

वार्षिक प्रतिवेदन ANNUAL REPORT

2017-18



केंद्रीय मूगा एरी अनुसंधान एवं प्रशिक्षण संस्थान
CENTRAL MUGA ERI RESEARCH & TRAINING INSTITUTE

(आई एस ओ ९००१: २०१५ प्रमाणित संस्थान) / (ISO 9001:2015 : Certified Institute)

केंद्रीय रेशम बोर्ड / CENTRAL SILK BOARD

वस्त्र मंत्रालय, भारत सरकार / Ministry of Textiles, Govt. of India

लाहदोईगड़, जोरहाट- ७८५७००, असम / Lahdoigarh, Jorhat-785700, Assam

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CONTENTS

Topics	Pages No.
Foreword	I - VII
Introduction	1-12
CMER&TI, Lahdoigarh at a glance	1
Mandate of the Institute	1
Human Resources	1
Extension Network	3
Organization set-up	3
Scientific Personnel	4
Delegated and Non-delegated units of CMER&TI	5
Highlights of Achievements (2017-18)	13-17
Financial Target and Expenditure	18-25
Research Advisory Committee of CMER&TI, Lahdoigarh	26-27
Achievement on Result Framework Document	28-33
List of the R&D projects	34-123
Concluded Projects	34
Ongoing R&D Projects	34
Regular Programmes	37
Pilot Studies	37
Achievements in concluded projects	38
Ongoing R & D Projects	59
Regular Programme and Pilot Projects	120
Important Events	124-132
Special Events	133-135
Other important activities of the institute	136
Extension and Training Activities	137-167
Brief notes on activities of nested units	168-178
Research Publications	179-190
Official Language - Hindi activities	191-192

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. 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*, *Samia canningie*, *Cricula trifenestrata*, etc.

Brahmaputra River valley of Assam is considered as original home of cultivated eri silkworm. 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 all time high i.e. more than 7060 MT during 2016-17. Muga silk is endemic to North East region producing golden coloured exquisite silk. The muga raw silk production has been also increasing gradually up to 171 MT during 2017-18 which is the highest 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 eri silks industry in the country. The institute has been focusing on development of farmer's friendly technologies in the areas of silkworm rearing management, host plant improvement and management, development of improved breeds, pests & diseases management, etc. and its diffusion and dissemination through farmer's participatory mode and in coordination with the NE States Department of Sericulture.

I am happy to note the institute could fulfill its goal in a remarkable extent during 2017-18. In case of Muga sector, the institute was able to develop for the first time two high yielding Muga silkworm races CMR-1 & CMR-2 by breeding procedures which are now under testing at institutional level. Moreover, the Muga silkworm mitochondrial genome is sequenced, mapped and published. The high yielding eri silkworm breed C2 which was developed by the institute and later approved by Hybrid Authorization Committee of CSB was widely popularized among the farmers and was accepted by the eri farmers. Moreover, two new

combinations 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 breed. The institute has developed 9 seri model muga and eri villages in Jorhat, Golaghat, Dibrugarh, Tinsukia, Goalpara and Sivasagar districts of Assam focusing women empowerment, additional income and employment generation through technological interventions in pre and post cocoon sectors as well as product design, diversification and natural dyeing of eri silk. Through implementation of SMVs, there was an improvement of 20.74 % and 21.25 % yield over benchmark during commercial crop, 2017 and Chatua seed crop 2018, respectively in case of muga sector and there was an improvement of 46.15 % yield over benchmark in case of eri sector.

The institute has also carried out studies on evaluation of wild muga silkworm for enhancement of fecundity and shell yield, development of forecasting and forewarning system for pest and diseases, *ex-situ* conservation of muga silkworm germplasm and integrated nutrient management package for castor, long term preservation of eri and muga silkworm seed, *etc.* The institute has established the world's first *in-situ* conservation site of muga and other wild silk moths at Golaghat, Assam. Weather station has been established at *in situ* (Upper Daigrung) and *ex-situ* site (Bogidhola farm of DoS, Assam).

During the year 2017-18, the institute emphasized on training and transfer of technologies to the doorsteps of farmers and institute implemented programmes such Seri-Model Village, Farmers' Field Schools, sericulture resource centres (SRC) on muga and eri covering large numbers of farmers in Assam, Meghalaya, Nagaland, West Bengal and Uttar Pradesh. More than 2595 farmers, persons and industry stakeholders were trained; organized Farmers' Skill Training covering 918 farmers under CBT; conducted exposure visit for technology awareness covering 205 farmers; Technology Orientation Programme covering 150 farmers; 737 farmers trained under Sericulture Resource Centres; covered 159 farmers under Post Cocoon Sector training; conducted Skilled Training sponsored by DoS under NERTPS to 405 farmers and DoS staff and 21 Project Internship. The institute and its nested units also organized a numbers of technology awareness programme, Reshom Krishi mela, field days, exhibition, group discussions, frontline demonstration, *etc.* The institute also strengthened its infrastructural facilities by establishing and commissioning the Cold Storage Facility centre for preserving muga and eri eggs; was able to obtain the approval of upgradation of the Institutional Biotech. Hub to an Advance Level Biotech. Hub from DBT; and also funding for few new research projects from CSB and DBT during this year.

It gives me immense pleasure to record my deep sense of gratitude to Prof. Kamal Malla Bujor 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 grassroots level for carrying out need based and useful research and extension services in eri and muga silk sectors.

D. Goswami
Director (I/C)

प्रस्तावना

भारत का पूर्वोत्तर क्षेत्र विविध वनस्पति तथा जीव-जन्तुओं का प्राकृतिक निवास स्थान है। इस क्षेत्र में विद्यमान सेरीसीजिनास् कीटों तथा इसके खाद्य पौधों के लिए उपयुक्त तथा सहायक पर्यावरण होने के कारण यह क्षेत्र इन कीटों का एक प्राकृतिक भूमि है। इस क्षेत्र में वाणिज्यिक रूप से दोहन रेशम अर्थात् शहतूत, मूगा, एरी और ओक तसर पाए जाते हैं तथा इसके अतिरिक्त सीरीसीजिनास् कीटों अर्थात् अटैकस, एटलस, समिया कैनिंगी, कृकुला त्रिफेनस्त्रता आदि पर्याप्त रूप में पाए जाते हैं।

एरी रेशम शलभ का मूल बासस्थान असम की ब्रह्मपुत्र घाटी माना जाता है। एरी रेशमकीट से उत्पादित रेशम वाणिज्यिक रूप से विश्व में तृतीय स्थान में सबसे अहम रेशम है जो शहतूत तथा चीनी रसर के क्रम के बाद आता है। देश में पूर्वोत्तर भारत द्वारा एरी कता हुआ कोसा तथा कता रेशम का कुल परिणाम के 98 प्रतिशत से अधिक उत्पादन करता है। इन उत्पादन के अतिरिक्त उत्तर प्रदेश, आन्ध्र प्रदेश, तामिलनाडू और उड़ीसा में एरी संवर्धन होने लगा है। एरी उत्पादन तथा इसके रेशम की मांग दिन प्रतिदिन वृद्धि हो रही है। इसका उत्पादन वर्ष 2016-17 के दौरान अब तक पाए गए उत्पादन में से बढ़कर 7060 मे.टन. से अधिक उत्पादन में बढ़ोत्तरी हुई है। पूर्वोत्तर क्षेत्र में पाए गए मूगा रेशम एक विशेष प्रकार का रेशम है जो सुनहरे रंग का उत्कृष्ट रेशम उत्पादन करता है। मूगा रेशम उत्पादन में धीरे-धीरे वृद्धि हो रही है। वर्ष 2017-18 के दौरान इसके उत्पादन में 171 मे.टन. तक वृद्धि हुई है जो अभी तक हुए उत्पादन में सबसे अधिक उत्पादन दर्ज हुआ है। मूगा रेशम कीट को निश्चित जीवीय तथा अजैव कारक से चुनौतियां का सामना करना पड़ रहा है जिससे कि इसके उत्पादन में बुरी तरह प्रभावित हो रहा है। इसके अतिरिक्त विश्वव्यापी गरमी, मौसम का बदलाव और मूगा उत्पादन में विद्यमान पर्यावरणीय प्रदूषण को नकारा नहीं जा सकता ।

केन्द्रीय रेशम बोर्ड के अधीन केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान ने बुनियादी तथा अनुप्रयोग अनुसंधान, विकासात्मक व विस्तार

गतिविधियों से संबंधित आदेशात्मक कार्य किया है जो देश के मूगा व एरी उद्योग के विकास में मदद मिले। रेशमकीट का प्रबंधन, खाद्य पौधा सुधार व प्रबंधन, विकसित प्रजनन, पीड़क व रोग प्रबंधन आदि की दिशा में कृषकों की अनुकूल प्रौद्योगिकी के विकास पर तथा कृषकों की सहभागिता को व्यापक रूप से प्रसारण का अभियान तथा राज्यिक रेशम उत्पादन विभाग के साथ सुसमन्वय स्थापित करने के प्रयास पर यह संस्थान केन्द्रित हो रहा है।

मुझे यह नोट करने में खुशी हो रही है कि संस्थान द्वारा वर्ष 2017-18 के दौरान महत्वपूर्ण गतिविधियां का लक्ष्य पूरा करने में सक्षम हुआ है। मूगा क्षेत्र के मामले में संस्थान द्वारा पहली बार दो उच्च उपज वाले मूगा रेशम की बीज सी एम आर -1 और सी एम आर-2 प्रजनन प्रक्रिया द्वारा विकसित कर सका है जो अभी संस्थानगत स्तर पर परीक्षण में है। इसके अलावा, मूगा रेशम कीट माइटोकॉन्ड्रियल जीनोम को अनुक्रमित, मानचित्र में प्रदर्शित तथा प्रकाशित किया गया है। संस्थान में अधिक उत्पादन करने वाले एरी रेशमकीट नस्ल सी-2 का विकसित किया गया तथा इसका अनुमोदन संकर प्राधिकरण समिति, केन्द्रीय रेशम बोर्ड, बेंगलूरु ने किया है जिसे व्यापक रूप से कृषकों के बीच लोकप्रिय बनाया गया है तथा एरी कृषकों द्वारा इसे ग्रहण किया गया है। इसके अतिरिक्त एरी रेशम कीट के दो नए संयोजन “वाई पी x जी बी जेड” (खोल वजन 0.53 ग्राम, बहुप्रजता संख्या-352) तथा “ जी बी एस x जी बी जेड” (खोल वजन 0.55 ग्राम, बहुप्रजता संख्या-355) विकसित किए जो वाणिज्यिक नस्ल से बेहतर हैं। संस्थान द्वारा असम के जिले क्रमशः जोरहाट, गोलाघाट, डिब्रुगढ़, तिनसुकिया, ग्वालपारा तथा शिवसागर में मूगा व एरी के 9 विलेज विकसित किया गया है जिसमें दोनों क्षेत्रों में कोसोत्तर व पूर्ववर्ती को कोसा तथा एरी रेशम के उत्पादन डिजाइन तथा विविध व प्राकृतिक रंगन की प्रौद्योगिकी के जरिए महिला सशक्तिकरण, अतिरिक्त आय और रोजगार का सृजन करने पर केन्द्रित रहा है। एस एम बी के के कार्यान्वयन किए जाने पर मूगा क्षेत्र में वाणिज्यिक फसल, 2017 तथा चतुआ बीज फसल, 2018 के बैच मार्क पर क्रमशः 20.74 प्रतिशत तथा 21.25 प्रतिशत उपज में सुधार हुआ है जबकि एरी क्षेत्र में 46.15 प्रतिशत उपज में सुधार हुआ है।

संस्थान में बहुप्रजता और खोल उपज में वृद्धि के लिए जंगली मूगा रेशम कीट, नाशक जीव तथा इससे होनेवाले रोग के लिए पूर्वानुमान और पूर्ववर्ती प्रणाली का विकास, मूगा रेशमकीट जननद्रव्य का इन-सीटू संरक्षण, एरंड के लिए एकीकृत पोषक प्रबंधन पैकेज, जंगली मूगा रेशम कीट बीज को दीर्घ दिन के लिए संरक्षण के मूल्यांकन पर अध्ययन किया गया है। संस्थान ने असम के गोलाघाट में मूगा और अन्य जंगली रेशम शलभ के लिए विश्व में पहली बार इन-सीटू साइट स्थापित किया गया है। इस साइट के निकट रेशम उत्पादन, असम के बोगिधोला फार्म में मौसम विज्ञान केन्द्र स्थापित किया गया है।

वर्ष 2017-18 के दौरान संस्थान द्वारा किसानों के घर घर जाकर मूगा व एरी पर प्रौद्योगिकी का प्रशिक्षण और स्थानांतरण पर जोर दिया गया है। संस्थान द्वारा असम, मेघालय, नागालैंड, पश्चिम बंगाल तथा उत्तर प्रदेश के अधिकतर किसानों को शामिल करते हुए सेरी मॉडल विलेज, किसान फील्ड स्कूल, सिंसीकल्चर रिसोर्स सेन्टर (एस आर सी) आदि जैसे कार्यक्रम का कार्यान्वयित किया गया। विविध प्रशिक्षण कार्यक्रम के जरिए 2595 से अधिक कृषकों, व्यक्तियों तथा उद्योग के हिताधिकारियों को प्रशिक्षित किया गया, सी टी बी के तहत 918 कृषकों का कुशल प्रशिक्षण कार्यक्रम आयोजित किया गया, प्रौद्योगिकी जागरूकता के लिए 205 एक्सपोजर याक्षाए आयोजित की गईं, 150 प्रौद्योगिकी अभिविन्यास कार्यक्रम, सेरीकल्चर रिसोर्स सेन्टर के तहत 737 किसान, कोसोत्तर क्षेत्र के प्रशिक्षण में 159 कृषकों को शामिल, एन ई आर टी पी एस के तहत रेशम उत्पादन विभाग द्वारा प्रायोजित कुशल प्रशिक्षण में 405 कृषकों, रेशम उत्पादन विभाग के कर्मचारियों तथा 21 परियोजना इंटरनशिप के लिए प्रशिक्षण आयोजन किया गया है। संस्थान तथा इसके अधीनस्थ इकाइयों द्वारा भी प्रौद्योगिकी जागरूकता कार्यक्रम, रेशम कृषि मेलाए, फील्ड डे, प्रदर्शनी, समूह चर्चाए, फ्रंटलाइन प्रदर्शन आदि आयोजित किए गए हैं। संस्थान द्वारा मूगा तथा एरी अंडे के संरक्षण की दृष्टि से शीत भंडारण की सुविधा संस्थान में स्थापित करते हुए आधारभूत सुविधाओं को मजबूत बनाया गया है जिससे संस्थानगत बायोटेक हब को उन्नत स्तर का बायोटेक हब में उन्नित करने के लिए भारत सरकार के डी बी टी से अनुमोदन प्राप्त करने में सक्षम रहा है तथा इस वर्ष

केन्द्रीय रेशम बोर्ड तथा डी बी टी से कुछ नई शोध परियोजनाओं के लिए भी वित्तीय मंजूरी प्राप्त हुई है।

मुझे प्रो. कमल मल्ल बूजोर बरूआ, उपकुलपति, असम कृषि विश्वविद्यालय तथा अध्यक्ष, अनुसंधान सलाहकार समिति, केन्द्रीय मूगा अनुसंधान व प्रशिक्षण संस्थान, लाहदोईगढ़ तथा अनुसंधान सलाहकार समिति के सभी सदस्यों को अनुसंधान व विकास के सभी अग्रणी क्षेत्रों में और मूगा व एरी उद्योग में विद्यमान समस्याओं का हल करने में उनके द्वारा दिए मूल्यवान व अहम मार्गदर्शन तथा सुझाव के प्रति कृतज्ञता व्यक्त करने में खुशी हो रही है।

मैं केन्द्रीय रेशम बोर्ड, बेंगलूरु के सक्षम प्राधिकारी को संगठन के लक्ष्य पूरा करने के साथ अनुसंधान व विकास की गतिविधियां को निष्पादन करने में सतत सहयोग प्रदान करने के लिए धन्यवाद ज्ञापित करता हूं तथा मैं उत्तर-पूर्वी क्षेत्र के रेशम उत्पादन विभागों को विकासात्मक व विस्तार सूचनाओं के आदान-प्रदान के कार्यक्रमों को प्रभावी से कार्यान्वयन किए जाने के लिए निष्ठापूर्वक प्रशंसा करता हूं। मैं सभी सहयोगी संस्थानों तथा निधि प्रदान करने वाले अभिकरणों तथा डिब्रगढ़ विश्वविद्यालय, गुवाहाटी विश्वविद्यालय, उत्तर-पूर्वी विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट, आई आई टी, खरगपुर, आई आई टी, गुवाहाटी एन ई एस ए सी, शिलांग, आर एफ आर आई, जोरहाट, आई ए आर आई, नई दिल्ली, असम कृषि विश्वविद्यालय, जोरहाट, विज्ञान तथा प्रौद्योगिकी विभाग, भारत सरकार को निष्ठापूर्वक प्रशंसा करता हूं जिनके सहयोग से देश में एक अग्रणी अनुसंधान व विकास के रूप में सक्षम बनाया है। अन्त में, उन कृषकों को अपार धन्यवाद व कृतज्ञता व्यक्त करता हूं जिन्होंने मूगा व एरी के दोनों के क्षेत्रों में विस्तार तथा अनुसंधान से संबंधित सेवाएं में विद्यमान चेतावनी के विरुद्ध लड़ाई करने में जरूरी व उपयोगी सहयोग प्रदान करते आ रहे हैं।

दुलाल गोस्वामी
प्रभारी निदेशक

INTRODUCTION

CMER&TI, LAHDOIGARH AT A GLANCE

Central Muga Eri Research & Training Institute is a R&D institute in the field of muga and eri culture, which is under the control of Central Silk Board, Ministry of Textiles, Government of India. 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 and eri culture. Muga and eri culture is a rural industry of all the North Eastern States and parts of the country. 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 and eri silkworms and thereby transforming these cultures from the state of traditional culture to a profit making and sustainable enterprises.

MANDATE OF THE INSTITUTE

- ❖ Providing R&D support for muga and eri sericulture.
- ❖ Basic, strategic and applied research to increase production and productivity of host plants and silkworms.
- ❖ Improvement of food plants and silkworm eco-races and hybrids
- ❖ Socio-economic research for assessing sustainability of newly developed technologies.
- ❖ Dissemination of findings to the end users through extension and training mechanisms.

HUMAN RESOURCES

Scientists	22
Technical staff	36
Administrative Staff	18
Supporting Staff	35

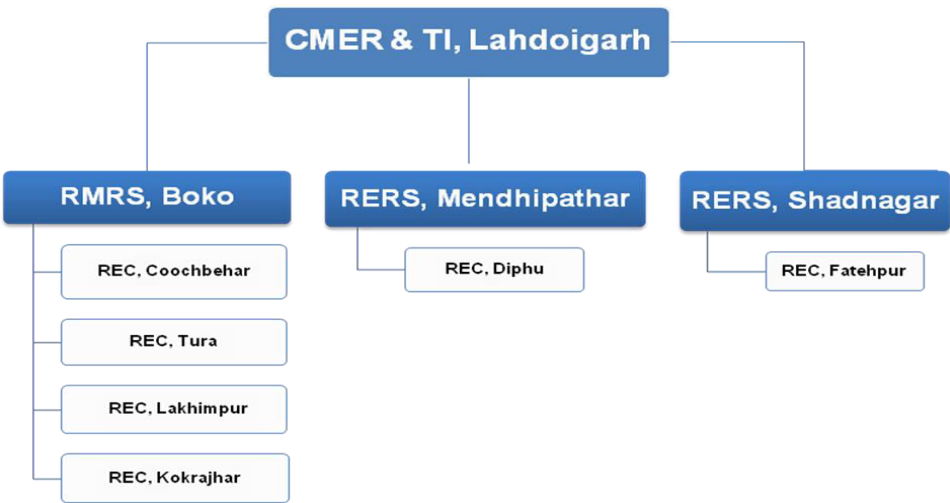
Total Staff	111
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The institute is located at Lahdoigarh, 16 km east of Jorhat, Assam, well connected with road. It has extension units in the North Eastern States, West Bengal, Uttar Pradesh and Andhra Pradesh. Scientists are working in close coordination 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.

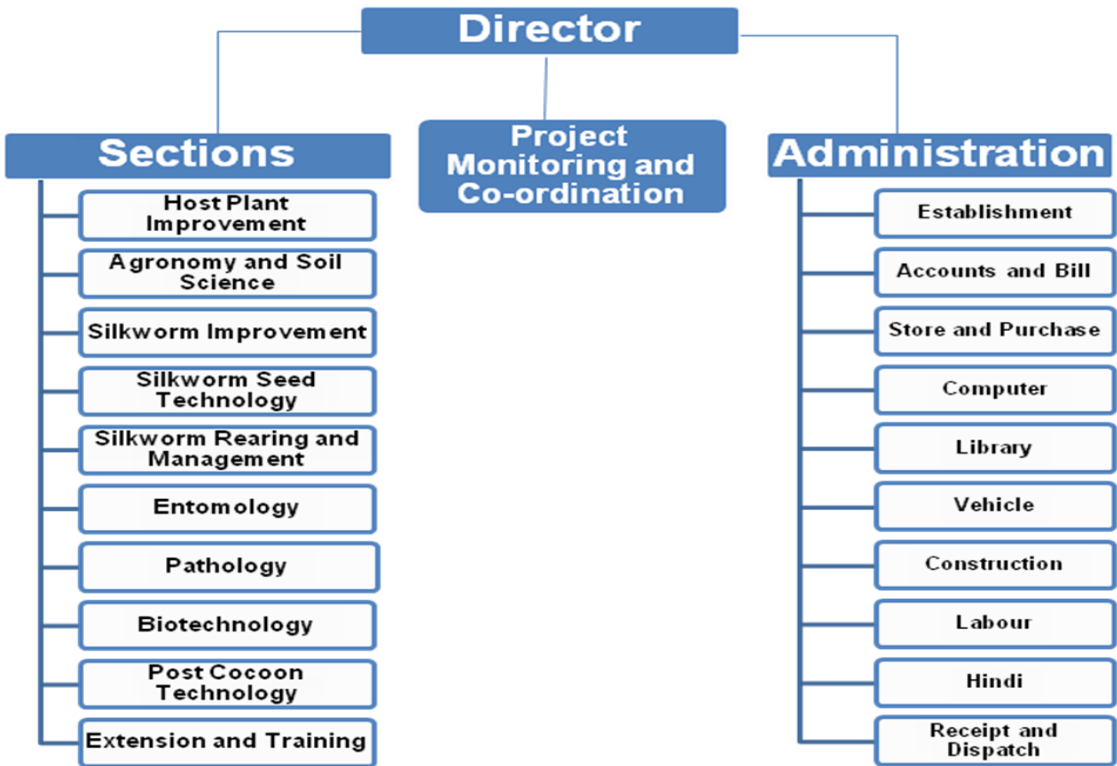
The administrative activities are carried out by ten sections viz., Establishment, Accounts & Bill, Stores and Purchase, Library, Vehicle, Construction, Labour, Computer, Hindi and Receipt & Dispatch.

To facilitate effective transfer of technologies developed by the institute and their validation in the field, Regional sericulture Research Stations and Research Extension Centres (REC) are established. Regional Muga Research Station (RMRS) is located in one of the major muga growing zones of Assam namely, Boko in the district of Kamrup. The station has been carrying out region specific adaptive research suited to the regional requirements besides providing training to farmers and grass root level extension workers. The RECs have the responsibilities of transferring technologies to the beneficiaries and also to provide all technological and input support to them. Besides these, REC, Tura in Meghalaya is sharing the responsibility of maintaining basic stocks of muga silkworm. Two Regional Eri Research Stations (RERS) are located at Mendipathar (Meghalaya) and Shadnagar (Andhra Pradesh) with similar responsibilities for eri. There are two RECs for eri, located at Diphu (Karbi Anglong, Assam, no longer available at present) and Fatehpur (Uttar Pradesh).

EXTENSION NETWORK



ORGANIZATIONAL SET-UP



SCIENTIFIC PERSONNEL (As on 31st March 2018)**I. MAIN INSTITUTE**

1. Dr. B. K. Singh	Director	Retd. on 31.08.2017
2. Shri. D. Goswami	Director (I/C)	w.e.f. 01.09.2017
3. Dr.(Mrs.) Ranjana Das	Scientist – D	
4. Mrs. Ranuma Das	Scientist – D	Up to 31.05.2017
5. Dr. K. Neog	Scientist – D	
6. Dr. M. C. Sarmah	Scientist – D	
7. Dr. Urmimala Hazarika	Scientist – D	
8. Dr.(Mrs.) M. D. Senapati	Scientist – C	
9. Dr. James Keisa	Scientist – C	
10. Dr. B. N. Sarkar	Scientist – C	
11. Dr. M. Chutia	Scientist – C	
12. Dr. D. K. Gogoi	Scientist – C	
13. Dr. Rajesh Kumar	Scientist – C	
14. Dr. S. A. Ahmed	Scientist – C	
15. Dr. D. K. Jigyasu	Scientist – B	
16. Dr. Kh. Subadas Singh	Scientist – B	
17. Dr. G. Subrahmanyam	Scientist – B	
18. Dr. Rajal Debnath	Scientist – B	
19. Dr. Ranjini M. S	Scientist – B	Up to 31.05.2017
20. Dr. Vinodakumar S Naik	Scientist – B	
21. Dr.Prashanth Sangannavar	Scientist – B	
22. Shri. Jeevan B	Scientist – B	
23. Shri. Vijay N.	Scientist – B	
24. Dr. Veerana D	Scientist – B	Up to 28.02.2018

II. RMRS, BOKO

25. Dr. S. Paliwal	Scientist – D
26. Shri. SAS Rahman	Scientist – D
27. Dr. M. Deka	Scientist – C
28. Shri. L. Sonowal	Scientist – C

III. RERS, MENDIPATHAR

1. Dr. H. Barman	Scientist – C
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IV. RERS, SHADNAGAR

2.	Dr. Praveen Kumar K	Scientist – D	
V. REC, LAKHIMPUR			
3.	Shri D. Mech	Scientist – D	
VI. REC, COOCHBEHAR			
4.	Dr. N. Biswas	Scientist – D	
5.	Dr. S. N. Bagchi	Scientist – D	Up to 31.05.2017
VII. REC, TURA			
6.	Shri. J. Kakoti	TA	
VIII. REC, KOKRAJHAR			
35.	Shri. S. Shankar	Scientist – D	
IX. REC, FATEHPUR			
36.	Dr. S. Pal	Scientist – D	
X. REC, Diphu			
37.	Shri. D. Khonikar	TA	Upto 30.10.2017

DELEGATED AND NON-DELEGATED UNITS OF CMER&TI

DELEGATED UNITS

- ❖ Central Muga Eri Research & Training Institute, Lahdoigarh, Assam
(Main Institute)
- ❖ Regional Muga Research Station, Boko, Kamrup, Assam
- ❖ Regional Eri Research Station, Shadnagar, Andhra pradesh

NON-DELEGATED UNITS

- ❖ Regional Eri Research Station, Mendipathar, Meghalaya
- ❖ Research Extension Centre, Tura, Meghalaya
- ❖ Research Extension Centre, Coochbehar, West Bengal
- ❖ Research Extension Centre, Kokrajhar, Assam
- ❖ Research Extension Centre, Diphu, Assam
- ❖ Research Extension Centre, Lakhimpur, Assam
- ❖ Research Extension Centre, Fatehpur, Uttar Pradesh

संस्थान की रूपरेखा (परिचय)

एक नज़र में केंद्रीय मूगा और एरी अनुसंधान और प्रशिक्षण संस्थान, लाहदोईगढ़

मूगा और एरी क्षेत्र में केन्द्रीय मूगा और एरी अनुसंधान और प्रशिक्षण संस्थान अनुसंधान और विकास का एक संस्थान है जो केंद्रीय रेशम बोर्ड के नियंत्रण में कार्यरत है। इस संस्थान द्वारा मूगा और एरी संवर्धन से जुड़े प्रक्षेत्र की गतिविधियां पर तथा कोसोत्तर क्षेत्रों की जरूरत को पूरा करने के लिए अनुसंधान और विकास की पूरी सक्रियताओं से सफलतापूर्वक कार्य किया जा रहा है। उत्तर पूर्व के राज्यों और देश के कुछ हिस्सों में मूगा व एरी संवर्धन एक ग्रामीण उद्योग है। अनुसंधान के संबंध में उच्च स्तरीय अनुसंधान करने के लिए संस्थान द्वारा संस्थान में बुनियादी सुविधाओं को मजबूत बनया जा रहा है। मूगा व एरी रेशम कीट की उत्पादकता में वृद्धि के लिए नयी-नयी प्रौद्योगिकताओं का विकास करना तथा राज्यों के कृषकों द्वारा अपनाए गए परम्परागत संवर्धन तकनीक को एक लाभकारी तथा सतत उद्यमों में स्थानांतरित करना संस्थान का मुख्य उद्देश्य रहा है।

संस्थान का अधिदेश

- ❖ मूगा और एरी संवर्धन के लिए अनुसंधान और विकास की सहायता प्रदान करना।
- ❖ खाद्य पौधा और रेशम कीट के उत्पादन और उत्पादकता में वृद्धि के लिए बुनियादी, रणनीतिक और अनुप्रयुक्त अनुसंधान।
- ❖ खाद्य पौधों और रेशम पारिस्थितिक प्रजाति और संकर में सुधार

- ❖ नव विकसित प्रौद्योगिकियों की स्थिरता का आकलन करने के लिए समाज-आर्थिक अनुसंधान ।
- ❖ विस्तार और प्रशिक्षण प्रणालियों के माध्यम से अंतिम उपयोगकर्ताओं को निष्कर्षों का प्रसारित करना।

मानव संसाधन

वैज्ञानिक	22
तकनीकी कर्मचारी	36
प्रशासनिक कर्मचारी	18
सहयोगी कर्मचारी	35

कुल कर्मचारी की संख्या	111
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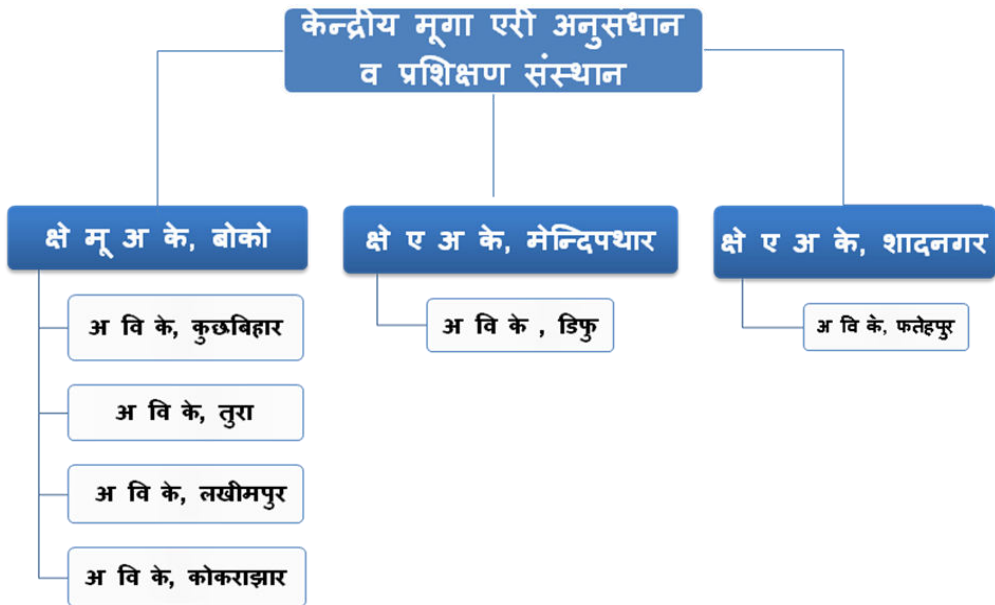
यह संस्थान लाहदोईगढ़, जोरहाट में स्थित है जो पूर्व जोरहाट से 18 कि.मी. दूरी पर स्थित है और सड़क मार्ग से अच्छी तरह से जुड़ा हुआ है। संस्थान के कई विस्तार इकाइयां हैं जो पूर्वोत्तर भारत के कई राज्यों के अतिरिक्त पश्चिम बंगाल, उत्तर प्रदेश और आन्ध्र प्रदेश में स्थित हैं। वैज्ञानिकों द्वारा कृषकों की अनुकूल प्रौद्योगिकियां, प्रक्षेत्र में इसका अनुप्रयोग, मूल्यांकन तथा प्रौद्योगिकियां व इसके प्रसारण की दिशा को व्यवस्थित रूप प्रदान करने के लिए सुसमन्वय में कार्य किया जा रहा है। संस्थान के बारह प्रभागों में अनुसंधान व विकास की गतिविधियां कार्यान्वयित हो रही हैं। इन गतिविधियों के संचालन हेतु योजना बनाने तथा मानीटर करने के लिए संस्थान में एक परियोजना मानीटरिंग अनुभाग कार्यरत है।

इसके अतिरिक्त, प्रशासनिक कार्यप्रणाली के सुसंचालनार्थ संस्थान में 10 प्रशासनिक अनुभाग हैं। ये इस प्रकार के हैं - स्थापना अनुभाग, लेखा व बिल

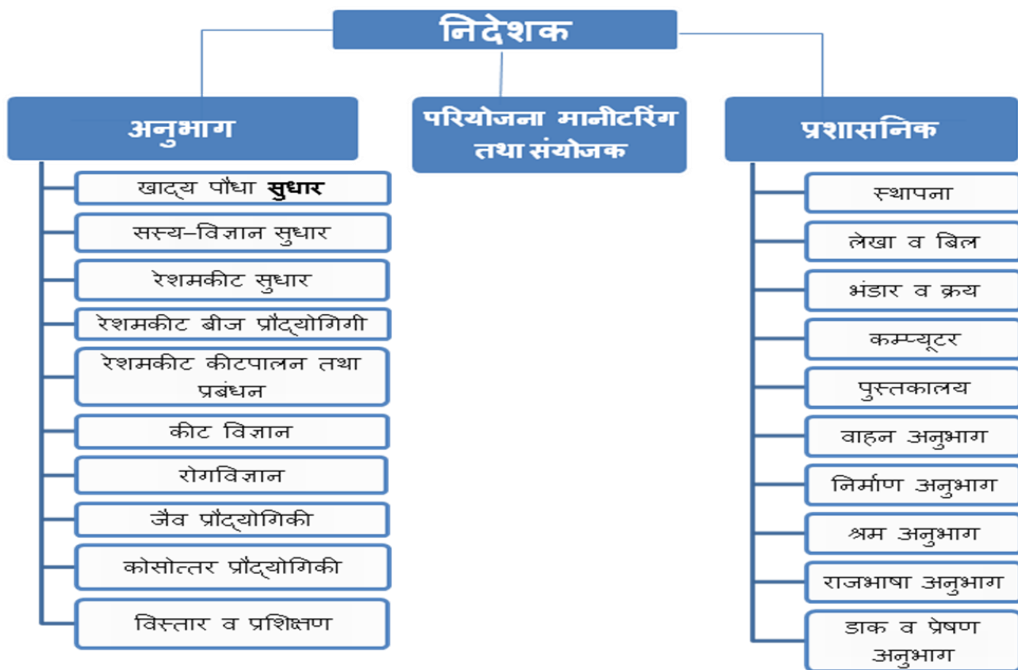
अनुभाग, भंडार व क्रय अनुभाग, पुस्तकालय अनुभाग, वाहन अनुभाग, निर्माण अनुभाग, श्रम अनुभाग, कम्प्यूटर अनुभाग, राजभाषा अनुभाग और डाक व प्रेषण अनुभाग है।

संस्थान द्वारा विकसित प्रौद्योगिकी तथा प्रक्षेत्र में इसका मूल्यांकन को प्रभावी रूप में स्थानांतरण करने के उद्देश्य से संस्थान के अधीन में क्षेत्रीय अनुसंधान केन्द्रों तथा अनुसंधान विस्तार केन्द्रों का स्थापित किया गया है। इन में से क्षेत्रीय अनुसंधान केन्द्र जो बोको, कामरूप जिले में स्थित है जिसमें क्षेत्रीय आवश्यकताओं पर अपेक्षित विशिष्ट अनुकूली अनुसंधान करने के साथ-साथ उक्त केन्द्र में कृषकों तथा जन साधारण स्तर के कर्मियों को प्रशिक्षण प्रदान करते आ रहा है। संस्थान के अधीनस्थ अनुसंधान विस्तार केन्द्रों को हिताधिकारियों को प्रौद्योगिकियां के स्थानांतरण कराने तथा उन्हें सभी प्रौद्योगिकियां प्रदान कराने और उसे परिणाम तक पहुंचाने के लिए निवेश की सहायता प्रदान करने की जिम्मेदारी दी गयी है। इसके अलावा, मेघालय में स्थित अनुसंधान विस्तार केन्द्र में मूंगा रेशम कीट का बुनियादी भंडार बनाए रखने की जिम्मेदारी संस्थान के साथ हिस्सेदारी कर रहा है। उसी क्रम में, मेन्दिपथार, मेघालय स्थित क्षेत्रीय एरी अनुसंधान केन्द्र तथा शादनगर, आन्ध्र प्रदेश स्थित में क्षेत्रीय एरी अनुसंधान केन्द्र में एरी रेशम कीट का बुनियादी भंडार बनाए रखने की जिम्मेदारी संस्थान के साथ हिस्सेदारी कर रहे हैं। एरी संवर्धन के लिए दो अनुसंधान विस्तार केन्द्र हैं जो एक डिफु, कार्वि आगलांग में स्थित है वही दूसरा केन्द्र फतेहपुर (उत्तर प्रदेश) में स्थित है। (डिफु, कार्वि आगलांग में स्थित केन्द्र जो अभी उपलब्ध नहीं है)

विस्तार नेटवर्क



संगठन-विषयक सांगठनिक ढांचा



वैज्ञानिक कार्मिक (दिनांक 31-03-2018 से)

I मुख्य संस्थान

01	डॉ बी के सिंह	निदेशक	सेवानिवृत्त	दिनांक
			31.08.2017 को	
02	श्री दुलाल गोस्वामी	निदेशक (प्र)	दिनांक 01.09.2017 से	
03	डॉ (श्रीमती) रंजना दास	वैज्ञानिक-डी		
04	श्रीमती राणुमा दास	वैज्ञानिक-डी	दिनांक 31.05.2017 तक	
05	डॉ के नेउग	वैज्ञानिक-डी		
06	डॉ एम सी शर्मा	वैज्ञानिक-डी		
07	डॉ उर्मिमाला हाजरिका	वैज्ञानिक-डी		
08	डॉ (श्रीमती) एम डी सेनापति	वैज्ञानिक-सी		
09	डॉ टी जैम्स कैसा	वैज्ञानिक-सी		
10	डॉ बी एन सरकार	वैज्ञानिक-डी		
11	डॉ एम चूतिया	वैज्ञानिक-सी		
12	डॉ डी के गोगोई	वैज्ञानिक-सी		
13	डॉ राजेश कुमार	वैज्ञानिक-सी		
14	डॉ एस ए अहमद	वैज्ञानिक-सी		
15	डॉ डी के जिजासु	वैज्ञानिक-बी		
16	डॉ के सुवादास सिंह	वैज्ञानिक-बी		
17	डॉ जी सुब्रहमन्याम	वैज्ञानिक-बी		
18	डॉ राजल देबनाथ	वैज्ञानिक-बी		
19	डॉ रंजिनी एम एस	वैज्ञानिक-बी	दिनांक 31.05.2017 तक	
20	डॉ विनोदाकुमार एस नायक	वैज्ञानिक-बी		
21	डॉ प्रशान्त संगण्णवर	वैज्ञानिक-बी		
22	श्री जीवन बी	वैज्ञानिक-बी		
23	श्री विजय एन	वैज्ञानिक-बी		
24	डॉ बीरना डी	वैज्ञानिक-बी	दिनांक 28.02.2018 तक	

II क्षेत्रीय मूगा अनुसंधान केन्द्र, बोको

- | | | |
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| 25 | डॉ एस पालीवाल | वैज्ञानिक-डी |
| 26 | श्री एस ए एस रहमान | वैज्ञानिक-डी |
| 27 | डॉ एम डेका | वैज्ञानिक-सी |
| 28 | श्री एल सोनावाल | वैज्ञानिक-सी |

III क्षेत्रीय एरी अनुसंधान केन्द्र, मेन्दिपथार

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| 29 | डॉ एच बर्मण | वैज्ञानिक-सी |
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IV क्षेत्रीय एरी अनुसंधान केन्द्र, शादनगर (अ.प्र.)

