Name of the institute: Seri-Biotech Research Laboratory

1. Organizational Set up

Unit	***Kodathi, Bangalore***
RSRS/ RSTRS	***Nil***
REC/ STSC	***Nil***

2. R&D Projects, TOT, ECP, CBT etc:

Item	**Target**	**Achievement**	**Remarks**
1. CSB coded Research projects			
1.1. With PI from the Institute			
1.1.1. Projects of earlier year continued through the year 2019-20	6	6	**Annex 8.I.1**
1.1.2. Projects continued through & concluded during the year 2019-20	5	3	**Annex 8.I.2**
1.1.3. New Projects initiated during 2019-20	7	4	**Annex 8.I.3**
1.2. With CI from the Institute			
1.2.1. Projects carried out during 2019-20	2	1	**Annex 8.I.4**
1.2.2. Projects continued through &concluded during the year 2019-20	0	0	**Annex 8.I.5**
1.2.3. New Projects initiated during 2019-20	1	1	**Annex 8.I.6**
2. Transfer of Technology			
2.1 On Station Trials (OST)			**Annex 8.II.1**
2.1.1. No. oftechnologies validated	0	0	
2.1.2. No. of trials	0	0	
2.2 On Farm Trials (OFT)			**Annex 8.II.2**
2.2.1. No. oftechnologies demonstrated	0	0	
2.2.2. No. of locations covered	0	0	
2.2.3. No. of stakeholders covered	0	0	
3. Capacity Building & Training (CBT)			**Annex 8.III**
3.1. No. of programmes conducted	5	5	
3.2. No. of stakeholders covered	40	27	
4. Extension Communication Programs (No.)			**Annex 8.IV**
4.1. Krishi Mela / Farmers' meet	0	0	
4.2. Field day	0	0	
4.3. Farmers day	0	0	
4.4. Awareness programme	0	0	
4.5. Group discussion /VicharGoshthi	0	0	
4.6. Technology demonstration / Enlightenment programmes	0	0	
4.7.Workshop / Seminars & Conferences	0	0	
4.8. Other activities (*Please specify*).	0	0	
5. Digital Soil Health Cards issued			**Annex 8.V**
6. Information, Education & Communication			**Annex 8.VI**
6.1. Periodicals	1	1	
6.2. Publications	6	7	
6.3. Extension literature	1	3	
6.4. Films / Videos	0	0	
6.5. Social media	0	0	

6.6. **Patents filed/ granted, technologies commercialized, Software, mobile/android app developed etc.**	1	1	**Annex 8.VII**
6.7. **Revenue generated (Rs. in Lakhs)**	0.5	1.125	**Annex 8.VIII**
6.8. **Other activities*(pl specify)***			**Annex 8. IX**

1. CSB coded Research projects

1.1. With PI from the Institute

Annex-8.I.1

1.1.1. Projects of earlier year continued during 2019-20

SN	Code	Title	Start	Closure	Milestone to be crossed	Progress achieved
1	ARP 3605 *(DBT funded Project)*	Validation of the DNA markers in silkworm breed developed by introgression of DNA markers associated with NPV resistance using Marker Assisted Selection Breeding and large scale field trial of the breed	March, 2017	Feb 2020 *(Extended up to **July,2020**)*	Distribution of DFLs to different stations, collection of data and co-ordination with NSSO for popularization of te breed	1. DFLs are distributed to Jammu, Berhampore and Mysore. For further distribution, DFLs are under preparation/ preserved at cold storage. 2. Autumn rearing at Jammu and Berhampore are over. Report awaited; P1 pure lines are reared at farmer level under the supervision of SSPCs which are used to develop hybrids for distribution
2	ARP-3606 *(DBT funded Project)*	Development of diagnostic tool for early detection of baculovirus causing tiger band disease in *Antheraeaproylei*"	Feb. 2017	Aug. 2020 *(Extended up to **Aug,2020**)*	1. To characterize the baculovirus pathogen causing tiger band disease in Oak tasar silkworm, *Antheraeaproylei* 2. To study the pathogenesis, source and mode of infection of viral pathogen 3. To develop DNA based diagnostic tools for early detection of baculovirus	1. The conserved regions of virus have been identified and phylogenetic analysis on the same has been performed. The full length genome of virus has been sequenced (Accession: GI: 1371952746). 2. The surfaces of the eggs of *A. proylei*have been analyzed for the presence of virus through PCR. Co-infection with other viral pathogens associated with oak tasar silkworm has been studied. The vertical viral transmission has been

