

## CENTRAL MUGA ERI RESEARCH AND TRAINING INSTITUTE, LAHDOIGARH

## Organizational Set up

Unit:	No.	Place
RSRS/ RSTRS	02	1) Boko (Assam) 2) Imphal (Manipur)
REC/ STSC	03	1) Lakhimpur (Assam) 2) Coochbehar (WB) 3) Fatehpur (UP)

## R&amp;D Projects, TOT, ECP, CBT etc:

Item	Target	Remarks
<b>1. CSB coded Research projects</b>		
<b>1.1. With PI from the Institute</b>		
1.1.1. Projects of earlier year continued through the year 2022 -2023	08	<b>Annex 5.I.1</b>
1.1.2. Projects to be concluded during the year 2022-2023	11	<b>Annex 5.I.2</b>
1.1.3. New Projects to be initiated during 2022-2023	06	<b>Annex 5.I.3</b>
<b>1.2. With CI from the Institute</b>		
1.2.1. Projects of earlier year continued through the year 2022 -2023	1	<b>Annex 5.I.4</b>
1.2.2. Projects to be concluded during the year 2022-2023	2	<b>Annex 5.I.5</b>
1.2.3. New Projects to be initiated during 2022-2023	0	<b>Annex 5.I.6</b>
<b>2. Trial of Technologies (ToTs)</b>		
<b>2.1 On Station Trials (OST)</b>		<b>Annex 5.II.1</b>
2.1.1. No. of technologies to be validated	09	
2.1.2. No. of trials to be conducted	40	
<b>2.2 On Farm Trials (OFT)</b>		<b>Annex 5.II.2</b>
2.2.1. No. of technologies to be demonstrated	12	
2.2.2. No. of locations to be covered	42	
2.2.3. No. of stakeholders to be covered	680	
<b>3. Capacity Building &amp; Training (CBT)</b>		<b>Annex 5.III</b>
3.1. No. of programmes to be conducted	78	
3.2. No. of stakeholders to be covered	1750	
3.3. No. of programmes to be conducted (KVK)	1	
3.4. No. of stakeholders to be covered (KVK)	24	
<b>4. Extension Communication Programs (No.)</b>		<b>Annex 5.IV</b>
4.1. Krishi Mela / Reelers mela cum exhibition	03	
4.2. Farmers Field day	08	
4.3. Awareness programme	23	
4.4. Technology demonstration / Enlightenment programmes	23	
4.5. Workshop / Seminars & Conferences	02	
4.6. Other activities ( <i>Please specify</i> ).		
<b>5. Soil Samples to be analyzed</b>	40	<b>Annex 5.V</b>
<b>6. Information, Education &amp; Communication</b>		<b>Annex 5.VI</b>
6.1. Periodicals	4	
6.2. Publications	65	
6.3. Extension literature	10	
6.4. Films / Videos	15	
6.5. Social media	50	
<b>7. Patents to be filed/ granted, technologies to be commercialized, Software, mobile/android app to be developed etc.</b>	02/01	<b>Annex 5.VII</b>
<b>8. Revenue generation (Rs. in Lakhs)</b>	33.00	<b>Annex 5.VIII</b>

9. Procurement of equipments and other accessories	439.32	Annex 5.IX
10. Other activities ( <i>pl specify</i> )	-	Annex 5.X
11. Target proposed at a glance for the year 2022-2023	-	Annex 5. XI

## 1. CSB coded Research projects

### 1.1. With PI from the Institute

#### Annex-5.I.1

#### 1.1.1 Projects of earlier year continued through the year 2022-2023

#	Code	Title	Start	End	Milestone to be crossed	Progress to be achieved	Budget reqd. (Rs in lakhs)
<b>At main institute</b>							
1	AIB 5012 SI	Inter and intra-specific hybridization for improvement of eri silkworm, <i>Samia ricini</i> Donovan	Mar, 2020	Feb, 2024	Estimation of general and specific combining ability. Selfing and grainage activities to produce crosswise F <sub>2</sub> seed and F <sub>2</sub> generation rearing by maintaining 03 replications/cross and recording the data for statistical analysis. Selection of hybrids in F <sub>2</sub> from top, optimum and poor performing lots. Selection and elimination based on desired traits. Single pair mating of selected lots to produce F <sub>3</sub> , F <sub>4</sub> , F <sub>5</sub> F <sub>6</sub> , F <sub>7</sub> , seeds Lot-wise F <sub>3</sub> , F <sub>4</sub> , F <sub>5</sub> F <sub>6</sub> , F <sub>7</sub> generation rearing by maintaining 03 replications/lot and recording the data for statistical analysis. Selection and elimination based on desired traits.	Estimation of general and specific combining ability will be helpful to identify suitable cross combinations for future breeding programmes. Selection of hybrid lots with desired traits will lead to evolution of improved Eri silkworm hybrid/breed. Single pair mating of selected hybrids and recurrent selection will lead to attaining a certain level of homozygosity in the desired traits.	4.96
2	AIP 5013 SI	Impact of elevated CO <sub>2</sub> and temperature on muga silkworm and its primary host plant	Mar, 2020	Feb, 2023	Establishment, Installation, calibration, and validation of Open Top Chambers and its controls. Imposing treatments on host plants for six months. Recording plant growth attributes, analysis for	Open Top Chambers for measuring eCO <sub>2</sub> and temperature regimes. Som plants exposed to eCO <sub>2</sub> and varied temperature regimes will exhibit change in their growth attributes and biochemical constituents after 06 months. Initial nutrition	33.20