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|----|--------------------|--------------|
| 30 | डॉ प्रवीण कुमार के | वैज्ञानिक-डी |
|----|--------------------|--------------|

V अनुसंधान विस्तार केन्द्र, लखीमपुर

- | | | |
|----|-----------------|--------------|
| 31 | श्री दिगन्त मेच | वैज्ञानिक-डी |
|----|-----------------|--------------|

VI अनुसंधान विस्तार केन्द्र, कुछबिहार (वे.बे.)

- | | | |
|----|----------------|--------------|
| 32 | डॉ एन विश्वास | वैज्ञानिक-डी |
| 33 | डॉ एस एन बागची | वैज्ञानिक-डी |

दिनांक 31.05.2017 तक

VII अनुसंधान विस्तार केन्द्र, तुरा

- | | | |
|----|-------------------|-----------|
| 34 | श्री जितेन काकति, | तक. सहायक |
|----|-------------------|-----------|

VIII अनुसंधान विस्तार केन्द्र, कोकराझार

- | | | |
|----|--------------|--------------|
| 35 | श्री एस शंकर | वैज्ञानिक-डी |
|----|--------------|--------------|

IX एरी अनुसंधान प्रसार केन्द्र, फतेहपुर (उ.प्र.)

- | | | |
|----|-----------|--------------|
| 36 | डॉ एस पाल | वैज्ञानिक-डी |
|----|-----------|--------------|

X अनुसंधान विस्तार केन्द्र, डिफु

- | | | |
|----|---------------|-----------|
| 37 | श्री डी खनिकर | तक. सहायक |
|----|---------------|-----------|

दिनांक 30.10.2017 तक

केंद्रीय मूगा और एरी अनुसंधान और प्रशिक्षण संस्थान, लाहदोईगढ़ के प्रत्यायोजित तथा गैर-प्रत्यायोजित इकाइयों

प्रत्यायोजित इकाइयों

- ❖ केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान, लाहदोईगढ़, असम (मुख्य संस्थान)
- ❖ क्षेत्रीय मूगा अनुसंधान केन्द्र, बोको, कामरूप, असम।
- ❖ क्षेत्रीय एरी अनुसंधान केन्द्र, शादनगर, आन्ध्र प्रदेश

गैर-प्रत्यायोजित इकाइयों-

- ❖ क्षेत्रीय एरी अनुसंधान केन्द्र, मेन्दिपथार, मेघालय
- ❖ अनुसंधान विस्तार केन्द्र, तुरा, मेघालय
- ❖ अनुसंधान विस्तार केन्द्र, कुछबिहार, पश्चिम बंगाल
- ❖ अनुसंधान विस्तार केन्द्र, कोकराझार, असम
- ❖ अनुसंधान विस्तार केन्द्र, डिफु, असम
- ❖ अनुसंधान विस्तार केन्द्र, लखीमपुर, असम
- ❖ अनुसंधान विस्तार केन्द्र, फतेहपुर, उत्तर प्रदेश

HIGHLIGHTS OF ACHIEVEMENTS (2017-18)

The Central Muga and Eri Research & Training Institute, Lahdoigarh, Jorhat in a network of RMRS, Boko, RERS, Shadnagar, RERS, Mendipathar and RECs located at Lakhimpur, Coochbehar, Tura, Diphu, Mangaldoi, Kokrajhar and Fatehpur provides R& D support in muga and eri sectors for the development of the industries.

Major achievements in research:

During 2017-18, 24 research projects were carried out, out of which 3 projects are DBT funded, 3 projects are DST funded, 1 project is NERTPS funded and remaining 17 are CSB funded. Four projects were concluded, 4 were newly initiated and remaining 16 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 and 2 pilot studies were conducted at the institute as well as at farmers' level. A brief highlight of the research works done during the year 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 and phenol content of leaves have been estimated for all the rearing seasons.
- A total of 1271 soil samples have been collected covering Assam, Nagaland, Manipur, Meghalaya, Mizoram and Arunachal Pradesh. 1094 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.
- Antagonistic bacteria were isolated and indentified from castor rhizospheres which are promising against *Alternaria* blight of castor.

- During the year, 1,80,740 nos. of Muga host plants were raised and 27,996 nos. were supplied and 52,500 nos. of Eri host plants were raised and 13,570 nos. were supplied to the farmers under different programmes.

Silkworm Improvement, Production and Protection

- Muga silkworm mitochondrial genome is sequenced, mapped and published.
- Two high yielding Muga silkworm races CMR-1 & CMR-2 have been developed by breeding procedures which are now under testing at institutional level.
- Two thousand 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.
- Established the world's first *in-situ* conservation site of muga and other wild silk moths at Golaghat, Assam. Weather station has been installed at *in-situ* site and *ex-situ* site at Bogidhola farm of DoS, Assam near the site.
- LED traps are used for controlling insect pests in muga silkworm rearing. One solar trap with lure has been found to be very effective in attracting Uzifly infesting muga silkworm.
- Two New combination of eri silkworm's 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 breed.
- A new chemical formulation has been developed for application in the rearing field as disinfectants. Muga silkworm mid gut microbiome associated with flacherie diseases has been deciphered.
- Biosurfactant producing bacteria viz. *Bacillus* sp., *Enterococcus* sp., *Pseudomonas* sp., *Staphylococcus* sp., and *Serratia* sp. were identified which 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.

- 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.
- 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.

Capacity Building and Training

- A total 2595 farmer's, and industry stakeholders were trained.
- Organized Farmers' Skill Training (CBT) – covering 918; Exposure visit for technology awareness – covering 205; Technology Orientation Programme- covering 150; Under Sericulture Resource Centres (Farmers) – 737 farmer's sanitized; Training under Post Cocoon Sector - covering 159; Skilled Training sponsored by DoS under NERTPS – covering 405 stakeholders; Project Internship – covering 21 persons.
- 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 seri-biotechnology related areas.
- One national level workshop on “Vanya Sericulture (Muga & Eri) and Seri-Biodiversity for Economic Upliftment “SeriBioEcon, 2018” was organized at this institute on 12-13th March, 2018, where 116 scientists / scholars / students from different organizations / universities participated.
- One national level workshop on “Vanya Sericulture (Muga & Eri) and Seri-Biodiversity for Economic Upliftment “SeriBioEcon, 2018” was organized at this institute on 12-13th March, 2018, where 116 scientists / scholars / students from different organizations / universities 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 were participated.
- One training programme on “Preparation of composting using biowaste materials for mushroom cultivation” sponsored by DBT, New Delhi was organized at this institute on 14th March, 2018, where 43 Scientists / scholars / students and farmers from different organizations / universities were participated.

Transfer of Technology

- Three Vanya Resham Krishimelas, 15 Field Days, 17 Farmers Days, 22 Awareness Programmes and 35 Group Discussions were organized by the institute. A total of 5470 persons were sensitized through these activities during the year.
- Under 9 SMVs, more than 2505 farmers / beneficiaries were sensitized for advanced and improved technologies of Muga and Eri.
- Under the SMVs, during Katia commercial crops-2017, 191 farmers conducted muga silkworm rearing, brushed 68,621 nos. of muga dfls, produced 35,95,856 commercial cocoons and produced 754.12 kg raw silk. During Chatua seed crop, 86 farmers conducted muga silkworm rearing, brushed 28,552 nos. of muga dfls, produced 14,82,459 cocoons. There was an improvement of 20.74 % and 21.25 % yield over bench mark during commercial crop, 2017 and Chatua seed crop 2018, respectively.
- In case of Eri SMVs, during autumn crop, 300 farmers conducted eri silkworm rearing, brushed 9780 nos. of eri dfls, produced 1014.4 kg cocoons. There was an improvement of 46.15 % yield over benchmark

PUBLICATIONS OF RESEARCH INSTITUTES

During 2017-18, CMER&TI published 19 research papers in National and international peer reviewed journals, 7 popular articles, 55 conference / workshop papers / abstracts, 14 technical leaflets / bulletin, 4 CMER&TI

News Letters, 1 Hindi Newsletter, 6 books, 1 Magazine and the Annual Report of the institute for 2016-17.

OTHER ACTIVITIES

- Guest Lectures were delivered by scientists from different institutes / organizations viz. SBRL. Kodathi, AAU, Jorhat; Mississippi State University, USA; Shivaji University, Kolhapur, Maharashtra were organized in the institute where 116 scientists / scholars participated.
- National Science Day was observed on 28th February, 2018 where eminent social scientist Peggy Carswell, Coordinator and Founding Board Member of NGO “FERTILE GROUND” of British Columbia, Canada participated and delivered lecture on “Organic Farming”
- Swachha Bharat Abhiyan, Swachha Hi Sewa, Swachhata Pakhwada, World Environment Day, International Yoga Day, World Science Day, World Soil Day, International Women’s Day etc. were celebrated by the institute.
- Two scientists of the institute participated in invited Radio Talks on “Eri product, by-products and product diversification” and “Enhancement of income by muga silkworm rearing”.
- Renewed ISO 9001: 2015 certificate for the institute during July, 2017.
- Received ISO 9001: 2008 certificate for RMRS, Boko during July, 2017.

FINANCIAL TARGET AND EXPENDITURE

(Rupees in lakhs)

Particulars	Consolidated Provisions							
	Estimated budget				Actual expenditure			
	Recurring	Capital Assets	Salary	Total	Recurring	Capital Assets	Salary	Total
	GIA-31	GIA-35	GIA-36		GIA-31	GIA-35	GIA-36	
Non-Plan	-	-	1756.34	1756.34	-	-	1479.30	1479.30
Normal Plan NE	295.94	513.27	-	809.21	280.60	334.31	-	614.91
Plan	71.09	-	-	71.09	62.88	-	-	62.88
Total	367.03	513.27	1756.34	2636.64	343.48	334.31	1479.30	2157.09

वर्ष 2017-2018 की उपलब्धियां का मुख्यांश

केन्द्रीय मूगा एरी अनुसंधान व प्रशिक्षण संस्थान, लाहदोईगढ़, जोरहाट के साथ जुड़े क्षेत्रीय मूगा अनुसंधान केन्द्र, बोको, क्षेत्रीय एरी अनुसंधान केन्द्र, शादनगर, क्षेत्रीय एरी अनुसंधान केन्द्र, मेन्दिपथार के अतिरिक्त लखीमपुर, कुछबिहार, तुरा, डिफु, मंगलदोई, कोकराझार तथा फतेहपुर में स्थित अनुसंधान विस्तार केन्द्रों द्वारा मूगा तथा एरी क्षेत्रों से संबंधित उद्योग के विकास के लिए अनुसंधान व विकास का सहयोग प्रदान करते हैं।

अनुसंधान में प्रमुख उपलब्धियां:

वर्ष 2017-18 के दौरान संस्थान तथा इसके अधीनस्थ इकाइयों में कुल 18 परियोजनाएं कार्यान्वयित की गयी थीं। इन में से 3 परियोजनाएं डी.बी.टी. की निधि द्वारा प्रदत्त, 3 परियोजनाएं डी.एस.टी. की निधि द्वारा प्रदत्त तथा 1 परियोजना एन.ई.आर.टी.पी.एस. द्वारा प्रदत्त तथा शेष 17 परियोजनाएं केन्द्रीय रेशम बोर्ड की निधि द्वारा प्रदत्त हैं। इन परियोजनाएं में से 4 परियोजनाएं समाप्त हुई, 4 परियोजनाएं शुरूआत की गयी हैं जबकि शेष 16 परियोजनाएं पिछले वर्ष से चल रही हैं। सभी अनुसंधान परियोजनाएं भिन्न-भिन्न वर्गीकरण में आते हैं जिसमें पर्यावरण संबंधी चुनौती और विश्वव्यापी गरमी, कठोर और उबाऊ काम का घटाव और महिला अनुकूल प्रौद्योगिकियों, निवेश लागत की कटौती और पर्यावरण-अनुकूल और जैविक खेती आदि शामिल हैं। इसके अतिरिक्त संस्थान तथा कृषक स्तर पर 1 नियमित कार्यक्रम और 1 प्रमुख अध्ययन का कार्य किया गया था। इस वर्ष के दौरान संस्थान द्वारा सम्पन्न किए गए अनुसंधान संबंधी कार्यों का संक्षिप्त विवरण नीचे दिया गया है।

खाद्य पौधा सुधार, उत्पादन तथा सुरक्षा

- मूगा रेशम कीट के लिए सबसे बेहतर खाद्य पौधा सोम में पाए गए फाइटोकेमिकल घटकों के मूल्यांकन तथा व्यापक पोषक प्रबंधन पैकेज विकसित करने के लिए सोम के पौधे का वर्णनकर्ता के अनुसार 19 मोर्फोलॉजिकल पैरामीटर दर्ज किया गया है। कीट पालन हेतु सभी ऋतुओं के लिए पत्तियों की नमी, प्रोटीन और पत्तियों की फिनोल सामग्री आदि का आकलन किया गया है।
- असम, नागालैंड, मणिपुर, मेघालय, मिजोराम और अरुणाचल प्रदेश से कुल 1271 मिट्टी के नमूने एकत्र कर 1094 मिट्टी के नमूने का विश्लेषण किया गया है। मृदा स्वास्थ्य कार्ड (एस .एच.सी.) 608 किसानों के लिए विकसित किया गया है। असम के 244 किसानों के लिए मृदा स्वास्थ्य कार्ड (एस .एच.सी.) का डिजिटलीकरण कार्य पूरा किया गया है।
- एंटीगोनिस्टिक बैक्टीरिया को केस्टर राइटोस्फीयर से अलग कर उसकी पहचान की गई जिसे कैस्टर का अल्टेमरिया ब्लाइट से उत्कृष्ट पाया गया है।
- वर्ष के दौरान 1,80,740 मूगा खाद्य पौधे तथा 52,500 एरी खाद्य पौधे उगाए गए तथा विभिन्न कार्यक्रमों के तहत किसानों को 52,500 मूगा खाद्य पौधे और 13,570 एरी खाद्य पौधे आपूर्ति किए गए।

रेशम कीट सुधार, उत्पादन तथा सुरक्षा

- [मूगा रेशम कीट माइटोकोण्ड्रियल जीनोम को अनुक्रमित, मानचित्र में दिखाया गया तथा प्रकाशित किया गया है।
- [दो उच्च उपज वाले मूगा रेशम कीट की प्रजातियां अर्थात् सी एम आर -1 और सी एम आर -2 प्रजनन प्रक्रिया द्वारा विकसित किया गया है जो अब संस्थागत स्तर पर परीक्षण में है।

- [संस्थान में प्रशिक्षित उद्यमियों ने उपचारित बांस का प्रयोग करते हुए 2000 एरी कोलोसिबल माउंटेज तैयार किए गए तथा इन सामग्रियों को असम व नागालैंड के विभिन्न स्थानों पर किसानों व लाभार्थियों को वितरित किया गया।
- [असम के गोलाघाट जिले में मूगा तथा अन्य वन्य रेशम शलभ हेतु विश्व का पहला इन-सीटू संरक्षण साइट स्थापित किया गया है। इस साइट के निकट रेशम उत्पादन विभाग, असम सरकार के बगीधोला फार्म में मौसम विज्ञान केन्द्र स्थापित किया गया है।
- [मूगा रेशम कीट के कीटपालन में कीट पीड़क के नियंत्रण के लिए एल.ई.डी. जाल का प्रयोग किया जाता है। मूगा कीट को आक्रमण करनेवाले ऊजी मकखी को सौर की किरण से आकर्षित कर सौर जाल का प्रयोग बहुत प्रभावी साबित हुआ है।
- [एरी रेशम कीट के दो नए संयोगन अर्थात् वाई.पी. x जी.बी.जेड. (खोल वजन 0.53 ग्राम: 352 अंड जनन क्षमता संख्या) और जी.बी.एस. x जी.बी.जेड. (खोल वजन 0.55 ग्राम: 355 अंड जनन क्षमता संख्या) विकसित किया गया जो वाणिज्यिक नस्ल से बहुत बेहतर हैं।
- [कीटपालन क्षेत्र में कीटाणुशोधक के रूप में एक नया रासायनिक फार्मूलेशन विकसित किया गया है। मूगा रेशम कीट के मध्य आंत में माइक्रोबायम जिसे फ्लाछेरी रोगों से जुड़े हुआ समझा गया है।
- [बायोसुरफैक्टेंट उत्पादन करने वाले बैक्टीरिया जैसे बैसिलस स्पसिस, एंटरोकोकस स्पेसिस, स्यूडोमोनास स्पसिस, स्टाफिलोकोकस स्पसिस और सेरातिया स्पसिस आदि की पहचान कर उन्हें अपर असम में मूगा उत्पादन होने वाले क्षेत्रों के निकट स्थानों से हाइड्रोकार्बन प्रदूषित मिट्टी से अलग किए गए। बायोसुरफैक्टेंट उत्पादन करने वाले बैक्टीरिया को

- तेल से प्रदूषित क्षेत्रों और मिट्टी के नमूने से अलग कर 16 एस.आर.आर.एन.ए. पी.सी.आर. का प्रवर्धन तथा विशुद्धिकरण किया गया।
- [लेपिडोप्टेरम कैटरपिलर से मूगा रेशमकीट (एन्थीरिया असामा हेलफर), 30 कैटरपिलर की प्रजातियां में आक्रमण होने वाले प्रेब्रिन बीजाणु के संकर संचरण की जांच करने के लिए मूगा कीट पालन क्षेत्रों से इन कीटों को लाया गया। संग्रहित कीटों में से 20 कीटों में प्रेब्रिन बीजाणु पाया गया है।
 - [मूगा फसल पर कीटनाशक दवाएं स्प्रे से होनेवाली संभावित क्षति को सुनिश्चित करने के संबंध में अपर असम के कुछ जिले के मूगा उत्पादन कुछ संभव्य क्षेत्रों में सर्वेक्षण किया गया। विषाक्तता के स्तर का आकलन करने के लिए आम तौर पर इस्तमाल किए जानेवाली कीटनाशक दवाएं की जांच की गई। कीटनाशक दवाएं के अविवेकी उपयोग से होनेवाला हानिकारक प्रभाव पर मूगा कीट पालकों के बीच कई जागरूकता कार्यक्रमों का आयोजन किया गया।

प्रशिक्षण भवन की क्षमता तथा प्रशिक्षण कार्यक्रम

- कुल 2595 कृषकों तथा उद्योग के हिताधिकारियों को प्रशिक्षित किया गया।
- कौशल प्रशिक्षण कार्यक्रम का आयोजन जिसमें सीबीटी के तहत 918, प्रौद्योगिकी जागरूकता की एक्सपोजर यात्रा संबंधी प्रोग्राम में 205, प्रौद्योगिकी अभिविन्यास कार्यक्रम में – 150, रेशम उत्पादन अनुसंधान केन्द्रों में – 737, कोसोत्तर क्षेत्र में प्रशिक्षण – 159, एन.ई.आर.टी.पी.एस. के तहत रेशम उत्पादन विभाग द्वारा प्रायोजित कौशल प्रशिक्षण कार्यक्रम में -405 तथा 21 परियोजना इंटरनशिप कार्यक्रम किया गया।

- निष्पादन (ग्रेडिंग) के आधार पर डी बी टी, नई दिल्ली द्वारा वित्त पोषित संस्थान के संस्थानगत बोयोटेक हब को रेशम जैव- प्रौद्योगिकी संबंधी विभिन्न क्षेत्रों में बुनियादी विकास, जागरूकता व युवा पीढ़ी के बीच प्रशिक्षण प्रदान करने के लिए उन्नित किया गया है।
- संस्थान में दिनांक 12 से 13 मार्च, 2018 को वन्य रेशमउत्पादन (मूगा व एरी) तथा आर्थिक उत्थान के लिए रेशम जैवविविधता (सेरीबायोइकोन, 2018) पर राष्ट्रीय स्तर पर एक कार्यशाला आयोजित हुई जिसमें 116 वैज्ञानिकों/विद्वानों तथा विभिन्न संगठनों तथा विश्वविद्यालयों से छात्रों ने भाग लिया।
- संस्थान में दिनांक 27 मार्च, 2018 से 2 अप्रैल, 2018 तक राष्ट्रीय स्तर पर डी.बी.टी., नई दिल्ली द्वारा प्रायोजित कार्यशाला-सह-प्रशिक्षण कार्यक्रम का आयोजन किया गया जिसमें विभिन्न संगठनों तथा विश्वविद्यालयों से 40 वैज्ञानिकों/विद्वानों तथा छात्रों ने भाग लिया।
- संस्थान में दिनांक 14 मार्च, 2018 को डी.बी.टी., नई दिल्ली द्वारा प्रायोजित मशरूम कृषि हेतु बायोस्टस्ट सामग्री का उपयोग से कंपोस्टिंग की तैयार पर एक प्रशिक्षण कार्यक्रम आयोजित किया गया जिसमें विभिन्न संगठनों तथा विश्वविद्यालयों से 43 वैज्ञानिकों/विद्वानों तथा छात्रों ने भाग लिया।

प्रौद्योगिकी स्थानांतरण

- संस्थान में तीन वन्य रेशम कृषिमेलाएं, 15 प्रक्षेत्र दिवस, 17 कृषक दिवस, 22 जागरूकता कार्यक्रम तथा 35 समूह चर्चाएं आयोजित की गई थीं। वर्ष के दौरान इन गतिविधियों के माध्यम से कुल 5470 व्यक्तियों को रेशम संवर्धन से संबंधित समस्याओं के प्रति समझाया गया और सचेत किया गया।

- 9 एस एम बी के तहत लगभग 2505 कृषकों तथा हिताधिकारीयों को मूंगा व एरी की उन्नत व विकसित प्रौद्योगिकियां की जानकारीयां से अवगत तथा सचेत किया गया।
- कटिया फसल, 2017 के दौरान एस एम बी के तहत 191 किसानों ने मूंगा रेशम कीट का कीटपालन कर 68,621 मूंगा रो मु च का डिंभक-अंतरण किया तथा उसे 35,95,856 बाणिज्यिक कोसा उत्पादित कर 754.12 किलोग्राम कच्चा रेशम का उत्पादन किया गया। चतुआ बीज फसल में 86 किसानों ने मूंगा रेशम कीट का कीटपालन कर 28,552 मूंगा रो मु च का डिंभक-अंतरण किया तथा उसे 1482459 कोसा उत्पादित उत्पादित किया गया। वाणिज्यिक फसल, 2017 तथा चतुआ बीज फसल, 2018 के दौरान बैच मार्क पर 20.74 प्रतिशत तथा 21.25 प्रतिशत की उपज में सुधार परिलक्षित हुआ है।
- एरी एस एम बी के मामले में देखा जाए तो शरद ऋतु के दौरान 300 किसानों ने एरी रेशमकीट का कीटपालन कर 9760 एरी रो मु च की डिंभक-अंतरण किया जिससे 1014.4 किलोग्राम कोसा उत्पादन हुआ। इस में बैच मार्क पर 46.15 प्रतिशत उपज का सुधार पाया गया।

अनुसंधान संस्थान में प्रकाशन

वर्ष 2017-18 के दौरान केन्द्रीय मूंगा एरी अनुसंधान व प्रशिक्षण संस्थान द्वारा राष्ट्रीय व अंतराष्ट्रीय पीर समीक्षित जर्नल में 10 अनुसंधान लेखा, 49 कॉन्फ्रेंस व कार्यशाला हेतु लेख, 14 लीफलेट्स व बुलेटिन, 4 सी एम आर टी न्यूज लेटरस्, 4 हिन्दी न्यूज लेटरस्, 4 पुस्तकें, 1 मैगजीन और संस्थान की 2016-17 की वार्षिक रिपोर्ट प्रकाशित किया गया।

अन्य गतिविधियां

- संस्थान में आयोजित विभिन्न कार्यक्रमों के अवसर विभिन्न संस्थानों/संगठनों अर्थात् एस बी आर एल, कोडाठी, असम कृषि विश्वविद्यालय, जोरहाट, मिसिपी स्टेट यूनिवर्सिटी, यू एस ए, शिवाजी विश्वविद्यालय, कोल्हापुर, महाराष्ट्र के विशिष्ट अतिथि व अतिथि विद्वानों द्वारा भाषण दिए गए जिन कार्यक्रमों में 116 बैज्ञानिकों व विद्वानों ने भाग लिया।
- संस्थान में दिनांक 28-02-2018 को आयोजित राष्ट्रीय दिवस मनाए जाने के सुअवसर पर उपस्थित विशिष्ट सामाजिक वैज्ञानिक पेग्गी करस्वेल, गैर सरकारी संगठन “फर्सूल ग्राउंड”, ब्रिटिश कोलंबूबिया, कानाडा संयोजक तथा फ्रन्डिंग बोर्ड सदस्य ने भाग लिया तथा जैविक कृषि पर भाषण दिया।
- संस्थान द्वारा संस्थान में स्वच्छ भारत अभियान, स्वच्छ ही सेवा, स्वच्छता पखवाड़ा, विश्व पर्यावरण दिवस, अंतर्राष्ट्रीय योगा दिवस, विश्व विज्ञान दिवस, विश्व मृदा दिवस तथा विश्व महिला दिवस आदि मनाये गए हैं।
- इस वर्ष के दौरान एरी उत्पादन व उत्पादन विविधता से एरी उत्पादन और मूगा रेशम कीट के कीटपालन से आय में वृद्धि के संबंध में रेडिओ पर चर्चा-परिचर्चा करने हेतु संस्थान के दो बैज्ञानिकों आमंत्रित मिला था।
- जुलाई 2017 के दौरान संस्थान के ISO 9001: 2015 का प्रमाण-पत्र नवीकरणित किया गया।
- जुलाई 2017 के दौरान क्षेत्रीय मूगा अनुसंधान केन्द्र, बोको के ISO 9001: 2008 का प्रमाण-पत्र नवीकरणित किया गया।

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ACHIEVEMENT OF THE RESULT FRAMEWORK DOCUMENT

Objectives	Actions	Success Indicator	Unit	Target	Achievement
1. Conduct scientific, technical and economic research to enhance production, productivity and quality of Indian silk.	Research Projects-coded by CO	Total on- going Projects	No.	24	24+1
		Projects Concluded	No.	4	4 ^a
		New Projects taken up	No.	7	8 ^a
		New Projects taken up at RMRS's & RECs	No.	2	1
		No of technologies/ innovations developed / likely to be developed out of concluded projects	No	2	2
		New technologies for field testing	No	2	2
		Equipment / machinery newly developed for sericulture mechanization	No.	2	2
		Machines / equipment absorbed in the field	No.	1	1
2. Sericulture technologies including chemical taken up for commercialisation /patenting		Technologies commercialised/ popularized	No.	3	3
		No. of technologies applied for patenting	No.	1	2
	Development of data base and technology under IT initiatives	No. of Farmers database created for m-Kisan Portal	No.	1000	1000
	No. of Messages up-loaded in M-Kisan Portal	No. of Messages	Nos.	60	60
	Designing & Up-loading of data for Vanya Cluster/Sericulture Resource Centre	No. of SRCs	No.	4	5
	No. of Research Projects uploaded for E-	No. of Research Projects	No.	2	7

	Monitoring: 2				
	Digitization of Soil Health Records	Soil sample collection, processing and analysis and issue of Soil Health Card by CMER&TI	No.	800	608
	Preparation of Technology descriptor adoption document	Preparation and publication of Technology descriptor adoption document (in Assamese)	Date	31-08-2017	31-08-2017
	% of implementation of Direct Benefit Transfer(DBT)	1072 farmers were trained under CBT-CSS and paid travel expenses through DBT	%	100	100
	Submission of DBT	DBT Report along with database of all farmers trained under the CBT sent	%	100	100
Field level Interventions for Quality and productivity Improvement through Information, Education and Communication and Capacity Building	Interventions through main Institutes level	No. of SMVs to be covered	No.	9	9
		Farmers adopted in the SMV programmes		862	1908
		Expected Raw Silk Production	Kg.	Muga 740 Kg Eri: 960 Kg	Muga: 754.12 Kg Eri: 1492.75 Kg
	Large scale trial of new technologies developed by the Institute	Collapsible mountage for eri spinning	No.	3000	3010
		Large scale trials of Borkesseru and Borpat	No.	40	65
	Interventions through RMRS/ RERS/REC level	Number of Blocks/Districts adopted	No.	12	12
		Number of farmers covered	No.	1200	1310
		Raw Silk output	MT	5	5.40
	Organization of Swachha Reshom Gram	Number of Village Covered	No.	2	2
	Adoption of villages	Level of adoption of villages in different identified activities (Cleanliness, Water	%	100	100

		supply, Sanitation, mass awareness, plantation drive, health, Sericulture activities, Waste recycling, etc.)- as per approved action plan			
	Number of farmers covers under 100% adoption of technology	Group Discussion, Skill Training, Seri-Input such as seed, breed and feed, Technology Awareness and Field day Programme both in institute as well as regional stations/REC level in SMVs and SRCs	No.	1200	1774
	Extension Communication programmes viz., Group Discussion, Awareness Programme, Field day, Krishi Melas, etc.	No. of programmes conducted	No.	141	175
	Group Discussion, Technology Awareness, Bichar Ghosti, Farmers Day and Field day Programme both in institute as well as regional stations/REC level	No. of farmers covered	No.	6290	7622
	Post programme follow up	Post programme follow up	No.	70	75
	Participation in Radio Programme		No.	12	2
	Participation in TV Programme	Participation in TV Programme	No.	10	1
	Success Stories	Success Stories on Entrepreneurship Development,	No.	7	7

		successful Eri and Muga Rearing on adoption of technologies, training, etc.			
	No. of paper and popular article published		No.	40	57
	Video on Important Technologies	Video on Important Technologies	No.	3	3
Skill Development	Different Training Programme	Number of farmers covered	No.	2630	2995
Development of improved silkworm breed	Development of improved silkworm breed	Development of new eri silkworm breed	No.	1	1
	Multilocation trials of improved breed	Dfls to be brushed	No.	2500	3000
Generation of funds as per Plan guidelines XII	Revenue generation through commercialization of technology	Revenue generated through Muga Silk Plus, C2 breed, S3 and S6 som accession, etc.	Rs. in Lakhs	4.00	4.01
	Revenue generation through other methods	Sale of yarn, Cocoons, Course fee, hostel accommodation, Guest House, consultancy, etc.	-do-	34.00	30.815
Strengthening of institutional framework to support ongoing research and related programmes	Utilization of existing land holding	Effective utilization of cultivable land for assigned mandates	Acres	50	55
	Utilization of service buildings (laboratory, rearing house, grainages, staff quarters, hostels, guest house etc).	Extent of utilization of facilities for the core purpose of assigned mandates	%	90	90
	Utilization of scientific		%	100	100

	manpower for research activities				
	Effective Monitoring of Civil Works	Monitoring of progress of construction works at Institute & sub-units	%	100	100
	Submission of UCs	Total expenditure as given by accounts section at CMER&TI	Rs. in crores	20.00	21.57
Collaborative research programmes with other R&D organizations in India and abroad	Collaborative research programmes with other R&D Institute in CSB and outside	Projects taken up for collaborative research	No.	2	5
Mandatory success indicators	Timely submission of draft RFD for 2017-18	Timely submission of draft RFD for 2017-18	June, 30, 2017	June, 30, 2017	100 %
	Timely submission of results of 2017-18	Timely submission of results of 2017-18	May, 2018	April 25, 2018	100 %
Administrative Reforms	Implement mitigating strategies for reducing potential risk of corruption	Salary remitted to the personal account of the staff	100 %	100 %	100 %
		Salary remitted to the personal account of TSW			
		Party payment made through Account pay through cheque			
		Reduced cash disbursement in the office			
		Payment of wage compensation to farmers through DBT			
		Complaints received			
Rajbhasha	Implementation of Rajbhasha	Rajbhasha	%	100	100
Swachha Bharat Abhiyan	Swachh Bharat Abhiyan at Institute level , Seri farmers	Swachh Bharat Abhiyan at Institute level , Seri farmers level and at Seri Reshom Gram	%	100	100

	level and at Seri Reshom Gram				
Submission of Annual accounts	Date of submission of Annual Accounts to CO	Date of submission of Annual Accounts to CO	Date	30 th April 2017	30 th April 2017
Outstanding DCB arrear	Outstanding DCB arrear		Rs.	2.69	1.13
DCB arrear recovered	DCB arrear recovered		%	100	42
Biometric Attendance	Units functioning under the Institute	Main institute, Regional Stations and RECs	No.	9	9
Improving internal efficiency / responsiveness / service delivery of the organization	Implementation of Sevottam	Internal audit for all the sections Installed complaint / suggestion box at the institute	%	100	100
	Independent audit of implementation of public grievances redressal system	No public grievances	%	100	100
Ensuring compliance of the Financial Accountability Framework	Timely submission of ATNs on Audit paras of AG & Internal Audit	ATNs received 28 and all replies to all the ATNs furnished to C.O., Bangalore within stipulated time.	%	100	100
	Timely submission of ATRs to AG & CSB, HQ.	ATRs/para received 30 nos and all replies furnished to C.O., Bangalore i.e. before stipulated time.	%	100	100
	Early disposal of pending ATNs on Audit paras of AG reports	No outstanding ATNs	%	100	100
	Early disposal of pending ATRs on AG reports	No outstanding ATNs	%	100	100

