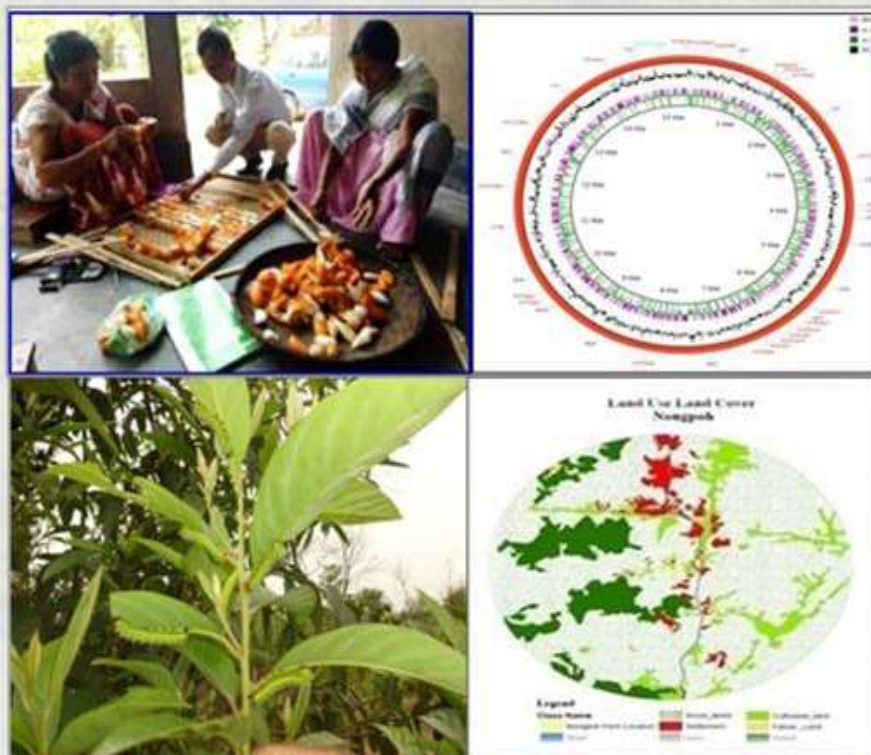




ANNUAL REPORT 2018-2019



Central Muga Eri Research and Training Institute
Central Silk Board, Ministry of Textiles (Govt. of India)
Lahdoigarh, Jorhat – 785700, Assam, INDIA

वार्षिक प्रतिवेदन ANNUAL REPORT 2018-2019



केन्द्रीयमूगाएरीअनुसंधानवप्रशिक्षणसंस्थान
Central Muga Eri Research and Training Institute

(आई एस ओ 9001: 2015 प्रमाणित संस्थान)

(ISO 9001:2015 Certified Institute)

केन्द्रीयरेशमबोर्ड Central Silk Board

वस्त्रमंत्रालय, भारत सरकार Ministry of Textiles, Govt. of India

लाहदोईगढ़, जोरहाट-785700, असम Lahdoigarh, Jorhat-785700, Assam

के.मू.ए.अ. व प्र.संकीर्ण 2018-19की वार्षिक प्रतिवेदन
Annual Report 2018-19 of CMER&TI

प्रकाशन का वर्ष: जुलाई 2019
Year of publication: July 2019

प्रकाशक Published

निदेशक (प्र), के.मू.ए.अ. व प्र.सं Director(i/c), CMER&TI
केन्द्रीयरेशमबोर्ड Central Silk Board
लाहदोईगढ़ Lahdoigarh-785700
जोरहाट, असम Jorhat, Assam
दूरभाष Phone: (91) 0375-2335513/2335124
फैक्स Fax: (91) 0376-2335528
वेबसाइट website: www.cmerti.res.in

संकलन Compilation

Dr. Manjunath RN, Scientist-B
Dr. M. Chutia, Scientist-D

संपादक - मंडल Editorial Board

Dr. M. Chutia, Scientist-D
Dr. Manjunath RN, Scientist-B

आवरण रचना Cover Design

Dr. Arun Kumar, Scientist-C
Dr. M. Chutia, Scientist-D

तकनीकी सहायता Technical support

श्रीमती निलिमा दत्त भुयां Mrs. Nilima Dutta Bhuyan, TA

हिन्दीअनुवाद Hindi Version

श्री गजेन टाये Shri. Gojen Taye
Dr. Amit Kumar, Scientist-C

© निदेशक, के.मू.ए.अ. व प्र.सं Director, CMER&TI
सर्वाधिकार सुरक्षित All rights reserved

Bilingual (Hindi & English): 150 Copies
द्विभाषी (हिन्दी और अंग्रेजी): 150 प्रतियां

Our Vision

To emerge as premier research institute for overall development of Muga, Eri & Oak Tasar silk industry

Our Mission

To achieve excellence in application oriented research for transforming the Muga, Eri and Oak Tasar industry from the subsistence level of production to a vibrant commercial base

CONTENTS

Foreword	1
CMER&TI, Lahdoigarh at a glance	6
Mandate of the Institute	6
Human resources	6
Extension network	7
Organisational set-up	7
Scientific personnel	8
Delegate and non-delegated units	9
Research Advisory Committee	10
Highlights of the achievements 2018-19	12
Financial target and expenditure	24
Result framework document (RFD, 2018-19)	25
List of R&D projects	31
Achievements in R&D projects	35
Concluded projects	35
Ongoing R&D projects	39
Extension & Training activities at Main Institute	66
Brief note on activities of Nested units	81
Important events	94
Visit of Dignitaries and Guests	98
Transfer of Technologies	100
Plan for Land and Resource Conservation	101
Publications	104
Official Language - Hindi Activities	109

FOREWORD

The North East region of India is a natural abode for diverse flora and fauna. The conducive environment of the North East India has made the region a natural home for sericigenous insects as well as their host plants. The region, at the confluence of Indo-Malayan, Indo-Chinese, and Indian biogeographical realms experiences, a predominantly humid sub-tropical climate with hot, humid summers, severe monsoons, and mild winters. Four types of commercially exploited silks, viz., mulberry, muga, eri and oak tasar are available in this region besides numerous commercially un-exploited sericigenous insects such as *Attacus atlas*, *Samiacanningie*, *Criculatrifenestrata*, etc. Along with this, Brahmaputra River valley of Assam is decorated home for cultivation eri silkworms. The silk produced by eri silkworm is considered economically the third most important silk in the world after mulberry silk and Chinese Tasar. The North Eastern region of India alone produces more than 98 % of the total amount of eri cut cocoons and spun silk in the country. Besides these, the eri culture has also undertaken in Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Odisha. The production and demand of eri silk is increasing day by day and its production has reached more than 6660 MT during 2017-18. Muga silk is endemic to North East region producing golden coloured exquisite silk. The muga raw silk production has been increasing gradually up to 192 MT during 2017-18 as reported so far. The muga silkworm is facing certain biotic and abiotic challenges hindering its potential raw silk production. Impact of global warming coupled with climate changes and environmental pollution on muga silk industry cannot be ignored.

The Central Muga Eri Research and Training Institute under Central Silk Board is the leading institute mandated to carry out basic as

well applied research, developmental as well as extension support for the growth of muga and erisilks industry in the country. The institute has been focusing on development of farmers' friendly technologies in the areas of silkworm rearing management, host plant improvement and management, development of improved breeds, pests & diseases management and its diffusion and dissemination through farmers' participatory mode and in coordination with the NE States Department of Sericulture.

I am happy to note that the institute could fulfil its goal in a remarkable extent during 2018-19. Two high yielding Muga silkworm races CMR-1 & CMR-2 have been multiplied and performance evaluation was done at institutional, state farm, RSRS and private farmers' fields' levels. During the year, 4966 dfls of CMR-1 and 6590 of CMR-2 were reared in different farms with 55-60 % ERR. Two New combination of eri silkworms' viz. YP X GBZ (shell weight 0.53 g; fecundity 352) and GBS X GBZ (shell weight 0.55g; fecundity 355) were developed which are superior to the existing commercial breeds. For conservation of Muga silkworms in-situ natural habitats, Indigenous Technical Knowledge (ITK) associated in muga culture was validated at institute and DoS and farmers' field levels. Standardization of bamboo treatment process which can be used without any detrimental effect to muga and eri silkworms was done. Institutional biotech hub funded by DBT, New Delhi is upgraded to advanced level on the basis of its performance (grading) for infrastructure development, awareness and training among the younger generation on seri-biotechnology related areas.

During the year 2018-19, the institute gave more emphasis on training to farmers and ensured the transfer of technologies to their fields. Throughout the year, around 5 Vanya

ReshamKrishimelas, 18 Field Days, 18 Farmer's Days, 33 Awareness Programmes and 37 Group Discussions, 11 technology demonstration programmes were organized by the institute. More than five thousand participants were sensitized through these activities during the year. Around 1169 farmers/beneficiaries were sensitized for advanced and improved technologies of Muga and Eri against through Sericulture Resource Centres (SRC). Under the Seri Model Village (SMVs), farmers were able to conduct muga silkworm rearing and harvested nearly 9.6 million cocoons that produced 1856 kgs of Muga raw silk. Similarly, in case of Eri SMVs, around 300 farmers could produce 3176 gs of Eri raw silk in three different crops through the year.

It gives me immense pleasure to record my deep sense of gratitude to Prof. Kamal MallaBujor Boruah, Vice Chancellor of Assam Agricultural University and Chairman, Research Advisory Committee (RAC) and all the members of RAC of the institute for their invaluable guidance and suggestions to keep up the momentum of spirit and involvement in frontier areas of R&D and to tackle the problems of muga and eri silks industry.

I would like convey my thanks to Competent Authority of Central Silk Board,

Bangalore for providing support for development of the institute to carry out the R&D activities in fulfilling the vision of the organization. I sincerely acknowledge and appreciate the supports and cooperation extended by Department of Sericulture of all North Eastern States in implementing developmental and extension communication programmes effectively. I also sincerely appreciate all the collaborating institute and funding agencies such as Dibrugarh University, Gauhati University, NEIST, Jorhat, IIT, Kharagpur, IIT, Guwahati, NESAC, Shillong, RFRI, Jorhat, IARI, New Delhi, Assam Agricultural University, Jorhat, Department of Science & Technology, Government of India and Department of Biotechnology, Government of India whose cooperation and support enabled the institute a frontier R&D institute in the country. Last but not the least I would like to convey my heartfelt thanks and gratefulness to the farmers for cooperation and sharing challenges faced in grassroot levels for carrying out need based and useful research and extension services in eri and muga silk sectors.

Dr. Ranjana Das
Director (I/c)

प्रस्तावना

भारत का उत्तरपूर्वी क्षेत्र विविध वनस्पतियों और जीवों का एक प्राकृतिक निवास है। उत्तर पूर्व भारत के अनुकूल वातावरण के कारण इस क्षेत्र में सीरीज़ियस कीटों तथा इन कीटों के लिए भोज्य पौधे प्राकृतिक तथा पर्याप्त रूप में पाए जाते हैं। यह क्षेत्र भारत-मलयाण, भारत-चीनी और भारतीय जैव-भौगोलिक क्षेत्र में शामिल है जिसमें मुख्य रूप से गर्म, आर्द्र, ग्रीष्म ऋतु, तीव्र मानसून और हल्की व नरमी सर्दियों की विद्यमानता के साथ आर्द्र उपोष्णकटिबंधीय की तरह जलवायु पायी जाती है। इस क्षेत्र में चार प्रकार के व्यावसायिक शोषित रेशम अर्थात् शहतूत, मूगा, एरी और ओक तसर उपलब्ध हैं, इसके अलावा यहां कई व्यावसायिक रूप से गैर-शोषित सेरिजेनस कीट जैसे -*अटैचसएटलस*, *सामियाकैनिंगी*, *क्रिकुलाट्राइफेनेस्ट्रेटा*, आदि पाए जाते हैं।

इसके साथ ही असम के ब्रह्मपुत्र नद की घाटी को एरी रेशम कीट का वास स्थान के रूप माना जाता है। आर्थिक रूप से देखा जाए तो एरी रेशम कीट से उत्पादित रेशम का स्थान शहतूत रेशम और चीनी तसर से उत्पादित रेशम के बाद आता है, जो महत्वपूर्ण विषय है। अकेले भारत में उत्तर पूर्वी क्षेत्र में कता एरी कोसा और काता रेशम का उत्पादन 98% से अधिक रहा है। उत्तरप्रदेश, आंध्रप्रदेश, तमिलनाडु और ओडिशा जैसे राज्यों में भी एरी संवर्धन आरंभ हो चुका है। एरी रेशम का उत्पादन और इसकी मांग दिन-प्रतिदिन बढ़ने लगी है। वर्ष 2017-18 के दौरान इसका उत्पादन 6660 मैट्रिक टन से अधिक रहा है। मूगा रेशम उत्तर पूर्वी क्षेत्र का स्थानिक रेशम कीट है जिसका रंग सुनहरे होने के साथ-साथ उत्तम रेशम भी है। वर्ष 2017-18 के दौरान मूगा कच्चे रेशम का उत्पादन धीरे-धीरे वृद्धि होने लगी हो जिसका उत्पादन रिकार्ड 192 मैट्रिक टन तक पहुंच गया है। देखा गया है कि संभावित कच्चे रेशम उत्पादन में मूगा रेशम कीट को प्रभाव डालने वाली कुछ जैविक और अजैविक चुनौतियों का सामना करना पड़ रहा है। इस संबंध में, ग्लोबल वार्मिंग के प्रभाव से होने वाला जलवायु परिवर्तन के कारण मूगा रेशम उद्योग पर पर्यावरण प्रदूषण का प्रभाव अस्वीकार नहीं किया जा सकता।

केन्द्रीय रेशम बोर्ड के अंतर्गत केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान देश में मूगा व एरी रेशम उद्योग के संबंध में बुनियादी तथा प्रायोगिक अनुसंधान, विकासात्मक कार्य करने व विस्तार व प्रसार के सहयोग से आगे बढ़ाने के लिए प्रतिबद्ध है। यह संस्थान पूर्वोत्तर भारत के राज्यिक रेशम उत्पादन विभागों के साथ सुसमन्वय बनाए रखते हुए रेशम कीटपालन प्रबंधन, खाद्य पौधा के सुधार और इसका प्रबंधन, उन्नत नस्लों, कीटों में पाए गए रोगों के प्रबंधन व विकास तथा किसानों की भागीदारी के प्रचारण के जरिए किसानों की अनुकूल प्रौद्योगिकियों के विकास पर ध्यान केंद्रित रहा है।

मुझे टिप्पणी करते हुए खुशी हो रही है कि वर्ष 2018-19 के दौरान मूगा रेशम कीट की प्रजातियां अर्थात् सी एम आर-1 और सी एम आर-2 को गुणण कर संस्थागत, राज्यिक फार्मों, क्षेत्र उ अ, केन्द्र तथा किसानों के निजी खेतों में इसके निष्पादन का मूल्यांकन किया गया है। वर्ष के दौरान विभिन्न स्रोत फार्मों में सी एम आर-1 के 4966 रो.मु.च. और सी एम आर-2 के 6590 रो.मु.च. को कीट पालन करने पर 55-60 प्रतिशत ई.आर.आर. प्राप्त हुआ है। एरी रेशम कीटों के दो नए संयोजन YPXGBZ (कवच भार 0.53 ग्राम; बहु प्रजता 352) और जी.बी.एस.जी.बी.जेड. का कवच भार .55 ग्राम, बहु प्रजता 355 को विकसित किए गए। जो मौजूदा वाणिज्यिक नस्लों से बेहतर हैं। ऊपरी डोगरंग वाइल्ड लाइफ क्षेत्र, गोलाघाट और कुकलुंग वन क्षेत्र, कोकराझार में मूगा रेशम कीट को उसके प्राकृतिक आवासों में संरक्षणके लिए आगामी 2047 तक 30 वर्ष के लिए असम वन विभाग तथा केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान के बीच समझौता ज्ञापन पर हस्ताक्षर किया गया है। संस्थान और रेशम उत्पादन विभागों के किसानों के क्षेत्र स्तर पर मूगा संवर्धन से जुड़े स्वदेशी तकनीकी ज्ञान (ITK) को मान्यता प्रदान किया गया है। मूगा और एरी रेशम कीटों पर किसी प्रकार हानिकारक प्रभाव पड़े बिना बांस उपचार प्रक्रिया के मानकीकरण कर उसका उपयोग किया जा सकता है। सेरी बायोटेक्नोलॉजी से संबंधित क्षेत्रों में युवा पीढ़ी के बीच बुनियादी विकास, जागरूकता और

प्रशिक्षण के निष्पादन (ग्रेडिंग) के आधार पर डीबीटी, नई दिल्ली द्वारा वित्तपोषित संस्थागत बायोटेक हब को उन्नत स्तर पर विकसित किया गया है।

वर्ष 2018-19 के दौरान संस्थान द्वारा कृषकों के लिए प्रशिक्षण तथा उनके क्षेत्रों में प्रौद्योगिकियां स्थानांतरण जैसे विषयों पर अधिक जोर दिया गया है। पूरे वर्ष के दौरान, संस्थान द्वारा लगभग 5 वन्य रेशम कृषिमेलाए, 18 क्षेत्र दिवस, 18 किसान दिवस, 33 जागरूकता कार्यक्रम और 37 समूह चर्चाएँ, 11 प्रौद्योगिकियां प्रदर्शन कार्यक्रम आयोजित किए गए। वर्ष के दौरान पांच हजार से अधिक व्यक्तियों को इन गतिविधियों के माध्यम से सुग्राही बनाया गया है। सेरिकल्चर रिसोर्ससेंटर (SRT) के माध्यम से मूगा और एरी उन्नत तथा विकसित तकनीकों पर जागरूकता के लिए लगभग 1169 किसानों / लाभार्थियों को सुग्राही बनाया गया है। सेरी मॉडल विलेज (SMV) के अन्तर्गत सक्षम किसानों मूगा रेशम कीट पालन करते हुए लगभग 9.6 मिलियन कोसाए प्राप्त किया है तथा इससे 1856 किलोग्राम मूगा कच्चे रेशम का उत्पादन किया गया। इसी तरह सेरी मॉडल विलेज (SMVs) के अन्तर्गत लगभग 300 किसानों द्वारा पूरे वर्ष के दौरान एरी कीटपालन करते हुए तीन अलग-अलग फसलों के जरिए 3176 ग्राम एरी कच्चे रेशम का उत्पादन करने में सक्षम हुए हैं।

मुझे प्रो. कमल मल्लबुजर बरूवा, कुलपति, असम कृषि विश्व विद्यालय तथा अध्यक्ष, अनुसंधान सलाहकार समिति, के मू ए व प्र सं तथा अनुसंधान सलाहकार समिति के सभी सदस्यों को अनुसंधान व विकास (आर एण्ड डी) के प्रमुख क्षेत्रों में भावना और भागीदारी की गतिशीलता को बनाए रखने और मूगा और एरी रेशम उद्योग की समस्याओं के समाधान के लिए उन के द्वारा दिए अमूल्य मार्गदर्शन और सुझावों के लिए आभार व्यक्त करते हुए बेहद खुशी हो रही है।

मैं केन्द्रीय रेशम बोर्ड, बेंगलूरु के सक्षम प्राधिकारी को संगठन के लक्ष्य को पूरा करने की दिशा में अनुसंधान व विकास की गतिविधियां का निष्पादन करने में किए गए सतत सहयोग के लिए धन्यवाद ज्ञापित करती हूं तथा मैं उत्तर-पूर्वी क्षेत्र के रेशम उत्पादन विभागों को विकासात्मक व विस्तार सूचनाओं के आदान-प्रदान के कार्यक्रमों को प्रभावी से कार्यान्वित किए जाने पर निष्ठापूर्वक प्रशंसा करती हूं। मैं सभी सहयोगी संस्थानों तथा वित्तपोषित अभिकरणों के साथ साथ डिब्रुगढ़ विश्व विद्यालय, गुवाहाटी विश्व विद्यालय, उत्तर-पूर्वी विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट, आई.आई.टी., गुवाहाटी, एन.ई.एस..ए.सी., शिलांग, आर.एफ.आर.आई, जोरहाट, आई.ए.आर.आई., नई दिल्ली, असम कृषि विश्व विद्यालय, जोरहाट विज्ञान तथा प्रौद्योगिकी विभाग, भारत सरकार को निष्ठापूर्वक प्रशंसा करती हूं जिनके समर्थन व सहयोग ने संस्थान को देश में एक अग्रणी अनुसंधान व विकास के रूप में सक्षम बनाया है। अन्त में, उन कृषकों का आभार व्यक्त करती हूं जिन्होंने ने मूगा व एरी के दोनों क्षेत्रों में विस्तार तथा अनुसंधान (आर एण्ड डी) से संबंधित गतिविधियों में विद्यमान चेतावनी के विरुद्ध लड़ने हेतु जरूरी तथा उपयोगी सहयोग प्रदान करते आ रहे हैं।

डॉ रंजना दास
निदेशक

CMER&TI, LAHDOIGARH AT A GLANCE

Central Muga Eri Research & Training Institute is a R&D institute in the field of muga, eri and oak tasar culture, which is under the control of Central Silk Board, Ministry of Textiles, Govt. The institute has been successfully undertaking entire gamut of R&D activities to cater the needs of the on-farm and post-cocoon sector of Muga, Eri and Oak tasar culture. The institute is strengthening the infrastructural facilities in recent years for conducting research in the frontier lines. The main objectives of the institute are to evolve new technologies for increasing the productivity of muga, eri and oak tasar silkworms and thereby transforming these cultures from the state of traditional culture to a profit making and sustainable enterprises.

The institute is located at Lahdoigarh, 16 km east of Jorhat, Assam, well connected with road. It has extension units in the North Eastern States, West Bengal, Uttar Pradesh and Andhra Pradesh. Scientists are working in close coordination towards the development of farmer's friendly technologies, their application in field, evaluation and fine tuning of the technologies and its dissemination. Research and Developmental activities of this institute are carried out under twelve divisions. There is a Project Monitoring Cell (PMC) in the institute for planning and monitoring of the institutional R&D activities. The administrative activities are carried out by ten sections viz., Establishment, Accounts & Bill, Stores and Purchase, Library, Vehicle, Construction, Labour, Computer, Hindi and Receipt & Dispatch. To facilitate effective transfer of technologies developed by the institute and their validation in the fields, two Regional sericulture Research Stations (RSRS) viz., RSRS Boko, Assam, and RSRS Imphal, Manipuralongwith three Research Extension Centres (REC) are working under the control of the main institute. The regional stations are located in major sericulture zones to

carry out region and season specific research and to facilitate test verification and effective dissemination of laboratory findings to the field. The research station situation at Boko is dedicated to Muga and Eri related research while the research station at Imphal is dedicated to Oak tasar and mulberry. The regional stations, along with the RECs under their control, are performing major works towards identification of technologies suitable to regional needs and their diffusion to field. RECs for muga are located at Coochbehar (West Bengal) and Lakhimpur (Assam) and REC for Eri is located at Fatehpur (U.P). REC, T. Khullem under the control of RSRS Imphal is sharing the responsibility of transferring the technologies to the beneficiaries involved Oak tasar sericulture.

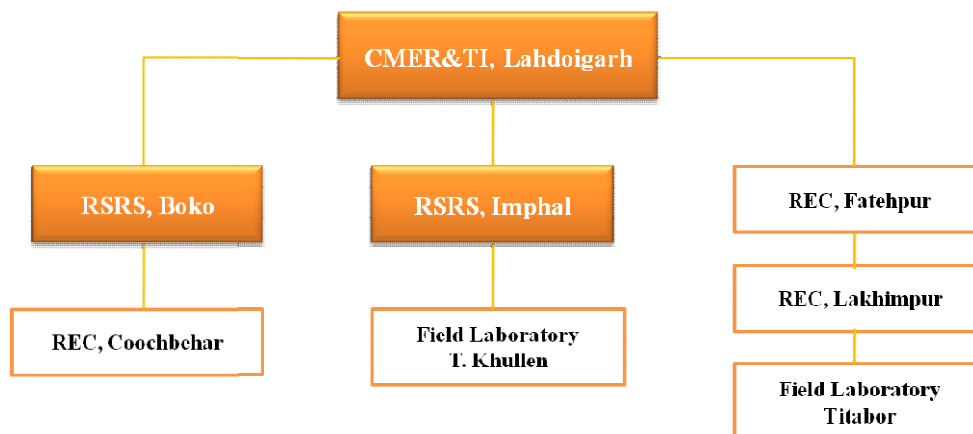
MANDATE OF THE INSTITUTE

- ❖ To act as an apex Research Institute for providing R&D support for muga, eri and oak tasar sericulture.
- ❖ To conduct basic, strategic and applied research to increase production and productivity of silkworms and their host plants.
- ❖ Improvement of food plants and silkworm eco-races and hybrids.
- ❖ To conduct socio-economic research for assessing sustainability of newly developed technologies.
- ❖ To percolate the research findings to the end users through extension and training mechanism.

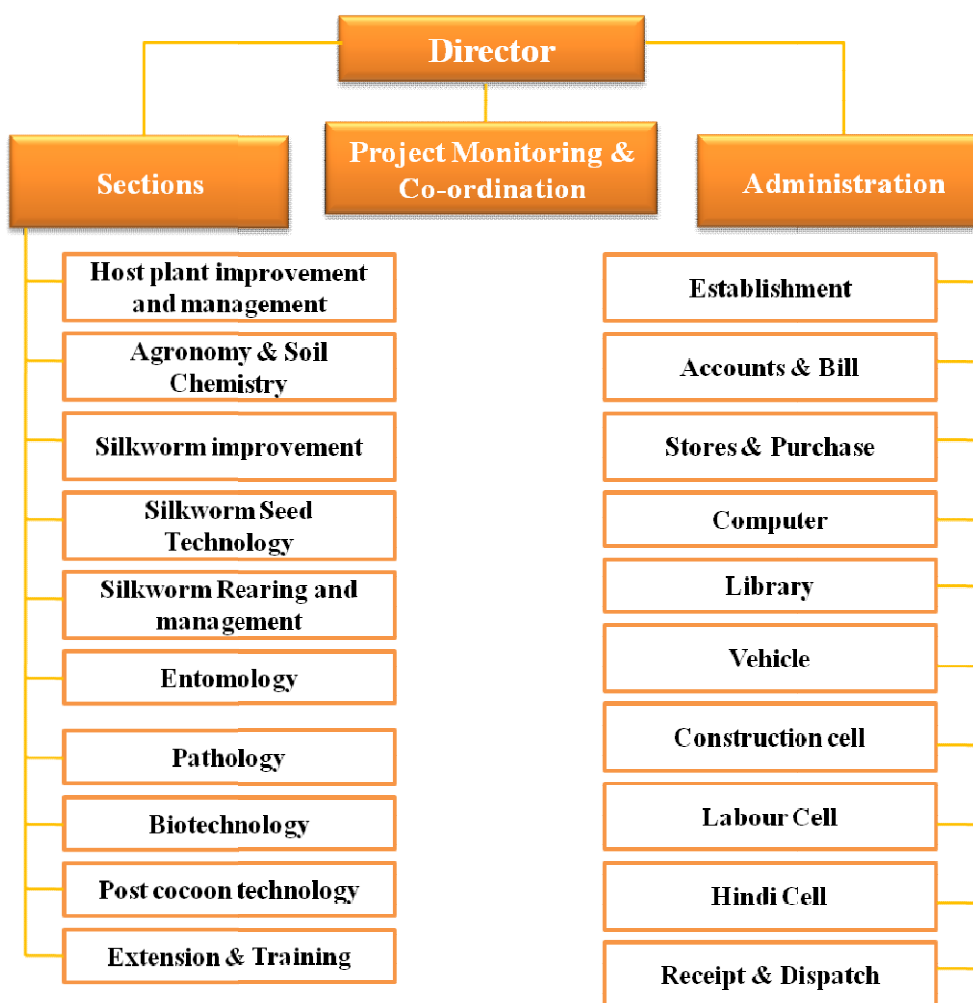
HUMAN RESOURCES

Scientists	31
Technical staff	56
Administrative Staff	24
Supporting Staff	99
Total Staff	111

EXTENSION NETWORK



ORGANIZATIONAL SETUP



SCIENTIFIC PERSONNEL (as on 31st March 2019)**I. CMERTI MAIN INSTITUTE**

Dr.Jyotshna Tirkey	Director	w.e.f. 15.02.2019
Dr. Ranjana Das	Director (I/C)	01.08.2019 – 14.02.2019
Shri. D. Goswami	Director (I/C)	Up to 30.07.2018
Dr. Reeta Luikham	Scientist –D	w.e.f. 13.08.2018
Dr. K. Neog	Scientist – D	
Dr. T. James Keisa	Scientist – D	
Dr. M. Chutia	Scientist – D	
Dr. Aftab Ahmad Shadnam	Scientist – D	w.e.f. 26.10.2018
Dr. D. K. Gogoi	Scientist – C	
Dr. Arun Kumar K P	Scientist – C	w.e.f 03.01.2019
Dr. Amit Kumar	Scientist – C	w.e.f 03.01.2019
Dr. D. K. Jigyasu	Scientist – B	
Dr. Kh. Subadas Singh	Scientist – B	
Dr. G. Subrahmanyam	Scientist – B	
Dr. Rajal Debnath	Scientist – B	
Dr. Vinodakumar S Naik	Scientist – B	
Dr.Prashanth Sangannavar	Scientist – B	
Sri. Vijay N.	Scientist – B	
Dr. Saikat Maji	Scientist – B	w.e.f 02.01.2019
Dr. Manjunath R N	Scientist – B	w.e.f 03.01.2019
Dr. Mahesh D S	Scientist – B	w.e.f 03.01.2019
Sri. Jeevan B	Scientist – B	Left service 30.06.2018

II. RSRS, BOKO

Sri. SAS Rahman	Scientist – D
Dr. M. Deka	Scientist – C
Dr. H. Barman	Scientist – C

III. RSRS IMPHAL

Dr. N.Ibotombi Singh	Scientist – D
Dr. Y.Debaraj	Scientist – D
Dr. L.Somen	Scientist – D
Dr. S.Subharani Devi	Scientist –C
Dr. Ritwika Sur Chaudhuri	Scientist –B

IV. REC, LAKHIMPUR

Sri D. Mech

Scientist – D

V. REC, COOCHBEHAR

Dr. N. Biswas

Scientist – D

VI. REC, FATEHPUR

Dr. S. Pal

Scientist – D

DELEGATED AND NON-DELEGATED UNITS OF CMER&TI

Delegated Units

- Central Muga Eri Research & Training Institute, Lahdoigarh, Assam (Main Institute)
- Regional Sericulture Research Station, Boko, Kamrup, Assam
- Regional Sericulture Research Station, Imphal, Manipur

Non-Delegated Units

- Research Extension Centre, Coochbehar, West Bengal
- Research Extension Centre, Lakhimpur, Assam
- Research Extension Centre, Fatehpur, Uttar Pradesh

.....