					biochemical constituents, nutritional quality of leaf at regular intervals Rearing of 1 <sup>st</sup> seed crop of muga silkworm in OTC's with varied CO <sub>2</sub> & temperature regimes. Recording of Silkworm growth, morphological attributes	parameters of host plants and their effect on silkworms growth	
3	ARP 5015 SI	Development of chemical based control measures for management of pebrine disease in Muga silkworm, <i>Antheraea assamensis</i> Helfer	Jan, 2021	Dec, 2023	Taxonomic identification of microsporidian pathogen of Muga silkworm along with other microsporidian species infecting wild silkworms with simple ITS based PCR Germination studies of microsporidian spores and evaluation of different life stages of pathogen in Muga silkworm Effect of chemical disinfectants and antifungal chemicals on survivability and infectivity of microsporidian spores Effect of chemical disinfectants on different gene copy numbers of microsporidian species by RT-PCR Insect bioassays studies with chemical disinfectants	Taxonomic and evolutionary relationship of microsporidian pathogen of Muga silkworm with other microsporidian pathogens Characterization of microsporidian pathogen of Muga silkworm Effective chemical substances suitable to control pebrine infection will be identified. Screening of the chemicals and their concentrations to control the pathogen growth. Suitable chemical disinfectant among other substances tested will be identified for use in Muga ecosystem	6.70
4	AIT 5016 MI	Integrating genomic and transcriptomics resources for functional insight into the biology of muga silkworm <i>Antheraea assamensis</i>	Jan, 2021	Dec, 2023	Annotation of genome, transcriptome and proteome data using bioinformatics tools, whole genome and transcriptome data Synteny analysis with <i>Bombyx mori</i> genome to study genome expansion, chromosomal	Complete gene list of muga silkworm with putative functions including immunity and silk characters. Genes linked to peculiar behavior of muga silkworm SNP and SSR markers for Marker-Assisted Breeding to speed up	21.59

					rearrangement, and chromosomal translocation. Identification and characterization of SNP markers. Screening of selected markers in muga populations.	the breeding process in muga culture Complete gene list of muga silkworm with putative functions including immunity Genes up- or Down-regulated upon infection. Information on genes linked to immune response in muga silkworm Information on silk genes of wild silkmoths	
5	APR 5018 MI	Effect of various host plants separately and in combination on Rearing and grainage performance of Muga silkworm, <i>Antheraea assamensis</i> Helfer	Mar, 2021	Feb, 2024	Muga silkworm rearing on four different food plants Som, Soalu, Dighloti and Mejankori both in solo and combination. Grainage performance of different rearings of solo and combination in different crop seasons.	Rearing performance in all six crops with respect to larval weight, larval duration, mortality, ERR% etc. will be studied. Crop wise grainage performance, cocoon weight, shell weight, shell ratio and fecundity will be studied in all six crop seasons. Record of meteorological data & analysis.	5.44
6	APS 5020 MI	Commercial egg production technology in sericulture for synchronization of hatching and subsequent rearing	Feb, 2022	Jan, 2024	Design and fabrication of different egg laying devices. Selection of best egg laying device. Large scale trial by using best egg laying device. Standardization of mass mother examination, early emerged male moth and seed preservation techniques for commercial egg production	Suitable egg laying device for commercial egg production. Standardized egg laying device for commercial egg production.	4.17
7	MOE 5022 MI	Popularization of Improved technologies in Muga & Eri culture for North-Eastern India	Apr, 2021	Mar, 2023	On Station trial (OST) of 09 newly developed technologies at 40 locations. On Field Trial (OFT) of 12 technologies covering 680 beneficiaries.	OST/OFT of new technologies covering 40 locations and 685 beneficiaries.	0.00 (Project cost covered under ToT head)
At nested units							

8	APS 5021 EF (DBT)	Studies on population diversity and role of host plant volatiles cues for enhancing egg laying in temperate tasar silk moth ( <i>Antheraea proylei</i> )	Oct 2021	Sep, 2024	Collection and rearing of Oak tasar silk moths across the NER. Feeding bioassay and evaluation of best suitable host on egg laying productivity Evaluation of standard synthetic oviposition stimulants for enhancing egg laying in Oak tasar silk moths in NER	Collection and rearing of Oak tasar silk moths across the NER. Feeding bioassay and evaluation of best suitable host on egg laying productivity Evaluation of standard synthetic oviposition stimulants for enhancing egg laying in Oak tasar silk moths in NER	0.00
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## Annex-5.I.2

## 1.1.2 Projects to be concluded during the year 2022-2023

#	Code	Title	Start	End	Project Outcome	Utility of out-put/Impact on silk industry	Financial (Rs. in lakh)
<b>At main institute</b>							
1	MOE 5004 EF (DST)	Adoption of improved sustainable technologies of muga culture for elevation of cocoon production in the tribal belt of Assam	Aug 2019	July 2022	Assistance to the beneficiaries Exposure visit Integrated Sericulture with other agricultural crops Extension & Communication program, farmers skill training program Midterm survey of Beneficiary of use of improved technologies	Mid-term survey, on crop performance, knowledge & adoption level of improved technologies after the ECP & Training programs.	0.0
2	PIB 5005 SI	Genetic enhancement of Castor ( <i>Ricinus communis</i> L.) germplasm as a source material for development of productive perennial varieties.	Oct, 2019	Sep, 2022	Enrichment of castor gene-pool with collection made primarily from NE region. Selection of superior accession based on characterization data. Selection of intermediate perennial castor hybrid in F <sub>2</sub> generation of 1 <sup>st</sup> crossing and mass selection lots and raising of F <sub>3</sub> generation of these hybrids is expected to attain a level of homozygosity. These hybrids have to	Enrichment of gene pool with varied germplasm collections will be utilized in future castor improvement programmes. Selection of most suitable and high yielding accession from the collected germplasm has opened up ways to recommend this accession for large scale cultivation. Selection of pre-bred intermediate castor hybrid with perennial characters will be utilized in a breeding programme for development of a productive perennial	7.12

