

MINUTES OF THE 44th MEETING OF THE RESEARCH ADVISORY COMMITTEE (RAC), HELD ON JULY 20, 2016 AT CSR&TI, BERHAMPORE, WEST BENGAL

The 44th Meeting of the Research Advisory Committee (RAC) of Central Sericultural Research & Training Institute (CSR&TI), Berhampore was held on July 20, 2016 at Berhampore to review the progress of R&D interventions made by the scientists of the Institute/Regional Sericultural Research Stations (RSRSs) during the last six months. The meeting was chaired by Prof. Saroj Kumar Sanyal, former Vice-Chancellor, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal.

Dr. S. RoyChowdhuri, Scientist-D, CSR&TI, Berhampore welcomed the Chairman, Members of RAC, Invitees and the participants for the meeting.

At the outset, Dr. Kanika Trivedy, Director, CSR&TI, Berhampore welcomed Prof. Saroj Kumar Sanyal, Chairman, Dr. S. Nirmal Kumar, Former Director, CSR&TI, Berhampore and Advisor, DoS, Tripura and BTC, Assam, all the distinguished members of the RAC, invitees and officers from the Eastern and the North-Eastern states and scientists of the Institute, nested RSRSs and RECs, invitees from the collaborative institutes and participants and requested for their valuable suggestions for the benefit of the sericulture stakeholders in the Eastern and the North-Eastern regions. Thereafter, the Director presented the highlights of the R&D interventions and achievements of this Institute.

Prof. Sanyal, Chairman, RAC in his opening remarks expressed thanks to Dr. Kanika Trivedy, Member-Convenor, distinguished members of the RAC, participants, representatives of Director of Sericulture from different States and scientists of the Institute for their presence. He appreciated convening the meeting of RAC in quick succession for taking stock of the R&D activities for the development of sericulture industry in the regions. With the joining of a new group of young and talented scientists (in Category B) at the CSR&TI, Berhampore, he expressed hope that the Institute would be in a position to serve the interest of the sericulture industry, as well as the farmers (the ultimate end-users) better.

Dr. S. Nirmal Kumar, former Director, CSR&TI, Berhampore expressed thanks for inviting him as a special invitee for the RAC meeting and suggested to take some quick measures to reduce the technology gap from lab to land which will ensure the economic benefit to the stakeholders and advised for focused attention of the Institute in this regard.

The list of participants is appended in **Annexure – I**.

RELEASE OF BOOK/ BOOKLET /BROCHURE / PAMPHLETS

The following book was released for the benefit of students/ stakeholders.

Book: 1. Training Manual: Training Manual on silkworm Diseases & pests.

Thereafter, agenda-wise items were taken up for discussion.

ITEM NO.1: CONFIRMATION OF THE MINUTES OF 43rd MEETING OF RESEARCH ADVISORY COMMITTEE (RAC) HELD ON 16th- 17th MARCH, 2016 AT CSR & TI, BERHAMPORE, WEST BENGAL.

As no comment was received from the Members of the RAC, the Minutes of the 43rd Meeting of the RAC were confirmed.

ITEM NO.2: REVIEW OF THE FOLLOW-UP ACTION TAKEN ON THE RECOMMENDATIONS/ DECISIONS OF THE 43rd MEETING OF RAC HELD ON 16th- 17th MARCH, 2016.

Altogether twenty one decisions / recommendations of the last RAC meeting were discussed and the action taken report was found satisfactory.

Regarding the new project **PIC 3554: “Candidate gene-based molecular marker (s) for screening promising recombinants in mulberry”**, it was observed that Bose Institute, the collaborator, had not signed the MoA and is not ready to work with the CSR&TI, Berhampore. Therefore, Dr. R. Banerjee, Scientist-D was advised to take up the project independently. She was also advised to tag other collaborator(s), if possible, instead of Bose Institute to fulfil the milestones or *else* if the scientists of the Biotechnology section have expertise in this line, their names may be included in the project. For that an approval is necessary from the Central Office (C.O.), Bangalore.

[Action: Dr. R. Banerjee, Scientist- D, MBG Section]

Regarding the project **PPS-3559: “Testing of Carbon capturing potential in mulberry in different locations”**, in regression equation negative correlation with maximum temperature and positive correlation with minimum temperature was noted. It was advised to analyze the data statistically at each location with respect to different seasons and to present the findings in the next meeting of the RAC.

[Action: Dr. R. Kar, Scientist-D & Co-ordinator of the project, RSRS, Kalimpong]

Regarding the project **AIT 3557: “Conduct of multi-locational trials of transgenic silkworm hybrids under contained facilities”**, the RAC advised that WBSDC approval from the State Department is necessary. The project work at CSR&TI, Berhampore has been completed. The scientist should not publish any paper in this line.