RESEARCH ADVISORY COMMITTEE

Chairman

Prof. Kamal Malla Bujarbaruah

Vice Chancellor, Assam Agricultural University, Jorhat – 785013, Assam

Members

Prof. Pradip Kumar Neog

Director, Extension Education Institute (NE Region),
Assam Agricultural University, Jorhat - 785013, Assam

Prof. Pratap J. Handique

Dept. of Biotechnology, Gauhati University,
Guwahati - 781014, Assam

Dr. A.K. Barooah

Director, Tocklai Tea Research Institute, Jorhat - 785008, Assam

Dr. R.S.C. Jayaraj, IFS,

Director, Rain Forest Research Institute, Jorhat - 785010, Assam

Director (Technical)

Central Silk Board, CSB, Bangalore - 560068, Karnataka

Dr. Jogesh Deori

Director of Sericulture, BTC, Adabari,
P.O. Choraikola, Govt. of Assam, Kokrajhar - 783376, Assam

Director of Sericulture

Govt. of Assam, Khanapara, Guwahati - 781004, Assam

Director of Sericulture,

Govt. of Nagaland, Kohima - 797004, Nagaland

Director of Sericulture,

Govt. of Manipur, Project Management Complex,
Sangaipat, Imphal East, Imphal - 7950048, Manipur

Director of Sericulture

Govt. of Mizoram, Aizawl - 796001, Mizoram

Director of Sericulture,

Dept. of Forest, Forest Secretariat, Govt. of Sikkim,
Deorali, Gangtok - 737102, Sikkim

Commissioner of Textiles & Handicrafts,

Govt. of Arunachal Pradesh, Itanagar - 791110, Arunachal Pradesh

Directorate of Sericulture & Weaving,

Govt. of Meghalaya, Shillong - 793001, Meghalaya

Scientist – D & Head

Muga Silkworm Seed Organization,
Central Silk Board, Guwahati - 781038, Assam

Mrs. SushilaSaikia

Muga Farmer, Borpathar, Golaghat, Assam.

Sri Narendra Borah,

Eri Farmer, Kaliabar, Nagaon, Assam

Member Convener

Director, CMER&TI, Lahdoigarh, Jorhat - 785700, Jorhat

HIGHLIGHTS OF ACHIEVEMENTS (2018-19)

The Central Muga and Eri Research & Training Institute, Lahdoigarh, Jorhat in a network of RSRS, Boko, RSRS, Imphal and RECs located at Lakhimpur, Assam; Coochbehar, West Bengal and at Fatehpur, Uttar Pradesh provides R& D support in muga, eri and oak tasar sectors for the development of the silk industries.

Major achievements in research

During 2018-19, 27 research projects were carried out, of which 3 projects are DBT funded, 3 projects are DST funded, 1 project is NERTPS funded and remaining are CSB funded. Three projects were concluded, 3 were newly initiated and remaining 21 projects are being continued from previous year. All the research projects are under different categorization viz., Environmental challenges and global warming, Drudgery reduction and women friendly technologies, Input cost reduction, Eco-friendly & organic farming etc. Moreover, 1 regular programme is conducted at the institute as well as at farmers' level. A brief highlight of the research works is presented below:

Host Plant Improvement, Production and Protection

- For assessment of phytochemical constituents of Som, the most preferred host plant of Muga silkworm, and to develop a comprehensive nutrient management package 19 morphological parameters according to the Som descriptor have been recorded. Leaf moisture, protein, major and micro-nutrient and phenol content of leaves have been estimated for all the rearing seasons.
- The institute had collected a total of 366 soil samples covering Assam, Nagaland, Manipur, Meghalaya, Mizoram and Arunachal Pradesh. 306 samples have been analyzed. Soil Health

Cards (SHCs) have been developed for 608 individual farmers. Digitalization of SHCs for 244 farmers of Assam has been completed.

- RSRS, Imphal had analyzed 984 soil samples for 13 parameters (pH, EC, OC, Available N, P, K, S, Zn, Fe, Cu, Mn, B & LR) for 1339 farmers (Manipur 866 sample for 1221 farmers & Meghalaya 118 sample for 118 farmers). Out of that, 1261 Soil Health Cards have been distributed (Imphal West-137, Imphal East-336, Bishnupur- 243, Ukhrul-108, Thoubal- 312, Churachanpur-3, Chandel-4, Meghalaya- 118).
- During the year, 99870 nos. of Muga host plants were raised and 24508 nos. were supplied; and 8000 nos. of Eri host plants were raised and supplied 7000 nos. to the farmers under different programmes. 5 acres of som plantation was also raised at farmers' fields.
- Antagonistic bacteria were isolated and identified from castor rhizospheres which are promising against *Alternaria* blight of castor. Biochemical and molecular characterization of bacterial antagonists has been completed.

Silkworm Improvement, Production and Protection

- Muga silkworm mitochondrial genome is sequenced, mapped compared with other sericigenous insects and published. Analysis of whole genome has been completed.
- Two high yielding Muga silkworm races CMR-1 & CMR-2 have been multiplied and performance evaluation was done at institutional, state farm, RSRS and private farmers' fields' levels. During the year, 4966 dfls of CMR-1 and 6590 of CMR-2 were reared in farms with 55-60 % ERR.
- Survey was conducted in seven districts of Nagaland to assess the seribiiodiversity of

sericigenous insects. 14 species of wild silk moths belonging to 8 genera were collected from seven districts of Nagaland during the study period. The fauna comprised of four species of *Antheraea* (*assamensis*, *roylei*, *proylei*, *frithi*); two species of *Actias* (*selene* and *rhodopneuma*); two species of *Samia* (*canningi* and *ricini*); two species of *Loepa* (*katinka* and *sikkima*) and one species each of *Attacus atlas*, *Archaeoattacus edwardsii*, *Criculatrifenestrata* and *Sonthonnaxiamaenas*. Morphological characterizations of all species were done.

- To check the cross transmission of pebrine spores from lepidopteran caterpillars to Muga silkworm (*Antheraea assamensis* Helfer), 30 caterpillar species were collected from Muga rearing fields. Out of these, 20 species are observed carrying pebrine spores.
- Pathobiome associated with muga silkworm flacherie disease is identified and established with comparative genomics studies. Pathogenic and opportunistic pathogenic bacteria distribution in Muga silkworm midgut has been deciphered with high throughput sequencing analysis. PCR amplification of pathogenic bacteria completed.
- A new chemical formulation for reducing the incidence of flacherie disease has been developed and field disinfection studies conducted with the newly developed formulation exhibited 22% increase in ERR under *In vitro* evaluation of the disinfectant.
- Two embryo isolation methodologies for Muga silkworm eggs have been standardized. Hot water method has been found suitable for early and mid embryonic stages, whereas KOH method is suitable for mid and late embryonic stages
- 2000 nos. of Eri Collapsible Mountages using treated bamboo have been prepared by the entrepreneurs who were trained by this institute and the same were distributed among the

farmers / beneficiaries in different location of Assam and Nagaland.

- Awareness programmes among local peoples were organized at both sites for conservation of muga and other wild silk moth. Weather stations have been installed for recording the meteorological parameters. Muga silkworms were released in both the sites of conservation.
- LED Solar trap has been developed and utilized to control insect pests in muga silkworm rearing. One solar trap with lure has been found to be very effective in attracting Uzi fly infesting muga silkworm. Demonstration and awareness of LED light trap device has been conducted at State sericulture farms in Golaghat district, Muga farmers at Lakhimpur, Dhakuakhana, Sivasagar, Kaliabor and Pasighat (Arunachal Pradesh).
- Morphological characterization of the virus causing tiger band disease of oak tasar silkworm has been carried out through Scanning electron microscope. Isolated the genomic DNA and used for PCR amplification. The PCR products were cloned, sequenced and results revealed that the Tiger Band disease virus is an alphabaculovirus of nucleopolyhedrovirus (Group -I) having close similarity with the NPV infecting *Antheraea pernyi*.
- Two New combination of eri silkworms' viz. YP X GBZ (shell weight 0.53 g; fecundity 352) and GBS X GBZ (shell weight 0.55g; fecundity 355) were developed which are superior to the existing commercial breeds.
- Biosurfactant producing bacteria viz. *Bacillus* sp., *Enterococcus* sp., *Pseudomonas* sp., *Staphylococcus* sp., and *Serratia* sp. were identified that were isolated from hydrocarbon contaminated soils nearby the Muga growing areas in Upper Assam. Biosurfactant producing bacteria from soil samples from oil polluted areas were isolated and 16S rRNA PCR amplification and purification has been done.

- Surveyed the potential muga growing areas in upper Assam districts to determine the possible loss of muga crop due to insecticide spray. Commonly used insecticides are screened to assess toxicity levels. Awareness programmes were conducted to show the deleterious impact of unscrupulous use of insecticides.
- Field survey has been conducted in the Muga rearing fields at different locations for studying population dynamics of predator bugs viz. *Sycanus collaris* Fab. and *E. furcellata*. Population dynamics, biology and life cycle of *E. furcellata* has been studied.
- For development of forecasting and forewarning system for pests and diseases of muga host plants and silkworm, survey was conducted in Dibrugarh, Golaghat, Jorhat, Sivasagar, North Lakhimpur, Kamrup and Goalpara districts of Assam and Jalpaiguri and Cochbehari of West Bengal and collected the data.
- For development of Decision Support System for early warning of selected muga silkworm diseases & pests with geospatial technique, the disease incidence and rearing performance of muga silkworm at different locations has been recorded. Muga farm based on slope, aspect, soil information and other land use pattern, GPS locations of available Muga Farms of Umling Block, Nongpoh has been completed. Meteorological equipments were installed at Jagduar, Jorhat. Rearing and historical meteorological data has been collected from Boko, Tura and Jagduar. Landscape photographs of state and CSB farms have been taken with UAV fly.
- Standardized the bamboo treatment process which can be used without any detrimental effect to muga and eri silkworms. 20 numbers of entrepreneurs were trained on treatment of bamboo. 2500 strip type collapsible mountages and 200 treated bamboo chalonis were distributed to the beneficiaries of Lakhimpur, Dimapur, Jorhat, Morigaon, Sivasagar,

Golaghat, Dibrugarh, Nagaon, and Udalguri. 6 numbers of demonstration and cum awareness programme organized at DOS Nagaland, Lakhimpur, Tokobari, Jorhat, Bogagaon, Titabar and Nellie covering more than 650 farmers for popularization of treated bamboos for utilization.

- Indigenous Technical Knowledge (ITK) associated in muga culture was validated at institute and DoS and farmers' field levels. Two technologies have been found to have positive effect on the production of muga cocoons when integrated with the recommended improved practice of muga culture. Average yield under integration of ITK and recommended package was recorded 71 cocoons/df with 66.2% ERR against 62 cocoons/df with 57.9% ERR under existing recommended package. Thus, cocoon yield under integration of ITK with the existing recommended practices was found to be increased by 14.5% at farmers' level.

Capacity Building and Training

- Total persons trained: 2302 farmers, and industry stakeholders against the target of 2030 numbers.
- Organized Farmers' Skill Training (CBT) – 403 against the target of 375 nos; Exposure visit for technology awareness- 177 against the target of 175; Technology Orientation Programme- 125; Skilled Training sponsored by DoS – 125 numbers; exposure visit: 177 farmers; Project Internship- 30.
- Institutional biotech hub is upgraded to advanced level on the basis of its performance (grading) funded by DBT, New Delhi for infrastructure development, awareness and training among the younger generation on seribiotechnology related areas.
- 1169 farmers / beneficiaries were covered and trained under 9 SRC (s) established under the institute against the target of 900.

- One national level Brainstorming Workshop on “Exploitation of problems, prospects and opportunities for improvement of silkworm and its host plants in Muga and Eri sericulture” was organized at this institute on 1st September, 2018, where 116 scientists / scholars / students from different organizations / universities participated
- One national level workshop on “Use of mulberry leaf as supplement in green tea” was organized at this institute on 30th November, 2018, where 74 scientists / scholars / students from different organizations / universities / tea garden owners and managers participated.
- One national level workshop cum training programme on “Techniques and Technologies of Seri-Biotechnology” sponsored by DBT, New Delhi was organized at this institute on 27th March-2nd April, 2018, where 40 Scientists / scholars / students from different organizations / universities participated.
- One DBT sponsored workshop cum hands-on training programme on “Soil Health Management” was organized at this institute on 3-6th April, 2018, where 16 Scientists / scholars / students and farmers from different organizations / universities participated.
- One national level workshop on “Muga Silkworm Crop Rescheduling to Meet the Challenges of Climate Change” sponsored by CSB, was organized at RSRs, Boko on 11th March-2nd, 2019, where 19 Scientists / scholars / students from different organizations / universities participated

Transfer of Technology

- Five Vanya ReshamKrishimelas, 18 Field Days, 18 Farmers Days, 33 Awareness Programmes and 37 Group Discussions, 11 technology demonstration programmes were organized by the institute. More than five thousand persons

were sensitized through these activities during the year.

- Under the SMVs, during Katia commercial crops, 2018, farmers conducted muga silkworm rearing, brushed 93914 nos. of mugadfls, produced 5496549 commercial cocoons and produced 1099 kg raw silk. During Aherua&Bhadia seed crops, 29 farmers conducted muga silkworm rearing, brushed 7590 nos. of mugadfls, produced 301416 cocoons. During Katia commercial crops, 82 farmers conducted muga silkworm rearing, brushed 61370 nos. of mugadfls, produced 3786505 cocoons and produced 757.30 kgs of muga raw silk.
- In case of Eri SMVs, during spring crop, 300 farmers conducted eri silkworm rearing, brushed 12520 nos. of eridfls, and produced 1051 kg raw silk. During summer crop, 300 farmers conducted eri silkworm rearing, brushed 12940 nos. of eridfls, and produced 1001 kg raw silk. During autumn crop, 300 farmers conducted eri silkworm rearing, brushed 13196 nos. of eridfls, and produced 1124 kg raw silk.

Publications of the institute

During 2018-19, CMER&TI published 6 research papers in National and international peer reviewed journals, 17 conference/workshop papers, 7 technical leaflets/bulletin, 2 News Letters, 2 Hindi Newsletter, 1 book, 2 Magazines and the Annual Report of the institute for 2018-19.

Other Activities

- Guest Lectures from different institutes / organizations viz. Assam Agricultural University, Jorhat, Assam; Rain Forest Research Institute, Jorhat, Assam; RSRs, Jorhat; NSSO, Bengaluru; Deakin University, Australia was organized in the institute where 172 scientists / scholars participated.

- National Science Day has been organized under the Advanced Level Institutional Biotech Hub on 28th Feb' 2019 at the institute. In connection with it, a scientific talk and a quiz competition has been organized among school students and accordingly cash awards has been presented in the valedictory function.
 - Swachha Bharat Abhiyan, Swachha Hi Sewa, SwachhataPakhwada' World Environment Day, International Yoga Day, World Science Day, World Soil Day, International Women's Day etc. were celebrated by the institute.
 - Four scientists of the institute participated in invited Radio Talks on "Muga silkworm host plants and rearing" and "Enhancement of income of farmers by muga silkworm rearing" during the year.
-

अनुसंधान में प्राप्ति उपलब्धियां का मुख्यांश 2018-19

केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान, लाहदोईगड़, जोरहाट के साथ जुड़े क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, बोको तथा क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, इम्फाल के अतिरिक्त लखीमपुर (असम), कोचबिहार (पश्चिम बंगाल) तथा फतेहपुर (उत्तर प्रदेश) स्थित अनुसंधान विस्तार केन्द्रों जो इस उद्योगों के विकास में मूगा और एरी क्षेत्रों के अनुसंधान और विकास के संबंध में सहायता करते हैं।

अनुसंधान में प्रमुख उपलब्धियां:

- 2018-19 के दौरान संस्थान में 30 अनुसंधान परियोजनाएं कार्यान्वित की गई थीं। इन में से डी.बी.टी. वित्त पोषित 3 परियोजनाएं, डी.एस.टी. वित्त पोषित 3 परियोजनाएं, एन.ई.आर.टी.पी.एस. वित्त पोषित 1 परियोजना तथा शेष केन्द्रीय रेशम बोर्ड वित्त पोषित 23 परियोजनाएं थीं तथा इनमें से पाँच परियोजनाएं पूरी हो चुकी हैं तथा 3 नई परियोजनाएं की शुरुआत हुई हैं और शेष 17 परियोजनाएं पिछले वर्ष से जारी हैं। सभी अनुसंधान परियोजनाएं को पर्यावरणीय चुनौतियां और ग्लोबल वार्मिंग, कठोर व उबाऊ काम का घटाव, महिलाओं के अनुकूल प्रौद्योगिकियाँ, निवेश लागत की कटौती, पर्यावरण के अनुकूल और जैविक खेती आदि में विभाजित किया गया है। इसके अलावा, संस्थान तथा कृषक स्तर पर 1 नियमित कार्यक्रम कार्यान्वित किया गया। वर्ष के दौरान क्रियान्वयन किए गए शोध कार्यों का एक संक्षिप्त व्यौरा (मुख्यांश) नीचे दर्शाया गया है।

खाद्य पौधा सुधार, उत्पादन और संरक्षण

- मूगा रेशम कीट के सबसे पसंदीदा सोम पौधे के पादप रसायनिक घटकों के मूल्यांकन के लिए, और सोम विवरणक के अनुसार एक व्यापक पोषक तत्व प्रबंधन पैकेज 19 रूपात्मक मापदंडों को विकसित करने के लिए दर्ज किया गया है। पत्ती की आद्रता प्रोटीन, प्रमुख और सूक्ष्म पोषक तत्व और पत्तियों की फिनोल सामग्री को पिछले सभी मौसमों के लिए अलग कर दिया गया है।
- संस्थान द्वारा असम, नागालैंड, मणिपुर, मेघालय, मिजोरम और अरुणाचल प्रदेश से कुल 366 मिट्टी के नमूने एकत्र किए गए तथा उनमें से 306 नमूनों का विश्लेषण किया गया है। 608 व्यक्तिगत किसानों का मृदा स्वास्थ्य कार्ड (SHCs) विकसित किए गए। असम के 244 किसानों का मृदा स्वास्थ्य कार्ड (SHCs) संबंधी डिजिटलीकरण पूरा कर लिया गया।
- क्षेत्रीय रेशम उत्पादन केन्द्र, इम्फाल द्वारा 13 मापदंडों (पीएच, ईसी, ओसी, उपलब्ध एन, पी, के, एस, जेडएन, एफए, क्यूई, एमएन, बी एंड एलआर) के 984 मिट्टी के नमूनों का विश्लेषण किया गया जिसमें भिन्न-भिन्न स्थानों के 1339 किसानों को शामिल किए गए अर्थात् (मणिपुर के 1221 किसानों के 866 नमूने तथा मेघालय के 118 किसानों के 118 नमूने)। उन में से 1261 मृदा स्वास्थ्य कार्ड (इम्फाल वेस्ट -137, इम्फाल पूर्वी -336, विष्णुपुर- 243, उखरुल -108, थौबल- 312, चूरचानपुर -3, चंदेल -4, मेघालय- 118) वितरित किए गए।
- वर्ष के दौरान 99870 मूगा खाद्य पौधे उगाए गए तथा 24508 पौधे आपूर्ति किए गए तथा 8000 एरी पौधे उगाए गए तथा विभिन्न कार्यक्रमों के दौरान किसानों को 7000 पौधे आपूर्ति किए गए तथा इसके अतिरिक्त कृषकों के स्तर पर 5 एकड़ भूमि में सोम पौधे रोपण भी किया गया।

- जीवाणुरोधी जीवाणुओं को पृथक कर एरंड रेज़ोस्फोर्सेस से पहचान की गई जो एरंड के अल्टरनेरिया ब्लाइट के लिए उत्कृष्ट है। बैक्टीरिया विरोधी के जैव रासायनिक आणविक लक्षण का काम पूरा किया गया।

रेशमकीट सुधार, उत्पादन और संरक्षण

- अन्य सेरिजीनस कीटों की तुलना में मूगा रेशम कीटाणु *माइटोकाँड्रियल जीन* को क्रमबद्ध करते हुए इसका मानचित्र बनाकर प्रकाशित किया गया। पूरे जीनोम का विश्लेषण का काम पूरा किया चुका है।
- मूगा रेशम कीट के दो अधिक उत्पादन देनेवाले प्रजातियाँ अर्थात् सीएमआर-1 और सीएमआर-2 को गुणन कर उसे संस्थागत, राज्य फार्म, क्षेत्रीय रेशम उत्पादन केन्द्र और निजी किसानों के खेत में इसका निष्पादन का मूल्यांकन किया गया। वर्ष के दौरान विभिन्न प्रक्षेत्रों में सी एम आर-1 के 4966 रोग मुक्त चकते तथा सी एम आर-2 के 6590 रोग मुक्त चकते कीटपालन करने पर 55-60 प्रतिशत ई आर आर प्राप्त हुआ है।

- सेरीकोजेनस कीटों की रेशम जैव विविधता का आकलन करने के लिए नागालैंड के सात अलग-अलग जिलों में सर्वेक्षण किया गया। अध्ययन की अवधि के दौरान नागालैंड के सात जिलों से 8 रेशम पुश्त से संबंधित वन्य रेशम शलभ की 14 प्रजातियों को एकत्र किया गया। इस प्राणी समूह में *एन्टीरिया* की चार प्रजातियाँ

अर्थात् आसामानिस्, रायली, प्रोयली, फ्रिथी; एक्टियास की दो प्रजातियाँ अर्थात् सेलेन और रोडोपनेमा; सामिया की दो प्रजातियाँ अर्थात् कैनिंगी और रिसिनी; लोपा की दो प्रजातियाँ अर्थात् कटिका और सिकिमा तथा अटाकस एटलस, अर्चियोआटेसस एडवर्ड्स, क्रिकुला ट्राइफेनेस्ट्रेटा और सोंथनो एक्सियामाएनास आदि की एक-एक प्रजाति से गठित हुआ। सभी प्रजातियों का रूपात्मक लक्षण वर्णन का कार्य पूरा किया गया।

- लेपिडोप्टेरान कैटरपिलर से मूगा रेशमकीट (*एन्थीरिया आसामानिस हेल्कर*) में पेब्राइन बीजाणुओं के संचरण की जांच करने के लिए मूगा कीट पालन क्षेत्रों से 30 कैटरपिलर प्रजातियाँ एकत्रित किया गया। इन प्रजातियों में से 20 प्रजातियों में पेब्राइन संचरण बीजाणु पाया गया।
- मूगा रेशमकीट फ्लैकेरी रोग से जुड़े *पैथोबार्मी* की पहचान कर उसे तुलनात्मक *जीनोमिक्स* अध्ययनों के साथ स्थापित किया गया। मूगा रेशमकीट मिडगुट में रोगजनक और हानिकर रोगजनक बैक्टीरिया का वितरण उच्च अनुक्रमण विश्लेषण के साथ किया गया तथा रोगजनक बैक्टीरिया का पीसीआर प्रवर्धन कार्य पूरा किया गया।
- फ्लैकेरी रोग की आपतन को कम करने के लिए एक नया रासायनिक सूत्रीकरण विकसित कर नव विकसित सूत्रीकरण के साथ प्रक्षेत्र कीटाणुशोधन अध्ययनों को संचालित किया गया जिसमें कीटाणुनाशक के विट्रो मूल्यांकन के तहत ई आर आर में वृद्धि 22 प्रतिशत को प्रदर्शित किया गया।
- मूगा रेशमकीट के अंडों के भ्रूण पृथक करण की दो पद्धतियाँ का मानकित किया गया। गर्म पानी की विधि प्रारंभिक है जो मध्य भ्रूण चरणों के लिए यह विधि उपयुक्त पाई गई है जबकि मध्य और बिलम्ब भ्रूण चरण के लिए *के ओ एच* विधि उपयुक्त है।
- संस्थान द्वारा प्रशिक्षित उद्यमियों द्वारा उपयोग किए जानेवाले उपचारित बांस के 2000 एरी कोलैप्सेबल माउंटेन प्रस्तुत किया गया और इन्हें असम और नागालैंड के विभिन्न स्थानों के किसानों/लाभार्थियों के बीच वितरित किया गया।

- मूगा और अन्य वन्य रेशम कीट के संरक्षण के लिए दोनों स्थानों के स्थानीय लोगों के बीच जागरूकता कार्यक्रम आयोजित किया गया। मौसम संबंधी मानकों का दर्ज करने के लिए वहां मौसम केंद्र स्थापित किया गया। संरक्षण के लिए दोनों स्थलों में मूगा रेशम कीट छोड़े गए।
- मूगा रेशम कीट पालन में पीड़क कीटों को नियंत्रण में उपयोग करने के लिए एलईडी सोलर जाल (ट्रैप) विकसित किया गया है। मूगा रेशम कीट उत्पीड़न करनेवाले उजी मक्खी को आकर्षित करने के लिए चारा के साथ एक सौर ट्रैप बहुत उपयोगी पाया गया है। इस संबंध में गोलाघाट जिले के राज्यात्मक रेशम उत्पादन फार्म में, लखीमपुर, ढकुवाखाना, शिवसागर, कलियाबर और पासीघाट (अरुणाचल प्रदेश) के मूगा कृषकों को एल ई डी लाइट ट्रैप वाला उपकरण प्रदर्शित कर किसानों को जागरूकता लाया गया।
- ओक तसर रेशमकीट में टाइगर बैंड रोगपैदा करने वाले वायरस का रूपात्मक लक्षण वर्णन स्कैनिंग इलेक्ट्रॉन माइक्रोस्कोप (SEM) के माध्यम से किया गया। जीनोमिक डीएनए को अलग कर इसे पीसीआर प्रवर्धन के लिए उपयोग किया गया। पीसीआर उत्पादों का क्लोन और अनुक्रम किया गया है और इसका परिणाम दर्शाता है कि टाइगरबैंड रोग वायरस न्यूक्लोपोलीहाइड्रो वायरस (समूह-I) का एक अल्फाबाकुलो वायरस है जो एन्थीरिया पार्मि को उत्पीड़न करनेवाला एन पी बी के साथ निकटम सादृश्यता है।
- एरी रेशमकीट के दो नए संयोजन YP X GBZ (कवच भार 0.53 ग्राम; बहुप्रजता 352) और GBS X GBZ (कवच भार 0.55 ग्राम; बहुप्रजता 355) विकसित किए गए जो मौजूदा वाणिज्यिक नस्लों से बेहतर पाए गए हैं।
- बायोसर्फैक्टेंट उत्पादन करने वाले बैक्टीरिया अर्थात् बेसिलस एसपी., एंटरोकोकस एसपी., *स्यूडोमोनास एसपी.*, *स्टैफिलोकोकस एसपी.* और *सेराटिया एसपी.* की पहचान की गई जो ऊपरी असम में तेल उत्पादन क्षेत्रों के पास हाइड्रोकार्बन दूषित मिट्टी से अलग कर दिए गए। तेल प्रदूषित क्षेत्रों से मिट्टी के नमूनों से बैक्टीरिया उत्पादन होनेवाले बायोसर्फैक्टेंट को अलग कर 16S rRNA PCR प्रवर्धन और शुद्धिकरण किया गया।
- कीटनाशक स्प्रे के प्रयोग से मूगा खेती में होनेवाली संभावित क्षति का निर्धारण के संबंध में ऊपरी असम के कुछ जिलों में संभानीय मूगा रेशम क्षेत्रों का सर्वेक्षण किया। आमतौर पर प्रयोग किए जाने वाले कीटनाशक दवाएं की विषाक्तता के स्तर का आकलन करने हेतु उसकी जांच की गई। अनैतिक रूप से कीटनाशकों के उपयोग से होनेवाले हानिकारक प्रभाव को दर्शाने के संबंध में जागरूकता परकई कार्यक्रमों आयोजित किए गए।
- परभक्षी मत्कुण अर्थात् *साइकोनस कॉलरिस फैब.* और *ई. फरसेलटा* की जनसंख्या गतिशीलता, जीव विज्ञान, तथा *ई. फरसेलटा* का जीवन चक्र के अध्ययनार्थ मूगा कीटपालन क्षेत्रों में क्षेत्र सर्वेक्षण कर इसका अध्ययन किया गया है।
- मूगा खाद्य पौधों और इसके रेशम कीटों में पीड़क का आक्रमण तथा रोगों आक्रान्त के बारे में पूर्वानुमान और पूर्वसूचना प्रणाली के विकास करने के लिए असम के डिब्रूगढ़, गोलाघाट, जोरहाट, शिवसागर, उत्तर लखीमपुर, कामरूप और ग्यालपारा जिलों और पश्चिम बंगाल के जलपाईगुड़ी और कोचबिहार में सर्वेक्षण कर इसका डेटा एकत्रित किया गया।
- भू-स्थानिक तकनीक के साथ चयनित मूगा रेशम कीट में रोगों और कीटों की प्रारंभिक चेतावनी के लिए निर्णय समर्थन करनेवाली प्रणाली के विकास के लिए विभिन्न स्थानों पर मूगा रेशम कीटों में रोग आक्रान्त और कीटपालन निष्पादन का दर्ज किया गया। उमलिंग ब्लॉक, नागपो में उपलब्ध मूगा फार्म की ढलान, इसका पहलू, मिट्टी संबंधी जानकारी और अन्य भूमि उपयोग का तरीका तथा जीपीएस स्थानों की आधारित सूचना पूरी की गई। मौसम विज्ञान संबंधी उपकरण जगदुवार, जोरहाट में स्थापित किया गया। कीटपालन और ऐतिहासिक मौसम विज्ञान संबंधी आंकड़े