					causing tiger-band disease 4. Validation of developed diagnostic tools in Oak tasargrainage and egg production centre	confirmed from infected eggs. Virus distributions in different tissues as well as different development stages have been studied using PCR techniques. 3. A workshop was conducted at RSRS, Imphal to demonstrate the egg disinfection technique for DOS staff, Staff working at various CSB units
3	ARP-08001 *(Indo-Swedish)*	Studies on the genetic characterization, transmission and tissue distribution of Iflavirus infecting the Indian tropical tasar silkworm, *Antheraeamylitta*"	Apr, 2018	Mar, 2021	1. To characterize the Iflavirus infecting the two silkworm species, *Antheraeamylitta* 2. To analyze the source of infection, tissue tropism, cross-infectivity, bio-geographic surveys and life histories	1. Characterization through whole genome sequencing of Iflavirus infecting *Antheraeamylitta* 2. The multiplication of Iflavirus in *Antheraeamylitta*was detected in fat body, midgut, Malpighian tubule & ovary. 3. Vertical transmission has also been confirmed from mother moth to offspring.

Annex- 8.I.2

1.1.2. Projects continued through and concluded during 2019-20

S. No	Code	Title	Start	Closure	Progress achieved	Utility of out-put/Impact on silk industry
1	AIT 3538	Development of Fibroin Fusion Silk with Antioxidant and Antibacterial Properties	May 2015	April, 2019 *(Extended up to **Oct, 2019**)*	1. We have successfully expressed Fibroin-Cecropin B in *Pichiapastoris*and in the cocoons of silkworms (transgenic) 2. The silk fusion protein was effective against gram-positive and negative bacteria 3. It has shown enhanced wound healing activity in rats and human dermal cells 4. The fusion protein has also shown strong activity against oxidative stress.	1. Opened up new translational research and has potential in the development of novel wound dressing and cell culture materials. 2. A follow-up project needs to be submitted to BIRAC (DBT) for translational output.
2	AIT-3583	Transkingdom RNA interference (tkRNAi) approach for resistance against *Bm*NPV infection in silkworm *Bombyx mori*	Sept, 2016	Aug, 2019	All the objectives are completed as milestones	This study has shown that feeding bacterially expressed dsRNA from non-pathogenic bacteria as a vector for delivering dsRNA and elicit RNA I against BmNPV in silkworm and alternative tool for insect pest management. This technology can be further utilized for

						knock down studies to study and understand the certain important physiological process underlying the diseases resistance in silkworm.
3	AIT 3584	Identification of molecular marker associated with filament characters and its use in improvement of multivoltine breeds	Sep, 2016	Aug, 2019	All the objectives are completed as milestones	The variation observed in the expression profiles of genes associated with silk proteins as well as silk processing and transportation like ITP-1, VATPase, vacular transport genes and GFL1 an SNP associated with shell weight and cocoon weight among Indian *B.mori*strains and their correlation with silk quality has provided insight into the role of the shortlisted genes in improving silk quality. Based on the variations, the utility of the genes as marker(s) for races that posses better post cocoon quality can be expanded that will aid in the selection of parental stocks for development

						of *B.mori* breeds possessing better silk quality.

Annex- 8.I.3

1.1.3. New projects initiated during 2019-20

SN	Code	Title	Start	Closure	Milestone to be crossed	Progress achieved
1	PRP - 08002MI	Identification of candidate gene based powdery mildew resistance for utilization in disease resistance breeding in mulberry.	May, 2019	May, 2022	1. Bioinformatics analysis to identify MLO genes from *M.notabilis* using homology search 2. Molecular phylogeny analysis, protein domain analysis	1. Identified 16 MLO genes through bioinformatics approach 2. Protein domain and motifs analysis identified canonical MLO proteins in mulberry
2	AIT 08003 CN	Gene Expression Profiling for the Identification of Resistant/Tolerant Genes to Microsporidian Infection in Lamerin Breed of Silkworm, *Bombyx mori L.* (In collaboration with IISC)	Aug, 2019	July, 2022	JRF to be appointed, Chemicals to be purchased, Transcriptional analysis of micropsoridian resistant/tolerant and susceptible lamerin silkworm breeds- Needs to outsource RNA seqExpts.	Rearing of silkworms started. In the preliminary stage.
3	AIT 08005 MI	Development and evaluation of Bidensovirus resistant silkworm hybrids developed from marker assisted breeding lines-Phase-II	March 2020	Feb 2023	Project code allotted vide Letter No.CSB-31/2(SBRL-NP)/2018-19/RCS Dated 31.03.2020	Project to be initiated
4	PIT08004 MI	Study on Epigenetic and autophagy	March 2020	Feb 2023	Project code allotted vide Letter No.CSB-31/2(SBRL-	Project to be initiated

		modifiers on induction of haploid microspore embryogenesis in mulberry			NP)/2018-19/RCS Dated 31.03.2020	

