MINUTES OF THE THIRTY NINTH MEETING OF RESEARCH ADVISORY COMMITTEE HELD ON 23rd OCTOBER, 2020

The thirty ninth meeting of the Research Advisory Committee [RAC] of CSGRC, CSB, Hosur was convened through webex platform on 23rd October, 2020, chaired by Dr.Chandish R. Ballal, Director (Retd.), National Bureau of Agricultural Insect Resources [NBAIR], Bangalore.

At the outset, Dr.B.T.Sreenivasa, Director, welcomed the Chairperson and all the Members for the meeting (list of participants enclosed as **Annexure-I**) and expressed his gratitude to the Chairperson, for chairing the meeting. The Director informed the Committee that the review period of the meeting is from September, 2019 to March, 2020. With these opening remarks, the Director requested the Chairperson to address the participants.

The Chairperson, Dr.Chandish R. Ballal welcomed all the participants and advised scientists to take up work as per the mandate including research also as a priority area of the centre. Dr.Ballal congratulated the centre for handling a large number of plant and animal (silkworm) resources and emphasized that work done should be projected focusing on clear presentations of inference of project results. Dr.Ballal encouraged the scientists to publish research papers in peer-reviewed journals with proper statistical analysis. Subsequent to the introductory remarks by the Committee, the Director took up the meeting as per the agenda.

ITEM NO. I: CONFIRMATION OF MINUTES OF THE 38th MEETING OF RAC HELD ON 30TH AUGUST 2019

The Director, CSGRC has requested the Committee for confirmation of the minutes of 38th RAC meeting. The Committee confirmed the minutes.

ITEM NO. II: REVIEW OF FOLLOW-UP ACTION ON THE DECISIONS TAKEN IN THE 38th MEETING OF THE RAC HELD ON 30TH AUGUST 2019

Follow-up action taken on the decisions/suggestions given during 38th RAC meeting was presented by Dr.M. Maheswari, Sc-D/Head, PMCE and following suggestions were made by RAC members:

- NBPGR should be informed regarding surveys well in advance so that joint survey trips for mulberry germplasm collection could be taken up.

- Contributions of CSGRC, Hosur should be submitted to RCS Section, CO for highlighting the same during RCC meetings.

- Scientists should apply for travel grants for attending conferences/seminars internationally, which in turn will provide exposure for the organisation.

- From the concluded projects, research papers should be published in peer-reviewed journals.

[Action: All concerned scientists]

ITEM NO. III: REVIEW OF DECISIONS TAKEN IN THE BRAINSTORMING MEETING TO FORMULATE STRATEGIES FOR EFFECTIVE CONSERVATION AND UTILIZATION OF SERI-GENETIC RESOURCES HELD ON 30TH APRIL 2019 AT CSGRC HOSUR

Based on the suggestion given during the Brainstorming meeting, the research project was formulated on “screening of silkworm germplasm resources for disease resistance” and submitted along with referee comments to C.O, CSB for approval.

Dr.B.T.Sreenivasa, Director presented a brief report on the overview, mandates and activities of the centre. He also informed the house that four new projects were formulated for effective conservation, and utilization of the germplasm, which were submitted to RCS, C.O, out of which two projects were implemented and two projects were awaiting approval.

ITEM NO. IV. REVIEW OF THE RESEARCH PROJECTS CONCLUDED DURING THE PERIOD

The following research project was concluded during the period under report.

AIB-3578: Evaluation of exotic bivoltine silkworm breeds to identify parental genetic resources

- Dr.M.Maheswari, Scientist-D presented the findings of the project and the Committee suggested that the final report of the project may be submitted to RCS Section, C.O along with proper statistical analysis. Screenshots of the database updated should be included in final presentation of the concluded projects.

[Action: Dr. M.Maheswari, Sc-D]

ITEM NO. V. CONSIDERATION OF NEW RESEARCH PROJECTS FOR APPROVAL

1. **Evaluation of silkworm genetic resources of *Bombyx mori* with reference to inbreeding depression and their conservation**

- The PI informed that the project was implemented from December, 2019 and data was recorded after batch-wise rearing which will be analysed after the completion of one year. The house took note of the same.

[Action: Dr. C.M.Kishor Kumar, Sc-D]

2. **Molecular characterization and assessment of genetic diversity in silkworm (*Bombyx mori*) germplasm**

- It was informed that the project was submitted after due discussions and revisions to C.O, for approval. The house suggested that molecular database should be created/updated on completion of the project.

