MINUTES OF 64th RC MEETING OF CMERTI LAHDOIGARH (Date: 13.12.2022)

The 64th Research Council meeting of CMER&TI, Lahdoigarh was held on 13th December 2022 under the Chairmanship of Dr. K.M. Vijaya Kumari, Director at conference hall of the Institute. The list of participants is enclosed as Annexure-I. The meeting was conveyed as per the agenda and explanatory notes.

AGENDA NO. 1: CONFIRMATION OF PREVIOUS RC MEETING MINUTES

The minutes of the 63rd RC meeting held on 7th June, 2022 were circulated to all the scientists of main institute and its Nested Units. Since, no comments were received, the minutes were considered confirmed.

AGENDA NO. 2: REVIEW OF ACTION TAKEN ON THE RECOMMENDATION/ DECISIONS OF THE LAST RC MEETING

Project wise actions taken report on the decisions/ recommendations of last RC meeting were presented by the Concerned Scientists.

AGENDA NO.3: NEW CONCEPT NOTES FOR APPROVAL

#		DETAILS
1.	**Project title :**	**Identification and Standardisation of clonal propagation methods in Borpat (*Ailanthus grandis* L.) for its mass multiplication**
A	Investigators involved (PI & Co-I's)	Om Prakash Patidar, PI; D K Jigyasu, CI,Aftab A. Shabnam, CI; One nominated Scientist from CSR&TI, Pampore (Preferably Dr. Gulab Khan, Sc-C as he has already worked on the similar subject).
B	Objectives:	To evolve a simple, rapid and inexpensive clonal propagation technique for mass multiplication of Borpat.
C	Methodology & work plan:	Work plan: First two years for identification and standardization of techniques and third-year for acclimatization and multiplication of plants using the suitable technique(s). The following methodology will be used for the present study: **I. Macro-propagation methods:** • Application of nutrient-rich fertilizers in roots, foliar spray and irrigation system for quicker vegetative growth • Induction of branching by Multiple Girdling on the main stem. • Utilization of these branches for Air Layering, using FYM/rooting hormones/sawdust/water etc. • Stem Cutting: ❖ Rooting under controlled conditions. ❖ Rooting induction with application of PGRs (Chemical and Botanical) **II. Micro-propagation Methods:** 1. Collection and sterilization of Explants (Shoot tip, petiole, leaf) 2. Preparation and sterilisation of tissue culture media with different concentrations and combinations of hormones Viz., i) MS + TDZ + BAP ii) Metatopolin + IBA iii) MS+BAP+IBA iv) Kinetin + TDZ v) TDZ + IBA 3. Culturing and sub-culturing of explants 4. Transfer of individual micro-shoots onto rooting media 5. Assessment of Genetic fidelity of regenerates using RAPD, ISSR and

		ScoT Molecular markers. 6. Acclimation of plantlets in greenhouse 7. Transplantation in the field along with continuous care for water, nutrients, and weeding operations.
D	Expected outcome and utilization:	It is expected that clonal propagation technique for Borpat will be developed for mass multiplication of true to type plants of this important Eri host plant. This will support in augmentation of perennial host plant availability for eri silkworm rearing.
E	Budget:	Rs. 39.6876 lakh (Approximately)
64th RC Suggestions		1. Title to be modified by replacing "identification and standardisation" with "development of propagation methods" and optimisation of the methods may be included as another objective. 2. More focus should be laid on macro-propagation techniques such as identification/exploration of grafting techniques. 3. Since Sh. SAS Rahman, Sc-D, RSRS Boko has relevant expertise on the subject (tissue culture), it is suggested to include him as CI. 4. It is suggested to look for the possible collaboration with RFRI, Jorhat for tissue culture studies instead of proposed collaboration with CSR&TI, Pampore. 5. Revise the concept note incorporating the suggestions made and submit the concept note for onward consideration.
2.	**Project title :**	**Development of Mugaculture through technology intervention and supporting system for sustainable livelihood of rural people in Manipur**
A	Investigators involved	Dr.Kh. Subadas Singh, RSRS Imphal (PI) Dr. L. Somen Singh, RSRS Imphal (CI
B	Objectives:	1. To popularize and expansion of Mugaculture in Manipur through survey and awareness programme. 2. To start-up Mugaculture in large scale and development of Muga industry through technological intervention and supporting system.
C	Methodology & work plan:	**Survey at different potential places:** Survey will be conducted at different places of different districts in Manipur at both existing and non-existing muga farms, availability of food plants, development of farmers' clusters, organize awareness programme to popularize mugaculture among farmers. **Development of Nursery of Muga food plants:** Collection of seeds of Som and raising nursery of Muga food plants following package of practices and supply to farmers for plantation at large scale. Maintenance of muga food plant nursery will be conducted at RSRS Imphal, Andro (Imphal East) and Senapati District etc. **Rearing of silkworm** Rearing of muga silkworm will be conducted at the existing farms following proper package of practices such as rearing techniques, disinfection practices, grainage activities etc. Rearing season: a. Jethua (April-May) b. Aherua (June-July), c. Bhodia (August-September), d. Late Bhodia (September -October) 1. Rearing will be conducted under nylon net cover by providing sufficient space between food plants and nets for better aeration. Chawki rearing and late age rearing will be conducted following package of practices. 2. For evaluation of rearing performance, the following five yield contributing parameters will be recorded a. Effective rate of rearing (ERR %)

		b. Weight of matured worms c. Single cocoon weight d. Cocoon shell weight e. Cocoon shell ratio (SR %) 3. Grainage will be conducted in all four crop seasons 4. Seed cocoon will be selected from Bhorpok and perform grainage for next crop. Grainage package will be followed while conducting grainage. 5. To study the variability of cocoons of different rearing sites, the following grainage parameters will be recorded. a. Pupal period b. Pupation percentage c. Valid moth percentage of the emerged moths d. Percentage of natural coupling e. Percentage of mechanical coupling f. Potential fecundity g. Realized fecundity (Egg laid in three days) h. No. of eggs retained i. No. of eggs per gram 6. Meteorological data will be recorded and correlated with rearing and grainage performance 7. Data will be statistically analyzed.
D	Expected outcome and utilization:	The outcome of the project will bring development of Muga industry in Manipur. Horizontal expansion of Mugaculture providing technological intervention and supporting system will boost production and productivity of Muga cocoon in Manipur.
E	Budget:	**24.848 Lakh**
64th RC Suggestions		1. The project is proposed for extension/awareness based approach of muga expansion in Manipur which is basically the routine mandate of RSRS Imphal. 2. The PI may conduct initial survey of the present status involving muga production statistics, disease occurrence, prevailing grainage and rearing performance along with agro-climatic conditions and come up with quantifiable approach with achievable physical targets. 3. Concept note not approved in its present form, needs thorough revision keeping in view the above suggestions.
3.	**Project title :**	**Standardization of platform rearing technology for large scale late age rearing in ericulture (PILOT STUDY)**
A	Investigators involved	**Principal investigator:** Dr. Mahesh D S, Scientist-C, CMER&TI
B	Objectives:	➢ Standardization of platform rearing methods for large scale late age rearing in Ericulture. ➢ Study of economics for platform rearing technology for large scale late age rearing in Ericulture.
C	Methodology & work plan:	**For 6 months:** Fabrication of bamboo platforms for rearing (50 to 100 dfls at a time). Late age rearing of eri silkworm using platform rearing method (3 trials). Study of uniformity in late age larval growth and synchronization in maturity. Standardization of lime dusting and lime quantity required in late age rearing. Standardization of shelf mounting system by using plastic mountages. Economics of platform rearing technology for large scale late age rearing. Development of standard package of practice.

D	Expected outcome and utilization:	Standardized platform rearing stands for large scale late age rearing in ericulture. Simpler methods in feeding, scheduling of feeding and quantity of feed required for late age rearing. Proper bed spacing methods in eri late age rearing. Lime dusting methods, schedule and quantity required during late age rearing. A separate package for maintaining uniformity after chawki rearing. A labour saving technology for large scale late age rearing in ericulture. Synchronized maturity and use of plastic mountages in eri silkworm.
E	Budget:	**1 Lakh**
64th RC Suggestions		1. The technology of platform rearing was recommended by CMERTI in 2005 itself. Clear comparison on the drawbacks of the previous technology should be justified with sufficient trial data. 2. More focus should be on popularisation of the technology (as it is presently not being widely practised) with necessary fine tuning, if required. 3. PI to submit revised concept note, incorporating above suggestions with data supporting the need for fine tuning/standardization of existing technology, for further review by PMCE.

