MINUTES OF THE 60th MEETING OF THE RESEARCH COUNCIL HELD ON 24TH SEPTEMBER 2021 AT CTR&TI, RANCHI

The 60th meeting of Research Council of Central Tasar Research and Training Institute was held on 24th September, 2021 under the Chairmanship of Dr. K. Sathyanarayana, Director CTR&TI, Ranchi. At the onset Director welcomed all the scientists and requested for new proposals which are oriented towards technology development to enhance the quality and production of tasar silk and consequently the farmers' income. List of participants is appended in Appendix-1.

Agenda No.1: Confirmation of the previous RC Meeting Minutes

The Minutes of 59th R.C. meeting was circulated to the Scientists vide E-mail dated 08.07.2021. As no comments or objections were received from any Scientist, the minutes were confirmed.

Director advised, henceforth agenda & explanatory notes of RC should be circulated 5 days in advance to the meeting to facilitate their preparation for the meeting and to avoid circulation of hard copies during the meeting.

Agenda No. 2: Review of action taken of the recommendation / decisions of the previous RC meeting

Follow up action taken on the decisions made during the previous RC meetings were reviewed by Director and following project-wise observations were made.

A. Review of the Concluded Research Projects

[PPA-4715] Effect of plant growth promoting rhizosphere microorganisms on leaf nutrient content of primary tasar host plants in forest and block plantation. (October 2016 - September 2019, extended up to March, 2021) [PI: Dr. Manjappa, Scientist-C]

Director viewed the non-submission of final report very seriously and asked Sri M.D. Tiwari Scientist-D to ensure submission of report by 31.10.2021.

[Action: Dr. Manjappa, Scientist-C & PI and Mr. M.D. Tiwari, Scientist-D]

B. Review of the progress of Ongoing Research Projects

[AIE-3555] Cryopreservation of Tasar Silkworm, *Antheraea mylitta* semen and its Artificial Insemination (February 2016 - extended up to Sept, 2021) [PI: Dr. J.P. Pandey, Scientist-D]

Dr. J.P. Pandey, Scientist-D informed the house, regarding hatching problem after insemination. He also expressed non-availability of expertise. Director observed that the same should have been brought to the notice of the PMCE/ Director to forge necessary collaboration. Dr. J.P. Pandey was advised to submit justification on the non-achievement of set objectives and also should propose some collaboration, if any. The same shall be placed before RAC for discussion and its recommendation.

[Action: Dr. J.P. Pandey, Scientist-D & PI]

C. Evaluation of New Research Proposals

i) **Diversity, Yield loss and Management of predatory wasps attacking *Antheraea mylitta* Drury** [PI. Dr. A.H. Naqvi]

Director expressed that suitable scientists in relevant field from BTSSO & its units may be included for better planning and execution of the project. As consented by Dr. A.H. Naqvi, Dr. H S Gadad, Scientist-B to be the PI of the proposed project.

[Action: Dr. A.H. Naqvi, Scientist - D and Dr. H.S. Gadad, Scientist-B]

ii) Assessment of technologies adaption by tasar farmers and their socioeconomic status [PI: Mr. M.D. Tiwari]

Director suggested PI to submit the details of technologies developed in last 5, 10 and 20 years, its percolation/ adoption in field with B:C ratio.

[Action: Sri. M.D. Tiwari, Scientist-D & PI]

iii) Conservation of wild Daba in their natural habitat [PI: Dr. Niranjan Kumar]

Director was not convinced about the concept note and the way it is being taken/ proposed, in light of the status of CTR-14, as expressed by B&G Section. Dr. Niranjan Kumar, Dr. I.G. Prabhu and Dr. Hanmant Gadad shall discuss on the same and modify the proposal accordingly. Further, as consented by Dr. Niranjan Kumar, Dr. I.G. Prabhu may act as PI for the said project.