1.2. With CI from the Institute (Collaborative projects with other CSB institutes)

Annex- 8.I.4

1.2.1. Projects of earlier year continued during 2019-20

SN	Code	Title	Start	Closure	Milestone to be crossed	Progress achieved
1	AIB 01004MI	Development of multi-voltine breeds with improved silk quality utilizing indigenous and exotic breeds *(in collaboration with CSRTI, Mysuru)*	Sep, 2018	Aug, 2022	The expression of diapause related gene in developed MV breeds will be evaluated	The diapause related gene expression was compared with phenotypic characters in the multivoltine races of MV1, HB4, Pure Mysore, HB4 x BM2, HB4 x S8, MV1 x BM2 and MV1xS8

Annex- 8.I.5

1.2.2. Projects continued through and concluded during 2019-20

Sl.No.	Code	Title	Start	Closure	Progress achieved	Utility of out-put/Impact on silk industry
Nil						

Annex- 8.I.6

1.2.3. New projects initiated during 2019-20

Sl.No.	Code	Title	Start	Closure	Milestone to be crossed	Progress achieved
1	AIE 06002MI	Evaluation of bivoltine silkworm genetic resources for tolerance to abiotic stress in	April,2019	Mar, 2022	Collection of moths from the shortlisted bivoltine accns. DNA extraction &	40 (10 individuals from each accn) bivoltine accessions were

		selected hot spots *(in collaboration with CSGRC, Hosur)*			purification PCR amplification of genomic DNA using primers	subjected to PCR using 4 shortlisted thermotolerant markers. Out of 40 accessions assessed for thermotolerant markers 19 accessions showed thermoltolerance between 75%-100%

2. Transfer of Technology Programmes carried out during 2019-20

Annex - 8.II.1

2.1.On Station Trials (for validation of technology at CSB institutes/ RSRSs/ DoS unitsetc.)

SN	Name of the Technology	Unit Cost (Rs.)	At CSB institutes	RSRSs	DOS Units	Total	Funds utilized (Rs.)	Findings
Nil								

Annex- 8.II.2

2.2.On Farm Trials (for demonstration of Technologies at farmers' level)

Sl. No	Name of the Technology	Unit Cost (Rs.)	No. of locations	No. of stakeholders	Fund utilisation (Rs.)	Findings
Nil						

Annex- 8. III

3. Capacity Building & Training programmes carried out during 2019-20

Sl. No.	Title of the training programme	Unit cost (Rs.)	Target	
			Physical (No.)	Financial (Rs.in lakh)
3.1	Structured Training Course*	NA		
3.1.1	PGDS			

3.1.2	Intensive Sericulture Training			
3.2	Farmers Skill Training			
3.3	Exposure visit for technology awareness			
3.4	Technology Orientation Programme			
3.5	Sericulture Resource Centres (SRCs)			
3.6	**Training under Post Cocoon Sector****			
3.6.1				
3.7	Management Development Programme under STEP			
3.8	Training for Adopted Seed Rearers (ASRs)			
3.9	Training to Registered seed Producers (RSPs)			
3.10	Training on Seed Act			
3.11	Other Need Based Training Programme (Training students for dissertation)	-	27	1.125
3.12	**Non-CBT:** Training programme funded by agencies other than CSB*	NA		
3.12.1				
3.12.2				
3.13	**Training under SAMARTH *****			
3.13.1	Pre-cocoon (Silkworm rearing)			
3.13.2	Post cocoon – Silk (Reeling, Spinning, Wet processing)			
3.13.3	Post cocoon – Handloom (Designing & Weaving)			
	Total		**27**	**1.125**

** Pl specify the details, ** Name of training with duration, *** only NSQF aligned courses*

Annex- 8. IV

4. Extension Communication Programmesconducted during2019-20

Sl. No	Programmes	Unit cost (Rs.)	No. of events		No. of stakeholders		Financial (Rs. In Lakhs)	
			Target	Achmt.	Target	Achmt.	Target	Achmt.
4.1	KrishiMela / Farmers meet	NA						
4.2	Field day							
4.3	Farmers day							
4.4	Awareness programme							
4.5	Group discussion /VicharGoshthi							
4.6	Technology demonstration / Enlightenment programmes							
4.7	Workshop/ Seminars & Conferences							
4.8	Other activities							
	Total							

Annex- 8.V

5. Digital Soil Health Cards issued during 2019-20

Sl. No.	Name of state	Target	Achievement
NA			

Annex-8.VI

6. Information, Education and Communication during 2019-20

Sl. No.	Item	Target (No.)	Achievement (No.)
6.1	Periodicals	1	1
6.2	Publications		
6.2.1	Research papers-National	--	1
6.2.2	Research papers-International	6	6
6.2.3	Proceedings/ Abstracts	--	4
6.2.4	Books/ Book Chapters/ Mannuals etc.	--	--
6.2.5	Popular Articles	1	3
6.2.6	Booklets, Brochures etc.	--	--
6.3	Extension literature	--	--
6.4	Films/ Videos	--	--
6.5	Social media	--	--
Total		**8**	**15**