LIST OF THE R&D PROJECTS

Sl. No.	Project code	Title of the project	Duration	Scientists involved
CONCLUDED PROJECTS				
1	ARP 5868	Isolation and Characterization of Anti Fungal Peptides from Muga Silkworm <i>Antheraea assamensis</i> Helfer	May, 2014 to July, 2017	K. Neog
2	AIB 5879	Development of suitable combinations of eri silkworm with sustainable performance for commercial exploitation	Nov., 2014 to Oct., 2017	B.N. Sarkar and M. C. Sarmah
3	ARP 5867	Characterization, transmission and cyto-pathology of infectious flacherie and cytoplasmic polyhedrosis virus in muga silkworm, <i>Antheraea assamensis</i> Helfer	July, 2013 to March, 2018	M. Chutia and R. Kumar
4	MOT 5883	Impact of Training on Knowledge and Adoption Level of Improved Technologies of Muga Culture.	Sept., 2016 to March, 2018	Vijay N and D. Mech
ONGOING PROJECTS				
1	AIB 5894	<i>In-situ</i> conservation of muga and other wild silk moths in Natural Habitat (NERTPS funded)	April, 2017 to March, 2019	R. Kumar and P. A. Sangannavar
2	AIT 5872	Whole Genome Sequencing and functional genomics of Golden Silk Moth <i>Antheraea assamensis</i>	Nov., 15 to Oct., 2018	K. Neog and D. K. Neog
3	ARE 5891	Development of LED traps for controlling major insect pests and predators in muga ecosystem- Need for organic muga silk production (DST funded)	July, 2017 to June, 2019	R. Kumar, Kh. Subadas Singh and Vijay N.
4	APR 5877	Role of hormesis in mitigating oxidative stress and its impact on growth and yield of Muga silkworm.	Sept., 2016 to Aug., 2019	P. A. Sangannavar, D. K. Gogoi and D. Goswami

5	PRP 5880	Characterization and efficacy of bacterial antagonists against <i>Alternaria ricini</i> infecting Castor in North-Eastern India	Sept., 2016 to Aug., 2019	Jeevan B, M.Chutia, Vijay N and Ranjana Das
6	ARP 5888	Standardi-zation and popularization of treated bamboo products in ericulture	April, 2017 to March, 2019	S.A. Ahmed
7	MOE 5873	Enhancement of rural economy through technology intervention for sustainable muga culture in upper Brahmaputra valley of Assam (DBT funded)	March, 2016 to Feb., 2019	Ranjana Das, S.A. Ahmed, D. Mech and D. Goswami
8	PPA 5879	Assessment of phyto-chemical diversity in Som, the primary host plant of Muga silkworm from northeast India	Sept., 2016 to Aug., 2019	P. A. Sangannavar, D. K. Gogoi and Ranjana Das
9	ARP 5874	Development of decision support system for early warning of muga silkworm diseases and pests with geospatial techniques	March, 2016 to Feb., 2019	S.A. Ahmed, D. K. Gogoi, Ranjana Das and D. Goswami
10	MOE 5875	Effect of plant protection formulations on the growth, development and productivity of Muga Silkworm, <i>Antheraea assamensis</i> Helfer	March, 2016 to Feb., 2019	K. Neog, S.A. Ahmed, D. Goswami and U. Hazarika
11	ARP 5878	Next generation sequencing studies and bioinformatics analysis of microbiome of flacherie infected muga silkworm for developing effective disease control measures	Sept., 2016 to Aug., 2019	G. Subrahmanyan, Ranjana Das, M. Chutia and Rajal Debnath
12	APS 5881	Development of suitable incubation device for incubation of eri silkworm eggs to overcome hatching device	Sept., 2016 to Aug., 2019	M.D. Senapati and M. C. Sarmah

		during summer		
13.	APR 5882	Validation of ITKs associated in muga silkworm seed production system	Sept., 2016 to Aug., 2019	D. Mech, Ranjana Das and Vijay N.
14.	ARP 5887	Isolation and characterization of lytic bacterio-phages against bacterial pathogens of muga silkworm, <i>Antheraea assamensis</i> Helfer	April, 2017 to March, 2020	M. Chutia and G. Subrahman yam
15.	AIT 5885	Development of microbial biocatalysts by heterologous expression of hpaC and soxABC gene cluster in biosurfactant producing bacteria (DST funded)	Aug., 2016 to July, 2019	G. Subrahman yam
16.	PPS 5884	Soil Health Cards for Sericultural Farmers of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh and Sikkim	July, 2016 to Aug., 2019	U. Hazarika, V. S. Naik, D. K. Jigyasu and S.A. Ahmed
17.	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	Kh. Subadas Singh, R. Kumar and M. Chutia
18.	APS 3612	Development of Seed Preservation Technology for Muga Silkworm (<i>Antheraea assamensis</i> , Helfer)	June, 2017 to May, 2019	R. Kumar
19.	APR 5886	Improvement of muga cocoon yield through technology intervention and refinement of crop schedule in Terai region of West Bengal.	Dec., 2016 to Nov., 2019	N. Biswas and S. A. S Rehman
20.	APR 5890	Biodiversity assessment of wild silk moths and rearing potentialities of muga (<i>Antheraea assamensis</i> Helfer) and eri silkworm (<i>Samia ricini</i> Donovan) for sustainable development in Nagaland (DBT	Feb., 2017 to Jan., 2020	K. Neog

		funded)		
21.	APR 5892	Formulation of semi-synthetic diet for muga silkworm.	Oct., 2017 to Sept., 2020	T.J. Keisa, Kh and Subadas Singh
22.	PPF 5893	Impact assessment of petroleum crude oil on Muga silkworm (<i>Antheraea assamensis</i> , Helfer) and its host plants in Assam.	Oct., 2017 to Sept., 2020	D. K. Jigyasu, Kh. Subadas Singh and K. Neog
23.	AIP 5895	Biology, population dynamics and control of <i>Sycanus collaris</i> Fabricius and <i>Eocanthecona furcellata</i> Wolff (Insecta: Heteroptera) - potential predators of muga silkworm.	March, 2018 to Feb., 2020	Kh. Subadas Singh and D. K. Jigyasu,
24.	APS 050001EF	Development of technology for enhancing egg laying in Vanya Silk moths by application of host plant volatiles (DBT Funded)	March., 2018 to Feb., 2021	K. Neog and P. S. Sangannavar
25.	AIT 5876	Advanced level institutional Biotech Hub (DBT funded)	Dec., 2015 to March, 2021	M. Chutia and Ranjana Das
REGULAR PROGRAMMES				
1.	CMERTI-RP1	Forecasting and forwarning for pest and disease of muga host plants and silkworm	Jan. 2014 onwards	R. Das, M. Chutia and S.A.S. Rehman
PILOT STUDIES				
1.	-	Assessment of Bio-chemical Properties and Nutritional Composition of Muga Silkworm (<i>Antheraea assamensis</i> Helfer) Litter.	-	V. S. Naik
2.	-	Effect of liquid organic manures on quantitative & qualitative parameters of castor (<i>Ricinus communis</i> Linn.) leaves towards sustainable Eri cocoon production	-	V. S. Naik

ACHIEVEMENTS IN CONCLUDED PROJECTS

1. Project Code	: ARP 5867
Project Title	: Characterization, transmission and cytopathology of infectious flacherie and cytoplasmic polyhedrosis virus in muga silkworm, <i>Antheraea assamensis</i> Helfer
Project Period	: July 2016 – March, 2018
Funding Agency	: DBT, New Delhi
Total Budget Allocation	: 26.35 Lakhs
Project Investigators	: M. Chutia, Principal Investigator : R. Kumar, Co- Investigator

Objectives

- Characterization of infectious flacherie and cytoplasmic polyhedrosis virus in muga silkworm.
- To study the transmission pattern of the viral agents.
- To study the cyto-pathology of midgut and silk gland from infected larvae.

Highlights of achievements

Isolation of Virus

The viral isolates were obtained from the midguts of infected larvae collected. The midguts of the diseased larvae were homogenized to collect the crude extract. This extract was used for isolation of viral agent. Then we have purified the polyhedra from infected larvae by Sucrose-Density-Gradient centrifugation according to a modification (Qanungo et al., 2000) of the method Hayashi & Bird (1970).

Disease monitoring

As per milestone of the project, a season wise disease survey was carried out at farmer's fields in various districts of Upper Assam and Lower Assam. Disease survey data were collected from farmers during each crop. From the disease survey data, it revealed that all the major diseases of the silkworm namely, Flacherie, Muscardine, Pebrine are reported in all the studied crops. Flacherie infected larvae are observed to be dull,

lethargic, soft and stops eating. The larvae become flaccid; vomits gut juices and excrete chain type faeces. It is caused by some species of bacteria. Muscardine affected larvae lose their appetite and become inactive. Moist specks are present on the skin. After death, the larvae gradually become hard followed by mummification due to growth of aerial mycelia and conidia over the body and body turns chalky white. It is caused by a fungus. Pebrine affected larvae are irregular in size of the body and moulting. Black spots appear on the body of the infected worms. It is caused by a protozoan species.

Extraction of OBs and microscopic study

At first, the OBs were extracted from individual diseased larvae for characterization of Nuclear Polyhedrosis Virus. To each cadaver 1ml sterile distilled water was added and disrupted by vortexing. Extract was filtered through cheese cloth. The filtrate was centrifuged at $15,000 \times g$ for 5 min. The supernatant was removed. Pellet was washed with 2 ml distilled water and centrifuged. The pellet was resuspended in 1ml of sterile distilled water and stored at 4°C . These OBs were then observed under light microscope and TEM.

For transmission electron microscopy, the samples were fixed in modified Karnovsky solution (Karnovsky, 1965), for 2 h at 4°C . Afterward, the samples were washed with 0.05 M sodium cacodylate buffer (three times for 10 min each) and post-fixed in 1% osmium tetroxide for 2h. The samples were washed in distilled water (two times for 15 s each) and immersed in 0.5% uranyl acetate overnight at 4°C .

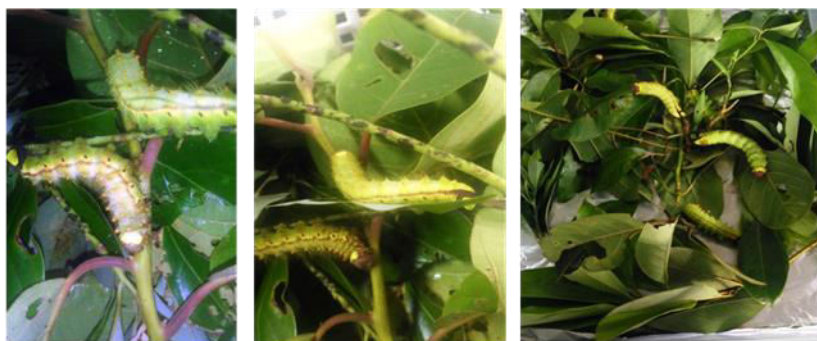


Fig. TEM analysis of the viral particles isolated from the infected silkworm larvae

Pathogenicity test

After collection, the infected 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 with the help of sterilized scissors in PBS buffer and the gut portion was collected separately in distilled water and homogenized. 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 homogenized and filtered through 0.22µm syringe filter paper and collected the filtrate.

Later, the filtered solution was fed to test silkworms and clinical symptoms were observed in the infected silkworm in order to confirm pathogenicity (Koch's laws). At the early stage of infection, it is very difficult to differentiate between diseased and healthy worms. At moulting phase, the diseased worms do not enter in to moult and become restless. The infected silkworm larvae fail to moult out, move restlessly and lose appetite. The integument becomes fragile, inter-segmental portions become swollen and the skin also becomes stretched. The body tissue and haemolymph of infected larvae become disintegrated into turbid white fluid.



Treatment day - 3

Treatment day - 2

Control day - 2

Treatment 4th day

Fig. Pathogenicity test of the viral particles isolated from infected larvae in the laboratory

The viral disease i.e. Grasserie was reported in muga silkworm based on symptoms although no viral agents/pathogens were identified till date. In this study, we have collected many samples based on symptoms and suspected or viral infection.

Isolation of Viral DNA and RNA

DNA extraction was performed by using viral DNA isolation kit according to the protocol given with the kit. The DNA yields were stored at -20°C until use. Then we have performed the PCR to identify the polyhedrin gene in viral DNA, by using previous reported degenerate primers.

For total RNA isolation, the samples were first homogenized in liquid nitrogen in sterile mortar pestle followed by Trizol reagent. Finally, RNA pellet was then washed with 70% ethanol and centrifuged. Pellet was dried and dissolved in DEPC water and stored at -80°C. Integrity of RNA was confirmed by 1% agarose gel electrophoresis.

PCR amplification of targeted genes

To identify the viral particles, the PCR reactions are being performed using previously reported degenerate PCR primer sets for different viral pathogens (targeted genes) in different conditions (Woo, 2001). The reactions are carried out in 50ng of viral DNA and 1µl of each primer in a total volume of 20 µl. Following amplification, the PCR

products are analysed by 1.0% agarose gel electrophoresis. Experiments are being performed and continued (since the project work is not yet completed) and after confirmation, amplified PCR products will be cloned into a pGemT-Easy PCR cloning vector and sequenced for identification of the viral agents.

Management of the disease

Maintenance of hygienic condition of rearing field is the most important factor for management of the disease. Disease free healthy eggs should be used for rearing and quality stage specific leaf should be fed to the larvae and never allows late stage worms to feed on tender succulent leaves. Disinfections of rearing site before rearing should be done. If any infected larvae are noticed in the rearing field, immediately burn it in the corner of the field.



2. Project code : **ARP-5868**
Project Title : Isolation and Characterization of Anti Fungal Peptides from Muga Silkworm *Antheraea assamensis* Helfer
Project Period : February 2014 – July 2017
Funding Agency : DBT, New Delhi
Total Budget Allocation : Rs. 26.05 Lakhs
Project Investigators : Kartik Neog, Principal Investigator.
: A. K. Ghosh, Principal Investigator.
: Jatin Kalita, Co-Investigator.

Objectives

- Isolation and purification of antifungal peptides from the haemolymph of fungal challenged muga silkworms *Antheraea assamensis* Helfer.
- Biochemical characterization of isolated antifungal peptides.
- Determination of mode of action of antifungal peptides against various fungi of *Candida* and *Aspergillus* sp.

Highlights of achievements

Comparison of polypeptide in non-immune and immune haemolymph extracts:

To obtain a haemolymph extract free from high molecular mass proteins an acidic / methanol extraction was done and analyzed by Tris-Tricine SDS-PAGE. The result showed several polypeptides of molecular mass below 21 kDa. In the extract of immune haemolymph additional peptide bands with molecular mass 3 and 14 kDa were detected when compared to the extract prepared from non-immune haemolymph. This suggested that additional bands contained peptides appearing in the haemolymph in response to immune challenge.

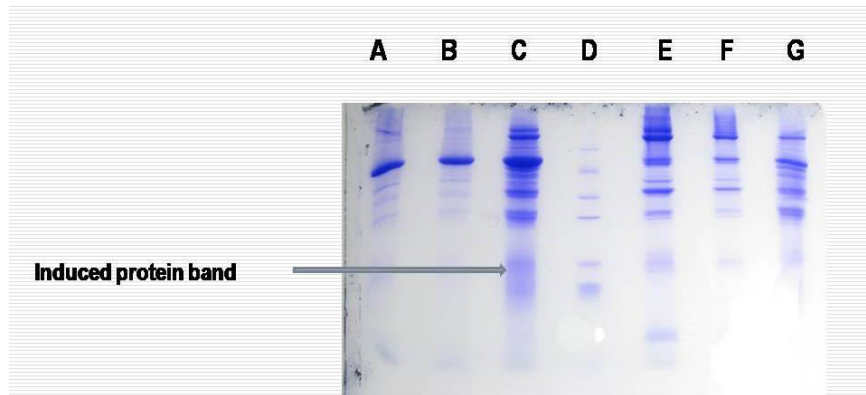


Fig: Lane A *C. albicans* after 15 days injection; lane B, *C. albicans* after 12 days injection; lane C, *C. albicans* after 9 days injection; lane D, marker; lane E, control after 15 days of PBS injection, lane F, control after 12 days of PBS injection; lane G, control after 9 days of PBS injection.

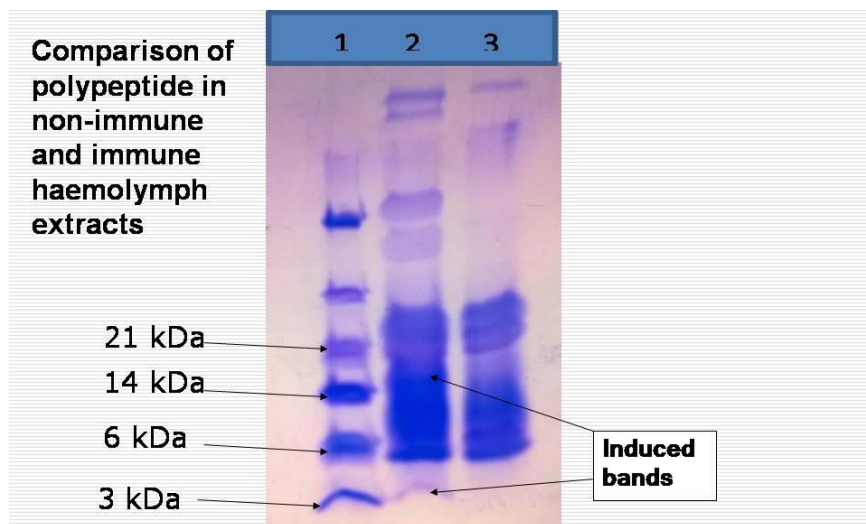


Fig. Lane 1: protein molecular marker, Lane 2: Immunized haemolymph extract, Lane 3: non-immunized haemolymph extract.

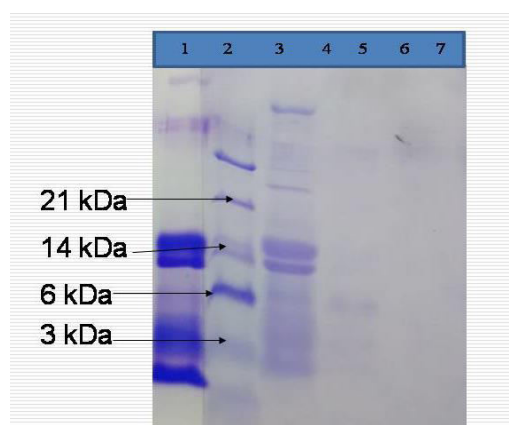


Fig. Analysis of gel filtration purified protein by tricine SDS-PAGE. (1) Crude haemolymph extract, (2) marker, (3) peak1, (4) peak2, (5) peak3, (6) peak4, (7) peak5.

Due to ineffective fractionation of haemolymph extract by size exclusion chromatography, purification of immune and non-immune haemolymph extract was done through reversed phase C-18 chromatography (HPLC) column. This has allowed effective separation of proteins into several (28) peaks. The obtained fractions were collected, lyophilized and tested for antimicrobial activity.

Fractionation of immune haemolymph extract by HPLC and analysis of its antimicrobial activity:

Due to ineffective fractionation of haemolymph extract by size exclusion chromatography, purification of immune and non-immune haemolymph extract was done through reversed phase C-18 chromatography (HPLC) column. This has allowed effective separation of proteins into several (28) peaks (Fig 5. non-immunized and Fig 6. immunized). The obtained fractions were collected, lyophilized and tested for antimicrobial activity (Table 1). Within 28 non immunized fractions showing antimicrobial activity, 17 fractions showed antifungal and 12 fractions showed antibacterial activity and one fraction (no 1) showed both antibacterial and antifungal activity. Similarly for the immunized haemolymph extract 19 fractions showed antimicrobial (8 antifungal and 12 antibacterial) activity, fraction nos. 1 and 12 showing both antibacterial and antifungal activity.

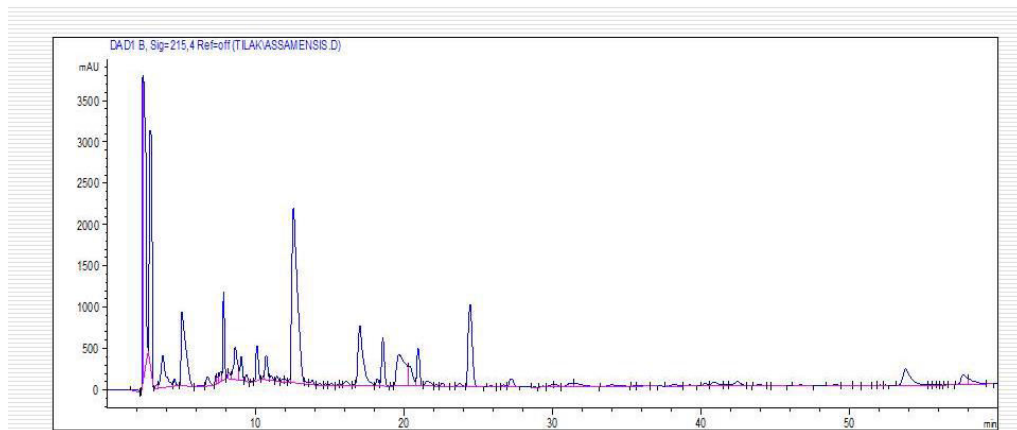


Fig. Reversed-phase HPLC fractionation of un-induced haemolymph extract

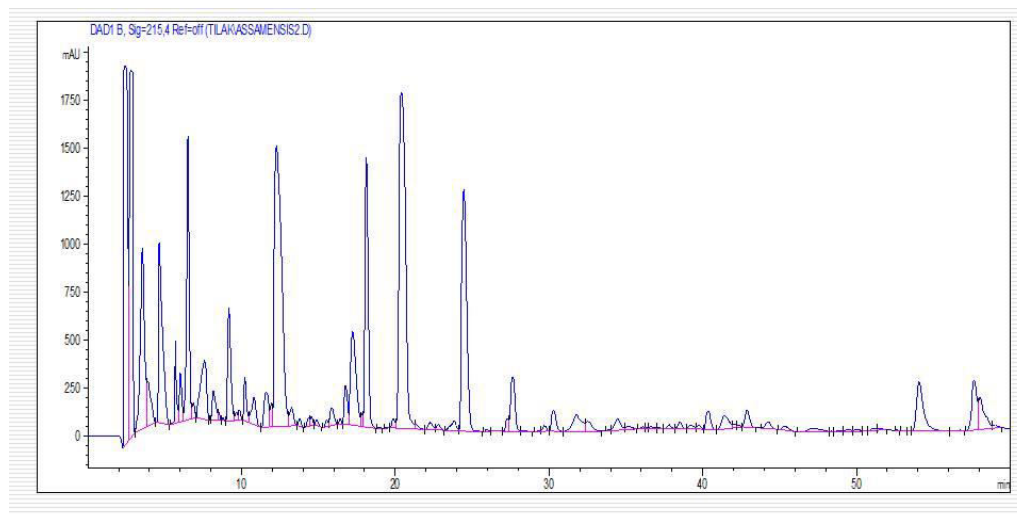


Fig. Reversed-phase HPLC fractionation of induced haemolymph extract.

Table: Antimicrobial activity of HPLC fractions of non immune and immuned haemolymph extracts (determined in micro titer plate).

Non-immuned			Immuned		
Fraction no. according to fig.	Anti- <i>Candida albicans</i> activity (% of growth inhibitor)	Anti- <i>E. coli</i> activity (% of growth inhibitor)	Fraction no. according to fig.	Anti- <i>Candida albicans</i> activity (% of growth inhibitor)	Anti- <i>E. coli</i> activity (% of growth inhibitor)
1	22.40	75.86	1	77.67	85.53
2	-	58.62	2	21.88	-
3	-	44.18	3	21.88	-
4	-	54.74	4	7.68	-
5	-	52.58	5	-	21.28
6	-	26.93	6	-	35.74
7	-	41.81	7	4.05	-
8	-	35.13	8	7.53	-
9	-	46.76	9	11.30	-
10	11.20	-	10	-	16.32
11	9.98	-	11	-	47.10
12	30.09	-	12	12.89	21.90
13	22.73	-	13	-	23.76
14	9.98	-	14	-	20.66
15	8.14	-	15	-	23.55
16	12.87	-	16	-	-
17	23.25	-	17	-	36.77
18	16.03	-	18	-	40.49
19	12.61	-	19	-	22.11
20	12.08	-			
21	-	25.64			
22	14.32	-			
23	13.53	-			
24	25.88	-			
25	17.87	-			
26	19.31	-			
27	-	25.00			
28	-	19.82			

Analysis of HPLC fractions by Tricine SDS-PAGE:

All HPLC fractions (obtained from un-immunized and immunized haemolymph extract) showing antifungal activity were analyzed by tricine SDS-PAGE gel and silver staining (because of very faint bands). From immunized haemolymph extract only four (fraction no 7, 8, 9 and 12) showed some protein bands in gel (Fig. 7).

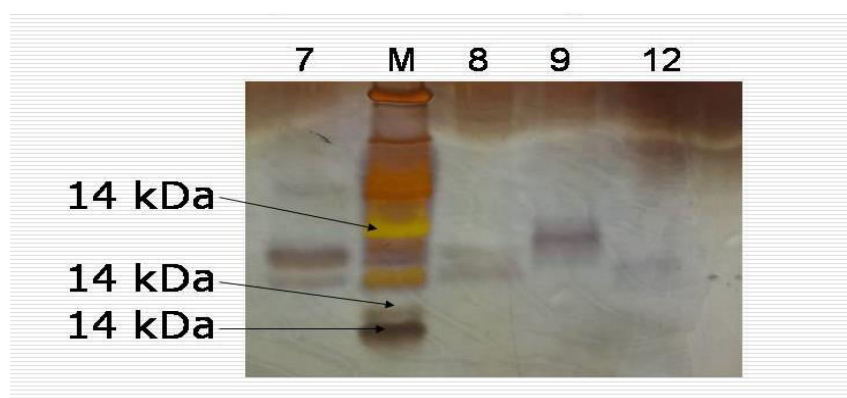


Fig. Analysis of HPLC fractionated proteins (peak 7, 8, 9 and 12) from immunized haemolymph extracted by Tricine SDS-PAGE (stained by silver staining).

Out of 17 HPLC fractions from un-immunized haemolymph extract only 3 fractions (fraction 1, 22, 26) showed band in Tricine SDS-PAGE gel after silver staining.

Mass spectrometric analysis of in-gel digested protein

In-gel digestion of protein bands were done (which were visualized by Tricine SDS-PAGE gel) and analyzed by mass spectrometry. Immunized fraction 7 showed similarity with putative protein turandot with molecular mass 14312 Da. Protein turandot is a humoral factor that plays a role in stress tolerance, give increased resistance to the lethal effects of bacterial challenge and stress. Immunized fraction 8 showed similarity with putative odorant-binding protein with molecular mass 18111 Da. Immunized fraction 9 and 12 showed similarity with chitinase like protein. MS result of non-immunized fraction 22 showed similarity with UPF0428 protein with molecular mass 28020 Da.

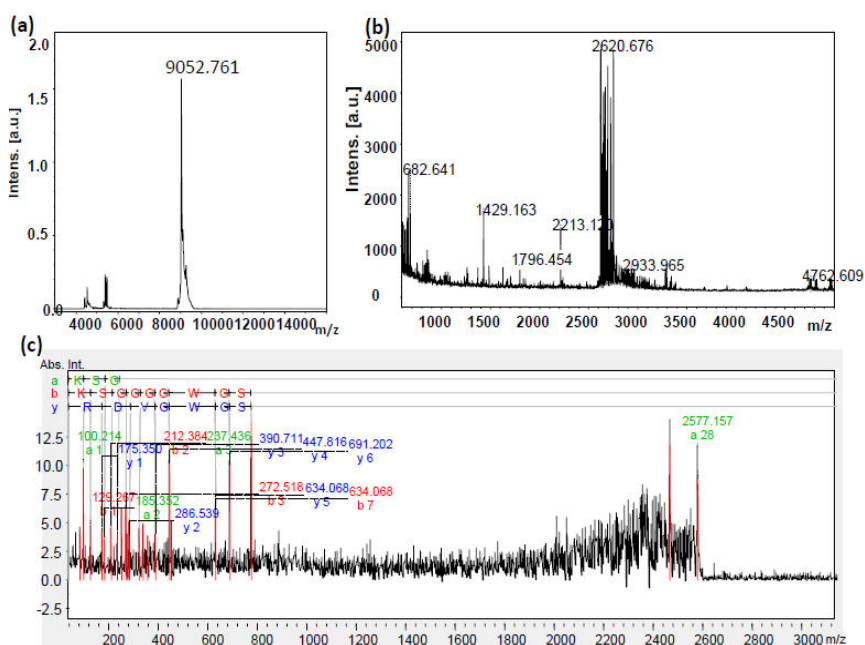


Fig. Characterization of purified peptide: MALDI-TOF-TOF mass spectrometric analysis of the peptide (a); peptide mass fingerprinting pattern of isolated peptide after trypsinization (b), de novo amino acid sequence analysis of one trypsin digested peptide fragment (c).



3. Project code	: AIB 5879
Project Title	: Development of suitable combinations of eri silkworm with sustainable performance for commercial exploitation.
Project Period	: November 2014 – October 2017
Funding Agency	: CSB, Bangalore
Project Investigators	: B.N. Sarkar, Principal Investigator. M.C. Sarmah, Co-Investigator.

Objectives:

- To isolate homozygous pure line strains of eri silkworm.
- To evolve productive cross(s) of eri silkworm
- To find out performance of evolved cross (s) on primary food plants (Castor and Kesseru) at farmers' and institute level

Highlights of achievements:

- ❖ Isolation of six pure line strains and rearing up to 5th generations has already been completed.
- ❖ Seven crosses viz. YP x GBZ, YZ x GBS, GBZ x YS, YS x GBS, YZ x YS, GBZ x YP and GBS x GBZ has been prepared based on established combining ability.
- ❖ Four experiment of trial of seven crosses namely YPxGBZ, YZx GBS, GBZ xYS, YSxGBS, YZxYS, GBZxYP, GBSxGBZ has been completed in different location of SRC,IVLP/SMV and potential eri growing area for observation of performance of rearing and economic character of evolved combinations to get high yielding cross breed.
- ❖ Based on the analysis of crosses the following combinations are found to be best among all seven crosses. YP×GBZ showed highest average shell weight (0.53g) with highest fecundity (352nos).GBS ×GBZ showed highest average shell weight (0.55g) with highest fecundity (355 nos).
- ❖ Specific combining ability (SCA) effect in 6 x 6 diallel cross of eri silkworm hybrid: SCA effect of 6 x 6 diallel cross among the 15 combination of YP, YS, YZ, GBP, GBS and GBZ the YP X GBZ has showed significantly higher value in the economic trait of cocoon weight (male 0.88), shell weight (male 0.64); female (0.48) and absolute silk yield value (25.14).
- ❖ Reciprocal effect in a 6 x 6 diallel crosses of eri silkworm hybrid: The reciprocal test of 15 combination indicated that GBS X GBZ is superior to others combination hybrid. The combination found highest

fecundity value (111.17), highest absolute silk yield (46.61) among the 15 combination of the test.