[Action: Dr. Jayeeta Sarkar, Scientist-D, SW Physiology &RTI Section]

ITEM NO. 3: DIRECTOR’S REPORTS ON THE R&D PROGRESS MADE DURING JANUARY TO JUNE, 2016

Dr. Kanika Trivedy, Director, while focussing on the R&D strategies for the development of sericulture in the days to come in the Eastern and the North-Eastern regions, presented the achievements made on mulberry and silkworm productivity improvement, crop protection, innovations and cost reduction, human resource development, extension and developmental activities.

ITEM NO. 4a: CONSIDERATION OF NEW RESEARCH PROJECT PROPOSALS OF THE MAIN INSTITUTE & NESTED UNITS

Fourteen new research projects proposals were critically reviewed and decisions taken were as follows:

1. Title of the Project: **Arsenic contamination in mulberry sericulture of Bengal plain and its alleviation through application of zinc in soil**—by Dr. V. Vijay, Scientist-B, Soil Science Section.

Duration: 3 years

Observation/ Suggestion: The PI was advised to conduct experiment with soils collected from the naturally occurring arsenic contaminated sites, especially Chakdah Block, Nadia or Kaliachak Block, Malda. He was advised to measure the arsenic concentration (WHO approved toxic limit) in different plant parts, including the root which is likely to record maximum accumulation. The project needs to be thoroughly overhauled, especially in respect of the proposed methodology and sent to Prof. S.K. Sanyal, Chairman, RAC for necessary suggestion / modification before sending the same to the Central office, Bangalore for securing the Code No.

Decision of RAC: Approved. PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Dr. V. Vijay, Scientist-B, Soil science section]

2. Title of the Project: **Improvement of leaf quality and productivity through external application of seaweed extracts in mulberry (*Morus alba* L.)**– by Shri Anil Pappachan, Scientist-B, Mulberry Pathology Section.

Duration: 1 year

Observation/ Suggestion: The project was discussed at length. The sea weed extract is acidic and its application for plant productivity improvement is not encouraging. Besides reports of similar work conducted earlier at the institute, resulting in low consistency and high variability, are available. Moreover, if mulberry plants have access to its optimum requirement of nutrients, water, sun shine, *etc.*, then the effect will be minimal. Therefore, the concerned scientist was advised to carry out the work using new formulations of sea weeds extracts and to come out with significant results.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Shri Anil Pappachan, Scientist-B, Mulberry Pathology Section]

3. Title of the Project: **Evaluation of low-cost drip fertigation systems on yield and quality of mulberry leaves**– by Dr. R. Mahesh, Scientist-B, Moriculture-I Division.

Duration: 3 years

Observation/ Suggestion: Earlier studies conducted should be referred and the calculated economics should be taken into consideration. Use of solar pump for low-cost drip fertigation may be taken as source of power. The PI was advised to check the fertilizers to be used since the commercial-grade solid fertilizers are generally not fully soluble in water which may block the fertigation tubes/pipes. The fertilizer chemistry (mixing compatibility, precipitation, clogging, and corrosion), water quality including pH, salt and sodium hazards and toxic ions need to be understood. Special attention is also required regarding pH, $\text{NO}_3^-/\text{NH}_4^+$ ratio and nutrient mobility in soil. The PI was advised to include 2' x 2' spacing as a separate experiment and compare with 3' x 3' spacing. He was advised to calculate the cost-effectiveness and feasibility of the study from the stakeholders' point of view.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Dr. R. Mahesh, Scientist-B, Moriculture-I Division].

4. Title of the Project: **Application of Growing Degree Days as a model driver for developing mulberry yield weather model**– by Dr. M. Chaudhuri, Scientist-D, Moriculture-I Division.

Duration: 2 years 3 months.

Observation/ Suggestion: The project was discussed at length and it was suggested to study the Growing Degree Days (GDD) for silkworm dynamics simultaneously as it is very important to synchronise the insect /plant growth which has to coincide in order to bio-fix the dates. Scientists of Silkworm Physiology & RTI section may be included as Co-investigators in the project. After the development of the model, it needs validation at RSRS/ RECs.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Dr. M. Chaudhuri, Scientist-D, Moriculture- I Division]

5. Title of the Project: **Development of thermo-tolerant bivoltine breeds / hybrids of silkworm, *Bombyx mori* through marker assisted selection** – by Shri N. Chandrakanth, Scientist-B, SBG Section.

