat silk in eri to avoid extraction of pupa from closed cocoon.

The talks were followed by panel discussion. First panel discussion was on Muga. Dr. S. N. Burhagohain, Scientist D (Retired) CSB and Dr. Mahananda Chutia Scientist D, MESSO chaired the session. During the panel discussion, it was suggested to initiate a project at the Institute focusing on vegetative propagation. Dr. S.B. Dandin also discussed the challenges in muga breeding technology and advised on prioritization. Experts on the panel further suggested maintaining muga seeds in *in-situ* conditions and developing standardized technology to address the muga seed problem. Further another panel discussion on Ericulture was held, which was chaired by Dr. BK Singh and Dr. BB Singha, Scientist D (Retired), CSB. During the panel discussion, it was discussed that increasing eri production to 11,000 MT by 2030 is achievable. The idea of developing thermotolerant breeds/races should be encouraged, along with focusing on flood-resistant varieties of muga or eri host plants. Integrated host plant cultivation and management, such as that practiced in the NGO Samvrudhi with Kessuru, Borpat, Castor, and Tapioca, may be considered for replication. Additionally, the establishment of cocoon banks to supply cocoons to stakeholders was recommended. Initiating spun mills under the Central Agricultural Committee (CAC) could ensure justification of floor price fixation and transactions. Training

programs for loose egg production in eri grainages for both public and private producers should be provided, along with the upgrading of cocoon openers.

A discussion with stakeholders was also held to hear the issues of farmers and NGOs. During the discussion, it was opined that we should focus on ensuring the availability of silk and directing our attention towards the potential of reeling capacity versus cocoon production. Additionally, there is a need to establish chawki rearing centers in the Northeastern region of India. Furthermore, cold reeling technology should be popularized at the field level.

Finally, a valedictory session was held. The experts provided their concluding remarks as below:

- In his concluding remarks, Dr. B.K. Singh suggested some important points. He advised establishing new Borpat plantation at the Chenijan farm of CMERTI. Additionally, he emphasized the need to popularize chawki rearing in the northeastern region of India. Furthermore, attention should be given to degumming as well as the cocoon opening process.
- Dr. S.N. Burhagohain also addressed the issue of seed availability for Vanya silkworm. He appreciated the concept of disease-tolerant breeds and suggested efforts towards host plant management.
- Dr. S.B. Dandin advised the state Departments of Sericulture (DoS) to come forward and join hands with CMERTI for the benefit of farmers. He also advised the Central Silk Board Regional Centers to expand their activities, emphasizing the need for large-scale expansion of host plants. Additionally, he recommended organizing regular meetings with the DoS and establishing organized markets for cocoons. Moreover, he suggested establishing mini Farmer Producer Organizations (FPOs) for better coordination in sector development, providing hybrids to farmers, and, finally, discussed about the importance of dissemination of technology.
- In her concluding remarks, Dr. K.M. Vijaya Kumari discussed the challenges faced by eri and muga silk production and explored strategies to address these challenges, emphasizing that muga is the pride of Assam. She also highlighted the importance of establishing an organized cocoon market. Lastly, she advised the Department of Sericulture (DoS) to collaborate with CMERTI that will help in the dissemination of technology to the farmers.

## **Recommendations in muga sector**

- 1) Muga seed availability in commercial season is a serious issue. Technologies have to be developed and implemented in field to address this issue.
- 2) Steps should be taken to increase and improve the quality of muga silkworm seeds. Seed act should be implemented in letter and spirit in muga culture.
- 3) State Departments of Sericulture should take necessary action to ensure the multiplication of muga seeds. A committee comprising CSB, DoSs and stakeholders may be constituted to address the critical issues related to the seed sector in muga.
- 4) All attempts should be made for utilization of cooler regions in Northeast India during summer months for muga seed production, so that there is adequate seed availability during Oct-Nov commercial season.
- 5) Development of new silkworm breeds in muga that have biotic and abiotic stress tolerance and high yielding should be taken up. Studies should be concentrated on identification of genetic loci linked to hibernation in muga.
- 6) Conservation of muga genetic resources has to be taken up as a continuous program to preserve genetic resources.
- 7) To enhance host plant availability, Agro-Forestry based system has to be developed.
- 8) Organize regular meetings with the DoS and work towards establishing organized markets for cocoons.
- 9) Cold reeling technology should be popularized at the field level.

## **Recommendations in eri sector**

### ***A) Host plant improvement:***

- 1) Existing 33 accessions of Castor, 10 accessions of Kesseru and 4 morphotypes each of Borpat and Tapioca collected by CMERTI should be characterized and evaluated with complete cataloguing.
- 2) Action should be taken for popularization of promising host plant varieties at field level.
- 3) Carbon sequestration level of eri host plants viz., Kesseru and Tapioca should be addressed as Carbon sequestration of castor is available.
- 4) Package and practices for raising and maintenance of Borpat should be developed and popularized among farmers.

- 5) Expansion of eri host plantation particularly Kesseru and Borpat may be taken up with Forest Dept. (Social Forestry and Agrforestry)

**B) Improvement of silkworm and silk production**

- 6) Chawki rearing practices developed by CMERTI should be popularized at selected clusters/NGOs
- 7) As only C2 breed is available as high yielding, initiatives should be taken up for developing new breed with higher productivity/disease and temperature tolerance.
- 8) Massive popularization of C2 breed should be taken up to increase productivity.
- 9) Streamlining of rearing schedule at cluster level assuring timely supply of laying for CRCs / Grainages
- 10) To develop crop protection measures against pathogens causing Flacherie disease.
- 11) Formulation of appropriate schemes for traditional farmers having small land holdings who are not covered under developmental schemes constituting major percentage of eri farmers.

**C) Seed technology development**

- 1) Supporting ASRs and Private grainuers in PPP mode
- 2) Enforcement / implementation of Seed Act in muga and eri like in mulberry

**D) Conservation / maintenance of eri ecoraces / strains should be carried out at R&D institutes.**

**E) Development of suitable Eri pupa removal device**



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