बोको, तुरा और जगदुआर से एकत्रित किया गया। राज्यिक तथा केन्द्रीय मूगा रेशम बोर्ड के फार्म में यूएवी मक्खी की लैडस्केप तस्वीरें ली गई।

- मूगा और एरी रेशम के कीट पालन में किसी प्रकार का हानिकारक प्रभाव पड़े बिना मानकित बांस उपचार प्रक्रिया का उपयोग किया जा सकता है। बांस के उपचार पर 20 उद्यमियों को प्रशिक्षित किया गया था। 2500 स्ट्रिप प्रकार के बांधने योग्य माउंटेज और 200 उपचारित बांस की चालनियां लखीमपुर, डिमापुर, जोरहाट, मरिगांव, शिवसागर, गोलाघाट, डिब्रूगढ़, नागांव, और उदलगुरी के लाभार्थियों को वितरित किया गया। रेशम उत्पादन विभाग, नागालैंड, लखीमपुर, टकोबारी, जोरहाट, बगागांव, तितबर और नेली में 650 से अधिक किसानों को शामिल करते हुए उपचारित बांस को लोकप्रिय बनाने के लिए 6 प्रदर्शनी सह जागरूक कार्यक्रम आयोजित किए गए।
- संस्थान, रेशम उत्पादन विभागों तथा कृषक के प्रक्षेत्र स्तर पर मूगा संवर्धन पर देशज तकनीकी ज्ञान (ITK) को मान्य किया गया। मूगा संवर्धन में सिफारिश किए गए विकसित अनुप्रयोग के साथ किए एकीकरण पर मूगा कोसा उत्पादन में दो प्रौद्योगिकियों में सकारात्मक प्रभाव पाया गया। देशज तकनीकी ज्ञान (ITK) तथा सिफारिश किए गए पैकेज के एकीकरण के तहत होने वाला उत्पादन औसत ईआरआर 66.2 प्रतिशत के साथ 71 कोसा/रो मु च दर्ज किया गया जबकि सिफारिश किए गए मौजूदा पैकेज के तहत ई आर आर 57.9 प्रतिशत के साथ 62 कोसा/रो मु च दर्ज किया गया। इस प्रकार सिफारिश मौजूदा अनुप्रयोग के साथ देशज तकनीकी ज्ञान (ITK) के तहत कृषकों के स्तर पर सिफारिश मौजूदा अनुप्रयोग के सापेक्ष 14.5 प्रतिशत कोसा उपज वृद्धि पायी गयी।
- अन्य सेरिजीनस कीटों की तुलना में मूगा रेशम कीटाणु *माइटोकाण्ड्रियल जीन* को क्रमबद्ध करते हुए इसका मानचित्र बनाकर प्रकाशित किया गया। पूरे जीनोम का विश्लेषण का काम पूरा किया चुका है।

भवन व प्रशिक्षण की क्षमता-

- प्रशिक्षितकुल व्यक्ति : प्रशिक्षण के लिए 2030 कृषकों को प्रशिक्षण प्रदान करने के लक्ष्य के सापेक्ष कुल 2302 कृषकों तथा उद्योग हितधारकों को प्रशिक्षित किया गया।
- 403 के लक्ष्य के सापेक्ष किसान कौशल प्रशिक्षण (सीबीटी)-375 कार्यक्रम आयोजित किए गए, प्रौद्योगिकी जागरूकता के संबंध में 175 लक्ष्य के सापेक्ष 177 एक्सपोजर यात्राएं शामिल की गई, के सापेक्ष 177; प्रौद्योगिकी अभिविन्यास प्रोग्राम मे 125; रेशम उत्पादन विभाग द्वारा प्रायोजित कौशल प्रशिक्षण-125 सदस्यों, एक्सपोजर यात्राएं: 177 किसान; प्रोजेक्ट इंटरनशिप- 30 आदि कार्यक्रमों आयोजित किए गए।
- डीबीटी, नई दिल्ली द्वारा वित्त पोषित संस्थागत बायोटेक हब को अपने निष्पादन (ग्रेडिंग) के आधार पर उन्नत स्तर पर विकसित किया गया है ताकि युवा पीढ़ी द्वारा सेरी-बायोटेक्नोलॉजी से संबंधित सभी सभी बुनियादी विकास, जागरूकता, प्रशिक्षण की सुविधा का लाभ उठा सकें।
- संस्थान द्वारा स्थापित 9 (एस आर सी) के तहत 900 लक्ष्य के सापेक्ष 1169 कृषकों व हिताधिकारियों को शामिल कर प्रशिक्षित किया गया है।
- संस्थान में 1 सितंबर, 2018 को “मूगा व एरी संवर्धन में इसके रेशम कीट तथा खाद्य पौधे के सुधार करने की समस्या, संभावनाएं तथा अवसरों की खोज” पर एक राष्ट्रीय स्तर पर मस्तिष्क मंथन कार्यशाला का आयोजन किया गया जिसमें विभिन्न संगठनों विश्वविद्यालयों से 116 वैज्ञानिक/विद्वान/छात्र-छात्राएं भाग लिया।

- संस्थान में दिनांक 30 नवंबर, 2018 को "हरी चाय के परिपूरक के रूप में शहतूत की पत्ति का उपयोग" पर एक राष्ट्रीय स्तर की कार्यशाला का आयोजन किया गया। उक्त कार्यक्रम में विभिन्न संगठनों/विश्वविद्यालयों से 74 वैज्ञानिकों/विद्वानों/छात्रों तथा चाय बागान मालिकों और प्रबंधकों ने भाग लिया।
- संस्थान में दिनांक 27 मार्च, 2018 से दिनांक 2 अप्रैल, 2018 तक डीबीटी, नई दिल्ली द्वारा प्रायोजित "सेरी-जैव प्रौद्योगिकी की तकनीक और प्रौद्योगिक" पर एक राष्ट्रीय स्तर की कार्यशाला सह प्रशिक्षण कार्यक्रम आयोजित किया गया जिसमें विभिन्न संगठनों/विश्वविद्यालयों से 40 वैज्ञानिकों/विद्वानों/छात्रों ने भाग लिया।
- संस्थान में दिनांक 3 से 6 अप्रैल, 2018 तक "मृदा स्वास्थ्य प्रबंधन" पर एक डीबीटी प्रायोजित कार्यशाला सह हैंड-ऑन प्रशिक्षण कार्यक्रम का आयोजन किया गया जिसमें विभिन्न संगठनों/विश्वविद्यालयों से 16 वैज्ञानिकों/विद्वानों/छात्रों और किसानों ने भाग लिया।
- क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, बोको में दिनांक 11 मार्च, 2019 को केन्द्रीय रेशम बोर्ड द्वारा प्रायोजित, "जलवायु परिवर्तन की चुनौतियों को पूरा करने के लिए मूंगा रेशम कीट फसल का पुनर्निर्धारण" पर एक राष्ट्रीय स्तर की कार्यशाला का आयोजन किया गया जहां विभिन्न संगठनों/विश्वविद्यालयों से 19 वैज्ञानिकों/विद्वानों/छात्रों ने भाग लिया।

प्रौद्योगिकी का स्थानांतरण

- वर्ष के दौरान संस्थान में पांच वन्य रेशम कृषिमेलाएं, 18 क्षेत्र दिवस, 18 किसान दिवस, 33 जागरूकता कार्यक्रम और 37 समूह चर्चाएँ, 11 प्रौद्योगिकी प्रदर्शन कार्यक्रमों आयोजित किए गए। इन कार्यक्रमों के जरिए पांच हजार से अधिक व्यक्तियों को सुग्राही बनाया गया। मूंगा और एरी की उन्नत और बेहतर प्रौद्योगिकियों के लिए 9 एसआरसी के तहत, 900 किसानों के लक्ष्य के विपरीत 1169 किसानों/लाभार्थियों को सुग्राही बनाया गया।
- काटिया वाणिज्यिक फसलों, 2018 के दौरान एस एम वी के तहत किसानों ने मूंगा रेशम कीट के पालन किया तथा 93914 मूंगा रोग मुक्त चकत्ते डिंभक-अंतरण करते हुए 5496549 वाणिज्यिक कोसा उत्पादन किया गया तथा 1099 कि. ग्रा. कच्चे रेशम का उत्पादन किया गया। अहेरुआ और भादिया बीज फसलों के दौरान 29 किसानों ने मूंगा रेशम कीट के पालन किया तथा 7590 मूंगा रोग मुक्त चकत्ते डिंभक-अंतरण करते हुए 301416 कोसा उत्पादन किया गया तथा 757.30 किलोग्राम मूंगा कच्चे रेशम का उत्पादन किया।
- एरी एस एम वी के मामले में, वसंत ऋतु की फसल के दौरान 300 किसानों ने एरी रेशम कीट के पालन किया तथा 12520 एरी रोग मुक्त चकत्ते डिंभक-अंतरण करते हुए 1051 किलो ग्राम कच्चे रेशम का उत्पादन किया। ग्रीष्म ऋतु की फसल के दौरान 300 किसानों ने एरी रेशम कीट के पालन किया तथा 12940 एरी रोग मुक्त चकत्ते का डिंभक-अंतरण करते हुए 1001 किलो ग्राम कच्चे रेशम का उत्पादन किया गया। शरद ऋतु की फसल के दौरान 300 किसानों ने एरी रेशम कीट के पालन किया गया तथा 13196 एरी रोग मुक्त चकत्ते का डिंभक-अंतरण करते हुए 1124 किलो ग्राम कच्चे रेशम का उत्पादन किया गया।

संस्थान का प्रकाशन:

2018-19 के दौरान केन्द्रीय मूंगा एरी अनुसंधान व प्रशिक्षण संस्थान ने राष्ट्रीय और अंतरराष्ट्रीय समकक्ष समीक्षित जर्नलों में 6 शोध पत्रों प्रकाशित किया। इसके अतिरिक्त संगोष्ठी/कार्यशाला में 17 शोध लेखों प्रकाशित किए गए तथा 7 तकनीकी पत्रक/बुलेटिन, 2 सीएमईआरटीआई समाचार पत्र, 2 हिंदी समाचार पत्र, हिन्दी में 6 लीफलेट्स, 1 पुस्तक, 2 पत्रिकाओं और द्विभाषी में वार्षिक रिपोर्ट का प्रकाशन किया गया।

अन्य गतिविधियां-

- संस्थान में आयोजित विभिन्न कार्यक्रमों में विभिन्न संस्थानों/ संगठनों अर्थात असम कृषि विश्वविद्यालय, जोरहाट, असम; वर्षा वन अनुसंधान संस्थान, जोरहाट, असम; क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, जोरहाट, एन.एस.एस.ओ., बेंगलुरु; डेकिन विश्वविद्यालय, ऑस्ट्रेलिया आदि विभिन्न संस्थानों/संगठनों के विशिष्ट व्यक्तियों द्वारा दिए गए अतिथि व्याख्यान तथा इन कार्यक्रमों के दौरान 172 वैज्ञानिकों/ विद्वानों ने भाग लिया।
- संस्थान में 28 फरवरी, 2019 को उन्नत स्तर के संस्थागत बायोटेक हब के तहत राष्ट्रीय विज्ञान दिवस का आयोजन किया गया। इसके संबंध में, स्कूली छात्र-छात्राओं के बीच वैज्ञानिक के साथ हुई चर्चा-परिचर्चा और एक प्रश्नोत्तरी प्रतियोगिता का आयोजन किया गया। समापन समारोह में विद्यार्थियों को नकद पुरस्कारों प्रदान किया गया।
- संस्थान द्वारा स्वच्छ भारत अभियान, स्वच्छ ही सेवा, स्वच्छता पखवाड़ा, विश्व पर्यावरण दिवस, अंतर्राष्ट्रीय योग दिवस, विश्व विज्ञान दिवस, विश्व मृदा दिवस, अंतर्राष्ट्रीय महिला दिवस आदि मनाया गया।
- वर्ष के दौरान संस्थान के चार वैज्ञानिकों ने "मूगा रेशम कीट खाद्य पौधों और इसका पालन" और "मूगा रेशम कीट पालन द्वारा किसानों की आय में वृद्धि" पर रेडियो द्वारा आमंत्रित चर्चा में भाग लिया।

.....

FINANCIAL TARGET AND EXPENDITURE

(Rupees in lakhs)

Consolidated Provision									
Particulars	Budget provision 2018-19			Expenditure 2018-19			Proposed budget 2019-20		
	Recurring GIA-31	Capital asset GIA-35	Total	Recurring GIA-31	Capital asset GIA-35	Total	Recurring GIA-31	Capital asset GIA-35	Total
Plan / NE Salary	2091.29	-	2091.29	2091.29	-	2091.29	2261.00	0.00	2261.00
Normal- Plan	55.00	-	55.00	55.00	-	55.00	-	-	-
NE-Plan	262.25	60.50	322.75	262.25	60.50	322.75	317.00	103.00	420.00
Grand Total	2408.54	60.50	2469.04	2408.54	60.50	2469.04	2578.00	103.00	2681.00

RESULTS FRAMEWORK DOCUMENTS (RFD) - (2018-19)

#	Objectives	Wt.	#	Actions	#	Success Indicator	Unit	Relative wt.	Annual Target	Cumulative achievement
1	Conduct scientific, technical and economic research to enhance production, productivity and quality of Indian silk.	14	1	Undertaking Research projects to enhance quality and productivity. (Research Projects-coded by CO)	i	Total on- going Projects	Number	1	24	27 ^a (26+1)
					ii	Projects Concluded (out of total 24 projects)	Number	1	6	5 ^b
					iii	New Projects taken up	Number	2	4	2 ^b
					iv	New Projects taken up at RSRS/REC (s)	Number	2	1	1 ^b
					v	No of Technologies / innovations developed /likely to be developed (out of concluded projects).	Number	2	2	2 ^b
					vi	New Technologies for field testing	Number	2	2	2 ^a
			2	Mechanization of sericulture industry	i	Equipment/ machines newly developed for sericulture mechanization	Number	2	1	0 ^a
					ii	Machines / equipment absorbed in the field	Number	2	1	1 ^a
2	Commercialization of products and Technologies	4	3	Sericulture technologies including chemical taken up for commercialization / patenting	i	Technologies commercialized / popularized	Number	2	2	2 ^a
					ii	Technologies applied for patenting	Number	2	1	2 ^b

3	IT Initiatives	9	4	Development of data base and technology under IT initiatives	i	No. of Farmers database created for m-Kisan Portal	Number	1	200	200 ^b
					ii	No. of Messages up-loaded in M-Kisan Portal	Number	1	60	104 ^b
					iii	Database of farmers of Sericulture Resource Centre	Farmers	2	400	430 ^b
					iv	No. of Research Projects uploaded for E-Monitoring	Nos.	2	2	2 ^b
					v	Preparation of Soil Health Cards	Number	3	400	596 ^b
		6	5	Implementation of DBT	i	% of implementation of Direct Benefit Transfer (DBT)	%	3	100	100 ^c
					ii	Submission of DCB arrears	%	2	100	100 ^c
4	Field level Interventions for Quality and productivity Improvement through Information, Education and Communication and Capacity Building	23	6	Interventions through main Institutes level	i	Number of Seri-model Villages covered	Number	1	9	9 ^a
					ii	No. of farmers adopted	No.	1	800	862 ^a
					iii	Expected raw silk Output	MT	1	5	8.5 ^b
		7	Large scale trial of new technologies developed by the Institute	i	Collapsible Mountages for Eri spinning	No. of farmers	2	2000	2500 ^b	
				ii	Large scale trial of CMR1 & CMR2	Dfls	2	5000	5979 ^b	
		8	Interventions through RSRS / REC level	i	Number of Blocks/ Districts adopted	Number	1	12	16 ^a	
				ii	No of farmers covered in different programmes	Number	1	2000	2756 ^b	
				iii	Raw silk Output	MT	1	5	6.1 ^b	
		9	Adoption of SwachhaResham Gram	i	No of villages covered	Number	2	2	2 ^a	
				ii	Nos. of farmers / villagers	Number	2	200	210 ^a	

						covered				
			10	100 % Adoption of Technologies amongst different stake holders	i	Number of farmers covers under 100% adoption of technology	Number	2	1200	1526 ^a
			11	Extension communication programmes viz., Group discussion, Awareness programme, Field days, Krishi Melas etc.	i	No of programmes conducted	Number	1	120	154 ^b
					ii	No of farmers covered	Number	2	6000	6301 ^b
					iii	Post programme follow up	%	1	70	70 ^c
					iv	Participation in Radio Programm	Number	1	4	5 ^b
					v	Participation in TV Programme	Number	1	4	3 ^b
					vi	No of Success stories prepared and publication under various aspects	Number	1	7	9 ^b
5	Knowledge generation and publication materials	6	12	Publication materials	i	Number of papers / popular articles published in journals	Number	3	20	24 ^b
					ii	Publication of Books/ leaflets / booklets etc.	Number	2	10	12 ^b
					vii	Video clips on all the popular technologies of the Institute	Number	1	5	8 ^b
6	Training and Skill development	5	13	Skill Development	i	Beneficiaries trained under structured programmes, need based programme etc.	Farmers / benefici aries	1	4000	3656 ^b
					ii	Training to in-house scientists / officials for skill upgradation	Number	1	6	6 ^b
			14	Development of improved silkworm breed	i	Development of new silkworm breed	No.	2	1	2 ^b
					ii	Multi-locational trials of improved breed	No. of Dfl	1	500	1948 ^b

7	Revenue Generation	4	15	Generation of funds as per XII Plan guidelines	i	Revenue generation through commercialization of Technology	Rs. In lakh	2	4.00	2.4886 ^b
					ii	Revenue generation through other methods	Rs. in lakh	2	36.00	36.00 ^b
8	Strengthening institutional framework to support ongoing research and related programmes	8	16	Utilization of existing land holdings	i	Effective utilization of cultivable land for assigned mandates	Acres	2	50	50 ^a
			17	Utilization of service buildings (laboratory, rearing house, grainages, staff quarters, hostels, guest house etc)	i	Extent of utilization of facilities for the core purpose of assigned mandates	%	1	90	90 ^c
			18	Optimum utilization of manpower	i	Utilization of scientific manpower for research activities	%	1	100	100 ^c
			19	Effective Monitoring of Civil Works	i	Monitoring of progress of construction works at Institute & sub-units	%	1	100	100 ^c
					ii	Submission of UCs	%	1	100	100 ^c
			20	Utilization of Grants	i	Financial Expenditure as per allotment	Rs. in Crore	2	23.00	24.59 ^b
9	Collaborative Research Programmes with other R&D organizations in India and abroad	2	21	Identifying potential R&D institutes in India and abroad and undertakes collaborative research programmes for the benefit of both the countries.	i	Projects taken up for collaborative research	No.	2	4	7 ^a

Mandatory Success Indicators										
10	Efficient functioning of RFD system	2	22	Timely submission of draft RFD for 2018-19	i	On time submission	Date	1	10/06/18	10.06.2018
			23	Timely submission of results of 2018-19	i	On time submission	Date	1	01/5/2019	09.04.2019
11	Administrative Reform	14	24	Implement mitigating strategies for reducing potential risk of corruption	i	% of implementation	%	1	100	100 ^c
			25	Implementation of Rajbhasha		% of implementation	%	1	100	100 ^c
			26	Swachha Bharat Abhiyan	i	% of implementation	%	3	100	100 ^c
			27	Submission of Annual Accounts to CSB	i	Date of submission of Annual Accounts to CO	date	1	30/04/19	30.04.2019
			28	Recovery of DCB arrears	i	DCB Arrears recovered	%	3	100	100 ^c
			29	Biometric Attendance	i	Units functioning under the Institute	Nos.	1	5	5 ^a
					ii	Units covered under Aadhaar based Biometric attendance (based on internet availability)	%	2	90	90 ^c
12	Improving internal efficiency / responsive- ness / service delivery of the organization	2	30	Implementation of Sevottam	i	Independent audit of implementation of Citizen's charter	%	1	100	100 ^c
					ii	Independent audit of implementation of public grievances redressal system	%	1	100	100 ^c

1 3	Ensuring compliance of the Financial Accountability Framework	2	31	Timely submission of ATNs on Audit paras of AG & Internal Audit	i	Percentage of ATNs submitted with in due date (4 months) from date of presentation of report	%	0.5	100	100 ^c
			32	Timely submission of ATRs to AG & CSB, HQ.	i	Percentage of ATRs submitted within due date (6 months) from date of presentation of report	%	0.5	100	100 ^c
			33	Early disposal of pending ATNs on Audit paras of AG reports.	i	Percentage of outstanding ATNs disposed off during the year	%	0.5	100	100 ^c
			34	Early disposal of pending ATRs on AG reports.	i	Percentage of outstanding ATRs disposed off during the year	%	0.5	100	100 ^c
		100						100		

a= Maximum of all quarter, b= Total of all quarter, c= average of all quarter

LIST OF R&D PROJECTS

CONCLUDED PROJECTS

Sl. No	Code	Title	Duration	Principal Investigator	Co-Investigator
1	AIT 5872	Whole Genome Sequencing and functional genomics of Golden Silk Moth <i>Antheraea assamensis</i> (In collaboration with SBRL).	Nov., 2015 to March, 2019	Dr. K. Neog	Dr. D. K. Gogoi
2	APR 5882	Validation of Indigenous Technical Knowledge (ITK) associated in muga culture.	Sept., 2016 to March., 2019	Sri. D. Mech	Dr. R. Das Sri Vijay N
3	ARP 5888	Standardization & Popularization of Treated Bamboo Products in Ericulture (Collaboration with Rain Forest Research Institute, ICFRE, Jorhat and NABARD, Jorhat)	Mar 2016 to Feb., 2019	Dr. D. K. Jigyasu	Dr. M. C. Sarmah

ONGOING PROJECTS

Sl. No.	Code	Title	Duration	Principal Investigator	Co-Investigators
1.	MOE 5873	Enhancement of rural economy through technology intervention for sustainable muga culture in Upper Brahmaputra Valley of Assam	April, 2016 to Aug., 2019	Dr. R. Das	Dr. M. Chutia Sri. D. Mech
2.	ARP 5874	Development of Decision Support System for early warning of selected muga silkworm diseases & pests with geospatial technique. [In collaboration with NESAC]	April, 2016 to Sept, 2019	Dr. D. K. Gogoi	Dr. R. Das Dr. G. Subramanyam
3.	MOE 5875	Effect of plant protection formulations on the growth, development and productivity of Muga Silkworm, <i>Antheraea assamensis</i> Helfer (Saturniidae: Lepidoptera).	April, 2016 to Sept., 2019	Dr. K. Neog	Dr. Kh. Subadas Singh
4.	AIT 5876	Establishment of Institutional Biotech Hub.	Feb, 2014 to Nov., 2020	Dr. M. Chutia	Dr. R. Das
5.	APR 5877	Role of hormesis in mitigating oxidative stress and its impact on growth and yield of Muga silkworm,	Sept., 2016 to Aug, 2019	Dr. P Sangannavar	Dr. D. K. Gogoi

		<i>Antheraea assamensis</i> Helfer.			
6.	ARP 5878	Development of technology for controlling bacterial flacherie disease in Muga silkworm.	Sept, 2016 to Aug., 2019	Dr. G. Subramanyam	Dr. R. Das Dr. M. Chutia Dr. R. Debnath
7.	PPA 5879	Assessment of phytochemical diversity in Som (<i>Persea bombycina</i> Kost), the primary host plant of <i>Antheraea assamensis</i> Helfer from Northeast India.	Sept., 2016 to Aug., 2019	Dr. P Sangannavar	Dr. R. Das Dr. D. K. Gogoi
8.	PRP 5880	Characterization and efficacy of bacterial antagonists against <i>Alternaria ricini</i> infecting Castor in North-eastern India.	Sept. 2016 to Aug., 2019	Dr. M. Chutia	Sri. Vijay N Dr. R. Das
9.	PPS 5884	Soil health cards for sericulture farmers of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh and Sikkim.	Sept., 2016 to Aug., 2019	Dr. Vinoda kumar Naik	Dr. D. K. Jigyasu
10.	AIT 5885	Development of microbial biocatalyst by heterologous expression of <i>hpaC</i> & <i>soxABC</i> gene cluster in biosurfactant producing bacterium for effective desulfurization of dibenzothiophene	July, 2016 to June, 2019	Dr. G. Subramanyam	
11.	APR 5886	Improvement of Muga Cocoon yield through technology intervention and refinement of crop schedule in Terai region of W.B.	Dec., 2016 to Nov. 2019	Dr. N. Biswas	Sri. SAS Rahman
12.	ARP 5887	Isolation and characterization of lytic bacteriophages infecting bacterial pathogens of Muga silkworm <i>Antheraea assamensis</i> Helfer.	April, 2017 to March, 2020	Dr. M. Chutia	
13.	ARP 5889	Studies on the cross transmission of pebrine spores from lepidopteran caterpillars to Muga silkworm (<i>Antheraea assamensis</i> Helfer) and its control measures.	June, 2017 to May, 2020	Dr. Kh. Subadas Singh	Dr. M. Chutia
14.	APR 5890	Biodiversity assessment of wild silkmoths and rearing potentialities of muga (<i>Antheraea assamensis</i> Helfer) and eri silkworm (<i>Samia ricini</i>)	Feb, 2017 to Jan, 2020	Dr. K. Neog	

		Donovan) for sustainable development in Nagaland.			
15.	ARE 5891	Development of LED traps for controlling major insect pests and predators in muga ecosystem – Needs for organic muga silk production	July, 2017 to June, 2019	Dr.Kh. Subadas Singh	Sri. Vijay N
16.	APR 5892	Formulation of Semi-synthetic diet for rearing Muga silkworm, <i>Antheraea assamensis</i> Helfer".	Oct., 2017 to Sept., 2019	Dr. T James Keisa	Dr.Kh. Subadas Singh
17.	PPF 5893	Impact assessment of petroleum crude oil on muga silkworm and their host plants in Assam.	Oct., 2017 to Sept., 2019	Dr. D. K. Jigyasu	Dr.Kh. Subadas Singh Dr.K.Neog
18.	AIB 5894	<i>In-situ</i> conservation of muga and other wild silk moths in Natural Habitat (In collaboration with R.O., CSB, Guwahati and Directorates of Sericulture, Assam, Meghalaya, BTC, Arunachal Pradesh).	April, 2016 to March, 2019	Dr. P. Sangannavar	Dr. G. Subramanyam Dr.Kh. Subadas Singh
19.	AIP 5895	Biology, population dynamics and control of <i>Sycanus collaris</i> Fab. and <i>E. furcellata</i> Wolff (Insecta: Heteroptera)-potential predators of Muga silkworm	March, 2018 to Feb., 2020	Dr.Kh. Subadas Singh	Dr. D. K. Jigyasu
20.	ARE 4726	Bio-ecology, economic injury level and management of insect pest infesting oak ecosystem.	June, 2017 to May, 2020	Dr. S. Subharani Devi	Dr. Y. Debaraj Dr. R Sur Chaudhuri
21.	ARP 3606	Development of a diagnostic tool for early detection of baculovirus causing Tiger band disease in <i>Antheraea proylei</i> .	Mar., 2017 to Feb., 2020	Dr. S. Subharani Devi	Dr.N.Ibotombi Singh
22	APS05 001EF	Development of technology for enhancing egg laying in Vanya Silk moths by application of host plant volatiles. (collaboration with SSTL, Kodathi)	Mar., 2018 to Feb., 2021	Dr. K Noeg	Dr. P Sangannavar
23	APS05 002EF	Popularization and utilization of Foldscope for detection of pebrine disease (<i>Nosema assama</i>) in muga silkworm seed production areas .	May, 2018 to April, 2019	Dr.Rajal Debnath	
24	MOE 05003 EF	Socio-economic uplifting of farmers through adoption of improved technologies and skill development in Eri culture.	Nov., 2018 to Oct., 2021	Dr. H Barman	Sri. SAS Rehman

PROJECTS AS CO-I IN OTHER INSTITUTES					
1	PPS 3600	Soil health card preparation for mulberry growing soils in Eastern and North-eastern India.	April, 2017 to Oct., 2019	Dr. Y. Debaraj	Dr.Ritwika Sur Chaudhuri
2	ARP 3606	Development of a diagnostic tool for early detection of baculovirus causing Tiger band disease in <i>Antheraea pernyi</i> .	Mar., 2017 to Feb., 2020	Dr. S. Subharani Devi	Dr.N.Ibotombi Singh
3	APS 3612	Development of Seed Preservation Technology for Muga Silkworm <i>Antheraea assamensis</i> Helfer (In collaboration with SSTL, Kodathi).	June, 2017 to May, 2019	Dr. D. K. Gogoi	
REGULAR PROGRAMMES					
1	CMER TI-RP1	Forecasting and forewarning for pest and diseases of muga host plants and silkworms	Jan 2014 onwards	Dr. R Das, Dr. M Chutia, Dr. SAS Rahman	

.....