Annex-8.VII

7. Patents obtained/ submitted for patenting/ technologies Commercialized/ ProductsDeveloped during 2019-20

Sl. No.	Item	Give information like Patent No., Date of filing patent by NRDC, Technology commercialised to & Date of licence.
7.1	**Patents filed**	
7.1.1	Nil	Nil
7.2	**Patents granted**	Nil
7.3	**Technologies commercialized**	Nil
7.4	**Android/mobile app, software developed etc.**	Nil

Annex-8.VIII

8. Revenue Generation during 2019-20

Sl. No.	Source of Revenue Generation	Physical (No.)	Revenue generated (Rs. in Lakhs)	
			Target	Achievement
8.1	**Patent (Technology)**			
8.1.1	License Fee collected	Nil	0.0	0.0
8.1.2	Royalty collected	Nil	0.0	0.0
8.2	**Testing & Analytical charges (Sample)**			
8.2.1	Testing of Soil/water/FYM/ Leaf etc	Nil	0.0	0.0
8.2.2	Quality analysis/ testing of products	Nil	0.0	0.0
8.2.3	Testing of cocoons/silk yarn/fabric etc.	Nil	0.0	0.0
8.3	**Consultancy (Services)**	Nil	0.0	0.0
8.4	**Supply/ sale proceeds of cutting / Sapling/ seedling/ chawki worms/ cocoons/ Silk etc.**			
8.4.1	Mulberry cutting	Nil	0.0	0.0
8.4.2	Vanya host plant sapling/ seedling	Nil	0.0	0.0
8.4.3	Mulberry chawki worms	Nil	0.0	0.0
8.4.4	Mulberry Seed (DFLs)	Nil	0.0	0.0
8.4.5	Vanyaseed (DFLs)	Nil	0.0	0.0
8.4.6	Cocoons	Nil	0.0	0.0
8.4.7	Output from R&D Projects (Silk, fabric etc)	Nil	0.0	0.0
8.4.8	Others (pl specify) Students dissertation training	27	0.50	1.125
	Total	**27**	**0.50**	**1.125**

Annex -8.IX

9. Other Activities carried out during 2019-20: **Nil**

Annex - 8.X

Progress at a glancefor the year2019-20

Name of the Institute	Research Projects as PI			Research Projects as CI			On Station Trials		On Farm Trials			Capacity Building & Training		Extension Communication programmes (ECPs)									Digital Soil Health Cards issued	No. of patents filed/granted and technologies to be commercialised	Revenue generated (Rs. in Lakhs)
	Projects of earlier year continued through	Projects concluded during the year	New Projects initiated	Projects of earlier year continued through	Projects concluded during the year	New Projects initiated	No. of technologies validated	No. of trials covered	No. of technologies demonstrated	No. of locations covered	No. of stakeholders covered	No. of Programs Conducted	No. of stakeholders trained	KrishiMela / Farmers meet	Field day	Farmers day	Awareness programme	Group discussion /Vichar Goshthi	Technology demonstration / Enlightenment programmes	Workshop / Seminars & Conferences	Field Visits	Other activities			
SBRL, Kodathi	**6**	**3**	**4**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1.12**

