AIB-3545

Authorization Trials of Silkworm Hybrids in Eastern & North Eastern India

DURATION

TWO YEARS (AUGUST, 2015 - JULY, 2017)

Budget : Rs. [36.0 lakhs]

Dr. S. Nirmal Kumar,	**Executive Authority**
Dr. A. K. Verma,	**Principal Investigator**
Dr. N. Suresh Kumar	**Co-Investigator**
Dr. A. K. Saha	**Project Coordinator**

Central Silk Board

Central Sericultural Research & Training Institute

(Under common RFD with NSSO, Bangalore)

Ministry of Textiles: Govt. of India

Berhampore –742101 (W.B.)

PROJECT

Authorization Trials of Silkworm Hybrids in Eastern & North Eastern India

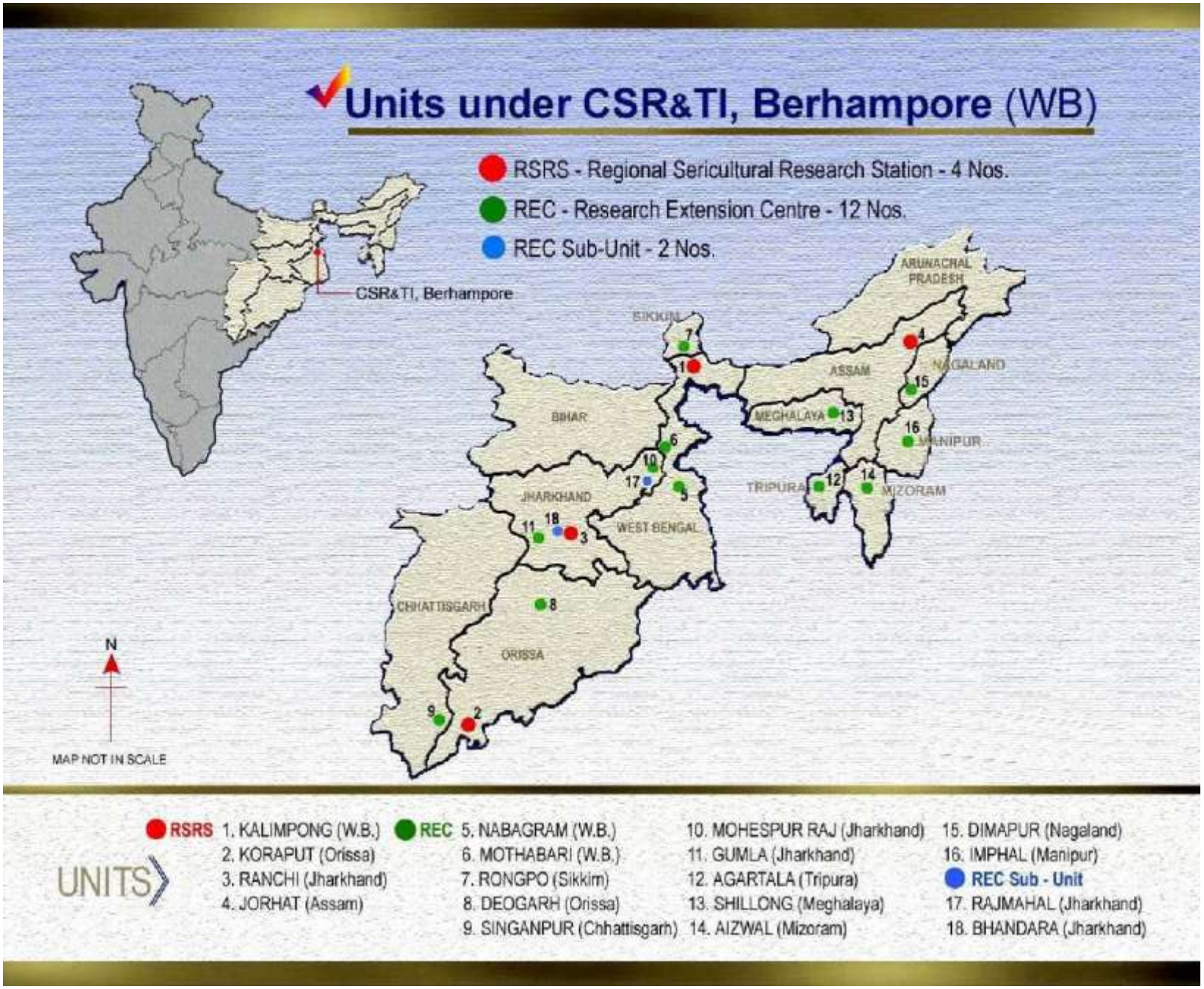
OBJECTIVE

- To evaluate the newly developed, Multi x Bi and Bi x Bi hybrids at the farmers level in Eastern & North Eastern Zone
- To popularize the newly developed hybrids at the farmers level in Eastern & North Eastern Zone
- To analyze the data of the tested hybrids in Eastern & North Eastern Zone.
- To identify the suitable hybrids for the Eastern & North Eastern Zone.
- Recommendation of the hybrids for the Eastern and North Eastern zone for commercial exploitation.