ACHIEVEMENTS IN R&D PROJECTS

CONCLUDED PROJECTS

Project Code: APR-5882

Project Title: Validation of Indigenous Technical Knowledge (ITK)- Associated in Muga Culture

Project Period : August 2016 to March 2019
 Funding Agency : CSB, Bengalore
 Total Budget : Rs. 12.25 lakhs
 Scientists involved : Sri D.Mech, PI
 Dr. Ranjana Das, CI
 Sri Vijay, N, CI

Objective

1. Scientific validation of the selected ITKs associated with *Muga* culture
2. Integration of the selected effective ITKs with the modern technology packages for enhancing the production and productivity of *Muga*
3. Assessment of Muga cocoon production through adoption of ITK hybridized modern technologies at farmers' field

Summary of the findings/achievements

1. Total 26 ITKs and beliefs associated in muga culture and commonly followed by the traditional muga farmers were documented through survey.
2. As per suggestion of RAC, following 6 ITKs namely early stage muga silkworm rearing at Dighlati plant (*Litsea salicifolia*), disinfection of appliances through smoke, spread tulsi (*Ocimum sanctum*) twigs over the layings, de-pairing of moths using smoke, burning at the rearing field and direct mode of brushing were selected for validation.
3. Validating the ITK, it has established that 'depairing of moths using smoke' is effective for self de-pairing of moths as well as fecundity

enhancement during muga silkworm seed production. Release of smoke generated by burning of thatch grass or paddy straw to the paired moths (after pairing of minimum 7-8 hours) for a period of 5-7 minutes, average self de-pairing was recorded to be higher (87.0%) than the normal practice (47.0%). Similarly, mean fecundity of winter and autumn seasons after exposing the moths in to smoke was observed significantly higher (168 nos) against normal practice (142 nos).

4. The ITK "early stage rearing at Dighlati plants (*Litsea salicifolia*)" was found effective for higher cocoon yield in muga culture. Average production of 69 cocoons/df with 55.3% ERR through early stage rearing at Dighlati plants against 52 cocoons/df with 43.5% ERR in recommended practice during Dec-Jan, Feb-Mar and Apr-May crop season was highly significant.
5. The ITKs namely *disinfection of appliances through smoke, spread tulsi twigs over the layings, burning at fields and direct mode of brushing* was not found significant for cocoon yield in muga culture.
6. Assessment of crop performance in integration of ITK (early stage silkworm rearing at dighlati plants) and recommended practices during Feb-Mar and Apr-May had shown significantly higher cocoon yield (average 71 cocoons/df with 57.0% ERR) compared to the cocoon yield of recommended practice alone (57 cocoons/df with 50.0% ERR)
7. Crop performance under integration ITK and recommended practices against existing recommended practice alone at farmers' field during Aug-Sep, Oct-Nov and Dec-Jan crops was found encouraging. Average production of 70 cocoons/df with 66.0% ERR under

integration of ITK with the existing recommended practice was highly significant against the production of 56 cocoons/dfls with 53.0% ERR in recommended practices alone. Thus, average cocoon yield under integration of ITK with the existing recommended practices was found to be increased by 25.0% with an increment of ERR by 24.5% over the existing recommended practice alone at farmers level.

.....

Project Code: ARP-5888

Project Title: Standardization and Popularization of Treated Bamboo Products in Ericulture

Project Period : March 2017 to Feb 2019
 Total Project Cost : 29.82 lakhs
 Funding agency : CSB, Bangalore
 Investigators : Dr. D. K. Jigyasu, PI
 : Shri R. K. Kalita, RFRI, CI
 : Dr. M. C. Sharma, CI

Objectives:

1. To utilize the existing standard treatment processes of bamboo and its products in Ericulture.
2. To study the impact of bamboo treatment on Eri silkworms.
3. Skill development and to develop entrepreneurship in value added bamboo products.
4. To popularize the value added treated bamboo products in Ericulture to make it for cost effective and remunerative.

Summary of the findings/achievements

Treatment process of bamboo has been standardized with 8% Boric Acid and Borax in 1.5:1 ratio. During the 10 days skill development training programme on treatment of bamboo species for the preparation of Seri-appliances, a total of 38

entrepreneurs were trained by RFRI, Jorhat in two batches. These trainees were prepared 2855 strip type collapsible mountages for Eri Silkculture and 690 treated bamboo Chaloni for MugaSilkculture under the supervision of CMER&TI Lahdoigarh&RFRI Jorhat. The unit cost of the bamboo mountages was finalized @ Rs. 450/- per mountages and Rs. 50/ per Chaloni by the competent authority of the institute. Around 2715 strip type collapsible mountages were distributed to the beneficiaries of Lakhimpur, Dimapur, Jorhat, Morigaon, Sivasagar, Golaghat, Dibrugarh, Nagaon, Tinsukia, Sonitpur and Udalguri, remaining 140 mountages were using by institute's farms. About of 500 treated bamboo chaloni distributed to DoS farms, CSB farms and beneficiaries under the different extension and transfer & technology programmes. During the period of project 15 numbers of demonstration and cum awareness programme conducted at DoS Nagaland, Lakhimpur, Tokobari, Jorhat, Bogagaon, Titabar, Morigaon and Nellie covering 756 farmers.

The results finding suggested that the treated bamboo made mountage is superior to the traditional jali i.e. benefit cost ration is 1:5.97. It is noticeable that the strip type collapsible mountage has lot of positive things and most significant advantage is that it can be utilized for rearing of Eri silkworm up to 3rd instar. Harvesting on strip type collapsible takes very less time i.e., 3-4 minutes required to harvest 300 cocoons against 30-35 minutes of traditional jail. Impact of treated bamboo products/appliances on Eri and Muga silkworms has no adverse effect and about 98.75% good cocoon of Eri can be harvested on strip type collapsible mountage.

Treatment and Grainage performance

Chemical preservative treatment is considered effective in relation to traditional methods of bamboo protection of bamboo. Further, the use of treated bamboo mountage was cost effective and sustainable in durability as the shelf life will be enhancing by 5-10 times than

traditional approaches. It is also help in judicious/sustainable use of bamboo resources, for example a single preservative treated bamboo pole saves 15-20 plants. The production of treated bamboo appliances helps to generation of employment. It is also help in developing entrepreneurship and enterprise in rural areas as well as large scale popularization and adoption of treated bamboo appliances in Eri growing region of the country, besides enhancing the economic level of farmers.



Cocoons harvesting from treated bamboo strip type collapsible mountage

Strip type collapsible mountage:

The collapsible strip type mountage is superior to traditional jail and other devices for the cocoon formation of Eri Silkworm which in terms of time requirement for harvesting, skill and gender

friendly for handling and used as a rearing tray also. The entire structure of this mountage is prepared by the treated bamboo. After placing the matured larva in the gaps the mountage has to cover with a paper. By pulling out the strips the cocoons can be harvested easily and about 98.75% good cocoon can be harvested. Same can be used a rearing tray after removing of strips. For the popularization of strip type collapsible mountage, 2715 numbers of were distributed to the beneficiaries.

Strip type collapsible mountagespecifications

- Size of the mountage is to maintained 90 cm × 60 cm (length × breadth).
- Size of side bar to make the mountage is to maintained 3.5 × 3.5 cm.
- Size of each strip is to be maintained 1 cm thickness and 3.5 cm breadth, fitted in grooves of side bar and which can be easily pulled out for cocoon harvesting.
- Gap between strips to be maintained at 3.5 cm.
- Backside of mountage is to be covered with treated bamboo net with sieve 1 cm² size.
- Capacity: 300 worms per device are sufficient for better result.

Importance of treated bamboo collapsible strip type mountage

- To prevent escape of mature larvae
- Uniform spinning of cocoons
- Less time requirement for harvesting
- Less space requirement for accommodation of mountages
- Durable and can be re-used after proper disinfection
- Dual uses; the treated bamboo strip type mountage has most significant advantage is that it can be utilized for rearing of Eri silkworm

up to 3rd instar. Additional, 25 dfl Eri silkworms can be brushed in a single tray also.

Economic aspects of Treated bamboo strip type collapsible mountage:

If untreated and non-durable bamboo is used, the decay is inevitably calling for loss and/or early replacement of material, sometimes with heavy labour charges. Untreated bamboo is attacked by insects and decay faster as compare to treated one, which is much costlier than the actual cost of bamboo itself. Therefore, use of untreated bamboo gives rise to maintenance problems and high annual costs.

For examples, average life of an untreated bamboo pole house thus may be considered not more than 7 years. Whereas, treatment cost (excluding equipment) including manpower is Rs. 25-30 for 15 ft length and 10-15 cm girth. Life of timber and bamboo after treatment enhances by five to ten folds and therefore the actual cost of bamboo and poles works out to be less than the cost of untreated bamboo and poles. Treatment with 8% BB will help increase service life of poles/bamboo and its products by 5 to 10 times. This means the cost of poles/bamboo can be decreased to one fifth to one tenth of original costs through treatment and the benefits are obvious.

The treated bamboo strip type mountage, box type mountage, cocoon cage and chalani need to be popularized continuously at large scale farmers level. The fact accords with observation during the awareness cum demonstration programmes, farmers demanding the treated bamboo strip type mountage at free of cost whereas they are not like to purchase. This project is mainly focus on Eri sericulture, whereas other bamboo appliances such as Box type mountage, cocoon cage, khorika etc. used in Muga sericulture also need treatment and popularization at farmer's level.

Project Code: AIT-5872

Project Title: Whole Genome Sequencing and functional genomics of Golden Silk Moth *Antheraea assamensis*

Project Period : Nov, 2015 to Oct, 2018
Funding Agency : CSB, Bangalore
Total Budget : 11.20 Lakhs
Project investigators : Dr. K. Neog, PI
: Dr. D.K. Gogoi, CI

Objectives

- To perform whole genome sequencing of prototype of *A. assamensis* and its assembly.
- To analyze transcriptome profile of specific larval tissues of *A. assamensis* after bacterial infection and control normal larvae.
- Identification of functional gene makers associated with silk quality from silk gland by RNA sequencing.

Summary of the findings/achievements

1. Whole genome sequence of muga silkworm has been completed, and is now being used for in-depth mining of genes involved in insect behavior, immune response, silk synthesis, sex determination, etc.
2. Sequencing of expressed transcriptome of several tissues at different developmental stages has been completed. Expression analysis of interesting candidate genes is going on for functional annotation of selected genes.
3. This study reports the alimentary canal, silk gland and residual body transcriptome of 5th instar larvae of *Antheraea assamensis* fed on *Persea bombycina* leaves.
4. Presence of putative silk gland factors 1 and 3, homothorax and extradenticle transcripts with

Lakhimpur: The historical data on disease incidence and weather parameters were collected from REC, Lakhimpur and were analysed.

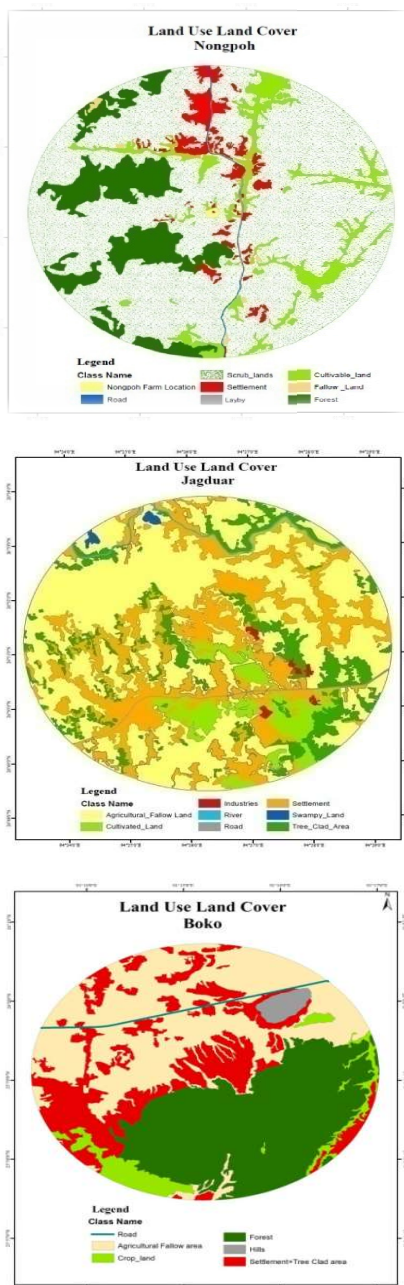


Fig 1: LULC map of Nongpoh, Fig 2: LULC map of Jagduar, Fig 3: LULC map of Boko

Satellite data analysis for landscape parameters:

- Classification of Land cover has been completed for Nongpoh, Boko and Jagduar taking 5 km buffer from the farm location.
- UAV was flown over Nongpoh farm (MSSO P3) and Jagduar farm to analyze the present condition of the farms during rearing season and also to analyze the landscape parameters.

.....

Project Code: MOE-5875

Project Title: Effect of plant protection formulations on the growth, development and productivity of Muga Silkworm, *Antheraea assamensis* Helfer (Saturniidae: Lepidoptera)

Project Period : April, 2016 to Aug 2019
 Funding Agency : CSB, Bangalore
 Total Budget : Rs. 15.95 lakhs.
 Scientists involved : Dr. Kartik Neog, PI
 Dr. Shubadas Singh, CI

Objectives

1. To study the effect of chemical pesticides / plant protection formulations on the growth and development of Muga Silkworm.
2. To study the effect of biopesticides / biocontrol agents on the growth, development and productivity of Muga Silkworm.
3. To develop suitable methodologies / procedures to reduce the effect of pesticides on muga silkworm.

Summary of the findings/achievements:

1. Field survey was conducted in Muga growing areas of Assam and it was observed that, spraying of insecticides in small as well as big tea gardens is generally done during April to September.
2. Muga silkworm from treated and control plots were collected. The samples were then processed for HPLC analysis. Samples were extracted with 1:1 mixture of dichloromethane and acetone, and the extracts are cleaned by

SPE using C₁₈ as stationary phase and methanol as mobile phase.

3. Laboratory study on the effect of commonly used insecticides of different groups on growth and development of Muga silkworm was conducted and it was found that among the insecticides, Insect can kill Muga silkworm (5th stage) within 2 hours at a very low dose.
4. Awareness programme was conducted among the Muga farmers, small tea growers, rice and vegetable growers to make aware the harmful effects of plant protection formulations on the Muga silkworm, on the human as well as on animal health, water and as a whole the whole ecosystem.
5. For categorization of the insecticides based on their toxicity level, rearing of muga silkworm rearing is under progress and experiments will be started when the worms enter 4-5th stages.

.....

Project Code: AIT 5876

Project Title: Establishment of Institutional Biotech Hub (2nd Phase)

Project Period : Oct., 2017 to March., 2020
 Funding Agency : DBT, New Delhi
 Total Budget : 69.68 lakhs
 Scientists involved : Dr. M. Chutia, PI
 Dr. Ranjana Das, CI

Objective

1. The institutional biotech hubs will be providing basic biotechnology infrastructure facility for the students, faculties and researchers of individual institutions as well as nearby institutions.

Summary of the findings/achievements

One training programme on 'Soil Health Management' was conducted under the financial and physical assistance of Advanced Level Institutional Biotech Hub among the research fellows and young faculty members of the host

institute and the nearby research institutes w. e. f., 03rd to 06th April, 2018. Fifteen candidates actively participated in the program and had fruitful interactions with the scientists and technical experts.

'World Environment Day' was conducted among the institute employees to create awareness on the deterioration of environmental health and the basic care to be undertaken to reduce such havoc. On the other hand, as part of the National Science Day' activities, a lecture session was conducted by one of the Entomologist's of the host institute among the school students for creating awareness on the different life cycles of eri, muga and mulberry silkworms. Further, a quiz competition was also conducted among the participants hosted by the Research Associate of the hub and presented with cash prizes and certificate of appreciation at the valedictory session. Altogether, three outreach programs have been conducted during the year at local schools and colleges for popularization of 'Basic science and its career prospects'.

Eight B.Sc students and one PGDS (Post graduate diploma in sericulture) student have successfully completed their dissertation works using the infrastructure facility of the Biotech Hub.

.....

Project Code: APR-5877

Project Title: Role of hormesis in mitigating oxidative stress and its impact on growth and yield of Muga silkworm *Antheraea assamensis* Helfer

Project Period : Sept 2016 to Aug, 2019
 Funding Agency : CSB Bangalore
 Total Budget : 7.85 Lakhs
 Investigators : Dr. Prashanth S, PI
 : Dr. Dip Kumar Gogoi, CI

Objectives

1. Study on the impact of hormetic effect of heat shock on growth and yield of muga silkworm
2. Understanding the levels of oxidative stress and antioxidants in muga silkworm

Summary of the findings/achievements:

Muga silkworms are invariably exposed to nature's vagaries besides pests, predators and pathogens. Crop loss has been observed in varied manner in different rearing crops. To address these issues hormesis phenomenon is proposed. Hormesis is a phenomenon where mild stresses enhance the metabolic activity of an organism and heat treatment is considered as one of the important hormesis factor. Hormesis was induced to understand its role in improving the functionality of Muga silkworm by mitigating intrinsic stress. Heat treatment imposed to muga silkworm in different rearing seasons like Jethua, Aherua, Kotia, Jarua and chatua crops. Hatching patterned improved from scattered to uniform in egg treatment compare to control across different seasons. Survivability % of young larvae after hatching improved across different seasons in heat treated experiment to control by 2 to 5 %. ERR along with shell ratio % improved across different seasons in heat treated experiments compare to control by 2 to 6%. Average fecundity improved across different rearing seasons in treatment compare to control by 8 to 12%. These results validate the role of hormesis induced improvement in the functional ability of Muga silkworm.

.....

Project Code: ARP 5878

Project Title: Development of a technology for controlling bacterial flacherie disease in Muga silkworm

Project Period : Sept 2016 to Aug 2019
Funding Agency : CSB, Bangalore

Total Budget : 20.95 Lakhs
Scientists involved : Dr. G. Subrahmanyam, PI
Dr. Rajal Debnath, CI
Dr. Ranjana Das, CI
Dr. M. Chutia, CI

Objectives

1. High throughput sequencing analysis of microbiome of flacherie infected muga silkworm.
2. Bioinformatics analysis and detection of causative bacterial pathogen responsible for flacherie disease in *Antheraeaassamensis*.
3. Establishing the bacterial pathogen and development of effective disease management practices.

Summary of the findings/achievements

1. Higher abundance of beneficiary gut microbiota such as *Alcanivorax*, *Oliebacter*, *Thalssospira*, *Citrobacter*, *Alteromonas*, *Enhydrobacter* were present in healthy muga silkworm midgut, while their numbers were decreased or disappeared in flacherie diseased Muga silkworms.
2. A new disinfectant formulation is developed and tested on bacterial pathogens in laboratory condition. Preliminary studies indicated that newly tested disinfectant had bacteriolytic activity on two potential muga silkworm pathogens *Pseudomonas* sp., and *Bacillus* sp.
3. Field evaluation has been tested in Aherua, Bhadia, Kotia, Jarua crops and results showed that treatment had significantly enhanced the effective rate of rearing by 15-20%.

.....

Project Code: PPA-5879

Project Title: Assessment of phytochemical diversity in Som (*Perseabombycina*Kost), the primary host plant of *Antheraeaassamensis* Helfer from Northeast India

Project Period : Sept 2016 to Aug, 2019

1. Assessment of phytochemical constituents of Som during different rearing seasons under agro-climatic zones of northeast region.
2. To develop a comprehensive nutrient management package for Muga host plant.

- Soil and leaf samples were collected from Tura (Meghalaya), Dhakuakhana (Lakhimpur) and Goalpara of North East India.
- Soil analysis was made to identify the physico-chemical properties (pH, OC, EC, Available N, P, K, Zn and S).
- Soil samples were analyzed. Soil physico-chemical properties varying from, 274.4- 463.2 kg/ha of available nitrogen, 12.51-32.17 kg/ha of available phosphorus, 120.2-282.5 kg/ha of available potassium, 0.40-1.27% of organic carbon, 0.37-2.03 mg/kg of Zinc, 30-78 mg/kg of Sulphur, pH from 4.00-5.73 and electrical conductivity of 0.10-0.77 dsm-1 was observed.
- This study indicates that muga growing areas of North east India differ in soil nutrient condition and need to be address for better production and productivity of muga silkworm rearing.
- Based on the available nutrient status of the soil, different organic or inorganic fertilizer or supplements can be recommended to ensure enough nutrients available for better muga silkworm production in different muga rearing areas of North east India.
- Secondary meteorological data were collected and processed.

- Collected leaf samples from three locations and assessment of their phytochemical constitute is under progress. Protein (8-18 mg/g) and phenol (80-120 mg/100 mg) content in different seasons were found low to high in range.
- Amino acids and Flavonoid (0.4 to 0.98 mg/ml) and Tannin (0.2 to 0.45 mg/ml) content were also recorded. Leaf moisture content revealed variation in different cropping seasons.

Nineteen morphological parameters according to the Som descriptor have been recorded. Leaf moisture, protein and phenol content of leaves have been estimated for all the rearing seasons.

[illegible]

Project Title: Characterization and efficacy of bacterial antagonists against *Alternaria ricini* infecting Castor in North-eastern India

Project period : Sept 2016 to Aug 2019
Funding Agency : CSB Bangalore
Total Budget : 15.25 lakhs
Scientists involved : Dr. M Chutia, PI
: Sri Vijay N, CI
: Dr. (Mrs) Ranjana Das, CI

1. To isolate and characterize bacterial antagonists from different castor growing areas against *Alternaria ricini*.
2. To evaluate the efficacy of different bacterial antagonists against *Alternaria ricini* causing leaf blight of castor.
3. Development and field evaluation of promising bio-formulation against *Alternaria* leaf spot of castor.

1. Most of the antagonists showed varying levels of significant antagonism with isolate LRP- 2, showing the maximum inhibition of test

pathogen. The data were analyzed statistically using analysis of variance.

2. Thereafter, the biochemical and molecular characterization of the selected bacterial antagonists has been done by following the Bergey's Manual of Systematic Bacteriology and 16S rDNA homology study and analysis.
3. Qualitative analysis of the PGP traits of the antagonistic rhizobacterial isolates has been carried out for production of nitrate reductase, phosphatase, NH_3 and HCN. Besides, pH and salt tolerance ability of the isolates has also been assessed.
4. Quantitative analysis has been worked out for soluble phosphate concentration, IAA, GA3 and ACC deaminase activity. The lowering of pH by the bacterial isolates has been tested for their ability to solubilize inorganic calcium phosphate in NBRIP broth.
5. Another pot experiment was conducted with eight different treatment combinations for analyzing the percent disease severity and incidence with triplicates. Highest activity was observed in the plants treated with T5 combinations which are 6.67 ± 0.21 nos., 50.00 ± 1.08 g and 40.00 ± 1.03 g respectively.
6. The leaf moisture content was found to be highest in the plants treated with T₂ and T₄ combinations which are 13.33 ± 1.14 g and 13.33 ± 1.02 respectively.
7. The effect of the most potential bacterial isolates LRP-2, HF-1 and UR-6 separately and in combination were tested and found that there was no any mortality in both the control as well as in the treated larvae.
8. The treatment with combinations of all the three strains showed enhancement of cocoon weight, shell weight and pupal weight against control.

.....

Project Code: PPS-5884

Project Title: Soil Health Cards for sericulture farmers of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh and Sikkim

Project Period : Sept, 2016 – Aug, 2019
 Funding Agency : CSB, Bengalore
 Total Budget : 31.48 lakhs
 Scientists involved : Dr. Vinod K S Naik, PI
 Investigators : Dr. D K. Jigyasu, CI
 Dr.Reeta Luikam, CI

Objective

1. To make the farmers aware about the importance of soil fertility on the production of quality leaves of Muga & Eri host plants by issuance of soil health cards

Summary of the findings/achievements

1. 1965 Soil samples were collected from Assam, Meghalaya, Manipur, Mizoram, Nagaland and Arunachal Pradesh states of NE Region.
2. Collected soil samples were processed and the nutrient status of the samples were analysed for pH, EC, OC, Macro (N, P, K, S) & micro (Fe, Mn, Zn, Cu & B) nutrients.
3. Accordingly, the developed SHCs have been distributed to the concerned DOS's. For the Third year, 366 soil samples were collected from Charaidoi, Dhemaji & Jonai, wokha and Analysis of these samples were accomplished.
4. Dataentry and recommendation of fertilizers are under progress.
5. Process for digitalization SHC's is under process.

.....

Project Code: AIT-5885

Project Title: Development of microbial biocatalyst by heterologous expression of *hpaC* & *soxABC* gene cluster in biosurfactant

producing bacterium for effective desulfurization of dibenzothiophene

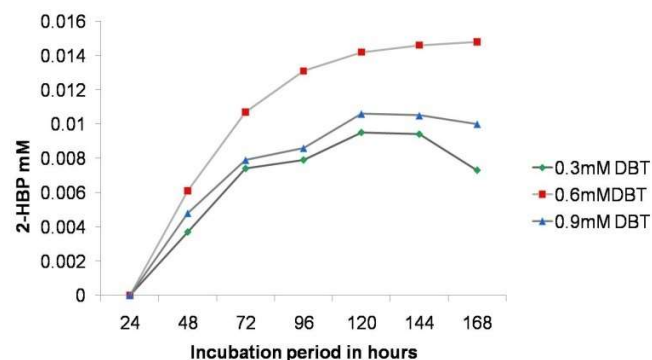
Project Period : Aug 2016 to July 2019
 Funding Agency : DST, New Delhi
 Total Budget : 28.00 Lakhs
 Scientists involved : Dr. G. Subrahmanyam, PI

Objectives

1. Cloning, expression and purification of hpaC and soxABC gene cluster in a biosurfactant producing bacterium *Bacillus subtilis* LBBMA 155
2. Characterization of the DBT desulfurization activity by recombinant strain LBBMA 155
3. Industrial applications of recombinant strain in biorefining the hydrotreated fuels

Summary of the findings/achievements

1. 16S rRNA based molecular identification revealed that biodesulfurizing bacteria are *Gordoniaspunder* the phylum *Actinobacteria*. The sequence was submitted to NCBI, GenBank under the accession no MH909836.
2. Phylogeny of *Gordonia sp.* was established.
3. *Gordonia sp. I* showed biodesulfurization potential of DBT under different concentrations of substrate (0.3, 0.6, 0.9 mM DBT).
4. Molecular detection of dsz operon was done with dszAB gene specific PCR.
5. *Gordonia sp. I* showed desulfurization potential of 0.3 Mm DBT and released approx. 15 μ M 2-HBP (2-Hydroxy biphenyl) at 168 hrs incubation indicating the biodesulfurization under extreme substrate concentration.



.....

Project Code: ARP-5886

Project Title: Improvement of muga cocoon yield through technology intervention and refinement of crop schedule in Terai region of West Bengal

Project Period : Dec 2016 – Nov 2019
 Funding Agency : CSB, Bangalore
 Total Budget : 4.75 Lakhs
 Investigators : Dr.N. Biswas, PI
 : Sri S.A.S. Rahman, CI

Objectives:

- To improve the Muga cocoon productivity in Terai Region of West Bengal through technology intervention and crop scheduling.

Highlights of achievement:

1. During Jethua, 2018 the highest cocoon harvest was found during the rearing schedule of 4th May, 2018 followed by the rearing schedule of 13th and 18th May, 2018.
2. During Bhadia, 2018 the rearing could not be completed due to non-hatching of dfls.

.....

Project code: ARP-5887

Project title: Isolation and characterization of lytic bacteriophages infecting bacterial pathogens of Muga silkworm *Antheraea assamensis* Helfer

Project period : Apr 2017-Mar 2020
 Project budget : 35.28 lakhs
 Funding agency : DST, New Delhi
 Investigators: Dr.M Chutia, PI
 Dr. Ranjana Das, CI
 Dr. G. Subrahmanya, CI

Objectives:

1. Isolation and characterization of bacteriophages against muga silkworm bacterial pathogens.
2. Study of the phage biology and genome organization.
3. Evaluation of the potential phages cocktail against muga silkworm pathogens.

Summary of the findings/achievements:

Isolation of pathogenic bacterium for isolation of phages

Fresh infected cadavers of Muga silkworms were collected from different silkworm rearing farms of Upper and lower Assam for isolation of the bacterial pathogens of muga silkworms. These silkworms were reared in the farm No. 3 of CMERTI. Naturally infected silkworms were collected in sterile polythene bags separately. The larvae were disinfected with 70% (v/v) ethanol for 1 to 2 min. and washed twice with sterile distilled water after it had just begun to soften.

The larvae were then dissected and the mid gut portion was collected separately in distilled water and homogenized. The bacterial pathogen was isolated using serial dilution agar plating method. The body fluid of the infected larvae was also collected separately with the help of sterilized insect needles. The diluted body fluid and mid gut samples were then inoculated onto Nutrient and Bacillus Agar media (Himedia) and incubated at $35\pm 2^\circ\text{C}$ for 48 h.

