MINUTES OF44th RESEARCH ADVISORY COMMITTEE MEETINGOF CSB-CMER&TI, LAHDOIGARH HELD ON 03rd and 04th DECEMBER 2024

The 44th Research Advisory Committee (RAC) Meeting of the Central Muga Eri Research and Training Institute (CSB-CMER&TI), Lahdoigarh, was held on December 3-4, 2024. Dr. Kartik Neog, Director, CSB-CMERTI, Lahdoigarh, inaugurated the meeting by extending a warm welcome to Dr. Bidyut Chandan Deka, Chairman of the RAC; Dr. Nitin Kulkarni, Director, Rain Forest Research Institute (RFRI), Jorhat; Dr. Palash Debnath, Professor and Head, Assam Agricultural University (AAU), Jorhat; Dr. B. K. Singh, former Director, Central Silk Board (CSB); Dr. N. Ibotombi Singh, retired Scientist, CSB; Dr. C. Chikkaputtaiah, Principal Scientist, CSIR-NEIST, Jorhat; Dr. S. Periasamy, Director, CSB-CSTRI, Bangalore; and Sh. P. K. Das, retired Scientist-E and Member, RCC-CSB.The meeting also witnessed participation from Directorate of Sericulture (DOS) of Meghalaya and Assam, along with beneficiary representatives associated with the sericulture sector. Additionally, representatives from the Research and Coordination Section (RCS), Central Office (CO) of CSB, Bengaluru and scientists from CSB-MESSO, CSB-CMER&TI Lahdoigarh, and its nested units attended, underscoring the collaborative framework of the gathering. The complete list of attendees is included in the Annexure.

Dr. Kartik Neog commenced the proceedings with a detailed presentation on the recent advancements and key developments achieved by CSB-CMER&TI, Lahdoigarh. His comprehensive PowerPoint presentation showcased the institute's research achievements, technological innovations, ongoing projects, and future plans aimed at boosting silk production, improving sericulture practices, and addressing related socio-economic challenges. The meeting then progressed according to the pre-defined agenda.

AGENDANO. 1: CONFIRMATION OFLAST RCMEETINGMINUTES

The last (43rd) RAC meeting of CMERTI, Lahdoigarh was held on 22.03.2024 under the chairmanship of Dr. B. C. Deka, Vice Chancellor, Assam Agricultural University, Jorhat. The minutes of the meeting were circulated among all the Members, Invitees and Scientists and as no comments received from any of the members, the minutes of the 43rdRAC meeting were confirmed.

AGENDANO. 2: FOLLOW UP ACTION ON THE GENERAL RECOMMENDATIONS OF THE LAST RAC MEETING

Dr. Aftab A. Shabnam, Scientist-D, PMCE presented the action taken report on the general recommendations of the previous RAC meeting to the committee members.

AGENDANO. 3: FOLLOW UP ACTION ON THE PROJECT SPECIFIC RECOMMENDATION OF THE LAST RAC MEETING

As previously decided, the follow-up actions on the project-specific recommendations from the last Research Advisory Committee (RAC) meeting were presented by the respective scientists during their individual presentations.

AGENDANO. 4: REVIEW OF CONCLUDED PROJECTS - Nil

AGENDA NO. 5: CONCEPT NOTES OF NEW RESEARCH PROJECTS FOR PPROVAL:

1.	**Project title:**	**Info chemicals mediated multifarious behavioural tactics for Uzi fly management in Muga culture**
A	**Investigators involved**	Chandrakumara K, PI; Kaiho Kaisa, CI; Mukesh K Dhillon, Co-PI (ICAR-IARI, New Delhi)
B	**Project period:**	36 Month
C	**Objectives:**	1. To evaluate the efficacy of insect origin infochemicals against Uzi fly 2. To evaluate the efficacy of Muga host plants volatiles and synthetic chemicals 3. To study the bioprospecting for the infochemicals from various flowering plants 4. To assess the effectiveness of infochemicals against Uzi fly
D	**Current status of the problem**	Tachinid parasitoids, such as the Uzi fly, rely on allelochemicals at various stages of their host-searching behavior. Research shows that damaged plants without larvae are more attractive to Tachinids than healthy plants with larvae, indicating the role of host-induced plant volatiles in host location. Chemical cues in host larval feces, such as frass, also play a significant role in parasitoid attraction. The host's diet, including plant species, varieties, and even plant tissues, can influence the parasitoid's behavioral response. Additionally, chemical cues from host-related products like saliva and scales, as well as floral and extrafloral nectars, are known to enhance parasitoid longevity, fecundity, and parasitism rates. Several flowering plants have been found to attract Tachinids, further supporting the importance of infochemicals in host location for these parasitoids.
E	**Methodology &work plan**	• Collect and characterize volatiles from larval frass, body extracts (cuticle, fat body, gut), and plant extracts (carrot, parthenium, pongamia, marigold) using dynamic headspace sampling, GC-MS, and GC-EAD to evaluate their eliciting response in Uzi fly. • Select the best chemicals/volatiles based on electrophysiology results and evaluate their behavioral response in Uzi fly using olfactometer, wind tunnel, and topical application of larval body and plant extracts. • Synthesize analogues based on GC-MS and GC-EAD findings, develop various formulations (gel, liquid, fumigant, tablet), and create low-cost trapping devices integrating identified infochemicals. • Validate the most effective trapping devices in major Muga rearing areas like Lakhimpur, Shivsagar, Dibrugarh, Jorhat, and Kamrup. • Analyze data using ANOVA for treatment differences and perform correlation and regression studies using statistical software (RStudio, SPSS, OPSTAT) to draw conclusions.
F	**Expected outcome & utilization**	➢ Infochemical profile data from various sources eliciting a response in Uzi fly. ➢ Insights into Uzi fly's differential reaction to extracts from larval body parts, frass, plant extracts, and synthetic chemicals. ➢ Identification of attractants, repellents, and ovipositional deterrents. ➢ Development of a cost-effective, eco-friendly trapping device to control Uzi fly, benefitting Muga farmers by reducing crop losses.
G	**Suggestion of RCS & follow-up action**	• Uzi fly is the major pest in silkworm, already identified chemicals need to be directly used to avoid time & energy for identification of compound etc. • Role of collaborating ICAR-IARI institute not clear, and budget proposed from the ICAR-IARI seems to be at higher end. • Additional manpower at CMERTI-Lahdoigarh not considered. **Follow-up:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		***1. The term Insect kyramones maybe used to reflect the actual focus/study area proposed instead of using broad spectrum of Info-chemicals.***