PART-II

PROPOSED PLAN FOR THE YEAR 2020-21

Name of the Institute: Seri-Biotech Research Laboratory

2. Organizational set up

Unit	Kodathi, Bengaluru
RSRS/ RSTRS	
REC/ STSC	

2. R&D Projects, TOT, ECP, CBT etc:

Item	Target	Remarks
1. CSB coded Research projects		
1.3. With PI from the Institute		
1.3.1. Projects of earlier year continued through the year 2020-21	7	**Annex 8.I.1**
1.3.2. Projects to be concluded during the year 2020-21	3	**Annex 8.I.2**
1.3.3. New Projects to be initiated during 2020-21	3	**Annex 8.I.3**
1.4. With CI from the Institute (Collaborative)		
1.4.1. Projects of earlier year continued through the year 2020-21	2	**Annex 8.I.4**
1.4.2. Projects to be concluded during the year 2020-21	0	**Annex 8.I.5**
1.4.3. New Projects to be initiated during 2020-21	3	**Annex 8.I.6**
2. Transfer of Technology		
2.1 On Station Trials (OST)		**Annex 8.II.1**
2.1.1. No. of technologies to be validated	1	
2.1.2. No. of trials to be conducted	2	
2.2 On Farm Trials (OFT)	0	**Annex 8.II.2**
2.2.1. No. of technologies to be demonstrated		
2.2.2. No. of locations to be covered		
2.2.3. No. of stakeholders to be covered		
3. Capacity Building & Training (CBT)		**Annex 8.III**
3.1. No. of programmes to be conducted	1	
3.2. No. of stakeholders to be trained	10	
4. Extension Communication Programs (No.)	0	**Annex 8.IV**
4.1. Krishi Mela / Farmers' meet		
4.2. Field day		
4.3. Farmers day		
4.4. Awareness programme		
4.5. Group discussion /VicharGoshthi		
4.6. Technology demonstration / Enlightenment programmes		
4.7.Workshop / Seminars & Conferences		
4.8. Other activities (*Please specify*).		
5. Soil Analysis Service provided	**0**	**Annex 8.V**
6. Information, Education & Communication		**Annex 8.VI**
6.1. Periodicals	1	
6.2. Publications	13	
6.3. Extension literature	1	
6.4. Films / Videos	--	
6.9. Social media	--	
6.10. Patents to be filed/ granted, technologies to be commercialized, Software, mobile/ android app developed etc.	--	**Annex 8.VII**
7. **Revenue generation (Rs. in Lakhs)**	0.50	**Annex 8.VIII**
8. Other activities *(pl specify)*		

2. CSB coded Research projects

1.1. With PI from the Institute

Annex- 8.I.1

1.2.1.Projects of earlier year continued through the year 2020-21

SN	Code	Title	Start	Closure	Milestone to be crossed	Progress to be achieved
1	ARP 3605 *(DBT funded Project)*	Validation of the DNA markers in silkworm breed developed by introgression of DNA markers associated with NPV resistance using Marker Assisted Selection Breeding and large scale field trial of the breed	Mar, 2017	Feb, 2020 *(Extended up to **July, 2020**)*	Distribution of DFLs to different stations, collection of data and co-ordination with NSSO for popularization of te breed	1. DFLs are distributed to Jammu, Berhampore and Mysore. For further distribution, DFLs are under preparation/ preserved at cold storage. 2.Autumn rearing at Jammu and Berhampore are over. Report awaited; P1 pure lines are reared at farmer level under the supervision of SSPCs which are used to develop hybrids for distribution
2	ARP-3606 *(DBT funded Project)*	Development of diagnostic tool for early detection of baculovirus causing tiger band disease in *Antheraeaproylei*"	Feb. 2017	Aug. 2020 *(Extended up to **Aug,2020**)*	5. To characterize the baculovirus pathogen causing tiger band disease in Oak tasar silkworm, *Antheraeaproylei* 6. To study the pathogenesis, source and mode of infection of viral pathogen 7. To develop DNA based diagnostic tools for early detection of baculovirus causing tiger-band disease 8. Validation of	4. The conserved regions of virus have been identified and phylogenetic analysis on the same has been performed. The full length genome of virus has been sequenced (Accession: GI: 1371952746). 5. The surfaces of the eggs of *A. proylei*have been analyzed for the presence of virus through PCR. Co-infection with

					developed diagnostic tools in Oak tasargrainage and egg production centre	other viral pathogens associated with oak tasar silkworm has been studied. The vertical viral transmission has been confirmed from infected eggs. Virus distributions in different tissues as well as different development stages have been studied using PCR techniques. 6. A workshop was conducted at RSRS, Imphal to demonstrate the egg disinfection technique for DOS staff, Staff working at various CSB units
3	ARP-08001 *(Indo-Swedish)*	Studies on the genetic characterization, transmission and tissue distribution of Iflavirus infecting the Indian tropical tasar silkworm, *Antheraeamylitta*"	Apr, 2018	Mar, 2021	➢ To characterize the Iflavirus infecting the two silkworm species, *Antheraeamylitta* ➢ To analyze the source of infection, tissue tropism, cross-infectivity, bio-geographic surveys and life histories	➢ Characterization through whole genome sequencing of Iflavirus infecting *Antheraeamylitta* ➢ The multiplication of Iflavirus in *Antheraeamylitta* was detected in fat body, midgut, Malpighian tubule & ovary. ➢ Vertical transmission has also been confirmed from mother moth to offspring.
4	PRP - 08002 MI	Identification of powdery mildew resistant genes and validation	May 2019	May 2022	➢ MLO genes expression analysis to identify powdery mildew	➢ Identification of MLO genes involved in powdery mildew from Mulberry