[Action PI: Dr. Niranjan Kumar & Dr. I.G. Prabhu, Scientist-D]

iv) Exploration of host plant leaf and Leaf surface microbial volatiles in enhancement of tasar silkworm fecundity [PI: Dr. Mala N.]

Director advised to submit the revised project document after incorporating the proposal in APS-04003SI as a Sub project with Dr. Gadad as Co-PI in the subproject. PMCE shall place a request to RCS for revision in the name of PI, in view of transfer of the present PI, Dr. Mala N.

[Action: Dr. K Jena, Scientist-D & CI, Dr. H. Gadad, Scientist-B and PMCE Division]

v) Studies on influence of seasons/crops and storage of tasar and muga cocoons on single cocoon quality characteristics, reeling performance and yarn quality [PI: Mr. D. Chattopadhyay]

Director advised to procure required quantity of the cocoons (as per proposed statistical design) available at various places like RMB Chaibasa, Champa and SERIFED, Odisha (at various TRCS), which were of 2 to 4 years storage duration & could not be disposed due to Covid Pandemic, immediately. He was advised to restrict his study to only tasar sector, project duration to around a year and submit the concept note by 5.10.2021.

[Action: Mr. D. Chattopadhyay, Scientist - D & PI]

<u>Agenda No. 3:</u> New concept notes for approval

Following new Concept notes were presented before the RC

i. Systematic identification of food plant metabolites controlling the expression of genes involved in the silk synthesis in *Antheraea mylitta* [PI: Dr. I.G. Prabhu, Scientist-C].

ii. Establishment and characterization of novel stable cell lines from tropical tasar silkworm with susceptibility to Cytoplasmic Polyhedrosis Virus [PI: Dr. I.G. Prabhu, Scientist-C].

iii. Transcriptomic and proteomic analysis of interactions between *Antheraea mylitta* and cytoplasmic polyhedrosis virus [PI: Dr. I.G. Prabhu, Scientist-C]

iv. Expression of *Nosema mylitta* specific fluorescent marker in *Antheraea mylitta* for the simple detection of Pebrine infection. Phase I: Characterization of *Nosema mylitta* specific expression of proteins in *A. mylitta* and development of transgenic *A. mylitta* expressing fluorescent marker using piggyback. [PI: Dr. I.G. Prabhu, Scientist-C]

v. Development of Genome-wide Simple Sequence Repeats (SSR) Markers for the specific identification of *A. Mylitta* ecoraces [PI: Dr. I.G. Prabhu, Scientist-C].

vi. Development of Kompetitive Allele Specific PCR based SNP barcoding system for the molecular identification of tropical Tasar silkworm ecoraces [PI: Dr. I.G. Prabhu, Scientist-C].

vii. Inhibition of multiplication of Pebrine spores in tasar silkworm through specific inhibitors [PI: Dr. K. Jena, Scientist-D].

viii. Voyage and endeavour towards utilisation of disease contaminated eggs of tasar silkworm *A. mylitta* for rearing [PI: Dr. J.P. Pandey, Scientist-D].

ix. Isolation of bio-molecules from tasar silk industry waste for its eventual utility in the bio-medical field [PI: Dr. J.P. Pandey, Scientist-D].

x. Unravelling of genes responsible for productive traits of tasar silkworm *Antheraea mylitta* using functional genomics approach [PI: Dr. J.P. Pandey, Scientist-D].

xi. Enterprise of tasar silkworm "Genomics Centre of Excellence Biotechnology" at CTR&TI Ranchi [PI: Dr. J.P. Pandey, Scientist-D].

xii. Establishment of Biotech-KISAN programme/developmental projects in 9 districts of Bihar, Odisha and Chhattisgarh (in collaboration of NGOs/State/REC/RSRS/BTSSO) [PI: Dr. J.P. Pandey, Scientist-D]

xiii. Isolation and identification of pheromones and kairomones for the management of vanya silkworm parasitoids [PI: Dr. H.S. Gadad, Scientist-B].