State wise trial locations and responsible executive officers

State	***Trial location***	***Name of the CSB officer***	***Name of the DOS officer***
West Bengal	Berhampore	Dr.A.K.Verma Scientist-C CSRTI,Berhampore Dr..N.Suresh Kumar Scientist-D CSRTI,Berhampore	JD/DD/AD DOS West Bengal
	Kamnagar	Dr. Tapati Dutta Biswas Scientist-D REC, Nabagram	
	Mothabari	Dr.A.K.Dutta Scientist-C REC, Mothabari	
Assam	Jorhat	Dr.Debaraj Scientist-D RSRS, Jorhat	JD/DD/AD DOS Jorhat
Jharkhand	Bandra	Dr.Ganashyam Singh Scientist-D REC, Bandra	JD/DD/AD DOS Ranchi
	M.P.Raj	Dr.D. Pandit Scientist-C REC, M.P.Raj	JD/DD/AD DOS Pakud
	Rajmahal	Scientist-D REC, Rajmahal	JD/DD/AD DOS Sahebganj

	Gumla	Dr.Ramkumar Scientist-C REC, Gumla	JD/DD/AD DOS Gumla
Orissa	Koraput	Dr.N.R.Rao Scientist-C RSRS, Koraput	JD/DD/AD DOS Koraput
	Debogarh	Dr. D.P. Das Mohapatra Scientist-C REC, Debogarh	JD/DD/AD DOS Debogarh
Mizoram	Aizwal	Dr. B.Choudhuri Scientist-D REC, Aizwal	JD/DD/AD DOS Aizwal
Tripura	Agartala	Dr.G.B.Singh Scientist-D REC, Agartala	JD/DD/AD DOS Agartala
Meghalaya	Shillong	Dr. Collin Z. Renthlei Scientist-C REC, Shillong	JD/DD/AD DOS Shillong
Manipur	Imphal	Dr.Somen Singh Scientist-C REC, Imphal	JD/DD/AD DOS Imphal
Chattisgarh	Bademaringa	Scientist-C REC, Bademaringa	JD/DD/AD DOS Bademaringa
Sikkim	Rangpo	Dr.S.T.Lepcha Scientist-C REC Rangpo	JD/DD/AD DOS Rangpo
Bangalore	NSSO	Scientists, NSSO	


Units under CSR&TI, Berhampore (WB)
RSRS - Regional Sericultural Research Station - 4 Nos.
REC - Research Extension Centre - 12 Nos.
REC Sub-Unit - 2 Nos.
CSR&TI, Berhampore
SIKKIM
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
BIHAR
JHARKHAND
WEST BENGAL
CHHATTISGARH
ORISSA
N
MAP NOT IN SCALE
UNITS
RSRS 1. KALIMPONG (W.B.)
2. KORAPUT (Orissa)
3. RANCHI (Jharkhand)
4. JORHAT (Assam)
REC 5. NABAGRAM (W.B.)
6. MOTHABARI (W.B.)
7. RONGPO (Sikkim)
8. DEOGARH (Orissa)
9. SINGANPUR (Chhattisgarh)
10. MOHESPUR RAJ (Jharkhand)
11. GUMLA (Jharkhand)
12. AGARTALA (Tripura)
13. SHILLONG (Meghalaya)
14. AIZWAL (Mizoram)
15. DIMAPUR (Nagaland)
16. IMPHAL (Manipur)
REC Sub - Unit
17. RAJMAHAL (Jharkhand)
18. BHANDARA (Jharkhand)

PROFORMA –I

PART I: GENERAL INFORMATION

1. **NAME OF THE INSTITUTE/ UNIVERSITY/ ORGANIZATION SUBMITTING THE PROGRAMME PROPOSAL:**

   Central Sericulture Research & Training Institute, Berhampore (W.B.)

2. **STATUS OF THE INSTITUTE(S):**

   Engaged in R & D of Mulberry & Mulberry Silkworm

3. **NAME(S) AND DESIGNATION(S) OF THE EXECUTIVE AUTHORITY OF THE INSTITUTE/ UNIVERSITY FORWARDING THE APPLICATION:**

   Dr. S.Nirmal Kumar , **Director**, Central Sericulture Research & Training Institute, Berhampore -742101, Murshidabad, W.B.

4. **PROJECT TITLE: Pre Authorization Trials of Silkworm Hybrids in Eastern & North Eastern India**

5. **CATEGORY OF THE PROGRAMME :** Applied**/** Trial

6. **SPECIFIC AREA:** Large scale testing of the hybrids developed by the institutes/ organizations engaged in this activity, to increase the quality & quantity of silk in India.

7. **DURATION :** Two years (August. 2015- July. 2017)

8. **TOTAL COST : Rs. [36.0 lakhs]**

9. **IS THE PROJECT SINGLE INSTITUTIONAL OR MULTI-INSTITUTIONAL:**

   Single Institutional with its nested units

10. **IF THE PROJECT IS MULTI-INSTITUTIONAL, PLEASE FURNISH THE FOLLOWING NAME, DESIGNATION AND ADDRESS OF THE PROJECT COORDINATOR :** Not Applicable

11. **SUMMARY OF THE PROJECT PROPOSAL**

Recently, one multi x bi hybrid, viz., , M6DPC x (SK6 x SK7), and one bi x bi foundation cross, B.Con.1 x B.Con.4 have been developed by this institute. These hybrids have realized substantially higher yield than the existing hybrids. Therefore, these hybrids have to be authorized for commercialization. Before authorization, sufficient data has to be generated in large scale at farmers level. Hence, a pre-authorization trial

programme has been proposed by CSB to popularize the newly developed hybrids jointly by the CSB institutions, State Departments looking after sericulture, the state owned Sericulture Research Institutions and the respective breeders/breeding institutions. Accordingly CSRTI, Berhampore has been entrusted with the responsibility of popularizing the newly developed hybrids in Eastern & North-Eastern India. Therefore, to overcome the problems of the Eastern & North Eastern Zone there is an urgent need for screening of productive, Multi x Bi and Bi x Bi hybrids developed by this institute with reasonably high survival alongwith quality and quantity in silk during favourable and unfavourable seasons. The identified hybrids will be finally recommended to be utilized for commercial crops in the particular region. Hence, this programme has been formulated to give a new shape and impetus to the sericulture industry for the Eastern & North Eastern Zone. It will give a major relief to the sericulture industry of the states. Hence, this programme.