Duration: 5 years

Observation/ Suggestion: After a threadbare discussion, it was observed that the institute has already identified a few thermo-tolerant breeds; therefore the RAC felt that further screening of the breeds is not required. The concerned scientist should directly use the breeds already identified as thermo-tolerant (SK4C and BHR3) as parent for breeding programme. Further, CSR&TI, Mysore, has identified five polymorphic markers in the eighth linkage group. The PI was also advised to consult Dr. S. Nirmal Kumar, Former Director, CSR&TI, and Berhampore and Expert for redesigning the project.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Shri N. Chandrakanth, Scientist-B, SBG Section]

6. Title of the Project: **Assessment of designed antimicrobial peptides for mulberry protection against brown leaf spot and root rot: a biotechnological approach**– by Dr. S. Chattopadhyay, Scientist-D, Biotechnology Section.

Duration: 3 years

Observation/ Suggestion: The RAC appreciated the PI for the proposal of useful research project and suggested the use of synthetic antimicrobial peptides. The selected AMPs need to be analysed for amino acid sequences against AMP data base.

Decision of RAC: Approved. The PI was advised to submit the project and obtain the Code No. from the Central Office, Bangalore.

[Action: Dr. S. Chattopadhyay, Scientist-D, Biotechnology Section]

7. Title of the Project: **Studies on the efficacy of phototrophic bacterial extracts as feed supplement for management of diseases in silkworm, *Bombyx mori* L.** -by Shri K. Rahul, Scientist-B, SW Pathology Section.

Duration: 3 years

Observation/ Suggestion: The RAC advised the PI to conduct study of gut micro-flora of silkworm reared with normal diet as well as the enriched diet. The growth kinetics of bacteria needs to be studied. Investigation must be carried out to ensure that the produced biomass is innocuous before its use.

Decision of RAC: Approved. The PI was advised to submit the project for Code No. from the Central Office, Bangalore.

[Action: Shri K. Rahul, Scientist-B, SW Pathology Section]

8. Title of the Project: **Organic pest management in mulberry cultivation with special reference to sucking pests in West Bengal**– by Shri Raghavendra K. V., Scientist-B, Entomology Section.

Duration:3 years

Observation/ Suggestion: The project proposal was discussed at length. Use of maize and brinjal as guard crops on the border of mulberry plantation would deplete the nutrients from the soil of the mulberry garden. Besides, crude extracts of plants have no merit unless the active ingredients are isolated and their quantities are determined for effective use. As maize and brinjal are nutrient exhausting plants, the PI was advised to drop the idea of using them. He was advised to modify the project accordingly.

Decision of RAC: Not approved as such. However, the RAC advised the PI to use the commercially available botanicals (which are yet to be tested on mulberry) and conduct the experiment for a period of one year, as a pilot study. It is desirable to investigate the efficacy of the product in sericulture ecosystem. The efficacy of plant products is known to depend on the presence of specific organic compound which may interfere with the physiology of silkworm. The components may belong to different chemical groups of secondary metabolites of plants. A holistic approach, involving in-depth research for using botanicals in sericulture, needs to be assessed. The project should be re-submitted with the suggestions and then sent to the Central Office, CSB, Bangalore for obtaining the Code No.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Shri Raghavendra K. V., Scientist-B, Entomology Section]

9. Title of the Project: **Study on mulberry sericulture production in West Bengal: A statistical approach**— Dr. G. R. Manjunatha, Scientist-B, PMCE, CSR&TI, Berhampore (presented by Mr. Shafi Afroj, Scientist-B, REC-SU, Gumla).

Duration: 1 year 6 months

Observation/ Suggestion: The RAC advised the PI to develop the data base, determine mulberry sericulture growth rate and correlate the results with the set mission and vision of the silk industry. The conceptual issues need to be brought out very clearly. The appropriate formula/technique for determining the production function and resource use efficiency needs to be indicated. The variables to be included should never be decided now and the same should be based after plotting the scatter diagram. It will be more appropriate to have simultaneous equation for mulberry and cocoons. Feed which influences the cocoon production becomes a very important variable and therefore it should be included.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Dr. G. R. Manjunatha, Scientist-B, PMCE Division]

10. Title of the Project: **Yield gap analysis in mulberry leaf and cocoon production – A study in Eastern Ghat highland zones of Odisha** –by Dr. M. K. Ghosh, Scientist-D, RSRS, Koraput, Odisha.

Duration: 2 years

Observation/ Suggestion: The project was discussed elaborately. It was suggested to consider the actual number of plants existing per acre. The analysis of the mulberry leaves and cocoon production ought to precede the study the yield gap.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Dr. M. K. Ghosh, Scientist-D, RSRS, Koraput, Odisha]

11. Title of the Project: **Skill gap analysis and capacity development of sericulture extension workers and farmers**- by Shri Shafi Afroj, Scientist-B, REC, Gumla, Jharkhand.

