SERI-BIOTECH RESEARCH LABOARATORY
KODATHI, BANGALORE 560035

MINUTES OF THE 28th MEETING OF RESEARCH ADVISORY COMMITTEE HELD ON 27th AUGUST 2021 AT BOARD ROOM AT CENTRAL SILK BOARD, MADIVALA, BANGALORE

The 28th RAC meeting began with welcome address by Dr.V Sivaprasad, Director, SBRL followed by the opening remarks from Dr. N. K Krishnakumar, Chairman. All the members of the RAC, Dr. Sanjay Ghosh (IBAB, Bangalore), Dr. Mohan(NBAIR, Bangalore), Dr. Nataraj Karaba (UAS, GKVK, Bangalore), Dr. K. Vijayan (Scientist), Dr. Manthira Murthy (RCS, CO) Dr Babulal, Director CSRTI, Mysore and Dr. B. T. Sreenivasa, Director, CSGRC, Hosur was invited by Dr K. M. Ponnuvel, Scientist-D, SBRL. The RAC members also self-introduced themselves by giving a brief introduction on their backgrounds, experience, their contribution and specialization areas of research. The list of participants is given at **Annex-1**.

In his opening address, Dr. Krishnakumar, Chairman mentioned the importance and contribution of biotechnology in the recent management of the CORONA pandemic worldwide. The chairman opined that Biotechnology should focus more on field oriented applications in sericulture and future projects should be more robust and focused on burning issues of the industry. During the discussion, Chairman suggested to revise the mandate of SBRL so as to carry out basic, strategic, applied research in SBRL for wider applications like silkworm as a model organism for toxicity studies, vaccine production and non-textile application of silk proteins. He also emphasized on the need of biotechnology interventions to solve major issues with the silkworm and host plants in Vanya sector. He emphasizd on conservation of silkworm sperms (haploid preservation) through sperm banking as well as preservation of mulberry pollen by cryopreservation to preserve the available resources.

The Committee took up the agenda of the meeting following the brief introduction.

AGENDA NO. 1: CONFIRMATION OF THE MINUTES OF 27TH MEETING OF RAC HELD ON 7TH JANUARY 2021

Since no comments were received from the members on the minutes of 27th RAC meeting held on 7th January 2021, the minutes was confirmed and accepted.

AGENDA NO. 2: FOLLOW-UP ACTION ON DECISIONS TAKEN DURING THE 27TH RAC MEETING

Dr. K. M. Ponnuvel, Scientist D, SBRL presented the follow-up action taken on the decisions of 27th RAC meeting. He appraised the house about Core Group of Directors decision to identify SBRL as the nodal centre for the Biotechnology work under CSB. Further, he also informed the house that based on the recommendations of RAC committee to strengthen the institute with adequate manpower, the institute was successful in getting three new scientists with expertise in Biotechnology. The Director appraised the chairman about the follow up of DBT BIRAC, MASN (OFT) projects that will be assessed at the farmers level. Dr K M Ponnuvel also presented significant achievements and the follow up of the concluded projects of SBRL that are field oriented and has significant outcome.

The Director informed about the recent issues related to Thrips and mites in the field and need for immediate intervention. The chairman and director together opined that the burning issues like Thrips and mites in the field must be tackled using various approaches of biotechnology and suggested the SBRL scientists to have a internal discussion to formulate a project to trouble shoot the existing field problem. In the above context the chairman also felt that scientists should carry out frequent field visits and have interaction with the farmers to understand and troubleshoot the existing field problems. The Director advised the scientists to identify thrust arears in sericulture and come up with ideas/concepts to address the needs through biotechnological approaches.

AGENDA NO.3: REVIEW OF RESEARCH PROJECTS CONCLUDED DURING THE PERIOD UNDER REPORT

There are no concluded projects during the review period.

AGENDA NO.4: REVIEW OF PROGRESS OF ONGOING RESEARCH PROJECTS DURING THE PERIOD UNDER REPORT

(i) PRP08002MI: Identification of powdery mildew resistant genes and validation of CAPS marker for Chalcone synthase (May 2019- May 2022)

Dr. Ramesha, Scientist-C presented the background, objective and the highlights of the progress made. The queries by the Committee were clarified by the PI. The Committee suggested to check the MLO genes mutations in wild species of mulberry also. The committee suggested the PI to visit the CSR&TI, Berhampore in the powdery mildew season and asses the phenotype. The CAPS marker analysis in segregating population should be presented in numbers and phenotype should be associated with the CAPS marker by appropriate statistical method.