Each of the different bacterial colonies (on the basis of colony morphology and colour) was purified and preserved at 4°C for isolation of

phages from environmental purposes. Further, the purified strains were fed to test silkworms and clinical symptoms were observed in the infected silkworm in order to confirm pathogenicity by the strains (Koch's laws). After confirmation of the pathogenicity, the isolated pathogenic bacterium (strains) was purified and incubated on a nutrient agar plate at 30°C for 24 h.

Silkworm disease monitoring

It was observed that the disease appeared throughout the year (2018-19) with the intensity varying in different months which maybe due to the environmental factors particularly temperature variations. The season wise variations of relative humidity ($80 \pm 10\%$) and precipitation (11.92 mm) were not significantly different in the sites. Temperature variations were not significantly different in the rearing sites, but varied season wise. The per cent disease infections (PDI) were negatively correlated with the temperature but not dependent on the RH. The disease was more prevalent during summer months (June-August) when temperature rises up to $30-35^\circ\text{C}$. However, higher temperature and RH were the most important factors for disease development. It is not known whether the bacterium has been infecting silkworms since long or else, it became pathogenic to the silkworm recently, as it is a soil borne, naturally occurring bacterium.

Phage isolation from environmental samples

Soil, water, litter, manure samples from cattle, sheep etc., and sewage effluent were collected for screening for the presence of phage active against these bacteria. An inoculum (400 μL) from the actively growing 3-4 hour culture is mixed with 4 mL of LB broth, 5mL of concentrated salt solution ($\text{MgCl}_2 + \text{CaCl}_2$) and 1mL/1g of environmental sample respectively. The mixtures are then kept in the shaker incubator for 7-9 days. From these mixtures, filtrates are collected every

day using sterile syringe and 0.22µm syringe filters. These then stored in the refrigerator at 4°C to use within the week and at -20°C for long term use. Samples are added to LB broth supplemented with 2 mM Calcium chloride and the mixture will be incubated for ~1 hr at room temperature with shaking. The supernatant are filtered using a 0.22 µm pore size syringe driven filter unit.

About 3-4 hours actively growing bacterial culture is mixed (400µL of culture/4mL of media) and pours over the 1st layer of LB Agar plates. After solidification of the overlay agar, 5-10µL spots of the filtrates collected are put on the agar accordingly. Plates are then placed for overnight incubation at 37°C. Clear zones are spotted with the drain water sample, filtrates collected each day from the mixture of environmental samples are diluted 5 times and spot test are again performed with the dilutions to obtain single plaques of phage which confirms the presence of phage. The clear plaques containing phage are picked from the overlay agar. These are then dissolved in SM buffer and stored at -20°C as phage stocks for further purification.

.....

Project Code: ARP 5889

Project Title: Studies on the cross transmission of pebrine spores from lepidopteran caterpillars to Muga silkworm (*Antheraea assamensis* Helfer) and its control measures

Project Period : June, 2017 to May, 2020
Funding Agency : CSB, Bangalore
Total Budget : 15.55 lakhs
Scientists involved : Dr. K. Subadas Singh, PI
Dr. M Chutia, CI

Objectives

1. Collection wild silkworm and other lepidopteron caterpillar from Muga rearing fields and detection of pebrine spores thereof

2. Pathogenicity test of the spores isolated from Wild caterpillars (saturniids)

Summary of the findings/achievements

Regular survey has been conducted and more than 30 lepidopteran species including Saturniids were collected. Collected caterpillars were mostly belong to Saturniidae, Noctuidae, Pyralidae, Papilionidae, Lymantriinae, Geometridae and Nymphalidae family and tested for pebrine spores. Among the above mentioned families, Saturniidae, Nymphalidae, Papilionidae Noctuidae was found infected with pebrine spores. Spores were isolated and preserved for further studies such as virulent and morphometric study.

Special focus was made on saturniid insects collected from rearing fields. *Cricula trifenestrata* (Lepidoptera: saturniidae) is abundantly available in Muga rearing field and they feed on Som (*Persea bombycina*) host plant. *C. trifenestrata* was collected from rearing fields, in different crop season and tested for pebrine spores. Pebrine spores were detected and isolated from *C. trifenestrata*. Pathogenicity tests of the isolated spores were conducted on same host (*C. trifenestrata*), positive result was obtained, as well as spores density was found increased when counted using Neubauer slide. These spores were preserved properly for conducting cross transmission test. Cross transmission test was carried out in isolate place using som plant saplings. First, the spores were sprayed on the freshly plucked healthy som leaves in a tray and fed to healthy young stage Muga silkworm (second instar). Continuous observation was taking place in respect to behavior, symptom or any mortality of Muga silkworm. After silkworm moulted (third instar), they were transferred to Som saplings for feeding and further observation. After continuous observation of 10 to 15 days, symptoms of pebrine infection were observed as compared to control. We collected 2-3 muga silkworms for pebrine test and found positive result.

Project Code: APR-5890

Project title: Biodiversity assessment of wild silk moths and rearing potentialities of muga (*Antheraea assamensis* Helfer) and eri silkworm (*Samia ricini* Donovan) for sustainable development in Nagaland

Project Period : Feb 2017-Jan 2020
 Funding Agency : DBT, New Delhi
 Total Budget Allocation : 15.55 Lakhs
 Project Investigators : Dr.K. Neog, PI

Objectives:

1. Exploration of wild silk moth species.
2. To develop a standardized rearing schedule including indoor rearing/bush plantation net rearing technology conforming climatic condition of Nagaland, particularly pre-seed and seed crop.
3. Survey of naturally available food plants and selection of most desired food plants, propagation and establishment of silk farm
4. Quantitative and qualitative enhancement of nutritional parameters of food plants to improve overall physiological status of silkworm in different stage
5. Replicable rearing and grainage of cultivated, wild and hybrid stocks in the pre-selected muga and Eri farms of adopted seed rearers
6. Crossbreeding and hybridization of cultivated and wild stocks
7. Assessment of genetic diversity on molecular markers

Highlights of findings/achievement:**1. Exploration of wild silk moth species**

14 species of wild silk moth comprising of *Antheraea (assamensis, roylei, proylei, frithi; Actias*

(*selene* and *rhodopneuma*); *Samia (canningi* and *ricini*); *Loepa (katinka* and *sikkima*) and *Attacus atlas*, *Archaeoatta cusedwardsii*, *Cricula trifenestrata* and *Sonthonn axiamaenas* were collected. The collected moths were morphologically characterized based on wing span, forewing hindwing, body length and breadth, color on dorsal ventral side.

2. Exploration of host Plants: Rearing of *Antheraea assamensis* is conducted only on *Persea bombycina* (Som). *Samia ricini*, the domesticated eri silk worm is reared on *Ricinus communis* (Castor), *Heteropanax fragrans* (Kessuru), *Evodia flaxinifolia* (payam) *Manihot esculanta* (Tapioca).

3. Identification of Zones for in situ conservation & Replicable rearing: Three sites namely Ungma, Aosenden and Kobulong villages of Mokokchung district were selected considering the suitability of rearing of muga and eri silkworms. Five adopted rearers of each site were selected and trained them. Muga seedlings were raised in farmers' field and in earthen pots for indoor rearing.

4. Eri rearing by tray method by sequential feeding on alternative host plants: Indoor tray rearing was undertaken during summer (June 2018), autumn (2018) and winter (Nov-Dec 2018) at Site I, II and III. Eri silkworms were fed initially with castor or kessuru or tapioca or payam and sequentially fed with rest of the foliage to evaluate its impact on Larval and cocoon characteristics.

5. Economic Performance of outdoor muga rearing: Outdoor control rearing was conducted in Site I, II and III from 2017 through 2018. Aosenden site III performed best during March April 2019 with net income of 42,600/ 300gm dfl compared to 38,847 and 31,095 INR respectively for Site I and Site II.

6. Comparative silkworm performance: Larval duration was minimum in site III (28 days) and maximum in site I (45 days). In reference to larval duration, S-II and S-III took 20-26 days and s-I took

24-30 days. More number of cocoons were harvested in site III followed by site II and site III.

7. Crossbreeding and Hybridization of cultivated and wild stocks: Collecting of wild silk moths is under progress to initiate cross breeding and hybridization with cultivated stocks.

8. Genetic diversity silk moths based molecular markers: larvae of collected silk moths species are preserved for molecular characterization. Genomic DNA from 6 eri and 2 muga stocks has been extracted from leg tissue and same has been utilized for fingerprint generation after standardization with specific marker.



Few wild silk moth species and rearing

Project Code: ARE 5891

Project Title: Development of LED traps for controlling major insect pests and predators in muga ecosystem-Needs for organic muga silk production.

Project Period : July 2017 to June 2019
Funding Agency : DST, New Delhi
Total Budget : 14.80 lakhs
Scientists involved : Dr.Subadas Singh (PI)
Sri. Vijay N. (CI)

Objective

1. To develop light traps through LED (Light emitting Diode) for controlling major insect pests and predators in muga ecosystem.
2. Field trial for validation of developed LED traps for controlling major insect pests and predators of muga ecosystem.

Summary of the findings/achievements:

The LED lights of 6 different colours having different wavelength were developed into LED light traps with transparent sheets applied with tangle foot glue were installed at the muga rearing field for monitoring of insect pest of muga ecosystem. At every one-week interval the transparent sheets are detached from the trap and the numbers of insects attracted are counted in 1-inch square area of trap separately on order wise basis and then accordingly the picture of attracted insects are taken by Telescopic Zoom Microscope. Seasonal occurrence of the insect pests trapped in LED light has been studied. It has been observed that leaf miner adults were attracted towards UV light, Soalu leaf and stem gall towards green light followed by blue and yellow. Blue light is giving good result for gall insects and UV light is attracting mostly micro-lepidopteran insets. Demonstration and awareness programme of the LED light trap has been initiated towards farmer level for large scale utilization.

Project Code: APR- 5892

Project title: Formulation of Semi-synthetic diet for rearing of Muga silkworm, *Antheraea assamensis* Helfer.

Duration : April, 2017 – March, 2020
Funding agency : 15.55 lakhs
Investigators : Dr. T. James Keisa, PI
: Dr.Subadas Singh, CI

Objectives:

1. Formulation and standardization of semi-synthetic diet for rearing of Muga silkworm

Summary of the findings/achievements

1. Periodically young, medium and semi mature leaves of Som, Soalu and Dighloti were collected from institute farm. After removing the branches and mid-dribs, the leaves were washed, shade dried for 4-5 days followed by oven dry at 45-60°C for 4-6 hrs per day for removing remaining moisture contents.
2. Dried leaves were crushed, grinded, sieved and fine leaf powders were kept in an air tight plastic container for further use.



Brushing newly hatched worms in different diets

3. 9 different combinations of ingredients along with leaf powders of Som, Soalu and Dighloti were prepared as Semi-synthetic diet for rearing of Muga silkworms.

4. 100 nos. of newly hatched worms were brushed on these semi-synthetic diets and the 3rd instar larvae were transferred to natural food plants in the field. The ERR% of semi-synthetic 13%(Som), 14% (Soalu) and 16% (Dighloti) respectively against 14% and 20%ERR when reared on control Soalu and Som plant.



2nd stage worms in diet with som powder and on fresh leave of som



Transfer of worms from indoor to outdoor condition

Project Code: PPF 5893**Project Title: Impact assessment of petroleum crude oil on muga silkworm and their host plants in Assam**

Project Period : Oct., 2017 to Sept., 2020
 Funding Agency : CSB, Bangalore
 Total Budget : 22.89 lakhs
 Scientists involved : Dr.D K Jigyasu, PI
 : Dr. K. Subadas Singh, CI
 : Dr. Kartik Neog, CI

Objective

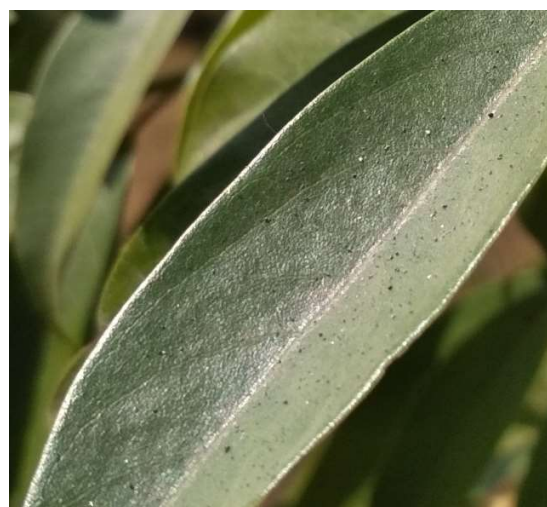
1. Determination of crude oil contamination in Muga Silkworm rearing and its mitigation measure

Summary of the findings/achievements

1. Soil samples collected from 0-30 cm depth from the contaminated sites and analyzed for their pH, EC & OC, macro and micro nutrients.
2. Mature and healthy leaves of Som plant samples collected from the contaminated sites and phytochemical analysis of Som leaf samples was done.
3. Rearing conducted at contaminated site during commercial season. The preliminary survey at Gelakey and Lakuwa areas of Sibsagar district and Ponka MVGR, Golaghat district of upper Assam suggested the surface contamination of Muga farms by spreading and continuous burning of crude oil in oil industries near the Muga rearing farms.
4. A Som plantation of 70 bighas under the State Government Muga Village Grazing Reserve (MVGR) located at Ponka, Numaligarh, Golaghat have been selected for rearing of Muga silkworm. This location is adjacent to the Numaligarh Refinery Limited, Golaghat. In this farm, scattered distributed 1400 numbers of Som plantations are available for Muga rearing. During the commercial seasons (*Kotia* and *Jethua*), rearing of 100 dfls were

conducted at this place. The study suggested that the comparatively more number of days required for the larval stage and mortality recorded higher in contaminated site. It was also observed that the continuous release of particulate matters (PM_{2.5} and PM₁₀) into the atmosphere and deposition on Som plant leaves alter the growth of Muga silkworm.

5. Muga Silk cocoons examined of commercial crop seasons, out of which 50 numbers of cocoons were checked randomly and it was observed that more than 60% cocoons were flimsy, malformed and stained inside.
6. Samples of soil were analyzed for the macro and micro nutrients constituents and it was recorded that the pH, EC, OC (%), N, P & K showing deficiency in contaminated soil. Analysis of soil samples show highly acidic in nature and nutrients deficient as compare with control site.



Deposition of particulate matter on Som leaves

7. The phytochemical analysis of leave samples of Som plant was done during the *Chatuacrop* of both contaminated site and control site.

Parameters	Contaminated site	Controlled site
PH	4.08	4.53
EC	0.01	0.15

OC (%)	1.27	1.34
N (kg/ha)	435.6	454.1
P (kg/ha)	87.58	16.53
K (kg/ha)	0.0	145.7
S (mg/kg)	46.0	5.3
Zn (mg/kg)	8.69	0.66
B (mg/kg)	0.55	6.2
Fe (mg/kg)	26.8	38.7
Mn (mg/kg)	9.0	0.0
Cu (mg/kg)	16.20	29.13

.....

Project Code: AIB - 5894

Project Title: *In-situ* conservation of muga silkworm, *Antheraea assamensis*, Helfer (Lepidoptera: Saturniidae) and other wild silk moths (In collaboration with R.O., CSB, Guwahati and Directorates of Sericulture, Concerned State - Assam, BTC, Meghalaya, Arunachal Pradesh)

Project Period : April 2016 to March, 2019
Funding Agency : NERTPS, MoT, Gol
Total Budget : 44.00 Lakhs
Investigators : Dr. Prashant S, PI
: Dr. G Dubramanyam, CI
: Dr. Subadas Singh, CI

Objectives:

1. Development of *in-situ* conservation site for muga silkworm and other wild silk moths species
2. Utilization of muga silkworm germplasm for breeding and seed production

Highlights of Achievements:

Muga and other wild silkworm conservation

Assam: MoU has been signed between Assam Forest Department and CMERTI, Lahdoigarh for Upper Doigrung Wild Life area, Golaghat upto

2047 (30 years). Awareness programme among tribal and local peoples were organized at Upper Doigrung Reserve Forest area for implementation and conservation of muga and other wild silk moth. Weather station has been installed in the peripheral village (Bankathar Village) for recording the meteorological parameter of Upper Doigrung Wild Life area. Another weather station has been installed in *ex-situ* site at Bogidhola farm of State Sericulture Department, Golaghat. In peripheral zone of *in-situ* conservation site upper Doigrung Reserve forest area different instar muga silkworm larvae's were observed. CSB official visited the site for monitoring and suggesting proper guideline for conservation.

BTC, Assam: MoU has been signed between Assam Forest Department and CMERTI, Lahdoigarh for Kuklung forest area, Kokrajhar upto 2047 (30 years). Awareness programme among tribal and local peoples were organized for implementation and conservation of muga and other wild silk moth. Weather station has been installed for recording the meteorological parameter. CSB inspection team visited the conservation site and provided valuable suggestion for conservation and recorded data, and monitoring of population. A team involving CSB scientists inspected the Kuklung forest area on 3rd December 2018 to review the work carried in the area. The team recommended the plantation of Solau and other host plants to encourage the diversity.

Meghalaya: After survey, it has been found that "Tura Peak" is most suitable place in terms of host plants availability, monitoring, accessibility and also belongs to reserve forest area in Meghalaya. Suggestions from Forest Department on MoU is awaited. State Sericulture farm, DoS, Tura, Meghalaya has been selected for *ex-situ* site. Letter has been sent to Directorate of sericulture & weaving, Shillong, Meghalaya for furnishing the status report of the *in-situ* conservation and Signing of MoU between State Forest Department,

DoS&W, Meghalaya, and CMER&TI. Response from the concern office is awaited.

Arunachal Pradesh: For *in-situ* conservation in Arunachal Pradesh – Mebo forest Pasighat selected and for *ex-situ* conservation Borguli state farm selected. Letter has been sent to Directorate of Textiles & Handicrafts, Itanagar, Arunachal Pradesh for furnishing the status report of the in-situ conservation and Signing of MoU between State Forest Department, DoT&H, Arunachal Pradesh, and CMER&TI. Response from the concern office is awaited.

.....

Project Code: AIP 5895

Project Title: Biology, population dynamics and control of *Sycanus collaris* Fab. and *E. furcellata* Wolff (Insecta: Heteroptera)-potential predators of Muga silkworm

Project Period : March 2018 to Feb., 2020
Funding : CSB, Bangalore
Total Budget : Rs.9.40 lakhs
Scientists involved : Dr. Kh. Subadas Singh, PI
Dr. D KJigyasu, CI

Objective :

1. To study biology, seasonal occurrence and population dynamics of two important predators of Muga silkworm, viz., *Sycanus collaris* Fab. (Assassin bug) and *Eocantheconafurcellata* Wolff (Stink bug) and their control measures.

Summary of the findings/achievements:

Regular field survey in Muga rearing farms at different places has been completed to study the peak incidence and population dynamics of predator bugs viz. *Sycanus collaris* (Assassin bug) and *E. furcellata* (Stink bug). Population of predator bugs was found increased in summer

season (April to September) and decrease in winter. While field survey was conducted, as a mechanical control, we collected predator bugs either in the form of egg, nymph or adult. Both nymphal and adult stage caused damage to muga silkworm. The collected predator bugs were reared in the laboratory condition and studied their life cycle. From field and laboratory observation, *the feeding behaviour of the predator bugs, E. furcellata has been studied.* Also visited to farmers' as well as state Muga rearing field (DSO, Assam) and share the information with farmers regarding damaged caused by predatory bugs and the ideas to adopt mechanical control against the predator bugs.

Survey and field monitoring of predator bug has been completed. Survey was conducted such as sampling the crop by using a sweep net or a beating tray, or by visual inspection of damage or presence of insects. Field survey was conducted at different Muga silkworm rearing sites of Assam. Survey was conducted to understand their population dynamics, seasonal occurrence, feeding behavior and development of management practices against the bugs, *S. collaris* and *E. furcellata*. Close observations were made in the muga rearing fields in respect to their feeding behavior of the bugs. Predator bugs were collected using insect trapping net, counted their numbers and cultured in the lab to study life cycle and biology of the bugs.

.....

Project Code: APS 05001EF

Project Title: Development of technology for enhancing egg laying in Vanya Silk moths by application of host plant volatiles

Project Period : Mar 2018 to Feb 2021
Funding Agency : DBT, New Delhi
Total Budget : 42.80 lakhs
Scientists involved : Dr.K. Neog, PI
Dr.P. Sangannavar, CI

Objective

1. Development of technology for enhancing egg laying in Vanya Silk moth by application of plant host volatiles.

Summary of the findings/achievements

1. Muga moths after pairing were tied with kharikas made from different host plants viz., Som, Soalu, Diglotti, Mejankari, Patihonda, Kothalua, Bogori, Bhoomloti and Gamari for laying eggs by the moths eggs laid by each moths has been recorded.
 2. It was found that during the month of May, maximum egg was laid on the Kharikas prepared from Mejankari (239 nos.) twigs followed by that of Bhoomloti (197 nos.) and thatch (181 nos.). Lowest realized fecundity was recorded in Kotholua (156 nos.). Maximum no. of retained eggs in kharikas prepared from Patihonda (57 nos.) twigs followed by that of Bhoomlotikharikas (55 nos.) and lowest was recorded in the twigs prepared from Bogori (19 nos.) followed by Mejankari (21 nos.).
 3. During the month of June (Season 2), maximum egg was laid on the Kharikas prepared from Mejankari (216 nos.) twigs followed by that of Soalu (202 nos.) and Bogori (196 nos.). Lowest realized fecundity was recorded in control (119 nos.). Maximum no. of retained eggs in kharikas prepared from Thatch (83 nos.) followed by that of Somkharikas (64 nos.) and lowest was recorded in the twigs prepared from Bhoomloti (25 nos.) followed by Mejankari and Patihonda (30 nos.).
 4. During 3rd season, i.e. July, 2018, maximum realized fecundity was obtained from Mejankari (192 nos.) followed by Bogori (183 nos.) compared to other twigs. Lowest was recorded from thatch kharikas. Maximum retained was also recorded in Mejankari (43 nos.) and lowest in SoaluKharikas (15 nos.).
 5. During 4th season, i.e. August, 2018, maximum realized fecundity was obtained from Som (159 nos.) followed by Mejankari and Bogori (148 nos.) compared to other twigs. Lowest was recorded from thatch kharikas (57 nos.). Maximum retained was recorded in Soalu (132 nos.) and lowest in Bogori (36 nos.) and MejankariKharikas (39 nos.).
 6. During 5th season, i.e. December, 2018-January, 2019, maximum realized fecundity was obtained from Som (262 nos.) followed by Gamari (253 nos.) compared to other twigs. Lowest was recorded from thatch kharikas (153 nos.). Maximum retained eggs was recorded in thatch and Bogori (64 nos.) and lowest in Som (21 nos.) and MejankariKharikas (39 nos.).
 7. In respect to seasonal variation, it has been observed that, realized fecundity was found maximum in Bhoomloti (182 nos.), followed by that of Som (180 nos.) and Mejankari (179 nos.). Moreover, it has been noticed that, the muga moths laid more eggs on Mejankari twigs during season 1 & 2; Som twigs during season 4 & 5 and thatch kharikas during season 3.
 8. In case of retained eggs, maximum number of retained eggs was recorded in season 4 (82 nos.), with a maximum retention of 132 eggs on Soalu twigs followed by Kotholua (126 nos.).
 9. During season 3 & 4, potential fecundity is lower than the other seasons which may vary depending on the prevailing weather conditions, food plants, health of larvae or pupae.
 10. Muga moths were treated with volatiles extracted from Diglotti, Som, Soalu and Mejankari leaves to see the number of eggs laid by the moths and the results are being awaited.
-

Project Code: APS 05002EF

Project Title: Popularization and utilization of Foldscope detection of pebrine disease (*Nosema assama* in muga silkworm seed production areas

Project Period : April' 2018 to March' 2019
 Funding Agency : DBT, New Delhi
 Total Budget : 6.00 Lakhs
 Scientists involved : Dr Rajal Debnath - PI

Objective

1. Utilization of Foldscope for detection of pebrine disease in muga silkworm seed production areas.

Summary of the findings/achievements

- On 13th July, 2018, a workshop was conducted at Chaukhat High School at Jorhat, Assam and demonstrated the students and teachers about the foldscope assembly and its utility in educating people of diverse age groups.
- As per our objectives different programs were conducted such as on 16th July, 2018 at Jaljori, Golaghat district.
 - In consultation with the lead Muga farmer in the district, we recruited participants for live demonstration of Muga mother moth examination for pebrine detection to 25 selected native muga farmers with standard student microscope that is a recommended approach.
 - Comparison between commercially used microscope and foldscope microscope was live demonstrated with preparation of pebrine samples.
- Similar programs were conducted on 4 August, 2018 at Diksu, in Sibsagar district, Assam,
 - We demonstrated and made them prepare samples for microscopic mounts. Moths were masserated and crushed for pebrine detection and demonstrated the significance of the technique towards pebrine process to 31 local farmers

- Four batches of Officials, Technical officers from state Department of Sericulture, Assam were trained in the same regard. Each batch comprised of 28-31 members of different districts of Assam.
- A batch of 63 students from NGO and Silkworm farmers were trained on rearing techniques, mother moth examination and foldscope assembly and their use in sericulture.
 - Another training program to train a batch of 63 farmers at Khowang, Dibrugarh on the assembly and use of foldscope on 7.3.2019.
 - Sets of motor pestle, glassslides, coverslips, packets of K₂CO₃ along with foldscope kit were distributed to farmers.
- 54 students from different universities were trained on 13th March, 2019 and the importance of pebrine detection and the benefits of microscopic technique to sericulture farmers.
- All the activities were simultaneously uploaded in the foldscope project relevant website at url: <https://microcosmos.foldscope.com>

.....

Project Code: MOE05003EF

Project Title: Socio-economic uplifting of farmers through adoption of improved technologies and skill development in Eri culture

Project Period : Aug 2018 to July 2021
 Funding Agency : DST, Govt. of India,
 Total Budget : 21.58 lakhs
 Scientists involved : Dr. H. Barman, PI
 Sri S. A. S. Rahman, CI

Objective

1. To adopt improved technologies (both pre & post cocoon sectors) at farmers' level
2. To improve the economies of scale through group approach

3. Diversification of Eri-culture towards income and employment generation

Summary of the findings/achievements

1. Two innovative technologies viz, 'All-in-One Eri Silkworm Device' and "Storage and Cocooning Device for Eri, Muga& Mulberry silkworm" have been developed and applied for patenting before field trials.
2. Seeds of Improved castor variety viz. RB-2 are being supplied to beneficiaries for castor garden raising.
3. Eri DFLs of C-2 breed are being supplied to beneficiaries for rearing. Kesseru saplings are being supplied to beneficiaries for developing permanent food plant garden.
4. 20 Group of beneficiaries each comprising 10 nos. from each village were developed and all project activities related to improvement of economic scale are being carried out in group.
5. Ginger seeds and Colocasiacornal are being supplied to beneficiaries for intercropping in kesseru garden towards income generation.

.....

Project Code: ARP 3606

Project Title: Development of a diagnostic tool for early detection of baculovirus causing tiger band disease in *Antheraea proylei*

Duration : Mar, 2017-Feb, 2020

Funding Agency : DBT, New Delhi

Total Budget : Rs. 17.14 lakhs

Scientists involved : Dr. S.Subharani Devi, PI
Dr. N.Ibotombi Singh, CI

Objective:

1. To characterize the baculovirus pathogen causing tiger band disease in oak tasar silkworm, *Antheraea proylei*.

2. To study the pathogenesis, source and mode of transmission of the viral pathogen.
3. Validation of developed diagnostic tools in Oak tasar grainages and egg production centers

Summary of the findings/achievements:

1. Different concentrations of AnprNPV were inoculated on the III instar larvae of *A. proylei*. Percent larval mortality ranged from 36-96% at various concentrations. The larval mortality increased with increasing concentration of polyhedra thereby showing a dose dependent relation. Probit analysis of the data based on the dosage vs larval mortality indicated the LC_{50} as 5.8×10^4 . The LT_{50} of AnprNPV was worked out to be 177.6 hrs.
2. Genomic DNA was isolated from different tissues of infected *A. proylei* larvae. PCR technique was standardized for identification of AnprNPV infection in different tissues. The infection was detected in midgut, fat bodies, malpighian tubules, silk gland of *A. proylei* larva through PCR.

Table: Mortality rate of *A. proylei* (III instar) at different days due to AnprNPV treatment

Day after virus treatment	Percentage mortality of larva			
	A	B	C	Mean
5	9 (3.16)	11 (3.46)	10 (3.32)	10.00 (3.32)
6	18 (4.36)	17 (4.24)	22 (4.8)	19.00 (4.47)
7	44 (6.71)	40 (6.4)	38 (6.24)	40.67 (6.46)
8	56 (7.55)	53 (7.35)	56 (7.55)	55.00 (7.48)
9	88 (9.43)	81 (9.06)	84 (9.22)	84.33 (9.24)
10	100 (10.05)	100 (10.05)	100 (10.05)	100 (10.05)

3. Cross-infectivity of AnprNPV with other lepidopteran insects was studied. The rearing

of *A. frithi* (belonging to the same genera) inoculated with the viral PIBs (5.8×10^4 OBs/ml) did not result in larval mortality. Larvae of *Pieris* species infesting cole crops cultivated in nearby farms were inoculated with viral suspension of AnprNPV @ 2.5×10^6 OBs/ml for cross-infectivity studies. No infection was detected in *P. brassicae* and *P. canidia* inoculated with AnprNPV. The experiment will be repeated by using higher concentrations of OBs for inoculation.