Table: Isolation of six pure line strains and rearing up to 5th generations

1st generation					
Strains	Hatching (%)	Larvalwt. (g)	Cocoonwt. (g)	Shellwt. (g)	Fecun. (nos.)
YP	86	7.00	3.10	0.51	358
YS	82	6.80	2.95	0.46	349
YZ	89	7.40	3.20	0.54	360
GBP	83	6.90	2.88	0.43	349
GBS	80	6.70	2.75	0.44	344
GBZ	85	7.10	2.85	0.50	355
St. dev.	3.19	0.25	0.17	0.04	6.16
C.Level(95.0%)	3.35	0.26	0.18	0.05	6.46
2nd generation					
Strains	Hatching (%)	Larvalwt. (g)	Cocoonwt. (g)	Shellwt. (g)	Fecun.(nos.)
YP	85	6.90	3.00	0.48	345
YS	83	6.60	2.85	0.43	335
YZ	88	7.10	3.10	0.51	354
GBP	82	6.40	2.78	0.42	336
GBS	80	6.30	2.79	0.42	333
GBZ	86	6.90	2.88	0.46	344
St. dev.	2.90	0.32	0.13	0.04	7.99
C.Level(95.0%)	3.04	0.33	0.13	0.04	8.38
3rd generation					
Strains	Hatchin g(%)	Larvalwt. (g)	Cocoonwt. (g)	Shellwt. (g)	Fecun.(nos.)
YP	85	6.90	3.10	0.49	344
YS	83	6.80	2.98	0.44	334
YZ	89	7.20	3.15	0.51	358
GBP	82	6.40	2.78	0.42	336
GBS	81	6.70	2.95	0.45	337
GBZ	86	6.90	2.97	0.46	349
St. dev.	2.94	0.26	0.13	0.03	9.25
C.Level (95.0%)	3.09	0.28	0.14	0.03	9.71

4 th generation					
Strains	Hatching (%)	Larvalwt. (g)	Cocoonwt. (g)	Shellwt. (g)	Fecun.(nos.)
YP	83	7.00	3.10	0.50	351
YS	83	6.60	2.85	0.43	335
YZ	87	7.20	3.16	0.52	358
GBP	82	6.40	2.78	0.42	336
GBS	80	6.30	2.79	0.42	333
GBZ	87	6.90	2.99	0.48	348
St. dev.	3.33	0.36	0.16	0.04	10.25
C.Level(95.0%)	3.49	0.47	0.17	0.05	10.76
5 th generation					
Strains	Hatching (%)	Larvalwt. (g)	Cocoonwt. (g)	Shellwt. (g)	Fecun.(nos.)
YP	83	7.80	3.45	0.52	361
YS	84	6.90	3.00	0.46	345
YZ	87	7.60	3.46	0.55	364
GBP	80	6.72	3.10	0.42	346
GBS	81	6.80	3.12	0.44	343
GBZ	85	7.20	3.30	0.56	358
St. dev.	2.58	0.45	0.19	0.06	9.20
C.Level(95.0%)	2.71	0.47	0.20	0.06	9.65

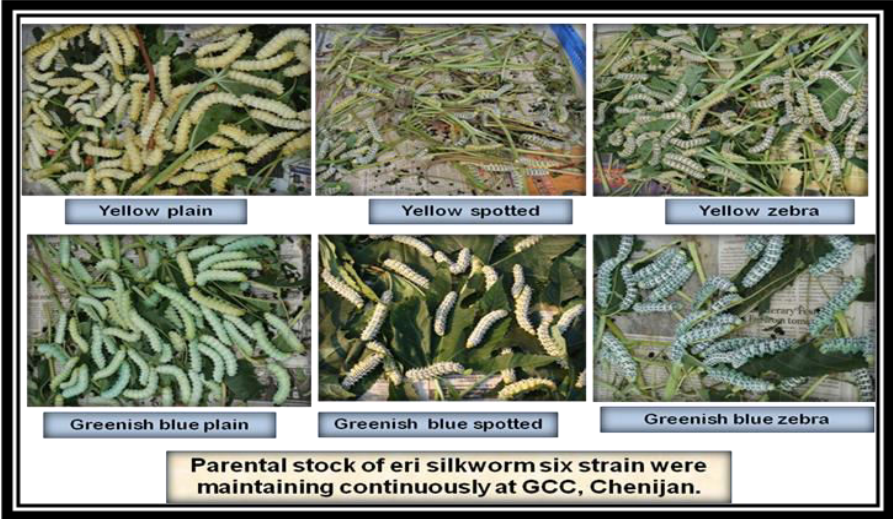




Fig.: Six strains of cultivated Eri silkworm *Samia ricini* Donovan

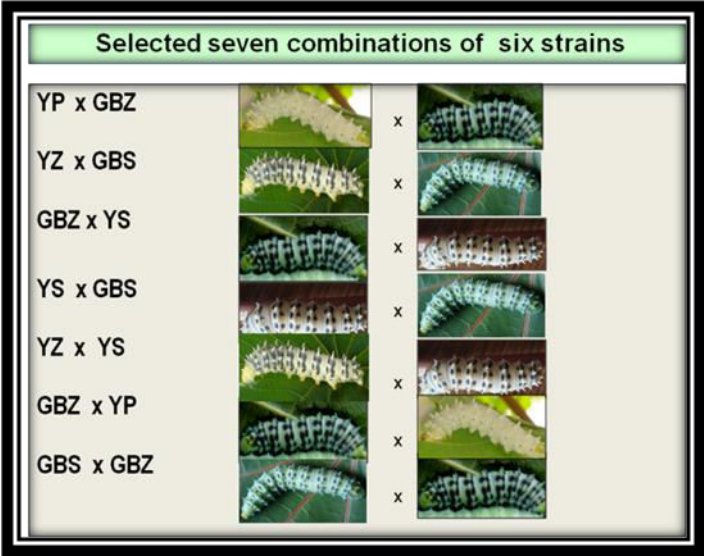


Fig.: Seven combinations on the basis of GCA test.



Fig.: Evolved superior combinations (GBSXGBZ) & (YPXGBZ) of Eri silkworm

Table: Rearing performance of seven combinations (Spring crop.)

Combi nations	Fecun dity	Hat ching (%)	Larval wt. (g)	Larval (days)	Cocoon Yield/ dfls	Cocoon wt. (g)	Shell wt. (g)	Pupal wt.	Shell %	ERR%	Absolute silk yield/dfls (g)
YP x GBZ	356	85	8.70	24	258	3.58	0.55	3.03	15.36	85.26	141.90
YZ x GBS	347	81	8.00	23	238	3.36	0.53	2.83	15.77	84.70	126.14
GBZ x YS	349	81	8.10	22	242	3.47	0.48	2.99	13.83	85.63	116.16
YS x GBS	344	83	8.20	24	245	3.40	0.49	2.91	14.41	85.84	120.05
YZ x YS	354	80	8.50	24	240	3.47	0.51	2.96	14.69	84.74	122.40
GBZ x YP	348	82	8.20	23	241	3.40	0.49	3.10	14.41	84.50	118.09
GBS x GBZ	355	85	8.81	23	260	3.59	0.56	3.03	15.59	86.20	145.60
C2 breed (Control)	352	84	8.30	22	250	3.40	0.52	2.88	15.30	84.55	130.00
St.Dev.	4.27	1.92	0.29	0.83	8.40	0.09	0.03	0.09	0.68	0.65	10.97
Confidence Level(95)	3.57	1.61	0.24	0.70	7.02	0.07	0.02	0.07	0.57	0.54	9.17

Table: Rearing performance of seven combinations (Summer crop.)

Combinations	Fecundity	Hatching (%)	Larval wt. (g)	Larval (days)	Cocoon Yield/ dfls	Cocoon wt. (g)	Shell wt. (g)	Pupal wt.	Shell %	ERR%	Absolute silk yield/dfls (g)
YP x GBZ	343	80	7.50	17	231	3.50	0.48	3.02	13.71	84.18	110.88
YZ x GBS	340	81	7.40	17	228	3.30	0.43	2.87	13.03	82.78	98.04
GBZ x YS	341	82	7.20	18	230	3.24	0.41	2.83	12.65	82.25	94.30
YS x GBS	339	81	7.40	18	232	3.20	0.40	2.80	12.50	84.48	92.80
YZ x YS	342	80	7.60	18	222	3.31	0.42	2.89	12.68	81.13	93.24
GBZ x YP	339	80	7.40	18	220	3.22	0.40	2.82	12.42	81.12	88.00
GBS x GBZ	346	81	7.70	17	233	3.52	0.50	3.02	14.20	83.13	116.50
C2 breed (Control)	350	86	8.00	18	247	3.30	0.38	2.92	12.58	78.00	93.86
St.dev.	3.82	2.00	0.24	0.52	8.19	0.12	0.04	0.09	0.65	2.08	9.91
Confidence Level (95.0%)	3.19	1.67	0.20	0.43	6.85	0.10	0.03	0.07	0.54	1.74	8.28

Table: Rearing performance of seven combinations (Autumn crop.)

Combinations	Fecundity	Hatching (%)	Larval wt. (g)	Larval (days)	Cocoon Yield/ dfls	Cocoon wt. (g)	Shell wt. (g)	Pupal wt.	Shell %	ERR%	Absolute silk yield/dfls (g)
YP x GBZ	354	86	8.70	19	258	3.57	0.56	3.01	15.68	84.74	144.49
YZ x GBS	350	85	7.90	19	241	3.39	0.49	2.90	14.45	81.00	118.09
GBZ x YS	343	84	7.44	19	242	3.33	0.45	2.80	13.51	83.99	108.90
YS x GBS	345	85	7.56	19	245	3.32	0.46	2.86	13.85	83.54	112.70
YZ x YS	350	84	8.10	19	245	3.47	0.51	2.95	14.69	83.33	124.95
GBZ x YP	347	83	7.30	19	239	3.34	0.46	2.88	13.77	82.98	109.94
GBS x GBZ	357	84	8.71	19	259	3.58	0.54	3.04	15.08	86.36	139.86
C2 breed (Control)	350	85	8.6	22	232	3.45	0.50	2.97	14.49	77.98	116.00
St.dev.	4.57	0.93	0.58	1.06	9.22	0.10	0.04	0.08	0.72	2.53	13.57
Confidence Level (95.0%)	3.82	0.77	0.49	0.89	7.71	0.09	0.03	0.07	0.61	2.12	11.34

Table: Rearing performance of seven combinations (Winter crop.)

Combi nations	Fecun dity	Hat ching (%)	Larval wt. (g)	Larval (days)	Cocoon Yield/ dfis	Cocoon wt. (g)	Shell wt. (g)	Pupal wt.	Shell %	ERR%	Absolute silk yield/dfis (g)
YP x GBZ	358	88	8.80	22	260	3.58	0.56	3.02	15.64	82.53	145.60
YZ x GBS	355	83	7.80	21	242	3.37	0.49	2.88	14.54	82.13	118.58
GBZ x YS	354	82	7.43	22	241	3.32	0.48	2.89	14.45	83.02	115.68
YS x GBS	354	82	7.50	21	244	3.30	0.45	2.85	13.63	84.05	109.80
YZ x YS	359	81	8.16	20	241	3.46	0.50	2.96	14.45	82.87	125.50
GBZ x YP	358	80	7.34	21	240	3.30	0.47	2.83	14.24	83.79	112.80
GBS x GBZ	361	87	8.90	20	265	3.64	0.60	3.04	16.48	84.37	159.00
C2 breed (Control)	353	84	8.40	21	251	3.56	0.53	3.93	14.88	84.65	133.03
St.dev.	2.88	2.83	0.62	0.76	9.68	0.14	0.05	0.36	0.89	0.92	17.33
Confidence Level (95.0%)	2.41	2.36	0.52	0.63	8.09	0.12	0.04	0.30	0.74	0.77	14.49

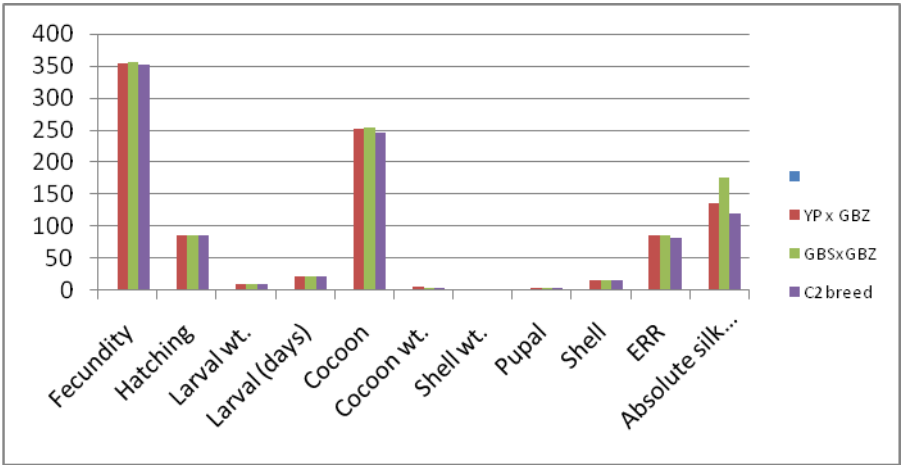


Fig.: Average performance of two evolved combinations YP×GBZ and GBS×GBZ with C2 breed (control)



Fig.: Rearing of two combinations YP×GBZ & GBS×GBZ at farmers level



4. Project code : **MOT 5883**
Project Title : Impact of Training on Knowledge and Adoption level of Improved Technologies of Muga Culture.
Project Period : Sep 2016 – Mar 2018
Funding Agency : CSB, Bangalore
Total Budget Allocation : 4.75 Lakhs
Project Investigators : Vijay. N., Principal Investigator
: D Mech, Co- Investigator

- Objectives:**
- To assess the extent of knowledge and level of adoption of improved technologies of Muga Culture among the farmers.
 - To assess the socio-economic impact of adoption of improved technologies of Muga Culture among the farmers.
 - To assess the impact of training on production and productivity of Muga farmers.

Highlights of achievements:

Milestone for the project	Achievements as per milestone
Data collection	➤ Questionary preparation. ➤ Survey of villages. ➤ Selection of respondents. ➤ Data collection by respondents through prescribed format of questionnaire. ➤ Statistical analysis.
Compilation of data and statistical analysis	

Training programme has a positive impact on cocoon production and productivity of trained farmers. Database of trained farmers before and after training has been strictly maintained and uploaded in the official website of the institute. It has been observed that some of the improved technologies like Mother moth examination, egg surface sterilization, biological control of uzifly, disinfection of rearing field and appliances have to be more stressed and so that it will benefit to the farmers.



ONGOING R&D PROJECTS

1. Project Code	: AIT-5872
Project Title	: Whole Genome Sequencing and functional genomics of Golden Silk Moth <i>Antheraea assamensis</i> .
Project Period	: November, 2015 to October, 2018
Funding Agency:	: CSB, Bangalore
Total Budget Allocation	: 11.20 Lakhs
Project investigators	: K. Neog, Principal Investigator : D.K. Gogoi, Co-investigator

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.

Highlights of achievements

- ❖ Treatment of the worms in isolated condition with pathogenic bacteria was done when the worms enter 4th/5th stage.
- ❖ Samples of Muga silkworms treated with pathogenic bacteria at different hours interval after treatment from different body parts like fat bodies, silk glands, haemolymph along with control have been submitted to SBRL, Kodathi for further genome analysis.
- ❖ Mitochondrial genome of Muga silkworm has been sequenced and analyzed in collaboration with IIT, Guwahati.
- ❖ Samples of wild stocks of Muga silkworm sent earlier have been submitted to sequencing agency.
- ❖ Infection of the Muga silkworm was done where the Scientist from SBRL, Kodathi was also took part. Several samples as desired from whole body, fat body, silk glands from cultivated and wild

rices of Muga silkworm was taken after treatment at different time intervals of infection.

- ❖ The samples were carried to the SBRL, Kodathi and submitted to the Company responsible for sequencing purposes.
- ❖ The Company has done Bioanalyzer profiles, DNA & RNA and submitted the QC Reports of DNA (wild and cultivated) and RNA extracted from the sample collected.
- ❖ All samples are QC cleared and have started working on sequencing.



Fig.: Different views of the collection, recording of data and injection of muga larvae with pathogenic bacteria for isolation of haemolymph, body parts, fat body and tissues etc.



2. Project Code : **MOE 5873**
Project Title : Enhancement of rural economy through technology intervention for sustainable muga culture in upper Brahmaputra valley of Assam
Project Period : March 2016 – February 2019
Funding Agency : DBT, New Delhi
Total Budget Allocation : 37.02 Lakhs
Project Investigators : Ranjana Das., Principal Investigator
: D. Goswami, Co-Investigator
: D. Mech, Co-Investigator
: M. Chutia, Co-Investigator

Objectives:

- To create awareness and popularize muga cultivation among the farmers of three upper Assam Districts.
- To increase income and employment generation avenues among the rural youth of weaker section through adoption of SHG approach
- To train 150 beneficiaries for up gradation of skills for sustainable employment generation through activities like rearing of muga silkworm, production of cocoon, marketing of cocoon, yarn, fabrics, utilization of pupae etc.

Highlights of achievements:

- ❖ A total of 734 youth farmers were sensitized by conducting awareness programmes, technology demonstrations in Dibrugarh, Sivasagar, Lakhimpur, Dhemaji and Jorhat districts of Assam.
- ❖ During last Chatua crop (Feb.-March, 2018), 6289 dfls were brushed, 289713 cocoons were harvested and produced 57.89 kgs of raw silk.
- ❖ For Jethua crop, 12000 muga dfls were made ready for brushing.

Training program on post cocoon technology



14.02.18 to 16.02.18 at Dibrugarh



01.02.18 to 03.02.18 at Lakhimpur



REARING OF MUGA SILKWORM



3. Project Code	: ARP-5874
Project Title	: Development of decision support system for early warning of muga silkworm diseases and pests with geospatial techniques
Project Period	: March 2016 – February 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 14.55 Lakhs
Project Investigators	: S.A. Ahmed, Principal Investigator : D. Goswami, Co-Investigator : Ranjana Das, Co-Investigator : D.K. Gogoi, Co-Investigator

Objectives:

- Identification of Various landscapes and Climatic Parameters Crucial for Disease incidences.
- Development of DSS for early Warning of selected Muga Silk Worm Diseases.
- Dissemination of interactive advisory Services to farmers linking with SILKS portal.

Highlights of achievements:

- The meteorological instruments installed at the selected locations.
- Collected 10 years historical automatic weather station (AWS) data on weekly basis from MOSDAC as well as purchased IMDs daily gridded rainfall and temperature data for more than 30 years.
- Detailed large scale mapping of Nongpoh has been done by taking five Kilometer buffer from the farm location.
- Currently digitizing Khowang site by taking 5 kilometer buffer is under progress.
- 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.
- Further, a review meeting regarding the meeting regarding the progress and future action plan of the project along with the NESAC team was organized at CMERTI, Lahdoigarh and Meteorological equipments were installed at Jagduar, Jorhat.



4. Project Code	: MOE-5875
Project Title	: Effect of plant protection formulations on the growth, development and productivity of Muga Silkworm, <i>Antheraea assamensis</i> Helfer
Project Period	: March 2016 – February 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 16.0 Lakhs
Project Investigators	: K. Neog, Principal Investigator : D. Goswami, Co-Investigator : S.A. Ahmed, Co-Investigator : U. Hazarika, Co-Investigator

Objectives:

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

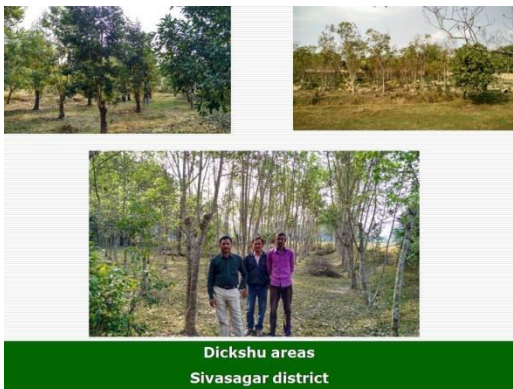
Highlights of achievements:

- ❖ Survey was conducted in different district of Assam viz. Jorhat, Sivasagar, Dibrugarh and Golaghat, Lakhimpur, Dhemaji in areas where Jethua, Aherua, Bhadia, Jarua etc. crops was done by the farmers.
- ❖ A list of small tea gardens/small tea gardens in the vicinity of Muga Farms near CMER&TI was prepared and awareness programmes on judicious use of chemical plant protection formulations were conducted at Jorhat, Tinsukia and Sivasagar districts.
- ❖ Samples of leaves and muga silkworms have been collected from farmers' fields and HPLC analysis of the or for detection of insecticide residue was done. Samples are also sent to NEIST, Jorhat for further confirmation through GS/GC MS
- ❖ Experiments with commonly used insecticides were conducted to categorize the chemical formulations based on lethal effect on Muga silkworm as highly toxic, moderately toxic and low toxic.
- ❖ Changes in biochemical components, viz. total protein, total soluble sugars, free amino acids, soluble protein and reducing sugars have been determined for all the selected formulations.

Table. List of Tea gardens/small tea gardens in the vicinity of Muga Farms

Sl No	Name and address of the tea gardens/Small Tea Gardens	Name Of the Owner	Mobile No	Area (Bigha/Ha.) under Tea Cultivation	Name Of the Muga Farmer/ Central Govt./State Govt. Muga Farms	Distance of the Muga farms from the tea Gardens (Km)
1	Jogduwar Tea Estate	Rajib Boruah		210	State Govt. Muga Farm, Jogduwar	.02 Kms
2	S.T.G, Jogduwar	Dhon Borah		8	State Govt. Muga Farm, Jogduwar	.02 Kms
3	S.T.G, Jogduwar Adarsh ME, Jogduwar	Ganesh Borah	8471839473	2	State Govt. Muga Farm, Jogduwar	.05 Kms
4	S.T.G, Jogduwar Adarsh ME, Jogduwar	Protap Boruah	Do	2	State Govt. Muga Farm, Jogduwar	.05 Kms
5	S.T.G, Jogduwar Adarsh ME, Jogduwar	Promud Bordoloi	Do	2	State Govt. Muga Farm, Jogduwar	.05 Kms
6	S.T.G, Jogduwar Adarsh ME, Jogduwar	Bitul Borah	9954942527	2	State Govt. Muga Farm, Jogduwar	.05 Kms
7	S.T.G, Jogduwar	Rakhan Hazarika	7896107366	14	State Govt. Muga Farm, Jogduwar	.03 Kms
8	S.T.G, Jogduwar	Munukon Boruah		12	State Govt. Muga Farm, Jogduwar	.03 Kms
9	S.T.G, Panchayat Office, Jogduwar	Munukon Boruah		2	State Govt. Muga Farm, Jogduwar	.2 Kms
10	S.T.G, Jogduwar	Utpal Khound	7002386018	1	State Govt. Muga Farm,	.1 Kms

					Jogduwar	
11	S.T.G, Tipomiya Gaon, Kaliapani	Kunja Borah	7638832635	1	State Govt. Muga Farm, Kaliapani	.03 Kms
12	S.T.G, Tipomiya Gaon, Kaliapani	Lohit Borah	9954339570	7	State Govt. Muga Farm, Kaliapani	.05 Kms
13	S.T.G, Tipomiya Gaon, Kaliapani	Ranjit Borah	8472873132	5	State Govt. Muga Farm, Kaliapani	.1 Kms
14	S.T.G, Tipomiya Gaon, Kaliapani	Moina Borah	9707092129	1.5	State Govt. Muga Farm, Kaliapani	.02 Kms
15	S.T.G, Tipomiya Gaon, Kaliapani	Dilip Borah	9954594695	1.5	State Govt. Muga Farm, Kaliapani	.1 Kms
16	S.T.G, Tipomiya Gaon, Kaliapani	Baba Borah	8133070681	0.5	State Govt. Muga Farm, Kaliapani	.05 Kms
17	S.T.G, Tipomiya Gaon, Kaliapani	Jiten Borah	9854774105	2	State Govt. Muga Farm, Kaliapani	.05 Kms
18	S.T.G, Tipomiya Gaon, Kaliapani	Debo Kr. Borah	985495131`4	4	State Govt. Muga Farm, Kaliapani	.1 Kms
19	S.T.G, Tipomiya Gaon, Kaliapani	Khagen Borah	9864622157 9864622175	8	State Govt. Muga Farm, Kaliapani	.04 Kms
20	S.T.G, Tipomiya Gaon, Kaliapani	Pushpa Ranjan Borah	8011209610	5	State Govt. Muga Farm, Kaliapani	.2 Kms





**Discussion with the President and Secretary of
Organic Tea Growers Association of NE on
16.3.2017**



5. Project Code	: AIT 5876
Project Title	: Advanced level institutional Biotech Hub
Project Period	: Dec., 2010 to Nov., 2019
Funding Agency	: DBT, New Delhi
Total Budget Allocation	: 69.68 Lakhs
Project Investigators	: M. Chutia, Principal Investigator
	: Ranjana Das, Co-investigator

Objectives:

- Providing basic biotechnology infrastructure facility for the students, faculties, researchers of individual institution as well as nearby institutions.

Highlights of achievement:**Organization of National Workshop cum Training Programme**

A DBT sponsored National Workshop – cum - Training Programme on “Techniques and Technologies of Seri-biotechnology” was organized for graduate, post graduate students and research scholars during 27 March - 2nd April, 2018 at Central Muga Eri Research & Training Institute, Lahdoigarh. A total of 40 participants attended in the event. Dr. P. Jayaraja, Director, RFRI, Jorhat graced the inaugural session of the programme as Chief Guest and interacted with the participants. The following training programmes were organized under the project.

Hands on trainings conducted:

Sl No.	Topic	Duration and Date	No. of participants	Level of participants
1	Techniques and Technologies of Seri-biotechnology	(1 week) 27 March - 2 nd April, 2018	20 + 20 (2 groups)	Research Fellows, M.Sc. & B.Sc. students
2	Soil Health Management	4 days 3-6 th April 2018	15	Research Fellows, M.Sc. and Technical Staff
3	Mushroom cultivation using bio-waste materials	1 day 14 th March 2018	40	Research Fellow, farmers and entrepreneurs

Outreach programmes conducted:

Sl. No	Topic	Name of the institution where conducted	Duration and Date	Level of participants
1	Muga and Eri Culture	Sericulture Resource Center, Dimoria	22.06.2017 & 23.06.2017	Farmers and entrepreneurs
2	Integrated technologies of Muga and Eri cultures	Sericulture Resource Center, Dimoria	09.10.2017	Farmers and entrepreneurs
3	Muga and Eri Culture- Problems and Prospects	Sericulture Resource Center, Dimoria	21.12.2017	Farmers and entrepreneurs
4	Awareness camp on Swachhata	Jatiya Vidyalaya, Jorhat	14.03.2018	Class IX - X
5	Basic Science and its scopes	Cheniamguri High School, Sotai, Jorhat	20.03.2018	Class VIII - X
6	Career in Life Sciences	Balya Bhavan School, Jorhat	21.03.2018	Class VIII - X
7	Recent advances in Basic Science	Sarojini Girls High School, Jorhat	27.03.2018	Class VIII - X
8	Biomedical Science and its applications	Rebakanta High School, Jorhat	27.03.2018	Class VIII - X
9	Popularization of Basic Science and its future scopes	Royal Oak High School, Jorhat	28.03.2018	Class VIII - X

Major achievements of the Biotech Hub during the year:

- ❖ Successfully organized need based hands on training programmes for research scholars, students and farmers entrepreneurs. Many college students came to the institute in last one year and availed the lab. facilities for their dissertation works.
- ❖ The Biotech Hub was able to disseminate knowledge (training) and popularize basic science among the students.
- ❖ Establishing a Bacteriophage Biology Laboratory along with Biotech hub facility.
- ❖ New scientific magazine namely “*BioQuest*” (half yearly) has been published under the Hub.
- ❖ Students from different schools, farmers and entrepreneurs visited the institute as well as the biotech hub throughout the year. National Science Day and World Environment Day was especially observed with different activities (awareness rally, plantations, and competitions).
- ❖ One SRF of the Biotech Hub completed his PhD work and successfully defended his PhD abstract submission seminar under Dibrugarh University.
- ❖ Trained farmers / entrepreneurs under SRC are continuously producing / rearing silkworm.
- ❖ Free disease testing services of vanya silkworms and host plants (Muga and Eri) to the beneficiaries, life cycles of Muga and Eri silkworms to students are provided time to time.



6. Project Code	: APR 5877
Project Title	: Role of hormesis in mitigating oxidative stress and its impact on growth and yield of Muga silkworm
Project Period	: September 2016 – August 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 7.85 Lakhs
Project Investigators	: Prashanth Sanganavar, Principal Investigator : D.K. Gogoi., Co-Investigator : R. Kumar, Co-Investigator : D. Goswami, Co-Investigator

Objectives

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

Highlights of achievements

- ❖ 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 (maximum hatching within two days) in egg treatment compare to control.
- ❖ Hatching % improved across different seasons in heat treatment compare to control by 5 to 10 %.
- ❖ Survivability % of young larvae after hatching improved across different seasons in heat treated experiment to control by 2 to 5 %.
- ❖ Effective Rate of Rearing % improved across different seasons in heat treated experiments compare to control by 2 to 6 %.
- ❖ Good cocoon %, Shell ratio % also improved in heat treated experiment.
- ❖ Average fecundity improved across different rearing seasons in treatment compare to control by 8 to 12.

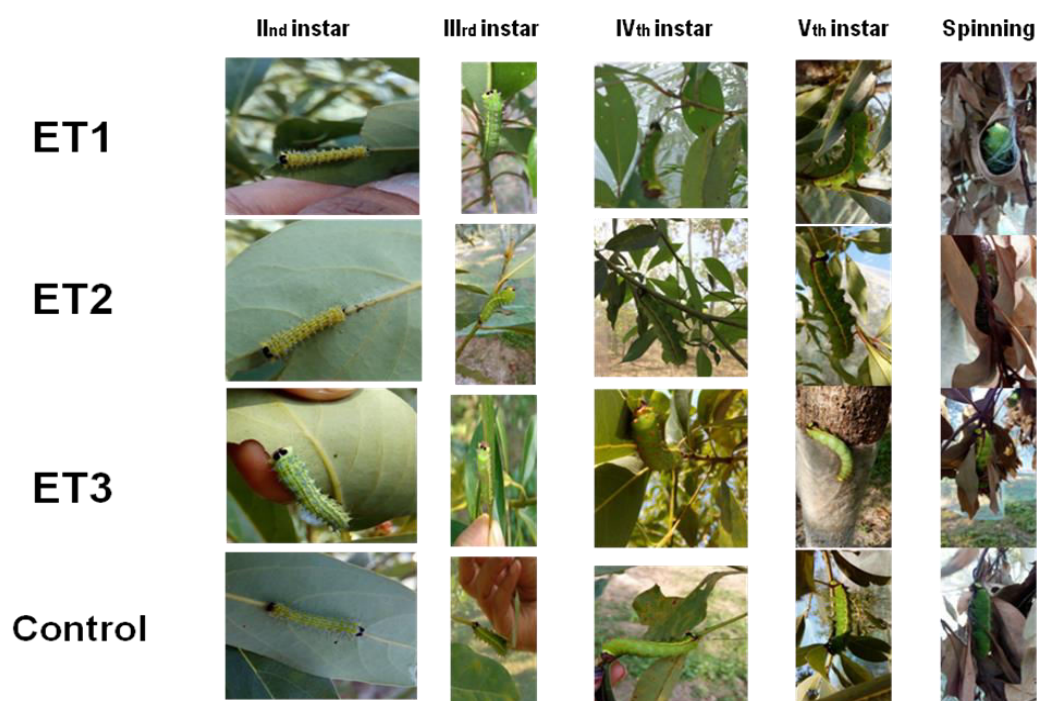


Fig. Larval stages in different treatments

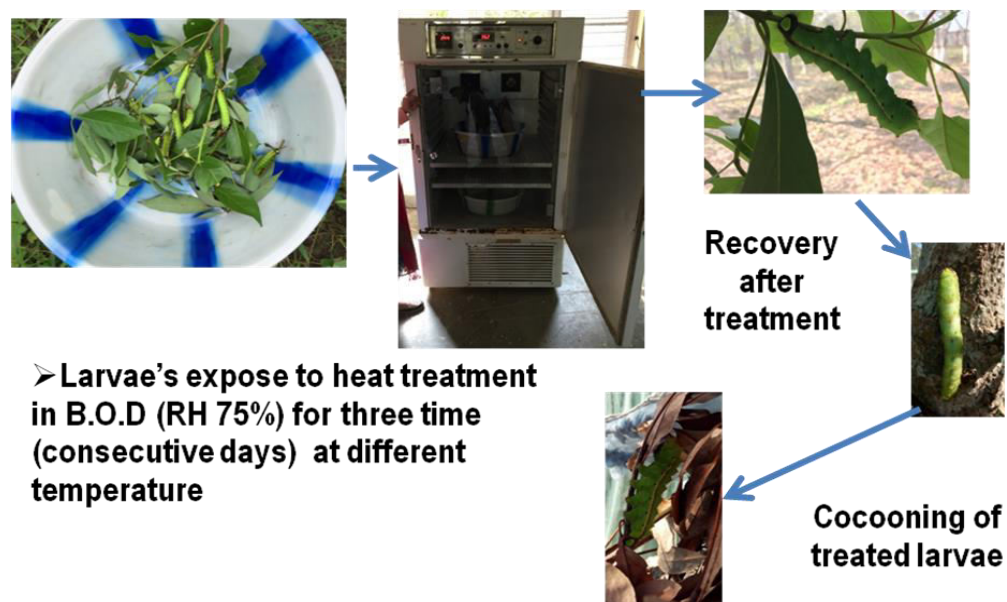


Fig. Implementation of heat treatment during larval stage

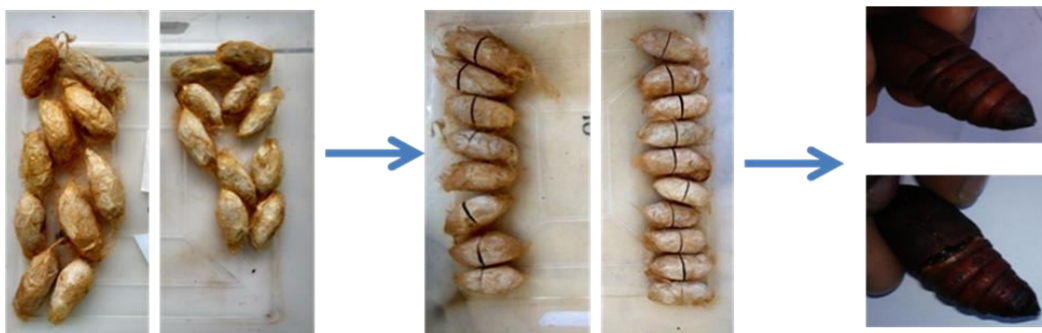


Fig. Cocoon parameter

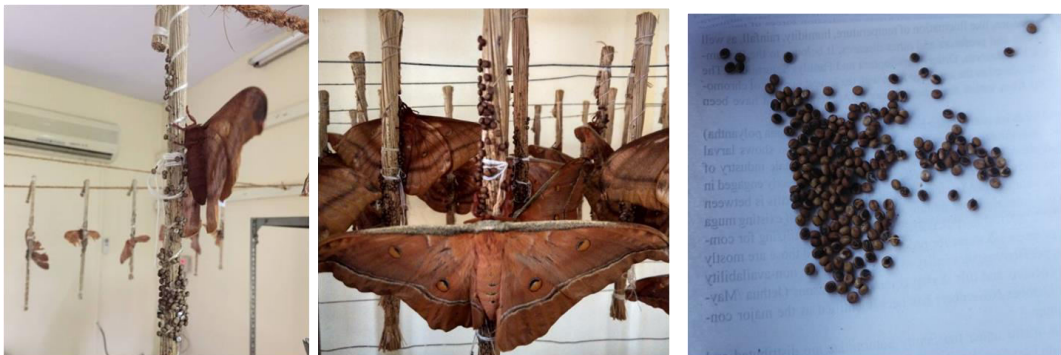


Fig. Moth emergence, coupling and fecundity



7. Project Code	: ARP-5878
Project Title	: Next generation sequencing studies and bioinformatics analysis of microbiome of flacherie infected muga silkworm for developing effective disease control measures
Project Period	: September 2016 – August 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 20.95 Lakhs
Project Investigators	: G. Subrahmanyam, Principal Investigator : Ranjana Das, Co-Investigator : M. Chutia, Co-Investigator : Rajal Debnath, Co-Investigator

Objectives:

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

Highlights of Achievement:

- ❖ Flacherie diseased muga silkworm mid gut is dissected and processed for gut microbiome analysis. Insect midgut metagenome was extracted from both healthy and flacherie diseased Muga silkworm samples.
- ❖ The DNA was purified and the quality of the extracted DNA was checked with 16S rRNA based polymerase chain reaction where desired amplicons have been obtained.
- ❖ Then the DNA was processed for high throughput sequencing analysis. High throughput sequencing analysis of V3-V4 (16S rRNA) regions revealed unprecedented microbial diversity in Muga silkworm midgut. More than 1 lakh sequencing reads were obtained in all the Muga silkworm midgut samples processed for NGS sequencing. Microbiome associated with Muga silkworm flacherie disease is established for the first time in this study.