		2. Arena chambers, activated charcoal approach may also be explored in methodology to reduce the intensive experimental work. ***3. Explore the possibility of collaboration with nearby Universities/institutes such as AAU Jorhat for ease of access to high end equipments required for the project study.*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
2.	**Project title:**	**Collection, Screening, and Evaluation of Nitrogen Use Efficiency in Kesseru (*Heteropanax fragrans* Seem) for Climate Smart Eri culture**
A	**Investigators**	Sinto Antoo, PI; Harisha R, CI
B	**Project period:**	36 Month
C	**Objectives:**	1. Collection of Kesseru accessions for the enrichment of the germplasm 2. Screening and evaluation of existing Kesseru germplasm for Nitrogen Use Efficiency to promote ericulture as a sustainable agroindustry
D	**Current status of the problem**	Eri culture has long been integral to the livelihoods of marginalized communities in Northeast India, contributing 82.31% of the total non-mulberry silk production in 2022–23. Eri silkworms, reared primarily on castor, face challenges due to its seasonal nature, high cultivation costs, and limited availability during winters. Kesseru, an evergreen perennial, offers a sustainable alternative with higher leaf yield, reduced cultivation costs, and long-term leaf availability. However, optimizing Kesseru cultivation requires improving nitrogen use efficiency (NUE) to enhance leaf biomass production under nitrogen-limited conditions while minimizing environmental impacts. Enriching Kesseru germplasm and selecting traits for superior NUE can ensure sustainable eri silk production and reduced reliance on synthetic nitrogen fertilizers.
E	**Methodology &work plan**	• Collection and Establishment: Collect Kesseru accessions, raise saplings in nurseries, and establish them in fields following recommended practices. • Soil and Nitrogen Treatments: Analyze soil nutrients and impose fertilized and unfertilized N treatments to evaluate NUE-related parameters. • Biochemical and Biomass Analysis: Estimate N assimilation enzymes, chlorophyll pigments, nitrogen/protein content, and above-ground biomass. • Silkworm Rearing: Rear Eri silkworms on high-NUE Kesseru leaves and record growth and yield parameters. • Registration and Conservation: Register accessions with NBPGR and ensure long-term conservation
F	**Expected outcome & utilization**	➢ Enrichment of Kesseru germplasm with diverse accessions, aiding future breeding programs and sustainable cultivation. ➢ Identification of high-NUE Kesseru plants, ensuring improved leaf biomass, protein content, and reduced dependency on nitrogen fertilizers, thereby minimizing environmental impact. ➢ Enhanced leaf yield and quality for ericulture, leading to superior Eri silk production and increased carbon sequestration potential.
G	**Suggestion of RCS & follow-up action**	• As samples collected as Seed, they may carry heterozygosity and heterogeneity, which may not true to the type for carrying forward. • As PI and CI not involved in any of the project, additional manpower- JRF not be considered. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.

44th RAC suggestions		***1. Reframe the title by adding "Nitrogen use efficient Kessuru" to commensurate with the proposed objectives.*** ***2. Root system should also be considered.*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
3.	**Projecttitle:**	**Genetic Enhancement of Tapioca (*Manihot esculenta* C.) for High Leaf Yield, Leaf Quality and Tuber Yield for Sustainable Ericulture**
A	**Investigators**	Harisha R, PI; SintoAntoo, CI
B	**Project period:**	48 Months
C	**Objectives:**	1. Exploration, collection, and conservation of tapioca germplasm for Ericulture 2. Characterization and evaluation of tapioca germplasm for Ericulture 3. Development of genetically improved tapioca genotype for high leaf yield, leaf quality, and tuber yield for Sustainable Ericulture
D	**Current status of the problem**	Tapioca (*Manihot esculenta*), a perennial shrub cultivated across 0.22 million hectares in India, produces 4.73 million tonnes annually with a productivity of 20.39 tonnes per hectare. Despite its potential, research on developing superior tapioca genotypes for Ericulture is limited. Past studies have highlighted the role of nutritional and anti-nutritional factors in silkworm rearing. Varieties like H-97, MVD1, and H226 demonstrated superior traits, supporting faster growth and higher cocoon yield, while varieties with higher anti-nutrients, like CO2, showed poor performance. Tapioca's balanced primary metabolites and lower phenol content compared to castor make it a promising alternative host plant for Ericulture, especially with location-specific selection of low-HCN varieties.
E	**Methodology &workplan**	• **Collection and Conservation:** Collect and conserve 25–30 tapioca germplasms from key regions for Ericulture at the Germplasm Conservation Centre, Chenijan. • **Characterization and Evaluation**: Characterize the germplasms for various traits and analyze genetic diversity using statistical methods over two growing seasons. • **Hybridization and Clonal Selection**: Perform hybridization of selected parents with desired traits and select superior F1 progeny for vegetative propagation. • **Varietal Development**: Evaluate the selected lines through On-Station Trials (OST) and On-Farm Trials (OFT) for varietal development.
F	**Expected outcome & utilization**	➢ Generate passport data for tapioca germplasms and identify promising genotypes for Ericulture. ➢ Develop genetically improved tapioca lines for higher leaf yield, quality, and tuber yield. ➢ Evaluate and recommend improved tapioca lines for commercial adoption in Ericulture. ➢ Register new germplasms with NBPGR and enrich the tapioca gene pool for future breeding.
G	**Suggestion of RCS & follow-up action**	• Tapioca is considered as one of the host plants for eri silkworm, not the primary food plant. Around 90% tapioca cultivation in South India and less than 5% at North East, proposed study area is not suitable. • CSB-CSRTI-Mysuru may take up the project in collaboration with CSB-CMERTI-Lahdoigarh and TNAU-Research Station, Namakkal, Tamil Nadu. Concept note to be revised and resubmitted. **Follow-up action:** Suggestions was incorporated and revised in presentation.
H	**Suggestions of referees**	Review from External Referees to be submitted after consideration of RAC.