AGENDA NO.4: CONCEPT NOTES PRESENTED IN THE 63rdRC MEETING

1. **Evaluation of role of polyamines; spermidine and spermine in enhancement of fecundity and egg production of muga (*Antheraea assamensis*) and eri (*Samia ricini*) silkworms**

   - The project is approved by 63rd RC and 40th RAC. PI informed that project was submitted to DBT on 06.06.2022 and internal screening is awaited.
   - PI is advised to incorporate suggestions received from RCS and include Dr. Arun Kumar, Sc-C as CI in the project.

   Action: Dr. Aftab A. Shabnam, Sc-D & PI

2. **Impact assessment of Skill Training on silk sector with reference to SAMARTH scheme in NE states**

   - The project concept was presented in 62nd RC and the revised concept was approved by 63rd RC with the following suggestions:
     - Add one more objective "To assess the socio economic status of beneficiaries".
     - Propose one Project Assistant and revise the project budget accordingly.
   - PI is advised to submit the revised concept note within 15 days for onward submission to RCS.

   Action: Sh. Bitupan Das, Sc-D & PI

AGENDA NO. 5: REVIEW ON CONCLUDED PROJECTS

1	**Project code and title:**	**AIT 05011EF - Molecular investigation into the lignocellulolytic system of a few wild silkmoths of North East India**
A	Investigators	Dr.Arun Kumar KP (PI), Dr.Rajal Debnath (CI)
B	Project period:	Sept 2019-Sept 2022
C	Objectives:	1. Impact of host plant range on the microbial community in *Antheraea assamensis* Helfer and *Samia ricini*Donovan 2. Lignocellulose degradation by the gut microbes associated with *Antheraea assamensis* and *Samia ricini* Donovan 3. Molecular characterization of the lignocellulolytic biomass degrading

		enzyme 4. Developing microbial pathogen resistance through induction of immunity in silkworm via manipulation of gut microbiome.
D	Progress achieved:	• Analysis of bacterial whole genome sequences has been completed. • Rearing of 4 different strains viz. Kokrajhar, Borduar, Titabor and C2 breed of Eri silkworms was carried out in 3 different host plants viz. Castor, Kesseru and Borpat for metagenomic DNA isolation. Metagenomic DNA has been isolated from gut of Kokrajhar and Borduarecorace and sent for sequencing. • A total of 250 bacteria were subjected to isolation. Qualitative screenings of gut bacterial isolates based on substrate utilization were tested by modified Congo red plate assay method. Further to identify the 81 positive isolates, 16S rRNA gene sequencing analysis was performed which revealed 3 phyla, 13 families and 22 genera. *Paenibacillusxylanilyticus* (SB6) was found to be the most promising strain and was selected for further study. • The optimization of the fermentative conditions for maximum extracellular xylanase enzyme activity was carried out using one factor-at-a-time (OFAT) approach and the optimum pH, temperature and incubation time. The maximum extracellular xylanase activity was recorded as pH 11, 32 ℃ and 72 h respectively. • Bacterial interaction and lignocellulosic material utilization were verified using Scanning Electron Microscope and Fourier-Transform infrared spectroscopy analysis.
E	Utility of outcome / Future course of action / impact on silk industry	1) The knowledge generated in the project needs to be applied in muga and eri culture in Northeast India. 2) The role of Wolbachia in the behaviour of muga has to be studied further. 3) The bacterial isolate showing high lignocellulolytic or xyalanaseacvitity needs to be further studied through cloning of concerned genes and using in industrial applications.
F	Budget and expenditure:	Budget: 46.32 lakhs , Expenditure: 18.26lakhs
G	Suggestion of last RC/RAC meeting:	**63rd RC comments** Continue the project as per milestones and conclude by Sept. 2022 without seeking any extension. **40th RAC comments** Committee observed, since objective no. 04 was added by CSB and is not a part of original project approved by DBT, the investigators could not do much work to achieve this objective. Hence, the objective may be dropped from the study and PI is advised to conclude the project by Sept. 2022 without seeking any extension.
H	Follow-up action taken on last RC/RAC meeting:	**ATR on 63rd RC comments** The project was carried out as per milestones and no extension was sought. **ATR on 40th RAC comments** Objective 4 added by CSB was dropped out from the study. The project has been concluded in Sept 2022.
64th RC Suggestions		The remaining works pending from the collaborative Institute should be completed and the project outcome, utility and future course of action along with the list of publications made should be presented in the next RAC.
2	**Project code and title:**	**APR:05008SI Standardization of Rearing and Grainage Technologies of *Antheraeafrithi* Moore**
A	Investigator	Dr. L. Somen Singh, PI, Dr. S. Subharani Devi, CI

B	Project period :	October 2019 – September 2022
C	Objectives:	To standardize the rearing and grainage technologies to suit for commercial adoption
D	Progress achieved:	During 2nd crop (summer) grainage 80% emergence of moths and 50% natural coupling of moths obtained inside the bamboo basket covered with black cloth. Recorded 76 to 80 % hatching when the moths were allowed for 14 hrs of coupling. Chawki rearing in indoor condition followed by outdoor rearing by feeding *L. dealbata, Q. serrata* and *Q. griffithi* leaves recorded higher cocoon yield of 40 cocoons per dfl in *L. dealbata* fed worms.
E	Utility of outcome / Future course of action	To be continued as a regular activity at the Institute and Farmers' field with necessary popularization.
F	Budget and expenditure :	Rs. 12.85 lakhs and 7.33 lakhs
G	Suggestion of last RC/RAC meeting:	**RC comments:** The activities should be carried out as a regular program after completion of the project duration. Continue as per milestones and timeline of the project. **RAC comments:** Continue the work as per the milestones. After completion of the project period, the work may be continued as a regular programme.
H	Follow-up action taken on last RC/RAC meeting	**Action taken against RC comments:** As suggested, the project will be continued as per the milestone and suggestions noted **Action taken against RAC comments:** As suggested the project is continued as per the milestone and suggestion noted.
I	Suggestions of RCS	To conduct experiment as per the set work plan To utilise the budget under the project effectively
J	ATR on RCS suggestion	-
64th RC Suggestions		1. The PI to explore the possibilities of developing *in-situ* & *ex-situ* conservation sites for conservation of *A. frithi* in coordination with DOS, Manipur. 2. As suggested by 40th RAC, the work may be continued as a regular programme. 3. The concluded report of the project along with the utility of the outcome and future course of action should be presented in the next RAC.
3	**Project code and title:**	**APR: 05010SI Evaluation of Eri Silkworm Races suitable for different agro-climatic conditions of Manipur.**
A	Investigators	Dr. Y. Debaraj (PI) and Dr. L.Somen Singh (CI)
B	Project period :	October 2019 – September 2022
C	Objectives:	To identify the best performing eri silkworm race in different agro-climatic conditions of Manipur.
D	Progress achieved:	Seed cocoons of different strains and ecoraces are under preservation for next crop rearing. Eri food plants are being maintained for next crop rearing. The spring crop rearing data revealed that the highest ERR was recorded in Borduar (81%) which is at par with C2 (80.64 %) at low altitude. Among the strains, highest ERR was recorded in Greenish Blue Plain (80.45%) followed by yellow plain (78.51%) in low altitude. Whereas at high altitude, highest ERR was recorded in C2 (78.29%) followed by Borduar (76.52%). Among the strains, highest ERR was

		recorded in yellow plain (77.34%).
E	Utility of outcome / Future course of action / impact on silk industry	To be appraised by the PI
F	Budget and expenditure	Rs. 11.80 lakhs and 6.459 lakhs
G	Suggestion of last RC/RAC meeting:	**RC suggestions:** PI is advised to recheck the statistical data and present in next meeting. **RAC suggestions:** Continue the project as per the milestones.
H	Follow-up action taken on last RC/RAC meeting:	**Action taken against RC comments:** As suggested, the statistically analysed data will be presented by the PI **Action taken against RAC comments:** As suggested, the project is continued as per the milestones
I	Suggestions of RCS	To utilise the budget under the project effectively
J	ATR on suggestion of RCS	-
64th RC Suggestions		The concluded report of the project along with the utility of the outcome and future course of action should be presented in the next RAC.