12. PART II: PARTICULARS OF THE INVESTIGATORS

Executive Authority : Dr. S.Nirmal Kumar, Director, CSRTI, Berhampore

Programme Co-ordinator

i) Name : Dr. A. K. Saha
ii) Date of birth : 27.08.1957
iii) Sex : Male
iv) Designation & Department : Scientist-D & Head, Sericulture Division
v) Institute/ University Address : CSR&TI, Berhampore (W.B.)

Principal Investigator

i) Name : Dr.A.K.Verma
ii) Date of Birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator : **Principal Investigator (PI).**
v) Designation & Department : Scientist-D, CSR&TI, Berhampore (W.B.)
vi) Institute/ University Address : CSR&TI, Berhampore (W.B.)

Co- Investigator

i) Name : Dr. N. Suresh Kumar
ii) Date of birth : 01-06-1956
iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator : CI

v) Designation & Department : Scientist-D, CSR&TI, Berhampore (W.B.)

Co- Investigator

i) Name : Dr. Debaraj

ii) Date of birth :

iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator : CI

v) Designation & Department : Scientist-D, RSRS, Jorhat

Co- Investigator

i) Name : Dr.Ganashyam Singh

ii) Date of birth :

iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator: CI

v) Designation & Department : Scientist-D, REC, Bandrai

Co- Investigator

i) Name : Dr.N.R.Rao

ii) Date of birth :

iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator: CI

v) Designation & Department : Scientist-C, RSRS, Koraput

Co- Investigator

i) Name : Dr. G.B. Singh

ii) Date of birth :

iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator : CI

v) Designation & Department : Scientist-D, REC, Agartala

Co- Investigator

i) Name : Dr. B.Choudhuri

ii) Date of birth :

iii) Sex : Male

iv) Indicate whether Principal Investigator/ Co-investigator : CI

v) Designation & Department : Scientist-D, REC Aizwal

Co- Investigator

i) Name : Dr. Collin Z. Renthlei
ii) Date of birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator : C.I
v) Designation & Department : Scientist-C, REC, Shillong

Co- Investigator

i) Name : Dr Suomen Singh
ii) Date of birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator : C.I
v) Designation & Department : Scientist-C, REC, Imphal

Co- Investigator

i) Name : Dr. A. K.Dutta
ii) Date of birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator : C.I
v) Designation & Department : Scientist-C, REC, Mothabari

Co- Investigator

i) Name : Dr. Tapati Dutta Biswas
ii) Date of birth :
iii) Sex : Female
iv) Indicate whether Principal Investigator/ Co-investigator: C.I
v) Designation & Department : Scientist-D, REC, Kamnagar

Co- Investigator

i) Name :
ii) Date of birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator: C.I
v) Designation & Department : Scientist-D, REC, Rajmahal

Co- Investigator

i) Name : Dr. D.Pandit
ii) Date of birth :
iii) Sex : Male
iv) Indicate whether Principal Investigator/ Co-investigator: CI
v) Designation & Department : Scientist-D, REC. M.P.Raj.

Co- Investigator

i) Name **:** Dr. Ramkumar
ii) Date of birth **:**
iii) Sex **:** Male
iv) Indicate whether Principal Investigator/ Co-investigator : CI
v) Designation & Department **:** Scientist-C, REC, Gumla

Co- Investigator

i) Name **:** Dr. D.P. Das Mohapatra
ii) Date of birth **:**
iii) Sex **:** Male
iv) Indicate whether Principal Investigator/ Co-investigator : CI
v) Designation & Department **:** Scientist-C, REC Deogarh

Co- Investigator

i) Name **:** Dr.S.T.Lepcha
ii) Date of birth **:**
iii) Sex **:** Male
iv) Indicate whether Principal Investigator/ Co-investigator : C.I
v) Designation & Department **:** Scientist-C, REC, Rangpo

Co- Investigator

i) Name **:** Dr.A.Borah
iii) Sex **:** Male
iv) Indicate whether Principal Investigator/ Co-investigator : C.I
v) Designation & Department **:** Scientist-D, REC,Dimapur

13. NO. OF PROJECTS BEING HANDLED BY PRINCIPAL INVESTIGATOR AT PRESENT: Two

14. PROPOSED RESEARCH FELLOWS: Nil

PART III: TECHNICAL DETAILS OF THE PROJECT

15. INTRODUCTION

To assess the productivity of silkworm hybrids and to judge their suitability to regions/ seasons, hybrids developed by the breeders are being subjected to a system of tests and subsequent authorization for wider popularization in commercial sericulture

industry. Authorization of silkworm breeds grants recognition to silkworm breeds for commercial exploitation. It gives authenticity to the organization or the breeder who developed the hybrid a right to popularize the same in the field along with other authorized hybrids. Now, there are a number of hybrids developed by this institute which are found to be promising and recording better yield than the existing hybrids. Therefore, there is an urgent need to test these in the various climatic zones in the Eastern & North Eastern part of India under the administrative and technical control of CSR&TI, Berhampore to increase the quality and quantity silk production of the nation.

15.1 DEFINITION OF THE PROBLEM

Indian sericulture industry is multivoltine oriented and hence the quality of silk is of low grade. Quality silk can be produced only through bivoltines. Or multivoltine x bivoltine hybrids. However, the hot climatic conditions prevailing in India is not conducive to rear the highly productive silkworm hybrids already available. Recently, this institute has developed silkworm hybrids which can withstand the adverse climatic conditions of the tropics. Therefore, there is an urgent need to evaluate these hybrids with the farmers of this zone.