					be selfed upto F <sub>7</sub> generation for attaining the homozygosity.	cultivar with wider adaptability, which will enhance the availability of leaf in the field for sustainable Eri culture.	
3	AIB 5006 SI	Breeding of muga silkworms for improved silk quality and disease tolerance	Oct, 2019	Sep, 2022	Basic genetic stock to start the breeding program. Inter-specific hybrids based on the availability of <i>A. mezops</i> samples. Better genetic stock from the selection for breeding. Better progeny resulting from different crossing regimes. Better muga lines for further breeding. Information on basic genetic and breeding characteristics of muga silkworms and their performance at fields.	Developed breeds will be utilized in field production. Genetic stocks generated will be utilized in further breeding program. Any smaller technologies developed during the breeding program will be utilized in further breeding programs	6.94
4	APR 5007 SI	Standardization of chawki rearing practices for Eri silkworm, <i>Samia ricini</i> (Donovan).	Oct, 2019	Sep, 2022	Well-designed rearing appliances for easy rearing of eri chawki worms. Ideal method for temperature and humidity maintenance in eri chawki rearing house by adopting advanced techniques. Suitable variety of castor and feeding methods for Eri chawki rearing. Simpler methods for brushing, bed spacing, cleaning, lime dusting, bed disinfection application to create good rearing performance with uniformity and free from pathogens. Standardization of eri chawki rearing practices for commercially available eri breed and races will be used as package of practice and technology.	Standard package of practice for eri chawki rearing will lead to the development of eri chawki rearing enterprises in different regions of northeastern states and other Eri growing areas. This project outcome will also be helpful for creation of more employment in each standardized practices. The standardized practices will be helpful in producing better quality of cocoons and increased yield of cocoons leads to increase in total raw silk production of India.	5.41
5	AIT	Molecular	Sep,	Sep,	Molecular	Analysis of sequence data	0.00

	5011 EF	investigation into the lingo-cellulolytic system of a few wild silkmoths in North East India	2019	2022	characterization of the lingo-cellulolytic biomass degrading enzyme from potential strains. Bioinformatics and bio-statistical analysis of NGS sequence data. Developing microbial pathogen resistance through induction of immunity in silkworm via manipulation of gut microbiome.	to identify the bacterial species involved in degradation of lingo-cellulolytic compounds. Selected bacterial isolates will be characterized at molecular level. Enzymatic assays will identify the highly efficient strains that show higher enzymatic activity. Identification of bacterial isolates that help in immunity in muga silkworms.	
6	BPP 5014 CN	Standardization of processing and production of a consumable beverage from mulberry leaves and blending with green Tea	Mar, 2020	June, 2021 Extended till Dec, 21)	Identified most suitable mulberry variety for producing mulberry beverage (K <sub>2</sub> and BC <sub>259</sub> ). Standardized technique for producing mulberry standalone beverage and mulberry powder blended with tea.	Commercialization of mulberry standalone and blended beverage.	0.00
7	CFC 5017 MI	Exploration and adoption of novel muga cocoon cooking technology for increasing its reelability and raw silk quality	Mar, 2021	Feb, 2023	Quick and efficient cocoon pre-treatment method to achieve uniform cocoon cooking and improved reelability.	Improvement in muga raw silk quality will give economical returns to the reelers. Improved reelability along with better recovery percentage will be economically beneficial for reelers community.	10.00
8	MFM 5019 MI	Development of honeycomb mountages and harvesting technology for muga Cocoon production with improved uniformity and raw silk recovery	Mar, 2021	Feb, 2023	Designed and fabricated the most suitable and improved mountage for muga cocoon production with improved uniformity and raw silk recovery.	Uniform and good quality cocoons will fetch better prizes for cocoon producers. Improved reelability and silk recovery percentage will be economically beneficial for the stakeholders.	8.25
<b>At nested units</b>							
9	APR 5008 SI	Standardization of rearing and grainage technologies of <i>Antheraea</i>	Oct, 2019	Sep, 2022	Standardized rearing and grainage technologies of <i>Antheraea frithi</i> .	Commercial rearing of <i>A frithi</i> will be recommended after conducting OST and OFT.	0.50

		<i>frithi</i> Moore.					
10	AIB 5009 SI	Isolation of thermo-tolerant line(s) of Oak tasar silkworm <i>Antheraea proylei</i> J.	Oct, 2019	Sep, 2022	A thermo-tolerant line of Oak Tasar silkworm will be isolated.	Thermo-tolerant line will be recommended after conducting OST and OFT.	0.50
11	APR 5010 SI	Evaluation of Eri Silkworm Races suitable for different agro-climatic conditions of Manipur.	Oct, 2019	Sep, 2022	Recommendation of suitable Eri silkworm races/ strains/ breeds for low and high altitude rearing in Manipur.	Rearing location specific eri silkworm/ race/ strains will improve cocoon yield.	0.70