(Action: Dr A. Ramesha, Sci- C)

(ii) PIT 08004 MI: Study on Epigenetic and autophagy modifiers on induction of haploid microspore embryogenesis in mulberry (March 2020- Feb 2023)

Dr. Ramesha presented the background, objective and the progress of the project. The Chairman suggested the PI to discuss the project with Prof. Natraja Karaba, UAS, GKVK. The committee suggested the PI to make sure ploidy level of mulberry accessions before using in tissue culture and should avoid triploid accessions. Individual effect of trichostatin and hormones need to be studied. The committee suggested not to include many accessions for testing anther response and suggested to test microspores instead of anthers.

(Action: Dr A. Ramesha, Sci- C)

(iii) AIT 08005MI: Development and Evaluation of Bidensovirus resistant silkworm hybrids developed from marker assisted breeding lines -Phase II(March 2020- Feb 2023)

Dr. Tulsi Naik, Scientist-C presented the details and progress of the project. The PI informed that out of 34 bivoltine and 19 multivoltine breeds that were screened for BmBDV resistance, 16 breeds were found to have BmBDV resistance alleles and bioassay is in progress for the 16 identified breeds to check their phenotype with respect to their resistance to BmBDV infection. The PI also informed about the status of transfer of BmBDV resistance to CSR2

and CSR27 back cross generations. The committee suggested the PI to show the yield characters of the CSR2 and CSR27 back crosses in the next review meeting.

(Action: Dr Tulsi Naik K S, Sci- C)

(iv) AIT08003CN: Gene Expression Profiling for the Identification of Resistant/Tolerant Genes to Microsporidian Infection in Lamerin Breed of Silkworm, *Bombyx mori* L. (Aug 2019- Oct-2022 Funded by DBT, New Delhi

Dr. Tulsi Naik, Scientist-C presented the details and progress achieved in the project. The PI explained about the molecular analysis of CSR2 and Lamerin breeds infected with *Nosema Bombycis* using the Nosema specific , host immune specific genes and also its differential expression was appropriately explained by the PI. The PI also showed the semi quantitative data that indicated the survivability of Lamerin Breeds with the pebrine infection. The PI informed the committee about the delay in achieving the milestones due to pending transcriptome and miRNA outsourcing work, which is important to carry out other objectives that are dependent on the transcriptome and miRNA analysis data. The Director suggested to initiate the cross breeding between CSR2 and Lamerin breed at the earliest as it requires more than 20 BC generations to stabilize the characters and he also felt that it is independent of the other objectives indicated in the project .

(Action: Dr Tulsi Naik K S, Sci- C)

(v) ARP- 08001 CI: Studies on the genetic characterization, transmission and tissue distribution of Iflavirus infecting the Indian tropical tasar silkworm, *Antheraea mylitta* (April 2018- March 2022)- (funded by Swedish Research Council, Sweden)

Dr. Ponnuvel, Scientist-D presented the details of the project and progress made so far. The PI informed the Committee about the extension of the project till March 2022 and also the funds received from the Swedish funding agency. The PI informed about the cloning and expression of the viral proteins that are targeted for development of POCT kits.

(Action: Dr K. M. Ponnuvel, Sci- D)

(VI) AIT -08006 EF: Development of lateral flow assay (LFA) kit for diagnosis of pebrine disease in silkworms (April 2021- September 2022)- (Funded by BIRAC-DBT, New Delhi).

Dr. Ponnuvel, Scientist-D presented the details of the project and progress made so far. The PI informed that the purified recombinant sporewall proteins have been given to Bhat Biotech for the development of polyclonal and monoclonal antibodies. The chairman suggested for possibility of utilizing polyclonal antibodies.

Collaborating projects from other institutes as CIs/Co-PIs

(VII) AIB 01004 MI: Development of multivoltine breeds with improved silk quality using indigenous & exotic breeds (Sep 2018- August 2022) collaboration with CSRTI, Mysore

Dr. K. M. Ponnuvel presented the details of the project and progress of the project. The Committee suggested to include respective parents and their generations in a single graph for comparing the diapause related gene expression and also to compare these diapause associated genes in other diapausing silkworms. The chairman also suggested to look into the possibility of inducing egg diapause in MUGA silkworms.