AGENDA NO. 6: PROGRESS OF ON-GOING PROJECTS

#	ON-GOING PROJECTS	DETAILS
1	**Project code and title:**	**MOE 05004EF:Adoption of improved sustainable technologies of muga culture for elevation of cocoon production in the tribal belt of Assam**
A	Investigators involved	Dr. Vijay N, (PI), Dr. D K Gogoi, CI (Upto Aug. 2021), Dr.D. Mech, (CI), Dr. S A S Rahaman, (Co-PI), Dr.Sathyanarayana, (Co-PI)
B	Project period :	August 2019 to July 2022 (Extended upto Feb. 2023)
C	Objectives:	1) To promote adoption of improved Muga rearing technologies among tribal rearers through sustainable NGO-rearer linkages facilitated by CMER&TI. 2) To improve the socio-economic status of tribal population by enhancing cocoon production through improved muga culture.
D	Progress achieved:	➢ 1 Nos Awareness programs conducted at study area participating 50-60 Nos of farmers. ➢ 1 Nos Exposure visit conducted from Dhakakuna and Lakhimpur area to P3 unit MESSO Naryanpur around 80 farmers are participated. ➢ Demonstration on use of foot sprayer for chemical disinfectants, controlling of diseases like Muscardine, flacherie and disinfectants of grainage and distribution of Lahdoi to the farmers
E	Specific outcome:	The farmers are exposed to the practical hands on training on the grainage activities of DFL production, which helps the farmer to produce or procure the muga seeds for the consecutive rearing. Use of disinfection and Lahdoi in the rearing field to reduce the disease incidence in Jarua crop to increase the cocoon production in the December crop.
F	Budget and expenditure	**RS 25,51,000 (Received Rs17,36,500)** **Expenditure :16,30,103**
G	Suggestion of last RC/RAC meeting:	**63rd RC:** • The progress made in the project is satisfactory. • Continue the project as per milestones.

		40th RAC: • Highlight the list of technologies promoted for adoption and the technologies that are most preferred by the farmers. • Record and statistically analyze target wise achievement of adoption and subsequent improvement in the cocoon production.
H	Follow-up action taken on last RC/RAC meeting:	**63ndRC:** Suggestion complied **40th RAC:** • Suggestion complied • The project activities are being continued as per milestones
I	Suggestions of RCS	To conduct experiment as per the set work plan
J	ATR on suggestion of RCS	-
64th RC Suggestions		1. Sh. SAS Rahman, Sc-D is advised to prepare a project on similar lines for muga expansion in Meghalaya State. 2. PI to complete the project as per set work plan and milestones.
2	**Project code and title:**	**PIB-05005-SI: Genetic enhancement of Castor (*Ricinuscommunis* L.) germplasm as a source material for development of productive perennial varieties.**
A	Investigators involved	AftabA. Shabnam (PI), Amit Kumar (CI up to 31.07.22),Vinodkumar S. Naik (CI) upto29.02.20, L.Somen Singh (CI), Dr. D. K. Jigyasu (CI)
B	Project period :	Oct. 2019 to Sept. 2022 (Extension sought upto March 2023)
C	Objectives:	1. Genetic enhancement of castor germplasm. 2. Development of pre-bred intermediate castor with perennial characteristics.
D	Progress achieved:	• Processing and labelling of F_2& F_3 seeds from 1st& 2nd crossing lots. • Land preparation for sowing of F_2& F_3 seeds from 1st& 2nd crossing lots. • Seed morpho-metric analysis of the left out accession has been completed and data will be presented. • F_1 and F_2 generation plantations are regularly monitored for more selections. Data recorded on morpho-metric traits of selected plants. • Plantation of F_1 and F_2 generation plantations at GCC, Chenijan was maintained as per recommended package of practices. • 05 more perennial source accessions were collected from Tawang area of Ar. Pradesh, Majuli area of Assam, Agartala (Tripura)& Manipur. • Data generated under the project has been compiled and statistically analysed. However, F_2 generation data of 17 potential cross combinations is yet to be recorded for which project period extension has been sought. • As suggested by 59th and 60th RC, the Castor Descriptor cum catalogue was published and officially released during Vanya Symposium held in Oct. 2022 at Ranchi.
E	Specific outcome:	• Selection of intermediate perennial castor hybrid in F_2 generation of 1st crossing and mass selection lot and raising F_3 generation of these hybrids is expected to attain a level of homozygosity. These hybrids have to be selfedupto F_7 generation for attaining the homozygosity. • Harvesting of pure F_2& F_3 seeds from 1st& 2nd crossing lots will help in selection of perennial traits. • Characterization of castor germplasm will help in identifying the potential castor accessions for inclusion in future breeding programs.
F	Budget and expenditure :	**Budget:** Rs. 13.30 lakh **Expenditure till November, 2022**: 8.37Lakhs

G	Suggestion of last RC/RAC meeting:	**63rd RC Suggestions:** • RC recommends extension of the project upto 31.03.2023 without any additional budget. The stipend of the PA for the extended period maybe paid from the reoccurring head for which the PI to seek permission for re-appropriation of budget from RCS, CO. • Continue as per milestones
H	Follow-up action taken on last RC/RAC meeting:	**Follow-up action on 63rd RC suggestions:** ➢ Extension for the project is sought upto March 2023. CO has sought complete report for its extension which is under preparation. ➢ Project is continued as per milestones.
I	Suggestions of RCS	To conduct experiment as per the set work plan To utilise the budget under the project effectively
J	ATR on suggestion of RCS	-
64th RC Suggestions		1. Complete the project as per set work plan and milestones and submit the detailed report as requested by RCS for consideration towards future course of action. 2. The project should be continued in 2nd Phase for stabilization of selected lines under this Phase of the project.
3	**Project code and title:**	**AIB05006SI: Breeding of muga silkworms for improved silk quality and disease tolerance**
A	Investigators	Dr.Arun Kumar KP, PI; Dr. Mahesh DS, CI; Dr.Manjunath RN, CI
B	Project period :	Oct 2019 – Sep 2022
C	Objectives:	1) Selection of better parents by field collection of mugasilkmoth samples 2) Classical breeding studies to select better lines for mugasilkmoths 3) Mass production for limited trials
D	Progress achieved:	• The wild samples were collected from Jorhat and pupal hibernation during summer was observed in grainage and the DNA was isolated individually from selected males and females. • GBS based large scale genotyping that was carried out before revealed that the wild muga, irrespective of place of collection was highly heterozygous in nature. Very little heterozygosity was observed in the cultivated stock, which probably is the reason behind reduced yield after several inbreeding cycles in the cultivated stock. • Genome wide association studies (GWAS) using the generated data is ongoing. • DFLs of selectedline (BP1) and wild muga stock are being reared on Farm No.2.
E	Specific outcome:	• Observation of summer hibernation in wild muga. • Almost ten times lower heterozygosity observed in cultivated stock compared to wild muga. • Loss of heterozygosity is a possible reason behind loss of vigor in cultivated muga. • One promising muga line has been selected after several rounds of directional selection and further rearing. This line is now being stabilized. • Both Muga and Wild muga DFLs are being reared based on their cocoon characteristics and fecundity for better muga lines
F	Budget and expenditure :	Budget: 18.32 lakhs Expenditure: 8.83 lakhs
G	Suggestion of last RC/RAC meeting:	**63rd RC comments:** • Continue the recurrent selection in few more generations to fix the character of higher filament length.