xiv. Development of microbial technology for *in situ* degradation of tree litter in Tasar host plantation: a green technology for sustainable leaf productivity [PI: Dr. Aparna Kopparapu, Scientist-B].

xv. Studies on shifts in rhizoplane microbial communities mediated by root exudates and rhizodeposition and their effect on the above ground performance of tasar host plants [PI: Dr. Aparna Kopparapu, Scientist-B].

xvi. Assessment of feasibility for solar energy utilization in tasar reeling and spinning [PI: Mr. D. Chattopadhyay, Scientist-D].

xvii. Evaluation of technologies and machines developed in tasar post cocoon technology [PI: Mr. D. Chattopadhyay, Scientist-D].

xviii. Comparative ovarian metabolomics of one day old and three days old healthy and pebrinated *Antheraea mylitta* DBV mother moths. [PI: Dr. S.S. Mohanraj, Scientist-B, BTSSO, Bilaspur] – (Conducted online through V.C.).

The above proposals were discussed at length during the RC meeting and -

- Proposal nos.(i), (ii), (iii), (iv), (vi), (vii), (viii), (x), (xi), (xii), (xiii) & (xviii) were approved to be proposed for DBT funding with the suggestion to merge the proposal nos. (ii) & (iii) and (vii) & (viii) and Muga & Eri also to be included in proposal no. (xii).
- Proposal no. (xvii) was approved for CSB funding with the suggestion to include all the technologies & machines developed by CSTRI & CTR&TI, besides involving CSTRI counterpart from Malda/ Bhagalpur, taking his inputs.
- It was suggested that proposal no. (xvi) shall be a part of revised OST-OFT project.
- Proposal nos. (xiv) & (xv) were not discussed as the PI was on Child Care Leave and it was decided to discuss the same in a special RC, at the earliest.
- Proposal nos. (v) & (ix) were not approved.

The proposals approved to be proposed for DBT funding were later discussed during the "Interactive Discussion cum Brainstorming Session in the field of Biotechnology" on 25.09.2021 with Dr. Mohd. Aslam, Advisor & Scientist-G (Retd.), DBT, New Delhi as the Expert.

It was suggested that the proposals will be revised in the light of the suggestions given by Dr. Aslam and will be uploaded on the e-ProMIS site of DBT with copy marked to RCS. Concepts which would be approved by DBT would be conveyed to RCS for further processing and approval.

Further, the Committee approved initiating the following Pilot projects.

I. **Induction of genes involved for parthenogenesis in tropical tasar silkworm, *Antheraea mylitta*.** [PI: Dr. I.G. Prabhu, Scientist -C]

[Action: Dr. I.G. Prabhu, Scientist-C & PI]

ii. **Design & Development of Tasar Silkworm Pebrine Identification System using Image processing Technique** [PI: Mr. M.M. Baig, Scientist-C] in collaboration with BIT, Mesra, presented by Dr. G.P. Singh.

[Action: Mr. M.M. Baig, Scientist-C & PI]

iii **Studies on ectomycorrhizal bio-inoculants for improving nutrient utilization efficiency, growth rate and leaf yield of *Terminalia arjuna* and *Terminalia tomentosa*** [PI: Dr. Aparna Kopparapu, Scientist-B]

[Action: Dr. Aparna Kopparapu, Scientist-B & PI]

iv. **Effect of recommended dose of individual micronutrients and their mixture on commercial characters of tasar cocoons and quality & luster of yarn** [PI: Mr. M.D. Tiwari, Scientist-D]

In the light of the decisions taken during the 65th meeting of RCC, held on 2nd & 3rd Sept. 2021, the following proposal was not considered.