	& follow-up action	
44th RAC suggestions		***1. Use "Identification of better genotypes" in title.*** ***2. Include Disease incidence in methodology*** ***3. Approach KVK Kokrajhar for the study*** and ***Explore with already implemented All India projects for tuber/tapioca material collection*** ***4. 3rd objective maybe omitted as it would not be achievable in the proposed project duration.*** **5.** ***Use the available information from the Passport data itself and avoid repeatability*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
4.	**Projecttitle:**	**Deciphering Virulent and Avirulent Strains of *Nosema* infecting Muga Silkworms**
A	**Investigators**	Brunda B N, PI
B	**Project period:**	36 Month
C	**Objectives:**	1. To isolate and characterize different strains of *Nosema assamensis* from infected Muga silkworms. 2. To assess the virulence of identified *Nosema assamensis* strains through controlled experimental infections in Muga silkworms. 3. To gain comprehensive understanding of the virulence-related genes and the associated pathways in virulent and avirulent strains of *Nosema assamensis*.
D	**Current status of the problem**	Pebrine disease, caused by the microsporidian pathogen *Nosema bombycis*, was first observed in silkworms in the 19th century. Later studies identified new species, such as *Nosema mylitta*, *Nosema ricini*, and *Nosema assamensis*, affecting non-mulberry silkworms in India. Research in 2009 explored the ultrastructure and life cycle of *Nosema assamensis*, while a 2012 comparative study highlighted higher mortality rates in muga silkworms during August-September. Recent molecular studies, including those by Subrahmanyam et al. (2019) and Esvaran et al. (2020), identified key genes involved in *Nosema* infections, such as 16S rRNA, β-tubulin, and several virulence genes. Transcriptome analysis of *Nosema assamensis* revealed important pathogenicity-related genes and metabolic pathways, particularly in energy metabolism. Additionally, the study of virulence factors and pathogenicity islands is ongoing to differentiate virulent and avirulent strains, offering insights for future biological control strategies.
E	**Methodology &workplan**	• Collection of infected silkworm samples & isolate *Nosema assamensis* spores. • DNA extraction and Virulence Assessment • Identification of virulence genes and pathogenicity islands • Statistical Analysis
F	**Expected outcome & utilization**	➢ The identification and characterization of highly virulent Nosema strains affecting Muga silkworms will help distinguish them from less pathogenic strains. ➢ This will provide valuable insights into the pathogenic mechanisms, including infection mode, replication dynamics, and host impact. ➢ With this knowledge, tailored management strategies can be developed to control the spread of virulent strains effectively, reducing the reliance on broad-spectrum pesticides or antibiotics.
G	**Suggestion of RCS & follow-up action**	• Previously and currently CSB-CMERTI and CSB-SBRL have worked in pebrine and identified & developed diagnostic tools, identified strains, gene, sequences which may be used directly for the current study.

		• Inclusion of scientist from SBRL-Kodathi Dr. Subrahmanyam, Sc-D, as he has expertise in mugapebrine. • Proposed equipments such as Real Time PCR and Nano Drop spectrophotometer, if available with the institute may be utilized instead purchasing of the same, revise budget accordingly. • As PI and CI not involved in any of the project, additional manpower not considered. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
5.	**Projecttitle:**	**Development of mobile based application for organized Muga seed sector**
A	**Investigators**	Pulak Rabha, PI; Vijay, N
B	**Project period:**	24 Month
C	**Objectives:**	1. Identification and mapping of the muga seed cocoon production areas 2. To prepare database of the muga seed cocoon producers 3. To develop an android mobile application for tracing the Muga seed cocoon producers
D	**Current status of the problem**	The Muga silk industry is facing significant challenges in seed production due to factors like deforestation, urbanization, chemical use, and the decline in natural crossing between domestic and wild stocks. This has led to a reduction in the development of superior characteristics and a widening gap between the supply and demand for Muga silkworm seeds. The industry also struggles with a lack of a well-organized seed production system, and many seed cocoon producers are unregistered. The shortage of quality seeds for large-scale production is a key constraint, with farmers often having to search for seeds across regions. While the government has set up strategic farms for seed production, the absence of a regulatory mechanism and the scarcity of healthy seeds remain major challenges. Studies suggest that a better commercial seed production system, utilization of disease-free seeds, and development of private seed producers could help address these issues and meet the growing demand for Muga silkworm seeds.
E	**Methodology &workplan**	• **Area Identification and Mapping:** Identify and map muga seed cocoon production areas in consultation with relevant stakeholders. • **Survey and Data Collection:** Use standard questionnaires to collect data on seed production, rearing practices, and constraints. • **Data Compilation and Analysis:** Organize and analyze data, separating registered and unregistered seed cocoon producers. • **Training for ASR/AGR Selection:** Train farmers on scientific practices and link them to relevant units for seed cocoon production. • **Mobile Application Development and Awareness:** Develop a mobile app for real-time updates on seed cocoon rearing and seed availability, with training and awareness programs for users.
F	**Expected outcome & utilization**	➢ More ASRs/AGRs will ensure compliance with regulations and quality muga silkworm seeds. ➢ Real-time data on seed availability will optimize rearing and coordination between rearers and producers. ➢ The mobile app will streamline monitoring, reduce travel costs, and support policy development and crop failure management.
G	**Suggestion of RCS & follow-up action**	• Proposed methodology is very basic type of work, taking information from the DOS and MESSO. Identification of seed producer areas, survey and