		• RC recommends extension of the project for one year without any additional budget to complete the limited trials within the project period. **<u>40th RAC comments</u>:** • Critical distinction of genotypes is very much important. The PI may go for large number of SNPs and look for distinct genotype. • Compare superiority of the selected line with that of the CMR-1and CMR-2. • One year extension of the project duration is recommended without any additional financial burden for desirable output. • PI to ensure completion of all the project works within the extended period.
H	Follow-up action taken on last RC/RAC meeting:	**<u>ATR on 63rd RC Comments</u>** • Pupae with higher filament length are selected and the DFLs are being reared on Farm to maintain the muga line. • A request was made to CO, CSB for one year extension of project. The RCS has suggested to submit the complete report before taking the decision on the extension of project. **<u>ATR on 40th RAC comment</u>** • Efforts are being made to design primers for SNPs and Indels identified in GBS analysis. However, it requires more time to shortlist usable DNA markers through screening of individual muga samples. • Superiority of the selected line with that of CMR-1 and CMR-2 will be compared in the upcoming commercial season. • A request was made to CO, CSB for one year extension of project. The RCS has suggested to submit the complete report before taking the decision on the extension of project. Efforts will be made to complete the pending work in the extended period.
I	Suggestions of RCS	To conduct experiment as per the set work plan To utilise the budget under the project effectively
J	ATR on suggestion of RCS	-
64th RC Suggestions		1. Complete the project as per set work plan and milestones and submit the detailed report as requested by RCS for consideration towards future course of action. 2. The project should be continued in 2nd Phase for stabilization of selected lines (BP-1) under this project along with identification of gene responsible for Diapause and its utilization in marker assisted breeding for evolution of muga Diapause breed.
4	**Project code and title:**	**APR05007SI: Standardization of chawki rearing practices for Eri silkworm, *Samiaricini* (Donovan)**
A	Investigators	Dr. Mahesh D S, PI; Dr.Arun Kumar K P, CI; Dr.Subadas Singh, CI (Upto June 2022)
B	Project period :	October 2019 to September 2022 (Extended upto March 2023)
C	Objectives:	a. Establishment and management of eri host plant garden for erichawki rearing. b. Design and fabrication of Eri silkworm chawkireaing equipment. c. Development of new rearing method and ideal environment for erichawki rearing.
D	Progress achieved:	-Completed the fabrication of a model erichawki rearing house of 5000 DFLs capacity at GCC, Chenijan, CMER&TI for demonstration and

		supply of chawki purpose. -Conducted erichawki rearing of 5000 DFLs in the model erichawki rearing house developed at GCC Chenijan in connection with the calculation of economics of erichawki rearing. -Conducted two field testings and demonstration of erichawki rearing at Bhadresar, Gujarat under farmers' skill training programme. The chawki batch is certified and distributed for late age rearing. The observations are being recorded.
E	Specific outcome:	-A model erichawki rearing house of 5000 DFLs capacity in CMER&TI for both demonstration and supply purpose. - Demonstration of erichawki rearing of 5000DFLs at the institute. - popularization of Erichawki rearing in non-traditional areas.
F	Budget & expenditure:	Total budget is **18.15 lakhs** and expenditure is**16.55 lakhs**
G	Suggestion of last RC/RAC meeting:	**RC Comments** 1.Identify and train entrepreneurs for establishing micro chawkicentres in the field. 2.RC recommends extension of the project up to 31.03.2023 without any additional budget. The stipend of the PA for the extended period maybe paid from the reoccurring head for which the PI to seek permission for re-appropriation of budget from RCS, CO. 3.Continue the project as per milestones. **RAC comments** 1.06 months' extension of project period is recommended without any additional financial burden. 2.PI to ensure completion of all the project works within the extended period.
H	Follow-up action taken on last RC/RAC meeting:	**ATR on RC comments** 1.Suggestions complied. Efforts are being made for identifying the entrepreneurs for establishing micro chawki rearing centres in the field level (Assam and Nagaland). A micro chawki rearing centre of 1000 DFLs capacity at Bhadresar village of Sabarkata district, Gujarat is initiated by using available house under Kalyan foundation. The lead farmers of the same region have been identified and trained for continuing the entire erichawki rearing process in the future. 2.Suggestions complied. RCS, CO approved the project period extension up to 31.03.2023 with re-appropriated budget. 3.Project is being continued as per the milestone. **ATR on RAC comments** 1.Upon request, RCS, CO approved the project period extension up to 31.03.2023 for re-appropriated budget. 2.Suggestion noted. All the project works will be completed within the extended period.
I	Suggestions of RCS	To utilise the budget under the project efficiently
J	ATR on suggestion of RCS	
64th RC Suggestions		1. PI should ensure necessary steps towards Entrepreneur development by identifying progressive lead farmers within the project period. 2. Complete the project as per set work plan and milestones without seeking any further extension.
5	**Project code and title:**	**AIB: 05009SI Isolation of thermo-tolerant line(s) of Oak tasar silkworm *Antheraea proylei* J.**
A	Investigators	Dr. Y. Debaraj, PI, Dr. S. Subharani Devi, CI, Dr. Arun Kumar, CI
B	Project period :	October 2019 – September 2022 (Extended upto Mar, 2023)

C	Objectives:	To isolate thermo-tolerant line of oak tasar silkworm, *A. proylei* Characterization of Heat shock protein gene in thermo-tolerant line.
D	Progress achieved:	Seed cocoons of thermal stress induced and control lots of 5th generation *A. proylei*, RTRS-1 and C27 are under preservation for continuing the generation. Protein profiling studies of heat induced cocoons of *A. proylei*, RTRS-1 and C27 showed six major proteins bands which are having high molecular weight to be expressed differentially (increased or decrease) after heat was induced at different temperature. These proteins were further identified by amino acid sequencing as HSP 19.9, 21, 60 and 90 which increase or decrease depending on temperature regimes. Preparation for experimental work on DNA isolation and SCAR marker development in Dept. of Biotechnology, Manipur University. Presented a paper entitled " Differential expression of heat shock proteins in temperate tasar silkworm, *Antheraeaproylei* Jolly (Saturniidae: Lepidoptera) in the ISC congress held at Romania.
E	Specific outcome:	Seed cocoons of heat tolerant population under preservation for maintaining the generation. Conducted protein profiling studies and sequencing studies for detection of heat shock proteins.
F	Budget and expenditure	Rs. 21.90 lakhs and 6.652 lakhs
G	Suggestion of last RC/RAC meeting:	**RC comments:** RC recommends extension of the project upto 31.03.2023 **RAC comments:** • The results obtained may be peer reviewed for analysis and necessary suggestions towards validation. • Expertise of Dr. Arun Kumar, may be utilized fordrawing meaningful conclusions. • 06 months extension of project period is recommended without any additional financial burden. • PI to ensure completion of all the project works within the extended period.
H	Follow-up action taken on last RC/RAC meeting:	**Action taken against RC comments:** As suggested, the project is continued to complete the remaining milestone during the extended period. **Action taken against RAC comments:** • As suggested the data of the project were analysed and results were discussed with Prof.SanjuKumar, Dept. of Biotechnology, MU. • Discussed with Dr.Arun Kumar, Scientist-C to draw meaningful conclusions from the project. • As suggested the remaining milestones of the project will be completed within the extended period. •
I	Suggestions of RCS	To conduct experiment as per the set work plan To utilise the budget under the project effectively
J	ATR on suggestion of RCS	-
64th RC Suggestions		Complete the project as per set work plan and milestones without seeking any further extension.
6	**Project code & title:**	**AIB 05012–SI: Inter and intra–Specific Hybridization for improvement of Eri Silkworm, *Samia ricini* Donovan**
A	Investigators	Dr.Reeta Luikham, (PI), Dr.Aftab Ahmad Shabnam, (CI)
B	Project period :	04 years (March, 2020 – February, 2024)
C	Objectives:	To develop improved cross breeds/hybrids of Eri silkworm with higher

		fecundity and silk yield for commercial exploitation.
D	Progress achieved:	As per 40th RAC suggestion, Continued selection of pureline strains based on larval colour and markings of the population achieved in F9. Crossing of pureline parents including top as well as low ranking strains was done in 10x10 diallel fashion. Crossed F1 seed were harvested and kept for producing F2 seed. Analysis of GCA and SCA is under progress. Selfed F4 generation of Wild eri*S. canningi* completed. Selfed F_5 generation rearing is under progress.
E	Specific outcome:	Selection of pureline parental stock for utilization in actual breeding programme.
F	Budget and expenditure :	Budget: Rs. 23.15 lakhs & Expenditure: 10.91 lakhs
G	Suggestion of last RC/RAC meeting:	**63rd RC:** Exploit the following best hybrid combinations by test verifying the results at CMER&TI and its attached farms: 1. BYP x T GBP 2. G YP x T GBP 3. C2 x BYP 4. G YP x C2 (High fecundity hybrid). Repeat inter-specific hybridization work to get desirable results. **40th RAC:** The PI should discuss with a breeder having expertise in silkworm breeding for better insight on the execution of the breeding programme. Continue selection of pure line strains based on larval colour and markings till 100% homogeneity of the population is achieved. Selection of pureline parents for crossing should include top as well low ranking strains. Possible cross combinations should be carried out accordingly.
H	Follow-up action taken on last RC/RAC meeting:	**63rd RC:** As per 40th RAC suggestion, repeated all possible cross combinations. Hence, rearing of earlier hybrid combinations is put on hold. Inter-specific hybridization will be repeated. Rearing of wild eri, *Samiacanningi*selfed F5 generation is under progress. **40th RAC:** Discussion was held with Dr. N. I. Singh, Retd. Sc, a silkworm breeder. Selection of pureline strains based on larval colour and markings of the population was achieved in F_9. Crossing of pureline parents including top as well as low ranking strains was done in 10x10 diallel fashion.
I	Suggestions of RCS	To conduct experiment as per the set work plan
J	ATR on suggestion of RCS	-
64th RC Suggestions		1. PI to initiate limited trials of top 03 combinations based on SCA to confirm the superiority. 2. Continue the project as per set work plan and milestones
7	**Project code and title:**	**AIP-05013-SI: Impact of elevated CO_2 and temperature on muga silkworm and its primary host plant**
A	Investigators involved	Dr. D.K. Jigyasu (PI); Dr. Aftab A Shabnam (CI); Dr. G. Subramanyam up to 26.07.2021; Dr. Amit Kumar (Co-PI)
B	Project period :	March 2020-Feb 2023 (Extension sought upto Feb. 2025)
C	Objectives:	1. To assess the influence of elevated CO_2 and temperature on growth and yield attributes of primary host plant (Som).