Duration: 2 years

Observation/ Suggestion: The RAC suggested the need to identify the critical skills. The project should also consider the impact of upcoming statutory or regulatory changes on the work as well as development of a list of competencies that most clearly and accurately describe what is needed to conduct the given study. The RAC suggested that the study should be conducted with the farmers of traditional (three

districts) of West Bengal and non-traditional (three districts) of Bihar and Jharkhand for comparison. It was also suggested to include Dr. G.R. Manjunatha, Scientist-B as Co-investigator for statistical designing and analysis.

Decision of RAC: Approved. The PI was advised to modify the project following the above noted guidelines and then submit the modified project for sending it to the Central office, Bangalore for Code No.

[Action: Shri Shafi Afroz, Scientist-B, REC, Gumla]

ITEM NO. 4b: CONSIDERATION OF NEED BASED PROJECTS/ PROGRAMMES/ PILOT STUDY PROPOSALS OF THE MAIN INSTITUTE & NESTED UNITS

PROJECT:

1. Title of the Project: **Soil health card preparation and mapping of nutrient status of mulberry growing soils in Eastern and North-Eastern India**– by Dr. M. Chaudhuri, Scientist-D, Moriculture-I Division (in collaboration with NBSS & LUP, Regional Centres, Kolkata & Jorhat).

Duration: 3 years

Observation/ Suggestion: The project was discussed elaborately on the kit to be used for soil samples testing. The Chairman suggested that PUSA Soil Test Fertility Meter (PUSA STFR), developed by IARI, New Delhi, may be procured by the Institute for cross-check of selected results of soil analysis (at random), to be conducted by the use of Mridaparikshak.

Decision of RAC: Approved. The PI was advised to submit the full project for approval and Code No. by the Central Office, Bangalore. It may be noted that the project was approved by the Member Secretary, CSB in the Video-Conference held with the Director with the CSB institutes' on 22.06.2016.

[Action: Dr. M. Chaudhuri, Scientist-D, Moriculture-I Division]

PROGRAMME:

1. Title of the Programme: **Mulberry Application (M-app) for data: An ICT approach** - Dr. G. R. Manjunatha, Scientist-B, PMCE, CSR&TI, Berhampore (Presented by Shri. Shafi Afroz, Scientist-B, REC, Gumla).

Duration: 1 year

Observation/ Suggestion: It was suggested to take all the care and measures for ensuring the security of the data, to be uploaded on the website through the software packages, as well as the total control over the data. It was also suggested to upload the simulated data on trial basis to check the efficacy of the package / m-app and if required, necessary modifications may be made for improvement.

Decision of RAC: Approved. The PI was advised to submit the programme proposal for Code No. from the Central Office, Bangalore.

[Action: Dr. G. R. Manjunatha, Scientist-B, PMCE Division]

PILOT STUDY:

1. Title of the Project: **Identification of bio-chemical markers for thermo-tolerance in silkworm (*Bombyx mori* L.)** – by Ms. Pooja Makwana, Scientist-B, Biotechnology Section.

Duration: 1 year

Observation/ Suggestion: The RAC noted that in the current scenario, the DNA markers have become the marker of choice for the study, as they are readily detected and are amenable to easy monitoring of the inheritance. Biochemical markers are generally not robust with their main weakness being relatively low abundance and low level of polymorphism. In fact, the latter are phenotypic markers and as such they are

influenced by the environmental conditions. However, the RAC suggested tuning up of the study as a pilot one for submission to the Central Office, Bangalore.

Decision of RAC: Approved. The PI was advised to submit the pilot study for Code No. from the Central Office, Bangalore.

[Action: Ms. Pooja Makwana, Scientist-B, Biotechnology Section]

ITEM NO. 5: REVIEW OF CONCLUDED PROJECTS / PROGRAMMES

During the period, as per the time schedule, three projects were concluded.

- 1. AIB-3501: Development of multivoltine breeds with high shell% and neatness-** Dr. A.K.Verma, Scientist-D, SBG Section.

It was observed that although the project has been concluded as per the milestones, the data so far recorded needs to be analysed statistically. The PI was advised to analyse the data, and come out with the recommendations. He was further requested to present the concluded report in the next meeting of the RAC.

[Action:Dr.A.K.Verma, Scientist-D, SBG Section]

- 2. PRE 3508:** Studies on the standardization of the mass multiplication and field efficacy of *Scymnus pallidicollis* for the eco-friendly management of Tukra-Shri D.Das, Scientist-D, Entomology Section.

The economics of mass multiplication of *Scymnus pallidicollis* needs to be worked out and popularised. Release of predators @200 pairs/acre is insufficient. Augmentative release of predators should initially be on the higher side to support their survivability in the adverse environment. Awareness needs to be created among the farmers about all the native predators existing in natural balance in the mulberry ecosystem. The PI was advised to analyse the data statistically and come out with the recommendations and also popularize the findings for the benefit of the stakeholders. The action taken report needs to be furnished in the next RAC meeting.