		data collection using standard questionnaire to be prepared. • As PI and CI not involved in any of the project, additional manpower- PA not considered. • Reduce the amount proposed for the mobile app preparation and computer & tablet purchase, besides period of the project not more than one year. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		***1. Utilize the services of technology agents/other Scientists/Officers for collection of data wherever CSB/DoS units/network are not available.*** **2.** ***Mapping of seed rearers for Jethua and Kotia crops*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
6.	**Projecttitle:**	**Integrating Muga Silk heritage with Sustainable Organic Tea Cultivation**
A	**Investigators**	Sinto Antoo, PI
B	**Project period:**	36 Month
C	**Objectives:**	➢ To establish standardized methods for integrating organic tea cultivation with Muga silkworm rearing
D	**Current status of the problem**	The muga silk industry in Upper Assam faces significant challenges due to conflicts with small tea growers, despite both tea and muga silk being vital resources for North-East India. These sectors require individual recognition and sustainable development, but a trust deficit exists between farming communities due to conflicting interests. To address this, enhanced coordination among stakeholders is crucial to ensure the sustainability of the muga silk industry. Efforts to build the capacity of farmers to adopt improved muga culture practices, particularly in areas where muga gardens coexist with tea gardens, are essential. Research projects have highlighted the negative impact of pesticide use in tea gardens on muga silkworms, with pesticides causing significant harm to silkworms and overall production. To mitigate these effects, promoting organic tea farming is a potential solution, as it avoids harmful pesticides and enhances soil health. Integrating agricultural practices like organic tea farming with muga culture can improve productivity, reduce environmental impact, and provide economic benefits.
E	**Methodology &workplan**	• **Survey of Integrated Tea Garden and Muga Sericulture:** ➢ Identify farmers and select experimental sites. ➢ Provide inputs and collect production data. ➢ Compare traditional and organic practices. • **Establishment of Experimental Gardens:** ➢ Set up tea and Som host plant cultivation with different spacing. ➢ Conduct bioassay studies and record production data. ➢ Standardize practices for muga rearing and tea production.
F	**Expected outcome & utilization**	➢ It is expected that the chemical usage for tea cultivation will reduce ensuring the harmonious coexistence and prosperity of muga and tea heritage industries. ➢ Preservation of the Muga silk heritage in synergy with tea cultivation will improve the livelihood of local communities, and increase cultural pride.
G	**Suggestion of RCS & follow-up action**	• The justification submitted for the problem identified for the work is not clear. • Statistical analysis and design for the experiment not indicated in the proposal.

		• As PI and CI not involved in any of the project, additional manpower not considered. • Budget kept for consultancy is for maximum for six seating per project i.e. Rs. 3000/- x six seating. Rs. 18,000/- only. Hence, proposed budget for consultancy not be considered • Concept note to be presented at the RAC for consideration. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		**1. *Revise the statistical design by increasing the number of replications including control.*** **2. *Existing tea plantation with Som plantation to be explored to avoid the lengthy time span and ensure achievement of the objectives within the project duration.*** **3. *Nano DoP and Nano urea application can also be included.*** **4. *Use of bio-formulations/bio-pesticides on Muga host plants to be followed, without affecting the organic tea production.*** **5. *Prerequisites like foliage retention to be explored and database to strengthen/generate as much as data regarding the need of organic treatments of soil for both Tea and muga host plants, disinfectant patterns etc.*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
7.	**Projecttitle:**	**Development of rearing technology in Early Spring and Late Autumn crop**
A	**Investigators**	Reeta Luikham, PI; Sinam Subharani Devi, CI; Sinto Antoo, CI
B	**Project period:**	36 Months
C	**Objectives:**	1. To develop a suitable rearing technology for early spring crop to avoid dfls wastage and establish a seed linkage with North West India. 2. To develop a suitable rearing technology for autumn crop to prevent the loss of seed cocoons due to erratic emergence and pupal mortality during preservation.
D	**Current status of the problem**	Oak tasar spring crop rearing begins in early March, coinciding with the sprouting of *Q. serrata* leaves. Efforts by RSRS, Imphal, aim to increase the yield of oak tasar cocoons and prevent the wastage of early prepared DFLs in grainage. The quality of silkworm growth is heavily influenced by the nutritional value of the leaves, with proper management improving leaf nutrient quality, water efficiency, and pest control, leading to higher productivity. Adequate fertilization is essential to maintain leaf quality for silkworms, especially in plantations that are used year after year. However, during the spring crop, around 15-20% of moths are lost due to poor vitality and erratic emergence after prolonged preservation. The current study aims to develop a technology for autumn crop rearing, including host plant management and disease control, to produce quality DFLs and enhance oak tasar productivity.
E	**Methodology &workplan**	**Early Spring Crop Methodology:** • Process *Antheraea proylei* moths from January to obtain disease-free layings, disinfect eggs, and incubate at 24°C. • Phase-wise prune host plants (Q. *serrata, Q. griffithii, L. dealbata*) and apply biofertilizer and 1.5% urea solution; use "Jalkund" for water conservation.