		2. To assess the impact of elevated CO_2 and temperature on muga seed crop production, cocoon characteristics and fecundity. 3. To design strategies for adoption in muga silk worm rearing under the changing environmental scenario in Assam.
D	Progress achieved:	• Imposing treatment of elevated CO_2 at 550 ppm concentration and elevated temperature (ambient +1.5 °C) on Som plants was started in July 2022 after the installation of OTCs. The treatments are presently going on as per plan and constant monitoring and data recording is in progress. The 1st seed crop rearing will be initiated after 06 months of treatment i.e. in January 2023. • Biochemical analysis of selected Som plants was completed and presented in previous RC. • The project is running two and half years behind the schedule due to delay in installation of OTCs. Project extension for 02 years will be sought for completing the set milestones to achieve the objectives.
E	Specific outcome:	Som plants exposed to CO_2 and varied temperature regimes will change in their growth attributes and biochemical constituents after 06 months.
F	Budget and expenditure :	**Budget:** Rs. 44.72 lakh **Expenditure till Nov, 2022:**Rs. 31.70 Lakh
G	Suggestion of last RC/RAC meeting:	**63rd RC Suggestions:** • Initiate project work immediately after installation of OTCs is completed. • Publish "Seri-Climatic Manual of Muga Growing Districts of Assam" book with ISBN number.
H	Follow-up action taken on last RC/RAC meeting:	**63rd RC Follow-up:** • Treatment of eCO_2 at 550 ppm concentration and e-temperature (ambient +1.5 °C) on Som plants was started in the month of August 2022 after installation of OTCs. • The project is running two and half years behind the schedule due to delay in installation of OTCs. Revised milestones for pending work will be submitted for the extension of project. • Book on "Seri-climatic manual of muga growing districts of Assam" was published with ISBN 978-81-959292-0-7 in the month of October, 2022 and inaugurated in the "National Symposium on Vanya Sericulture: An Opportunity Galore" to be held on 28th& 29th Oct., 2022 at CTR&TI, Ranchi.
I	Suggestions of RCS	To conduct experiment as per the set work plan To utilise the budget under the project effectively
J	ATR on suggestion of RCS	-
64th RC suggestions		1. Continue the project as per set work plan and milestones. 2. Check the treatment data hours. 3. Continue the treatment schedule and ensure to carry out the muga silkworm rearing during seed crop (January, 2023). 4. Seek extension of the project for two years along with re-appropriated budget and revised milestones since the project is running two years behind the schedule.
8	**Project code and title:**	**ARP05015SI, Development of chemical based control measures for management of pebrine disease in Muga silkworm, *Antheraea assamensis* Helfer**
A	Investigators	Dr.Arun Kumar K.P, (PI)
B	Project period :	Jan 2021 – Dec 2023
C	Objectives:	• Effect of different chemical disinfectants and antifungal substances on survivability and infectivity of microsporidian spores

		• Efficacy analysis and field application of chemical disinfectants suitable for management of pebrine disease.
D	Progress achieved:	• Motility assay and germination assay carried out with 7 chemical agents against *Nosemaassamensis* • Field trial is being carried out with the selected chemical agents that showed reduced spore activity. • Shortlisted additional chemical agents for testing on Nosema spores in vitro and selection for further analysis.
E	Specific outcome:	• Motility assay and Germination assay on 4 chemical agents and 3 herbal agents were carried out. • Of which 5% Mancozeb 75 and 3%Nirmool were able to decrease spore activity. • Field trial with the 5% Mancozeb, 3% Nirmool, 2% NaOCl is being carried out.
F	Budget and expenditure :	Budget: 19.92 lakhs Expenditure: 7.50 lakhs
G	Suggestion of last RC/RAC meeting:	**63rd RC comments** • Continue the project as per milestones and objectives of the project. **40th RAC comments** • Focus exclusively on developing best chemical based control measures for management of pebrine disease. • Ascertain the field utility of the shortlisted chemicals.
	Follow-up action taken on last RC/RAC meeting:	**ATR on 63rd RC comments** • Project is being continued as per milestone. **ATR on 40th RAC comments** • Chemical agents are being tested in vitro against *Nosema* spores. • Field trial of the shortlisted chemical agents is being carried out.
I	Suggestions of RCS	To utilise the budget under the project efficiently
J	ATR on suggestion of RCS	-
64th RC suggestions		Continue the project as per set work plan and milestones
9	**Project code and title:**	**AIT05016MI- Integrating genomic and transcriptomics resources for functional insight into the biology of muga silkmoth *Antheraea assamensis***
A	Investigators	Dr.Arun Kumar K.P – PI
B	Project period :	2 Years (Jan. 2021 to Dec. 2022)
C	Objectives:	• Development of web accessible database 'Mugabase' to host the muga sequence data, initially within CSB and later for public access. • Refining of assembly and annotation of the whole genome and transcriptome sequence data. • Identification and validation of functional genes associated with insect behaviour, silk quality and immunity.
D	Progress achieved:	1. Development of 'Vanya Silkbase' is completed. 2. Refining of assembly and annotation of whole genome and transcriptome sequence data is completed. 3. SNPs identified in both wild type and cultivar muga genome. 4. Experimental infection of muga silkworm is completed and tissues collected for gene regulation analysis. 5. 20 genes were selected for validation and their semi quantitative validation is being carried out.
E	Specific outcome:	1. *Vanya Silkbase* has been developed 2. Assembly and annotation of *Anthereae assamensis* genome

		completed. 3. Candidate silk character genes identified. 4. Around 0.5M SNPs detected in both Wild type and cultivar muga genome. 5. Synteny analysis in comparison to *Bombyx mori* genome is completed. 6. In silico analysis of differential expressed gene completed.
F	Budget and expenditure :	Budget – 41.68 Lacs Expenditure – 17.83 Lacs
G	Suggestion of last RC/RAC meeting:	**63rd RC Comments** 1. Pacify the procurement of RT-PCR. 2. The progress in the project is satisfactory. Continue the project as per milestone. **40th RAC Comments** 1. Authenticate the status of CMR-1 & CMR-2 through molecular markers. 2. Continue the project as per the milestones.
H	Follow-up action taken on last RC/RAC meeting:	**ATR on 63rd RC comments** 1. Bidding is completed and proposal sent to central office for approval. 2. Project is being continued as per milestones. **ATR on 40th RAC comments** 1) Efforts are being made to design primers for SNPs and Indels identified in GBS analysis. However, it requires more time to shortlist usable DNA markers through screening of individual muga samples. 2) Project is being continued as per milestones.
I	Suggestions of RCS	To utilise the budget under the project efficiently
J	ATR on suggestion of RCS	-
64th RC suggestions		1. Complete the pending works in coordination with SBRL. 2. Continue the project as per set work plan and milestones.
10	**Project code and title:**	**CFC5017MI: Exploration and adoption of novel muga cocoon cooking technology for increasing its reelability and raw silk quality.**
A	Investigators involved	Dr.Manjunath R.N, PI; Dr. Dip Kr. Gogoi, Co-PI; Dr. Rajiv K Munshi, CI (RSTRS)
B	Project period :	March 2021 to Feb. 2023
C	Objectives:	1.To study the efficacy of enzymatic and non-enzymatic approaches in muga cocoon cooking/ softening. 2.To develop a new cocoon cooking technique to improve the reelability & raw silk quality in muga cocoons dried under different techniques 3. To carry out large scale Multi-location trials at CSB and DoS reeling units for validating the efficacy of the newly developed cooking method. 4.To create awareness among the reeling beneficiaries to adopt/popularize the outcome of the project.
D	Progress achieved:	➢ A new cooking formulation was test verified at reelers level in Dhemaji, Lakhimpur, Dhakuakhana, Palasbhari, Guwahati and Sivsagar regions in coordination with DoS. ➢ Under enzymatic approach, following activities were undertaken; 1. Isolation of protease producing bacteria 2. Screening of lipase and protease activity of isolated strain 3. Qualitative test for protein