Life stages of *Pieris canidia*



Life stages of *Pieris brassicae*

4. Isolation of Genomic DNA of mother moths, their hatched eggs and larvae hatched from those eggs upto 2nd instar was completed.
5. One disinfectant was tested for surface sterilization of eggs which were randomly collected from the commercial grainage. The surface sterilized eggs along with its hatched 1st, 2nd and 3rd instar larva were checked for presence of AnprNPV virus through PCR using tiger band specific primers and it revealed absence of the virus. Surface sterilization of *A. proylei* eggs with different disinfectants is under progress to study its rearing performance. Prepared herbal formulations developed earlier for control of tigerband disease and rearing is under progress & larvae are in 1st instar. The experiment will be repeated during summer crop.

.....

Project Code: APS-3612

Project Title: Development of seed preservation technology for muga silkworm *Antheraea assamensis* Helfer

Project Period : April 2017 to Sept 2019
 Funding Agency : CSB Bangalore
 Total Budget : 8.55 lakhs
 Scientists involved : Dr. D. K. Gogoi, (PI)

Objectives:

1. To develop Muga silkworm embryonic chart through embryogenesis studies.

2. To evolve an appropriate egg preservation technology through identification of sensitive and suitable embryonic stage.
3. To evaluate the rearing performance of the preserved seed by conducting bioassay studies.

Summary of the findings/achievements

1. Study of the embryology of the Muga silkworm has been completed
2. Standardized two embryo isolation methodologies for Muga silkworm eggs : (i) Hot water method suitable for early and few mid embryonic stages & (ii) KOH method for mid and late embryonic stages
3. Altogether 120 treatments have been designed for single step refrigeration technique to develop the Muga seed preservation technique.
4. Hatching percentage of Muga eggs has been studied after preservation at different temperature range.
5. Specific age of embryos has been selected for preservation at 2.5, 5, 10, 15, and 20 °C for 5, 10, 15 and 20 days respectively by maintaining three replications.
6. Muga seed cocoons are being supplied to SSTL, Kodathi for the ongoing experiments.

.....

Project Code: ARE-4726

Project Title: Bio-ecology, economic injury level and management of insect pest infesting oak ecosystem

Project Period : June, 2017 - May, 2020
 Funding Agency : CSB Bangalore
 Total Budget : Rs. 18.31 lakhs
 Investigators : Dr. S.Subharani Devi, PI
 Dr. Y.Debaraj, CI
 Dr. Ritwika S Chaudhuri, CI

Objective:

1. To study the population dynamics of Uzi fly, *Blepharipasugan* infesting oak tasar silkworm, *A. proylei* and oak semilooper, *Hyblaeapuera* and hairy caterpillar, *Phalera raya* infesting oak plant
2. Studies on the biology of Uzi fly, *Blepharipasugan*
3. Studies on the biology of *Hyblaeapuera* and *Phalera raya*
4. To determine the ETL of major insect pests infesting oak silkworm and its preferred host.
5. Integrated management practices for control of *Blepharipasugan*
6. To evaluate the efficacy of biopesticides for control of *Hyblaeapuera* and *Phalera raya*

Summary of the findings/achievements:

1. Population study of Uzi fly, semi-looper and hairy caterpillar for the 2nd year is continuing.
2. Studied the biology of *H.puera* and Uzi fly. Total duration of Uzi fly life cycle is 36-43 days and that of *H. puera* is 27-38 days.
3. Effectiveness of different specially designed uzi traps were compared, and it was found that Chuhi (concentrated Sugarcane juice) trap was the most effective in trapping the uzi flies followed by Rotten chicken intestine.
4. Estimation of ETL of major insect pests infesting *Q.serrata* was carried out. Economic Injury level for *P. ray* was determined as 1.27 larva per m row and Economic Threshold level was 0.95. On an average, single larva per m row reduced the yield to the extent of 361 kg/ha. The ratio of the value of yield saved to the cost of insecticide application at one larva per m row was 1.18.
5. Management of Uzi fly through mechanical, chemical and biological methods is under

progress. Diversity of the insects lured through chuhi trap showed majority of uzi flies followed by ants and fruitflies.

6. The study on the efficacy of biopesticides for control of *Hyblaeapuera* and *Phalera raya* is under progress.

.....

EXTENSION AND TRAINING ACTIVITIES AT MAIN INSTITUTE

FIELD DAYS

Pirakota VGR, Teok, Jorhat

A Field Day on Muga culture was organized by on 01.06.2018 at Pirakota VGR, Teok, Jorhat covering 70 farmers from the adjoining areas. The program was started with the well come address from Dr. D. K. Gogoi, Sc-C followed by a briefing of the institute and its role in extension of sericulture in this region. Dr. G. Subrahmanyam, Sc-B demonstrated various disinfection techniques in rearing field and grainage house and highlighted the diseases of Muga silkworm and its preventive measures before and during the rearing period. Dr. Kartik Neog, Sc- D described the modern rearing techniques and recent advancement taken both pre and post cocoon sector. Dr. (Mrs.) R. Das, Sc-D informed about various pests of Muga silkworm and demonstrated about the products developed by this institute like Lahdoi for control of Muscardine disease, Phytoblihgton for host plant disease etc. Besides, she distributed few Rearing nets, Tarpaulin and other rearing appliances to encourage the youth to take up Muga rearing on commercial scale.



Distribution of rearing nets

Kamalabari, Sibsagar

A field day programme on Muga and Eri culture was organized at Kamalabari, Sibsagar district on 21-08-2018. Dr. Kartik Neog, Sc-D, Dr. G. Subrahmanyam, Sc-B, of this institute, officials from DoS, Shri Paban Deouri, Seri demonstrator; Honourable Gaon Panchayat (GP) President of Napam Baruwati Gaon Smt. Diplai Gogoi; President of NGO Aranyam, Gelakey Shri Ram Borthakur; Vice president of NGO Aranyam Shri NiranGogoi participated in the programme. A total of 74 farmers attended the programme. The programme was inaugurated by Shri Ram Borthakur and he further informed about the Geographical indication (GI) registration of Muga silk. Smt. Diplai Gogoi acknowledged the Central Silk Board and its efforts to socio-economic upliftment of Muga farmers. Shri. Niran Gogoi, suggested that farmers should go for large scale Muga rearing by utilizing the available resources and spoke about Institute-Village linking programme (IVLP). Shri. Paban Deuori, discussed food plants and rearing practices of Muga culture.



Gathering of participants

Dr. K. Neog, enlightened the climate resilient sericulture and the importance of crop rescheduling for sustainable Muga culture. He revealed the rearing parameters of newly developed Muga silkworm breeds CMR-1 and

CMR-2. He practically demonstrated the treated bamboo made improved mountage cum rearing trays for Eri culture. Dr. G. Subrahmanyam, highlighted the microbial diseases of Muga and Eri silkworm and informed about the anti-muscardine formulation viz .“Lahdoi”. He also pointed the rearing parameters of Eri C2 breed and NBR1 and NBR2 Caster varieties for sustainable Eri culture.



Distribution of Bamboo mountages

Farmers posed many questions on host plant management and silkworm rearing practices. Farmers discussed about their problems in previous crop and asked the necessary measures to be taken for next crop.

Gargaon, Galabil, Golaghat

Field Day programme on muga culture was conducted at Gargaon, Golaghat on 14.09.18 covering 102 muga farmers and 4 resource persons. Smt. Mimali H Saikia, Member of ThangalKachari Autonomous Council, Smt. Sushila Saikia, Muga lead farmer of Golaghat, Dr. Ranjana Das, Director (I/C) and Dr Prashanth Sangannavar, Sc-B attended the meeting.



Dr. Ranjana Das briefing the participants

Dr. Ranjana Das described the muga rearing techniques and management practices along with its importance of muga culture. Dr. Prashanth explained the muga host plant nursery development and its management. The participants discussed their field rearing problems with the scientists and expressed their willingness for undergoing training in muga sector for improvement of their knowledge.

Kukurachowa, Amguri, Sivasagar

A field day was organized at Kukurachowa village of Sivasagar district on 22.12.2018. The main objectives of the field day were to give farmers a chance to showcase their achievements to fellow farmers and other stakeholders. Dr. (Mrs.) Ranjana Das, Director (i/c), Dr. K. Neog, Sc-D of; Sri Ratan Gogoi, Sericulture Demonstrator (SD), Sri Prasanta Gogoi, and Sri Dip Moni Gogoi, of state sericulture department attended the event. Sri Pankaj Hatiboruah, a progressive muga farmer of the area took the lead for organizing the event. A total of 60 farmers actively participated in the programme.



Dr.K Neog briefing the participants

Dr.K. Neog, Sc-D explained about the objectives of the programme and elaborated the activities of Central Silk Board in the field of sericulture. Sri Prasanta Gogoi, explained the tips for successful muga crop rearing which includes adoption of improved rearing practices, selection of quality cocoons, care during brushing and rearing etc. Sri Dip Moni Gogoi, briefed the methodologies to be adopted for reducing loss of worms due to diseases and pests. Dr. (Mrs.) Ranjana Das briefed host plant raising, disease and pest management, rearing management, using improved technologies in fibre extraction, dying and product diversification.



Planting of S3 Somseedling at farmer's field

A technology demonstration programme was also held simultaneously to demonstrate to the farmers regarding the use of high yielding Som plants varieties viz. S3 & S6, use of "Lahdoi", the antifungal formulation during winter crop rearing, use of "Sodium Hypochloride", during seed and

commercial crops rearing for field disinfection was demonstrated to the farmers in spot.

Deosal, Marigaon

A Field Day was organized at Deosal, Marigaon, Assam on 26.12.2018 to discuss the problems and prospects pertaining to eri silkworm rearing. The farmers were apprised about systematic plantation of Eri host plant cultivation and its management, silkwormrearing and management by Dr. M. Chutia, Sc-D, to encourage them for adopting eri culture. Sri Dilip Nath, and Ms. Premoda Nath, Demonstrators, Marigaon attended the event. A total of 71 farmers actively participated in the programme. Sri Nath stressed upon adoption of improved technologies especially to rear quality and productive seeds. He briefed about the sericulture activities including host plant raising, disease and pest management, rearingmanagement etc. Dr.Chutia emphasized that adoption of new technologies for overall development of the Muga and Eri sericulture industry is a must for tackling the changes in climatic parameters due to global warming, air and water pollution, use of pesticides in tea gardens and agricultural crops etc.

FARMERS DAY

Dhansiripar, Dimapur

A Farmers Day programme was organised at Dhansiripar, Dimapur (Nagaland) on 14th June, 2018 covering 69 farmers along with State sericulture officials, namely Shri Yashimeren, Deputy Director, DSO (Dimapur). During the programme, discussions and interactions were took place on various aspects, specially disease and pests management, disinfection activities, plantation of food plants and their maintenance etc.



Gathering of participants

Udalguri

A farmer's day programme was organized on 25.09.2018 at Udalguri Eri farmers' fields. At the outset, Dr. T. James Keisa, Sc-D, welcome the participants, Eri farmers and Director (i/c). Dr. R Das highlighted the rearing Technology on Eri Culture for successful seed and cocoon production throughout the crop seasons. Discussions were held on Eri rearing, Host plantation management, Eri silkworm disease management, Pest and disease control of host plant. There were 40 farmers came from different localities and villages of Udalguri area.



Dr. R Das and Dr. James Keisa with Eri Rearers

KalipaniGoan, Teok

Farmers' Day was organised at Kalipani Goan, Teok District on 11th October 2018. Dr. MC. Sarmah, Sc-D, highlighted the rearing Technology and emphasized disease management to reduce

the loss of cocoons caused by diseases of silkworm in the Eri and Muga culture in Assam. Dr. T. James Keisa, Sc-D, highlighted the importance of Eri silk and its utility for mankind. Dr. D.K. Jigyasu narrated the utility and its longevity of Treated bamboo in Muga & Eri rearing culture for rearing and cocooning. There was an interaction of the farmers and Scientists in the related fields of sericulture.

Another Farmers Day & Technology Demonstration programme was organised on 21st February 2019 at Koliapani, Teok, Jorhat district covering 80 muga farmers and 2 no's resource person. Sri. Pranab Bura Gohain, Muga lead farmer of Jorhat, Dr. Rajal Debnath, Sc-B and Dr Prashanth Sangannavar, Sc-B attended the meeting. Dr. Prashanth Sangannavar described the importance of muga culture for improvement of livelihood in rural economy of the country. Dr Rajal Debnath, explain how to use collapsible mountage box in eri silk worm.

Dhodang Gorla Kachari, Baruaabamun Gaon

A Farmers Day programme was organised at Dhodang Gorla Kachari Gaon, Baruaabamun Gaon P.O., Golaghat, Assam on 6th October, 2018. In the programme, 39 Eri farmers along with State sericulture officials, namely Shri Birinchi Hazarika, SD, Bokakhat Circle, Golaghat were present. Discussions and interactions were taken place on various aspects, especially economic gain through Eri culture, adoption of improved technologies evolved by the institute like rearing of improved breed (C-2), disease and pests management, plantation of food plants and their maintenance etc.

Lukhura Khonia Village, Golaghat

A Farmers Day programme was organised at LukhuraKhonia Village, Golaghat, Assam on 05.11.2018 covering 39 Eri farmers. Discussions and interactions took place on economic gain through Ericulture by adopting improved technologies like rearing of improved breed (C-2),

disease and pest management, disinfection activities, plantation of food plants and their maintenance etc. Two farmers shown their eri fabrics produced by them.



Dr. M C Sarmah briefing the participants

Dr. R. Debnath, Sc-B explained about different by-product development in Ericulture and application of silk in bio-medical applications.

AWARENESS MEETS

Dimmria, Kamrup

An Awareness Meet on Muga culture was organized on 29th June' 2018 at Dimmria, Kamrup. 67 farmers of the village and adjoining areas along with the officer from Star Cement Co. have attended the meet. Dr. R. Das, Sc-D, welcomed the participants, dignitaries and briefed the activities of the institute and its role in extension of sericulture. Dr. K. Das, retired scientist, emphasized the adoption of new technologies for overall development of the Muga and Eri sericulture. Dr. Kartik Neog, briefed about the host plant raising, disease and pest management, use of vermicompost in sericulture, development of two new breeds of Muga CMR-1 and CMR-2, rearing management, use of improved technologies in fibre extraction, dying and product diversification *etc.* Dr. Prasanth, Sc-B, demonstrated about the various products developed by this institute like Lahdoi for

control of Muscardine disease, Phytoblighton for host plant disease etc.



Participants at the awareness program

Ponka, Golaghat

A Technology awareness programme on muga culture was conducted at Ponka, Golaghat on 20-08-2018 covering 70 muga farmers and 4 resource person. Smt Mamoni Hazarika, President of Pachayat, Sri Bolo Saikia, staff of Panka VGR, Smt S Saikia, Muga lead farmer and Dr. Ranjana Das, Sc-D, Dr P. Sangannavar, Sc-B and Smt. Mitali Saikia, Sr. FA attended meeting. Dr. Ranjana Das described the importance of muga culture for improvement of livelihood in rural economy of the country. Mrs M. Hazarika, advised the all participant for coming forward to conduct muga rearing for up-liftmen of their economy and also for employment generation.

Sepon, Sibsagar

Awareness programme on Muga and Ericulture was organized at Sepon, Sibsagar district on 13-09-2018. Dr. Kartik Neog, Sc-D and Dr. G. Subrahmanyam, Sc-B, Shri Robin Bharali, a progressive farmer and Officials from Primary school, Moran were present in the programme alongwith 62 farmers. Smt. Diplai Gogoi acknowledged the Central Silk Board efforts for developing technologies to cadre the need of the seri stakeholders and pointed the importance of various extension activities for making awareness among local youth about Muga culture.



Participants at the awareness program

Dr. K. Neog, spoke about the benefits of practicing Muga culture for economic up-liftment and he informed the climate resilient sericulture. He further highlighted that importance of Muga host plant “Som nursery” as an effective tool in augmenting farmer’s income and suggested that Muga seed/ pre-seed crops are profitable. Further he practically demonstrated treated bamboo made improved mountage cum rearing trays for Eri silkworm rearing. Dr. G. Subrahmanyam, spoke about different microbial diseases of Muga and Eri silkworm and discussed about economics of Ericulture and urged the women farmers should take it as main profession. During the programme treated bamboo made improved mountage cum rearing trays for Ericulture was distributed among farmers by Dr. K. Neog.

Silchang, Marigaon

An awareness Programme on Sericulture was organized at Silchang, Marigaon, Assam on 21.12.2018. Sri SAS Rahman, Sc-D, RSRS, Boko; Sri Ataur Rahman,(ADS), Marigaon, Dr. M. Chutia, Sc-D; Ms. Manju Rani Patar Bordoloi, President, Silchang Gaon Panchayat, Sri Dilip Nath, and Ms. Premoda Nath, Demonstrators of Kaliabor and Jr. Rita Jose, Silchang Church attended the event.



View of participants in the meet

Speaking on the occasion, A. Rahman, appealed the farmers for adopting the sericulture as business because no other cultures give quick and higher return by investing a small amount of money. Sri SAS Rahman shared his knowledge in rearing of Muga and Eri silkworm and stressed upon adoption of improved technologies especially to rear quality and productive seeds. An interaction session was arranged to discuss about the various problems of the farmers. Ms. Krishna Deka, appealed the other farmers to engage themselves in eri or muga culture for more income generation. Ms. Bordoloi, spoke on the occasion and expressed her happiness to attend the event first time after her election.

TECHNOLOGY AWARENESS PROGRAMMES

Khowang, Dibrugarh

A technology awareness programme was organized at Reeling Shed Model Village Scheme, Khowang, Dibrugarh district on 07.03.2019 along with Mr. Prafulla Dekaboruah. The program witnessed active Eri farmers (60 nos.) as well as new enthusiasts (male and female) from Khowang and neighbouring areas.

Dr.Rajal highlighted the importance of low cost and highly productive Strip type collapsible mountage (STCM) Lastly, Ms Rupjyoti Das explained about the Mother moth examination

procedure along with pictures taken in rearing grainages of CMER&T Lahdoigarh.



Dr. Rajal Debnath briefing the participants

Kaliabor, Nagaon

A Technology Awareness Programme on Sericulture was organized at Kaliabor, Nagaon, Assam on 13.08.2018. Sri D. Goswami, Retired Director (i/c), Dr. K. Neog and Dr. M. Chutia, Sc-D and Dr. D.K. Jigyasu, Sc-B; Sri Jagadish Ch. Sarmah, Supdt. of Sericulture, Kaliabor; Sri Rajesh Bordoloi and Sri Khirud Deuri, Sericulture Demonstrator attended the event. A total of 71 farmers actively participated in the programme.

At the very outset, Dr. M. Chutia, explained the activities of Central Silk Board in the field of sericulture. Sri J.C. Sarmah, expressed his happiness and briefed the farmers on the adoption of methods to eradicate pathogens from rearing fields to get rid of danger of different diseases. Dr. D.K. Jigyasu, highlighted about the different training activities organized among the sericulture farmers by the institute. Dr. K. Neog, shared his knowledge in rearing of Muga and Eri silkworm and stressed upon adoption of improved technologies especially to rear new breed like C2.



Distribution of treated bamboo mountages

Sri Dulal Goswami emphasized the adoption of new technologies for overall development of the Muga and Eri sericulture. An interaction session was arranged to discuss about the various problems of the farmers. Many farmer participants requested for supply of Kesseru and Borpat saplings. Dr. K. Neog, ensured the supply of the saplings and seeds and requested the DoS officials to give a list of farmers asking for supply of the seedlings so that the same may be supplied.

Dergaon, Golaghat

A Technology Awareness was organized on 06th March 2019 at Dergaon, Golaghat district covering 61 eri and muga farmers. Sri Tileswar Bora, Eri lead farmer of Golaghat, Dr. Dharmendra Jigyasu, Sc-B and Dr Prashanth, Sc-B attended the meeting. Dr. D Jigyasu, explained collapsible box type bamboo mountage in eri silkworm, farmers discussed about the use of the mountage in rearing, cocooning and harvesting.



Group discussions during the awareness meet

TECHNOLOGY DEMONSTRATIONS

RaidangGuri Gaon, Borhola

A Technology Demonstration programme on Muga and eri culture was organized on 26th July' 2018 at RaidangGuri Gaon, Borhola, Jorhat, Assam covering 36 farmers. The technologies demonstrated in the programme were; Biological Control of Uzifly attack to Muga as well as Eri silkworms through release of *Nesonalix thymus*, the hyperparasitoid of Uzi flies; use of treated bamboo mountages for dual purposes for using as trays for rearing eri silkworms and as mountages for mature worms; application of Sodium Hypochloride as treatment to the worms for reducing incidence of diseases; disinfection of rearing hall for rearing eri silkworms; disinfection of rearing fields of muga silkworms; rearing of highly productive eri silkworm breeds like C2 etc. Dr. Neog demonstrated the use of the treated bamboo made dual purpose rearing tray cum mountage, use of hyperparasitoid of Uzi flies and that of Sodium Hypochloride as disinfectant.

Sri Dulal Goswami, Director (I/C) urged the farmers to adopt these new technologies which are cheap, eco- and farmers' friendly. He assured that, the institute will provide all sorts of technical support to the farmers including preparation of disease free layings, supply of quality silkworm seeds, seeds and seedlings of Muga and Eri host plants, and also providing training on improved

technologies for pre- and post cocoons, Finally, 100 numbers of treated bamboo mountage were distributed to the farmers present in the occasion and 5 litres of Sodium Hypochloride was also handed over to the lead farmer cum president of M/S Lakhimi Self Help Group, Mrs. LakhimaiLahon, for application during the crop going to be reared in August, 2018.

Barpathar, Golaghat

A Technology Demonstration was organised on 16th Feb, 2019, at Barpathar, Golaghat district covering 65 Muga & Eri farmers. During the programme, Dr. Ranjana Das, Dr. Dip Gogoi, Smt S. Saikia, Member of Gram Panchayat attended the programme. Dr. Ranjana Das demonstrated the use of high yielding C-2 breed for erirearing by which we can produce more silk and the rearing procedure of early instar larvae of eri silkworm. At the same time demonstration was done on use of bamboo mountage.



Dr. R Das demonstrating to the participants

Bokhaghat, Golaghat

A technology demonstration programme on prospects of Eri culture has been conducted on 25-02-2019 at Rajabari, Bokhaghat, covering 30 farmers. Dr. G. Subrahmanyam, discussed the importance of controlling diseases and pests in Ericulture during contrasting climate conditions and emphasized different management practices involved in ericulture. He demonstrated "Treated

bamboo made rearing tray cum spinning device” for Eri culture and highlighted its importance in maintaining both rearing and spinning practises for conferring good quality eri cocoons and significantly reduces time in harvesting. During the programme 10 nos of “Treated bamboo made rearing tray cum spinning devices” were distributed among farmers.



Demonstration of bamboo trays

Koliapani, Teok

A Technology Demonstration programme was organised on 21.02.2019 at Koliapani, Teok, Jorhat district covering 80 muga farmers and 2 no's resource person. Sri. Pranab Bura Gohain, Muga lead farmer of Jorhat, Dr.Rajal Debnath and Dr Prashanth attended the meeting. Dr. Prashanth gave information about the muga Host plant importance, improvement of muga host plants, nursery maintenance and establishment of seedling etc. Dr Rajal Debnath, explained on how to use collapsible mountage box in eri silk worm.



Demonstration of collapsible mountages

GROUP DISCUSSIONS

Kamalabari

A group discussion on problems and prospects of Muga culture was conducted on 23-06-2018 at Kamalabari by Dr. G. Subrahmanyam, Jeevan B, along with Shri. Paban Deuori, Seri Demonstrator, DOS Sivsagar. Dr.Ranjana Das, discussed the importance of various diseases and pest control in Muga during contrasting climate conditions. Dr. G. Subrahmanyam, emphasized different management practices to counter the incidences of diseases in Muga culture. Sri. Paban Deuori, discussed about different food plants and rearing practices of Muag culture. Dr. R. Das, explained traditional management practices of Uzi fly control. Application of Lahdoi to avoid the muscardin infection in winter crop was also discussed.

Pirakota, Jorhat

A Group discussion was held at Pirakota, Jorhat on 25.07.2018 covering 50 Muga and Eri farmers. The major discussions were on diseases and their management practices. Scientists explained the disinfection practices before and after rearing , feeding techniques to the worms and regular cleaning of rearing bed/rearing house etc.



Participants at the discussion

Borhola, Jorhat

A group discussion was held on Muga and eri culture on 26th July' 2018 at Gaon, Borhola, Jorhat, to discuss assess the eri commercial crop conducted. Mrs. Lakhima Lahon, lead farmer informed that on an average of 200-225 cocoons were harvested and 10-12 kgs of green cocoons were obtained per 100 dfls of erisilkworm. Mrs. Mamu Saikia revealed that, there was incidence of diseases in the worms and worms died of it during the rearing period in July, 2018. Briefing the discussion, Sri Dulal Goswami, Director (I/C), ensured to provide quality seeds of castor and seedlings of kesseru for plantation in the farmers' fields. He also advised the farmers to adopt all measures for disinfection of the rearing house, grainage hall and to provide quality leaves to the worms during rearing period. Speaking on the occasion, Dr. Dip Kumar Gogoi, Sc. C described the modern rearing techniques for eri silkworm and elaborated the recent advancements of both pre and post cocoon sectors of eri sericulture. He

.....

briefed about the rearing potentialities of C2 breed of Eri silkworm over the traditionally reared.

Demow, Sivasagar

A Group discussion programme was conducted at Demow, Sivasagar on 19.01.2019. covering 33 eri and muga farmers. Discussions were held mainly on the prevention disease occurrence, on time disinfection practices, systematic plantation of food plants and improvement of quality production. With the encouragement to the farmers, both emerging and skilled farmers, the programme was ended with proper discussion on various aspects of ericulture and mugaculture with the aim to enhance qualitative and quantitative silk production.

CAPACITY BUILDING AND TRAINING

Sl.	Training / Course		Target		Achievement	
			Physical	Financial	Physical (Nos.)	Financial (lakhs)
1	Structured Training Course		-	0	0	-
2	Training Impact Assessment		0	0	0	-
3	Sericulture Resource Centre (SRC)		900	6.75	1169	1.5
4	Skill Training	5 days programme	375	16.05	403	9.71
		10 days programme	50	2.14	67	1.03
Sub Total			425	18.19	470	10.74
5	Exposure visit for technology awareness		175	7.00	177	1.10
6	Tech. Orientation Programme		200	7.60	125	2.40
7	Training Programme utilizing Non CSB Funds (DOS, NERTPS etc)		330	-	361	-
Total			2030	39.54	2302	15.74

.....

BRIEF NOTES ON ACTIVITIES OF NESTED UNITS

RSRS, BOKO

Research Highlights

- ❖ Sexual multiplication of S3 & S6 morphotypes of Som were studied for comparative mortality of seedlings.

Sl. No.	Morpho-type	Seedling raised	Mortality	Balance
1	S3	40000	6800(17%)	33200
2	S6	30000	6300(21%)	23700
Total	S3 & S6	70000	13100	56900

- ❖ 70000 seedlings were raised and 10,838 seedlings were supplied to DOS Meghalaya, MSSO Guwahati, DOS Assam, DOS Manipur, DOS Kolkata and NGOs & private farmers.
- ❖ 1361 farmers were covered through Krishimela, Awareness Programmes, Field Days and Group Discussions. 45 farmers were trained under Short Term Training Programmes organised by DOS, Assam,.
- ❖ Under training programme, 5 days training to 25 farmers was imparted on Muga Culture at RSRS, Boko.
- ❖ Experimental trials on rearing of Muga silkworm were conducted to see the effect coupling time on fecundity and hatching.
- ❖ A total of 8195g DFLs were produced out of which 5625g DFLs were supplied and 2570g DFLs were consumed by RSRS, Boko.
- ❖ Under commercial Muga crop rearing 2163g DFLs were reared to produce 33508 Nos. of commercial cocoons.
- ❖ The centre generated a total revenue of Rs. 160613/-.

MUGA AWARENESS PROGRAMME

Muga Awareness Meet was organized by RSRS, Boko at Kachubari, Tamulpur, Baksa on 27.09.2018. The DOS officials Mr. Hemen Bayan, SD, Tamulpur and Kumud Chandra Sarma, SD, Nagrijuli arranged to invite 72 Muga farmers from near-by villages. The meeting was chaired by Sri Dhaneswar Das, Teacher, Kachubari High School, Tamulpur. Welcoming the gathering, Dr. M Deka, Sc-C highlighted the objectives of the meet.



Participants in the awareness program

The farmer's representatives, Sri Ramnath Brahma, Sri Bharat Rabha, Sri Mangal Rabha and Sri Hareswar Rabha highlighted the problems pertaining to Muga host plants management, silkworm rearing & management and marketing of their produces and the solutions to overcome these problems were discussed. The discussion on problems of Muga host plant cultivation & management was headed by Dr. M Deka, Sc-C, while the discussion on marketing of the produces and backward & forward linkage for Muga culture was headed by Dr. H Barman, Sc-C,. Sri Dhaneswar Das opined that the awareness meet will certainly motivate the farmers to adopt Muga culture as a subsidiary vocation for their livelihood. The day long programme was ended with vote-of-thanks giving ceremony to scientist representatives from RSRS, Boko, DOS officials and the farmers who had actively participated in the program.