## Annex-5.I.3

## 1.1.3 New Projects to be initiated during the year 2022-2023

#	Code	Title	Start	End	Objectives	Expected outcome	Financial (Rs. in lakh)
<b>At main institute</b>							
1	-	Vanya silkworm disease monitoring in North-eastern states of India	2022	2026	To estimate the disease prevalence in Vanya silkworms (Muga and Eri) at seed farms, commercial farmers and grainages in North-eastern India To suggest timely remedial measures to ASRs, farmers and DoS personnel to manage the Vanya silkworm diseases and to prevent disease outbreak	Monitoring diseases in Muga and Eri silkworms Reduced disease incidence in vanya sericulture in North-east India Molecular biological identification of disease causing pathogens in vanya sericulture Knowledge on seasonal nature of disease incidence in vanya sericulture	15.00
2	-	Advanced level Biotech-Hub for upper Assam area  (DBT)	2022	2025	<ul style="list-style-type: none"> <li>Collection and maintenance of different ecoraces and strains of eri silkworms</li> <li>Genotyping by Sequencing of selected ecoraces and strains of eri silkworms</li> <li>Analysis of SNP data for use in different downstream applications for the improvement of eri silkworm</li> </ul>	<ul style="list-style-type: none"> <li>The proposed work would help in identification of causal genes for larval phenotypes and cocoon phenotypes through linkage mapping.</li> <li>The GBS efforts in eri ecoraces/strains help us in knowing if these are genetically different.</li> <li>The repertoire of SNPs will be useful in DNA marker assisted breeding to develop high yielding breeds.</li> <li>The molecular basis of characteristics and its</li> </ul>	0.00



						comparison to other Saturniid silkworms will help us understand basic biology of vanya silkworms.	
3	-- (Approved in 59 <sup>th</sup> RC)	In-situ conservation of muga silkworms in natural habitat – Phase II	2021	2026	Fortification of Muga silkworm host plants at natural habitat Enrichment of Muga silkworm population at conservation site Assessment genetic variability among gene pool of Muga silkworm at conservation sites	Muga silkworms will be conserved at natural habitat. It helps in preventing the extinction of this precious species The germplasm resource will be readily available for utilization in development of new breeds	4.00
4	(Approved by 61 <sup>st</sup> RC)	Characterization and evaluation of Soalu ( <i>Litsaea monopetala</i> ) accession for muga silkworm rearing	Apr, 2022	Mar, 2025	To evaluate and characterize the available Soalu accessions towards varietal development	It is expected to identify most suitable Soalu accession for commercial cultivation to enhance muga production and productivity. This study will also support to identify base material for future breeding program.	21.45
5	(Approved by 63 <sup>rd</sup> RC)	Evaluation of role of polyamines; spermidine and spermine in enhancement of fecundity and egg production of muga ( <i>Antheraea assamensis</i> ) and eri ( <i>Samia ricini</i> ) silkworms.  (DBT Funded in Collaboration with GITAM, AP)	2022	2025	To standardize the effective dose of various polyamines that enhances egg production of muga and eri silkworms (CMERTI and GITAM). To understand the mechanism by which polyamines enhance fecundity and egg production of muga and eri silkworms (GITAM). Field trials with selected concentrations of polyamine (CMERTI).	The problem of inadequate seed supply can be addressed if the enhancement of fecundity ratio by polyamines in muga and eri silkworms proved at lab scale and is tested at farm level. The new method developed in the project will be given to seed production centres for testing. Identification of genes involved in testicular development that help in enhancement of fertility. Enhancement of sperm count, sperm maturity, sperm motility, fertilization, number of eggs produced and fertility ratio through application of polyamines. Enhancement of farm level muga and eri egg production	00
6	(Approved by)	Impact of SAMARTH	2022	2024	To assess the extent of skill enhancement after	The findings of the study will indicate the level of	3.00

	63 <sup>rd</sup> RC)	– a NSQF aligned courses for generation of sustainable income through gainful employment			training and increased level of income	skill and adoption of technologies among the trained and non-trained farmers for enhancement of productivity/income.	
<b>At nested units</b>							

## 1.2 With CI from the Institute (Collaborative projects with other CSB Institutes)

### Annex-5.I.4

#### 1.2.1. Projects of earlier year continued through the year 2022-2023

#	Code	Title	Start	End	Milestone to be crossed	Progress to be achieved	Financial (Rs. in lakh)
<b>At main institute</b>							
1	AIB 08007 MI (SBRL, Kodathi)	Evaluation of eri silkworm populations to develop breeds/hybrids with improved productivity	Mar 2022	Feb 2025	Maintenance of genetic stock (pure ecoraces/strains). Supply of materials to SBRL Rearing of crossed strains	Gene pool maintenance.  Evaluation of hybrids	1.10
<b>At nested units</b>							

### Annex-5.I.5

#### 1.2.2. Projects to be concluded during the year 2022-2023

#	Code	Title	Start	End	Project Outcome	Utility of output/Impact on silk industry	Financial (Rs. in lakh)
<b>At main institute</b>							
1	BPS 1013 CN	Utilization and diversification of silkworm pupae products for human & animal consumption and composting	Sep 2020	Aug 2022	Identification & characterization of novel proteins and bio-molecules present in Eri & muga silkworm pupae for biomedical application. Human food products prepared from eri silkworm pupae.	Creation of entrepreneurs thus by Generation of employment. Information generated would be useful for further by-product utilization research.	5.00