[Action: Mr. M.D. Tiwari, Scientist-D]

Agenda NO. 4: Review on concluded projects

i. **[PPA-4715] Effect of plant growth promoting rhizosphere microorganisms on leaf nutrient content of primary tasar host plants in forest and block plantation** (March, 2016 to Feb., 2019; Extended up to March, 2021) [PI: Dr. Manjappa, Scientist -C]

Director observed that since Mr. M.D. Tiwari has taken over the charge/ materials/ documents from Dr. Manjappa, the then PI and Mr. M.D. Tiwari shall be responsible for submission of the final report in RMIS-10 by October 2021. It was also decided that the OST of PSB should also be done at the Institute along with other test centres.

[Action: Mr. M.D. Tiwari, Scientist - D]

ii. **[AIT-4727] Integrated biotechnological approach towards improvement of quality and productivity of tropical tasar silk.** (December, 2017-December, 2020; Extended up to June, 2021) (Funded by DBT)

Sub Project-1: Sequencing of whole-genome of Tasar silkworm, *Antheraea mylitta* (in collaboration with NIAB, Hyderabad) [PI: Dr. J. P. Pandey, Scientist -D]

House agreed with the progress of project in the area of whole genome sequencing of *A. mylitta* for the first time. It was suggested to prepare the follow-up project Phase II entitled "Unraveling of genes responsible for productive traits of tasar silkworm *Antheraea mylitta* using functional

genomics approach" in RMIS-1 and should focus on expertise and infrastructure available with the Institute.

[Action: Dr. J.P. Pandey, Scientist-D & PI]

Sub Project 2: Genetic characterization of tropical Tasar silkworm, *Antheraea mylitta* through single nucleotide polymorphism based molecular barcode (in collaboration with University of Hyderabad) [PI: Dr. I.G. Prabhu, Scientist -C]

Director observed that the achievement should be crisp and presented in bulleted form with focus on takeaway of the project. It was also suggested to utilise the budget properly, as the budget under consumables was not utilized under the project.

[Action PI: Dr. I.G. Prabhu, Scientist-C & PI]

iii. **[AIT-4728] Identification of the most-active cocoonase of sericigenous insects through molecular characterization** (February, 2018-February 2021; extended up to August, 2021) (Funded by DBT, in collaboration with IISER, Pune and BIT, Mesra) [PI: Dr. J. P. Pandey, Scientist -D]

Director suggested to PI to present the outcome in bulleted form (1-2 lines). For calculating the economics of softening of cocoons with Papain and trypsin should be done for at least 200 cocoons. In future projects, the statistical method, treatments and sample size should be done in consultation with statistician. Further for studying the PCT characters at laboratory level, the sample size should be in consultation with PCT section and also CSTRI. It was felt atleast the sample size of 50 cocoons with three replications at institutional level and 200 cocoons with three replications at field level. PCT section should submit the details of the parameters to be studies, statistical methods, number of replications, sample size etc., for the PCT parameters latest by 5th October 2021.

It was advised to include the cocoonase variant trypsin and papain feasibility in cocoon softening/silk processing as OST at six places including Kharsawan & CTR&TI Ranchi. Also, taking up of trials at more places may be explored for its immediate popularization.

[Action: Dr. J.P. Pandey, Scientist-D & PI]

Agenda NO. 5: Progress of Ongoing projects

A. <u>CSB Funded Projects</u>

i. **[PIN04001SI] Development of a package for optimum nutritional requirement of tasar host plants for producing quality Tasar cocoons** (February, 2019 - January 2022) [PI: Dr. Jitendra Singh, Scientist-C]

Director advised that expenditure should be presented in % of approved budget in case of all ongoing projects, also. He also observed that there should have been a row of plants between the treatments /replications to avoid or minimizing the effect of leaching. It was suggested to discuss the experimental design with expert statistician for possible midterm corrections, if possible.

[Action: Dr. Jitendra Singh, Scientist-C & PI]

ii. **[AIE-3555] Cryopreservation of tasar silkworm, *Antheraea mylitta* semen and its artificial insemination** (February 2016 - September 2019, extended up to September, 2021) [PI: Dr. J.P. Pandey, Scientist-D]

It was observed that requisite expertise is not available at the Institute. After repeated attempts, hatching could not be achieved in the inseminated moths. PI was advised to seek the advice from concern field expert if any, prior to closure of the project.