[Action: Dr. G.Lokesh, Sc-D]

3. Studies on cytological status of mulberry genetic resources

- Dr. M.C. Thriveni, Sc-B, presented the progress of the project. The Committee suggested the PI to circulate the project proposal and referee comments to all the RAC members by mail for ratification, as also advised by the Director (Tech) and RCS.

- As per the suggestion, the project proposals along with referee comments were circulated and the comments received are as follows.

  - Minor correction in the objective is suggested and should be revised as "Identification of chromosome number and ploidy level of mulberry accessions"

  - The project has been modified based on the comments of referees and RAC members and hence is recommended for funding support.

[Action: Shri. Raju Mondal, Sc-B]

4. Molecular characterization of mulberry genetic resources for the identification of duplicates and effective utilization

- Dr. M.C. Thriveni, Sc-B and PI presented the progress of the project. It was suggested to revise the budget for whole genome sequencing. The objective should have the whole genome sequencing first. Further, the Committee suggested the PI to circulate the project proposal to all the RAC members by mail along with referee comments for ratification.

- As per the suggestion of Director (Tech) and RCS, the project proposal along with referee comments were circulated to RAC members and the comments received are as follows:

  - All the three referee comments are the same. This needs to be checked and clarified as it is not understood how comments given by three independent referees can be same.

  - The major concern is the work plan given in the project. It is indicated that 100 accessions will be characterized using SSR markers to identify duplicates in the germplasm banks. The details of the accessions like species which would be assessed for molecular characterization is not provided. This is critical for SSR genotyping as primer pairs developed for one species may

not work well in other species. Preliminary work has to be conducted to short-list polymorphic markers which can identify the duplicates.

- The work plan does not explain how the primer pairs will be designed or selected and how many will be finally used for DNA profiling.

- It is not clear why amplicon sequencing is needed for verification of SSRs.

- The PI has proposed to procure fragment analyzer for SSR genotyping. Hence, the work plan should be based on using the equipment for SSR genotyping.

- Based on the RAC recommendation, whole genome sequencing of *M. alba* and *M indica* has been included. It is given that the same will be outsourced and a budgetary provision of Rs. 2.00 lakh for the sequencing and analysis has been made. The genome size of *M. notabilis* is 330Mb and the chromosome level assembly of *M. alba* has been recently reported (Jiao et al., 2020). Hence, a draft genome sequencing at 100X depth will generate 33-35 GB data based on the genome size of the selected species. Further, as the analysis also will be outsourced, there may be escalation in cost of sequencing. Hence, probably Rs.3.00 lakhs can be factored in for the activity. **However, chromosome –level assembly is already reported in *M. alba*. Hence, an alternate species can be sequenced. The species can be chosen based on its importance as a germplasm resource and its use in future breeding programs in India.**

- The first objective can be whole genome sequencing of two mulberry species. The choice of species can be as enumerated above. The SSRs can be mined from the genome and primer pairs can be designed from the sequence data (this can be included in specification during outsourcing the whole genome sequencing work).

- There should be clarity in the species which are being targeted for molecular characterization. If the species selected include the ones for which WGS is done, then primer pairs can be selected from that data. If other species are included in the characterization, then details of primer selection should be included.

- The work plan should include a preliminary study on screening of primer pairs to identify polymorphic markers for DNA profiling of the accession panels. Based on this data, the probable number of markers which will be finally used for characterizing the germplasm may be indicated.

- The work plan should include SSR genotyping using fragment analyzer. This is missing in the work plan.

- Budgetary provisions for using the fragment analyzer for SSR genotyping should be checked and if needed the budget under consumables may be increased.

- A detail on how the data analysis will be done is completely missing from the project. This is a vital part to identify duplicates. The method of allele scoring and software's for marker data analysis may be included for better clarity.

- Training of the PI/Co-PI in SSR genotyping is mandatory.

- As indicated by the referees, it will be advantageous if collaboration with an Institute which routinely works on molecular characterization of germplasm using SSR markers can be included. Since it is a new area of research for CSGRC, this networking will facilitate better output.

- Dr.K.S.Varaprasad suggested removing identification of duplicates (highly dependent on number and type of markers used to call it a duplicate- it may be found later as not a duplicate) from the title. Identification of diverse accessions is for effective utilization and it includes assessment on variability including duplicates.