15.2 ORIGIN OF THE PROPOSAL/ RATIONALE OF THE STUDY

Recently CSRTI, Berhampore have developed four multi x bi hybrids and one bi x bi foundation cross with better quantitative and qualitative traits than the existing hybrids. Therefore, it is more appropriate to evaluate the performance of these hybrids in various climatic zones. Accordingly, CSR&TI, Berhampore (W.B.) has chalked out a programme for popularization of the newly developed mulberry silkworm hybrids developed in India. Hence the programme.

15.3 RELEVANCE TO THE CURRENT ISSUES & EXPECTED OUTCOME

In India, though, many silkworm hybrids have been authorized, only very few are in commercial use. There is an urgent need of more number region and season specific silkworm hybrids to cater to the need of different zones of the country. Therefore, it is

highly imperative to evaluate the already developed silkworm hybrids in different parts of the country and identify suitable region and season specific silkworm hybrids. The successful completion of the programme will enable to identify suitable region and season specific silkworm hybrids for commercialization which will definitely enhance the production of large quantity of quality silk.

15.4 OBJECTIVE

- To evaluate the newly developed Multi x Bi and Bi x Bi hybrids at the farmers level in Eastern & North Eastern Zone
- To popularize the newly developed hybrids at the farmers level in Eastern & North Eastern Zone
- To analyze the data of the tested hybrids in Eastern & North Eastern Zone.
- To identify the suitable hybrids for the Eastern & North Eastern Zone .
- Recommendation of the hybrids for the Eastern and North Eastern zone for commercial exploitation.

16. The review should restrict to relevant information which gives an insight into the current issue/ problem or clues for solving the problem. Any relevant work on other organisms that can provide cues for solving the present problem should be included.

16.1 INTERNATIONAL STATUS

Not applicable

16.2 NATIONAL STATUS

Not applicable

16.3 IMPORTANCE OF THE PROPOSED PROGRAMME IN THE CONTEXT OF CURRENT STATUS:

This institute has developed a few silkworm hybrids which in turn will help the sericulture farmers to enhance their income and increase the quality silk production of the nation to enable the nation to get foreign exchange. Hence, this programme is of paramount importance to identify more number of region and season specific silkworm hybrids

16.4 ANTICIPATED PRODUCTS, PROCESSES/ TECHNOLOGY PACKAGE INFORMATION OR OTHER OUTCOME FROM THE PROGRAMME AND THEIR EXPECTED UTILITY:

Region and season based productive hybrids will be identified along with their promising output return.

16.5 EXPERTISE AVAILABLE WITH PROPOSED INVESTIGATION GROUP /INSTITUTION ON THE SUBJECT OF THE PROJECT:

Yes

16.6 LIST OF FIVE EXPERTS IN INDIA IN THE PROPOSED SUBJECT AREA: Not Applicable being Central Silk Board's own internal programme

17. WORK PLAN

This programme will be conducted jointly by the CSB Institutions; State Departments looking after sericulture, the state owned Sericulture Research Institutions, and the respective breeders/ breeding institutions. The CSB Research Institution will take the lead role of planning the finer details of the programme, organizing the supply of seed, inputs, data collection and analysis, while other partners shall carryout crop supervision, data collection and compilation within their respective jurisdiction and submit the same to the respective CSB Research Institute i.e. CSR&TI, Berhampore. The selection of hybrids will be made as per guideline of Central Office, CSB, Bangalore. The breeder has to supply the basic seeds to NSSO. The Director of CSB Institute will workout the requirement of the silkworm seeds of different hybrids crop-wise for the whole programme and give an indent for the whole programme well in advance and the NSSO will in turn supply the required number of DFLs of each hybrid including the control as per the schedule of brushing. The reeling parameter of the hybrids will be evaluated by SCTH Malda with the sample cocoons purchased from farmers of different test locations.

1. Collection of , Multi x Bi and Bi x Bi hybrids from NSSO required for the RSRSs and its nested test centers as per their crop schedule.

2. National Silkworm Seed Organization, Bangalore to produce the quantum of testing material to the respective tests centers through its Silkworm Seed Production Centers.
3. Distribution of the silkworm hybrids to the concerned RSRSs and RECs as per crop schedule.
4. Collection of the seed production data from the Silkworm Seed Production Centers about the grainage performance of the particular hybrid.
5. Collection of the rearing data through tests centers of the rearing performance of the particular hybrid at the farmers level alongwith the meteorological data during the entire rearing period.
6. Collection of the reeling data through reeling centers of the reeling performance of the particular hybrid.
7. Ranking of hybrids in comparison with ruling hybrids/ varieties.
8. Final recommendation.

The programme is to be implemented with the following hybrids under two schemes,

1. **Scheme-I for the testing of Bi x Bi hybrids**

   In this scheme, B.Con.1 x B.Con.4 along with the control hybrid, SK6 x SK7 will be tested with the farmers coming under the jurisdiction of the test centers**.**

2. **Scheme-II for the testing of multi x bi hybrids**

   In this scheme, M6DPC x (SK6 x SK7) along with the control hybrid, Nistari x (SK6 x SK7) will be tested with the farmers coming under the jurisdiction of the test centers.

Hybrid materials selected for this programme

As per the recommendation of the hybrid authorization committee, the hybrids which are authorized for eastern and north - eastern zone are being considered as hybrid materials for the said programme. Based on the performance, two top ranking hybrids along with control have been selected as depicted in the Table 1.