TECHNOLOGY AWARENESS PROGRAMME

Muga Technology Awareness Programme was organized at Pathsala, Barpeta on 28.09.2018. The meet was arranged by the help of Sri Jiten Das, SD Bajali, DOS, Assam and around 75 Muga farmers from near-by three villages were invited. Under the Chairmanship of Sri B Rabha, Supdt of Sericulture, Bajali, Barpeta, Dr. M Deka, Sc-C highlighted the aims and objectives of the awareness meet.



Dr. SAS Rahman briefing the participants

In-depth discussions were held on envisaging the solutions to various problems posed by the farmers related to Muga host plants cultivation & management, silkworm rearing & management and marketing of their produces. Sri S.A.S Rahman, Sc-D, and Dr. M Deka, Sc-C addressed the problems associated to commercial rearing management and Host plant management respectively.

FARMER'S SKILL TRAINING PROGRAMME

A training programme on "Nursery Management of Muga Food Plants" was organized from 20.09.2018 to 26.09.2018. 25 farmers from Goalpara Districts of Assam were invited and accommodated with fooding and lodging facilities at RSRS, Boko. Dr. K Das, retired Scientist from CMER&TI, Lahdoigarh highlighted the financial implication of the training programme. The session was followed by hands-on training for 5 days on systematic Muga silkworm host plant cultivation & nursery management by Dr. M Deka, Sc-C, Muga silkworm rearing & management by Sri S. A. S.

Rahman, Sc-D and post cocoon technologies & economics by Dr. H. Barman, Sc-C. The participating farmers were apprised about latest technological interventions in Muga culture and its benefits for generating additional income for their livelihood.



Farmers being trained during the program

The farmers were also made aware of silk portal, product diversifications and marketing linkages for their produces. The whole programme was ended with certificate distribution and vote of thanks to stakeholders, organizers and CSB representatives.

FIELD DAY PROGRAMME

A Field Day was organized at Batakuchi village, Kamrup on 15.12.2018. Muga silkworm seed rearers and commercial crop rearers from nearby villages of Kamrup district were invited to discuss their problems and prospects pertaining to Muga silkworm rearing. The participating farmers were apprised about systematic Muga silkworm host plant cultivation & its management, Muga silkworm rearing & management to encourage

farmers them for adopting Muga culture for their financial upliftment. Sri SAS Rahman, Sc-D, detailed the preventive measures to counter the problems of disease & pests with latest scientific technologies developed by CMER&TI and RSRs, Boko.



Gathering of the participants

MUGA KRISHI BIGYAN MELA

A Muga Krishi Bigyan Mela was organized jointly by RSRs, Boko and Directorate of Sericulture, BTC, at Directorate of Sericulture Campus, on 13.03.2019. The Krishi Mela was chaired by Dr. Jogesh Deuri, Director, DOS, BTC, with Sri B C Phukan, IAS, Principal Secretary, BTC as Chief Guest, Dr. Jyotsna Tirkey, Director, CMER&TI, Sri Arun Basumatary, Joint Secretary, BTC; Sri B. N. Choudhury, Sc-D & Head, RO (CSB), Guwahati; Sri Sarat Deuri, Retired Joint Secretary, RO (CSB), Guwahati were honoured as Guests of Honour. Around 300 participants mainly farmers, reelers and weavers practicing Muga and Eri culture participated in the Mela.



Inauguration of MugaKrushiBigyan Mela

S.A.S. Rahman, Sc-D explained the purpose of organizing the Krishi Bigyan Mela and Sri B C Phukan encouraged the farmers to produce Muga and Eri silk yarn of good quality. Sri Arun Basumatary assured to help the farmers under his jurisdiction for upliftment of Muga and Eri culture through various schemes. In line to this, Dr. Jyotsna Tirkey numerated different developmental schemes undertaken by CSB for the development of Sericulture in NE region.

The Chairperson elaborated the uses of Muga and Eri products for diversification and value-added-branded-products to create interest of young generation to take-up Muga and Eri culture. He also stressed upon developing model farming, which would encourage new generation to adopt Muga and Eri culture. He requested for active participation of farmers in different training programmes organized by the Central Silk Board and DOSs to up-date their technical knowledge pertaining to Sericulture. A technical session chaired by Dr. Jogesh Deuri, was also held to address the problems faced by the farmers.

WORKSHOP ON “MUGA SILKWORM CROP RESCHEDULING TO MEET THE CHALLENGES OF CLIMAT CHANGE”

Due to global warming, the summer period has been extended by almost three months and the winter has been shortened by almost three months. As a result, the conventional Jethua and Kotia commercial crops were not performing well.

The farmers had been facing frequent crop losses for the last 10-12 years. To discuss these problems in detail, a workshop on “Muga silkworm crop rescheduling to meet the challenges of climate change” was organized at RSRS, Boko on 11.03.2019, under the Chairmanship of Dr. Jotsna Tirkey, Director, CMERTI. After discussions, following recommendations were made.

1. Conventional crop schedule should be substituted by postponing Kotia crop and preponing Jethua crop, which will lead to one seed crop between Kotia and Jethua crops and three seed crops between Jethua and Kotia crops.
2. The cocoons and yarn obtained from proposed commercial crops may be analyzed to ascertain the commercial characteristics of the cocoons and silk yarn.
3. Package of practices may be developed for the proposed commercial and seed crops, accordingly.
4. As per proposed crop schedule, there is only three months gap in between autumn and spring commercial crops, therefore, a new pruning schedule may be developed to produce sufficient foliage.
5. Representatives from CSB (CME&TI, MSSO, RO), DOSs and farmers may sit together for implementation of proposed crop schedule.
6. As, foot hill region of Garo Hills district of Meghalaya, Kamrup and Goalpara districts of Assam are the main seed zone for Muga culture, a committee may be formed comprising RSRS, Boko, MSSO, Hahim and MSSO, Adokgiri to explore and collect wild Muga silkworm for sustainable commercial and seed crop rearings.
7. The West Khasi hills district may be surveyed and the farmers may be provided with technical and financial assistance to make the area as buffer seed zone.

8. All the recommended package of practices on host plant improvement, field sanitation & hygiene should be effectively followed by the Research Stations and disseminate the same among farmers through Extension Programmes.

RSRS, IMPHAL

Research Highlights

- ❖ Produced 72,032 dfls and supplied to State govt and ASRs for further multiplication during spring crop 2019.
- ❖ In the GPB two species of Oak tasar silkworm *A. proylei*, *A. pernyi*, and 11 evolved breeds are being maintained.
- ❖ 6,200 Kg of vermicompost prepared and applied to the fields of RSRS, Imphal.
- ❖ Developed indoor platform rearing technology where, 35 cocoons/DFL were achieved against 16 cocoons/DFL in control during summer season and 40 cocoons/DFL were achieved against 30 cocoons/DFL in control during spring season.
- ❖ A Seri-Model village at Yumnam Khunou, Imphal was developed covering 70 mulberry farmers who reared 14,000 DFLs in two crops and obtained an average yield of 47 cocoons/100DFLs.
- ❖ Organised an Oak Tasar Krishi mela on 07.02.2019 at RSRS, Imphal campus and one Resham Krishi Mela on 23.02.2019 to popularize the latest technologies in oak tasar, mulberry rearing and grainage technologies.
- ❖ Three months' Practical Training was imparted to 5 PG Diploma (Sericulture) students on various aspects of Oak Tasar Culture from July-September, 2018.
- ❖ Conducted 11 Group discussions, 9 Field day/Farmer Days, 3 Awareness Programme, 3 Technology Demonstration and 2 Kisan Mela during the year 2018-19.

- ❖ Revenue generated was Rs. 1.9113 lakhs from sale of mulberry cuttings/saplings, cocoons, Oak tasarDfls and cocoons.

TECHNOLOGY TRANSFERS

Package of Practices for Chawki Rearing:

This technology includes package of practices for chawki rearing of mulberry silkworms. Through adoption of this technology, the cocoon yield/100 DFLs was found to be 43 kgs whereas it was 37kg/100 dfl in control. The monetary benefit was Rs. 2,400/100 DFLs over control. The technology demonstration covered 2 CRCs with 20 farmers.

Package of Practices for Late Age Rearing:

This technology includes package of practices for late age rearing of mulberry silkworms. Through adoption of this technology, the cocoon yield/100 DFLs was found to be 50 kgs whereas it was 37kg/100 dfl in control. The monetary benefit was Rs. 5,200/100 DFLs over control. The technology demonstration covered 10 farmers.

Mounting and Harvesting Technology:

This technology includes package of practices for mounting and harvesting of mature mulberry silkworms. Through adoption of this technology, the cocoon yield/100 DFLs was found to be 38 kgs whereas it was 37kg/100 dfl in control. The monetary benefit was Rs. 400/100 DFLs over control. This package, combined with package for chawki rearing and late age rearing improved the cocoon yield to 52 kgs/100 DFLs with monetary benefit of Rs.6000/100 DFLs over control. The technology demonstration covered 10 farmers.

Oak tasar egg disinfection technology:

This technology includes two steps of egg washing and disinfection, the first step being washing of newly hatched eggs with soap solution and then treating them in a mixture of equal

volume of HCl (3%) and formalin (3%), and the second step being disinfection of the eggs just 1-2 days before hatching by dipping the eggs in 0.5% NaOH followed by dipping in 3% HCl and 3% Formalin mixture for 10 minutes. This technology, the cocoon yield was found to be 35 cocoons/DFL against 30 cocoons/DFL in control. The monetary benefit was Rs. 833/100DFL over control.

Oak Tasar Pruning Technology:

This technology involves complete branch pruning during December to obtain quality foliage and initiate sprouting of oak leaves during early February. The second pruning should be conducted during July-August at low altitude in the form of light clipping and leaf plucking for second crop during September. This technology, the cocoon yield was found to be 36 cocoons/DFL as against 30 cocoons/DFL in control. The monetary benefit was Rs. 1000/100 DFLs over control.

Oak Tasar Disease Management Technology:

This technology includes the use of disease free layings, spraying of 0.02% Sodium hypochlorite once each during II and III instar and twice each during IV and V instar. This also involves other prophylactic measures such as field disinfection with lime and bleaching powder mixture (9:1), removal of dead/diseased silkworms, disinfection of rearing appliances. Adoption of this technology improved the survival rate of silkworms' upto 20% and increased cocoon yield to 36 cocoons/ DFL.

Technologies under multi-locational trial:

1717 dfls of the improved breed, RTRS-I were supplied to Dollansabi and Thumkhonglok State farms. The yield obtained was @ 42 cocoons/DFL. Trial rearing of 1562 dfls of C27 at REC, Kikrma was carried out and obtained 16560 cocoon yield (10.6 cocoon/DFL). The low yield was due to heavy larval mortality caused by hailstorms, incessant rains and cyclonic winds.

FARMERS DAY

Farmer's Day (Oak Tasar)

A Farmer's Day was organised at T.Khullen Village, Senapati District on 07.03.2019 and 100 farmers participated in the event. Dr.N.Ibotombi Singh, Sc-D presided over the function and he encouraged the farmers to take up oak tasar silkworm rearing during spring as well as summer crops. He enlisted the benefits of pursuing Oak tasar culture especially for the hill folks and requested the farmers to obtain any technical knowhow from the nearby T.Khullen centre as well as scientists of RSRS, Imphal. The farmers stressed on the need of infrastructural support for conducting summer crop rearing.

Farmers Day (Mulberry)

A farmer's day was organized on 03.07.2018 at Terakhong village, Bishnupur District to recognize the role of farmers in sericultural development and 54 farmers participated in the event. Another farmer's day was organized On 07.07.2018 at Yumna m Khunou, Imphal East to recognize the role of farmers in sericultural development and 45 farmers participated in the event.

KRISHI MELA

Oak Tasar Krishi Mela

Oak Tasar Krishi Mela was organized by RSRS, Imphal on 7th February 2019. The programme was inaugurated Shri. K. M. Hanumantharayappa, Hon'ble Chairman, Central Silk Board. He appreciated the active participation of farmers and advised the farmers to take up oak tasar culture with sincerity to achieve good production for sustainable livelihood. An exhibition with 19 stalls showcasing live demonstration of oak tasar silkworm rearing, yarn samples, oak tasar fabrics, cocoons, wild silk moths, reeling machines, different oak tasar products was also set up which

evoked much interest among farmers and invitees. A booklet entitled "Package of Practices of Oak Tasar Culture" was released. Awards were also distributed to the best farmers selected as per their rearing performances during spring crop 2018.

Resham Krishi Mela (Mulberry)

Resham Krishi Mela cum Exhibition was held at Tushen Baptist Church hall, Ukhrul by RSRS, Imphal on 23rd February, 2019, where 148 participants attended the program. Shri AS. Shinmi, Headman, Tushen village was the Chief Guest and Shri S. Kunjakishor Singh, MCS, Director of Sericulture, Govt. of Manipur was the President. Dr. Soumen Chattopadhyay, Sc-D, CSR&TI, Berhampore & Rev. Mayonsing Moinao, Pastor, were also present as Guests of Honour. Shri AS Shinmi, highlighted the scope for mulberry bivoltine sericulture in Tushen village and requested to the Director of Sericulture, Manipur to recognise as a Sericulture Model Village. Shri S. Kunjakishor Singh, appreciated the farmers of Ukhrul District particularly Tushen village for their contribution in bivoltine cocoon production in the state. Further, he informed that he will declare "Tushen" a Sericulture Model Village by getting approval from the Govt. of Manipur.

An exhibition was also organised demonstrating different technologies on pre-cocoon and post-cocoon sectors. During the mela, three progressive farmers from Ukhrul district of Manipur viz. A.S. Timrawon, A. S. Ramshing and Ningreingam were honoured as the best farmer's of the year. Besides, there was a technical session in which Shri L. Ramkumar Singh, Inspector, DoS, Manipur, and Shri A. Nilamani Meitei, T. A. addressed the queries made by the farmers related to mulberry cultivation and disease & pest of mulberry. Similarly, Dr. L. Somen Singh, Sc-D & Dr. Y. Debraj, Sc-D, explained the package of practices related to silkworm rearing and silkworm diseases respectively.

REC LAKHIMPUR**FARMER SKILL TRAINING**

A training programme was organized from 25th-29th Sep 2018 for 25 muga farmers of Lakhimpur districts in coordination with the DoS, Lakhimpur. Based on the need assessed before the training, improved technologies and its benefits were educated to the farmers. An interaction session between the trainees and trainers was held every day. In addition to the technological aspects, economics of mugaculture, product utilization and marketing were also included in the training schedule. Following are the different aspects covered under the training programme.

- Raising and maintenance of muga host plants.
- Management of pest and disease of muga host plants
- Early stage rearing of muga silkworm
- Late stage rearing of muga silkworm
- Management of pest and disease of muga silkworm
- Collection of matured worms and their mounting
- Production of disease free layings
- Post-rearing management/disinfection of rearing field etc
- Economics of muga culture
- Marketing of cocoons, yarns, etc.

TECHNOLOGY AWARENESS MEET

Three Awareness Meet on Integrated Technology Package of Muga culture was organized at Dhekiajuli, Lawkuth and Balioni, Ghilamora of Lakhimpur district in Assam on 03.08.2018, 03.11.2018 and 18.01.2019 respectively. More than 90 farmers participated in each programme. Sri D. Mech, Sc-D highlighted the recent technology of muga culture developed at CMER&TI, Lahdoigarh and improved technologies of host plant raising and management, silkworm seed production, early and late stage silkworm

rearing, pest and disease management of muga host plant and silkworm, improved cocoon spinning devices, post rearing management of field, etc.

FIELD DAY

Two Field days were organized at Dakshin Bhir, Biswanath Chariali on 13.09.2018 and at Bhugmon, Azad in Lakhimpur on 19.02.2019. Total 132 farmers along with DoS staffs were present on the first field day on 13.09.2018 and about 90 farmers were present on 19.02.2019. On both the field days, Shri D. Mech, Sc-D demonstrated the practices of host plant raising and management, silkworm seed production, early and late age silkworm rearing, pest and disease management of eri host plant and silkworm, high yielding silkworm race (C2 Breed). Farmers were also enlightened about the importance of quality seed and feed for the success of muga silkworm rearing.

VANYA RESHOM KRISHIMELA

Vanya Reshom Krishimela was organized at Sile, Arunachal Pradesh on 09.01.2019. 150 muga and eri farmers and 25 officers and officials from of Textiles & Handicraft (Seri) department participated in the Krishimela. An exhibition on recent technologies of muga and ericulture was arranged in coordination with CMER&TI, Lahdoigarh. Welcoming the participants, Shri D. Mech, spoke about the potentiality of Arunachal Pradesh with suitable climate, availability of land, to produce raw silk. The prime objective of the Krishimela was to make educate the farmers about recent technologies of sericulture. Addressing the participants, Dr (Mrs) R. Das, Director (i/c), CMER&TI, Lahdoigarh, informed spoke about the special interest of Central Silk Board and its schemes implemented in conjoint with the state agencies alongwith the continuous efforts of researchers to develop Muga and Ericulture. She also assured the supply of required quantity of seeds from CSB.

Mrs. Opung Jamoh, ADS, Itanagar appealed the farmers to learn and adopt the improved technologies for higher cocoon production. Mr. D. Riba, Assistant Director, Textiles & Handicraft, Pasighat, spoke about the possibility of inter-cropping with rice and vegetables to improve the primary source of income. Shri T. Borang, (APCS), ADC, East Siang district, He requested the farmers to involve in sericulture with steady planning and interact more with scientists to acquire knowledge about the improved technologies for resolving their problems in muga and eri culture. Farmers were demonstrated with improved technology packages in muga and eri culture, along with interaction to discuss Various problems viz, scarcity of muga and eriseeds on time, non-hatching of dfls, incidence of pest and diseases of silkworms, were discussed and necessary remedial measures were suggested during the session.

FARMERS DAY

Two Farmer Days were organized at Kawoimari Boginadi Block and Mazaguri, Azad on 16.07.2018 and 17.01.2019 respectively. Most of the families of Boginadi area are involved in sericulture and but many of them are unaware about the appropriate use of improved technologies for better production. On talking to the farmers, Sri D. Mech, Sc-D potentiality of sericulture in employment generation and explained the improved technologies and the need for advance planning of rearing to produce quality foliage and provided necessary suggestions to the farmers for overcoming the problems commonly faced by them.

GROUP DISCUSSION

REC, Lakhimpur had organized six Group Discussions with the muga farmers and DoS staffs in different muga growing areas. Details of the venue, date and number of participants are furnished below.

Date	Venue	Foot fall
14.06.2018	GohainTekela village, Lakhimpur	25
16.08.2018	Gohain Gaon, Dhakuakhana	25
18.08.2018	Singia, Ghilamora	32
24.12.2018	Japisajia State Sericulture Farm, Lakhimpur district	27
26.12.2018	Kumarkata Farm, Kadamial, Lakhimpur	25
01.01.2019	Napam, Lilabari , Lakhimpur	27
Total		161

Major problems faced by the muga farmers during different seed and commercial crop seasons specially, non availability of seeds, low hatching, high cost of seeds, diseases of silkworm, etc and probable remedial measures of the problems were discussed. During discussion, many of the farmers also expressed their views based on their experiences in muga culture.

.....

SUCCESS STORIES

Mr. Rainaba, Khullen, Manipur

Mr. Rainaba (42) is a traditional Oak tasar farmer hailing from TumuyunKhullen Village in the hilly district of Senapati, Manipur. With no educational background and having a family size of 7, he struggled in the initial years by depending solely on paddy cultivation to meet both ends. He was introduced to Oak Tasar Culture through a farmer's day organized by RSRS, Imphal in the year 2008. Taking great deal of interest in this practice, Mr. Rainaba started off Oak tasar culture simultaneously with paddy cultivation in the 10 acres of natural Oak plantations available nearby his home. He later underwent training on pre-cocoon sector at RSRS, Imphal and has taken up Oak Tasar culture as his main livelihood. He receives support in the form of rearing equipments, disinfectants and technical inputs from time to time from Field Lab, T.Khullen, a nested unit of RSRS, Imphal. By adopting all the technologies developed by RSRS, Imphal, he has set a record production of 42 cocoons /DFL and a net profit of Rs. 1 lakh in a span of 45 days.



Cocoons harvested by Rainaba during spring crop

"The spring crop rearing of 2018 has been outstanding as there was a very good hatching percentage of more than 80 percent and no

disease mortality; the returns I got from Oak tasar practice is very high in comparison with paddy" exclaimed Mr. Rainaba. Details of cocoon production by the farmer: As per his experience, regular shifting of the rearing site, less handling of the larvae and proper management during rearing accounted for the good harvest of oak tasar cocoons. He appreciated scientists and staff of RSRS, Imphal, Central Silk Board, for providing support and encouragement to involve more and more in Oak Tasar culture. He is currently planning to take up second crop rearing of Oak Tasar with the support of RSRS, Imphal alongside paddy cultivation.



Mr. Rainaba, being interviewed at RSRS, Imphal

Year	DFLs	cocoons harvested	DFL: Cocoon	Net Income
2016	1000	36,000	1:36	35,125
2017	1000	40,000	1:40	72,000
2018	1500	63,000	1:42	1,01,500

With his success, Mr. Rainaba has emerged as a "role model" to the farmers of his village. He has motivated and already guided 10 farmers to take up Oak tasar culture. He now wishes to own a private grainage with infrastructural support from Central Silk Board and supply DFLs to the farmers for boosting the Oak tasar cocoon productivity.

IMPORTANT EVENTS

Establishment Day

CMER&TI organized its 19th Establishment Day on 01.09. 2018. The day was inaugurated by Shri. Hanumatharayappa, Hon'ble Chairman of CSB, as Chief Guest. The day began with an institute flag hoisting followed by an exhibition that showcased various technologies developed by the institute along with diversified Muga and Eri fabrics.



Dr. Ranjana Das, Director (i/c) of the institute delivered welcome address and felicitated all the dignitaries. The session was inaugurated by an invocation and lighting of lamp Mr. Dilip Baruah, CEO, Fabric plus, Guwahati grace the occasion as "Guest of Honour", Dr. NR Singhvi, Sc-D, Head RCS, CO, CSB, Bangalore appreciated the institute regarding the activities and challenges taken up by the institute. He also expressed that CMER&TI is the heart and soul of Assamese people as Muga and erisilk are traditionally related to Assam people culture. He congratulated the institute for its glorious 19 years existence and its important role in Vanya silk sector.

Mr. Dilip Baruah, suggested that problems and challenges faced in the industry should be responsibility of all sericulture fraternity. Research

Institutes, farmers, NGOS, whosoever taking role in the fraternity should seriously work together for prosperity of Muga and Eri culture among rural population. He opined that continuation of sericulture as profession by future generation is a big challenge. We need to sensitize the youth towards sericulture and bring interest among them to sustain the silk industry.



Dr. B.K. Singh, Director (rtd.) congratulated all the former directors and scientists who contributed immensely to bring this institute to a premier institute level in Vanya seri sector. He suggested scientists and research scholars to work on meeting the demands of the seed production and silk production. He also pointed out to continue the *in situ* conservation project with utmost importance. Dr. Mayur Bora, IIBM, Guwahati

appreciated the new developments in R&D sector of Muga and Eri and expressed the need for focus on extension programme as well. Product diversification towards sustainable development of the society should be the main priority.

Shri. Hanumantharayappa, expressed his happiness and acknowledged the organizers for successfully organizing the 19th establishment day of the Institute. He advised all the scientists to conduct lab to land kind of works to cadre the need of farmers. He appealed State Sericulture officials to help and cooperate with CSB organization in extension programmes.



DR. R. Chakravorty, Retired Director spoke on the history of the institute and stressed upon the development of disease tolerant Muga and suggested for collaboration with IIT, Guwahati for post cocoon sector. An award distribution ceremony also conducted on the occasion, where successful farm worker, technical staff and scientists and staff of Central Silk Board were awarded. One book and one booklet were released on the occasion.

International Women's Day 2019

CMERTI had organized the "International Women's Day 2019" on 8th March, 2019 at the institute premises. The programme was inaugurated with lighting of lamp by Chief Guest Dr. Ruprekha Bordoloi, Principal, Kakajan College, Jorhat followed by cutting of Cake and invocation song by all the JRFs/SRFs of the institute.

Dr. D.K. Gogoi, Sc-C welcomed the Chief Guest and all the scientific and administrative staff. Smt. Asmat Jan, Asstt. Director (Comp.) delivered her speech on Women's Day highlighting the theme of the Women's Day 2019 'which says "think equal, build smart, innovate for change"'.



Smt. Nilakshi Saikia, TA, Miss Mainu Kalita, JRF, Dr. K. Neog, Sc-D, Sri S.K. Hazarika, Supdt., delivered their speeches and elaborated their ideas on gender equality and women empowerment. The Chief Guest, Dr. Ruprekha Bordoloi, gave her views on the role of women in the social life for building a balanced society which would be possible only when the women are considered equally. The function was ended with vote of thanks by Dr. T. James Keisa, Sc-D followed by recitation of National Anthem.

DBT sponsored Workshop-cum-training

A DBT sponsored National Workshop – cum - Training Programme on "Techniques and Technologies of Seri-biotechnology" was organized during 27 March - 2nd April, 2018 at the institute. Dr. P. Jayaraja, Director, RFRI, Jorhat graced the inaugural session as Chief Guest and interacted with the participants. In the inaugural session, Dr. M. Chutia, Organizing Secretary of the workshop briefed about the event and Dr. Ranjana Das, highlighted the main objectives and recent developments in Seri-biotechnology sector. Sri D. Goswami, Director (i/c), briefed the activities of the institute, research areas and facilities. Dr. M.C.

Sarmah, expressed the role of CMER&TI, in sericulture sector and highlighted its technologies that are currently being disseminated to the farmers.



The scientists of the institute delivered lectures on different aspects of Muga and Eri culture.. Laboratory experiments, field demonstration and visits to the Insect Repository, Grainage Operation and Museum were arranged for the participants. The trainees were exposed to firsthand experience on modern tools that can be adopted for their research programmes. Valedictory Session was held on the last day of the event. Certificates to participations were distributed.

National workshop cum hands-on training on Soil Health Management was organised by Advance Level Institutional Biotech Hub in association with Agronomy & Soil Science Section during 3-6th April, 2018. A total of 16 Research Scholar's (Dibrugarh University, AAU Jorhat, RFRI Jorhat & CMER&TI, Lahdoigarh) participated in the workshop. The workshop was inaugurated by, Dr. R. Das, Director (I/c) followed by scheduled lectures and hands-on training by guest faculties and scientists of CMER&TI, Lahdoigarh during four days programme.



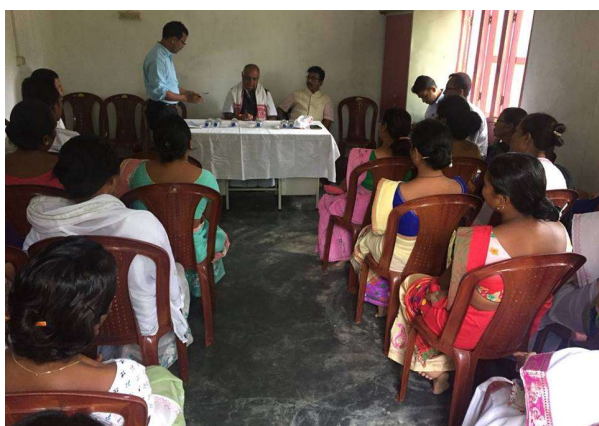
Dr. Vinodakumar S. Naik, Dr. D. K. Jigyasu & Dr. M. Chutia scientists of the institute organised the workshop and covered various aspects of soil, soil health and sustainable management of soil resources. Workshop was concluded with valedictory function & distribution of participation certificates on 6th April, 2018.

.....

VISIT OF DIGNITARIES AND GUESTS

Shri K.M. Hanumantharayappa, Hon'ble Chairman, CSB

Shri KM Hanumantharayappa, Hon'ble Chairman of Central Silk Board visited Sericulture Resource Center (SRC), Mariani on 02.09.2018. Dr. M. Chutia, Scientist-D; Dr. P. Sangannavar and Dr. V.S. Naik, Scientist-B of CMER&TI, Lahdoigarh and Dr. Vijaykumar, Deputy Secretary (Tech), CSB & P.S. to Chairman accompanied the Chairman.



View of participants

A group discussion programme was held at the SRC building of Mariani where 35 farmers attended the programme including local people and student union leaders. Sri DigantaGogoi, Lead Farmer of SRC, Mariani coordinated the programme and communicated with the local farmers to organize the event. Dr. M. Chutia, Scientist-D and Nodal Officer of SRC, Mariani introduced the guest and welcomed the Hon'ble Chairman. Sri Raktim Jyoti Baruah, Leader, Tai Ahom Student Union, Mariani also welcomed the Chairman and felicitated him with a Gamusa. Dr. Chutia briefed about the SRC, their activities, action plan, targets and achievement in the state. The farmers and participants actively took part in the interaction session and expressed their views, problems, expectation and other related issues related to sericulture.



Hon'ble Chairman interacting with farmers who exhibited their Seri-products

Later Dr. Chutia briefed about the activities of SRC, Mariani and the institute to the participants. The Hon'ble Chairman in his speech clarified all the issues raised by the farmers and participants and also assured them to take necessary steps and initiatives to fulfill their demands and solve the issues.



A group photograph of Hon'ble Chairman along with the participants during his visit to SRC

The chairman went around the SRC and also visited the exhibits (sericulture products) displayed by the local sericulture farmers. The chairman has enquired about castor and other host plant cultivation in the area. After fruitful discussion, the programme was ended with vote of thanks delivered by Sri Gogoi, Lead Farmer of SRC, Mariani.