[Action:Shri D.Das, Scientist-D, Entomology Section]

- 3. PRE-3511:** Studies on predatory efficacy of coccinellid predator, *Scymnus posticalis* Sicard for management of white fly on mulberry - Dr. U.C.Barua, Scientist-C, RSRS, Jorhat, Assam.

The PI was advised to submit the concluded report, while the technology generated, if any, may be popularized in the field.

[Action:Dr.S.N.Gogoi&Dr.U.C.Barua, Sci-D, RSRS, Jorhat, Assam]

Comments of the RAC Chairperson, the Members and other distinguished participants:

Dr. M. V. Samson, Member, RAC, thanked the Director for her dynamic leadership and guidance to the scientists in R&D interventions. While appreciating the efforts of the scientists, he suggested that during preparation of project in respect of control of mulberry pests, recommended botanicals need to be selected. He advised the newly joined scientists to visit the field in order for to be acquaintance with the stakeholders and their socio-economic conditions.He advised the extension functionaries to take special care in respect of the disinfection at the farmers' level.

Prof. Kanchan Baral, Member, RAC, thanked the Director and appreciated the efforts of the young scientists of the Institute, especially on biotechnological aspects. He urged to put stress on the use of organic formulations and pheromone trap for management of mulberry pests.

Dr.P.K.Mishra, Director (Tech.), CSB, Bangalore, Member, RAC appreciated the newly joined scientists for their presentations and suggested them to come forward with new concepts. He advised the young scientists to go through the Annual reports of the previous years and other research publications of the Institute before

formulation of the projects which should be farm/farmers-oriented in place of being laboratory-and/or computer-oriented. He felt that the young scientists should frequently visit the farmers' field to collect grass-root level information and know their basic needs for crop success. Further, he pointed out that most of the senior scientists being on the verge of retirement, the newly recruited young scientists should take guidance from the senior scientists towards the new approach in research.

Dr. A.Sahay, Director, CSGRC, CSB, Hosur -Invitee, RAC suggested to formulate the need-based projects and include the appropriate technological interventions. He expressed that during the formulation of region-based projects, involvement of the appropriate State Sericulture Department (DoS) is very much essential. He also suggested to explore the possibilities of external funding. He opined that the profitability and sustainability of sericulture can be increased only through needful mechanization and drudgery reduction.

Shri A.K.Pani, Deputy Director, Berhampore, West Bengal [Representative of Commissioner, DoT (Seri)]-Member, RAC expressed concern regarding white fly-infestation, recently reported in Murshidabad district, for which suitable control measures to address the white fly menace need to be adopted on urgent basis. He also urged for continuous supervision of the activities of the registered chawki rearers (RCRs) by specialist scientists. He also informed that inspection of seed-crops and issue of seed certification to the farmers/ CRC owners is mandatory to ensure production of quality silks.

Shri Ranjit Bhattacharjee, Joint Secretary (Tech.), R.O., CSB, Kolkata-Member, RAC, suggested giving attention on white fly problems. He also emphasized that the farmer representatives been enlightened with the gist of the concluded project reports in their local languages for better understanding, followed by effective carrying forward of the same to their peers at the grass-root level.

Md. Khadim Attique, PPC, MPRaj, Jharkhand [Representative of Director, DoS, Government of Jharkhand, Ranchi]-Member, RAC expressed satisfaction at the proceedings and felt the necessity of the collective efforts of both the State Government and the Central Silk Board for enhancing the mulberry acreage in the region.

Shri Prasenjit Ray, Scientist, NBSS & LUP, Regional Centre, Jorhat, Invitee, RAC suggested appropriate measures for getting optimum results from the soil analysis.

Shri R.P. Rai, ADS, DoS, Gangtok, Sikkim [Representative of Director, DoS, Gangtok, Sikkim] -Member, RAC expressed thanks to the RAC and scientists of the Institute. He informed that the technologies developed by the Institute are being adopted by the Seri-farmers in Sikkim.

Suresh Ch. Behera, ADS, Director [Representative of Director, DoS, Odisha] -Member, RAC, expressed his satisfaction at the R&D intervention of the Institute. He urged for developing season- /region-specific breeds of silkworm for Odisha state. Collective efforts need to be made both by DoS (Odisha) and CSB to sustain the sericulture in Odisha. The State Government officials should also be included in the projects, while periodic discussion needs to be undertaken for mulberry sericulture development in Odisha state.