Table 1: Selected silkworm hybrids for pre-authorization trial in the Eastern and North-eastern zone

Table 1a: Scheme-I : Bi x Bi hybrid

Crop	Hybrid
Falguni (Spring)	B.Con.1 x B.Con.4 SK6 x SK7*
Agrahayani (Autunm)	B.Con.1 x B.Con.4 SK6 x SK7*

Table 1b: Scheme-II : Muli x Bi hybrids

Crop	Hybrid
Falguni (Jan-feb)	M6DPC x (SK6 x SK7) N x (SK6 x SK7)*
Agrahayani (November)	M6DPC x (SK6 x SK7) N x (SK6 x SK7)*
Baishaki (April)	M6DPC x (SK6 x SK7) N x (SK6 x SK7)*

** Control hybrids*

Salient features of selected hybrids

M6DPC x (SK6 x SK7)

Larvae and cocons of M6DPC x (SK6 x SK7)

Parameters	Values
Shell percentage (%)	15.0-16.5
Filament length (m)	600-650
Renditta	9.0-9.5
Yield/100 dfls (kg)	40.0-45.0
Rearing condition	Temp.25-31°C;Humidity 75-80% (October- April)

Nistari x (SK6 x SK7)

Larvae and cocoons of Nistari x (SK6 x SK7)

Parameters	Values
Shell percentage (%)	16.5-17.0
Filament length (m)	550-600
Renditta	7.5-8.5
Yield/100 dfls (kg)	40.0-50.0
Rearing condition	Temp.25-31°C;Humidity 75-80% (October- April)

B.Con.1 x B.Con.4

Larvae and cocoons of B.Con.1 x B.Con.4

Parameters	Values
Shell percentage (%)	19.0-20
Filament length (m)	850-900
Renditta	6.5-7.0
Yield/100 dfls (kg)	50.0-55.0
Rearing condition	Temp.24-26°C;Humidity 75-80% (October- March)

SK6 x SK7 (Control hybrid)

Larvae and cocoons of SK6 x SK7

Parameters	Values
Shell percentage (%)	15.0-16.5
Filament length (m)	600-650
Renditta	8.0-8.5
Yield/100 dfls (kg)	50.0-55.0
Incremental benefit % over control	12.5%
Rearing condition	Temp.25-31°C;Humidity 75-80% (October- April)

SCHEME-I : AUTHORIZATION TRIALS OF BIVOLTINE X BIVOLTINE SILKWORM HYBRIDS

Under this scheme, the selected bivoltine hybrids along with control hybrid will be tested with the farmers coming under the jurisdiction of the test centers. The selected bivoltine hybrids along with the control will be tested in spring and autumn seasons of the two years. The number of farmers, No. of dfls/ per crop, total No. of dfls seasons and tentative date of brushing in respective centers are given in the table 2.

Table 2: Scheme for Authorization Trials of bivoltine x bivoltine silkworm hybrids
Spring & Autumn 2015

Centre	*Season*	*No. of farmers*	*No. of DFLs/ crop*	*Tentative date of brushing*
REC, Mangaldoi	Spring	100	8500	15th March
	Autumn	100	8500	25th September
REC, Shillong	Spring	100	4500	5th April
	Autumn	100	4500	3rd week August
REC, Aizwal	Spring	100	4500	15th March-5th April
	Autumn	100	4500	15th September
REC, Imphal	Spring	100	6900	15th March
	Autumn	100	6900	15th September
REC, Agartala	Spring	100	4200	5th March
	Autumn	100	4200	15th September
REC, Dimapur	Spring	50	2200	15th March
	Autumn	50	2200	25th September
REC, Rangpo	Spring	50	2500	15th April
	Autumn	50	2500	25th-Aug to 1st Sept
REC, Kamnagar	Spring	50	4500	26thJan-1st February
	Autumn	90	4500	31st Oct-5th November
REC, Mothabari	Spring	90	4500	26thJan-1st February
	Autumn	90	4500	31st Oct-5th November
REC, Rajmahal	Spring	36	1800	26thJan-1st February
	Autumn	36	1800	31st Oct-5th November
REC, M.P. Raj	Spring	10	500	26thJan-1st February
	Autumn	10	500	31st Oct-5th November
ZSSO, Malda	Spring	106	5300	26thJan-1st February
	Autumn	106	5300	31st Oct-5th November
REC, Bhandara	Spring	12	600	25th February
REC, Gumla	Spring	12	600	25th February
RSRS, Koraput	Spring	18	900	20th February
REC, Deogargh	Spring	18	900	20th February
REC, Bademaringa	Spring	18	900	20th February
Total	Spring	**970**	**54800**	
	Autumn	**932**	**48900**	
Grand Total		**1902**	**103700**	

Table 2A: Scheme for Authorization Trials of bivoltine x bivoltine silkworm hybrids
Spring & Autumn 2016

Centre	*Season*	*No. of farmers*	*No. of DFLs/ crop*	*Tentative date of brushing*
RSRS Jorhat	Spring	100	8500	15th March
	Autumn	100	8500	25th September
REC, Shillong	Spring	100	4500	5th April
	Autumn	100	4500	3rd week August
REC, Aizwal	Spring	100	4500	15th March-5th April
	Autumn	100	4500	15th September
REC, Imphal	Spring	100	6900	15th March
	Autumn	100	6900	15th September
REC, Agartala	Spring	100	4200	5th March
	Autumn	100	4200	15th September
REC, Dimapur	Spring	50	2200	15th March
	Autumn	50	2200	25th September
REC, Rangpo	Spring	50	2500	15th April
	Autumn	50	2500	25th-Aug to 1st Sept
REC, Kamnagar	Spring	50	4500	26thJan-1st February
	Autumn	90	4500	31st Oct-5th November
REC, Mothabari	Spring	90	4500	26thJan-1st February
	Autumn	90	4500	31st Oct-5th November
REC, Rajmahal	Spring	36	1800	26thJan-1st February
	Autumn	36	1800	31st Oct-5th November
REC, M.P. Raj	Spring	10	500	26thJan-1st February
	Autumn	10	500	31st Oct-5th November
ZSSO, Malda	Spring	106	5300	26thJan-1st February
	Autumn	106	5300	31st Oct-5th November
REC, Bhandara	Spring	12	600	25th February
REC, Gumla	Spring	12	600	25th February
RSRS, Koraput	Spring	18	900	20th February
REC, Deogargh	Spring	18	900	20th February
REC, Bademaringa	Spring	18	900	20th February
Total	Spring	**970**	**54800**	
	Autumn	**932**	**48900**	
Grand Total		**1902**	**103700**	