					Eri & Muga pupal by-product for creating additional income.		
2	CYF 7014 MI	Development of 3D woven silk fabrics and their applications (In collaboration with CSTRI, Bangalore)	Jul, 2020	Jun, 2022	Physical characterization of 3D silk fabrics and their property evaluation Exploring the possibility of using 3D silk fabrics in current technical applications. Optimization of weaving technology for producing specific end use fabric structures	Property evaluation and Physical characterization of the developed 3D silk fabrics will be done. Possibilities of 3D silk fabrics uses in current technical applications will be explored. Optimized technology of weaving for producing specific end use fabric structures will be available for further exploitation	0.00
At nested units							

## Annex-5.I.6

## 1.2.3. New Projects to be initiated during the year 2022-23

#	Code	Title	Start	End	Objectives	Expected outcome	Financial (Rs. in lakh)
At main institute							
At nested units							

## 2. Transfer of Technology (ToTs) Programmes to be carried out during 2022-2023

## Annex-5.II.1

## 2.1 On Station Trials (for validation of technology at CSB institutes/RSRSs/DoS units etc.)

#	Name of the Technology	Unit Cost (lakh)	At CSB institutes	RSRSs	DOS Units	Total No. of trials	Budget (Lakhs)	anticipated impact
1	<b>OST of technologies developed for integrated pest management in Oak tasar rearing</b>							
1.1	Validation of IPM technology for control of uzi fly in oak tasar culture	0.03		2	3	5	0.15	Reduced uzi infestation below 10%.
1.2	Validation of use of Biopesticides for control of insect pest infesting <i>Q. serrata</i> .	0.03		2	3	5	0.15	70-75% reduction infestation
2	<b>On station multi-locational trials of muga and eri silkworm breeds/cross breeds</b>							
2.1	Multi-location trials of muga breeds CMR-1/CMR-2	0.20	1	3	2	6	1.20	new muga breeds

2.2	Multi-location trials of Eri breeds/cross breeds	0.10	1	3	2	6	0.60	as perHAC norms
<b>3</b>	<b>Integration studies on Muga Seed Cocoon and Seed Preservation Technologies</b>							
3.1	Development of seed preservation technology for Mugasilkworm,	0.45	2	-	-	2	0.90	To skip unfavorable season for seed production
<b>4</b>	<b>On station trials of Muga silkworm egg treatment (heat) for uniform hatching and higher survivability of young larvae</b>							
4.1	Validation of Muga silkworm egg treatment for uniform hatching and higher survivability of young larvae	0.07	3	1	-	4	0.28	Uniform hatching & survivability of worms
<b>5</b>	<b>Summer crop management in Muga (in coordination with MSSO, Guwahati)</b>							
5.1	Rearing management of Muga silkworm in cooler region during summer	0.20	1	5	-	6	1.20	new muga breeds
5.2	Trial of formulated volatiles application for enhancing egg laying capacity of Muga silk moth during commercial crop.	2.50	1	2	-	3	7.50	Enhanced egg laying capacity in Muga
5.3	Trial of formulated volatiles application for enhancing egg laying capacity of Eri silk moth during commercial crop.	2.00	1	1	1	3	6.00	Enhanced egg laying capacity in Eri
<b>Total</b>						<b>40</b>	<b>17.98</b>	

## Annex-5.II.2

## 2.2 On Farm Trials (for demonstration of Technologies at farmers' level)

#	Name of the Technology	Unit Cost (Rs.)	No. of locations	No. of stakeholders	Cost (lakh)
<b>1</b>	<b>On farm trials (popularization) of improved perennial host plant of eri silkworm</b>				
1.1	Popularization of KesseruEri host plant HF005 and HF008	2,210 (per farmer)	5 locations (Imphal, Boko, Lakhimpur, Upper and Lower Assam)	400	8.84
1.2	Popularization of Borpat Eri host plant				
1.3	Popularization of other host plants				
<b>2</b>	<b>On farm trials of silkworm protection formulations, devices and practices for higher productivity (muga silkworm)</b>				
2.1	LED light trap for control of muga insect pests	2,000	3 (Upper lower and middle Assam)	30	0.60
2.2	Evaluation and popularization of Eri egg incubation device	5,00	3 (Upper lower and middle Assam)	50	0.25
2.3	Formulation for controlling bacterial flacherie disease in Muga silkworm	1,000	5 (5 districts)	50	0.50

2.4	Validation of use of PET bottles for uzi trap in mugasilkworm rearing	5,000	3 (locations in Assam)	30	1.50
2.5	Integrated Practice of ITK and Modern Technology for Muga Silkworm Seed production	3,500	8 (Sivsagar, Dibrugarh, Golaghat, Lakhimpur, Dhemaji, Goalpara, Kamrup and East Siang)	40	1.40
2.6	Integrated Practice of ITK and Modern Technology for Higher Muga cocoon yield	7,500	6 (Sivsagar, Dibrugarh, Golaghat, Lakhimpur, Dhemaji and East Siang (AP))	30	2.25
<b>3</b>	<b>Integrated on farm trials of technologies for higher productivity in oak tasar rearing</b>				
3.1	Establishment and Popularization of new breed C27 among farmers.	6,000	3 (locations in Manipur)	10	0.60
3.2	Validation of use of PET bottles for uzi trap in oaktasar silkworm rearing	5,000	3 (locations in Manipur)	30	1.50
3.3	Validation of use of Sodiumhypo-chlorite for seed treatment against tiger band disease of oak tasar silkworm.	6,000	3 (locations in Manipur)	10	0.60
		<b>Total</b>	<b>42</b>	<b>680</b>	<b>18.04</b>