Shri R. P. Mandal, Assistant Secretary (Tech.), R.O., CSB, Patna, Bihar, Member, RAC, expressed satisfaction at the proceedings and thanked the RAC.

Shri S. N. Acharya, Deputy Secretary (Tech.), RO, Bhubaneswar, Odisha, Member, RAC, suggested the need for development of drought-tolerant mulberry variety for Odisha state. He was informed that C-1730, a drought tolerant mulberry variety, is available for adoption in Odisha state. He also requested to conduct awareness programmes during seed-crop rearing for benefitting the stakeholders. The Director, CSR&TI, Berhampore informed that such type of awareness programmes are being conducted by RSRS and RECs in Odisha.

Dr. Kalidas Mandal, Scientist-D, ZSSO, Malda [Representative of Director, NSSO, CSB, Bangalore] - Member, RAC, discussed the benefit of the stakeholders and suggested a comparison with the stakeholders in South India in regard to the adoption of technologies. He also suggested that the gaps relating to technology adoption need to be reduced by taking appropriate measures. Transfer of technology programmes should also be strengthened.

Md. Sufian Ali, Farmers' representative, Member, RAC, expressed satisfaction on rearing of Bivoltine hybrids and expressed happiness for better price of bivoltine cocoons that the farmers are getting in Malda and other districts in West Bengal.

Shri Prafulla Kumar Mandal, Reelers' representative, Member, RAC, expressed his satisfaction at the price improvement of mulberry cocoons and yarn. He expressed interest in the Wetting Agent (WA) developed by the Institute for reeling efficiency and improvement of quality yarns.

Dr. Kanika Trivedy, Director, CSR&TI, Berhampore, Member Convenor, RAC, expressed her happiness for active participation of the RAC members, invitees of collaborating units, Directors' representatives of DoSs and scientists from different units of the Central Silk Board. She stated that the interactions were meaningful and effective, particularly the guiding role played by the Chairman, RAC. She thanked all the RAC members, experts for their valuable suggestions. She expressed that more research is required regarding the control of mulberry pests, especially whitefly and pebrine, the dreaded disease of silkworm. She thanked the DoSs for coordination received for development of sericulture in the Eastern and the North-Eastern regions.

Dr. S. Nirmal Kumar, Former Director, CSR&TI, Berhampore & Advisor, DoS, Tripura and BTC, Assam, appreciated the efforts of the scientists and suggested to take the comments / suggestions made in the right perspective towards reaching the goals. He also expressed that the new scientists should be well-trained in every aspect of rearing activities. Expressing thanks to the Chairman, RAC and members for their valuable suggestions and guidance to the scientists, he emphasized that the immediate need is to reduce the existing yield gap in both mulberry and silkworm by the timely technological interventions. He expressed his satisfaction at the scientific work being carried out and large number of technology demonstrations in farmers' fields, but stressed the need to accelerate the technology and knowledge empowerment of farmers. He advised the scientists to organize the activities so that the results are more oriented towards the goals and mandate of the Institute. He also emphasized the need for the interpretation of research outcome in a logical manner with scientific outlook. Further, it was suggested that the scientists should carry out extensive literature survey before formulating the projects. The projects need to be on novel approaches and should be quality-based.

Prof. Saroj Kumar Sanyal, Chairman, RAC, expressed his sincere thanks to the RAC members, the Director of the Institute, Former Director of the Institute, Directors, collaborators, farmers' representative, CSB representatives, scientists of the Institute and Invitees for their participation and active interaction in the meeting. He expressed his satisfaction at the precise and well-focussed quality presentations made by the young scientists. He also appreciated the efforts of the CSB, Bangalore in the recruitment in the scientists' posts which is very much necessary to move ahead. Prof. Sanyal advised to the PIs of the new projects to consult and cite the references of recent publications in the relevant fields, as well as consult journals and books of international repute for updating their knowledge-base. Scientists need to work with the environment-friendly projects to cope with the global challenges and follow the bio-friendly approaches. He requested the Director to ensure the right placement of the scientists and stressed on the orientation of new scientists for strengthening their capacity and direction. Prof. Sanyal further opined that the process-based modules should be adopted and help of expert scientists should be sought, wherever necessary. The extension activity gaps

need to be deliberated upon which seems to be the weakest link in the end-to-end approach from the technology generation to its effective dissemination to the targeted end-users. He also approached the RAC members from DoSs of different states to play vital role in ensuring effective transfer of technology (ToT) as they are the main players in the extension activities. The Extension units at the RSRs/RECs should also ensure the involvement of the state departments in the execution of the extension activities. They must work together for better outcome, Prof. Sanyal opined. The Chairman also suggested that subject-matter experts may be called from time-to-time for discussion, suggestions as well as taking the up-to-date stock of the progress of the projects. Finally, he appreciated the excellent rapport of the Institute with the State Governments for improvement of the livelihood security of the sericulture farmers and the sericulture industry at large in the region.