		• Alternate food plants for early brushing and conduct indoor chawki rearing, recording key performance metrics (hatching %, larval weight, ERR, cocoon weight). **Autumn Crop Methodology:** • Select and preserve seed cocoons from spring crop for stock maintenance. • Light clip host plants (*Q. serrata, Q. griffithii, L. dealbata*) at 10-15 days intervals. • Break pupal diapause using light and cold treatments, synchronized with new foliage sprouting. • Perform indoor and outdoor chawki rearing and record performance metrics (hatching %, larval weight, ERR, cocoon weight). • Conduct grainage for both crops, recording pupal diapause, moth emergence, coupling, and fecundity, followed by data analysis.
F	**Expected outcome & utilization**	➢ Early spring rearing technology will prevent DFL wastage due to non-synchronized leaf sprouting. ➢ Autumn crop technology will address seed loss from erratic emergence and pupal mortality during prolonged seed cocoon preservation. ➢ Developed host plant management and early brushing technology will enhance cocoon production, support seed linkage between North East and North West India, and improve farmer income.
G	**Suggestion of RCS & follow-up action**	• Statistical design for collection and analysis of data is not provided. • Title of the project need to be changed to "Development of Suitable Technology for rearing Oak Tasar Silkworm during Autumn Crop". • As PI and CI not involved in any of the project, additional manpower not considered. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
8.	**Projecttitle:**	**Isolation of shorter larval duration line of Oak Tasar silkworm - *A. proylei* through selection from the mass population**
A	**Investigators**	Laishram Somen Singh, PI; Khwairakpam Subadas Singh, CI
B	**Project period:**	48 Months
C	**Objectives:**	➢ Selection of inbreed line with shorter larval duration from the mass population of *A. proylei.*
D	**Current status of the problem**	The improvement of oak tasar silk yields depends on the availability of genetic resources and understanding gene action within populations. Sixteen species of oak-fed Antheraea, including *A. proylei, A. pernyi, A. roylei*, and *A. frithii*, are conserved ex-situ at RTRS, Imphal. A. proylei shows high heritability and genetic advance for key yield traits like fecundity and cocoon weight, with positive heterosis observed in F1 crosses. Promising breeds like C27 and RTRS-1 have been developed through hybridization and selection, showing good performance across different locations. However, further exploration of shorter larval duration lines in *A. proylei* is still needed.
E	**Methodology &workplan**	• Early moulted larvae from the base population of *A. proylei* will be isolated and selected for early cocoon spinning and early pupation, initiating the short larval duration (SLD) line. • F1 larvae will be selected based on early and late moulting, with the longer larval duration rejected, and healthy larvae will be chosen at each instar for the early pupating line. • Recurrent selection and breeding for SLD will be continued from F2-F6. • Composite rearing will be done at F7, followed by further selection and

		breeding. • Test rearing will be conducted at F8-F9.
F	**Expected outcome & utilization**	➢ The project will result in the isolation of a Short Larval Duration (SLD) line, reducing the larval period of *A. proylei* by 10 days. ➢ This will decrease larval mortality, leaf consumption, and reduce rearing man-days by 30 for 400 dfls per acre. ➢ Additionally, rearing capacity per acre will increase to 450-500 dfls, boosting cocoon production by 12-16%. ➢ The newly isolated SLD line will be valuable for future Oak Tasar breeding programs.
G	**Suggestion of RCS & follow-up action**	• Proposed methodology is very basic type of work, from the base population of *A. proylei* larvae. • Statistical design and data points were not indicated in the proposal, which may be included. • As PI and CI not involved in any of the project, additional manpower not considered. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		**1. *Analyze the effect of shorter larval duration on cocoon quality parameters.*** **2. *Entomological aspects should also be studied systematically.*** ***The project is recommended for funding excluding JRF. The PI may instead utilize the services of Sericulture Assistants/Technical staff. Revised project proposal should be submitted by the PI no later than 30th December 2024.***
9.	**Project title:**	**Evaluation and Genomic Dissection of Castor (*Ricinus communis*) Germplasm for Ericulture**
A	**Investigators**	Harisha R, PI
B	**Project period:**	36 Months
C	**Objectives:**	1. Exploration, collection and characterization of diverse castor germplasm for Ericulture 2. Standardization, screening and evaluation of castor germplasm for water logging tolerance 3. Genome wide association mapping to identification of marker trait association for water logging tolerance and leaf yield attributes
D	**Current status of the problem**	Northeast India has a rich heritage in silk production, with eri culture playing a crucial role in rural livelihood, especially for marginalized communities. Eri silkworms primarily feed on castor, a fast-growing plant that is highly valued for its ability to produce high-quality silk. However, castor's growth is significantly impacted by waterlogging during the monsoon season, limiting the availability of leaves for eri silkworm rearing. Despite the importance of castor for eri culture, there is a lack of studies on its waterlogging tolerance and leaf yield potential. The present study aims to evaluate castor germplasm for waterlogging tolerance and high leaf yield, and to identify genes associated with these traits, contributing to the development of improved castor cultivars for sustainable eri culture.
E	**Methodology &workplan**	• **Germplasm Collection:** Castor germplasm will be collected from northeastern India and major growing regions, focusing on waterlogging tolerance and high leaf yield. 120-150 accessions will be evaluated at two locations in Assam. • **Waterlogging Screening:** Castor plants will be exposed to waterlogging for 5, 10, and 15 days. Traits will be analyzed using ANOVA, PCA, and PCoA. • **Genomic Analysis & GWAS:** DNA will be analyzed using GBS, SSR, or