[Action: Dr. M.C. Thriveni, Sc-B]

ITEM NO. VI. REVIEW OF THE PROGRESS OF THE ON-GOING RESEARCH PROJECTS

1. **PIE-06001 SI**: **Collection, characterization, evaluation, conservation and supply of mulberry genetic resources - Phase IX (Nov.18 – Nov.21)**

- The PI presented the progress of the project. The house noted that the budget utilization should be improved.

- Dr.B.Sarat Babu, Member, RAC suggested that the NBPGR should be informed regarding surveys well in advance so that joint survey trips for mulberry germplasm collection could be taken up. The photographs of sample collection along with GPS location of the surveyed areas can be shown for better presentation.

- Dr.K.Sathyanarayana, Scientist-D suggested that the range of values given in the characterization and evaluation data should be lower to higher and data should be supported with SD, SE and other appropriate statistical analysis. If needed the PI may take the help of a statistician for proper statistical interpretations.

[Action: Dr. G. Thanavendan, Sc-C]

2. **PIB-3505:Development of drought tolerant mulberry variety for rain fed sericulture (Coll. project of CSR&TI, Berhampore with CSGRC, Hosur)**

- The Co PI presented the progress of the project. The Committee insisted that the Investigator should obtain final report of the project from the host institute and highlight the role of CSGRC, Hosur in the project.

[Action: Dr. G. Thanavendan, Sc-C]

3. **PIB-3586:Development of superior mulberry varieties through controlled hybridization for North-West Indian states (Coll. project of CSRTI, Pampore with CSGRC, Hosur)**

- The Co PI presented the progress of the project. The Committee suggested the PI to highlight the role of CSGRC, Hosur in the project and collect information on the actual status and progress of the project from CSR&TI, Pampore.

[Action: Dr. G. Thanavendan, Sc-C]

4. **PIB-3629: Development of mulberry genotypes suitable for rainfed hill farming in North - West India (Coll. project of RSRS, Jammu with CSGRC, Hosur)**

- The Co PI presented the progress of the project. The Committee suggested the PI to follow up with the host institute even if the role of CSGRC, Hosur in the project is completed, and collect information on the actual status and progress of the project from RSRS, Jammu.

[Action: Dr. G. Thanavendan, Sc-C]

5. **PIC-01003CN: Genetic enhancement of mulberry by genomics approaches: A multi component network project: NW4b: Mimic alkaloids in mulberry and their role in modulating host plant – Insect interactions (Coll. project of CSR&TI, Mysore with UAS-GKVK, Bangalore, CSIR-NCL, Pune and CSGRC, Hosur)**

- The Co PI presented the progress of the project. The Committee suggested the PI to follow up with the host institute even if the role of CSGRC, Hosur in the project is completed, and collect information on the actual status and progress of the project from GKVK, Bangalore and NCL, Pune.

[Action: Dr. G. Thanavendan, Sc-C]

6. **AIE-06002MI: Evaluation of bivoltine silkworm genetic resources for tolerance to abiotic stress in selected hotspots (Collaboration with SBRL, Kodathi, CSR&TI, Mysuru, Berhampore & Pampore)**

- The PI and CI from collaborating institute presented the progress of the project. The committee suggested that the collaborating institute should be equally involved throughout the tenure of the project.

[Action: Dr. M. Maheswari, Sc-D; Dr. Tulsi Naik, Sc-C]

ITEM NO. VII. LIST OF PUBLICATIONS

The Director informed the house that two research papers were published by the centre during the period of report. The Committee suggested the scientists to contribute for increasing the number of publication in peer-reviewed journals.

ITEM NO. VIII: GENERAL OBSERVATIONS / SUGGESTIONS FROM THE CHAIRPERSON AND MEMBERS

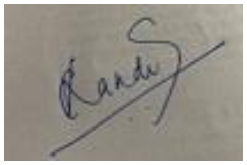
- Dr. Chandish Ballal thanked Dr. R. K. Mishra, Director (Tech) for the formation of RAC Committee, which had well-informed and motivated members, who contributed immensely during the RAC meetings. This being the last meeting of the present RAC Committee, she thanked each and every member for their substantial contributions. Dr.Ballal appreciated the research progress presented by all scientists and suggested to continue the good work. Dr.Ballal insisted on holding pre-RCC meetings for better presentation and reflection of the activities of the centre during RCC meetings. Dr.Ballal also stressed on the importance of global visibility of the centre and urged the scientists to work towards the same. Screenshots of publications, databases, images of scientists attending national/ international conferences, commercialization related to the centre should be highlighted during RAC meetings.