The meeting concluded with vote of thanks.



(Dr. Kanika Trivedy)
Director & Member Convenor,

Approved



(Prof. Saroj Kumar Sanyal)
Chairman, RAC,
CSR&TI, Berhampore

Dated: 26.08.2016

ANNEXURE -I

**LIST OF PARTICIPANTS IN THE 44TH MEETING OF RESEARCH ADVISORY COMMITTEE (RAC) HELD ON
20.07.2016 AT CSR & TI, BERHAMPURE, WEST BENGAL**

Sl. No.	Name	Designation
1.	Prof.Saroj Kumar Sanyal, Former Vice-Chancellor, BCKV, Mohanpur, Nadia, West Bengal	Chairman
2.	Dr. Kanika Trivedy, Director, CSR&TI, Berhampore	Member Convenor
3.	Prof. Kanchan Baral, Department of Plant Protection, Palli Siksha Bhavana, Sriniketan, Birbhum	Member
4.	Dr. M. V. Samson, Ex-Director, Central Silk Board, Bangalore	Member
5.	Dr. P. K. Misra, Director (Tech.), Central Silk Board, Bangalore	Member
6.	Dr. A.K. Sahay, Director, Director, CSGRC, Central Silk Board, Hosur	Invitee
7.	Dr. S. Nirmal Kumar, Former Director, CSR&TI, Berhampore & Advisor Tripura and BTC Assam	Invitee
8.	Commissioner, DoT (Seri), West Bengal (Representative: Shri A.K.Pani, Deputy Director, Berhampore)	Member
9.	Shri R. P. Mandal, Assistant Secretary (Tech.), R.O., CSB, Patna, Bihar	Member
10.	Shri Ranjit Bhattacharjee, Joint Secretary (Tech.), R.O., CSB, Kolkata	Member
11.	Director, NSSO, CSB, Bangalore (Representative: Dr. Kalidas Mandal, Scientist-D, ZSSO, Malda)	Member
12.	Director, DoS, Gangtok, Sikkim (Rep. Shri R.P. Rai, ADS, DoS, Sikkim)	Member
13.	Director, DoS, Government of Jharkhand, Ranchi, Jharkhand (Representative: Md. Khadim Atique, PPC, MPRaj, Jharkhand)	Member
14.	Director, Directorate of Textiles & Handlooms, BBSR, Odisha (Representative: Shri Suresh Ch. Behera, ADS, DoTH, Odisha)	Member
15.	Shri Sufian Ali, Farmers Representative, Malda, West Bengal	Member
16.	Shri Prafulla Kumar Mandal, Farmers Representative, Murshidabad, West Bengal	Member
17.	Shri S. N. Acharya, Deputy Secretary (Tech.), R.O., CSB, Bhubaneswar, Orissa	Member
18.	Dr. Ranjit Kar, Scientist-D, RSRS, Kalimpong, West Bengal	Member
19.	Dr. S. N. Gogoi, Scientist-D, RSRS, Jorhat, Assam	Member
20.	Dr. M.K. Ghosh, Scientist-D, RSRS, Koraput, Odisha	Member
21.	Dr. M. Alam, Scientist-D (I/C), RSRS, Ranchi, Jharkhand	Member
22.	Shri Prasenjit Ray, Scientist- ICAR-NBSS&LUP, Regional Centre, Jorhat, Assam	Invitee

Absentee:		
1	Dr. R. K. Varshney, Director, Centre of Excellence in Genomics, Applied Genomics Laboratory, Patancheru, Andhra Pradesh	Member
2	Dr. Sunirmal Maity, Professor (Retired), BCKV, Mohanpur, Nadia, West Bengal	Member
3	Dr. S. Senthil Vinayagam, Professor & Principal Scientist, ICAR-NAARM, Hyderabad	Member
4	Director of CST&RI, Bangalore	Member
5	Director of Handloom & Sericulture, Government of Bihar, Patna	Member
6	Director of Sericulture, Government of Chattishgarh, Raipur	Member
7	Director of Sericulture & Weaving, Government of Meghalaya, Shillong	Member
8	Director of Handloom, Handicrafts & Sericulture, Government of Tripura, Agartala, Tripura	Member
9	Director of Sericulture, Government of Mizoram, Chaltlang, Aizawl, Mizoram	Member
10	Director of Sericulture, Government of Assam, Guwahati, Assam	Member
11	Director of Sericulture, Government of Manipur, Imphal	Member
12	Director of Textiles and Handicrafts, Government of Arunachal Pradesh, Itanagar	Member
13	Joint Secretary (Tech.), R.O., CSB, Guwahati	Member
14	Director of Sericulture, BTC, Kokrajhar, Assam	Member
15	Director of Sericulture, Government of Nagaland, Kohima	Member