		WGS, and GWAS will identify marker-trait associations for waterlogging tolerance and leaf yield.
F	**Expected outcome & utilization**	➢ The project will enrich the castor germplasm repository at CSB-CMER&TI, Jorhat, focusing on high leaf yield and waterlogging tolerance for Ericulture. ➢ Promising castor germplasm with high leaf yield and waterlogging tolerance will be identified for future breeding programs. ➢ Genes for waterlogging tolerance and leaf yield will be identified, with superior germplasms potentially registered at NBPGR and published in scientific journals.
G	**Suggestion of RCS &follow-up action**	• Basic need of establishment of germplasm suitable to water logging may be achieved, by simply checking the germplasm tolerant to water logging condition. Genome wide association mapping for waterlogging is simply waste of time and money for the isolation of line tolerant to waterlogging. • Need to establish the phenotypic tolerance to water logging by the castor germplasm, later it can be tagged with Genome wide association mapping. • Modification pertaining to objective and goal to achieve may be finalized before submission. Budget proposed seems to be at higher end, need to be reduced to 25-30lakhs. • Concept note considered for submission to DST for funding. **Follow-up action:** Suggestions was incorporated and revised in presentation
H	**Suggestions of referees & follow-up action**	Review from External Referees to be submitted after consideration of RAC.
44th RAC suggestions		**1. *Revise the title in-line to properly justify the objective and expected outcome. Include the "water logging" in the title itself.*** **2. *DNA fingerprinting should not be approached in 1st year.*** **3. *Use RBD statistical design of experiment as the plantations will be kept under outdoor conditions.*** **4. *Raise and sunken bed technology / tea nursery concept may also be explored.*** ***The project is recommended for external funding.***

AGENDANO. 6: REVIEW OF THE PROGRESS OF ON-GOING PROJECTS

The progress of the following ten ongoing projects was reviewed and the respective investigators were advised to continue the projects as per the set target milestones and effectively utilize the allocated budget under each project:

1. AIB 5013 SI: Impact of elevated CO_2 and temperature on muga silkworm and its primary host plant

Dr. Sinto Anto, Sc-B presented the progress of the project and investigators were advised to continue the projects as per the set target milestones and effectively utilize the allocated budget under each project. The following suggestions were made during the meeting;

1. *Mitigation strategies/recommendations to be devised and suggested by the completion of the project after analyzing all the data generated.*

2. *Ambient conditions to be specified and indicated while preparing the final report..*

2. APS-05021-EF: Studies on population diversity and role of host plant volatile cues for enhancing egg laying in temperate tasar (Vanya) silk moths *Antheraea proylei*.

Dr. S Subharani, Sc-D presented the progress of the project and investigators were advised to peruse the release of grants from the funding agency besides exploring other potential

approaches for completing the set target milestones envisaged under each project.

3. ARP05023CN: Muga and Eri silkworm disease monitoring in north eastern states of India

Dr. Arun Kumar K P, Sc-D presented the progress of the project and the following observations were made during the meeting:

- *The investigators should coordinate with the Seri DM team to develop the webpage along similar lines and integrate it with the Institute's website, ensuring it is accessible to the public.*
- *Create/develop a disease map covering the entire locations of NER and update the forecasting/forewarning calendar for the benefit of the farmers/stakeholders.*

4. AIT05024EF - Advanced-Level Institutional Biotech Hubs at CMERTI-Jorhat (Phase-II)

Dr. Arun Kumar K P, Sc-D presented the progress of the project and investigators were advised to continue the projects as per the set target milestones.

- *Recheck the homogeneity of the collected ecoraces/strains since it is impossible to attain the homogeneity only in 02 generations.*

5. PIB 5025 SIC: Characterization and evaluation of Soalu (*Litsea monopetala*) accessions for muga silkworm (*Antheraea assamensis*) rearing

Dr. Omprakash Patidar, Sc-C presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Utilize the budget effectively and timely to avoid any further financial implications*.

6. SPR 5026 SIC: Development of suitable Muga and Eri based Integrated Farming System (IFS) for North East India

Dr. Diganta Mech, Sc-D presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Sustainability index for different IFS models to be calculated/assessed.*
- *IFS models for smaller and micro-land holders to be included and recommended.*
- *Family data to be collected as per the data format shared by RCS and analyzed wrt social & economic aspects associated with IFS also.*
- *Record good quality videos/photographs of field level models/interesting aspects of IFS for future requirements and awareness/popularization.*

7. MOE 5027 SIC: Economic analysis of Tapioca based Eri-culture in Assam & Nagaland

Dr. Vijay N, Sc-C presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Extension of the project maybe sought with proper justification, overall work done and milestones yet to be accomplished.*

8. SPR 5028 SIC: Popularization of Improved Technologies of Muga Culture for Enhancing Cocoon Production in Manipur

Dr. Subadas Singh, Sc-C presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Comparison with the Control sample plot without any advanced technology should be taken into consideration and the improvements over the control should be reported.*
- *Norms/protocols designed for seed season and commercial season should be followed and the same to be evaluated.*
- *Data collection should be carried out as per the format provided by Extension Division and significant improvements observed should be well documented with good video recordings.*
- *Model Som/Soalu plot should be maintained at the Station for demonstration and dissemination of recommended package of practices.*
- *Utilize the envisaged budget effectively and timely.*

9. PIT 5029 SIC: Development of clonal propagation methods in Borpat (*Ailanthus grandis* L.) for its mass multiplication

Dr. Omprakash Patidar, Sc-C presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Explore propagation through leaf bud cutting techniques/leaves or other low cost regeneration techniques. Seek expert consultation from AAU Jorhat.*
- *Seasonal effect on the propagation should be seriously considered and accordingly the experiments to be planned.*
- *Use of suitable modified growth regulators may also be explored.*
- *Previous study on vegetative propagation of som plantation conducted by RFRI can be referred and suggested recommendations from the study may also be considered.*

10 MOE 5030 SNC: Evaluation, optimization & Popularization of Eri-culture Practices in Castor Growing Areas of Gujarat

Dr. Mahesh D S, Sc-C presented the progress of the project and the investigators were advised to continue the projects as per the set target milestones.