Table 3 : Season wise distribution of dfls of bivoltine hybrids to test centers

Spring & Autumn 2015

Centre	*Season*	*No. of farmers*	*No. of DFLs/ crop*	*B.Con.1 x B.Con.4*	*SK6 x SK7*
RSRS Jorhat	Spring	100	8500	8000	500
	Autumn	100	8500	8000	500
REC, Shillong	Spring	100	4500	4000	500
	Autumn	100	4500	4000	500
REC, Aizwal	Spring	100	4500	4000	500
	Autumn	100	4500	4000	500
REC, Imphal	Spring	100	6900	6400	500
	Autumn	100	6900	6400	500
REC, Agartala	Spring	100	4200	4000	200
	Autumn	100	4200	4000	200
REC, Dimapur	Spring	50	2200	2000	200
	Autumn	50	2200	2000	200
REC, Rangpo	Spring	50	2500	2000	500
	Autumn	50	2500	2000	500
REC, Kamnagar	Spring	50	4500	4000	500
	Autumn	90	4500	4000	500
REC, Mothabari	Spring	90	4500	4000	500
	Autumn	90	4500	4000	500
REC, Rajmahal	Spring	36	1800	1600	200
	Autumn	36	1800	1600	200
REC, M.P. Raj	Spring	10	500	400	100
	Autumn	10	500	400	100
ZSSO, Malda	Spring	106	5300	5000	300
	Autumn	106	5300	5000	300
REC, Bhandara	Spring	12	600	500	100
REC, Gumla	Spring	12	600	500	100
RSRS, Koraput	Spring	18	900	800	100
REC, Deogargh	Spring	18	900	800	100
REC, Bademaringa	Spring	18	900	800	100
Total	Spring	**970**	**54800**	**49800**	**5000**
	Autumn	**932**	**48900**	**43400**	**4500**
Grand Total		**1902**	**103700**	**93200**	**9500**

Table 3A : Season wise distribution of dfls of bivoltine hybrids to test centers

Spring & Autumn 2016

Centre	*Season*	*No. of farmers*	*No. of DFLs/ crop*	*B.Con.1 x B.Con.4*	*SK6 x SK7*
RSRS Jorhat	Spring	100	8500	8000	500
	Autumn	100	8500	8000	500
REC, Shillong	Spring	100	4500	4000	500
	Autumn	100	4500	4000	500
REC, Aizwal	Spring	100	4500	4000	500
	Autumn	100	4500	4000	500
REC, Imphal	Spring	100	6900	6400	500
	Autumn	100	6900	6400	500
REC, Agartala	Spring	100	4200	4000	200
	Autumn	100	4200	4000	200
REC, Dimapur	Spring	50	2200	2000	200
	Autumn	50	2200	2000	200
REC, Rangpo	Spring	50	2500	2000	500
	Autumn	50	2500	2000	500
REC, Kamnagar	Spring	50	4500	4000	500
	Autumn	90	4500	4000	500
REC, Mothabari	Spring	90	4500	4000	500
	Autumn	90	4500	4000	500
REC, Rajmahal	Spring	36	1800	1600	200
	Autumn	36	1800	1600	200
REC, M.P. Raj	Spring	10	500	400	100
	Autumn	10	500	400	100
ZSSO, Malda	Spring	106	5300	5000	300
	Autumn	106	5300	5000	300
REC, Bhandara	Spring	12	600	500	100
REC, Gumla	Spring	12	600	500	100
RSRS, Koraput	Spring	18	900	800	100
REC, Deogargh	Spring	18	900	800	100
REC, Bademaringa	Spring	18	900	800	100
Total	Spring	**970**	**54800**	**49800**	**5000**
	Autumn	**932**	**47900**	**43400**	**4500**
Grand Total		**1902**	**102700**	**93200**	**9500**

SCHEME-II: AUTHORIZATION TRIALS OF MULTI X BI SILKWORM HYBRIDS

Under this scheme, the selected multi x bi hybrids along with control hybrid will be tested with the farmers coming under the jurisdiction of 14 test centers. The selected multi x bi hybrids along with the control will be tested in Falguni, Baishaki, and Agrahayani of the two years. The number of farmers, no dfls/ per crop, total no. of dfls, seasons and tentative date of brushing in respective centers are given in the table 4 .

Table 4: Scheme for authorization trials of multi x bi hybrids

Falguni, Baishaki & Agrahayani 2015

Centre	Season (Multi. x Bi)	No. of farmers	No. of DFLs/ crop	Tentative date of brushing
REC, Kamnagar	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani,	29	2900	31Oct-5th Nov.
REC, Mothabari	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March.
	Agrahayani,	29	2900	31Oct-5th Nov.
REC, Rajmahal	Falguni	7	700	6th-9th Feb
	Baishaki	7	700	28-30th March
	Agrahayani,	7	700	. 31Oct-5th Nov.
REC, M.P. Raj	Falguni	14	700	26th-30th Jan
	Baishaki	14	700	28-30th March
	Agrahayani,	14	700	31Oct-5th Nov.
DoT (Seri) Malda	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov.
DoT(Seri) Murshidabad	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani,	29	2900	31Oct-5th Nov.
DoT (Seri) Birbhum	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov.
DoT (Seri) Nadia	Falguni	14	700	26th-30th Jan
	Baishaki	14	700	28-30th March
	Agrahayani	14	700	. 31Oct-5th Nov.
ZSSO, Malda	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov
REC, Bhandara	Autumn	14	700	2nd October
REC, Gumla	Autumn	14	700	20th October
RSRS Koraput	Autumn	14	700	20th October
REC, Deogargh	Autumn	14	700	20th October
REC, Bademaringa	Autumn	14	700	20th October
Total	**Falguni**	**211**	**19500**	
	Baishaki	**211**	**19500**	
	Agrahayani	**261**	**20900**	
Grand Total		**683**	**59900**	