[Action: Dr. J.P. Pandey, Scientist-D & PI]

iii. **[AIT04002SI] Selection of stable thermos-tolerant line(S) of tropical tasar silkworm *Antheraea mylitta* through SCAR markers** (February, 2019- January 2022) [PI: Dr. I. G. Prabhu, Scientist-C]

PI submitted that multi-location trial could not be taken due to COIVID-19 pandemic and requested for extension of the project period. It was suggested to submit the request with justification for consideration by RAC in its next meeting and RCS.

[Action: Dr. I. G. Prabhu, Scientist-C & PI]

iv. **[APS 04003 SI] Studies on the reproductive potential of Tasar silkworm *Antheraea mylitta* D with special reference to nutritional and mechanical indices** (March, 2020- February 2022) [PI: Dr. Mala. N, Scientist-B]

It was decided that Dr. K. Jena will be the P.I. and experiments related to volatile will be taken care by Dr. Gadad. Until the administrative approval and budget will be conveyed by RCS, the expenditure shall be met with the approved budget of the project.

[Action: Dr. K. Jena, Scientist-D & Dr. Gadad, Scientist-D]

v. **[BPC 04005SI] Tasar waste to wealth by Cordyceps**. (March, 2020- February 2022) [PI: Mr. M.M. Baig, Scientist-C]

Regarding low utilization of budget, Dr. G.P. Singh informed that on GeM portal the equipments proposed were available at lower price. Hence, under equipment head some fund was left despite procurement of all the equipments. Director asked for revising the overall budget and if required there can be re-appropriation of the budget, with approval of CO. For culturing cordyceps on Muga, it was suggested to procure the Muga refuse material before next RAC.

[Action: Mr. M.M. Baig, Scientist-C & PI]

vi. **[ARE 04006 CN] Management of important pests of Tasar silkworm *Antheraea mylitta* (D) through botanical repellents** (April, 2020- March 2022) [PI: Dr. H.S. Gadad, Scientist-B]

The In-charges of BSM&TC should be consulted for the field related issues/projects. The P.I. should visit at least 2 field units/BSM&TCs, besides seeking expert consultation/ collaboration.

[Action: Dr. H.S. Gadad, Scientist-B and PI]

vii. **[AIB-4717] Improvements of tropical tasar silkworm *Antheraea mylitta* D for high silk yield through recurrent Selection** (Oct 2020 - Sept, 2022) [PI: Dr. Niranjan Kumar, Scientist-D]

Director expressed dissatisfaction on the project approach, as breeding studies cannot be restricted to specific host plant. Also he suggested virgin areas should be explored to avoid Pebrine contamination while stabilising the initial generations, besides to ensure minimal exploitation. While Dr. Niranjan Kumar suggested taking Kurjuli as a breeding hub, it was advised not to depend on one location, as dependency on Kurjuli by DOS and others is increasing.

Director felt in absence of continuous maintenance of any of silkworm lines at P4 Chakradharpur, conservation of Daba eco-race at two or three places with less human interference need to be planned immediately. If required, permissions from the Department of Forest can be sought. He also suggested to concentrate on such systematic conservation work, which would serve as reserve for future breeding work, besides integrating the same with Biotechnological work, simultaneously utilising the said genetic resources.

During discussion on the report submitted by Dr. Niranjan and Dr. Prabhu regarding the declining performance of CTR-14 was discussed. In view of the decision of HAC, the scientists were advised to inform CO on the possible action in the mater.