(Action: Dr K. M. Ponnuvel, Sci- D)

(VIII) AIE06002MI: Evaluation of bivoltine silkworm genetic resources for tolerance to abiotic stress in selected hot spots (Feb 2019- Jan 2022) collaboration with CSGRC , Hosur

The said project was presented by the PI at CSGRC, Hosur in their RAC, the milestones of SBRL was completed in the first year of the project and at present the milestones are field trials for evaluation of the selected breeds at different hotspots is in progress.

(Action: Dr Tulsi Naik K S, Sci- C)

(IX) AIT05016MI: Integrating genomic and transcriptomics resources for functional insight into the biology of muga silkmoth *Antheraea assamensis* – phase II (Jan 2021 – Dec 2022) Collaboration with CMERTI, Lahdoigarh

Dr. Himanshu Dubey, Scientist-B presented the progress of the project so far. During the presentation the committee enquired about the genetic variability in the populations and suggested to analyse the domestication related characters in the Muga. The chairman advised the Co PI to analyse the genomic data in all angels to enhance our knowledge especially related to its domestication, silk quality, behaviour that would help us to understand the wild species much better.

(Action: Dr Himanshu Dubey, Sci- B)

(X) AIG-06007-MI: Molecular characterization and assessment of genetic diversity in silkworm (*Bombyx mori* L) germplasm. (March 2021- Feb 2024) collaboration with CSGRC , Hosur

The project was initiated in March 2021. Dr Himanshu presented the progress till date to the committee.

(Action: Dr Himanshu Dubey, Sci- B)

AGENDA NO. 7: TRIAL OF TECHNOLOGIES

Name of the Technology: NPV tolerant mulberry silkworm bivoltine hybrids and cross Breeds.

The PI of the project Dr G Subrahmanyam, Sci-C proposed the new proposal for the on-farm trial (OFT)to the committee. The PI informed the committee about the different regions of trial all over India. The chairman suggested for incorporating an co-investigator with economics background for evaluating the socio economics in the project. The project may be submitted to DBT for possible funding

(Action: Dr G. Subrahmanyam, Sci- C)

AGENDA NO. 8: Any other subject with permission of the chair

New Concept Proposals:

New Proposal 1: Characterization of genes related to pathogenicity from microsporidian pathogens causing pebrine disease in wild and domesticated silkworms through comparative genomics.

The PI of the project Dr Himanshu Dubey proposed the new proposal to the committee. The committee suggested to omit the 4th objective ie., identifying secondary host of the Nosema pathogens and focus only on first three objectives of the study to enable the PI to achieve the milestones within the project period.

(Action: Dr Himanshu Dubey, Sci- B)

New Proposal 2: Identification of a pathogen causing virosis in Muga silkworm *Antheraea assamensis* Helfer (Pilot Study)

The PI of the project Dr G Subrhamanyam, Sci-C proposed the new proposal to the committee. The Director suggested to study the etiology of the virosis that included identification and characterization of the virus similar to the study of tiger band disease. The director suggested to take up the transcriptome work after establishing the etiology of the virus. .

(Action: Dr G. Subrahmanyam, Sci- C)

New Proposal 3: Collaborative studies on speciation and domestication through high-precision comparative genomics and validation through CRISPR-CAS9 technology (DST-JSPS ; Indo-Japan)

The PI of the project Dr Rajal Debnath, Sci-C proposed the new proposal to be submitted for DST-JSPS funding to the committee. The PI also informed the committee about the importance of the proposed study in understanding the speciation and domestication through high-precision comparative genomics and the training to the scientist in the CRISPR-CS9 technology. The Director also felt that the collaboration with the Japan counterpart would help in exchange of knowledge/ideas in the much anticipated field of biotechnology.

(Action: Dr Rajal Debnath, Sci- C)

General Observations

Dr. Sanjay Ghosh, IBAB, Bangalore

Following suggestions were made:

1. Suggested for basic & Translation research in Sericulture
2. Effective translation of bioinformatics data for field application.
3. Suggested all the scientist for effective utilization of the funds in CSB projects
4. Training of scientist in the field of bioinformatics and CRISPR-CAS9 technology.