		of CAPS marker for Chalcone synthase			responsive MLO gene(s) ➢ Analysis of CAPS marker in breeding population/diverse mulberry germplasm ➢ Identification of mulberry germplasm resistant to powdery mildew/screening of germplasm resistant to powdery mildew	➢ CHS-CAPS marker analysis ➢ Identification of powdery mildew resistant/susceptible genotypes
5	AIT 08003 CN	Gene Expression Profiling for the Identification of Resistant/Tolerant Genes to Microsporidian Infection in Lamerin Breed of Silkworm, *Bombyx mori L.* (In collaboration with IISC)	Aug, 2019	July, 2022	➢ Transcriptional analyses of microsporidian resistant/tolerant and susceptible silkworm breeds ➢ Identification of genes responsible for combating microsporidian infection.	Identifying genes responsible for tolerance to microsporidian infection
6	AIT 08005 MI	Development and evaluation of Bidensovirus resistant silkworm hybrids developed from marker assisted breeding lines-Phase-II	March 2020	Feb 2023	➢ Screening of silkworm breeds from CSR&TI, Berhampore and Mysore and making homozygous for BmBDV resistant gene. ➢ Transfer of resistance gene to CSR4 and CSR27 and to susceptible parents of commercial hybrids from West Bengal regions	Silkworm breeds homozygous for BmBDV resistance gene. Transfer of BmBDV resistance allele to parents of commercial hybrids

7	PIT080 04MI	Study on Epigenetic and autophagy modifiers on induction of haploid microspore embryogenesis in mulberry	March 2020	Feb 2023	➢ Establishment of working tissue culture facility at CSGRC and at SBRL. ➢ Standardizing culture conditions for mulberry ➢ Identification of right stage of anthers for induction of microspore embryogenesis	➢ Working plant tissue culture facility at CSGRC and SBRL ➢ Identifying right culture conditions for mulberry ➢ Identifying right stage of microspore for embryogenesis

Annex- 8.I.2

1.2.2.Projects to be concluded during the year 2020-21

Sl. No	Code	Title	Start	Closure	Project Outcome	Utility of out-put / Impact on silk industry
1	ARP 3605 DBT funded Project	Validation of the DNA markers in silkworm breed developed by introgression of DNA markers associated with NPV resistance using Marker Assisted Selection Breeding and large scale field trial of the breed	Mar, 2017	July, 2020	Field evaluation of hybrids developed from MASN (MASN4 x CSR4; Nistari x MASN4) were successfully reared at regions under Jammu and Berhampore	Farmers are interested to accept the new hybrid / cross particularly in Jammu and Berhampore regions. More number of DFLs has to be supplied and make it a popular race in the northern India.
2	ARP-3606 DBT funded Project	Development of diagnostic tool for early detection of baculovirus causing tiger band disease in *Antheraeaproylei*"	March , 2017	Aug, 2020	Validation of developed diagnostic tools and egg surface disinfection technique in Oak tasar grainage and egg production centre	The technology will be demonstrated to DOS staff, Oak tasargrainage operators and farmers.
3	ARP-08001 Indo-Swedish	Studies on the genetic characterization, transmission and tissue distribution of Iflavirus infecting the Indian tropical tasar silkworm,	Apr, 2018	Mar, 2021	iflavirus infection on susceptibility status of host silkworms & its impact on infection of	The effect of iflavirus infection on susceptibility status of host silkworms & its impact on infection of other

		Antheraeamylitta"			other potential pathogens ie., microsporidian &baculovirus studied. Developed diagnostic method early detection of viral pathogen	potential pathogens ie., microsporidian&baculovirus elucidated

Annex- 8.I.3

1.2.3. New Projects to be initiated during 2020-21

SN	Code	Title	Start	Closure	Expected outcome
1	--	Development of Lateral Flow Assay (LFA) kit for diagnosis of microsporidian infection in silkworms (Concept note approved and proposal to besubmitted to BIRAC-DBT for financial approval in collaboration with CTRTI, Ranchi and CMERTI)	2020	2022	Simple and high throughput diagnosis of microsporidian infection in seed sector
2	--	Characterization of virulence and avirulance genes from *Nosema assamensis* and *Nosema mylitta* through whole genome sequencing. (To be submitted to SERB Start-up Research Grant)	2020	2022	The outcome will help in identification of virulence factor from *Nosema assamensis* and *Nosema mylitta* which can be further targeted to develop resistance in silkworm.
3		Hybrid development using multiple molecular markers for different high yield traits in the silkworm *Bombyx mori*	2020	2024	High yielding hybrids of the silkworm *Bombyx mori* assisted by functional molecular markers

1.3. With CI from the Institute (Collaborative projects with other CSB Institutes)

Annex- 8.I.4

1.2.1. Projects of earlier year continued through the year 2020-21

SN	Code	Title	Start	Closure	Milestone to be crossed	Progress to be achieved
1	AIB 01004MI	Development of multi-voltine breeds with improved silk quality utilizing indigenous and exotic breeds *(CSRTI, Mysuru)*	Sep, 2019	Aug, 2022	Identification of diapause related gene in multivoltine. Improved cross breeds of	To develop a multivoltine breeds with purely non-diapausing character
2	AIE 06002 MI	Evaluation of bivoltine silkworm genetic resources for tolerance to abiotic stress in selected hot spots *(in collaboration with CSGRC, Hosur; Funding from CSB)*	April, 2019	Mar, 2022	Nil	Nil