- *Analyze the additional income generation of the castor farmers beneficiaries adopting ericulture and the same to be included in the subsequent reporting.*

AGENDANO.7: R&D HIGHLIGHTS

At the onset of the meeting, the Director of CSB-CMER&TI presented a comprehensive overview of the institute's Research and Development (R&D) highlights. This presentation encapsulated the key achievements, advancements, and ongoing projects within the Institute. Following the presentation, the Chairman expressed appreciation for the notable progress made by CSB-CMER&TI.

AGENDANO.8: TRIALS OF TECHNOLOGIES (OST/OFTs)

- All the trials of technologies should be presented with the outcome of the trials and analyzed data by the concerned scientists in the next meeting.
- Record the best practice and outcome of technology trials and their impact through photos/videos for easy dissemination and popularization of the technologies.

AGENDANO.9: EXTENSION COMMUNICATION PROGRAMMES

Dr. D Mech, Sc-D & Head SEEM Division presented the overall progress of the Extension activities conducted during 2024-25. It was suggested to maintain the data base of the stakeholders covered under various extension communication programmes.

AGENDANO.10: CAPACITY BUILDING & TRAINING PROGRAMMES

Dr. Harisha R, Sc-B presented the overall progress of the Training programs conducted during 2024-25. It was suggested to ensure the timely completion of the training programs as per the target of Annual Action plan and other need-based trainings. More focus to be given on establishment of SRCs and monitor their activities periodically.

AGENDANO.11: CONCLUDING REMARKS FROM RAC MEMBERS AND CHAIRMAN

- It was emphasized that breeder stocks of Muga, Oak Tasar and Eri breeds/hybrids should be maintained at all times at the Main Institute and its respective nested units. These stocks should be readily available for both research and commercial purposes.
- It was recommended to organize a Breeders' Meet involving a group of experts and invitees from across the silk sector (Mulberry and Vanya). This meet would focus on discussing existing constraints and exploring potential approaches for effective breed maintenance.
- The need to send scientists for specialized training on the maintenance of breeder/parental stocks was highlighted to ensure sustainable and effective breed management. It was underscored that scientists with subject matter expertise should be entrusted with the overall responsibility for scientific breed maintenance. This measure is essential to prevent the loss of valuable genetic materials and ensure proper maintenance of breeders stocks.
- PCT Scientists to take part in field-oriented issues. Proper training and popularization of technologies to be disseminated. Mutual collaboration with PCT Scientists of other Institutes should be considered while proposing the R&D projects to holistically work on the development of the sector without duplicacy and with transparency.
- The importance of training young scientists under the guidance of senior experts was emphasized, along with the need to align research activities with the mandates, visions of ministries, departments, and schemes, focusing on national development and the Sustainable Development Goals (SDGs).
- The host plant team was advised to prioritize silkworm requirements and work on improving food plants accordingly. Enhancing raw silk production should remain a primary concern, and a detailed plan of action across all sectors should be formulated to achieve this goal.
- Focus on soil microbiological aspects of Muga and Eri sericulture, and develop a microbial

consortium to enhance leaf productivity.

- It was suggested to systematically evaluate the environmental impact of the developed technology before its commercialization.
- Researchers were encouraged to stay updated, employ novel approaches for long-term impact, and focus on product and technology development. These should be integrated into beneficiary-oriented schemes to promote effective adoption among farmer beneficiaries.
- Efforts to enhance silk production were stressed as the foremost priority across all assignments.
- It was suggested that JRFs/Project Assistants contributing intellectual inputs to projects could be considered for multitasking roles to support scientists and enhance project efficiency.
- It was suggested that more focus should be placed on developing water logging-resistant varieties of Kesseru and castor. Additionally, greater attention needs to be directed towards the Muga silkworm breeding with emphasis on improving fecundity and productivity.
- Projects for the establishment of *in-situ* Muga conservation sites be expanded to other districts of Meghalaya. The impact of climate change on Muga culture should also be addressed. Additionally, support from CSB-CMER&TI was requested for providing hands-on training on relevant technologies to the Department of Sericulture, Meghalaya staff.
- The focus should remain on benefiting farmers, ensuring that the results are reproducible and effectively transferred to them. Serious efforts must be made towards the development of new breeds in Muga and Oak Tasar, with a strong emphasis on the collection and maintenance of germplasm at the main institute and its nested units.
- The expansion of *in-situ* conservation sites should be considered, and the progress of ongoing sites must be included for appraisal by the RAC. New sites should be selected where already plantations and silkworms are available and accordingly reviewed as per the requirements of the *in-situ* conservation. In the case of Eri, efforts to commercially exploit hybrids should be expedited.
- The Director of CSB-CMER&TI has requested Dr. NI Singh and Dr. B K Singh to periodically monitor and review the progress of the RSRS Imphal and RSRS Boko, respectively.
- CSB-CMER&TI must prioritize the maintenance of breeder stock. The evaluation of quality Muga seeds should be undertaken with the involvement of MESSO, DoS, and relevant stakeholders. Efforts should be made to revive and revamp the *in-situ* conservation site at Upper Doigrang, Golaghat.