## Annex-5.III

**3. A. Capacity Building & Training programmes to be carried out during 2022-23**

Sl. No.	Title of the training programme	Unit cost (Rs.)	Target		
			Physical (No.)	No. of Stake holders	Financial (Rs.in lakh)
3.1	Structured Training Course*		-	-	-
3.1.1	PGDS		-	-	-
3.1.2	Intensive Sericulture Training		-	-	-
3.2	Farmers Skill Training		19	475	21.375
3.3	Exposure visit for technology awareness				
3.4	Technology Orientation Programme		10	250	9.50
3.5	Sericulture Resource Centres (SRCs)		45	900	1.80
3.6	<b>Training under Post Cocoon Sector**</b>		6	150	5.40
3.6.1					
3.7	Management Development Programme under STEP		1	25	0.32
3.8	Training for Adopted Seed Rearers (ASRs)		-	-	-
3.9	Training to Registered seed Producers (RSPs)		-	-	-
3.10	Training on Seed Act		-	-	-
3.11	Other Need Based Training Programme		-	-	-
3.12	<b>Non-CBT: Training programme funded by agencies other than CSB*</b>		-	-	-

3.12.1				
3.13	<b>Training under SAMARTH ***</b>		5*	150*
3.13.1	Pre-cocoon (Silkworm rearing)		-	-
3.13.2	Post cocoon – Silk (Reeling, Spinning, Wet processing)		-	-
3.13.3	Post cocoon: Handloom (Designing & Weaving)		-	-
	<b>Total</b>		<b>86</b>	<b>1950</b>
				<b>52.585</b>

\* Pl specify the details, \*\* Name of training with duration, \*\*\* only NSQF aligned courses

**B. Capacity Building & Training programmes to be carried out during 2022-23 (KVK)**

#	Training Location	CMERTI-Lahdoigarh (Accomodation : Farmers Hostel)
	<b>No. of participants</b>	<b>24</b>
#	Items/ Heads of Expenditure	
<b>A</b>	<b>Boarding &amp; Lodging charges for participants</b>	
1	Lodging x 6 days [Rate varies according to location]	36,000.00
2	Boarding [Breakfast, lunch, dinner, session tea/coffee & snacks (twice) @ Rs. 800/- per day]	1,15,200.00
	<b>Sub-Total - A</b>	<b>1,51,200.00</b>
<b>B</b>	<b>Training expenses</b>	
1	Stationery, photocopying, Sanitizerr, mask etc @ Rs. 150/- per person	3,600.00
	<b>Sub-Total - B</b>	<b>3,600.00</b>
<b>C</b>	<b>Faculty fee</b>	
1	Rs. 500/- per session for internal faculties x 18 sessions	9,000.00
2	Programme co-ordinators fee: Rs. 250/- per day x 2 co-ordinator x 5 days	2,500.00
	<b>Sub-Total - C</b>	<b>11,500.00</b>
<b>D</b>	<b>Transportation</b>	
1	Train/ Road travel and other transit expenses for participants @ Rs. 2000 /- per person	48,000.00
2	Local conveyance, Taxi/ Bus hiring charges etc [for CSB institutes only]	20,000.00
	<b>Sub-Total - D</b>	<b>68,000.00</b>
<b>E</b>	<b>Miscellaneous and contingencies</b>	
1	Inauguration & Valediction , awards and other sundry expenses	5,000.00
	<b>Sub-Total - E</b>	<b>5,000.00</b>
	<b>Total [A to E]</b>	<b>2,39,300.00</b>

Note:

\*Training Kit & Certificate Printing @ Rs. 250 per person, may be met from GIA Fund [Head: Training]

\*\*Training Material & Module will be supplied from CO-Bengaluru

\*\*\*TA/DA for one nominated programme Co-ordinator from CO (CBT Division/ RCS Section), may be met

from GIA Fund [Head: Training]

\*\*\*\*Travel Cost is to be restricted to 2AC train fare or actual bus / Train fare, whichever is lower

## Annex-5.IV

**4. Extension Communication Programmes to be conducted during 2022-23**

#	Programmes	Unit cost (Rs.)	Fund reqd. (lakh)	No. of events					No. of stakeholders				
				I Qtr	II Qtr	III Qtr	IV Qtr	Total	I Qtr	II Qtr	III Qtr	IV Qtr	Total
4.1	Krishi Mela / Reelers Mela cum exhibition	2.50 (1.25)	5.0			1	2	3			400	400	800
4.2	Farmers Field day	0.15	1.20	2	2	2	2	8	140	140	140	140	560
4.3	Awareness programme	0.10	2.30	4	5	7	7	23	200	250	350	350	1150
4.4	Technology demonstration /Enlightenment programmes	0.01	0.23	4	5	7	7	23	80	100	140	140	460
4.5	Workshop /Seminars & Conferences	2.00	4.00			1	1	2			100	100	200
4.6	Other activities												
	<b>Total</b>		<b>12.73</b>	<b>10</b>	<b>12</b>	<b>18</b>	<b>19</b>	<b>59</b>	<b>420</b>	<b>490</b>	<b>1130</b>	<b>1130</b>	<b>3170</b>