Annex- 8.I.5

1.2.2. Projects to be concluded during the year 2020-21

-Nil-

Annex- 8.I.6

1.2.3. New Projects to be initiated during 2020-21

Sl. No	Code	Title	Start	Closure	Expected outcome
1	--	Recombinant Silk Fibroin – Cecropin Fusion Protein Nanoparticulate Drug Delivery for the Treatment of Lung Cancer *(With Acharaya Institute, Bangalore)*	To apply for DBT funding		The use of silk protein nanoparticles may improve the pharmacokinetic and 22enerate22ynamics properties of the various types of anticancer drug molecules.
2	--	Integrating genomic and transcriptomics resources for functional insight into the biology of mugasilk moth *Antheraeaassamensis* – PHASE II **(With CMER&TI, Lahdoigarh)**	Apr, 2020	Mar, 2022	Genome and Transcriptome analysis of muga silkworm; Identification of SSRs and functional gene markers associated with yield traits and bacterial tolerance
3	--	Molecular characterization and assessment of genetic diversity in silkworm (*Bombyxmori* L.) germplasm. **(With CSGRC,Hosur)**	2020	2023	The Whole genome sequence, functionally annotated gene of Pure Mysore breed along with SNP and SSRs makers will be made available in the public databases. The generated resource will be helpful for silkworm breeding and genetic diversity analysis.

2. Transfer of Technology Programmes to be carried out during 2020-21

Annex- 8. II.1

6.1. On Station Trials (for validation of technology at CSB institutes / RSRSs/ DoS units etc.)

Sl. No	Name of the Technology	Unit Cost (Rs.)	At CSB institutes	RSRSs	DOS Units	Total
1	Effective disinfection for oak tasar silkworm eggs to protect against tiger band disease	100		Imphal	Manipur and Uttarkhand	1,00000/ 100 participants

Annex- 8. II.2

6.2. On Farm Trials (for demonstration of Technologies at farmers' level)

Sl. No	Name of the Technology	Unit Cost (Rs.)	No. of locations	No. of stakeholders
Nil				

Annex- 8. III

7. Capacity Building & Training programmes to be carried out during 2020-21

Sl. No.	Title of the training programme	Unit cost (Rs.)	Target	
			Physical (No.)	Financial (Rs.in lakh)
3.1	Structured Training Course*	NA		
3.1.1	PGDS			
3.1.2	Intensive Sericulture Training			
3.2	Farmers Skill Training			
3.3	Exposure visit for technology awareness			
3.4	Technology Orientation Programme			
3.5	Sericulture Resource Centres (SRCs)			
3.6	**Training under Post Cocoon Sector****			
3.6.1				
3.6.2				
3.6.3				
3.7	Management Development Programme under STEP			
3.8	Training for Adopted Seed Rearers (ASRs)			
3.9	Training to Registered seed Producers (RSPs)			
3.10	Training on Seed Act			
3.11	Other Need Based Training Programme (Training students as part of dissertation)	-	10	-
3.12	**Non-CBT:** Training programme funded by agencies other than CSB*	NA		
3.12.1				
3.12.2				
3.13	**Training under SAMARTH *****			
3.13.1	Pre-cocoon (Silkworm rearing)			
3.13.2	Post cocoon – Silk (Reeling, Spinning, Wet processing)			
3.13.3	Post cocoon – Handloom (Designing & Weaving)			
	Total		**10**	

** Pl specify the details, ** Name of training with duration, *** only NSQF aligned cours*

Annex- 8. IV

8. Extension Communication Programmes to be conducted during 2020-21

Sl. No	Programmes	Unit cost (Rs.)	No. of events					No. of stakeholders to be sensitized				
			I Qtr	II Qtr	III Qtr	IV Qtr	Total	I Qtr	II Qtr	III Qtr	IV Qtr	Total
4.1	KrishiMela / Farmers meet											
4.2	Field day											
4.3	Farmers day											
4.4	Awareness programme											
4.5	Group discussion /VicharGoshthi											
4.6	Technology demonstration / Enlightenment programmes											
4.7	Workshop / Seminars & Conferences											
4.8	Other activities											
	Total											

NA

Annex- 8. V

9. Soil Analysis services to be provided during the year 2020-21

Sl. No.	Name of state	Target
Nil		

Annex -8.VI

10.Information, Education and Communication

Sl. No.	Item	Target (No.)
6.1	Periodicals	1
6.2	Publications	
6.2.1	Research papers-National	--
6.2.2	Research papers-International	6
6.2.3	Proceedings/ Abstracts	2
6.2.4	Books/ Book Chapters/ Mannuals etc.	1
6.2.5	Popular Articles	2
6.2.6	Booklets, Brochures etc.	2
6.3	Extension literature	1
6.4	Films/ Videos	--
6.5	Social media	--
Total		**15**