<u>Chairman remarks (Dr. B.C. Deka – 03.12.2024)</u>

- Young scientists should be encouraged to work in rural and remote areas to uplift local beneficiaries by assessing traditional and cultural practices. They should also raise awareness about newer and improved technologies and practices. Efforts must be focused on improving the sustainability of Muga, with a strong emphasis on rejuvenating and reviving the sector.
- The growing tea industry poses a threat to Muga due to the high levels of pesticides and

chemicals used in tea cultivation. A synergistic approach between organic tea and Muga culture should be explored to protect the sector.

- New scientists should concentrate on developing new genotypes and breeds, improving silkworm performance, creating high-yielding varieties, and developing quick multiplication techniques for host plants. These developments should be supported and quantified, with a focus on enhancing overall silk production.

Chairman remarks (Sh. P K Das – 04.12.2024)

- Scientists should consult with members and experts during meetings to gather valuable inputs for R&D, with a focus on addressing field-level problems. Protocols for seed crops need to be developed and effectively implemented.

- The pattern of Uzi fly infestation should be studied and addressed. The multiplication, maintenance, and timely release of *N. thymus* should be carried out, with integrated management practices and nested units should take responsibility for this. The sources of attractants for the Uzi fly should be identified and studied.

- Cooler regions outside the Northeast Region should be explored for seed production during unfavorable seasons.

- The integration of tea and Muga approach is promising, and efforts should be made to ensure its success.

Overall, the member appreciated the enthusiasm and dedication of scientists in conducting R&D projects. The meeting ended with vote of thanks by Dr. Manjunath R N, Scientist-C, PMCE.

(Bidyut Chandan Deka)

Chairman-RAC

LIST OF PARTICIPANTS IN THE 44thRESEARCH ADVISORY COMMITTE MEETING OF CSB-CMER&TI, LAHDOIGARH HELD ON 03rd& 4th DECEMBER 2024

Chairman:

1. Dr. Bidyut Chandan Deka, Vice Chancellor, Assam Agricultural University, Jorhat
2. Sh. P K Das, (Retd. Scientist-E, CSB) – Nominated Chairman for 04.12.2024 (*Special Invitee*)

Members

3. Dr. Nitin Kulkarni, Director, RFRI Jorhat
4. Dr. Palash Denath, Professor &HoD, AAU Jorhat
5. Dr. B K Singh, Retd. CSB Director
6. Dr. N Ibotombi Singh, Retd. CSB Scientist
7. Dr. C Chikkaputtaiah, Principal Scientist, CSIR-NEIST Jorhat
8. Smti. C. B Sangma, Director of Sericulture and Weaving, Govt. Meghalaya
9. Sh. Ataur Rahman, Additional Director, Dept of Sericulture, Govt of Assam
10. Sh. D K Rabha, Deputy Director, DoS Assam
11. Sh. Hema Chandra Baruah, Rearer Representative, Lakhimpur
12. Sh. Binod Borah, Reeler Representative, Sivsagar
13. Dr. Kartik Neog, Director, CSB-MESSO Guwahati (Convenor)
14. Dr. S Periasamy, Director CSB-CSTRI Bangalore
15. Dr. Jhansi Lakshmi, Scientist-D & Head, RCS-CO CSB
16. Dr. B N Sarkar, Scientist-D & Representative, Director CSB-MESSO
17. Prof. Gautam Saikia, Assam Agricultural University, *(Invitee)*

Scientists

18. Dr. Reeta Luikham, Scientist–D, CMER&TI, Lahdoigarh
19. Dr. D. Mech, Scientist-D, CMER&TI, Lahdoigarh
20. Dr. Laishram Somen Singh, Scientist-D, RSRS, Imphal
21. Dr. Aftab A. Shabnam, Scientist-D, CMER&TI, Lahdoigarh
22. Dr. Sinam Subharani Devi, Scientist-D, RSRS, Imphal
23. Dr. Arun Kumar K.P., Scientist-D, CMER&TI, Lahdoigarh
24. Dr. D.K. Jigyasu, Scientist-D, EREC Fatehpur (Online mode)
25. Dr. K. Subadas Singh, Scientist-C, RSRS Imphal
26. Dr. Vijay N., Scientist-C, CMER&TI, Lahdoigarh
27. Dr. Mahesh D.S., Scientist-C, CMER&TI, Lahdoigarh (Online mode)
28. Dr. Manjunath R.N., Scientist-C(R&S), CMER&TI, Lahdoigarh
29. Dr. Om Prakash Patidar, Scientist-C, CMER&TI, Lahdoigarh
30. Sh. Roshan Lal Meena, Scientist-B (R&S), CMER&TI, Lahdoigarh
31. Dr. Kaiho Kaisa, Scientist-B, CMER&TI, Lahdoigarh
32. Ms. Brunda B N, Scientist-B, CMER&TI, Lahdoigarh
33. Dr. Chandrakumara K, Scientist-B, CMER&TI, Lahdoigarh
34. Dr. Harisha R, Scientist-B, CMER&TI, Lahdoigarh
35. Sh. Sinto Antoo, Scientist-B, CMER&TI, Lahdoigarh
36. Sh. Pulak Rabha, Scientist-B, REC Lakhimpur

Technical staff/Research Fellows

37. Mrs. Nilima Dutta, STA
38. Mr. Niraj Kumar, JE
39. Sh. Akib Hussain, JRF
40. Sh. Suraj K Shah, JRF
41. Ms. Akshita Choudhury, JRF
42. Ms. Rubi Sut, JRF
43. Ms. Raisa Begum, PA
44. Shri Saif Afridi Hussain, PA
45. Shri Porag Das, PA

46. Shri Mohmudur Rohman, PA