- Chairperson also urged the scientists to take up more collaborative projects and stressed on ensuring that there is credit sharing in publications, patents, contributions, etc., wherever the scientists of CSGRC have contributed. Since one of the main objectives of the projects is database creation, screenshots of the database created/updations should be included in final presentation of the concluded projects. It should be mandatory for the beneficiaries to acknowledge the centre in their research results/ reports, publications, thesis, etc. Further, clear instructions should be provided in the supply Proforma to mention the accession numbers of the utilized germplasm in their publications/thesis/articles, etc. Supply and utilization of germplasm and revenue generation of the centre should be reflected through graphical representations in CSGRC website. Scientists should update the computer section regularly for the same.

- Dr. Modhumita Dasgupta suggested that statistical analysis should be conducted even for interim results and the data interpretation should be based on this analysis, to provide better insight to research outcomes. She emphasized on publication in peer reviewed journals and participation of scientists in International Symposium/ Seminar/ Conference. She also suggested that an extension project can be proposed to assess the tangible and intangible impact of the germplasm (mulberry and silkworm) supplied to different user groups. Finally, she thanked Director, CSGRC, Dr. R. K. Mishra, Director (Tech), Dr. Chandish Ballal, Chairperson and all members of RAC for giving an opportunity to be a part of the committee. She appreciated the enthusiasm of all scientists of CSGRC and suggested them to highlight their research contributions in national and international fora.

- Dr. K.S Varaprasad appreciated the role of the centre and suggested taking up feedback and impact oriented projects to identify the utilization of germplasm resources in India and abroad. It may be practical to add one objective in the project "PIE-06001 SI: Collection, characterization, evaluation, conservation and supply of mulberry genetic resources - Phase IX (Nov.18 – Nov.21)" on monitoring of germplasm supplied, utilised to develop end product or commercialised" instead of a separate project. A database can be prepared through feedback and follow-up. Presentations should be made brief, impactful and impressive. He further suggested that mulberry conservation project should be done on the basis of gap analysis in future. It can be area-, trait-, or ecosystem-based and should be taken up in a phased manner for better coverage.

The meeting concluded with a vote of thanks from Dr. C.M.Kishor Kumar, Sc-D & Head, Silk worm Division.



CHAIRPERSON
RESEARCH ADVISORY COMMITTEE
CSGRC HOSUR

Annexure-1

List of participants for the 39th Meeting of Research Advisory Committee (RAC) held on 23/10/2020

1. **Dr.Chandish R. Ballal,** Former Director, NBAIR, Bengaluru, Chairperson, RAC.
2. Dr. K. Varaprasad, Principal Scientist, NBPGR, Hyderabad
3. Dr. Sarat Babu, Principal Scientist, NBPGR, Hyderabad, Member RAC.
4. Dr. Modhumita Dasgupta, Scientist-F, ICFRE, Coimbatore, Member RAC.
5. Dr. R.K. Mishra**,** Director (Tech), CSB, Bengaluru, Member RAC
6. Dr. B.T. Sreenivasa, Director, CSGRC, Hosur, Member Convener RAC
7. Dr.K.Vijayan,Scientist-D,RCS, CSB, Bengaluru
8. Dr. K.Sathyanarayana, Scientist-D, RCS, CSB, Bengaluru
9. Dr. Prashanth Sangannavar, Scientist-C, RCS, CSB, Bengaluru
10. Dr. C.M. Kishor Kumar, Scientist-D & Head, Silkworm Division, CSGRC, Hosur
11. Dr. G. Ravikumar, Scientist-D & Head, Mulberry Division, CSGRC, Hosur
12. Dr. M. Maheswari, Scientist-D & Head, PMCE Division, CSGRC, Hosur
13. Dr. Jameela Khatoon, Scientist-D (R&S), CSGRC, Hosur
14. Dr. G. Lokesh, Scientist-D, CSGRC, Hosur
15. Dr. Ritwika Sur Chaudhuri, Scientist-C, CSGRC, Hosur
16. Dr. G. Thanavendan Scientist-C, CSGRC, Hosur
17. Dr. K. Tulsi Naik, Scientist-C, Seri-Biotechnology Laboratory, CSB, Kodathi
18. Dr. M.C.Thriveni, Scientist-B, CSGRC, Hosur
19. Shri S. Sekar A.D (Comp), CSGRC, Hosur
20. Shri. R. Gopinathan, Steno grapher Grade-I (A&A)