		4. Effect of temperature on enzyme activity 5.Identification of bacteria(16SrRNA sequencing)
E	Specific outcome:	➢ The trial results were ascertained by reduced cooking duration, reduced breakages (by ~20%), improved reelability and recovery during the reeling process.
F	Budget and expenditure :	**Budget:** Rs. 18.27 lakh; **Expenditure**: 8.18 lakhs
G	Suggestion of last RC/RAC meeting:	**Suggestions of 63rdRC:** ➢ Progress under the project is satisfactory. PI to continue the trial of "Muga super cook" and look for commercialization of the same through some entrepreneurs. ➢ Dr. D.K. Gogoi, Scientist-D &CoPI of the project should present the progress of enzymatic approach through virtual mode in the next meeting. **Suggestions of 40th RAC:** ➢ The PI should re-work the economics based on with large scale trials and take up a statistical analysis. ➢ Study the effect of formulation on the physical properties of the silk. ➢ Ascertain the impact of seasonal variation, if any, on the formulation. ➢ Continue work as per objectives.
H	Follow-up action taken on last RC/RAC meeting:	**Follow-up action on 63rd RC:** ➢ The trial of "Muga super cook" was conducted various locations of upper and lower Assam regions and will be continued in various other regions including BTC and Nagaland region. ➢ Suggestion complied. **Follow-up action on 40th RAC:** ➢ The economics based on large scale trials underwent till date is re-worked in terms of Cost per Kg of Reeled silk production. ➢ Samples have been submitted to CSTRI to study the effect of formulation on the physical properties of the silk. Results awaited. ➢ There was no effect of seasonal variations on the performance of the formulation. However, the drying technique had some impact wherein it was observed that smoke dried cocoons required 20-30 seconds of additional cooking duration. ➢ The project is continuing as per the milestone
I	Suggestions of RCS	-
J	ATR on suggestion of RCS	-
64th RC suggestions		1. PI to simultaneously work for filing of patent & licensing. 2. Pursue with CSTRI, Bengaluru for getting the results of physical properties of silk. Explore other possibilities for carrying out the work without any further delay. 3. Dr. D.K. Gogoi, Sc-D, RSRS, Koraput to present the progress of enzymatic approach in forth coming RAC meeting.
11	**Project code and title:**	**APR05018MI- Effect of various host plants separately and in combination on Rearing and grainage performance of Muga silkworm, *Antheraea assamensis* Helfer**
A	Investigators involved	DK Jigyasu (PI w.e.f. 1st July, 2022), Kh. Subadas Singh (PI up to 30th June, 2022), S. A. S. Rahman (CI), Vikram Kumar (CI), D. Mech (CI, w.e.f. Nov., 2022)
B	Project period :	3 Years (March, 2021 to Feb, 2024)
C	Objectives:	1. To study the effect of various host plants separately and in combination on rearing performance of muga silkworm.

		2. To study the effect of various host plants separately and in combination on grainage performance of muga silkworm.
D	Progress achieved:	Experimental rearing of muga silkworm on different host plants Viz., Som (*Persea bombycina*), Soalu (*Litsea monopetala*), Dighloti (*Litsea salicifolia*) and Mejankori (*Litsea cubeba*) is conducted in Jethua and Kotia commercial crops. Grainage performance of both solo and combination rearing was recorded. Results show that Som host plant exhibited better performance in terms of short larval duration and larval weight as compared to other food plants. Jarua seed crop (Nov-Dec) rearing is in progress.
E	Specific outcome:	Assessment of Muga silkworm rearing on different host plants in Jethua and Kotia commercial crops.
F	Budget &expenditure	**Budget: Rs. 15.42 lakh** (CMER&TI: 7.62 lakh),Total Expenditure till November, 2022: R**s. 3.22348 Lakh**
G	Suggestion of last RC/RAC meeting:	**63rd RC Suggestions:** • PI to recheck the data and present statistically analysed comparative data in the forthcoming meetings. • In view of transfer of Dr. Subadas Singh (PI), Dr. D. Jigyasu is nominated as PI and Dr. D. Mech as CI of the project.
H	Follow-up action taken on last RC/RAC meeting:	**63rd RC Follow-up:** • The data generated under the project were checked and statistically analysed. • Suggestions complied. The files, registers and data received from Dr. Subadas Singh.
I	Suggestions of RCS	-
J	ATR on suggestion of RCS	-
64th RC suggestions		1. PI to present rearing data and grainage data separately. 2. Present average climate data in tabulated form. 3. Continue the project as per set work plan and milestones.
12	**Project code and title:**	**MFM5019MI: Development of Honeycomb Mountages and Harvesting Technology for Muga Cocoon Production with Improved Uniformity and raw silk recovery.**
A	Investigator	Dr.Manjunath R.N, PI; Dr. Mahesh D. S, CI;
B	Project period :	March 2021 to Feb. 2023
C	Objectives:	1. Fabrication of honeycomb mountages and suitable harvesting technology for uniform muga cocoon production. 2. Impact assessment of honeycomb mountages on cocoon production, cocoon characteristics and reeling performances. 3. To conduct on-station feasibility trials of the mountages at CSB/DoS units for prototype test verification
D	Progress achieved:	➢Optimization of honeycomb mountage dimensions has been completed through lab scale prototypes and trials. ➢Fine tuning and Fabrication of Honeycomb mountages (for commercial scale) having optimized cell dimensions & good ventilation with suitable harvesting technology (keeping low-cost, eco-friendly, durability and affordability aspects in mind) is under progress through outsourcing.
E	Specific outcome:	A new type of mountage with a possibility to produce uniform cocoon production.
F	Budget and expenditure :	**Budget:** Rs. 10.95 lakh Expenditure 2022: 4.25 Lakh
G	Suggestion of last	**Suggestions of 63rd RC:**

	RC/RAC meeting:	➢ PI is advised to explore more models to make the mountages user friendly, environment friendly and economical. **Suggestions of 40th RAC:** ➢ Effect of mountages on the silk recovery % should be calculated and depicted in the results. ➢ Analyze the data statistically and workout the economics of the mountages.
H	Follow-up action taken on last RC/RAC meeting:	**Follow-up action on 63rd RC:** ➢ Fabrication of Honeycomb mountages is being done keeping low-cost, eco-friendly, durability and affordability aspects in mind **Follow-up action on 40th RAC:** ➢ Effect of new mountages on the silk recovery % was calculated and was found to be increased by 11-13% ➢ The economics of the mountages will be worked upon complete development of prototype and large scale trials
I	Suggestions of RCS	Nil
J	ATR on suggestion of RCS	-
64th RC suggestions		1. Compare the characteristics of cocoons harvested with honey comb mountage and recommended bamboo mountage. 2. Fabrication part & feasibility trial is yet to be completed. The PI may seek extension of the project for 06 months to complete the left over work.
13	**Project code and title:**	**APS 05020MI: Commercial egg production technology for ericulture**
A	Investigators involved	Dr. Mahesh D S, Sci-B (PI), Dr.Lalith Natarajan, Sc-D, EBSF, Topatoli, (Co-PI) Dr. Arunkumar K P, Sci-C (CI)
B	Project period :	February 2022 to January 2024
C	Objectives:	a. Standardization and selection of suitable egg laying device for commercial loose egg production in eri. b. Synchronization of hatching and subsequent rearing. c. Popularization of loose egg production in Ericulture.
D	Progress achieved:	**CMER&TI:** -Shortlisted the egg laying devices for testing through large scale trials. -Eri silkworm seeds preservation at different temperatures is under progress. -Assisted EBSF, Topatoli for eri loose egg production large scale trials by using different egg laying devices with various techniques. -The obtained dfls of large scale trials have been utilized for chawki rearing to check the hatching %. More than 95% of hatching was recorded. -The chawki worms were distributed to the farmers for subsequent rearing performance studies and the rearing is under progress. **EBSF, Topatoli:** -Conducted a large scale trial by using different egg laying techniques and devices in coordination with CMER&TI. -Recorded the egg laying performance in all the replications of each treatment. -On par egg laying performance has been recorded in the treatments.
E	Specific outcome:	Nil
F	Budget and expenditure :	Total budget is 14.5 Lakhs and expenditure is 3.70 Lakhs
G	Suggestion of last RC/RAC meeting:	**RC Comments** Continue the project as per milestones. **RAC comments**