Annex-8.VII

7. Patents to be filed/ granted and Technologies to be commercialized

Sl. No.	Item	Details
7.1	**Patents to be filed**	
Nil		
7.2	**Patents to be granted**	
Nil		
7.3	**Technologies to be commercialized**	
Nil		
7.4	**Software, mobile/android app developed etc.**	
Nil		

Annex -8.VIII

11.Revenue Generation for the year 2020-21

Sl. No.	Source of Revenue Generation	Physical (No.)	Revenue to be generated (Rs.) in lakhs
8.1	**Patent (Technology)**	0	0
8.1.1	License Fee collected		
8.1.2	Royalty collected		
8.2	**Testing & Analytical charges (Sample)**	0	0
8.2.1	Testing of Soil/water/FYM/ Leaf etc		
8.2.2	Quality analysis/ testing of products		
8.2.3	Testing of cocoons/silk yarn/fabric etc.		
8.3	**Consultancy (Services)**	0	0
8.4	**Supply/ sale proceeds of cutting / Sapling/ seedling/ chawki worms/ cocoons/ Silk etc.**	0	0
8.4.1	Mulberry cutting		
8.4.2	Vanya host plant sapling/ seedling		
8.4.3	Mulberry chawki worms		
8.4.4	Mulberry seed (DFLs)		
8.4.5	Vanya DFLs		
8.4.6	Cocoons		
8.4.7	Output from R&D Projects (Silk, fabric etc)		
8.4.8	Others (pl specify) Students dissertation training	10	0.5
	Total	**10**	**0.5**

Annex-8.IX

9. Other Activities to be taken up during the year 2020-21: Nil

Annex – 8.X

Proposed Plan at a Glance for the year 2020-21

Name of the Institute	Research Projects as PI			Research Projects as CI			On Station Trials		On Farm Trials			Capacity Building & Training		Extension Communication Programmmes (ECPs)								Digital Soil Health Cards to be issued	No. of patents to be filed/granted and technologies to be commercialised	Revenue to be 26enerate (Rs. in Lakhs)
	Projects of earlier year continued through	Projects concluded during the year	New Projects to be initiated	Projects of earlier year continued through	Projects concluded during the year	New Projects to be initiated	No. of technologies to be validated	No. of trials to be covered	No. of technologies to be demonstrated	No. of locations to be covered	No. of stakeholders to be covered	No. of Programs to be Conducted	No. of stakeholders to be trained	KrishiMela / Farmers meet	Field day	Farmers day	Awareness programme	Group discussion /VicharGosthi	Technology demonstration / Enlightenment programmes	Workshop / Seminars & Conferences	Field Visits	Other activities			
SBRL, Kodathi	**7**	**3**	**4**	**2**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**10**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0.5**

Asset creation/instrument purchase proposed for the year 2020-21

SN	Item	Quantity	Approximate Price in Rs. in Lakhs
1	-30^{0}C Deep freezer	1	4.0
2	20 KVA UPS (Solar)	1	12
3	Protein gel apparatus	1	1.5
4	Small volume spectrophotometer	1	3.5
5	UV Transilluminator	1	2.0
6	PH meter for tissue culture lab	1	0.3
7	Magnetic stirrer for tissue culture lab	1	0.4
8	Plant growth chamber	1	5.0
9	Borewell for the laboratory	1	9.0
10	Plant tissue culture rack	1	0.5
11	Vacuum concentrator	1	5.5
12	Probe sonicator	1	5.0
13	-80^{0}C Deep freezer	1	5.0
14	Water tanker (5000 lts) with trailer	1	3.0
		Total	**56.7**

IT initiative proposed for the year 2020-21

SN	Item	Quantity	Approximate Price in Rs. in Lakhs
1	High end computer work station	1	7.0
2	Desktop computer	2	1.0
3	Laptop for meetings and presentations	1	0.5
		Total	**8.5**

Maintenance work proposed for the year 2020-21

SN	Infrastructure	Approximate Price in Rs. in Lakhs
1	Fabrication of staff room	2.5
2	Drainage work	5.0
3	Painting of Laboratory block & admin block	6.0
4	Repair of instruments	3.0
	Total	**16.0**

Instrument to be purchased under DBT Project code AIT 08003CN

SN	Instrument	Quantity	Approximate Price in Rs. in Lakhs
1	Real Time PCR	1	10.03
2	PCR	1	2.95
3	Electrophoresis Apparatus	2	1.07
4	Vortex mixture and microfuge	2	0.38