Table 4A: Scheme for authorization trials of multi x bi hybrids

Falguni, Baishaki & Agrahayani 2016

Centre	Season (Multi. x Bi)	No. of farmers	No. of DFLs/ crop	Tentative date of brushing
REC, Kamnagar	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani,	29	2900	31Oct-5th Nov.
REC, Mothabari	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March.
	Agrahayani,	29	2900	31Oct-5th Nov.
REC, Rajmahal	Falguni	7	700	6th-9th Feb
	Baishaki	7	700	28-30th March
	Agrahayani,	7	700	. 31Oct-5th Nov.
REC, M.P. Raj	Falguni	14	700	26th-30th Jan
	Baishaki	14	700	28-30th March
	Agrahayani,	14	700	31Oct-5th Nov.
DoT (Seri) Malda	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov.
DoT(Seri) Murshidabad	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani,	29	2900	31Oct-5th Nov.
DoT (Seri) Birbhum	Falguni	29	2900	26th-30th Jan
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov.
DoT (Seri) Nadia	Falguni	14	700	26th-30th Jan
	Baishaki	14	700	28-30th March
	Agrahayani	14	700	. 31Oct-5th Nov.
ZSSO, Malda	Falguni	29	2900	6th-9th Feb
	Baishaki	29	2900	28-30th March
	Agrahayani	29	2900	31Oct-5th Nov
REC, Bhandara	Autumn	14	700	2nd October
REC, Gumla	Autumn	14	700	20th October
RSRS Koraput	Autumn	14	700	20th October
REC, Deogargh	Autumn	14	700	20th October
REC, Bademaringa	Autumn	14	700	20th October
Total	**Falguni**	**211**	**19500**	
	Baishaki	**211**	**19500**	
	Agrahayani	**261**	**20900**	
Grand Total		**683**	**59900**	

Table 5: Season wise distribution of dfls of multi x bi hybrids to test centers

Falguni, Baishaki & Agrahayani 2015

Centre	Season (Multi. x Bi)	No. of farmers	No. of DFLs/ crop	M6DPC x (SK6 xSK7)	N x (SK6 x SK7)
REC, Kamnagar	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
REC, Mothabari	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
REC, Rajmahal	Falguni	7	700	500	200
	Baishaki	7	700	500	200
	Agrahayani,	7	700	500	200
REC, M.P. Raj	Falguni	14	700	500	200
	Baishaki	14	700	500	200
	Agrahayani,	14	700	500	200
DoT (Seri) Malda	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
DoT(Seri) Murshidabad	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
DoT (Seri) Birbhum	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
DoT (Seri) Nadia	Falguni	14	700	500	200
	Baishaki	14	700	500	200
	Agrahayani	14	700	500	200
ZSSO, Malda	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
REC, Bhandara	Autumn	14	700	500	200
REC, Gumla	Autumn	14	700	500	200
Total	**Falguni**	**211**	**19500**	**16500**	**3000**
	Baishaki	**211**	**19500**	**16500**	**3000**
	Agrahayani	**261**	**20900**	**17500**	**3400**
Grand Total		**683**	**59900**	**50500**	**9400**

Table 5A: Season wise distribution of dfls of multi x bi hybrids to test centers

Falguni, Baishaki & Agrahayani 2016

Centre	Season (Multi. x Bi)	No. of farmers	No. of DFLs/ crop	M6DPC x (SK6 xSK7)	N x (SK6 x SK7)
REC, Kamnagar	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
REC, Mothabari	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
REC, Rajmahal	Falguni	7	700	500	200
	Baishaki	7	700	500	200
	Agrahayani,	7	700	500	200
REC, M.P. Raj	Falguni	14	700	500	200
	Baishaki	14	700	500	200
	Agrahayani,	14	700	500	200
DoT (Seri) Malda	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
DoT(Seri) Murshidabad	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani,	29	2900	2500	400
DoT (Seri) Birbhum	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
DoT (Seri) Nadia	Falguni	14	700	500	200
	Baishaki	14	700	500	200
	Agrahayani	14	700	500	200
ZSSO, Malda	Falguni	29	2900	2500	400
	Baishaki	29	2900	2500	400
	Agrahayani	29	2900	2500	400
REC, Bhandara	Autumn	14	700	500	200
REC, Gumla	Autumn	14	700	500	200
RSRS Koraput	Autumn	14	700	500	200
REC, Deogargh	Autumn	14	700	500	200
REC, Bademaringa	Autumn	14	700	500	200
Total	**Falguni**	**211**	**19900**	**16700**	**3200**
	Baishaki	**211**	**19700**	**16600**	**3100**
	Agrahayani	**261**	**22400**	**18700**	**3700**
Grand Total		**683**	**62000**	**52000**	**10000**

For the implementation of this programme, the total quantity of dfls the hybrids selected for this programme has been calculated and is depicted in Table 6. The crop-wise requirement of dfls required for the programme us depicted in the table 7. Besides, the details of the requirement dfls of selected hybrids in different seasons as per the three schemes are depicted in the Table 8.