- ❖ Seven dominant bacterial phyla in diseased silkworms and 14 dominant bacterial phyla in healthy silkworms are noticed. Bacterial species diversity as measured by Shannon index (h) has been drastically reduced during onset of flacherie disease. NGS data revealed bacterial pathogens as *Enterococcus* sp., *Enterobacter* sp., *Bacillus* sp., *Pseudomonas* sp., *Erwinia* sp., etc in diseased silkworm midgut.
- ❖ Bacterial pathogens have been isolated (by Koch postulates) based on the cues from NGS analysis and *In vitro* bioassay studies were performed for understanding pathogenicity bacterial isolates.
- ❖ These bacterial isolates were further used as test organisms for developing formulations for controlling bacterial flacherie disease.
- ❖ A new formulation is being developed and is under field trails.

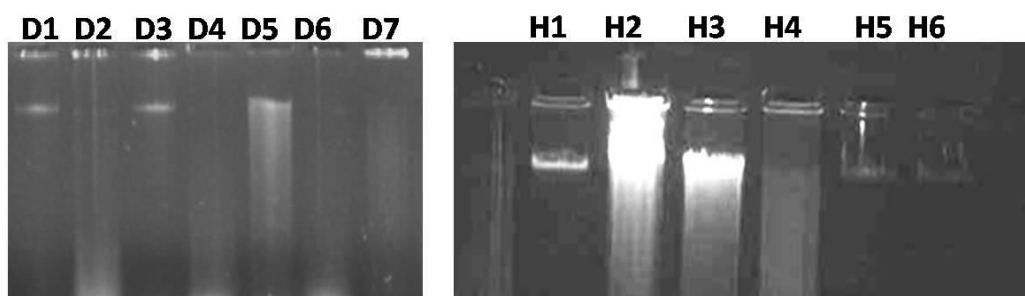


Fig.: DNA extraction from Muga silkworm midgut. D1 to D7 are flacherie diseased samples; H1 to H6 are healthy silkworm samples.

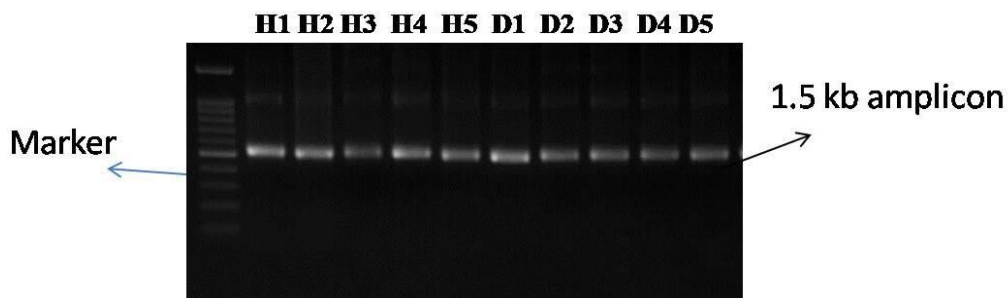


Fig.: PCR amplification of 16S rRNA gene from DNA samples extracted from Muga silkworm midgut. H: Healthy silkworm; D: Flacherie diseased silkworm

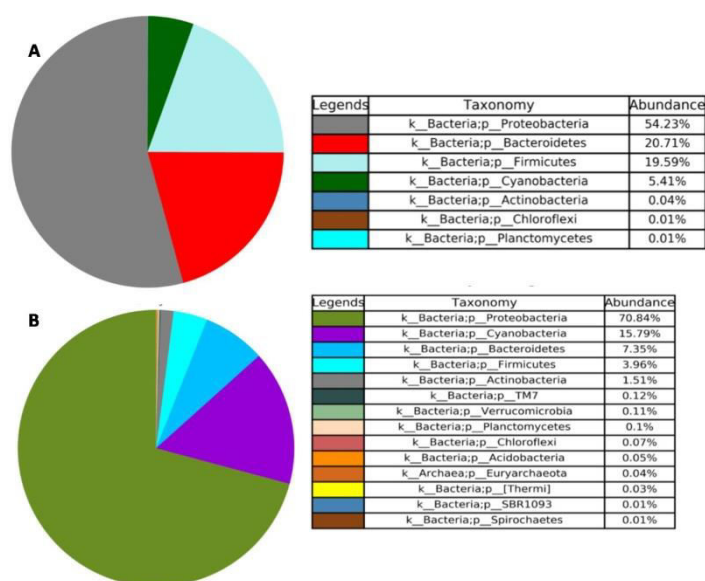


Fig.: Venn diagram representing distribution of bacterial phyla (%) in diseased (A) and healthy (B) Muga silkworm midgut.



8. Project Code : **PPA-5879**
Project Title : Assessment of phyto-chemical diversity in Som, the primary host plant of Muga silkworm from northeast India
Project Period : September 2016 - August 2019
Funding Agency : DBT, New Delhi
Total Budget Allocation : 15.20 Lakhs
Project Investigators : Prashanth Sanganavar, Principal Investigator
: D.K. Gogoi, Co-Investigator
: Ranjana Das, Co-Investigator

Objectives:

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

Highlights of achievements:

- Leaf moisture content revealed variation in moisture level in different cropping seasons. There is necessary for proper maintenance of host plant with irrigation at crucial periods of drought or dryness. This leading to highly palatable leaf to low palatable leaf availability for muga rearing.
- 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. a wide range of variation in % organic carbon, available nitrogen, phosphorus, potassium, Zinc, Sulphur, pH and electrical conductivity was observed in the soil samples collected from the different muga rearing areas.

Soil Nutrient Status

	pH	Rating	EC	Rating	% OC	Rating	Available N (kg/ha)	Rating
Goalpara	4.05	very strongly acidic (<5.0)	0.70	Normal (<1.0)	0.86%	High	413.36	Medium
Tura	5.73	Moderately acidic (5.5-6.0)	0.15	-do-	1.25%	Very High	428.13	Medium
Dhakuakhana	4.38	very strongly acidic	0.06	-do-	1.01%	High	444.5	Medium

	Available P (kg/ha)	Rating	Available K (kg/ha)	Rating	Zn (mg/kg)	Rating	S (mg/kg)	Rating
Goalpara	12.51	Low	64.06	Low	0.80	Medium	31	High
Tura	23.14	Medium	184.83	Medium	0.47	Low	58.33	Very High
Dhakuakhana	35.43	Medium	45.14	Low	1.98	High	35	High

- Leaf Sample collected from Goalpara, Tura and Dhakuakhana location.
- Leaf Sample collected from Jethua, Aherua, Bhodia, Kotia, Jarua and Chatua crop were processed.
- Leaf samples were analyzed for chemical content present like Protein, phenol etc. phytochemicals content analysis under progress.
- Protein, phenol etc content in different seasons found low to high content in mature, semi-mature and tender respectively (protein 8-18 mg/g and phenol 80-120 mg/100mg). Phytochemical like amino acids and Flavonoid (0.4 to 0.98 mg/ml) Tannin (0.2 to 0.45 mg/ml) content was recorded in mature, semi-mature and tender. Chotua crop leaf sample chemical composition analysis is under progress.
- Administrative approval for purchase of spectrophotometer sent to Central office.
- Purchased equipment's and minor instruments required for analysis.
- Purchased Chemicals and glassware required for analysis.



Fig. Sample collection at Dhakuakhana State sericulture farm in different seasons



Fig. Sample collection at Goalpara State sericulture farm in different seasons



Fig. Sample collection at Tura State sericulture farm in different seasons



9. Project Code	: ARP 5880
Project Title	: Characteri-zation and efficacy of bacterial antagonists against <i>Alternaria ricini</i> infecting Castor in North-Eastern India
Project Period	: September 2016 – August 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 15.25 Lakhs
Project Investigators	: Jeevan B., Principal Investigator : M. Chutia., Co-Investigator : Vijay N. Co-Investigator : Ranjana Das, Co-Investigator

Objectives:

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

Highlights of achievements:

- ❖ A total of 57 bacterial isolates were obtained from castor rhizosphere and subjected to anti-fungal activity against *Alternaria ricini*.
- ❖ The Dual culture bioassay studies reveal that 10 isolates were found to restrain the pathogen.
- ❖ The isolate LRP-2 showed the maximum inhibition against the test pathogen over the control.
- ❖ Biochemical characterization of the bacterial antagonists revealed that LRP- 2 has the ability to utilize wide variety of carbon sources.
- ❖ The isolate LRP-2 was subjected molecular characterization of using 16s rRNA universal primers. A unique PCR product of approximately 1400bp was obtained, the product was purified.
- ❖ Clones were sequenced in both the directions using 16s rRNA forward and reverse primers at Bioserve, Hyderabad, India.

- ❖ The 16s rRNA gene sequence of the isolate LRP-2 was compared with other respective bacterial sequences obtained from the NCBI database. Sequences obtained were identified in terms of closest homology sequence using blast (<http://www.ebi.ac.uk/Tools/msa/clustalw2/>).
- ❖ Multiple sequence alignments were made by CLUSTAL W. MEGA software (version 4.0) was used for the phylogenetic analysis.
- ❖ Phylogenic trees were constructed by neighbor-joining method. The Phylogenetic analysis revealed that the isolate LRP-2 is *Bacillus* sp.

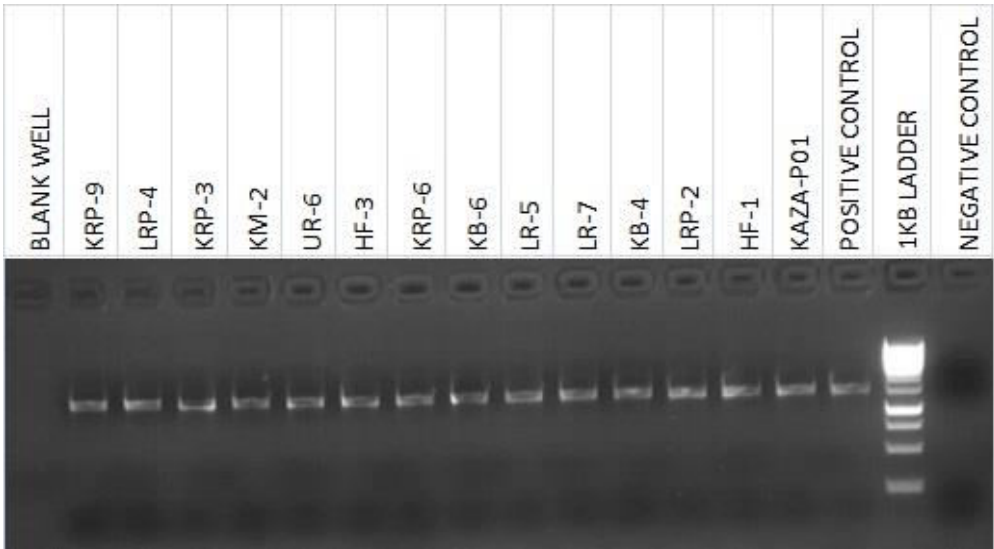


Fig. : PCR amplification of 16S rRNA gene from DNA samples extracted from bacterial antagonists.



10. Project Code : **APS-5881**
Project Title : Development of suitable incubation device for incubation of eri silkworm eggs to overcome hatching device during summer
Project Period : September 2016 – August 2019
Funding Agency : CSB, Bangalore
Total Budget Allocation : 20.95 Lakhs
Project Investigators : M.D. Senapati, Principal Investigator
: M.C. Sarmah, Co-Investigator
: B.N. Sarkar, Co-Investigator
: S.A. Ahmed, Co-Investigator

Objectives:

- To evaluate a suitable device for incubation of eri silkworm eggs for proper and uniform hatching.

Highlights of Achievement:

Five devices were tested and one device is found to be the best with 76-80 % hatching of eggs compared to 67-70 % in control.



11. Project Code	: APR-5882
Project Title	: Validation of ITKs associated in muga silkworm seed production system
Project Period	: September 2016 – August 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 12.25 Lakhs
Project Investigators	: D. Mech, Principal Investigator
	: R. Kumar, Co-Investigator
	: Ranjana Das, Co-Investigator
	: Vijay N. Co-Investigator

Objectives:

- Survey, documen-tation and scientific validation of ITKs associated in muga silkworm seed production system

Highlights of Achievement:

- ❖ Self depairing of moths through smoke is highly effective (87.0%) and the fecundity of eggs after exposing the moths in to smoke is significantly higher (Av.168) against the normal practice (Av.142).
- ❖ ERR between some ITKs (*disinfection of appliances through smoke, spread of tulsi twigs over the layings, burnning fields and direct mode of brushing*) and existing technology package is not significant.
- ❖ ERR with ITK and recommended practices (59.3%) and the recommended practices alone (52.2%) is highly significant.



Rearing under integration of ITK



12. Project Code	: PPS-5884
Project Title	: Soil Health Cards for Sericultural Farmers of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh and Sikkim
Project Period	: July 2016 – August 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 31.448 Lakhs
Project Investigators	: U. Hazarika, Principal Investigator : S. A. Ahmed, Co-investigator : Vinodakumar S. Naik, Co-investigator : D. K. Jigyasu, Co-investigator

Objectives:

- To make the farmers aware about the importance of soil fertility on the production of quality leaves of muga and eri host plants by issuance of soil health cards.

Highlights of achievement:

- A total of 1271 soil samples have been collected covering Assam, Nagaland, Manipur, Meghalaya, Mizoram and Arunachal Pradesh. 1094 samples have been analyzed.
- SHCs have been developed for 1094 individual farmers.
- Digitalization of SHCs for 244 farmers of Assam has been completed



Fig. Soil collection from farmers' fields and analysis using Mridaparikshak at the institute

Sample of SHCs issued to farmers

 CENTRAL SILK BOARD Ministry of Textiles Govt. of India Bangalore-560 006 Central Muga Eri Research and Training Institute, Lahdoigarh, Jorhat 785 700 Soil Health Card 	SOIL HEALTH CARD		Name of Laboratory		Central Muga Eri Research and Training Institute, Lahdoigarh, Jorhat 785 700						
	FARMER'S DETAILS				SOIL TEST RESULTS						
	Name		Smt. Pronita Naben		#	Parameter	Test Value	Unit	Rating		
	Village		Amaluma		1	pH	5.71	-	Extremely acidic		
	Sub-District		Dhansiripar		2	EC	0.08	-	-		
	District		Dimapur		3	Organic Carbon (OC)	1.14	%	Very High		
	Pin code		797112		4	Available Nitrogen (N)	402.2	kg/ha	Medium		
	Aadhaar No. / Voter ID No		820073368939		5	Av. Phosphorus (P)	25.9	kg/ha	Medium		
	Mobile Number		9375147427		6	Available Potassium (K)	168.9	kg/ha	Medium		
	Soil Sample Details				7	Available Sulphur (S)	15	kg/ha	Sufficient		
Soil Sample Number		56		8	Available Zinc (Zn)	4.44	mg/kg	Sufficient			
Sample Collected on		29.10.17		9	Available Boron (B)	2.39	mg/kg	Sufficient			
Survey No.		-		10	Available Iron (Fe)	33.5	mg/kg	Sufficient			
Khajira No. / Dag No		-		11	Av. Manganese (Mn)	61.1	mg/kg	Sufficient			
Farm Size		1.0 Acre		12	Available Copper (Cu)	4.8	mg/kg	Sufficient			
Geo Position (GPS)		N 26°44'0.74" E 93°25'53.12"									
Validity : From April 2017 - March 2020		Irrigated / Rainfed		Rainfed							
Secondary & Micro Nutrients				Fertilizer Recommendations for Reference Yield							
#	Parameter	Recommendations for Soil Applications	#	Host plants	Reference Yield (t/ha)	Fertilizer Combination-1 for N P K (Straight fertilizers)			Fertilizer Combination-2 for N P K (Complex/mixed fertilizers)		
1	Sulphur (S)	Not Required	1	Som & Soals (Muga)	18-20	Urea	SSP	MOP	Urea	DAP	MOP
2	Zinc (Zn)	Not Required	2	Kassira (Eri)	20-25	217 (kg/ha)	313 (kg/ha)	83 (kg/ha)	109 (kg/ha)	109 (kg/ha)	83 (kg/ha)
3	Boron (B)	Not Required	3	Annual Castor (Eri)	10-12	195 (g/pl)	282 (g/pl)	75 (g/pl)	98 (g/pl)	98 (g/pl)	75 (g/pl)
4	Iron (Fe)	Not Required	4	Perennial Castor (Eri)	12-15	272 (kg/ha)	469 (kg/ha)	42 (kg/ha)	109 (kg/ha)	163 (kg/ha)	42 (kg/ha)
5	Manganese (Mn)	Not Required				245 (g/pl)	422 (g/pl)	38 (g/pl)	98 (g/pl)	147 (g/pl)	38 (g/pl)
6	Copper (Cu)	Not Required				196 (kg/ha)	250 (kg/ha)	33 (kg/ha)	109 (kg/ha)	87 (kg/ha)	33 (kg/ha)
General Recommendations						20 (g/pl)	25 (g/pl)	3 (g/pl)	11 (g/pl)	9 (g/pl)	3 (g/pl)
1	Organic Manure (FYM)	5 t/ha				261 (kg/ha)	250 (kg/ha)	67 (kg/ha)	174 (kg/ha)	87 (kg/ha)	67 (kg/ha)
2	Vermicompost	1.5 t/ha				39 (g/pl)	38 (g/pl)	10 (g/pl)	26 (g/pl)	13 (g/pl)	10 (g/pl)
3	Lime requirement (LR)	12.5 t/acre (30 t/ha)	Manures & synthetic fertilizers should be applied to all the crops in two equal split doses during Feb-Mar & Aug-Sept seasons								
International Year of Soils 2015			Developed under the project - "Soil Health Cards for Sericulture Farmers of Assam, Meghalaya, Mizoram, Manipur, Nagaland, Arunachal Pradesh and Sikkim"								
 Healthy Soils for Healthy Life			Investigator:			Director, CMER&TI, Lahdoigarh					

13. Project Code	: APS-5885
Project Title	: 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
Project Period	: August 2016 – July 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 28.0 Lakhs
Project Investigators	: G. Subrahmanyam, Principal Investigator

Objectives:

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

Highlights of achievements:

- ❖ Genomic DNA extraction of the biosurfactant producing bacterial isolates was carried out and the extracted DNA was purified and processed for 16S rRNA gene amplification for identifying the bacterial isolates (Fig.1). 16S rRNA gene was amplified with universal eubacterial primers and desirable 1.5kb amplicons were obtained (Fig. 2). The amplicons were sent for sequencing. 16S rRNA gene sequencing revealed that majority of the biosurfactant producing bacteria are gram positive *Firmicutes*. Phylogenetic information among the bacterial isolates have been deciphered (Fig. 3). Bacterial isolates have been identified as *Bacillus* sp., *Pseudomonas* sp., *Klebsiella* sp., *Staphylococcus* sp., *Serratia* sp. and *Enterococcus* sp. (Fig. 3).
- ❖ Dibenzothiophene (DBT) degrading bacteria was isolated with enrichment technique. Oil polluted soils are inoculated in basal salt medium (BSM) containing DBT as sole source of sulfur (Fig. 4).

After 7 days of incubation, DBT biodesulfurization was characterized with Gibbs assay.

- ❖ Biodesulfurizing bacteria were isolated from enriched cultures shown positive in Gibbs assay. The bacterial isolates were purified and screened from biodesulfurization potential. Bacterial isolate it was shown positive in Gibbs assay and further optimization of the process is being studies.
- ❖ In addition to this, Plant growth promoting traits (PGPR) of the biosurfactant producing bacterial isolates have been done with stanadred protocols. Among all the isolates G1, G8 and G9 shown positive for amylase activity, lipase activity, catalase activity. None of the isolates shown positive for inorganic phosphate mobilization. Among 25 bacterial isolates, L3, L5, N6, N9, N13, G1, G8 and G9 are shown good anionic biosurfcant production on CTAB plates

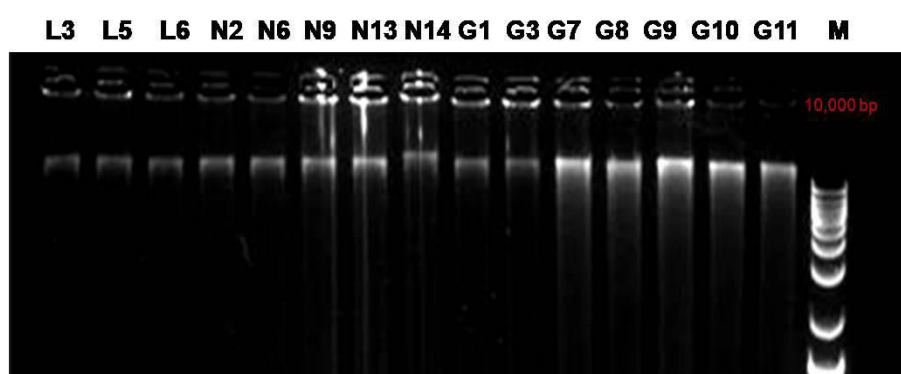


Fig. : Genomic DNA extraction from biosurfactant producing bacterial isolates.

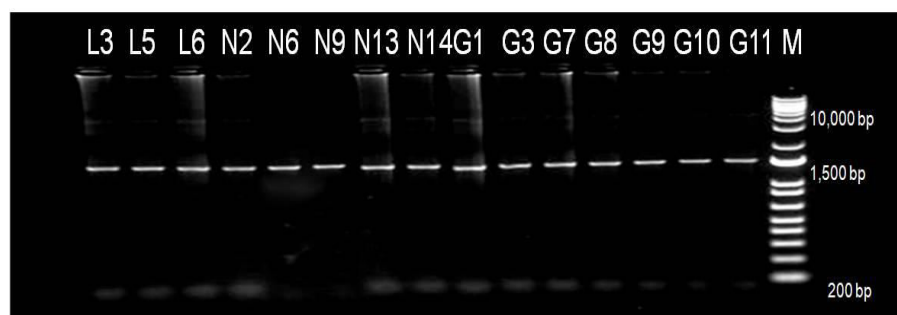


Fig. : 16S rRNA PCR results of bacterial isolates. Desired 1.5kb amplicons are obtained.

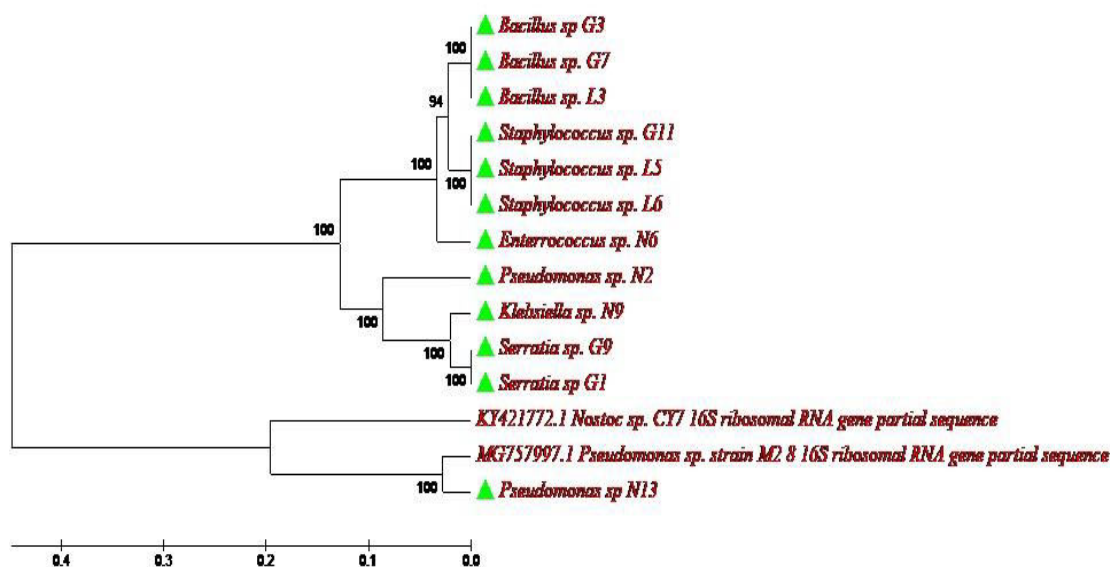


Fig. : Phylogenetic tree of biosurfactant producing bacterial isolates. The tree was constructed based on the 16S rRNA sequencing similarity.

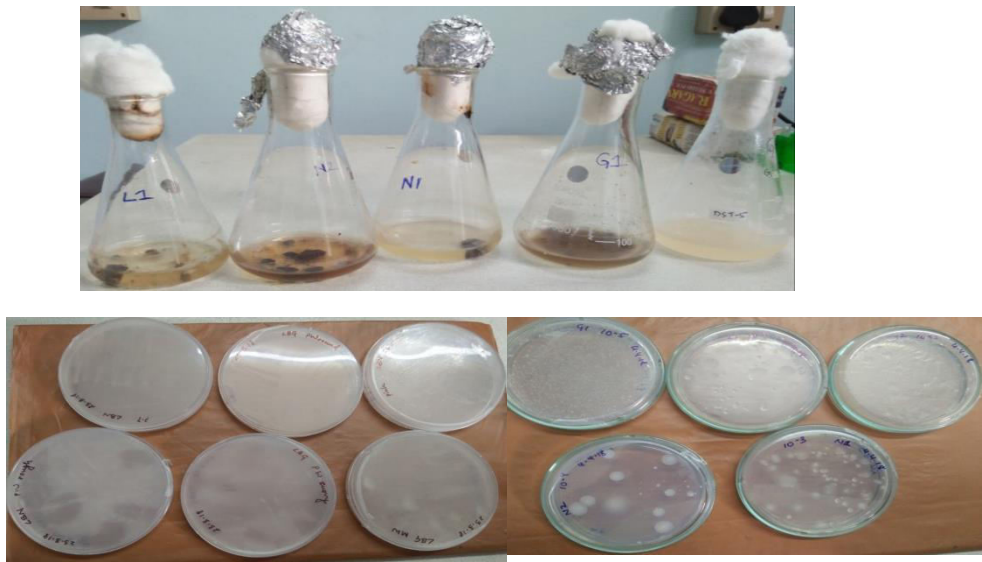


Fig. : Enrichment of DBT biodesulfurizaing bacteria on basal salt medium.



14. 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	: December 2016 – November 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 4.75 Lakhs
Project Investigators	: N. Biswas, Principal Investigator : S.A.S. Rahman, Co-investigator

Objectives:

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

Highlights of achievement:

- ❖ During Jethua, 2017 the highest cocoon harvest was found during the rearing schedule of 6th May, 2017 followed by the rearing schedule of 11th and 16th May, 2017.
- ❖ Highest cocoon yield was obtained when brushing was done during first week instead of late brushing.
- ❖ During Bhadia, 2017 the highest cocoon harvest was found during the rearing schedule w.e.f. 26th August, followed by the rearing schedule of 09th August and 2nd August respectively.
- ❖ During August, highest yield was obtained when brushing was done during last week instead of first or 2nd week.

Table: Rearing performance of *A. assamensis* during Bhadia, 2017
Dfl quantity::@25 gram in each rearing schedule Eggs per gram::130 nos

Hatching	Date		Larval duration (days)	No. of worms brushed	Mature worms collection (Nos.)	Mortality %			ERR %
	Spinning					Disease	Pest predator	Natural calamity	
02.08.17 (50.23%)	19.08.17		18	1632	151 ♂wt::4.98g ♀wt::7.50g	46.29	8.12	36.34	9.25
09.08.2017 (52.14%)	25.08.17		17	1694	270 ♂wt::5.10g ♀wt::8.15g	40.22	8.42	35.43	15.93
26.08.17 (56.17%)	16.09.17		22	1825	520 ♂wt::5.35g ♀wt::8.72g	357	27.2	8.61	28.49

Table: Cocoon Analysis

Date of Brushing	Cocoons harvested (Nos)					Cocoon assessment					
	Good	Poor	Melted	Uzi infected/ Naked/ Double	Total	Cocoon wt		Shell wt		SR%	
						♂	♀	♂	♀	♂	♀
02.08.17	110	37	4	NIL	151	3.12	4.22	0.24	0.32	7.69	7.58
09.08.17	190	40	40	NIL	270	3.14	4.32	0.24	0.33	7.64	7.63
26.08.17	436	62	22	NIL	520	3.20	4.51	0.28	0.37	8.75	8.20

Table: Meteorological Data

Temp ° C			Humidity%			Rainfall (in days)		
A	B	C	A	B	C	A	B	C
Mx::31.9 Mn::29.5	Mx::30.04 Mn::28.8	Mx::28.5 Mn::24.2	Mx::91 Mn::82	Mx::89 Mn::82	Mx::89 Mn::80	12	13	9

A.1st Rearing:: 2nd -19th Aug.17

B.2nd Rearing:: 9th -25th Aug.17

C.3rd Rearing:: 26th Aug. -16th Sept.17

Table : Rearing performance of *A.assamensis* during Jethua, 2017

Dfl quantity::@25 gram in each rearing schedule Eggs per gram::130 nos

Date		Larval duration (days)	No. of Worms Brush	Mature Worms Collection(No)	Mortality %			ERR%
Hatching	Spinning				Diseases	Pest predator	Natural calamity	
06.05.17 (64.66%)	03.06.17	29	2101	695 ♂wt::5.01g ♀wt::8.92g	7.27	19.35	40.31	33.07
11.05.2017 (64.33%)	05.06.17	26	2091	592 ♂wt::5.05g ♀wt::8.36g	25.39	15.07	31.23	28.31

16.05.17 (64.32)	07.06.17	23	2090	503 ♂wt::5.17g ♀wt::8.68g	35.73	11.65	28.56	24.06
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Table: Cocoon Analysis

Date of Brushin g	Cocoons harvested (Nos)					Cocoon assessment					
	Goo d	Poo r	Melte d	Uzi infected / Naked/ Double	Tota l	Cocoon wt		Shell wt		SR%	
						♂	♀	♂	♀	♂	♀
6.5.2017	466	197	32	NIL	695	5.03	6.25	0.49	0.58	9.74	9.07
11.05.17	351	206	35	NIL	592	4.27	8.83	0.39	0.63	8.47	8.04
16.5.17	321	131	51	NIL	503	4.25	7.27	0.35	0.53	8.23	5.29

Table: Meteorological Data

Temp ⁰ C			Humidity%			Rainfall (in days)		
A	B	C	A	B	C	A	B	C
Max::29.25 Min::22.35	Max:31.23 Min:25.31	Max::31.33 Min::26.32	Max:94 Min:74	Max:94 Min::72	Max:94 Min::86	16	14	10

A.1st Rearing:: 06.05.2017-03.06.2017

B.2nd Rearing:: 11.05.2017-05.06.2017

C.3rd Rearing:: 16.05.2017-07.06.2017



15. Project Code : **ARP-5887**
Project Title : Isolation and characterization of lytic bacteriophages infecting bacterial pathogens of Muga silkworm *Antheraea assamensis* Helfer.
Project Period : April 2017 – March 2020
Funding Agency : DST, New Delhi
Total Budget Allocation : 27.52 Lakhs
Project Investigators : M. Chutia, Principal Investigator
: G. Subrahmanyam, Co-Investigator
: Ranjana Das, Co-Investigator

Objectives:

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

Highlights of Achievement:

Pathogenic bacterium for isolation of phages

- ❖ The infected cadavers of muga silkworms were collected from different silkworm rearing farms for isolation of the bacterial pathogens of muga silkworms. For experimental purpose, Muga silkworms were reared in the farm No. 3 of Central Muga Eri Research and Training Institute, Central Silk Board, Jorhat, Assam (India). 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 with the help of sterilized scissors in PBS buffer 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°C for 48 h.

- ❖ Each of the different bacterial colonies was purified and preserved at 4°C for further experiments i.e. isolation of phages from environmental purposes. Further, the purified strain was 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.

Pathogenicity test of the bacterial isolates

- ❖ The Bacterial isolates were used for pathogenicity test in laboratory by following Koch's Postulates. After performing pathogenicity test, the bacteria cultures were confirmed as bacterial pathogens isolated from the silkworms.

Disease epidemiology

- ❖ It was observed that the disease appeared throughout the year (2017-18) with the intensity varying in different months. This was because of the environmental factors particularly the temperature variations round the year.
- ❖ The season wise variations of relative humidity ($82 \pm 10 \%$) and precipitation (11.92 mm) were not significantly different in the sites. The disease was recorded throughout the year in the rearing fields and the infection percentage varied from season to season.
- ❖ Temperature variations were not significantly different in the rearing sites, but varied season wise. The percent 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°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 are being isolated for screening for the presence of phage active against these bacteria. 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.