[Action: Dr. Niranjan Kumar, Scientist-D & PI]

CSB Funded Collaborative Projects

viii. **[AIE 04004 CN] Study on existence of tropical Tasar silkworm ecoraces and their subsist places with the help of geospatial technology** (In collaboration with NESAC, Shillong) (March, 2020- February 2022) [PI: Dr. I. G. Prabhu, Scientist-C]

Collaboration with IFP, Lalgutwa, Ranchi was proposed by the PI, as per discussions with NESCA, Shillong during the training programme. It was decided to remind CO for the approval and work out the revised budget for placing before next RAC.

[Action: Dr. I. G. Prabhu, Scientist-C & PI]

ix. **[BPS 01013 CN] Utilization and diversification of silkworm pupae products for human & animal consumption and composting** (In collaboration with ICAR-CIFRI, Kolkata, CSIR-CFTRI, Mysuru, CSTRI, Bengaluru, CSRTI, Mysuru & CMERTI, Ladoigarh. (Oct, 2020 - Sept, 2022) [Co-PI: Dr. K. Jena, Scientist-D]

Director observed that the diversification is meant for utilization of chitin and other by-products also. PI was suggested to regularly keep in touch with CSRTI Mysore to ensure the tasar component wrt all objectives is attended to.

[Action: Dr. K. Jena, Scientist-D & PI]

C. Externally Funded Projects

x. **[BPC 04008EF] Mass level extraction of sericin from tasar cocoon cooking waste water for its prospective utilization** (March, 2021- March, 2024) [PI: Dr. K. Jena, Scientist-D] (DBT funded)

The PI presented the progress made since last RC meeting. It was suggested to speed up the process of procurement of equipment and consumables at the earliest.

xix. **[MOE 04007EF] Establishment of Biotech-KISAN Hub at Professional Assistance for Development Action (PRADAN), Deoghar, Jharkhand for three Aspirational Districts of Jharkhand (Godda, Dumka and Pakur)** (Collaborative Project with PRADAN) [PI: Dr. J.P. Pandey, Scientist-D] (DBT funded)

The PI briefed the house about progress of the project. The project progress was also discussed with Dr Aslam on 25.9.2021.

E. Collaborative Projects of Other Institute

xii. **[CFC07006MI] Studies on tasar cocoon drying and cooking using CSTRI Conveyer Dryer and pressurized cooking technology** (March, 2018 to Feb., 2021) [CI: Mr. Mr. Z.M.S. Khan, Scientist-D]

Director has observed that in view of focus by the DOS Jharkhand to establish conveyer dryer in Kolhan region, non-submission of reports by CSTRI would hamper its promotion. He suggested to seek the said reports from the Director, CSTRI, Bangalore under copy to CO, CSB, in this regard.

[Action: Mr. Z.M.S. Khan, Scientist-D]

AGENDA NO. 6: Trial of Technologies (OSTs/ OFTs):

Following were decided for refinement of the proposed project on OST /OFT:

i. For trial of cocoonase, at least 6 locations including CTR&TI, Ranchi and Kharswan shall be included, besides at few reelers in major reeling clusters. Mr. D. Chattopadhyay should also be involved in the trial.

ii. For validation of chemical trap for Ichneumon wasp, BSM&TC, Kharswan and Kathikund should also be included.

iii. Trial of Steam Borer should also be conducted as BSM&TC, Kharswan and Kathikund.

iv. Trial of PSB to be conducted at CTR&TI also in addition to RSRSs.

v. Validation and popularization of cooking package should also be taken at STSC, Bhagalpur. Anything related to PCT issue should be taken in coordination with STSCs/ RSTRSs, State representatives of Jharkhand, Odisha and Chhattisgarh should also be involved, to cover major ecoraces. Component-wise unit cost of the technology should be given along with Benefit: Cost Ratio.

vi. Trial of Light reflector paints shall be tried at BSM&TCs with RCC roof, PPCs and BSPUs as they produce nucleus seeds and not at private grainages which produce only commercial dfls, which is in most favourable season for a short duration and does not involve long term preservation of cocoons. Maximum number of locations should be considered to avoid OFT and for its immediate commercialisation.

vii. Assessment of feasibility for solar energy utilization in Tasar reeling and spinning to be included in TOT project.

viii. Scientists should submit the revised trial details with stepwise methodology (process document) as suggested by RCS, to be followed by the stakeholders by 5th October 2021. Unit cost (item wise, quantity and value) man-days for sprays and benefit cost ratio should also be added. Actual cost of technology and travel budget should be mentioned separately. Revised project should be submitted by 5th October 2021.