List of Scientists/ participants attended the Meeting

Sl.No.	Name	Designation	Address
1.	Smt. Chanda Majee	Scientist-D, Training Division	CSR&TI, Berhampore
2.	Dr. S. Roy Chowdhuri	Scientist-D, PMCE Division	CSR&TI, Berhampore
3.	Dr. U. K. Bandyopadhyay	Scientist-D, PMCE Division	CSR&TI, Berhampore
4.	Dr. Dipesh Pandit	Scientist-D, PMCE Division	CSR&TI, Berhampore
5.	Dr. Sandip Kr. Datta	Scientist-D, Moriculture Division	CSR&TI, Berhampore
6.	Dr. S. Chattopadhyay	Scientist-D, Sericulture Division	CSR&TI, Berhampore
7.	Dr. Subhra Chanda	Scientist- D, Extension Division	CSR&TI, Berhampore
8.	Dr. Monica Chaudhuri	Scientist-D, Agro-Physio- FM- S.ScDivision	CSR&TI, Berhampore
9.	Dr. A. K. Verma	Scientist-D, SilkwormBreeding&Genetics Section	CSR&TI, Berhampore
10.	Dr. Jayeeta Sarkar	Scientist-D, RTI & Silkworm Physiology Section	CSR&TI, Berhampore
11.	Dr.(Mrs) R. Banerjee	Scientist-D, MulberryBreeding&Genetics Section	CSR&TI, Berhampore
12.	Shri D.Chakravarti	Scientist-D, MulberryBreeding&GeneticsSection	CSR&TI, Berhampore
13.	Shri Zakir Hossain	Scientist-D, Silkworm Pathology Section	CSR&TI, Berhampore
14.	Shri. N. B.Kar	Scientist-D, Reeling & Spinning	CSR&TI, Berhampore
15.	Shri. Debojit Das	Scientist-D, Entomology Section	CSR&TI, Berhampore
16.	Shri S. Chatterjee	Scientist-D, RSRS	Kalimpong, West Bengal
17.	Smt. Mina Pamegam	Scientist-D, RSRS	Jorhat, Assam
18.	Dr.G. B.Singh	Scientist-D, REC	Agartala, Tripura
19.	Dr. G. S. Singh	Scientist-D, REC(SU)	Bhandra, Jharkhand
20.	Dr.P. K. Ghosh	Scientist-D, REC	MBG, CSR&TI, WB
21.	Shri S.T.Lepcha	Scientist-D, REC	Rangpo, Sikkim
22.	Shri Gopal Ch. Das	Scientist-C, BV- Cell Section	CSR&TI, Berhampore
23.	Shri Sukhabrata Sarkar	Scientist-C, Training Division	CSR&TI, Berhampore
24.	Shri S.K.Misro	Scientist-C, RSRS	Koraput, Odisha
25.	Shri Satyabrata Dey	Scientist-C, REC	Dhenkikote, Odisha
26.	Dr. D.P. Das Mahapatra	Scientist-C, REC	Deogarh, Odisha
27.	Shri Anil Pappachand	Scientist- B, Agro-Physio- Farm Management	CSR&TI, Berhampore
28.	Dr. V. Vijay	Scientist- B, Mulberry Pathology Section	CSR&TI, Berhampore
29.	Ms. Pooja Makwana	Scientist- B, Biotechnology Section	CSR&TI, Berhampore
30.	Shri R. Mahesh	Scientist- B, Agro-Physio- Farm Management	CSR&TI, Berhampore
31.	Shri K. Rahul	Scientist-B, Silkworm Pathology Section	CSR&TI, Berhampore
32.	Shri N. Chadra Kanth	Scientist-B, Silkworm Breeding & Genetics Section	CSR&TI, Berhampore
33.	Shri Suresh K.	Scientist-B, Silkworm Breeding & Genetics Section	CSR&TI, Berhampore
34.	Shri Raghavendra K. V.	Scientist B, Entomology Section	CSR&TI, Berhampore,
35.	Md. Safi Afroz	Scientist B, REC	Gumla, Jharkhand
36.	Shri T.N. Sreekantha	A.D. (Stat.), PMCE Division	CSR&TI, Berhampore
37.	Shri.Subrata Sarkar	Technical Assistant, PMCE Division	CSR&TI, Berhampore
38.	Shri T.K. Maitra	Technical Assistant, Computer Cell	CSR&TI, Berhampore
39.	Shri Gaurab Ray	Junior Research Fellow, Silkworm Pathology Section	CSR&TI, Berhampore