16. Project Code : **PRP 5888**
Project Title : Standardi-zation and popularization of treated bamboo products in ericulture
Project Period : April 2017 – March 2019
Funding Agency : CSB, Bangalore
Total Budget Allocation : 29.82 Lakhs
Project Investigators : S.A. Ahmed, Principal Investigator
: M. C. Sarmah., Co-Investigator
: D. K. Jigyasu., Co-Investigator

Objectives:

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

Highlights of achievements:

- ❖ First batch of Skill Training on Treated Bamboo appliances (12days) for 20 entrepreneurs conducted at Rain Forest Research Institute (RFRI), Jorhat.
- ❖ Distribution of 200 Nos. of mountages to the beneficiaries of Lakhimpur area, 100 Nos. of Jorhat, 420 Nos. of Nagaland and 300 Nos. of Morigaon district of Assam.
- ❖ Demonstration and Cum Awareness Programme was held in DOS of Nagaland, Jorhat, Lakhimpur, Tokobari, Bogagaon and Nellie

Table: Preparation of Treated Bamboo appliances through Entrepreneurs & Collaborating agency

#	Location of trainees	No. of trainees	Physical (No.)	Target	Achievements as on 31.03.2018
			Up to Dec' 17	Jan-Mar 2018	
1	Jorhat (Borholla & Mariani)	4	500	0	250
2	Sivasagar (Bokota)	2	200	0	100
3	Udalguri, BTC	4	400	0	300
4	Dimapur, Nagaland	5	400	0	420
5	Lakhimpur, Assam	2	200	0	200
6	Morigaon, Assam	3	300	0	300
7	Parikshit Borkotoky		-	1000	440
8	RFRI, Jorhat		1000		
Total		20	3000	1000	3010

Preparing of bamboo mountages
Location: Dimapur, Nagaland



Distribution Cum Awareness Programme on Treated Bamboo Appliances
Venue: Lakhimpur



Fig. Different views on the training, preparation and distribution of treated bamboos



17. Project Code	: ARP-5889
Project Title	: Studies on the cross transmission of pebrine spores from lepidopteran caterpillars to muga silkworm (<i>Antheraea assamensis</i> , Helfer) and its control measures
Project Period	: June 2017 – May 2020
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 16.30 Lakhs
Project Investigators	: Kh. Subdas Singh, Principal Investigator : R. Kumar, Co-investigator : M. Chutia, Co-Investigator

Objectives:

- Characterization of pebrine spores through illustrated taxonomic features and molecular tools.
- To control the identified pebrine infected lepidopteran caterpillar from muga eco-system.
- To study the cross infection of pebrine spores from Lepidopteron caterpillars to Muga silkworm

Highlights of achievement:

Collection of lepidopteran caterpillars was started in March, 2017 by visiting at different Muga rearing fields. Lepidopteran caterpillars were collected from CMERTI institute farms viz. Farm No1, Farm No. 2, Farm No. 3, GCC Chenijan, Titabor field laboratory and P3 unit Nongpoh and Sibsagar. Different lepidopteran insects occurred in different crop season at different location. Most of the caterpillars collected from the fields were belong to Pyralidae, Papilionidae, Noctuidae, Lymantriinae, Geometridae and Nymphalidae family. Till now more than 30 lepidopteran species including wild silkworm viz. *Cricula trifenestrata*, *Attacus atlas* (Saturniidae) were collected from different Muga rearing fields. All of them were tested for pebrine spore infection using Fujiwara method. Unidentified caterpillars were cultured till adults for their identification. From our observation, more than 20 lepidopteran species were found infected with pebrine spores. Different spores were observed and number of spores varies from one insect to another. Pebrine spores detected from the Papilionidae, Nymphalidae and Noctuidae were similar with the spores of Muga silkworm. From the saturniidae family, *Cricula trifenestrata* was found infected with different types of spores. Pyralidae family was the largest number of lepidopteran caterpillars but no pebrine spore was detected thereof. Some caterpillars were found infected with large number of pebrine spores, and some species were detected with very few pebrine

spores. Among the above mentioned lepidopteran families, Papilionidae, Nymphalidae and Noctuidae are found frequently detected with pebrine spores, followed by Lymantriinae and Geometridae. Spores isolated from the caterpillars and wild silkworms were preserved for further studies.

a) Physical & overall progress of the project

REGULAR FIELD VISIT AND COLLECTION OF CATERPILLARS



Fig. Muga farmer's field at Nongpoh CMERTI Farm No.3 (Meghalaya)



Fig. caterpillar collection at

SOME OF THE IMPORTANT LEPIDOPTERAN CATERPILLARS COLLECTED FROM MUGA REARING FIELDS

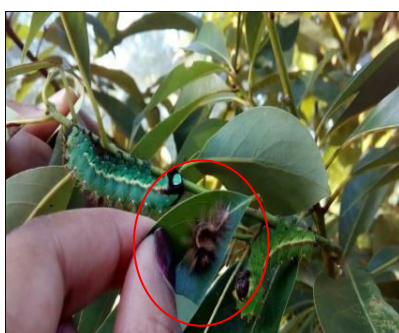


Fig. Wild lepidopteran caterpillars coexisting with Muga silkworm in rearing field



Fig. Wild lepidopteran caterpillars coexisting with Muga silkworm in rearing field



Fig. *Attacus atlas* (Lepidoptera: saturniidae) in Soalu (*Litsea monopetala*) plantations



Fig. *Cricula trifenestrata* (Lepidoptera: saturniidae) and Noctuid larva infesting som leaves



Fig. Lepidopteran larvae belong to Nymphalidae and Lymantridae collected from Muga rearing fields



Fig. Lepidopteran larvae Geometridae and Papilionidae collected from Muga rearing fields

DETECTION OF PEBRINE SPORES FROM LEPIDOPTERAN CATERPILLARS FOLLOWING FUJIWARA METHOD



Fig. Isolation of pebrine spores from lepidopteran caterpillars collected from Muga rearing fields



Fig. Detection of pebrine spores from lepidopteran caterpillars collected from Muga rearing fields

PRELIMINARY VIRULENT TEST OF THE ISOLATED SPORES



Fig. Spraying pebrine spores on Muga silkworm and its host plant leaves for virulent test



Fig. Release of Muga silkworm sprayed with pebrine spores at isolated place



18. Project Code	: APR-5890
Project Title	: Biodiversity assessment of wild silk moths and rearing potentialities of muga (<i>Antheraea assamensis</i> Helfer) and eri silkworm (<i>Samia ricini</i> Donovan) for sustainable development in Nagaland
Project Period	: February 2017 – January 2020
Funding Agency	: DBT, New Delhi
Total Budget Allocation	: 15.55 Lakhs
Project Investigators	: K. Neog, Principal Investigator

Objectives:

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

Highlights of achievement:

- ❖ Survey was conducted in foothill areas of Nagaland bordering Assam.
- ❖ The collected worms / cocoons / moths were characterized morphologically. Actions have also been taken for characterization of the species at molecular level.
- ❖ All necessary laboratory chemicals and glass wares have been procured.
- ❖ JRFs and Project Assistants as per approval have been recruited for carrying out different activities under the project.



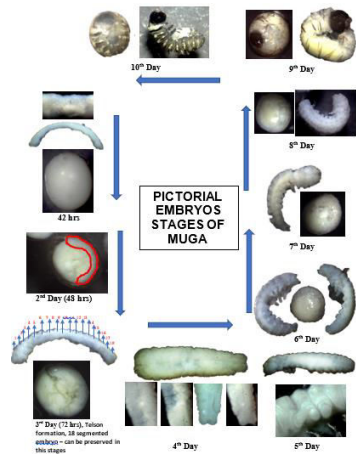
19. Project Code	: APS-3612
Project Title	: Development of Seed Preservation Technology for Muga Silkworm (<i>Antheraea assamensis</i>, Helfer)
Project Period	: June 2017 – May 2019
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 3.70 Lakhs
Project Investigators	: R. Kumar, Principal Investigator
	: B. Sailaja, Principal Investigator (SSTL)

Objectives:

- To develop Muga silkworm embryonic chart through embryogenesis studies.
- To evolve an appropriate egg preservation technology through identification of sensitive and suitable embryonic stage
- To evaluate the rearing performance of the preserved seed by conducting bioassay studies.

Highlights of achievement:

E01: Studies on embryogenesis and development of Muga silkworm embryonic chart
 Embryonic stages dissected and taken all stages photographs for development of chart.



E02: Screening and identification of suitable and sensitive embryonic stage for seed preservation-single step

DFLs (5-5 dfls) of 1st, 2nd, 3rd day laid eggs at 10°C with 75% RH for 30 days with 1 day interval of 15°C. The hatching was observed 79% in first day laid eggs preserved at 10°C. Rearing is going at Farm No. 3, in soalu. It was observed that the first day preserved eggs were found in 7th day stage of embryo, 2nd day preserved eggs were found in 8th day stage and 3rd day eggs preserved found at 9th day stage. All the information was documented in pictorial manner with full proof. The hatching was observed 79% in first day laid eggs preserved at 10°C. Accordingly, the rearing is going on for further assessment of lots. The experiment will be repeated.

Table: Egg preservation schedule for first, second and third day laid egg by muga moth and hatching percentage.

Collection of laid eggs	Embryonic stages	Preserved upto (days)	Temperature (7 days)	Intermediate Temperature (1 day)	Embryonic stage on 25th day	Av. % of hatching
First Day	32 hrs	25	10°C	15°C	7th day stage	79 %
Second day	48-54 hrs	25	10°C	15°C	8th day stage	68 %
Third day	65-75 hrs	25	10°C	15°C	9th day stage	45 %



Fig: Rearing of preserved eggs at Experimental Farm No. 3, CMERTI, Lahdoigarh



20. 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 Allocation : 14.8 Lakhs
Project Investigators : Rajesh Kumar, Principal Investigator
: Vijay, N., Co-Investigator
: Kh. Subadas Singh, Co-Investigator

Objectives:

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

Highlights of Achievements:

Objective wise achievements are given below

Objective 1. To develop light traps through LED (Light emitting Diode) for controlling major insect pests and predators in muga ecosystem.

The LED lights of different colours having different wavelength and also some consumable items were procured and were developed into LED light traps. The traps were continuously used during the dusk period in the muga rearing field (*Litsea monopetala*, *Persea bombycina*) for monitoring of insect pests present in muga ecosystem.

Developments of LED solar and Lure trap for Controlling uzifly and other pests:

The items which were needed for development of lure trap were brought and the traps were modified in our laboratory itself.



Objective 2. Field trial for validation of developed LED traps for controlling major insect pests and predators of muga ecosystem.

The modified traps LED solar; electric and suction traps installed in the muga ecosystem:



Data collection and identification of insects at laboratory:

Earlier, pheromone plastics were used for capturing insect pests attracted towards different light source, but later on the pheromone plastics were replaced with transparent plastic sheets applied with tangle foot glue. The attracted insects were trapped in glue. At every one-week interval the transparent sheets are detached from the LED 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 trapped insects were taken by Telescopic Zoom Microscope.



Observations:

In this study we have compared the different colour LED light source based on number of insect pests attracted. LED light of four different colours (yellow, blue, red and green) of 1.3W and UV suction trap were installed in the field for controlling insect pests in muga ecosystem. The blue colour LED trap attracts the maximum number of insect pests followed by green and yellow and the least was by red. The maximum number of insects trapped, belonged to order Diptera followed by Hemiptera, Hymenoptera, Coleoptera, Lepidoptera, Ephemeroptera, Orthoptera and Odonata. UV suction trap attracted Lepidopteran, Hymenopteran, Dipteran, Hemipteran, Coleopteran insects.

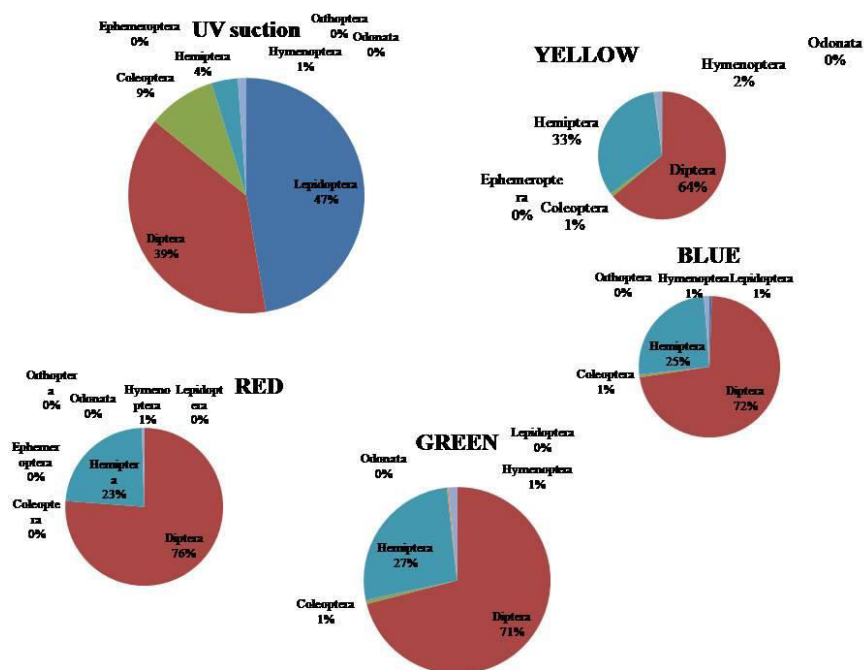


Fig.: Pie chart for attracted insects towards different wavelength of LED traps

Observing the attraction of insects towards different wavelength of LED trap for validation :

Releasing of tingids bugs of som inside the laboratory against the four types of colour traps (November, 2017). And it has been observed that bugs are attracted towards blue colour light.



AWARENESS PROGRAMME:

- ❖ Awareness training programme on proper rearing of muga and eri and also highlighted the advantages of using light trap over chemicals to the farmers of Tengakhat, Dibrugarh (October, 2017).
- ❖ Demonstration on LED solar trap at MSDP Dakhuakhana Seri Farm, Dakhuakhana, Lakhimpur (9 March 2018).
- ❖ LED trap demonstration at DoS Khanapara for controlling of insect pests of muga ecosystem 10 – 11 March, 2018.



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21. Project Code	: AIB - 5894
Project Title	: <i>In-situ</i> conservation of muga silkworm, <i>Antheraea assamensis</i> , 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
Total Budget Allocation	: 44.00 Lakhs
Project Investigators	: Rajesh Kumar, Principal Investigator Prashant Sangannavar, Co-investigator

Objectives :

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

Highlights of Achievements:

The highlights of achievement is given below state-wise

Assam:

- ❖ MoU has been signed between Assam Forest Department and CMERTI, Lahdoigarh for Upper Doigrung Wild Life area, Golaghat upto 2047 (30 years) – *in situ* conservation site.
- ❖ A board has also been installed near the site and hoarding will be installed.
- ❖ Wifi weather station has also been installed in the peripheral village (Bankathar Village), which is nearest to the Upper Doigrung Wild Life area.
- ❖ Another wifi weather station has also been installed in *ex-situ* condition at Bogidhola farm of state sericulture department, Golaghat.
- ❖ The muga larval population has been found in peripheral zone, it means the population of muga is increasing in core zone.
- ❖ On 25th Dec., 2017 Shri Mukti Gogoi, IAS Commissioner & Secretary to the Govt. of Assam and Shri Mukta Nath Saikia, ACS,

Director, Directorate of Sericulture, Assam visited *Ex-situ* and *In-situ* conservation of muga silkworm progress at Bogidhola farm and Upper Doigrung Wild Life area, respectively.

- ❖ 5KVA solar grid station in *ex-situ* and 2 solar lights in *in-situ* centre were installed.
- ❖ The plantations have been done at *ex-situ* conservation centre in demarcated area.



Fig.: WiFi weather station at *in-situ* conservation site Upper Doigrung Wild Life Area, Golaghat



Fig.: WiFi weather station at Ex-situ conservation site Bogidhola Muga Farm, Golaghat



Fig.: Upper Doigrung Wild Life Area in-situ Conservation Site



Fig.: Installed Board after getting permission from Forest Department of Assam



Fig.: Adopted village near to Upper Doigrung Wild Life Area for *In-situ* Conservation of Muga silkworm – Organic Sericulture Village

BODOLAND

- ❖ It was established before implementation of NERTPS scheme.
- ❖ Mixed plantation has been completed in Kuklung forest area
- ❖ Fifty dfls of muga silkworm has been brushed on scattered host plants
- ❖ One Awareness programme conducted

MEGHALAYA

A survey has been conducted at three sites Bagmara Reserve forests, Bagmara; Reserve Forest, near to Balpakram National Park, Garo Hills with state sericulture staff, Tura on 29-31.09.2017 and Tura Peak on 21.12.2017. The matter was discussed with PCCF, Department of Forest, Govt. of Meghalaya, Shillong, Meghalaya and he suggested that the site may be selected in Garo Hills, which is most suitable place for “In-situ conservation for muga and other wild silk moth”. After completion of 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, which is finalized now. Tura Peak Reserve Forest is near to Tura Town and also accessible from Sericulture Department easily.

Observation at site is given below:

- ❖ During survey of Balpakram and Bagmara reserve forest area, it has been observed that there is no office / staff of CSB and State Sericulture Department of Meghalaya at this site. It is not easily accessible and road conditions are very bad. There is lot of insurgency and disturbance in this area. This site is most suitable site, but we rejected due to above said problems.
- ❖ Another site has been surveyed i.e., “Tura Peak Reserve Forest” This Tura Peak Reserve Forest land is suitable in all point of view viz., full of natural host plants of wild silkworm including muga. The matter was discussed with local people and they informed that we found many times cocoons in this forest.
- ❖ During survey, we found wild eri cocoons in forest area and many primary & secondary host plants of muga and other wild silk moths viz., Soalu (*Litseamonopetala*), Mejankuri (*Litseacitrata*), Digloti

(*Litsea salicifolia*), wild mulberry (*Morus* sp.), wild Castor (*Ricinus communis* Linn.), Kesseru (*Heteropanax fragrans* Seem), Payam (*Evodia fraxinifolia*), Tapioca (*Manihot esculanta*), Cassava (*Manihot utilissima* Phol) Gamari (*Gmelina arborea*), Hingori (*Castanopsis indica*), Tree of Heaven (*Ailanthus altissima* Miller), Waljem (*Sterculia colorata* Roxb.).

- ❖ The elevation point for selected site is 500 to 1200 mt asl. The area is near about more than 5 kilometer with dense forest.
- ❖ The matter can be discussed with DFO, Tura for forwarding the proposal to Head of Forest, Department of Forest, Govt. of Meghalaya to get the permission for development of “*In-situ* conservation of Muga and other wild silkmths”.
- ❖ Later on, 2 MoU can be signed one between State Forest Department of Meghalaya and Central Silk Board (CMERTI, Lahdoigarh) and another between Directorate of Sericulture of Meghalaya and Central Silk Board (CMERTI, Lahdoigarh, Jorhat, Assam) for procuring land and its utilization for conservation purpose.
- ❖ Visited Tura peak Reserve Forest, is finalized and report has been submitted to R.O., Guwahati to forward to State Sericulture Department, Shillong which will be forwarded to PCCF, Shillong through DFO, Tura. The full cooperation is required in Meghalaya for establishing *in-situ* and *ex-situ* conservation centre.

22. Project Code : **APR-5892**
Project Title : Formulation of semi-synthetic diet for muga silkworm
Project Period : February 2017 – January 2020
Funding Agency : CSB, Bangalore
Total Budget Allocation : 15.55 Lakhs
Project Investigators : T. James Keisa, Principal Investigator
: Kh. Subadas Singh, Co-investigator
: D. Goswami, Co-Investigator

Objectives:

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

Highlights of achievement:

- ❖ Five formulations with different combinations of ingredients were tested.
- ❖ Diet No. 3 was found to be most preferred by the worms.
- ❖ Further study is under progress.



23. Project Code	: PPF-5893
Project Title	: Impact assessment of petroleum crude oil on Muga silkworm (<i>Antheraea assamensis</i> , Helfer) and its host plants in Assam.
Project Period	: October 2017 – September 2020
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 22.898 Lakhs
Project Investigators	: D. K. Jigyasu, Principal Investigator : Kh. Subadas Singh, Co-investigator : K Neog, Co-investigator

Objectives:

- Determination of crude oil contamination in muga silkworm rearing and its mitigation measures.

Highlights of achievement:

- ❖ Field survey conducted for the collection of Muga Silkworm rearing information at vicinity of oil drilling and gathering in Sivasagar district of Assam. Huge numbers of Muga Silkworm host plants; Som (*Persea bombycina*), Soalu (*Litsea monopetela*) and Mejankari (*Litsaea cubeba*) have been observed in these areas.
- ❖ We have surveyed at State Govt. Muga farm and Muga Silk Development project, Borahibari, in Gelakey where, Muga Silkworm rearing is going on Som plant. The areas of Som plantation are 200 bighas and 09 acre at two different places, and distance from the oil fields is 9-10 Km. During winter crop season, nearly 35000 numbers of cocoons produced whereas, quality of cocoons was not good. Private Muga rearers are practicing Muga rearing in 520 bighas of Som plantation in Gelakey area. The distance of Muga rearing farm from oil drilling sites and gas gathering station is 600-800 metres. At this place, it was observed that the particulate matters and gaseous substances were coming out from gas gathering station (ONGC-GGS) and from drilling sites, respectively.
- ❖ Other group of private Muga rearers are practicing Muga rearing in 200 bighas of Som plantation which is situated within the radius of 10 Km from oil drilling sites. A total 65000 numbers of Muga Silk cocoons were produced by these farmers during commercial crop season, out of which 50 numbers of cocoons were checked

randomly. And it was observed that cocoons were flimsy, malformed and inside stained.

- ❖ A Private Muga rearer in Sivasagar conducting rearing on 100 numbers of Som plants and distance from the gas gathering station (ONGC, GGS-I) is 500 metres. They are traditionally involved in Muga rearing. They are having more than 1000 numbers of Som plantations. This location is adjacent to both drilling site and gas gathering station (50 metres & 1.5 Km from the ONGC, GGS-V). At this place, it was observed that the gases with pungent odour were releasing into the atmosphere from drilling site.
- ❖ The location for the sampling of contaminated and effected leaves of Som plant, soil and larvae have been selected for the present research work. These samples will be collected for the further analysis of micronutrients and phytochemicals estimation from the contaminated Muga rearing site.

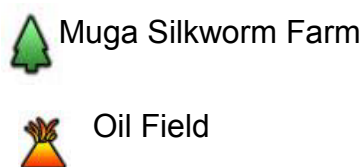
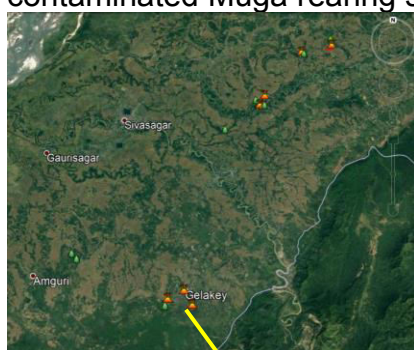


Fig.: Google earth map showing the location of Muga Silkworm farms and oil fields

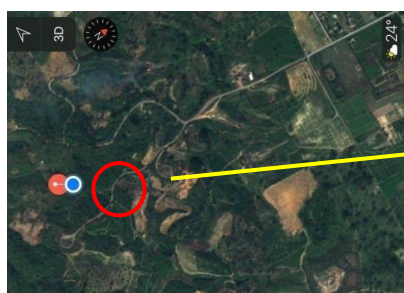


Fig.: Google earth map showing the location of Muga Silkworm farms and continuous burning of petroleum substituent at GGS-I in Gelakey.



24. Project Code	: AIP-5895
Project Title	: Biology, population dynamics and control of <i>Sycanus collaris</i> Fabricius and <i>Eocanthecona furcellata</i> Wolff (Insecta:Heteroptera) potential predators of muga silkworm.
Project Period	: March 2018 – February 2020
Funding Agency	: CSB, Bangalore
Total Budget Allocation	: 9.40 Lakhs
Project Investigators	: Kh. Subdas Singh, Principal Investigator : D. K. Jigyasu, Co-Investigator : R. Kumar, Co-Investigator

Objectives:

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

Highlights of achievement:

Field survey started in March 2018 at CMER&TI Muga rearing farms and private farmer's farm at Boiragibor, Sivasagar district, to study the population of predator bugs viz. *Sycanus collaris* (Assassin bug) and *E. furcellata* (Stink bug). During field visit, occurrence of *E. furcellata* was found more than *S. collaris* at both Boiragibor and institute farms, which means *S. collaris* was occurred comparatively less than *E. furcellata* in Muga rearing fields. More collection of *E. furcellata* nymphs was from Boiragibor, Sivasagar district. Till now, more than 300 numbers of *E. furcellata* nymphs were collected from Boiragibor and institute farms and around 50 numbers of *S. collaris* were collected. Collected predator bugs are being cultured in laboratory at CMER&TI, Lahdoigarh to study biology and life cycle.



REGULAR PROGRAMMES**Project Code** :RP-01**Project Title** : Forecasting and forwarning for pest and disease of muga host plants and silkworm

Scientists involved : Ranjana Das CMERTI, Lahdoigarh
 : D. Mech, REC, Lakhimpur
 : N. Biswas, REC, Cochbehari
 : M.Chutia, CMERTI, Lahdoigarh

Objectives:

Development of forecasting and forewarning system for pests and diseases of muga host plants and silkworm to provide timely forewarn so that muga farmers able to take disease management strategies against the host plant and silkworm diseases and pests.

Highlights of achievements:

Pest and diseases are one of the major causes for reduction of muga production. Major foliar diseases of muga food plant som are leaf spot (*Phyllosticta perseae*), red rust, (*Cephaleuros parasiticus*), anthracnose (*Colletotrichum gloeosporioides*) and grey blight disease. (*Pestalotiopsis desiminata*). In soalu brown blight (*Colletotrichum gloeosporioides*) and grey blight (*Pestalotiopsis thea*) are the major diseases. Similarly in case of pests the major pest are Stem bore (*Zeuzera indica*) and leaf gall (*Aspondylia spp* & *Pauropsylla beesoni* are recorded. On som and soalu. Uzi fly (*Exorista sorbillan* / *Blepharipa zebina*) is the major pest of muga silkworm. The major muga silkworm diseases are flacherie (*Bacillus .thurimgensis* pseudomonas aeruginosa) and muscardine (*Beauveria bassiana*). These diseases and pest causes a huge loss. The huge loss((10-43%) in leaf and cocoon productivity and quality of muga cocoon. Accordingly on the basis of data recorded during the period forewarning calendar have been developed and presented in the table 1 - 5. It is reported that leaf spot disease of som is observed from May to November but diseases intensity was less than 10PDI. Highest infection observed during August with more than 5 PDI but less than 10 PDI. Anthracnose disease and grey blight disease of som was recorded from April to November with more than 10% PDI during September to November.

In case of Soalu the brown blight disease is occurred throughout the season but h it is highest in Upper Assam from during September to November with 13-5 to 18 PDI. In Lower Assam and West Bengal the disease is highest during September-October with more than 10 PDI. Similarly grey blight disease was highest (more than 10%) September-October in soalu. The leaf gall is recorded with more than 10% during April-May and September-Coctober. The stem borer is recorded through out the year in all the localities but it is highest during September to December in all the places .In case of muga silkworm fungal disease is recorded during December (less than 5% infection), January (5- 10% crop loss). .But, it was highest during April, (more than 10%) in Upper Assam. Bacterial disease is recorded throughout the year but maximum with more than 10% crop loss was recorded during June-July and December .Viral disease was noticed during Feb-March, June – Aug and Nov-Dec, only in Lower Assam. Uzi is occurred from October to March but it was highest during February March. The work is being continued.



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PILOT STUDIES

Programme: Pilot Study : 01

Title : Assessment of Bio-chemical Properties and Nutritional Composition of Muga Silkworm (*Antheraea assamensis* Helfer) Litter

Scientists involved : Vinodakumar. S. Naik

Objective:

- To study the Bio-chemical properties and nutritional composition of muga silkworm litter.

Highlights of achievements:

Muga silk worm litter was collected from farms of Central Muga Eri Research & Training Institute (CMER&TI), Lahdoigarh, Assam (farm No. 1, 2, 3 & GCC, Chenijan) during six crop seasons of muga rearing viz., Aheirua (Jun-Jul), Bhoidia (Aug-Sep), Katia (Oct-Nov), Jarua (Dec-Jan), Chotua (Feb-Mar) & Jethua (Apr-May). Composite samples were prepared by mixing 3 subsamples of Muga silk worm litter. Bio-chemical Properties and Nutritional Composition of Litter were analyzed and recorded the proximate composition of organic carbon, nitrogen, phosphoric acid, potash, calcium, magnesium, iron, manganese, zinc, copper, boron.



Programme: Pilot Study : 02

Title : Effect of liquid organic manures on quantitative & qualitative parameters of castor (*Ricinus communis* Linn.) leaves towards sustainable Eri cocoon production.

Scientists involved : Vinodakumar. S. Naik

Objectives:

- To study the effect of different organic liquid manures on quantitative parameters of castor leaves through morphological study.
- To study the fertility status of the soil through chemical analysis.
- To workout the economics of different organic liquid manures.

Panchagavya, New Mixture, Jeevamruth and Beejamruth prepared with standered inputs and protocols. Applied to the castor crop at sowing, 30, 60, 90 & 120DAS. Nutrient status of Panchagavya, New Mixture, Jeevamruth and Beejamruth were studied separately. Soil/ foliar application and seed treatment of liquid organic manures were carried out during sowing, 30, 60, 90, 120DAS. Growth and yield attributes were recorded during 30, 60, 90, 120DAS. Pre-sowing and at 135 DAS soil samples were collected for assessment of soil chemical properties. Soil samples were processed and lab analysis was done.

	
Experimental Plot at GCC, Chenijan	Preparation of liquid organic manures



IMPORTANT EVENTS

World Environment Day 2017 at CMER&TI, Lahdoigarh

The institute celebrated World Environment Day 2017 with a day long programme on 5th June 2017 with different activities under the Silk Board Nature Club of CMER&TI, Lahdoigarh. The event was started with massive plantation at Germplasm Conservation Centre (GCC), Chenijan where all the scientists, officers and staff of the institute actively took part. Awareness rally was also organized among the Scientists/Staffs with different slogans and play cards in two different places, one at roadside of GCC, Chenijan and one at Diha Gochpuria, Lahdoigarh. The slogans displayed during the rally were as follows-

- Nurture the Nature to save future.
- Zero tolerance for the illegal wild life trade
- Lets educate children about natural resources
- Switch off the fans and lights when not in use
- No time is better other than now lets plant trees etc.



Four different documentary films on environmental related issues like climate change, global warming etc. were displayed on the occasion for creating awareness and motivation among the staff. A special documentary was displayed which was made on the achievement of the “Forest Man of India” Padmashree Sri Jadav Payeng, which was very innovative and encouraging. In the event, Dr. S.A. Ahmed delivered a talk on the



different issues of the environment, Dr. V.K.S. Naik gave a presentation on climate change and its cause and effects towards environment and Dr. B.K. Singh, Director also delivered a talk on the environmental problems, present situations and suggested for different measure to address the existing environmental problems. He also critically pointed out many tips of our day to day life linked to the environmental conservation. Environmental related Quiz and Extempore Speech competitions were also held among all the staff of the institute

Organization of Vanya Reshom Krishimela at CMER&TI, Lahdoigarh

Vanya Reshom Krishimela cum Technological Workshop, an annual event of Central Muga Eri Research & Training Institute, Lahdoigarh, Jorhat was organized on 29th August, 2017 (Tuesday) at institute premises. About 500 sericulturists including participants from SMOI, SRCs, SMVs, NGOs, SHGs and entrepreneurs from different districts of Assam viz., Sivasagar, Dibrugarh, Golaghat, Jorhat, Morigaon etc. took part in the function. Smt Renupoma Rajkhowa, Hon'ble MLA, Teok constituency graced the programme as "Chief Guest", Dr. R.S.P Jayaraj, IFS, Director, RFRI, Jorhat was the "Guest of Honour", while Shri Jogesh Deuri, Director of Sericulture, BTC, Shri Imtissosang Ao, Director of Sericulture, Nagaland and Shri Sarat Deori, Adviser, Director of Sericulture, BTC were the "Special Guests" during the occasion. Several senior officers from the Department of Sericulture of Assam, Meghalaya, Nagaland and BTC including scientists from RSRS, SSPC Jorhat, retired senior scientists of CSB and scientists of nested units of CMER&TI participated in the workshop. On the auspicious occasion of Krishimela an exhibition was also organized displaying and demonstrating different technologies on pre and post cocoon sector evolved by the institute. Several entrepreneurs, SHGs participated in the exhibition and displayed their products including diversified fabrics. All dignitaries and farmers were impressed on the innovations of the new technologies, products etc. developed by the institute as well as SHGs. A newly constructed "Cold Storage" also inaugurated by Hon'ble MLA, Teok constituency, during the occasion.

In the occasion, books, booklets, leaflets on Management of Muga Pests and Diseases, Management of Eri Diseases and Pests, Eri Seed Technology, C2 Breed Rearing, Soil Health Cards etc. were also released. Five farmers were awarded for their praiseworthy achievements in Muga and Eri Culture. Moreover, a muga reeling machine “Bani” was distributed to a local entrepreneur Mr. Kaustav Borbora in presence of the Hon'ble MLA. Personnels from local printing media and Doordarshan Kendra, Guwahati were also present in the mela for media coverage.



Gathering of participants at Vanya Krishimela



A view of dignitaries in Dias



Hon'ble MLA visiting Exhibition stall



Visit at Exhibition stall by participants

Different views of Vanya Reshom Krishimela held on 29th August, 2017

Establishment Day of CMER&TI, Lahdoigarh

Central Muga Eri Research & Training Institute, Central Silk Board, Lahdoigarh, Jorhat has celebrated its 18th Establishment Day on 23rd September, 2017 at the institute premises. The day was organized by hoisting of CMER&TI flag by Shri Dulal Goswami, Director i/c of the institute. A cleaning drive was also under taken in view of “**Swachhta Hi Sewa**” programme. An exhibition was also organized on the occasion where different technologies developed by the institute were displayed. The exhibition was inaugurated by Padma Shree Jadav Payeng, Forest Man of India.

Shri Jadav Payeng participated in the inaugural session as “Chief Guest”. Shri Dulal Goswami, Director i/c of the institute delivered welcome address and felicitated all the dignitaries. The session was inaugurated by an invocation “Swaraswati Vandana” and lighting of lamp. The staff of



CMER&TI, Lahdoigarh presented a Corus song. In the day long programme other dignitaries like Dr. R.S.C Jayaraj, IFS Director RFRI, Jorhat, Shri Kutubuddin Ahmed, Noted writer, Registrar Research Wing of Axom Xahitya Xobha, Jorhat



including Dr. A.K. Bhagawati, Former Scientist, Central Silk Board and Eminent Businessman participated in the programme as “Special Guest”. Dr. R.S.C Jayaraj, IFS Director RFRI, Jorhat in his address opined that CMER&TI is like younger brother of RFRI, Jorhat. Most of the Muga and Eri food are forest based he remarked. He spoke on collaborative treated bamboo project with them. He also referred about non-textile use of silk

like medical use in IIT, Guwahati. Further he spoke on use of bamboo fibre and silk bending in Europe. Shri Kutubuddin Ahmed, Noted writer, Registrar Research Wing of Axom Xahitya Xobha, Jorhat praise for the lot of R&D activities of the institute. He referred historical background of silk in Assam. He opined that practical teaching of student is must for strengthening of knowledge. He spoke on his experience in Germany about practical teaching of student from nursery standard. Dr. A.K. Bhagawati, Former Scientist, Central Silk Board recalled his experience in Central Silk Board. He stressed on conservation of Muga silk rather than its domestication.

Padma Shree Jadav Payeng “Chief Guest” in the inaugural session as in his address appealed people for giving priority in forest as well as animal conservation. He remarked that shifting of railway track for conservation of endangered Gibbon in “Gibbon Wild life sanctuary” is priority area.

Several scientists and employees were awarded for their outstanding contributions in different field. A cultural programme was also organized in commemoration of the programme. The event was ended with vote of thanks.

Organization of National Workshop

CMER&TI, Lahdoigarh, Jorhat organized a national level Workshop “Vanya Sericulture (Muga & Eri) and Seri-Biodiversity for Economic Upliftment “SeriBioEcon, 2018” at CMER&TI, Lahdoigarh, from 12th-13th March, 2018. More than 150 sericulturists including participants from Directorate of Sericulture, BTC, Kokrajhar, Assam; Assam Agricultural University, Jorhat, Assam; NEIST, Jorhat; IIT, Guwahati; students from nearby colleges viz. Kakojan College,



Kendriya Mahavidyalaya, J.B. College, Jorhat Institute of Science & Technology (formerly Science College, Jorhat); scientists from CMER&TI; and farmers from different areas of Assam were present and presented research and technical papers in the workshop.

The inaugural session was graced by Dr. Bidyut Kumar Sarmah, Director, Biotechnology Centre for North East and also the Norman Borlough Chair of Assam Agricultural University, Jorhat; Dr. Bolin Kumar Konwar, Ex-Chairperson of Research Advisory Committee of CMER&TI; Dr. B.G. Unni, Director (R), Assam Down Town University, Guwahati; Dr. P.K. Das, Scientist-E (Retd.) CSB, Guwahati; Dr. B.K. Singh, Director (Retd.), CMER&TI, CSB, Jorhat; Prof. Utpal Bora, IIT, Guwahati.

The workshop was distributed in to seven Technical Sessions as follows

1. Biochemistry, Molecular Biology, Microbiology and Biotechnological research on Vanya sector
2. Vanya Seri-Biodiversity, collection, characterization, utilization and conservation for productivity improvement
3. Recent technologies on
4. Vanya host plants & silkworm rearing and management practices
5. Recent advances on management of host plants and silkworms disease & pest management in Vanya silk sector
6. Assessment of seri-stakeholders needs and impact of IT-initiative in transfer of technologies of muga & eri silk sector
7. Product diversification, utilization and commercialization in Vanya sector



Each session was chaired by an eminent Professor or Scientist or personnels from state sericulture department working particularly on Vanya Sericulture Sector. A total of 14 Lead Papers and 30 research papers were presented in the workshop.