		Replicate the data initially at Institute level. Continue the project as per milestone.
H	Follow-up action taken on last RC/RAC meeting:	**ATR on RC comments** Project is being continued as per the milestones. **ATR on RAC comments** Suggestions complied. The studies to shortlist the best egg laying devices for commercial loose egg production are completed at institute and the large scale trials are being carried out to work out the economics forthe development of standard commercial loose egg production technology in ericulture.
I	Suggestions of RCS	
J	ATR on suggestion of RCS	-
64th RC suggestions		➢ Recheck egg retention data. ➢ Rework on synchronization for hatching of different day laid eggs on single day. ➢ Follow the already available egg preservation schedules and check for hatching. ➢ Continue the project as per set work plan and milestones.
14	**Project code and title:**	**APS 05021EF: Studies on population diversity and role of host plant volatile cues for enhancing egg laying in temperate tasar (Vanya) silk moths *Antheraea proylei*.**
A	Investigators involved	Dr S Subharani Devi (PI), Dr. Y. Debaraj (Co-PI) Dr. K M Vijayakumari (PI)
B	Project period :	Oct 2021- Sep 2024
C	Objectives:	1. To survey and establish population diversity of oak tasar silk moths across NER. 2. To establish potent food plants (Host) for oak tasar silk moths, A. proylei for egg production. 3. To isolate and evaluate highly suitable host plant volatiles to activate/increase egg laying in oak tasar silk moth. 4. To standardize the synthetic oviposition stimulant blends to enhance egg production in oak tasar silk moths and establishing the efficacy of developed technology. 5. To evaluate the synthetic volatile blend in large scale at oak tasar seed production centers.
D	Progress achieved:	Surveyed and collected *Antheraea proylei* cocoons from Nagaland, Mizoram, Assam and Megahalaya and samples sent to Manipur University for molecular studies. Collected *Antheraea frithi* cocoons and moths from Manipur and Arunachal Pradesh. Collected *Antheraea mylitta* cocoons and moths from Assam and Arunachal pradesh. Second crop rearing under progress and larvae are in 5th instar. Study on egg laying potential of *Antheraea proylei* moths on different food plants viz. *Quercus serrata, Quercus griffithi, L. dealbata, Q.incana* and *Q.semicarpifolia* showed highest fecundity with *Q.serrata* leaves and branches
E	Specific outcome:	Collected different life stages of oak tasar silk moth from different areas of NER. Studied the egg laying potential of *A. proylei* on leaves and branch of different oak plants viz. *Quercusserrata, Quercusgriffithi, L. dealbata, Q.incana* and *Q.semicarpifolia.*
F	Budget & expenditure:	Rs.122.49 lakhs &Rs. 5.817 lakhs
G	Suggestion of last RC/RAC meeting:	**RC Comments:** Use other markers such as GBS, SNPs instead of cytochrome oxidase for

		molecular characterization. **RAC comments:** ➢Communicate to funding agency (DBT) regarding change in Selection of markers. ➢Continue the project as per objectives
H	Follow-up action taken on last RC/RAC meeting:	**Action taken against RC comments:** Complied as suggested **Action taken against RAC comments:** Complied as suggested
I	Suggestions of RCS	-
64th RC suggestions		1. Maintain the genetic stocks of oak tasar silkworm collected from different NE states. 2. Include statistical data for realized and potential fecundity. 3. Continue the project as per set work plan and milestones
15	**Project code and title:**	**MOE 05022 MI: Evaluation and popularization of improved technologies developed in the field of Muga, Eri and Oak sector for Northeastern India (On-station/On-farm Trials of CMER&TI, Lahdoigarh)**
A	Investigators involved (PI & Co-I's)	Dr. D K Jigyasu, CMERTI (PI), Sri Suraj Pal, REC-Fatehpur (CI), Dr. James T Keisa, CMERTI (CI), Dr. Y Debaraj, RSRS-Imphal (CI), Dr.LSomen Singh, RSRS-Imphal (CI), Sri. B N Choudhury, RSRS-Boko (CI), Sri SAS Rahman, RSRS-Boko (CI), Dr D.Mech, REC-Lakhimpur (CI), Dr.Aftab A Shabnam, CMERTI (CI), Dr.SSubharani Devi, RSRS-Imphal (CI), Dr.Arun Kumar KP, CMERTI (CI), Dr. Amit Kumar, CMERTI (CI), Dr.Kh. Subadas Singh, CMERTI (CI), Dr Vijay. N, CMERTI (CI), Dr. Mahesh D S, CMERTI (CI), Dr.Manjunath R N, CMERTI (CI), Mr. Abhishek Singh, MESSO (CI)
B	Project period :	February 2022 to January 2024
C	Objectives:	➢ To popularize various technologies in different stages developed by the Institute ➢ To further create awareness for technological intervention among the farmers and beneficiaries ➢ To increase the overall cocoon production.
D	Progress achieved:	• The OST for validation of IPM technology for control of uzi fly in oak tasar culture is conducted in 2nd crop, Aug-Sep 2022. Percentage of uzi infestation recorded was 6 -9 % with IPM as against 16-20 % in control. • The OST for validation of use of Biopesticides for control of insect pest infesting *Q. serrata* is conducted in 2nd crop, Aug-Sep 2022. Recorded 70-75 % reduction of pest infestation on 14th day after application of Bioneem. • Multi-location trials of muga breeds CMR-1 and CMR-2 is conducted in May-June season this at 6 locations. The findings of trials were presented in HAC meeting in November, 2022. And another round of multi location trial is going on at six locations. • Multi-location trials of Eri breeds/ cross breeds was conducted in last commercial crop and another round of multi-location trial will be conducted in next crop on at 10 locations. • 3690 Muga seed cocoons were preserved for 42 days preservation schedule in the cold storage. Total of 3143 (85.18%) moths were emergence in which 252 (6.83%) moths found healthy and 2891 (78.35%) found cripple. Emerged moths are weak, unhealthy and wings are not properly spread therefore, cold storage preservation practice could not use for coupling purpose. It is also observed that

		moths are unable to lay eggs and the eggs are also depressed and unfertilized. The un-emerged cocoons were recorded 547 (14.82%). • Trial for validation of muga silkworm egg treatment for uniform hatching and higher survivability of young larvae could not completed as DFLS were not supplied by MESSO on time. • Rearing management of muga silkworm in cooler region during summer trial could not completed as DFLS were not supplied by MESSO. • Trial of formulated volatiles application for enhancing egg laying capacity of muga and eri is going on at Institute level. • 6900 Kesseru (HF-008 & HF-005) seedlings were distributed to 69 Eri farmers. • 5085 Borpat seedlings were distributed to 37 farmers in Sivasagar, Mariani, Jorhat area of Assam and Dimapur area of Nagaland. • 230 Som seedlings were distributed to 2 farmers. • The OFT for integrated Practice of ITK and Modern Technology for Muga Silkworm Seed production was conducted at 8 farmers field in Charideo, Sivsagar and Lakhimpur district during the month of September has shown to increase fecundity significantly by 15.3% over the normal practice. • The OFT for integrated Practice of ITK and Modern Technology for Higher Muga cocoon, Dfls were supplied to 7 farmers in Charideo, Sivsagar and Lakhimpur district for Late Bhadia crop (Sep-Oct) 2022. Rearing was completed. • Trail for LED light trap for control ofmugainsect pests was conducted in upper Assam, lower Assam and middle Assam areas with 10 farmers each location. It decreases pest infestation 20-30% to both muga silkworm as well as its host plants. The device is recommended for field application in larger scale to control different insect pests. • The OFT for validation of use of PET bottles for uzi trap in muga silkworm rearing resulted that this device is not recommended for uzi fly control in muga rearing field. However, some other different attractant can be used in the PET trap for uzi fly trap. This device can be used to trap wasps. • Rearing performance of C27 breed showed 21-25 cocoons per dfl as against 15-20 cocoons per dfl in *A. proylei* (control) during 2nd crop. • Percentage of uzi infestation recorded was 10 –12% with PET bottle uzi trap as against 16-20 % in control. • Rearing performance of 0.2% Sodium hypochlorite treated lot recorded 20 - 26 cocoons per dfl as against 15-20 cocoons per dfl in control during 2nd crop.
E	Specific outcome:	Awareness and popularization of technologies in muga, eri and oak tasar.
F	Budget and expenditure :	**Budget: Rs. 36.02 lakh** (Rs. 17.98 lakh for OST) + (Rs. 18.04 lakh for OFT) **Expenditure till Nov, 2022**: 3.22348 Lakh
G	Suggestion of last RC/RAC meeting:	**63rd RC Suggestions:** Achieve the set targets as per project milestones & action plan 2022-23.
H	Follow-up action taken on last RC/RAC meeting:	**63rd RC Follow-up:** Transfer of technologies programmes are continued as per milestones.
I	Suggestions of RCS	-
J	ATR on suggestion of RCS	-
64th RC suggestions		1. Based on the results generated, the IPM technology for control of uzi fly in oak and use of biopesticides for control of insect pest infesting