## Annex-5.V

**5. Soil samples analysis to be carried out during the year 2022 -23**

#	Item	Target (No.)	Financial (in lakh)
1	North East Region	40	0.48
	<b>Total</b>	<b>40</b>	<b>0.48</b>

## Annex-5.VI

**6. Information, Education and Communication to be carried out during the year 2022-23**

#	Item	Target (No.)	Financial (Rs. in lakh)
6.1	Periodicals	4	2.00
6.2	Publications		
6.2.1	Research papers-National	5	0.50
6.2.2	Research papers-International	15	1.00
6.2.3	Proceedings/ Abstracts	15	2.00
6.2.4	Books/ Book Chapters/ Manuals etc.	10	3.00
6.2.5	Popular Articles	10	0.00
6.2.6	Booklets, Brochures etc.	10	1.50
6.3	Extension literature	10	0.50
6.4	Films/ Videos	15	0.50
6.5	Social media	50	0.00
	<b>Total</b>	<b>144</b>	<b>11.00</b>

## Annex-5.VII

## 7. Patents to be filed/ granted and Technologies to be Commercialized during the year 2022 - 23

#	Item	Details	Financial (Rs. in lakh)
7.1	<b>Patents to be filed</b>		
7.1.1	Technology for enhancing egg-laying in Muga	01	1.00
7.1.2	Technology for enhancing egg-laying in Eri	01	1.00
7.2	<b>Patents to be granted</b>	--	0.00
7.3	<b>Technologies to be commercialized</b>		
7.3.1			
7.4	<b>Software, mobile/android app developed etc.</b>		
7.4.1	<b>Mobile app for identification of pebrine disease</b>	01	6.00
		<b>Total</b>	<b>8.00</b>

## Annex-5.VIII

## 8. Revenue Generation for the year 2022-2023

Sl. No.	Source of Revenue Generation (Rs. in Lakhs)	Physical (No.)	Target
<b>8.1</b>	<b>Patent (Technology)</b>		
8.1.1	License Fee collected		-
8.1.2	Royalty collected		-
<b>8.2</b>	<b>Testing &amp; Analytical charges (Sample)</b>		
8.2.1	Testing of Soil/water/FYM/ Leaf etc		0.50
8.2.2	Quality analysis/ testing of products		0.0
8.2.3	Testing of cocoons/silk yarn/fabric etc.		0.0
<b>8.3</b>	<b>Consultancy (Services)</b>		1.0
<b>8.4</b>	<b>Supply/ sale proceeds of cutting / Sapling/ seedling/ chawki worms/ cocoons/ Silk etc.</b>		
8.4.1	Mulberry cutting		<b>0.0</b>
8.4.2	Vanya host plant sapling/ seedling		1.0
8.4.3	Mulberry chawki worms		0.0
8.4.4	Mulberry Seed (DFLs)		0.0
8.4.5	Vanya seed (DFLs)		0.0
8.4.6	Cocoons/pierced cocoons/		2.0
8.4.7	Output from R&D Projects (Silk, fabric etc)		5.0
8.4.8	Others (pl specify)		
8.4.8.1	Guest house /Hostel charges		4.0
8.4.8.2	Licenses fees		9.0
8.4.8.3	Convenience charge		0.35
8.4.8.4	Other Misc. receipt (excess payment recovery, computer advance recovery, auction proceeds, etc.)		8.0
8.4.8.5	Course fees		1.20
8.4.8.6	Intercropping in between Som, Kesseru etc.		0.95
	Electricity refund		0.0
		<b>Total</b>	<b>33.00</b>



## Annex-5.IX

**9. Procurement of equipments and other accessories for the year 2022-23**

#	Equipment/other requirement	Qty	Justification	Approx. price (in lakhs)
	<b>At main institute</b>			
1	Real Time PCR machine	1	Under the project AIT05016MI	10.00*
2	Multimode microplate reader	1	Under the project AIT 05011EF	12.00 <sup>#</sup>
3	Electric bikes	3	For commuting between different farms	03.00
4	Portable microscope with screen display	6	Under new project on Disease surveillance	09.00*
5	Purification system for molecular biology grade water	1	Under new project Biotech Hub (DBT funded)	05.00 <sup>#</sup>
6	Open Top Chambers (OTC's)	04	The proposed facility viz. Open Top Chambers (OTC's) is required to maintain the two different temperature and CO2 levels as per the treatments.	26.80*
7	High power Binocular	1	Required for survey of host plants in natural forest areas under germplasm evaluation program mme.	0.50
8	Clinometer	1	To measure elevation angle and height of the trees under germplasm evaluation programme.	0.35
9	Infra Red Gas Analysers (IRGA) with florescence probe	1	Evaluation of host plant leaves for their carbon assimilation process. In the changing environment and present climate change scenario, change in the carbon dynamics of the plants, this is very necessary to understand the various aspect of the carbon dynamic. Therefore due to high accuracy, utilization and performance over the various experiments IRGA with florescence probe is highly needed at CMERTI. This instrument will also be utilized in evaluation of the host plant germplasm.	48.0
10	Double Distillation Unit (02)	2	Required for the continuous supply of distilled water for the analysis of various parameters in different labs	1.0
11	Leaf Spectrometer	1	This is required for the real time analysis of important biochemical parameters of Soalu leaf samples. The analysis will be non-destructive and will help in identifying stress tolerant accessions.	8.50*
12	Ultrasonicator	01	Instrument is required for DNA/RNA extractions and biochemical extractions.	1.50
13	Liquid nitrogen cylinders/container	02	Using for different Research Projects for storing liquid nitrogen which is essential component in DNA/RNA extractions.	1.50
14	Digital autoclave	01	se for easy & quick sterilization.	1.50
15	BOD incubator	02	For egg incubation of Eri.	1.00
16	Dying equipments and accessories	01	For fabric dying for training and regular work in the section.	1.00
17	Compound Microscope	01	For Muga/Eri moth examination.	0.75
18	Vacuum Cleaner	01	For cleaning of moth scales/dust in the	0.35