The major outcomes of the research findings and recommendations of the workshop are as follows:

- The main constraints of muga culture are shortage of seeds, higher mortality of worms due to disease, pests and predators, failure of summer seed crops, climate change and shrinkage of food plant growing areas due to expansion of small tea gardens, indiscriminate application of inorganic and biological pesticides.
- Potential parents should be used for breeding purposes to evolve superior breeds for higher productivity in Muga and Ericulture.
- Intensify research for improvement of season specific sees crops.
- The silkworm product development and diversification is very much necessary for survival of muga silk. Blending with other natural fibres will be one of the future needs for muga silk industry.
- Evaluation/development of eri host plants like castor, (*Ricinus communis*), Kesseru, (*Heteropanax fragrans*) including eri silkworm breed/combinations is needed for increasing production and productivity of ericulture.
- Nanotechnology is considered as one of the modern tool for more precise and effective solutions in sericulture research. Research projects should be formulated for exploring the possibilities using nanotechnology to enhance the quality of silk production and in controlling microbial diseases of silkworm.
- *In-situ and ex-situ* conservation of Muga and other wild silkmooths are important for solving the problem of basic seed production of Mug culture
- Improvement of Som genotypes through different breeding techniques should be given preference for development of high yielding varieties with higher feeding preference.
- Research on biological control of muga and eri silkworm host plants diseases and pests has gained lot of importance.

- Tapioca can be utilized as potential perennial food plant for Eri silkworm rearing to get more income through selling of tuber & study should be conducted with this host plant in CMERTI. However, HCN quantity in leaves needs to be assessed.
- Organic based farming system may be introduced in Eri sector for better production and productivity. Benefit cost ratio is to be analyzed for every technology before releasing to the farmers.

DBT sponsored Workshop-cum-training Programmes

A DBT sponsored National Workshop – cum - Training Programme on “Techniques and Technologies of Seri-biotechnology” was organized for graduate, post graduate students and research scholars during 27 March - 2nd April, 2018 at Central Muga Eri Research & Training Institute, Lahdoigarh. A total of 40 participants attended in the event. Dr. P. Jayaraja, Director, RFRI, Jorhat graced the inaugural session of the programme as Chief Guest and interacted with the participants.



In the inaugural session, Dr. M. Chutia, Organizing Secretary of the workshop briefed about the event at the very beginning. Dr. Ranjana Das, Senior Scientist of the institute highlighted the main objectives and recent



developments in Seri-biotechnology sector and importance of hands on training on basic techniques related to Sericulture and Seri-biotechnology. Sri D. Goswami, Director (i/c), CMER&TI, Lahdoigarh explained in brief about the activities of the institute, research areas and facilities together with its mandate areas. Dr. M.C. Sarmah, Senior Scientist of the institute opined that CMER&TI is the only institute in the country doing research and developmental activities in the field of Muga and Eri silkworm. He expressed the role of Central Silk Board especially CMER&TI, Lahdoigarh in sericulture sector and highlighted its new technologies which are presently being disseminated to the farmers for higher silk recovery.

The scientists of CMER&TI, Lahdoigarh delivered lectures on different aspects of Muga and Eri culture in the workshop. The participants were also informed about the available facilities at CMER&TI and the provision of subsidies to procure reeling machines, procuring dfls and seedlings of host plants etc. 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.

SPECIAL EVENTS

Swachhta Pakhwada Programme

CMER&TI, Lahdoigarh, organized Swachhta Pakhwada Programme, 2017-18 at different places nearby the institutes at a stretch from 1st March to 15th March, 2018.

During the 1st day programme of Swachhata Pakhwada, cleanliness and awareness drives were conducted in main institute and surrounding areas. All the concerned people of the locality and office staff were actively participated in the programme.



Cleanliness drive and awareness programmes were started at Deha Gajpuria, Jorhat where cleaning of surroundings, disinfection of drains with bleaching powder and cleaning of whole building surrounding areas were carried out. All scientists, staffs and local residents actively took part in the event.

Namgarh, Gajpuria. Jorhat and institutional farms

The 2nd Day programme of Swachhata Pakhwada of Central Muga Eri Research & Training Institute was organized in Citizen Interface Areas located in Gajpuria Namgarh, Jorhat on 2nd March 2018 under the leadership of Dr. K. Neog, Scientist-D of CMER&TI, Lahdoigarh and all scientists and staff of CMER&TI, Lahdoigarh took part in the event.



A plantation programme was organized at all the institutional farms by Dr. K. Neog Scientist-D and Dr. Subadas Singh, Sc-B, CMER&TI. At

the very outset, Dr. Neog gave the overview of the day long programme under Swachhta Mission and also emphasized the importance of systematic collection and disposal of wastes and cleaning of toilets. He further pointed the significance of maintaining cleanliness in and around the surrounding specially in citizen interface areas where we live.

The 3rd day of the fortnight (1st – 15th March, 2018) programme was conducted in Titabor Residential Special Training Centre, Sarba Siksha Abhijan, Jorhat on 03-03-2018. Toiletry items viz. Plastic Dusbins, Bleaching powder, Dettol Hand wash, Towels, Bamboo broom long, Bamboo brush, Phenyl and Lifebouy soaps were distributed to students of the R.S.T.C. School. More than 40 saplings of Som, Kesseru and Mulberry were planted within the premises of school compound and all plants were fenced with plastic bags and bamboo sticks.



Subsequently, the programme was conducted on 5th March 2018 at the Training Hostel of the institute; the 6th Day programme was organized in Citizen Interface Areas located in and around Lahdoigarh tinali, Jorhat on 6th March 2018; on 7th March 2018 at the Opor Deuri M.E. School located near sericulture village Upper Deuri and Dagaon Anath Ashram; on 8th to 9th March 2018 at all the sections of CMER&TI, Lahdoigarh; in Citizen Interface Areas located in and around Lahdoigarh tinali, Jorhat on 10th March 2018; in Citizen Interface Areas located in and around Chungi tinaly, Titabor on 12th March 2018; in



Citizen Interface Areas located in and around Sipahikhula Market, Jorhat on 13th March 2018; and on 14th March' 2018 at the CMER&TI, Lahdoigarh and Axom Jatiya Vidyalaya, Meleng, Jorhat.

Valedictory session for Swachhata Pakhwada was organized on 15th March' 2018 at Conference hall, CMER&TI, Lahdoigarh. The function was chaired by Shri Dulal Goswami, Director (i/c), CMER&TI. Dr. G. Subrahmanyam, Sc-B of the institute has summarized various programmers carried out during the fortnight (1 to 15th March 2018). Dr. D.K. Ggogi, Sc-C, CMER&TI, announced the winners for extempore speech and slogan writing competitions and prizes were distributed.

Swachhata Pakhwada was also organized by all the nested units of the institute during the year in different places nearby the respective units.



OTHER IMPORTANT ACTIVITIES OF THE INSTITUTE

Maintenance of ISO 9001: 2015 in the institute

The institute has been maintaining the ISO 9001: 2015 quality management standards since August, 2016. Management Review Meetings (MRM) were regularly held to discuss about different issues related to research, development, technical, technological, innovative trading, extension and services support to silk industry. During July, 2017, the Surveillance audit was conducted by the auditors from Certification Body. The auditors expressed happiness on the improvements made by the institute in its different spheres of mandated activities and agreed to extend the certification for another year.



VISIT OF DIGNITARIES & GUESTS

- Dr. A.R. Pradeep, Sr. Scientist from SBRL visited the institute during November, 2017 and delivered a lecture on “Immune Suppression in Bombyx mori by uzifly infestation.”
- Dr. Pranab Dutta, Sr. Scientist from the Dept. of Pathology, Assam Agricultural University was invited for a guest lecture on 30.11.2017. He delivered lecture on the topic “Nanotechnological approaches for plant health / disease management”.
- Dr. Sorina C. Popescu, Mississippi State University, USA, visited the institute on 15th December, 2017 and delivered scholarly lecture on “Signal transduction in plant immune system”.
- Dr. A.D. Jadhav, Shivaji University, Kohlapur along with his team of research scholars and students (8 nos.) visited CMER&TI on 20th

January, 2018. He delivered interesting lecture on “Global Silk Scenerio”.

- Mrs. Peggy Carswell, founder of Fertile Ground, Canada visited CMER&TI on 28th January, 2018. She delivered scholarly National Science Day lecture on “Organic tea production and Vanya Silk”.
- Dr. Kamala Kalita, Chairman, Khadi & Gramudog Board, Govt. of Assam, Guwahati visited and participated Krishi Mela organized by RERS, Mendipasthar on 29.11.2017..
- Secretary, M/O Textiles, Govt. of India, Joint Secretary, M/O Textiles, Govt. of India, New Delhi and Member Secretary, Central Silk Board, Bangalore visited RMRS, Boko Boko Campus.

Awards / appreciation letters received by CMER&TI

- CMER&TI received RFD score of 93 % (Excellent) for 2017-18.
- Appreciation letter received from the Deputy Director, Dept. of Official Language, RIO (NER) for publication of Hindi Newsletter (special issue of Establishment Day).
- Appreciation letter received from the Town Official Language Implementation Committee, Jorhat for best performance in implementation of Official Language (Hindi) during 2016-17.
- Appreciation letter received from Member Secretary, CSB for appreciable work done by CMER&TI for commendable works during the organization of International Conference on Wild Silk Moths organized at Guwahati by Central Silk Board during January, 2018.
- Dr. G. Subrahmanyam, Scientist-B of the institute received best participant award for ICAR, Gov. of India sponsored Training programme on “Preparation of bioformulation of fungal and bacterial biocontrol agents for management of biotic stress of agricultural crops” held at Department of Pathology, Assam Agriculture University, Jorhat during 1st-10th September 2017.
- Dr. M. Chutia, Scientist-C has been recognized as the Ph. D. Guide / Supervisor under Faculty of Sciences, Gauhati University, Guwahati (Assam).

- Dr. M. Chutia, Scientist-C acted as Chairperson in a Technical Session of the National Seminar on “*Prospects and challenges of Plant Science Research in India*” held at Dept. of Botany, Gauhati University during 25-26th November, 2017.

INTERNATIONAL VISIT

Dr. Rajesh Kumar, Scientist – C of this institute attended "2017 International Conference on Management of Destructive Pests *Spodoptera* (Noctuidae)" and delivered an Invited Lecture on the topic "Polyphagous wild silkworms vs *Spodoptera litura* in North East India - a current status" organized by State Key Laboratory of Silkworm Genome Biology, Southwest University, Chongqing, China from 14-17 November, 2017.



EXTENSION AND TRAINING ACTIVITIES

Extension activities

For dissemination of technologies developed by the institute through implementation of research projects / experiments, a numbers of extension activities were conducted during 2017-18. The activities were conducted as per the annual action plan and also on specific target oriented programmes viz. Extension Communication Programmes, Sericulture Resource Centre (SRC), Institute Village Linkage Programme – Seri Model Village (IVLP-SMV) *etc.* The activities include organization of Workshop / Seminars, Vanya Resham Krishi Mela, Technology Awareness Programme, Field Days, Group Discussion, *etc.* In addition, there were also other activities viz. raising and supply of host plants, rearing of silkworms, commercial as well as seed cocoon production, preparation of dfls and supply, *etc.*, which has the ultimate objective of proper utilization of the available land and resource conservation and also to generate revenue to maximum level.

Organization of Vanya Reshom Krishimela

Three Vanya Reshom Krishimelas were organized by the institute and its nested units during 2017-18 as follows.

Sl. No.	Institute / Unit	Date	Place	No. of farmers / participants
1.	CMER&TI	29 th August, 2017	CMER&TI, Lahdoigarh	500
2.	RMRS, Boko	26 th March, 2018	RMRS, Boko	300
3.	RERS, Mendipathar	29 th November, 2017	Saniboriya Bazar, Boko	200
			Total	1000

Extension Communication Programmes in brief

1. CMER&TI, Lahdoigarh

Sl. No.	Place	Date	No. of farmers / participants
A. Field Day :			
1.	Thengal village, Kamargaon, Golaghat	27.06.2017	100
2.	Sonowal gaon, Golaghat	08.09.2017	112
	Total A		212
B. Awareness Programme :			
1.	Balipara, Sonitpur	29.06.2017	100
2.	Nagabat Village, Titabar, Jorhat	15.09.2017	142
3.	Tingkhong State Farm, Dibrugarh	26.09.2017	51
4.	Khanamukh, Sivasagar	14.09.2017	100
5.	Tamulbari, Jorhat	13.10.2017	100
	Total B		493
C. Farmers Day :			
1.	Gohainjaan village, Titabar, Jorhat	29.06.2017	50
2.	Raidungjuri, Titabar, Jorhat	27.11.2017	60
	Total C		110
D. Group discussion :			
1.	Morongor, Nongpoh, Meghalaya	18.05.2017	25
2.	Falafung, Bamunigaon, Kamrup	19.05.2017	30

Sl. No.	Place	Date	No. of farmers / participants
3.	Sakumari, Santipur, Kamrup	19.05.2017	20
4.	Dolakakhoria, Golaghat	22.07.2017	31
5.	Khutura habi gaon, Khanamukh, Sivasagar	14.09.2017	31
6.	Khorikatia, Mariani, Jorhat	16.10.2017	33
7.	Borpathar , Golaghat	31.10.2017	32
8.	Hemlai gaon, Jorhat	01.11.2017	20
9.	Nagajanka, Mariani, Jorhat	03.11.2017	20
	Total D		242
E. Technology demonstration :			
1.	Bhitoruwal gaon, Tamulisiga, Sivasagar	05.08.2017	28
2.	Khamjongia village, Titabar, Jorhat	11.08.2017	24
3.	Kamar gaon, Golaghat	08.09.2017	40
4.	Kachhu pathar, Dibrugarh	07.09.2017	40
5.	Dolakakhoria, Golaghat	26.09.2017	30
6.	Tingkhong State Farm, Dibrugarh	26.09.2017	51
7.	Rajakhat, Dimoria, Morigaon	09.10.2017	41
8.	Hanchara, Sivasagar	16.10.2017	30
9.	Paninora village, Titabar, Jorhat	21.10.2017	20
10.	Jaljori, Golaghat	31.10.2017	40
11.	Nagajanka, Mariani, Jorhat	03.11.2017	40
	Total E		384
	Grand Total Farmers (A – E)		1441

#	Activities /Programme	Target		Achievement	
		Phy.	Fin. (Rs. In lakh)	Phy.	Fin. (Rs. in lakh)
1	Workshop/seminar				
	CMER&TI	1	2.50	1	2.50
2.	Krishimela (Nos)		-	-	-
	CMER&TI, Lahdoigarh	1	3.00	1	3.00
	RMRS, Boko	1	1.00	1	1.00
	RERS, Mendipathar	1	1.00	1	1.00
3.	Field Days				
	CMER&TI, Lahdoigarh	3	0.45	2	0.30
	RMRS, Boko	2	0.30	2	0.30
	RERS, Mendipathar	2	0.30	2	0.30
	RERS, Shadnagar	2	0.30	-	-
	REC, Tura	1	0.15	1	0.15
	REC, Coochbehar	2	0.30	2	0.30
	REC, Lakhimpur	3	0.45	3	0.45
	REC, Fatehpur`	1	0.15	1	0.15
	REC, Kokrajhar	2	0.30	2	0.30
	Total	18	2.70	15	2.25
4.	Farmers' Days				
	CMER&TI, Lahdoigarh	2	0.04	2	0.04
	RMRS, Boko	2	0.04	2	0.04
	RERS, Mendipathar	2	0.04	3	0.06
	RERS, Shadnagar	2	0.04	-	-
	REC, Tura	2	0.04	2	0.04
	REC, Coochbehar	2	0.04	2	0.04
	REC, Lakhimpur	3	0.06	3	0.06
	REC, Fatehpur`	1	0.02	1	0.02
	REC, Kokrajhar	2	0.04	2	0.04
	Total	18	0.36	17	0.34

#	Activities /Programme	Target		Achievement	
		Phy.	Fin. (Rs. In lakh)	Phy.	Fin. (Rs. in lakh)
5	Awareness programmes				
	CMER&TI, Lahdoigarh	4	0.60	5	0.75
	RMRS, Boko	3	0.45	3	0.45
	RERS, Mendipathar	2	0.30	2	0.30
	RERS, Shadnagar	2	0.30	2	0.30
	REC, Tura	2	0.30	2	0.30
	REC, Coochbehar	2	0.30	2	0.30
	REC, Lakhimpur	2	0.30	2	0.30
	REC, Fatehpur`	2	0.30	2	0.30
	REC, Kokrajhar	2	0.30	2	0.30
	Total	21	3.15	22	3.30
6	Transfer of technology (TOT) - Muga				
	CMER&TI, Lahdoigarh	6	0.12	6	0.12
	RMRS, Boko	5	0.10	-	-
	REC, Tura	3	0.06	3	0.06
	REC, Coochbehar	3	0.06	-	-
	REC, Lakhimpur	3	0.06	3	0.06
	REC, Kokrajhar	2	0.04	2	0.04
	Transfer of technology (TOT) - Eri				
	CMER&TI, Lahdoigarh	6	0.12	6	0.12
	RERS, Mendipathar	4	0.08	4	0.08
	RERS, Shadnagar	2	0.04	-	-
	REC, Fatehpur`	2	0.04	2	0.04
	REC, Kokrajhar	4	0.08	3	0.06
	Total	40	0.80	29	0.58

#	Activities /Programme	Target		Achievement	
		Phy.	Fin. (Rs. In lakh)	Phy.	Fin. (Rs. in lakh)
7	Vichar Gosthi / Group discussion				
	CMER&TI, Lahdoigarh	10	0.10	9	0.09
	RMRS, Boko	5	0.05	3	0.03
	RERS, Mendipathar	5	0.05	5	0.05
	RERS, Shadnagar	5	0.05	-	-
	REC, Tura	4	0.04	4	0.04
	REC, Coochbehar	3	0.03	3	0.03
	REC, Lakhimpur	6	0.06	7	0.06
	REC, Fatehpur`	2	0.02	2	0.02
	REC, Kokrajhar	2	0.02	2	0.02
	Total	42	0.42	35	0.34

Land use and resource conservation

#	Activities /Programme	Target	Achievement
A. Raising of som / 144oalu seedlings / saplings			
	CMER&TI, Lahdoigarh	50000	45730
	RMRS, Boko	100000	105680
	REC, Lakhimpur	5000	7000
	REC, Coochbehar	5000	10000
	REC, Tura	5000	-
	REC, Kokrajhar	5000	-
	TOTAL	170000	180740
B. Raising of kesseru seedlings / saplings			
	CMER&TI, Lahdoigarh	50000	50000
	RERS, Mendipathar	20000	2500
	REC, Kokrajhar	5000	-
	Total	75000	52500
C. Supply of som / soalu seedlings / saplings			
	CMER&TI, Lahdoigarh	10000	15930
	RMRS, Boko	20000	8216
	REC, Lakhimpur	5000	2450

	REC, Coochbehar	5000	1400
	TOTAL	40000	27996
D. Supply of kesseru seedlings / saplings			
	CMER&TI, Lahdoigarh	8000	13545
	RERS, Mendipathar	10000	25
	Total	18000	13570

Activities /Programme	Target	Achievement
Muga commercial crop rearing	No. of dfls brushing	
CMER&TI, Lahdoigarh	3000	2866
RMRS, Boko	2500	2000
REC, Lakhimpur	500	510
REC, Coochbehar	500	500
REC, Kokrajhar	400	550
TOTAL	6900	6426
Muga seed crop rearing	No. of dfls brushing	
CMER&TI, Lahdoigarh	1700	6107
RMRS, Boko	700	4038
REC, Tura	600	650
REC, Lakhimpur	400	580
REC, Coochbehar	600	600
TOTAL	4000	11975
Eri dfl brushing		
CMER&TI, Lahdoigarh	300	300
RERS, Mendipathar	500	608
RERS, Shadnagar	500	-
REC, Fatehpur	200	-
REC, Kokrajhar	200	30
Total	1700	938

Activities /Programme	Target	Achievement
Muga commercial cocoon production		
CMER&TI, Lahdoigarh	180000	102289
RMRS, Boko	150000	33800
REC, Lakhimpur	30000	31660
REC, Coochbehar	30000	4072
REC, Kokrajhar	24000	6105
TOTAL	414000	177926
Muga seed cocoon production		
CMER&TI, Lahdoigarh	68000	69302
RMRS, Boko	28000	4515
REC, Tura	24000	4372
REC, Lakhimpur	16000	14500
REC, Coochbehar	24000	1005
TOTAL	160000	93694
Eri cocoon production (Kg)		
CMER&TI, Lahdoigarh	30	23
RERS, Mendipathar	50	35.53
RERS, Shadnagar	50	-
REC, Fatehpur	20	-
REC, Kokrajhar	20	1.55
Total	170	60.1
Muga dfl production		
CMER&TI, Lahdoigarh	13600	8859
RMRS, Boko	7000	8479
REC, Tura	4000	525
REC, Lakhimpur	2400	2410
REC, Coochbehar	4000	50
TOTAL	31000	20323
Eri dfl production (No.)		
CMER&TI, Lahdoigarh	6000	1537
RERS, Mendipathar	12000	7337

RERS, Shadnagar	8000	-
Total	26000	8874
Muga dfl supply		
CMER&TI, Lahdoigarh	13600	4665
RMRS, Boko	7000	7677
REC, Tura	4000	400
REC, Lakhimpur	2400	2030
REC, Coochbehar	4000	-
TOTAL	31000	14772
Eri dfl supply (No.)		
CMER&TI, Lahdoigarh	5700	1247
RERS, Mendipathar	11500	6729
RERS, Shadnagar	7500	-
Total	24700	7976

IMPLEMENTATION OF SERI MODEL VILLAGES

With a view to enhance muga and eri raw silk production through disseminating the integrated technology package and providing need based critical inputs to the farmers in the potential muga and eri producing pockets, the institute has been implementing Seri Model Villages (SMVs) under the aiges of Institute Village Linkage Programmes (IVLP) w.e.f. 2016. During 2017-18 also, four Muga SMVs, four Eri SMVs and one Post Cocoon Technology SMV were implemented covering 100 beneficiaries in each village and one PCT IVLP covering 62 beneficiaries. The location and number of programmes conducted during the year under SMV is given below. In order to implement the SMVs smoothly and effectively, two scientists were given responsibility as Nodel Officers for each SMV and all the Nodal Officers were coordinated by a scientists as Coordinator of SMV. Director of the institute reviewed the progress of different activities and impact of the programme at regular interval.

Sl. No.	Sector (Muga / Eri)	Name of the SMV / IVLP	Nodal Officer(s)
01.	Muga	Dibrugarh	D. Goswami Vijay N., CMER&TI
		Golaghat	Dr. (Mrs.) Ranjana Das Dr. P. Sanganavar, CMER&TI
		Sivasagar	Dr. K. Neog Dr. G. Subrahmanyam, CMER&TI
		Goalpara	Dr. M. Deka, RMRS, Boko
02.	Eri	Golaghat	Dr. M.C. Sarmah, Dr. Jeevan, CMER&TI
		Sivasagar	Dr. B.N. Sarkar, Dr. Subdas Singh, CMER&TI
		Jorhat	Dr. (Mrs.) M.D. Senapati, Dr. T. James Keisa, CMER&TI
		Tinsukia	Dr. R. Debnath, Dr. D. Jigyasu, CMER&TI
03.	PCT	Jorhat	Dr. D.K. Gogoi, Dr. Veeranna, CMER&TI

Activities conducted under SMV / IVLP during 2017-18

1. Muga SMV / IVLP: Golaghat

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Bar-Sapari, Golaghat	Importance of muga seed crop, etc.	20.12.17	70	10000.00
	Jaljori, Golaghat	-do-	15.03.18	64	10000.00
Technology Awareness programme	Tangani, Golaghat	Muga culture	07.11.17	63	10000.00
	Dulakhoria, Golaghat	Muga culture	22.03.18	64	10000.00
Technology Demonstration	Naharbari, Golaghat	Cultivation of muga food plant	07.11.17	51	2500.00

	Jaljori, Golaghat	Importance of commercial crop, etc.	20.12.17	40	2500.00
	Da gaon, Golaghat	Cultivation of muga food plants	15.03.18	64	2500.00
	Dulakhoria, Golaghat		22.03.18	64	2500.00

2. Muga SMV/ IVLP: Dibrugarh

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Mahmora, Dibrugarh	Integrated technology package of muga culture	28.11.17	85	10000.00
	Dhemechi gaon, Dibrugarh	Technology development in muga culture, etc.	27.03.18	58	10000.00
Technology Awareness programme	Naharani, Dibrugarh	Muga culture	15.11.17	75	10000.00
	Tingkhong, Dibrugarh	Muga culture	07.03.18	75	10000.00
Technology Demonstrati on	Naharani, Dibrugarh	Muga culture	15.11.17	30	2500.00
	Mahmora, Dibrugarh	Muga culture	28.11.17	25	
	Tingkhong, Dibrugarh	Muga culture	07.03.18		2500.00
	Dhemechi gaon, Dibrugarh	Improved technologies for successful muga crop, etc.	27.03.18		2500.00

1. Muga SMV/ IVLP: Sivasagar

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Somguri, Patsaku, Charaideo	Awareness among the muga rearers	08.02.18	54	10000.00
	Borsohoki gaon, Doba, Charaideo	Kotia crop of both Muga & Eri rearing	27.03.18	51	10000.00
Technology Awareness programme	Namti, Sivasagar	Muga culture	09.11.17	100	10000.00
	Charaideo, Sivasagar	Muga culture	05.01.18	64	10000.00
Technology Demonstration	Namti, Sivasagar	Muga culture	09.11.17	26	2500.00
	Charaideo, Sivasagar	Muga culture	05.01.18	28	2500.00
	Somguri, Patsaku, Charaideo	Raising & plantation of saplings, pre-paration of vermi compost, etc.	08.02.18	52	2500.00
	Borsohoki gaon, Doba, Charaideo	Demonstration on raising & plantation of saplings, vermi compost preparation, etc.	27.03.18	48	2500.00

4. Muga SMV/ IVLP: Goalpara

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	SMV, Lungupara, Goalpara	Muga Silkworm rearing	17.11.17	60	10000.00
Technology Awareness programme	Dhanubhang a, Goalpara	-do-	12.12.17	58	10000.00
	Lungupara, Goalpara	-do-	08.03.18	74	10000.00
Technology Demonstration	Lungupara, Goalpara	Host plant cultivation	17.11.17	48	2500.00
	Dhanubhang a, Goalpara	-do-	12.12.17	58	2500.00
	Lungupara, Goalpara	Muga Silkworm rearing and cocoon mountage	08.03.18	69	2500.00

5. Eri SMV/ IVLP: Golaghat

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Natun Chapori gaon, Dist. Golaghat	Importance of high yielding breed, recent rearing, etc.	10.11.17	82	10000.00
	Bahupathar , Dist. Golaghat	Importance of improved technologies high yielding breed, etc.	12.12.17	50	10000.00

Technology Awareness programme	Molai Kumar village, Dist. Golaghat	Awareness on high yielding breed for rearing and its economical gain, etc.	25.11.17	75	10000.00
	Borbam Chungi gaon	Awareness on adoption of new technologies, etc.	20.03.18	63	10000.00
Technology Demonstration	Dani Chapori gaon, Dist. Golaghat	Raising of high yielding Eri food plants discussed & demonstrated.	10.11.17	40	2500.00
	Da dhora Ahom gaon, Dist. Golaghat	- do -	25.11.17	41	2500.00
	Da dhora Ahom gaon, Dist. Golaghat	Disinfection in sericulture	12.12.17	50	2500.00
	Burha gaon, Golaghat	Plantation technology with seedling distribution	20.03.18		2500.00

6. Eri SMV/ IVLP: Sivasagar

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Kuturahabi, Khanamukh	Disinfection in eri	24.11.17	56	10000.00

		rearing, etc.			
Technology Awareness programme	Kaliapani, Teok	Eri culture	08.12.17	53	10000.00
Technology Demonstration	Dupdoria, Khanamukh	Technology of raising of improved Kesseru plantation, etc.	24.11.17	31	2500.00
	Pasani gaon, Teok	Improved eri technology	08.12.17	32	2500.00

7. Eri SMV/ IVLP: Jorhat

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Thekeraguri, Bogar gaon, Titabar	Systematic Kesseru plantation and eri rearing	25.11.17	27	10000.00
	Kamalpur village, Titabar	Systematic Kesseru plantation and eri rearing	23.12.17	59	10000.00
Technology Awareness programme	Silikha grant village, Titabar	Systematic kesseru plantation & improved pkg. & practices of eri culture	18.11.17	55	10000.00

	Bhagyalakshmi village, Titabar	-do-	30.12.17	61	10000.00
Technology Demonstration	Silikha grant village, Titabar	Systematic plantation & distribution of kesseru seedlings	18.11.17		2500.00
	Tokowbari, Titabar	Systematic Kesseru plantation	25.11.17	27	2500.00
	Kamalpur village, Titabar	Systematic plantation & distribution of kesseru seedlings	23.12.17	59	2500.00
	Bhagyalakshmi village, Titabar	Systematic plantation & distribution of kesseru seedlings	30.12.17	59	2500.00

8. Eri SMV/ IVLP: Tinsukia

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Field Day	Kordoiguri and Borgora village, Tinsukia	Eri culture technology	23.3.18	29	10000.00
	Sadia, Chapa khowa, Tinsukia	Eri culture technology	12.12.17	43	10000.00
Technology Awareness programme	Duliajan, (Talap area), Tinsukia	Eri culture technology	16.11.17	116	10000.00

	Sadia,Chapa khowa, Tinisukia	Eri culture technology	12.12.17	110	10000.00
Technology Demonstrati on	Kordoiguri & Borgora village, Tinisukia	Kesseru plantation technology	16.11.17	116	2500.00
	Sadia,Chapa khowa, Tinisukia	-do-	12.12.17	43	2500.00
	Lina, Talap, Dangari, Tinsukia	seed cocoon examinatio n	23.3.18	29	2500.00

9. Eri SMV PCT: Jorhat

Activity	Location	Subject	Date	No. of farmers attended	Expense s (Rs.)
Technology Awareness programme	Simple grant village, Borholla	Advancemen t in Eri post cocoon sector, etc.	22.12.17	52	10000.00
	Jonai, Dhemaji	Advancemen t in Eri pre & post cocoon sector and modern technologies for eri yarn production, etc.	02.01.18	102	10000.00

Target and achievement in cocoon production under different SMV/ IVLP

Consolidated report of DFL Brushing and cocoon production in IVLPs of Muga & eri Pre-cocoon sectors are given in the following tables for each SMV separately.

Season : Katia Commercial crop (Oct-Nov), 2017

SMV/ IVLP-Dibrugarh

#	Particulars	Target	Achievement
01.	Farmers covered	85	73
02.	Dfls brushed	25000	27962
03.	Cocoons harvested	15 Lakhs	1476785
04.	Cocoon yield / dfl	1 : 52.39	45
05.	Improvement over benchmark	-	16.42
06.	Raw silk production	300 kg	296.52 kg

SMV/ IVLP-Golaghat

#	Particulars	Target	Achievement
01.	Farmers covered	50	42
02.	Dfls brushed	15000	12400
03.	Cocoons harvested	7 Lakhs	595200
04.	Cocoon yield / dfl	1 : 62	48
05.	Improvement over benchmark	-	29
06.	Raw silk production	140 kg	153.6 kg

SMV/ IVLP-Sivasagar

#	Particulars	Target	Achievement
01.	Farmers covered	85	76
02.	Dfls brushed	25000	28259
03.	Cocoons harvested	15 Lakhs	1523871
04.	Cocoon yield / dfl	1 : 52.56	45
05.	Improvement over benchmark	-	16.81
06.	Raw silk production	300 kg	304 kg

Season : Chatua crop (Feb.-March), 2018**Muga- SMV/ IVLP-Dibrugarh**

#	Particulars	Target	Achievement
01.	Farmers covered	15	21
02.	Dfls brushed	2500	8543
03.	Cocoons harvested	1 Lakh	484235
04.	Cocoon yield / dfl	1 : 56	40
05.	Improvement over benchmark	-	24.7

Muga- SMV/ IVLP-Golaghat

#	Particulars	Target	Achievement
01.	Farmers covered	15	26
02.	Dfls brushed	2500	7800
03.	Cocoons harvested	1 Lakh	361500
04.	Cocoon yield / dfl	1 : 46.3	40
05.	Improvement over benchmark	-	21.6

Muga- SMV/ IVLP-Sivasagar

#	Particulars	Target	Achievement
01.	Farmers covered	15	24
02.	Dfls brushed	2500	9809
03.	Cocoons harvested	1 Lakh	535180
04.	Cocoon yield / dfl	1 : 54.6	40
05.	Improvement over benchmark	-	36.4

Muga- SMV/ IVLP-Goalpara

#	Particulars	Target	Achievement
01.	Farmers covered	15	15
02.	Dfls brushed	2500	2400
03.	Cocoons harvested	1 Lakh	101544
04.	Cocoon yield / dfl	1 : 42.31	40
05.	Improvement over benchmark	-	2.31

Season : Autumn crop (Oct-Nov), 2017
Eri- SMV/ IVLP-Golaghat

#	Particulars	Target	Achievement
01.	Farmers covered	100	100
02.	Dfls brushed	3000	3780
03.	Cocoons production (kg)	300	379.4
04.	Cocoon yield / dfl	7.0	10.04
05.	Improvement over benchmark	-	35.71
06.	Raw silk production	240 kg	303.5 kg

Season : Spring crop (Feb.-Mar.), 2018
Eri- SMV / IVLP - Jorhat

#	Particulars	Target	Achievement
01.	Farmers covered	100	100
02.	Dfls brushed	3000	7035
03.	Cocoons production (kg)	300	767.9
04.	Cocoon yield / dfl	7.0	10.95
05.	Improvement over benchmark	-	56.42
06.	Raw silk production	240 kg	614.32 kg

Season : Autumn crop (Oct-Nov), 2017
Eri SMV / IVLP- Sivasagar

#	Particulars	Target	Achievement
01.	Farmers covered	100	100
02.	Dfls brushed	3000	3000
03.	Cocoons production (kg)	300	302
04.	Cocoon yield / dfl	7.0	10.06
05.	Improvement over benchmark	-	43.71
06.	Raw silk production	240 kg	241.6 kg

Season: Spring crop (Feb.-Mar.), 2018
Eri- SMV / IVLP- Jorhat

#	Particulars	Target	Achievement
01.	Farmers covered	100	100
02.	Dfls brushed	3000	3000
03.	Cocoons production (kg)	300	333
04.	Cocoon yield / dfl	7.0	11.1
05.	Improvement over benchmark	-	48.0
06.	Raw silk production	240 kg	333.3 kg

TRAINING CONDUCTED BY CMER&TI, LAHDOIGARH DURING 2017-18

Training is an part and parcel of the institute for dissemination of the evolved technologies to the stakeholders to get maximum production of cocoons. During the year 2017-18, a total of 2574 farmers, and industry stakeholders were trained throughout the length and breadth of northeast. Details of the training programme and its impact on the adoption level and productivity of muga and eri is given below.