	Q. serrata should be tested at farmers' field under OFT. 2. Update the expenditure carried out under different OFTs 3. Continue the project as per set work plan and milestones.

As CI with other Institutes:

1.	**Project code and title:**	**BPS 01013CN- Utilization and diversification of silkworm pupae products for human & animal consumption and composting.**
A	Investigators involved	Dr. Mahesh D S, Sci-B (PI), Dr. James Keisa, Sci-D (CI)
B	Project period :	September2020 to August 2022 (extended up to March 2023)
C	Objectives:	a. To evaluate nutrients and bioactive compounds in silkworm pupae of Eri and Muga. b. To characterize proteome of Eri and Muga silkworm pupae.
D	Progress achieved:	-The shelf life studies for the eri pre pupae and matured pupae are under progress at CFTRI, Mysore. The eri pre pupae and matured pupae are being supplied to CFTRI, Mysore whenever required to conduct the shelf life studies and preparation of the food products for human consumption. -Standardized the de-cuticle procedure for both eri and muga pupae by using different techniques. -The studies on pupal cuticle and flesh contents are under progress. -The samples of pre-pupae and matured pupae (fresh whole pupae, dried pupae, cuticle and flesh) reared on different primary host plants are being used for proteomic studies by using MALDI-TOF at CIF of IIT, Guwahati.
E	Specific outcome:	-Standardized the de-cuticle procedure for both eri and muga pupae by using different techniques. -Proteomicsstudies to identify the proteins present in eri pre pupae, matured pupae and muga pupae are under progress.
F	Budget and expenditure	Total budget is 11.88 lakhs and expenditure is8.73 lakhs
G	Suggestion of last RC/RAC meeting:	**RC Comments** 1.Continue the project as per milestones **RAC comments** 1.Co-PI is advised to select some shortlisted products for popularization. 2.Seek extension of the project period for completion of the incomplete part.
H	Follow-up action taken on last RC/RAC meeting:	**ATR on RC comments** 1.Project is being continued as per the milestone to achieve the target. **ATR on RAC comments** 1.Suggestions noted. The shelf life studies on selected products are under progress at CFTRI, Mysore. The eri pre pupae and matured pupae are being continuously supplied for CFTRI, Mysore whenever required to conduct the shelf life studies and preparation of the shortlisted food products for human consumption. 2.Suggestions complied. RCS, CO approved the project period extension up to 31.03.2023 for re-appropriated budget. All the incomplete project works will be completed within the extended period.
I	Suggestions of RCS	-
64th RC suggestions		Continue the project as per set work plan and milestones

AGENDA NO. 7: Trial of Technologies (OSTs/ OFTs)

- Covered under Project "MOE05022MI"

AGENDA NO. 8: Discussion on Annual Action plan (2022-23) and 67th RCC ATR.

Following Institute specific recommendations of Action Plan 2022-23 were discussed and targets assigned during 63rd RC were reviewed:

1. The status of mug a breeds viz., CMR-1 & CMR-2 and Eri hybrids, YP x CBZ and CBS X GBZ to be furnished by May 2022 including the performance across the seasons.
2. Research project to be taken up on Eri pupae storage & packaging, besides strategy for transportation and marketing of pupae to be worked out. Products from Korea/Japan on pupae & pupae by-products may be examined and development of similar products may be explored in collaboration with R&D labs on food sciences.
3. To take up need based research project on "Development of Ericulture in Gujarat (Castor based) and Tamil Nadu (Tapioca based), for which detailed proposals in the RMIS formats to be submitted by June 2022.
4. The muga silkworm conservation programme to be taken up in project mode.
5. To expedite the management practices developed for control/eradication of tiger band disease in oak tasar sericulture.
6. To conduct training programme on Statistics for the Scientists under CMER TI before 31st March 2022.
7. To publish the Hand Book on Sericulture (Muga & Eri) before 31st May, 2022

The concerned were advised to pacify the action on the points which are yet to be addressed.

Follow-up action on the decision of 67th meeting of RCC of CSB

#	Decision	ATR
1	The proposed studies on the vegetative propagation of *Q. Serrata* may be revisited for production of utilization of oak tree plantation in NE stated for Oak Tasar production.	*RSRS, Imphal*

INSTITUTE SPECIFIC RECOMMENDATIONS: BPP 5014 CN – Complete feedback & patent.

- RSRS, Imphal has informed that presently the propagation of *Q. Serrata* is carried out through seed and it grows naturally in the forest areas and there is no demand for saplings/seedlings. The vegetative propagation techniques have been attempted by CTR&TI, Ranchi. Hence, the action point is more relevant to that Institute.
- CMER&TI has supplied the 9000 sample saches of mulberry stand alone and blended tea (3000 each) to the CI of the Project (Dr. Prashanth S., Sc-C, CO, Bengaluru) for collection of feedback data and filing of patent.

AGENDA NO. 9: Any other points for discussion

- The budget utilization in most of the projects is poor. The PIs are advised to effectively utilize the allocated project budget.

(DR. K.M. VIJAYAKUMARI)
Director & Chairperson

Annexure-I

LIST OF PARTICIPANTS OF THE 64th RESEACH COUNCIL MEETING OF CMER&TI, LAHDOIGARH HELD ON 13.12.2022

#	**Name & Designation**
1.	Dr. K. M. Vijaya Kumari, Director, CMER&TI
2.	Dr. Y. Debraj, Scientist-D, RSRS, Imphal
3.	Dr. Reeta Luikham, Scientist-D, CMER&TI
4.	Dr. L. Somen Singh, Scientist-D, RSRS, Imphal
5.	Dr. D. Mech, Scientist-D, CMER&TI
6.	Sh. S A S Rahman, Scientist- D, RSRS, Boko
7.	Dr. T. James Keisa, Scientist-D, CMER&TI
8.	Dr. Aftab Ahmad Shabnam, Scientist-D, CMER&TI
9.	Sh. Bitupan Das, Scientist-D, CMER&TI
10.	Dr. S. Sobharani Devi, Scientist-D, RSRS, Imphal
11.	Sh. L. Sonowal, Scientist-C, REC, Sille
12.	Dr. Arun Kumar K.P, Scientist-C, CMER&TI
13.	Dr. K. Subadas Singh, Scientist-C, RSRS, Imphal
14.	Dr. D. K. Jigyasu, Scientist-C, CMER&TI
15.	Dr. Vijay N., Scientist-C, CMER&TI
16.	Dr. Mahesh D.S., Scientist-C, CMER&TI
17.	Dr. Manjunath R.N., Scientist-C (R&S), CMER&TI
18.	Dr. Om Prakash Patidar, Scientist-C, CMER&TI
19.	Ms. Lucu Moni Borah, JRF, CMER&TI, Lahdoigarh
20.	Ms. Padmini Baruah, SRF, CMER&TI, Lahdoigarh
21.	Ms. Priyanka Sahu, PA, CMER&TI, Lahdoigarh
22.	Ms. Priya Boro, PA, CMER&TI, Lahdoigarh
23.	Ms. W. Sapana Devi, PA, CMER&TI, Lahdoigarh
24.	Sh. Suraj Kumar Saha, JRF, CMER&TI, Lahdoigarh
25.	Ms. Raisa Begum, PA, CMER&TI, Lahdoigarh