Prof. Nataraj Karaba, GKVK, Bangalore

Following suggestions were made:

1. Effective utilization of genomic resources.
2. Focus on basic as well as translational research
3. More Collaboration with different Institutes and with UAS to be encouraged.
4. Public Private enterprise (PPE) for bridging the industry with the private enterprenuers/enterprises for transfer of technology.

Dr. Mohan, Principal Scientist, NBAIR, Bangalore

Following suggestions were made:

1. Transfer of the technology to farmers is to be encouraged.
2. A mega project focusing various issues of the industry and utilization of the outcome for filed applications.
3. Training for scientist in the field of genomics/transcriptomics.

Dr. Vijayan, Scientist-D, CSB, Bangalore

Following were suggested:

1. Field visit of young scientists to understand the field problems.
2. Focus on developing information for future research and for the industry.
3. Frequent scientific interactions through initiation of Journal clubs

Dr. Manthira Moorthy, Scientist- D, CSRTI, Mysore

Following were suggested:

1. Emphasised the need to focus on other aspects of research for improving the productive traits in addition to disease resistance.

Dr. V. Sivaprasad, Director, SBRL

Following were suggested:

1. Suggested all the PI and CI of the projects to visit the collaborating institutes for effective follow up of the project.
2. Suggested SBRL scientist to take up projects to address the issues of the host plant.
3. Focus on Vanya project: host plant as well as Silkworm.
4. Explore sericulture research going on in other countries to keep informed about the various applications of silk.
5. Suggested the scientists to propose ideas to tackle various burning issues of the industry.

Dr. N K Krishnakumar, Chairman

Summing up the meeting, the Chairman made following observations:

1. Suggested to include hypothesis in the project proposals and in the slides
2. Economics of analysis: A status paper on the contributions made by SBRL and impact analysis to be prepared and presented to the Committee.
3. Focused research on host plant and the silkworm in the Vanya sector.
4. Suggested for possibility of "Ahimsa Silk" which has niche market in the near future.

The meeting ended with vote of thanks to the Chair, the Committee members and other scientists/research students by the Dr V Sivaprasad Director, SBRL

Date: 30/Sep/2021

Dr. N. K. Krishna Kumar
Chairman, RAC

Annex-1

List of Participants

1. Dr. N. K. Krishna Kumar, Former DDG (ICAR), Chairman
2. Dr. M. Mohan, Principal Scientist, NBAIIR, Bangalore, Member
3. Dr. Sanjay Ghosh, Staff Scientist- IBAB, Bangalore, Member,, Member
4. Dr. N. Nataraja Karaba, Professor, GKVK, Bangalore, Member
5. Dr. K. Vijayan, Scientist –D, CSB, Bangalore, Member
6. Dr. S. Manthira murthy Scientist-D, RCS, Member
7. Dr. B. T. Sreenivasa, Director, CSGRC, Hosur , Member
8. Dr. G. Lokesh, Scientist- D CSGRC, Hosur
9. Dr Babulal, Director, CSRTI, Mysore
10. Dr K B Chandrashekar, Scientist D, CSRTI, Mysore
11. Dr M N Chandrashekar, Scientist D, CSRTI, Mysore
12. Dr Ranjini, Scientist- C CSRTI, Mysore
13. Dr. Prashanth Sangananavar, Scientist –C, CSB, Bangalore
14. Dr. V Sivaprasad, Director, SBRL, Member Convener
15. Dr. K. M. Ponnuvel, Scientist- D, SBRL
16. Dr. Tulsi Naik, Scientist- C, SBRL
17. Dr. A Ramesha, Scientist-C , SBRL
18. Dr G Subhramaniyam, Scientisy-C, SBRL
19. Dr Rajal Debnath, Scientist-C SBRL
20. Dr. Himanshu Dubey, Scientist- B, SBRL
21. Shri G Raghavender, Field assistant, SBRL
22. Mrs. Anupama Jagadish, Research Scholar, SBRL
23. Ms. Diksha Khajje, Research Scholar, SBRL
24. Ms Vanitha C Project assistant, SBRL