Sri Atul Kumar Tiwari, IAS, Joint Secretary (Silk & NERTPS)

Sri Atul Kr. Tiwari, IAS, Joint Secretary (Silk & NERTPS) visited RSRS, Boko on 6th September 2018. Interaction was held among the farmers who were supported under NERTPS and based on the interaction with the farmers following suggestions were made.



Visit of RSRS, Boko by Sri Atul Kr. Tiwari, IAS, Joint Secretary (Silk & NERTPS)

- Since there is only one breed available of Muga it is necessary that CSB needs to develop a new superior breed of Muga silkworm of desirable characters by advocating modern scientific technologies to cope up with the present climatic condition.
- The Muga Silkworm Seed Organization may explore the possibility to shift the present seed zone area to higher altitude areas of NE States so that frequent seed crop failure due to adverse climatic condition is prevented.

- The DoS Assam may organize regular training programme on latest technologies for farmers as refresher training to enhance the skill of the farmers for more benefit
- The intervention sought by the farmers for additional support may be provided by the concerned should be properly addressed in converging with other line department like Handloom, Art-fed etc.

Member Secretary, Central Silk Board



Shri. Rajit Ranjan Okhandiar, IFS, Hon'ble Member Secretary of Central Silk Board, Bengaluru, visited CMER&TI, Lahdoigarh on 24th October 2018. The Member Secretary appreciated the efforts of the institute towards R&D activities and extension works. He opined that CMER&TI, Lahdoigarh is the only institute that can promote Muga & Eri culture in the country in general and state in particular.

.....

TRANSFER OF TECHNOLOGY

Sl. No	TOT Activity (Name)	Farmers covered (nos)		Impact on sericulture output
		Target	Achieved	
At CMERTI, Lahdoigarh				
1.	Construction and supply of treated bamboo appliances like Split typecollapsible mountage for eri	500	500	Cost effective, sustainable and long term use of treated bamboo devices in field. Improving the economic level of farmers through the judicious use of bamboo resources.
2.	Construction and supply of treated bamboo appliances like box typemountage for muga, chaloni etc	100	500	Training on the technology was held during September 2018.
At RSRS, Imphal				
3.	Popularization of Package of Practices of Chawki Rearing	20	20	A 40.3% increase of cocoon yield to 50.5 c/dfl was observed against 36 c/dfl in control.
4.	Popularization of Package of Practices of Late Age Rearing	10	10	
5.	Popularization of Mounting and Harvesting technology	10	10	
Total		640	1040	

.....

PLAN FOR LAND USE RESOURCE CONSERVATION

Sl.No.	Programme / Unit	Target for 2018-19	Achievement during 2018-19
A.	Raising of Som / Soalu seedlings / saplings (Raising cost Rs.4/ seedling in ploy tube)		
1.	CMER&TI, Lahdoigarh	100000	14370
2.	RSRS, Boko	100000	70000
3.	REC, Lakhimpur	5000	5500
4.	REC, Coochbehar	5000	5000
	TOTAL	210000	99870
B.	Raising of Kesseru / Borpat seedlings (Raising cost Rs. 4/ seedling in ploy tube)		
1.	CMER&TI, Lahdoigarh	10000	8000
2.	RSRS, Boko	10000	
	TOTAL	20000	8000
C.	Supply of seedlings / saplings		
	Som / Soalu seedlings (@ Rs. 5/- per seedling)		
1.	CMER&TI, Lahdoigarh	10000	5620
2.	RSRS, Boko	20000	10838
3.	REC, Lakhimpur	5000	5050
4.	REC, Coochbehar	5000	3000
	TOTAL	40000	24508
	Kesseru seedlings (@ Rs. 5/- per seedling)		
1.	CMER&TI, Lahdoigarh	8000	
2.	RSRS, Boko	10000	7000
	TOTAL	18000	7000
D.	DFLs brushing		
I.	Muga commercial crop (Cost @ Rs. 10/- per dfl)		
1.	CMER&TI, Lahdoigarh	3000	958
2.	RSRS, Boko	2500	2163
3.	REC, Lakhimpur	500	650
4.	REC, Coochbehar	500	485
	TOTAL	6500	4256

II.	Muga Seed crop (Cost @ Rs. 10/- per dfl)		
1.	CMER&TI, Lahdoigarh	1700	5147
2.	RSRS, Boko	700	1040
3.	REC, Lakhimpur	400	450
4.	REC, Coochbehar	600	600
	TOTAL	3400	7337
III.	Eri (Cost @ Rs. 5/- per dfl)		
1.	CMER&TI, Lahdoigarh	300	472
2.	RSRS, Boko	700	250
3.	REC, Fatehpur	200	-
	TOTAL	1200	722
E.	Muga commercial cocoon production		
1.	CMER&TI, Lahdoigarh	180000	67148
2.	RSRS, Boko	150000	33508
3.	REC, Lakhimpur	30000	40540
4.	REC, Coochbehar	60000	6085
	TOTAL	420000	148161
F.	Muga seed cocoon production		
1.	CMER&TI, Lahdoigarh	68000	63665
2.	RSRS, Boko	28000	29953
3.	REC, Lakhimpur	16000	17954
4.	REC, Coochbehar	24000	3100
	TOTAL	136000	114672
G.	Eri cocoon production (kg)		
1.	CMER&TI, Lahdoigarh	30	24.10
2.	RSRS, Boko	50	14.87
3.	REC, Fatehpur	20	-
	TOTAL	100	38.97
H.	Mugadfl production		
1.	CMER&TI, Lahdoigarh	13600	8395
2.	RSRS, Boko	7000	8195

3.	REC, Lakhimpur	2400	2450
4.	REC, Coochbehar	4000	400
	TOTAL	27000	19440
I.	Eri dfl production (kg)		
1.	CMER&TI, Lahdoigarh	1900	1862
2.	RSRS, Boko	10000	2150
	TOTAL	11900	4012
J.	Mugadfl supply		
1.	CMER&TI, Lahdoigarh	13600	5014
2.	RSRS, Boko	7000	5626
3.	REC, Lakhimpur	2400	2450
4.	REC, Coochbehar	4000	200
	TOTAL	27000	13290
K.	Eri dfl supply		
1.	CMER&TI, Lahdoigarh	1600	1505
2.	RSRS, Boko	9500	1875
	TOTAL	11100	3380

.....

PUBLICATIONS OF THE INSTITUTE (2018-19)

Research articles

1. Baishya M., Barman H., Rahman S. A. S., (2019), Present Status of Eri - Muga Culture in NE Region and related biodiversity resources as tool for sustainable economic uplifting of seri-Stakeholders, *International Journal of Life Science*, 5(3), 2284-2290.
2. Kalita M, Krondashree D, Das K, Chutia M, Das R, Subrahmanyam G. (2018), Diversity and distribution of biosurfactant producing plant growth promoting bacteria (PGPB) from hydrocarbon contaminated soils of upper Assam. *International Journal of Current Microbiology and Applied Science*, 7: 204-215.
3. Subrahmanyam G, Chutia M, Das R. (2019), Suitable molecular methods in the rapid diagnosis of microbial pathogens of Muga silkworm, *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae). *Research journal of Agriculture Sciences*, (Accepted).
4. Gohain, A., Sarma, R.K., Debnath, R. et al. (2019) Phylogenetic affiliation and antimicrobial effects of endophytic actinobacteria associated with medicinal plants: prevalence of polyketide synthase type II in antimicrobial strains. *Folia Microbiol* (accepted)
5. Gandotra S., Kumar A., Naga K., Bhuyan P. M., Gogoi D. K., Sharma K., Subramanian S., (2018). Bacterial community structure and diversity in the gut of Muga silkworm, *Antheraea aassamensis* Lepidoptera: Saturniidae from India. *Insect Molecular Biology*, 27(5): 603-619
6. Bhuyan P. M., Sandilya S. P., Nath. P. K., Gandotra S., Subramanian S., Kardong K., Gogoi D. K., (2018). Optimization and characterization of extracellular cellulase produced by *Bacillus pumilus* MGB05 isolated from midgut of muga silkworm (*Antheraea assamensis* Helfer). *Journal of Asia Pacific Entomology*, 21(4):1171-1181.
7. Devi S. S., Debaraj Y., Chaudhuri R. S., Singh N. I., (2019) Biology and morphometrics of *Phalera raya* Moore (Lepidoptera: Notodontidae) infesting *Quercus serrata* Thunb, *Munis Entomology and Zoology*, 14(2) (published online).
8. Chaudhuri R. S., & Subramanya, G. (2018) Prospects of molecular genetics in silkworm breeding: An Overview, *Indian Journal of Entomology*, 80(4): 1716-1719.
9. Chaudhuri R. S., Debaraj Y., & Singh N. I., (2018) Impact assessment of front line demonstration of technologies on oak tasar cocoon yield and economics, *Sericologia*, 58(3&4): 182-188.
10. Singh S., Jigyasu D. K., Roy D., Shabnam A. A., Das R., (2018). Feeding Behaviour of Two Important Predator Bugs *Eocantheconafurcellata* Wolff and *Sycanus collaris* Fabricius in Muga Ecosystem. *Research Journal of Agricultural Sciences*, 10(1): 185-188

Popular articles

- Subrahmanyam G, Kalita M, Chutia M, Das R. (2018). Repetitive sequence based polymerase chain reaction (rep-PCR) technique as a suitable diagnostic tool in silkworm pathology. *BioQuest*, 2(1): 13-15.
- Kalita M, Subrahmanyam G, Chutia M, Das R. (2018). Biodesulfurization: A step towards sulphur free air. *BioQuest*, 2(1): 23-25.

Papers presented in Conferences/seminars

- Vinodakumar, S. N., Jigyasu, D. K., Das, R. & Tamuly, B., Soil Health Card and Its Impact on Livelihood Security of Seri-Farmers of NE-India, *International Conference on Climate Change, Biodiversity and Sustainable Agriculture* (ICCBSA) 13-16 December, 2018.
- Biswas, N., Rahman, S. A. S., Neog, K., & Bagchi, R. Improvement of cocoon yield of Jethua commercial crop through alteration of crop schedule in Tarai region of West Bengal. *APSERI-2019*, 2-4th March 2019, Mysuru.
- Biswas, N., Rahman, SAS., Neog, K., and Das, R., (2019). Jarua pre seed crop of Muga silk worm under changing climatic condition in tarai Region of West Bengal. *National Seminar on Recent Trend in Ecological Research*. Assam University, Silchar.
- “Scientific approach for economic uplifting of rural tribal women folk through diversified Eri culture”. *National Seminar on Global Climatic Impact on Sustainable Development of Sericulture Industry in NE India*, Bikali College, Goalpara, Assam.
- Subrahmanyam G, Kalita M, Chutia M, Das R. Isolation, Identification and Characterization of *Gordonia* Sp. Gi, For Biodesulfurization Of Dibenzothiophene”, *APSERI-2019*, 2-4th March 2019, Mysuru.
- Chutia M., Sandilya S. P., Jeevan B., Subrahmanyam G., Vijay N., Das R., Native rhizobacteria as plant growth promoting and biocontrol agents for alternaria blight disease in Castor, a primary food plant of Eri silkworm. *APSERI-2019*, 2-4th March 2019, Mysuru.
- Subrahmanyam G, Debnath R, Kalita M, Sosanka S, Chutia M, R Das. Bacterial diversity associated with flacherie disease of Muga silkworm *Antheraea assamensis* Helfer by high throughput sequencing analysis in *International conference on Climate Change, Biodiversity and Sustainable Agriculture*, AAU, Jorhat during 13 to 16th December, 2018.
- Kalita M, Subrahmanyam G, Chutia M, Das R. Isolation and characterization of biodesulfurizing bacteria from hydrocarbon contaminated soils” in *International conference on Climate Change, Biodiversity and Sustainable Agriculture*, AAU, Jorhat during 13 to 16th December, 2018.
- D.K. Gogoi, P.M. Bhuyan, S.P. Sandilya and R. debnath. Optimization of extracellular cellulase produced by *Bacillus pumilus* MGB-05 isolated from the gut of *Antheraea assamensis* Helfer. *APSERI-2019*, 2-4 March 2019, Mysuru.
- Sailaja, P. S. Rao, D.K. Gogoi, R. Kumar, S.K. taj, S. Vidyunmala and R.K. Mishra. Development of a preservation schedule for the eggs of Muga silkworm, *Antheraea assamensis* Helfer, *APSERI-2019*, 2-4 March’ 2019 Mysuru.
- P.M. Bhuyan, T.J. Keisa, K. S. Singh, R. Luikham, D.K. Gogoi and R. Das. Semi-Synthetic Diet: Alternative food for Muga silkworm rearing, *International Conference on “Climate change, Biodiversity and Sustainable Agriculture”* Assam Agricultural University, Jorhat, Assam during 13th-16th December 2018.
- P.M. Bhuyan, S.P. Sandilya, T. J. Keisa and D.K. Gogoi. Impact of culture parameters on CMCase and β -glucosidase activity of Muga silkworm (*Antheraea assamensis* Helfer) gut bacteria, *National Seminar on “Vanya Sericulture and Ser-Biodiversity for Economic Upliftment: SeriBioEcon-2018”* organized by CMERTI, Central Silk Board from 12th to 13th March’ 2018.

- S P Sandilya, P M Bhuyan, D Kardong, D K Gogoi, M. Chutia and K Neog. Effect of Integrated Nutrient Management package on the growth and phytochemical properties of *R. communis* L., *National Seminar entitled "Vanya Sericulture and Seri-Biodiversity for Economic Upliftment- 'SeriBioEcon', 2018"* organized by CMER&TI, on 12th-13th March, 2018.
- S P Sandilya, P M Bhuyan, R Debnath, M Chutia, D Kardong and D K Gogoi (2018). Impact of nitrate reducing *Achromobacter* strains on plant growth promotion and phytochemical constituents of *Ricinus communis* grown in Assam, India, *International Seminar entitled 'Biodiverse-2018'* organized by IIT, Guwahati in coordination with ADNAT, Hyderabad on 27th -29th Jan' 2018.
- Nang SenaManpoong, Rajesh Kumar, PreetirekhaChutia, Mustaq Ahmed and D. Goswami, 2018. Use of led in attraction of pests in muga ecosystem, as an IPM component. Abstract Proceedings of *8th International Conference on Wild Silk Moths*, 22-24 January, 2018, Guwahati, Pp 34-35
- Manpoong NS, Singh Subadas, Roy Dinata, LuikhamReeta and Das Ranjana. Led light trap: physical method of insect pest control in muga ecosystem *International Conference on "Climate change, Biodiversity and Sustainable Agriculture*, AAU, December 13-16, 2018.
- Kartik Neog, M.C Sharmah and R. Das (2018). Silk biodiversity in North East India and their significance to the sustenance of livelihood, soil and water resources. Paper presented in the *27th National Conference of SCSI on "Sustainable management of soil and water resources for doubling farmers' income"* held during 25-27 October 2018 at Assam Agricultural University, Jorhat.
- Kartik Neog (2018). Technologies for Sericulture Development in NE India. "*Seminar cum NRDC Interactive Meet on FoodProcessing, Sericulture and Tea*" organized by NRDC, New Delhi at Pragna Bhawan, Agartala, Tripura, India on 7th December 2018
- Kartik Neog (2018). Sericulture: A profitable agro-based enterprise in IFS. "*Model Training Course for Extension Functionaries on Integrated Farming System for Sustainable Agriculture*" held w.e.f. 19-26 November, 2018 at Assam Agricultural University, Jorhat.
- Kartik Neog, M.C Sharmah and R. Das (2018). Silk biodiversity in North East India and their significance to the sustenance of livelihood, soil and water resources. Paper presented in the *27th National Conference of SCSI on "Sustainable management of soil and water resources for doubling farmers' income"* held during 25-27 October 2018 at Assam Agricultural University, Jorhat.
- K. Neog, M. Baruah, P. Dutta, D.K. Gogoi and R. Das. Muga Silkworm seed production: Technology for enhancement of fecundity. Paper presented in the "*International Conference Climate Change, Biodiversity and Sustainable Agriculture* Dec., 13th-16th, 2018 Organized by Assam Agricultural University and Prof. H.S. Srivastava Foundation for Science, Lucknow, at AAU, Jorhat.
- K. Neog and R. Das. Effect of commonly used insecticides on the growth and development of Nuga silkworm. Paper presented in the "*International Conference Climate Change, Biodiversity and Sustainable Agriculture*, Dec., 13th - 16th, 2018 Jointly organized by - Assam Agricultural University, and Prof. H.S. Srivastava Foundation for Science, Lucknow, at AAU, Jorhat.
- M Borkotoky, I Boiss, L John, C Sharma, M Chutia, Evaluation of antibacterial and

cytotoxicity activity of different fruit extracts of *Eleaegnuslatifolia*. In: Abstract book of the international conference on 'Climate Change, Biodiversity and Sustainable Agriculture' held at Assam Agricultural University, during 13th-16th December, 2018.

- Ponnuvel, K.M., Terenius, O., de Miranda, J., Subharani Devi, S. and Mishra, R.K. Detection of baculovirus infection in Oak Tasar silkworm, *Antheraeaaproylei* and its co-infection with iflavivirus. *APSERI-2019*, 2-4th March 2019, Mysuru.
- Y. Debaraj and N.Ibotombi Singh, Biology of *Scymnusposticalis* Sicard (Coleoptera: Coccinellidae) reared on *Dialeuroporadecempuncta*(Quaintance& Baker) (Homoptera : Aleyrodidae)*APSERI-2019*, 2-4th March 2019, Mysuru.
- N.I Singh, Ritwika SChaudhuri, S. Subharani Devi, Y. Debaraj and L. Somen Singh Comparative Rearing Performance Of Oak Tasar Silkworm In Indoor Shoot Feeding And Outdoor Rearing On Oak Bushes. *APSERI-2019*, 2-4th March 2019, Mysuru.
- L. Somen Singh, N.Ibotombi Singh and Ranjana Das, Evaluation and identification of superior interspecific F1 hybrids of oak Tasar silkworm. *APSERI-2019*, 2-4th March 2019, Mysuru.
- Singh S, Jigyasu D K, Neog K (2017). Impact assessment of petroleum crude oil on Muga Silkworm and its host plants in Assam. In: *National Seminar on "Economic Insects of NEIndia: Thrust on Recent Advances in Vanya Silks*. CMER&TI and BTC organisers, pp-15.
- Jigyasu DK, Chetia B, Singh S &Neog K. A case study: impact of petroleum crude oil on muga silkworm (*Antheraea assamensis* Helfer) and its host plants. *National Workshop on Vanya Sericulture and Seribiodiversity for Economic Upliftment*, 12th-13th March, 2018.

Books/ Book Chapter

- Subrahmanyam G, Chutia M, Das R. 2019. Advanced molecular methods in the diagnosis of microbial pathogens of *Antheraea assamensis* Helfer, In *Molecular Insect Science*, Edited L. K. Hazarika and S. Kalita, Pp: 27-34, ISBN: 978-81-928703-8-0.
- Subrahmanyam G, Sangannavar P, Saikia M, Das R. *Muscardine Disease and Its Management Practices in Muga Culture*, published by CMER&TI, Lahdoigarh, 2018.
- S.A.S. Rahman & Manabendra Deka (2018). *Package of Practices for Muga Culture*, published RSRs, Boko. September, 2018.
- N. Ibotombi Singh (2019) Biodiversity of Oak fed silkmoths in North East India and Prospects of Oak Tasar Culture in the region. In: *Proceedings of the Workshop on Sericulture in Nagaland- A New Horizon at Nagaland on 25th Feb, 2019*. Pp. 1-11.
- D. K. Jigyasu, Subadas Singh, D. K. Gogoi, "Eri Silk Culture", 2018.

Booklets/ leaflets/ News items

- R. Das, D. Goswami, (2019) "Unat muga sasutpadanor babe lobologavevastasamuh" Assamese booklet on "Production for requirement of high yield muga seed", CMER&TI Lahdoigarh.
- R. Das, D. Goswami, (2019) "Muga palonatprayojonia sadarangyan" Assamese leaflet on "General knowledge for muga rearing", CMER&TI Lahdoigarh.
- Y. Debaraj, S.Subharani Devi, Ritwika Sur Chaudhuri, L.Somen Singh &N.Ibotombi Singh (2019) *Package of Practices of Oak Tasar Culture*, CMER&TI Lahdoigarh

Seed officer/analyst

- Dr. D K Gogoi, Dr. M Deka, Dr. Rajal Debnath, Dr. P Sangannavar, Dr. Shubadas Singh, Dr. D K Jigyasu, Dr. G Subramanyam, Dr. Vinod K S Naik have completed Seed Officer's training and have been appointed as seed officers.
- Dr. Aftab A Shabnam, Dr. K Neog, Dr. D Mech, Dr. James Keisa, Dr. ReetaLuikham, Dr. S A S Rahman, Dr. Suraj Pal, Dr. N Biswas have completed Seed Analysts' training and have been appointed as seed analysts.

Workshop/Training attended

- Dr Manjunath R N has attended a workshop on "Medical Devices and Rehabilitation Engineering", held on 25-27th March, 2019 at IIT Guwahati.
- Dr. Ritwika Sur Chaudhuri attended 14 days wet lab training on "Advanced molecular biology and Biotechnology techniques" at ICAR, Imphal from 26.02.19 to 11.03.19.

Awards & Appreciation

- Dr. Prashanth Sangannavar and Dr. G Subramanyam received Dr. S. N. Choudhury memorial best scientist award-2018, CMER&TI Lahdoigarh.
- Dr. G Subramanyam received Best oral presentation award in International conference on Climate Change, Biodiversity and Sustainable Agriculture (ICBSA-2018), during 13-16th Dec, 2018, Assam Agriculture University AAU, Jorhat.
- Dr. G Subramanyam received Appreciation letter for acting as a resource person in a National Farmers Meeting "North east agriculture: Farmers' Perspective, during Dec

07-08, 2018 held at Central Agriculture University, Barapani, Meghalaya.

- Dr. M. Chutia, Scientist-D of CMER&TI, Lahdoigarh is recognized as Ph.D. Guide (Life Science) under the Faculty of Science, Dibrugarh University, Dibrugarh (Assam).

New Scientists joined

Name	Designation	Joining date
Dr. Arun Kumar	Scientist-C	03.01.2019
Dr. Amit Kumar	Scientist-C	03.01.2019
Dr. Saikat Maji	Scientist-B	02.01.2019
Dr. Manjunath R N	Scientist-B	03.01.2019
Dr. Mahesh D S	Scientist-B	03.01.2019

Retirement from Board Service

Name	Designation	Date of retire
Sri Dulal Goswami	Scientist-D	31.07.2018
Dr. M C Sarmah	Scientist-D	30.11.2018
Sri. RodenLepcha	Deputy Director	31.12.2018
Sri. N M Rahman	Asst. Director	28.02.2019
Sri. Sarbeswar Boruah	MTS	28.02.2019
Sri. Akrom Ali	MTS	30.09.2018

.....

वर्ष के दौरान संस्थान में राजभाषा हिन्दी के कार्यान्वयन तथा उसकी उपलब्धियां

वर्ष 2018-19 के दौरान संस्थान में राजभाषा हिन्दी के कार्यान्वयन से संबंधित विभिन्न गतिविधियां का संक्षिप्त विवरण नीचे मद वार दिया गया है-

1. राजभाषा अधिनियम 1963 की धारा 3(3) की स्थिति:

राजभाषा अधिनियम 1963 की धारा 3(3) के अंतर्गत जारी कुल कागजात की कुल संख्या- 278

2. हिन्दी पत्राचार की स्थिति:

क्षेत्र	हिन्दी में	अंग्रेजी में	भेजे गए कुल पत्रादि की संख्या	प्रतिशत
क	07	02	09	78
ख	-	-	-	-
ग	2754	1542	4296	64.10

3. राजभाषा कार्यान्वयन समिति की बैठक -

वर्ष के दौरान संस्थान में संस्थान की राजभाषा कार्यान्वयन समिति की 4 बैठकें आयोजित हुई।

4. हिन्दी कार्यशाला -

संस्थान में कार्यरत सभी अधिकारी व कर्मचारी को हिन्दी संबंधी नई-नई जानकारी देने के लिए वर्ष के दौरान कुल 5 हिन्दी कार्यशालाएं आयोजित की गईं। इन कार्यशालाएं में भाग लेने वाले अधिकारी व कर्मचारी की संख्या निम्न प्रकार है-

(क) हिन्दी कार्यशाला आयोजन तथा उन की तिथि:-

1. दिनांक 30.06.2018 को।
2. दिनांक 13.09.2018 को।
3. दिनांक 29.12.2018 को।
4. दिनांक 23.03.2019 तथा दिनांक 26.03.2019 को।

(ख) भाग लेने वाले अधिकारी व कर्मचारी की कुल संख्या

प्रशिक्षित अधिकारी की कुल संख्या- 44

प्रशिक्षित कर्मचारी की कुल संख्या- 36

5. राजभाषा निरीक्षण-

वर्ष के दौरान संस्थान में राजभाषा कार्यान्वयन पर हुई प्रगति का निरीक्षण श्रीबदरीयादव, सहायक अनुसंधान अधिकारी, कार्यान्वयन कार्यालय (उत्तर-पूर्वी), राजभाषा विभाग, गृहमंत्रालय, भारत सरकार, शिलपुखुरी, गुवाहाटी द्वारा किया गया।

इसके अतिरिक्त मूगा रेशम बीज संगठन, केन्द्रीय रेशम बोर्ड, गुवाहाटी ने संस्थान की संस्थान में राजभाषा हिन्दी के कार्य तथा इसकी गतिविधि का निरीक्षण किया।

6. संस्थान में हिन्दी पखवाड़ा व हिन्दी दिवस मनाया गया:

हर वर्ष की तरह इस वर्ष भी संस्थान में दिनांक 1.09.2018 से दिनांक 13.09.2018 तक हिन्दी पखवाड़ा मनाया गया। पखवाड़े के दौरान हिन्दी भाषा तथा इसके कार्य से संबंधित विषयों पर कई प्रतियोगिताएं जैसे- हिन्दी नोटिंग व

ड्राफ्टिंग, हिन्दी तत्काल भाषण, हिन्दी कविता पाठ तथा हिन्दी गीत (केवल मल्टी टाक्सिंग स्टाफ के लिए) आयोजित हुई जिसमें संस्थान के सभी वैज्ञानिकों, अधिकारियों तथा कर्मचारीवर्ग ने भाग लिया।

संस्थान में दिनांक 14.09.2018 को सांय 1-30 बजे हिन्दी दिवस तथा समापन समारोह का आयोजन किया। संस्थान के वैज्ञानिक-डी डॉ रीता लुईखाम ने उक्त समारोह की अध्यक्षता की।

अध्यक्ष महोदया द्वारा दीप प्रज्ज्वलन के साथ कार्यक्रम का शुभारंभ किया गया। हिन्दी दिवस के उपलक्ष्य में जेआर केन्द्रीय रेशम बोर्ड के अध्यक्ष महोदय तथा माननीय सदस्य सचिव के संदेश का पाठ किया गया।

इस अवसर पर डॉ टी. जैम्स कैसा, वैज्ञानिक-डी ने कहा कि अब हर क्षेत्र में हिन्दी की प्रगति दिखाई दे रही है जिसका परिणाम कार्यालय, सामाजिक तथा स्थान अथवा वाणिज्यिक क्षेत्र में हो रही है। देश के लोग खास तौर पर पूर्वोत्तर भारत के सभी राज्यों के लोग हिन्दी बोलने में इसके पहले जो झिझक थी, वह अब दूर होने लगी है।

अपने अध्यक्षीय भाषण में डॉ रीता लुईखाम, वैज्ञानिक-डी ने कहा कि केन्द्रीय सरकार के कार्यालयों में हिन्दी दिवस आयोजन कर राजभाषा हिन्दी को गरिमा के साथ मर्यादा प्रदान करना ही नहीं बल्कि केन्द्रीय सरकार के कर्मचारियों के बीच हिन्दी भाषा का प्रचार व प्रसार करना अति आवश्यक है। उन्होंने इस अवसर पर आयोजित सभी गतिविधियां तथा रंग-विरंग कार्यक्रमों को देख कर खुशी जाहिर की।

समापन समारोह के दौरान सभी प्रतियोगिताएं में विजयी प्रतिभागियों को क्रमशः प्रथम, द्वितीय, तृतीय तथा प्रोत्साहन पुरस्कार से पुरस्कृत किया गया। इसके अतिरिक्त वर्ष 2017-18 के दौरान जिन अधिकारी व कर्मचारी ने मूल रूप में हिन्दी में कार्य करते हुए 10,000 या इससे अधिक शब्द लिखा हैं, को इस अवसर पर नकद राशि से पुरस्कृत किया गया।

7. प्रकाशन:

वर्ष के दौरान हिन्दी में कई प्रकाशन किए गए हैं। इन में से दो पत्रिकाएं तथा 4 लीफलेट्स हैं जो निम्न प्रकार हैं- पत्रिकाएं

1. हिन्दीन्यजलेटर (वार्षिक, 2018-19)
2. ई-मैगजीन- 2018-19

लीफलेट्स

1. धारणीय मृदा स्वस्थ के प्रबंधन के लिए वर्मीकॉम्पोस्ट
2. मूंगा रेशम संवर्धन पर सफलता कहानी
3. एरी रेशम संवर्धन पर सफलता कहानी

.....



For any more information please contact

Director

**Central Muga Eri Research and Training Institute
Central Silk Board, Ministry of Textiles, Govt. of India
P.O. – Lahdoigarh - 785 700, Jorhat, Assam (India)
Phone: + 91-376 2335513, 2335124 Fax: +91-376 2335528
Email: cmerti@rediffmail.com / cmertilad.csb@nic.in**