Sl. No.	Particulars of Sub-components	Target for 2017-18	Achievement
01.	Farmers' Skill Training		
a.	10 days duration	150	154
b.	5 days duration	450	464
c.	3 days duration	300	300
02.	Exposure visits (Lead farmers)	900	918
03.	Technology Orientation	150	150
04.	Post Cocoon Technology Sector	150	150
05.	Sericulture Resorce Centres	700	737
06.	Training Impact assessment	0	-
07.	Total (1 to 6)	2100	2169
08.	Non-CBT (NERTPS, DoS sponsored)	220	405
Grand total		2320	2574

Training Impact Assessment for the years 2016-17 and 2017-18

With a view to assess the impact on training and further requirement, surveys were regoriously conducted to the trained and non trained farmers in different places and data was collected based on some structured questionnaires. An overview of the impact of training is given below.

- During 2016-17, 4235 stakeholders (Farmers, Officers and Staffs of State Department of Sericulture, CSB Field Staffs, Students, NGO Officials, etc.) with overall achievement of 292%.
- Similarly during 2017-18, 2169 stakeholders were trained under CBT programme with overall achievement of 103% besides 426 farmers and Staffs trained under sponsored programme.
- The new clusters of eri and muga have been identified and developed through human resource development initiatives such as Kaliabor, Bokakhat, Mariani, Barekuri, Dimoria, Dadhara besides upgradation of existing clusters such as Dickshou, Dhakuakhana, Borhola, Barpathar, etc.
- Overall improvement of cocoon production in eri sector enhanced from 7.8 Kg to 11.5 Kg and income level increased from Rs. 4500 to Rs. 12500 per crop per farmer. Some of the farmers are earning annual income upto Rs. 3.00 Lakhs in Nellie and Udalguri areas
- 72% new farmers have been brought under eri and muga culture. The qualified youngsters have been priority in this regard and trained under Technology Orientation Programme and NIAM sponsored Entrepreneurship Development Programme such Mr. Narendra Borah who is running SRC, Kaliabor, and formed farmers producer company Oi-Qua for marketing support to 250 eri farmers of his village.
- The new technologies such as disinfection, improved silkworm breed C2, Borpat and improved castor varieties, pruning and pollarding in muga host plants, quality cocoon and seed production technologies, etc. have been adopted in greater extent.

ACTIVITIES OF SERICULTURE RESOURCE CENTRES

SRCs were established by CMERTI with approval from competent authority of Central Silk Board with the main objective of spreading knowledge with assuring economical sustainability of the people involved in sericulture activity. These centres act as the Community Centres for Human Resource Development in Rural Areas. In specific locality which has been identified as a potential Muga or Eri growing pocket, a SRC has been established with financial assistance for a meeting hall with all audio visual tools. Four SRCs were established during 2015-16, 4 during 2016-17 and 1 during 2017-18 and are actively functional in disseminating technologies to the farmers through skill development training and other means by the Lead Farmers in each SRC. These SRCs also act as training cum facilitation centres in Muga and Eri clusters, to act as an important link between Extension Centres of R&D labs and the beneficiaries. The purpose of these SRCs is to conduct technology demonstration, skill enhancement, group discussion, one-stop shop for Seri-inputs, doubt clarification and problem resolution at cluster level itself. SRCs are managed by handpicked lead/ elite farmers and 'not for profit' organization, for the benefit of cluster farmers/ sericulturist.

The SRCs were provided with training building with plinth area of 400-450 sq.ft constructed by the Local Construction Committee consisting of representatives of local bodies, District /Block administration, official of State Department of Sericulture, lead farmer, etc. A sum of Rs. 1.50 Lakh was provided as grant under CBT programme and remaining amount required for construction was mobilized through community participation. All the SRCs were provided with requisite training equipments such as Chairs (52 Nos.), Table (1 No.), Almirah (1 No.), LCD projects, Laptop and White board, etc. within budget provision of Rs. 1.50 Lakh.

The details of the SRCs are as follows:

#	Name of SRCs	Name of the Lead Farmers	Name of the Nodal Officer	No. of adopted farmers	Year of Estt.
1	Udalguri, BTC	Smt. Mugashri Hainary Narzary	Dr. B.N. Sarkar	100	2015-16
2	Barbam, Dibrugarh	Shri. Abani Borah	Dr. R. Kumar	100	
3	Jaljari, Golaghat	Smt. Sushila Saikia	Dr. M.C. Sarmah	100	
4	Dakhuwakhana, Lakhimpur	Shri Hema Baruah	Dr. K. Neog	100	
5	Mariani, Jorhat	Shri Diganta Gogoi	Dr. Prashanth Sanganavar	122	2016-17
6	Dickshou, Sivasagar	Shri Nripen Borgohain	Dr. D.K. Gogoi	100	
7	Kaliabor, Nagaon	Shri Narendra Borah	Dr. S A Ahmed	102	
8	Dimoria, Kamrup	Shri Dipal Chetri	Dr. M. Chutia	100	
9	Bokakhat, Golaghat	Shri Rameswar Dash	Dr. S.A. Ahmed	105	2017-18
	Total			929	

Objectives of SRCs

- To create an Innovation driven uniformly sustainable silk culture
- Creating awareness and knowledge transfer along with economical sustainability for the people related to silk culture activity
- Creating awareness and knowledge transfer by training
- Assure their economical sustainability through sericulture activity
- Make them involve in market oriented activity

During 2016-17 and 2017-18, 1277 farmers and 739 farmers were trained respectively through these SRCs, respectively mostly on location specific technical issues and to create awareness for adoption of improved technologies for improving production and productivity of eri and muga silk.

IMPACT OF TRAINING & EXTENSION – FEW CASE STUDIES

Success Story - 1

Name of the Farmer	Sri Nilmomi Mahan
Address	C/O. L. Kuladhar Mahan; Vill- Nahartoli PO- Doba. Dist:- Charaideo, Mobile No. 9859785735
Age	48 years
Educational qualification	Matriculate
Family Members (Nos.)	5
Experience in Sericulture	About 17 years
Status	Muga Seed as well as Commercial rearer
Plantation	Having 1.0 acre systematic Som plantation
Rearing capacity	400 dfls per crop/1600 dfls yearly in 4 crops
Yearly production	1,20,000 nos. cocoons (during 2017-18) [Seed cocoons: 80000; Cut cocoons: 40,000 nos.].
Annual income	Rs. 2,88,000.00



Mr. Nilmoni Mahan



Sri B. Saikia and Dr. K. Neog



Plantation of Som seedlings in Nilmoni's farm by CMER&TI and grainage conducted during Chatua crop, 2018

He usually reared around 800-1000 grams of muga dfls during two or three seasons and had an annual production of around 50-60 thousand cocoons per year from which he earned yearly about 60 thousand to 72 thousand by selling reeling and pierced cocoons obtained from the commercial crops. The farmer was motivated to conduct seed as well as commercial crops rearing adopting the technologies developed by CMER&TI and technologies were demonstrated hand to hand in his field. He was trained by Central Muga Eri Research & Training Institute, Lahdoigarh in association with Office of Assistant Director of Sericulture, Govt. of Assam during 2015-16 and as such, he took up rearing of Aherua, Jarua and Chotua crops during subsequent years.

With the support from CMER&TI, he raised additional 1.0 acre Systematic Som plantation in his own land during this year. At present, Sri Mahan conducts regular rearing with 400-500 dfls per crop and at least 4 crops in a year. Now, he is able to support the family members from the income realized primarily from the Muga sericulture. He has established himself as a progressive Muga farmer in the Doba area in the district. Inspiration received from him led to engagement of more than 40 other farmers of his locality to adopt improved technologies to become self dependent through Muga silkworm rearing.

Report: Dr. K. Neog, Scientist-D, CMER&TI and Shri Binanda Saikia, SD, DOS, Assam

Success Story – 2

Name of the Farmer	Smt. Krishna Deka
Address	Borigaon, Morigaon district
Age	45 years
Educational qualification	Matriculate
Family Members (Nos.)	5
Experience in Sericulture	About 15 years
Status	Eri Seed and Commercial rearer
Plantation	Having 1.0 acre systematic castor and Kesseru plantation
Rearing capacity	60-100 dfls per crop – 8-9 crops
Annual income	Rs. 2,50,000.00

Smt. Krishna Deka aged 45 years from Borigaon, Morigaon district initially practiced eri rearing traditionally with 15 -20 dfl per crop in 3-4 crops annually. She collected the castor leaves from natural plantation quite far from her house which was quite uneconomical. She was trained at Central Muga Eri Research and Training Institute, Lahdoigarh during 2014-15 and 2016-17 and received all technical supports from State Sericulture Department. She has established 1.0 acre Kesseru and Castor plantation and at present conducting 8-9 crops with 60-100 dfls in each crops and established herself as a major Eri Seed Cocoon Producer in the Morigaon district. Her average annual earning out of sericulture activities is Rs. 2-2.50 Lakh and provides support in studies of her college going son and daughter. Now, she used give advice to fellow neighbouring traditional Eri farmers to follow her and to become self dependent through sericulture industry.



Report: Dr. S.A. Ahmed, Scientist-C, CMER&TI and Shri Dilip Nath, SD, DOS, Assam

Success Story – 3

Name of the Farmer	Smt Sushila Devi.
Address	C/o Sri Kero Nath, Vill- Adarshagaon PO- Killingvelley. Dist:- Morigaon
Age	45 years
Educational qualification	Class VIII
Family Members (Nos.)	5
Experience in Sericulture	About 15 years
Status	Eri commercial rearer
Plantation	Having 1.0 acre systematic castor and kesseru plantation
Rearing capacity	210 dfls per crop/1260 dfls yearly in 6 crops
Yearly production	3,15,000 nos cocoons (during 2015-16) [Seed cocoons: 60000; Cut cocoons: 102 Kg and Pupa: 728 Kg]
Annual income	Rs. 2,12,400.00



In the initial stage, she used to practice eri silkworm rearing with traditional methods and techniques with a capacity of 15-20 dfls per crop only and conducted 3-4 crops annually with the castor leaves collected from natural plantation and forest areas. She was trained by Central Muga Eri Research & Training Institute, Lahdoigarh in association with Office of Assistant Director of Sericulture, Govt. of Assam during 2015-16 and subsequently she raised 1.0 acre Systematic castor plantation in her own land and started to conduct rearing commercially with 150-250 dfls per crop and 5-6 crops in a year. Now, She along with her family members realized the rich of sericulture economy & practice regularly and

she has recognized herself as progressive Eri farmer in the Nellie area in Morigaon district. She has also motivated more than 50 other traditional Eri farmers of her locality to follow her and to adopt improved technologies to become self dependent through eri silkworm rearing.

Report: Dr. S.A. Ahmed, Scientist-C, CMER&TI and Shri Dilip Nath, SD, DOS, Assam

BRIEF NOTES ON ACTIVITIES OF NESTED UNITS

RMRS, BOKO

Research Highlights

1. Sexual multiplication of S3 & S6 morphotypes of Som were studied for comparative tolerance against leaf spot & leaf blight foliar diseases and mortality of seedling.
2. A total of 105680 (against the target of 105000) seedlings were raised and 8216 (against the target of 20000) numbers of seedlings were supplied to DOS Meghalaya, MSSO Guwahati, DOS Assam, DOS Manipur, DOS Kolkata and NGOs & private farmers.
3. Under extension and technology awareness programme 1095 farmers were covered against the target 1000 farmers through Krishimela, Awareness Programmes, Field Days and Group Discussions. Under SMV, 225 farmers were covered through Awareness, Field Days, Technology Demonstration and Short Term Training Programmes.
4. Under training programme, 5 days training to 25 farmers was imparted on Muga Culture at RMRS, Boko.
5. Under Exposure Visit and Technology Orientation Programme to students, NGO, DOS and CSB Staffs, farmers, 233 persons were covered against the target of 100 persons.
6. An experimental rearing of Muga silkworm was conducted to see the effect one plant's extract and one Au-nano-particle formulation on silk ration.
7. Under seed crop rearing 5103g DFLs were reared against target of 700g DFLs to produce 13602 Nos. of seed cocoons against target of 28000 Nos of cocoons.
8. Grainage activity was carried out to meet the own need of DFLs and to supply to stakeholder as per their need. A total of 3551 DFLs were produced out of which 1100 DFLs were supplied and 2451 DFLs were consumed by RMRS for own rearing.
9. Under commercial Muga crop rearing 2000g DFLs were reared against target of 2500 g DFLs to produce 33800 Nos. of commercial cocoons against target of 150000 Nos of cocoons.
10. The centre generated a total revenue of Rs. 130640/- against the target of Rs. 600000/-.

Organization of Vanya Reshom Krishimela: RMRS, Boko

A Krishi Bigyan Mela was organized at RSRS, on 26.03.2018 at RSRS, Boko Campus. On the occasion one Inaugural and one Technical Sessions were organized under the Chairmanship of Sri Dulal Goswami, Director, CMER&TI, Lahdoigarh and Dr. Kartik Neog, Scientist-D, CMER&TI, Lahdoigarh, respectively. Moreover, one Exhibition was also organized showcasing the recent technologies of muga culture. Nearly 350 progressive muga farmers of the area, Scientists from CMER&TI, MSSO, RSRS, Boko and top officers of Rabha Hasong Autonomous Council participated on Mela

The inaugural session started with the welcome address by Sri Somesh Paliwal Scientist-D, RMRS, Boko. In his welcome address Sri Paliwal highlighted the aim and objectives of the Mela, mandate and achievement of RSRS, Boko. Distinguished guest Sri B. Chowdhury, Scientist-D & Head, MSSO, Guwahati spoke about the problems faced by the muga farmers during last few years. He also emphasized on the crop rescheduling to cope up Global Warming.

In his speech, Hon'ble Chief Guest, Sri Tankeswar Rabha, Chief Executive Member, Rabha Hasang Autonomous Council highlighted the scope of muga culture in Rabha Hasang area. He briefly illustrated about the different schemes adopted by Rabha Hasong Autonomous Council for development of Muga culture. He also opined that Sericulture activities can easily be taken up as subsidiary enterprise for economic betterment of the rural tribal masses.

Guest of Honour, Mrs. Jayanthi Rabha, Executive Member, of Sericulture, Rabha Hasang Autonomous Council stressed on active roles to be played by RSRS, Boko for the betterment of sericulture in Rabha Hasang Autonomous Council. Few farmers also expressed their views and problems faced in muga culture.

Sri Dulal Goswami, Director, CMER&TI, Lahdoigarh in his presidential address elaborately discussed about the recent developments of technologies in the field of Muga culture. He appealed farmers to adopt scientific approach in muga culture.

The inaugural Session ended with vote of thanks given by S.A.S. Rahman, Scientist-D, RSRS, Boko.

After Inaugural Session and interaction session between farmers and scientists was held under the Chairmanship of Dr. K Neog, Scientist-D, CMER&TI, Lahdoigarh where problems related to muga culture were thoroughly discussed.



Different views of Vanya Resham Krishimela at RMRS, Boko

RERS, Mandipathar

Research Highlights

During the year 2017-18, RERS, Mendipathar, organized one Vanya Resham Krishimela, 2 awareness meet and several other programmes viz. field days,



technology demonstrations, group discussions and also other programmes like Swachhta Hi Sewa, BR Ambedkar,s Day etc. A brief notes on the important events organized by the station is given below.

Organization of Vanya Reshom Krishimela: RERS, Mendipathar

As per annual action plan target, Vanya Reshom Krishimela was organized by RERS, Mendipathar on 29th November' 2017 at Saniboriya Bazar, Boko. Dr. Kamala Kalita, Ex-Minister and present Chairmen of Khadi and Village Industries Board, Assam; Nripen Goswami, Principal, J. N. Collage Md. S.A.S. Rehman, Scientist-D, RMRS, Boko and Sri M. Sankar, Scientist- D, REC, Kokrajar were present on the occasion along with 200 numbers of Eri farmers neighbouring Boko areas viz. Kahibama, Langkona, Kinangaon, Lampara and Poiranga localities. Along with the krishimela, one exhibition on Eri-culture as part of krishimela programme had been arranged. On the occasion one pamphlet in Hindi and another pamphlet in English were published. In the meeting, certificates and cash awards were distributed to the awardees viz. Mrs. Sabita Boro Pathak and Sri Rastra Rabha for their outstanding pre and post-cocoon activities along with distribution of certificates to Eri Seed Cocoon Producers registered by Central Silk Board.



Organization of training under CBT

A training course for 50 nos. of seri farmers under capacity building programme was conducted by RERS w.e.f. 27-06-2017 to 29-06-2017 at Azad Bhawan, Pathsala in association with DoS, Assam. The beneficiaries were selected by the Superintendent of Sericulture, Bajali. The breaks up of the trainees are as under : -

Caste	ST	SC	OBC	General	Total
Male	6	-	-	13	19
Female	24		3	4	31
Total	30		3	17	50

During the three days duration period the following resource persons imparted the training on different subjects of their interest.

1. Sri Jiban Kumar Deka, Superintendent of Sericulture, Bajali
2. Sri Jiten Das, SD, Bajali
3. Motsed Ali Ahmed, Seri. Inspector, Bajali
4. Dr. B. K. Singh, Director, CMER & TI, Lahdoigarh
5. Dr. S. A. Ahmed, Scientist- C, CMER & TI, Lahdoigarh
6. Sri Davidson Marak, TA, RERS, Mendipathar
7. Dr. H. Barman, Scientist- C, RERS, Mendipathar



Fig. Views of participants and resource persons in the dias at the training programme

Organization of Technology Awareness Programmes

Two awareness meet on Eri-culture was organized in collaboration with Assistant Director of Sericulture's Office, Bongaigaon during the year 2017-18 by RERS, Mendipathar. One was organized on 12-08-2017 at Noyagaon and the other on



Manikpur in Bongaigaon district on 18-02-2018. In the first programme, a total of 105 nos. participants attended the programme. Most of the participants were OBC community women. Most of the participants are seriously engaged in eri silkworm rearing, spinning, and weaving Eri garments.

In the first meeting, prominent dignitaries viz. Sri Pankaj Goswami ADS, Bongaigaon, Sri Kabindra Ch. Roy, Social activist, Mrs. Susilla Roy, Ward Commissioner, Ghilaguri Gaon Panchayat, Ranjit Rabha, SD, Sri Dipak Ch. Das, SD, Noyagaon were present. Dr. H. Barman, Sci.-C, RERS, Mendipather, Sri P. Goswami, ADS, Sri Dipak Ch. Das, SD, Noyagaon along with the farmers elaborately discussed about the different aspects of ericulture including the problems faced by the farmers during rearing. Mrs. Susilla Roy, Ward Commissioner, address the gathering mentioning needs of various government schemes for development of Eri culture.

In the second programme a total of 80 nos. participants comprising female and male farmers attended the programme. Most of the participants were women. Most of the participants are seriously engaged in eri silkworm rearing,



spinning, and weaving Eri garments. Important speakers along with the farmers in this occasion were Sri Pankaj Goswami, ADS, DoS, Assam, Dr. H. Barman, Sci.-C, RERS and R. K. Barman, Extension Officer from Manikpur Development Block, Manikpur who discussed the value and needs of eri-culture for women empowerment and economic upliftment of the poor sections of the society.

REC, Lakhimpur

Technology awareness Programme

Research Extension Centre, Lakhimpur had organized 2 Technology Awareness Meet on improved technology package of Muga culture at Tarioni Muga Farm on 10.08.2017 and Gohain Tekela village on 29.11.2017 in Lakhimpur district of Assam. In both the programme, more than 100 muga farmers along with DoS staffs of respective districts were

participated. Sri D. Mech, Scientist –D of REC, Lakhimpur highlighted the recent technology development of muga culture viz., 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. using the multi media projector. Shri Mech also informed the farmers that to success the crops in different seasons, the farmers should have advance planning for rearing so as to produce quality foliage through pruning of host plants for early and late stage silkworm and also to get silkworm seed on time. He requested the farmers to adopt the improved technologies for better production of cocoons as well as better income generation through muga culture. In both the programme, the participated farmers had also interacted actively. Some views of the Technology awareness meets are furnished below.



Technology Awareness Programme

Field Day

In view of demonstrate result of improved technologies of muga culture, REC, Lakhimpur had organized 3 Field days on 20.09.2017 at Garehage, Lakhimpur, on 30.11.2017 at Ghughua, Dhemaji and on 05.12.2017 at Narayanpur. More than 100 muga farmers along with the DoS staffs were participate in each programme. In each programme, the Scientist-D of REC, Lakhimpur highlighted the recent technology advancement in muga host plant management and silkworm rearing. He also demonstrated the result of improved technologies using the

multimedia projector. A fruitful interaction of farmers on various problems faced by the muga farmers specially the incidence of uzi fly, non-hatching of silkworm eggs, non-availability of seeds on time, etc were also discussed in the programme and provided necessary suggestions to the farmers for overcoming the problems.



Field Day

Group Discussion

Group discussion with the farmers and DoS staffs were held on different issues like problems of muga seed crops, non-hatching of eggs, non availability of seed cocoon/dfls during Kotia crop, seasonal incidence of diseases and pest of silkworm. During the discussions, various remedial measures also discussed along with the participants to overcome the problems. Total 7 nos of Group Discussion were held at different muga potential areas of Lakhimpur district namely Japisajia, Badhakara, Hiloidari, Na-Pam, Kadamial, Lalpani Gohain Gaon and Phkonarhut during the year 2017-18. In each programme, 25- 50 farmers were participated.



Group Discussion

Farmers Day

In view of create awareness of improved technologies of among the muga farmers, REC, Lakhimpur had organized 4 Farmers Day at different muga growing areas namely Boginadi, Kadam, Japisajia and Rangpuria in Lakhimpur district during 2017-18. In each programme, 50-70 farmers along with the DoS staffs were participated. During each programme, the Scientist-D of REC, Lakhimpur highlighted the recent technology advancement in muga host plant management and silkworm rearing. He also demonstrated the result of improved technologies using the multimedia projector. A fruitful interaction of farmers on various problems faced by the muga farmers specially the incidence of uzi fly, non-hatching of silkworm eggs, non-availability of seeds on time, etc were also discussed in the programme and provided necessary suggestions to the farmers for overcoming the problems.



Farmers Day

Technology demonstration

As per Action Plan, REC, Lakhimpur had organized 3 technology demonstration programme on integrated technology package of muga culture during the year 2017-18. More than 25 farmers were participated in each programme organized at Kawaimari, Barcharia and Na-Pam of Lakhimpur district. In each programme, techniques of pruning/pollarding of host plants, application of inputs to the host plants, disinfection of rearing field before brushing of silkworm, etc were demonstrated at the field practically. The whole demonstration programme was farmers' participatory mode. Some views of the programme are furnished below.



Demonstration

RESEARCH PUBLICATIONS (2017-18)

Research articles in journals

- 1) Bhuyan, D., Sarmah, M.C. and Dutta, K. (2017). A study on the seasonal variation of the post cocoon parameters of eri silkworm *Samia ricini* (Donovan) reared on Kesseru *Heteropenex fragrance* (Roxb.) Seem. *Int. J. Sci. Res.*, 6(1): 375-376.
- 2) Chetia, H., Kabiraj, D., Sharma, S., Das, S., Mosahari, P.V., Sharma, P., Neog, K., Deka, M., Jayaprakash, P. and Bora, U. (2017). *De novo* transcriptome analysis of the muga silkworm, *Antheraea assamensis* (Helfer). *Gene*, 0378-1119, 10.1016/j.gene.2017.02.021.
- 3) Das, R. and Das, K. (2017), Effect of fungal and bacterial diseases in different instar muga silkworm, *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae) in different crop seasons. *Mun. Ent. Zool*, 12(2), 578-582. (ISSN : 1306-3022)
- 4) Deuri, J., Barua, P.K. and Sarmah, M.C. (2017) Effect of food plants on rearing performance and cocoon quality of Eri silkworm (*Samia ricini* Donovan). *World J. Agril. Sci.*, 12 (6): 431-436.
- 5) Deuri, J., Barua, P.K., Sarmah, M.C. and Ahmed, S.A. (2017). Biochemical attributes of the Castor and Tapioca leaves, the promising food plants of Eri silkworm (*Samia ricini* Donovan). *Int. J. Eco. & Eco Sol.*, 4(1): 1-4.
- 6) Nath, C., Chutia, B.C., Goswami, L. M. and Neog, K. (2017). Genetic variation within six different colour strains of *Samia ricini* Donovan from North East India, NeBIO, 8(1): 40-44 ISSN 2278-2281(Online Version) www.nebio.info | www.neceer.org.in.
- 7) Neog, K., Dutta, P. Choudhury, B. and Singh, B.K. (2017). Field efficacy of methoprene, a juvenile hormone analogue, on growth, cocoon characters and fecundity of the muga silkworm *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae). *Int. J. Agril. Policy & Res.* Vol.5 (9):, Available online at <https://www.journalissues.org/IJAPR/>, [https://doi.org/ 10.15739/IJAPR.17](https://doi.org/10.15739/IJAPR.17).
- 8) Reddy A. D., Subrahmanyam, G., Dechamma, M.M., Nayak B.B., Karunasagar, I. and Karunasagar I. (2017). Effect of Ammonia Concentration on the Nitrification Potential of Ammonia Oxidizing

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- 2) Rajesh Kumar (2017) Mahendra Sarmah motivates yongstar for muga culture. *India Silk*, Vol. 7-8, no 12-2, 18-19.
- 3) Ranjana Das, K. Das and K. Giridhar, (2018) Management of seedling blight of eri food plant, castor to maximize yield potential, *Indian Silk* Vol. 8 (Old56). No.5-7 18-19.
- 4) Sangannavar. P. A., (2017) Climate resilient crop producing by genomics assisted breeding. *BioQuest* vol. 1 (1). 26-27.
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- 7) Subrahmanyam, G., B. Jeevan D.K. Jigyasu; M. Chutia; R. Das and B.K. Singh. (2017). Deciphering silkworm associated microbial communities at the 'omics' age, *BioQuest*, 1(1): 23-24
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- 1) B. N. Choudhury, S. C. Das., M. C. Sarmah and M. Ahmed (2018) Influence of socioeconomic factors on knowledge and technology adaptation of sericulture farmers of Aizawl district of Mizoram Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India). P-129-130.
- 2) B. N. Sarkar, M. C. Sarmah and D. Goswami (2018) A study of hybridization of cultivated eri silkworm *Samia rcini* (Donovan) and wild eri silkworm *Samia canningie* (Hutton) Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India). P 50.
- 3) B.N. Sarkar, M. C. Sarmah, D. Goswami (2018) Management of eri seed production and development of long term preservation technology. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-40.
- 4) Biswas.N. S.A.S.Rahman., Neog.K. Sarma.M. Bagchi.S.N. and Goswami.D. Influence of changing atmospheric temperature in seed crop rearing of Muga silkworm, *A.assamensis* in Terai region of West Bengal. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-27.
- 5) D Singh, D Kabiraj, P Sharma, H Chetia, P V Mosahari, K Neog and U Bora (2018) Comparative mitogenomic and phylogenetics of *Antheraea assamensis* with other lepidopteran insects. Souvenir and Abstract book, International Symposium on Biodiversity and Biobanking. BioDiverse 2018, 27-29 January 2018 at IIT, Guwahati, Assam. P-168-169.

- 6) D. Bhuyan, M.C. Sarmah, and K.Dutta (2018) Commercial aspects of Eri Silkworm, *Samia ricini* Donovan reared on Kesseru, *Heteropanax fragrans* (Roxb.) Seem . Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India). P 53.
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- 8) Dharmendra Kumar Jigyasu, Babul Chetia, Subadas Singh and Kartik Neog (2018) A case study: impact of petroleum crude oil on Muga Silkworm (*Antheraea assamensis* Helfer) and its host plants. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-63.
- 9) G. Subrahmanyam, B Jeevan, M Kalita., M Chutia, and R Das., (2018) Efficiency of disinfectants for controlling bacterial flachere in muga silk worm, *Antheraea assamensis*, Helfer. Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India). P-36.
- 10) G. Subrahmanyam, M. Kalita, R. Debnath, B. Jeevan M. Chutia, R. Das, D. Goswami (2018) High throughput sequencing analysis of midgut bacterial pathobiome associated with flacherie disease in Muga silkworm *Antheraea assamensis* Helfer. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-15.
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- 13) J.Deuri and M.C.Sarmah (2018) Tapioca or cassava, *Manihot esculenta* Crantz: A potential food plant of eri silkworm. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-31-36.
- 14) K Neog, M C Sarnah and D Goswami (2018) Muga and Eri silk worm germplasm conservation and breeding strategies. Status papers, Seri-Breeders Meet 20-21st February 2018 at Central Silk Board, Bengaluru. P-131-137.
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- 16) K. Neog, M. Sarmah, R. Debnath, D. Gogoi & D. Goswami (2018) Antimicrobial Peptides from Silkworm: A Review. Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018 P-17.
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 - 22) M. Chutia, M.P. Barkataki, G. Subrahmanyam (2018) Experimental Phage Therapy for *Pseudomonas aeruginosa* Infection: an emerging pathogen of vanya silkworm. Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India).P – 63-64.
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- 39) S.A. Ahmed, B.Gogoi, M.C. Sarmah and C. Dash (2017) Exploration of Borpat (*Ailanthus grandis* Prain), a forest based perennial food plant for sustainable ericulture and mitigation of environmental challenges International journal of wild silkmoth & silk. 20-21, 1-15.
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 - 48) U.Hazarika., V. K. S. Naik, K Dutta and B. K. Singh (2018) Soil Health Card: Helping hand to Sericulture farmers. Abstract and lead paper. 8th International Conference of Wild Silkmoths (ICWS-2018) scheduled held on 22-24th January 2018 at Guwahati, Assam (India).
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- 1) CMER&TI Sericulture News (English), Vol. 22; April-June, 2017 issue edited by Urmimala Hazarika.
- 2) CMER&TI Sericulture News (English), Vol. 23; July-September, 2017 issue edited by M.C.Sharma
- 3) CMER&TI Sericulture News (English), Vol. 24; Oct.-Dec., 2017 issue edited by Urmimala Hazarika and M.C.Sharma
- 4) CMER&TI Sericulture News (Hindi), Vol. VII; Jan.-June., 2017 issue.
- 5) CMER&TI Sericulture News (Hindi), Vol. Special Issue on Establishment Day.

Books / Booklets / Souvenir

- 1) Assamese Book: Muga aru Eri Palonot Hoghonai Utha Prashna aru Eiyar Uttarhomuh, Published by CMER&TI, August, 2017.
- 2) Souvenir of “Souvenir Vanya Sericulture and Seri-Biodiversity for Economic Upliftment : SeriBioEcon – 2018”.
- 3) Urmimala Hazarika, Vinodakumar S. Naik and B.K.Singh (2017) Soil Health Card: A guide to Farmer (A booklet in English)
- 4) Urmimala Hazarika, B.K.Singh and Kalyan Kumar Dutta (2017) Mati Shasthya Patra : Krishakar babe ek path pradarshak (A booklet in Assamese)
- 5) Urmimala Hazarika and B.K.Singh (2017) Recent Research Publications (From 2011-12 to 2016-17)
- 6) हिंदी पुस्तिका: “एरी किसानों के लिए प्रशिक्षण पाठ्यक्रम”, डॉ डी.के. जिग्यासु, डॉ एस.ए. अहमद और डॉ एम.सी. सरमा द्वारा संपादित. Hindi Book on “Training Course Material for Farmers on Ericulture”, Edited by: Dr. D.K. Jigyasu, Dr. S.A. Ahmed and Dr. M.C. Sarmah

Annual Report published:

Annual Report of the institute for the year 2016-17 was published by CMER&TI during 2017-18.

राजभाषा हिन्दी की गतिविधियां**2017-18 वर्ष के दौरान संस्थान में राजभाषा हिन्दी के कार्यान्वयन से संबंधित विभिन्न गतिविधियां का संक्षिप्त विवरण****1. राजभाषा अधिनियम 1963 की धारा 3(3) की स्थिति:**

- (क) वर्ष के दौरान राजभाषा अधिनियम 1963 की धारा 3(3) के अंतर्गत जारी कागजात की कुल संख्या: 453

(ख) इन में से अंग्रेजी में जारी किए गए कागजात की संख्या: नहीं ।

2. हिन्दी पत्राचार की स्थिति:

मंत्रालय विभाग आदि द्वारा भेजे गए कुल पत्रों का व्यौरा:

क्षेत्र	हिन्दी में	अंग्रेजी में	भेजे गए कुल पत्रादि की संख्या	प्रतिशत
क	31	07	38	81.57
ख	-	-	-	-
ग	2376	1325	3701	64.19

3. राजभाषा कार्यान्वयन समिति की बैठकों की कुल संख्या - 4**4. आयोजित हिन्दी कार्यशाला की कुल संख्या - 4****5. हिन्दी दिवस तथा हिन्दी पखवाड़ा का आयोजन संबंधी विवरण**

संस्थान में दिनांक **1.09.2017** से दिनांक **12.06.2017** तक हिन्दी पखवाड़ा आयोजित किया गया। इस दौरान हिन्दी निबंध, हिन्दी नोटिंग व ड्राफ्टिंग, हिन्दी शब्दावली और हिन्दी प्रश्नोत्तरी आदि प्रतियोगिताएं आयोजित की गई जिसमें संस्थान के सभी अधिकारी व कर्मचारी भाग लिया।

इसी क्रम में संस्थान में हिन्दी दिवस तथा समापन समारोह दिनांक **14.09.2017** को आयोजित किया गया। इस समारोह के अवसर पर हिन्दी पखवाड़े के दौरान आयोजित विभिन्न प्रतियोगिताएं में विजित प्रतिभागियों को नकद राशि के साथ प्रथम ,द्वितीय ,तृतीय तथा सांत्वना पुरस्कार प्रदान किया गया।

इसके अतिरिक्त वर्ष **2017-18** के दौरान मूल रूप में हिन्दी में किए गए कार्यों करने पर संस्थान तथा इसके अधीनस्थ इकाइयों के अधिकारी व कर्मचारी को नकद राशि से पुरस्कार प्रदान किया गया। हिन्दी कार्यान्वयन में बेहतर निष्पादन करने वाले संस्थान के अधीनस्थ इकाइयों तथा संस्थान के अनुभागों को क्रमशः प्रथम, द्वितीय और तृतीय पुरस्कार के रूप में प्रमाण-पत्र भी दिया गया।

6. हिन्दी न्यूज लेटर का प्रकाशन तथा इस प्रकाशन पर प्राप्त प्रशंसक-पत्र

वर्ष 2017 के दौरान दो हिन्दी न्यूज लेटर प्रकाशित किया गया। इस प्रकाशन पर संस्थान को क्षेत्रीय कार्यान्वयन कार्यालय (पूर्वोत्तर क्षेत्र), राजभाषा विभाग, गृह मंत्रालय, भारत सरकार, शिलपुखुरी, गुवाहाटी द्वारा प्रशंसक-पत्र जारी किया गया है।

7. राजभाषा कार्यान्वयन पर प्राप्ति उपलब्धि:

जोरहाट शहर में अवस्थित केन्द्र सरकार के कार्यालयों के बीच वर्ष 2016-17 के दौरान राजभाषा हिन्दी कार्यान्वयन के बेहतर प्रदर्शन एवं उत्कृष्ट कार्य संपादन के लिए केन्द्रीय मूंगा एरी अनुसंधान व प्रशिक्षण संस्थान, लाहदोईगढ़, जोरहाट को **शिल्ड के साथ प्रशस्ति पत्र** प्रदान किया गया है।



प्रभारी निदेशक Director (i/c)

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वार्षिक प्रतिवेदन 2017-18