			grainage section/other office purpose.	
19	Automatic Drilling Machine	01	For pit digging to transplant Host plants.	0.60
20	Pocket/Mobile projector	03	For using quick presentation or showing relevant photograph during field of farmers.	0.90
21	Portable public address system	01	For conducting farmers meeting or group discussion in different remote areas.	0.50
22	Sliding glass display board	01	For arranging exhibition during Krishimela or farmers meet, awareness etc.	0.12
23	Pruning Saw	02	Use for pruning of Som plantation.	0.70
24	Desktop	10	There is dearth of desktops at Institute as most of the staff is without computers or working on slow obsolete desktops. [In 2021-2022 20 No .of desktops were declared unserviceable by SVO( approval for Auction is pending from CO )]	8.0
25	Laptops	02	01 for computer section, 01 for PMC for online anywhere meetings. [In 2021-2022 , 08 laptops were declared unserviceable by SVO (approval for Auction is pending from CO)]	2.0
26	Printers	10	05 duplex printers for Admin/account section, 05 duplex B/W printers for other divisions.[In 2021-2022 , 08 laptops were declared unserviceable by SVO ( approval for Auction is pending from CO)]	2.0
27	Structured LAN	01	Presently there is no structured LAN at Institute.	15.0
28	Furniture/rearing stands/racks etc and other equipments	30	For utilization in different laboratories	13.40
29	Power Tiller	01	The existing power Tillers are very old and require frequent repairing, hence it is proposed to purchase power tiller for ploughing in the field.	2.00
30	Mini Tractor	01	For farm use to manage closely spaced plantations.	5.00
32	Irrigation system at Germplasm conservation at CMER&TI Chenijan Farm (Portable sprinkler based)	01	Essential for Germplasm conservation maintained at Chenijan farm and also durig different cropping season.	10.0
35	Pick up vehicle for DFL/chawki worms/Seedlings supply	01	Preferably Scorpio or TATA/Bolero Pickup.	18.15
39	Creation of drainage system at CMER&TI main campus and Cinammara Staff quarter campus	--	No drainage system exists in CMER&TI main campus and the drainage system of Cinammara Staff quarter campus is faulty due to raising of height of main road.	10.0
40	Advanced Photocopy machine	01	For official use	5.0
			<b>Sub-Total</b>	<b>153.62</b>
<b>At nested units</b>				

<b>RSRS, Boko</b>				
41	Construction of Store Room at RSRS, Boko	01	For storing the store materials	8.00
42	BOD Incubator	01	For incubation/preserving dfls	1.00
43	Generator Set( 50 KVA)	01	For continuous power supply.	4.00
44	Compound Microscope	02	For mother moth examination.	0.30
45	Centrifuge	01	For mother moth examination	0.30
46	Electronic Balance	02	For laboratory used	0.40
47	Petrol Operated pruning Saw	02	For pruning of plantation	0.60
48	Petrol operated grass cutter	01	For cutting of grass in plantation & internal road	0.60
49	Furniture & Other Equipments	--	For use in different laboratories	3.10
50	Power Tiller	01	For use in ploughing purpose.	2.00
51	Motor Cycle	02	For use in field visit.	1.70
			<b>Sub-Total</b>	<b>22.00</b>
<b>RSRS, Imphal</b>				
52	Hot Air oven	01	For Dying of cocoons	0.70
53	BOD Incubator	01	For incubation/preserving dfls	1.00
54	Deep freezer	01	For use in laboratory for experimental purpose.	1.50
55	Furniture & Other Equipments	--	For use in different laboratories	0.90
			<b>Sub-Total</b>	<b>4.10</b>
			<b>G. Total</b>	<b>179.72</b>
<b>Maintenance of Existing infrastructure/ Asset</b>				
01	Up-gradation of water filtration unit at CMER &TI, Training Division, Farm No.-1, Lahdoigarh.	01	For improving quality drinking water facility, it is proposed to up-grade water filtration unit at CMER&TI Training complex, Farm No.-1, Lahdoigarh.	15.0
02	Fixing of Concertina Coil over Boundary wall of Staff Quarter Complex, Cinnamara.	--	Required for safe guarding the CSB staff quarter complex, Cinnamara.	20.0
03	Repairing/painting of Staff Quarters Building of CMER&TI, Quarter Complex,	--	The staff quarters need repairs to fix seepage, leakage and for face lifting.	15.0
04	Interior roads of CMER&TI main campus and Cinammara Staff quarter complex	--	Existing roads are in dilapidated condition	20.0
05	Multipurpose Community hall / Common facility Centre at Cinammara Staff quarter campus	01	For various community base programmes and meetings	90.0
06	Repairing and enrichment of Institute museum	01	Museum of the Institute needs to be shifted to ground floor for which repairs of the hall are required. Museum also needs to be enriched with materials to display.	10.0
07	Maintenance of other existing assets	--	All institute assets and maintenance as and when required	90.0
			<b>G. Total</b>	<b>260.00</b>

\*The equipment cost is already covered under the ongoing/concluding/new projects, hence the cost is not included in the total budget requirement.

#To be procured under external funded projects (Not included in total)

**Annex-5.X**

## **10. Other Activities to be taken up during the year 2022-2023:**