AGENDA NO. 7: EXTENSION COMMUNICATION PROGRAMMES(ECP) AND OTHER PROGRAMMES

Progress of Extension (ECP) and other programme presented by the Scientist-D, SEEM, Division was found satisfactory.

AGENDA NO. 8: TRAINING (CBT) AND OTHER PROGRAMMES

Progress on HRD & Training was presented by the Scientist-D, Capacity Building &Training. Training section was asked to prepare the material for the exposure visit & FST.

AGENDA NO. 9: DISCUSSION ON GENERAL COMMENTS / SUGGESTIONS OF RC/RAC

General comments and suggestions of 59th RC and 48th RAC were discussed and measures taken to speed up the fund utilization of R&D projects were reviewed.

For mass multiplication of *L. speciosa*, Host plant division should seek support from Forest departments as they are already into seedling preparation for their regular programmes and they should concentrate on multiplication of Accession No.102 & 123.

ANY OTHER POINT:

- Maintenance of Technology Park has to be done on priority by the Host Plant division and the structures should be ready for visit by RAC members by 25.10.2021.
- Regarding under-utilization of budget, Director stressed for serious planning for budget proposed and proper utilization of the approved budget, which shall be part of all reviews.
- The indents should be placed for procurement of equipment within the first month of approval of the project and allotment of code.
- Two/ three days training on statistics shall be organised for the scientists. Dr. Suresh Rai may be consulted as expert while formulating new projects and expenditure may be incurred from the available budget, to decide on design, replications, sample size etc.
- Any patentable product or technology developed either from projects or pilot studies may be considered for patenting.
- PCT activities starting from stifling to storage of cocoons, reeling, twisting, weaving etc. should be displayed in the section for visitors.

The meeting ended with a vote of thanks to the chair.

-Sd-

Dr. K. Sathyanarayana
DIRECTOR

Annexure-I

LIST OF PARTICIPANTS ATTENDED 60th MEETING OF THE RESEARCH COUNCIL HELD ON 24TH SEPTEMBER 2021 AT CTR&TI, RANCHI

1) Dr. K. Sathyanarayana, Director, CTR&TI, Ranchi
5) Dr. Niranjan Kumar, Scientist-D, CTR&TI, Ranchi
6) Dr. G.P. Singh, Scientist-D, CTR&TI, Ranchi
7) Dr. A.H. Naqvi, Scientist-D, CTR&TI, Ranchi
8) Dr. S. Gandhi Doss, Scientist-D, CTR&TI, Ranchi
9) Mr. M.D. Tiwari, Scientist-D, CTR&TI, Ranchi
10) Ms. Susmita Das, Scientist-D, CTR&TI, Ranchi
11) Dr. J. P. Pandey, Scientist-D, CTR&TI, Ranchi
12) Dr. K. Jena, Scientist-D, CTR&TI, Ranchi
13) Dr. Vishal Mittal, Scientist-D, CTR&TI, Ranchi
14) Mr. Debasish Chattopadhyay, Scientist-D, CTR&TI, Ranchi
15) Dr. Jitendra Singh, Scientist-C, CTR&TI, Ranchi
16) Dr. D.I.G. Prabhu, Scientist-C, CTR&TI, Ranchi
17) Dr. Harendra Yadav, Scientist-C, CTR&TI, Ranchi
18) Dr. H.S. Gadad, Scientist-B, CTR&TI, Ranchi