. **Table 6: Quantum of DFLS required year wise**

Hybrid	First year	Second year	Total
Bi x Bi	102700	102700	**205400**
Multi x Bi	62000	62000	**124000**
Total	**164700**	**164700**	**329400**

Table: 7. Crop-wise requirements of the DFLS in each year

Hybrid	Season					Total
	Falguni	Baishaki	Shravani	Aswina /Bhaduri	Agrahayani	
Bi x Bi	54800				47900	102700
Multi x Bi	19900	19700			22400	62000
Total	**74700**	**19700**			**70300**	**164700**

Table 8 : Requirement of dfls of different hybrids during different seasons / year

Hybrid/Season	***Spring***	***Autumn***	***Total***	
Bi x Bi				
B.Con.1 x B.Con.4	49800	43400	**93200**	
SK6 x SK7	5000	4500	**9500**	
Total	**54800**	**47900**	**102700**	
Multi x Bi				
Hybrid/Season	***Falguni***	***Baishaki***	***Agrahayani***	***Total***
M6DPC x (SK6 x SK7))	16700	16600	18700	**52000**
Nistari x (SK6 x SK7)	3200	3100	3700	**10000**
Total	**19900**	**19700**	**22400**	**62000**

17.1 METHODOLOGY

- The RSRSs and RECs will identify the farmers in their jurisdiction for implementing the programme as per the three different schemes.
- The quantum of the DFLs of Multi x Bi and Bi x Bi will be distributed among them as per their capacity of the sericulture farmers and seasons as depicted in the three different schemes
- The DFLs will be supplied free of cost as per plan.
- Disinfectants will be supplied to the farmers free of cost.
- The respective officer in-charge of the RSRSs and RECs will monitor the crop during the rearing of the hybrids with the farmers of their jurisdiction.
- Three kg cocoons each from five farmers of respective areas will be purchased and sent to SCTH Malda, West Bengal for assessment of post-cocoon parameter

- The reeled silk of each hybrid will be subjected for assessment of weaving parameters.

- Feed back data from individual sericulture farmers, seed production units, reelers and weavers will be collected on the specific format during the programme period.

- The generated data will be analysed for identification of region and season specific hybrids.

17.2 ORGANIZATION OF WORK ELEMENTS

Responsibilities	**Organization**
Rearing of parents and generation of seed cocoons	NSSO, Bangalore Basic Seed Farms
Preparation of F1 hybrids from the seed cocoons	SSPCs
Preparation of action plan	CSRTI, Berhampore
Distribution of dfls to respective regions	CSRTI, Berhampore & respective DOS
Crop monitoring	CSRTI, Berhampore & respective DOS
Identification and distribution of the layings to farmers under their control, crop monitoring and data collection	RSRSs & respective DOS
Identification and distribution of the layings to farmers under their control, crop monitoring and data collection	RECs & respective DOS
The cocoons will be reeled and the post cocoon parameters will be evaluated.	SCTH, Malda
The raw silk will be evaluated for fibre quality	Weavers(Private)
Over al data compilation, identification suitable hybrids and recommendation	CSRTI, Berhampore

17.3 PROPRIETARY/ PATENTED ITEMS, IF ANY, EXPECTED TO BE USED FOR THIS PROGRAMME:

Region and season specific hybrids will be identified for commercialization.

17.4 SUGGESTED PLAN OF ACTION FOR UTILIZATION OF THE EXPECTED OUTCOME FROM THE PROGRAMME

The identified hybrids will be ultilized in this zone for better productivity

17.5. TIME SCHEDULE OF ACTIVITIES GIVING MILESTONES

Sl.	Milestone/ Activity	Expected Date of	
		Starting	Completion
1	Collection, rearing of parents and Preparation of hybrids by NSSO	August 2015	September 2015
2.	Distribution of hybrids along with checks to the sericulture farmers and supervision of crops	October 2015	November 2015
3	Collection of rearing performance data	December 2015	January 2016
4.	Supply of cocoons to the reeling units for generating reeling data.	January 2016	February 2016
5	Collection of reeling performance data	February 2016	March 2016
6	The same activity of Sl.No.1 to 5 will be repeated in each of the three crops	April 2016	April 2017
7	Data analysis and recommendation	May 2017	July 2017

18. EXPECTED OUT PUT

Successful completion of the programme will result in the identification and popularization of sustainable hybrids which are suitable for the eastern and north eastern India which in turn will increase the silk productivity of this region and upliftment of the socio-economic situation of the sericulturists of this region.

PART IV: BUDGET PARTICULARS

Budget for authorization trial of silkworm hybrids

Sl. No.	*Item*	*Unit*	*Unit cost Rs.*	*No. of units*	*1st year Amount (Rs.)*	*2nd year Amount (Rs.)*	*Total amount (Rs.)*
1.	Silkworm Seed	No. DFLs	4=00	164700	658800	658800	1317600
2.	Disinfectants (General)	Kg	60=00	2718	163080	163080	326160
3.	Bed Disinfectants	Kg	70=00	6588	461160	461160	922320
4	Cost of cocoons for reeling	kg	300=00 250=00	522 576	156600 144000	156600 144000	313200 288000
5	Reeling charges* (Out sourcing)		80=00	1098	87840	87840	175680
6	Travel expenditure				80000	77040	157040
7	Contingencies				50000	50000	100000
	Total				**1801480**	**1798520**	**3600000**

*** Since the facilities for reeling at SCTH, Malda are not sufficient, the provision for reeling of cocoons has been proposed to be outsourced.**

Assumption

A. Bed disinfectants = 4 kg /100 dfls

B. General disinfectants = 2 kg bleaching powder /farmer /crop

C. COST OF COCOONS : RS. = 3,00,600 (Purchased from farmers for reeling purpose)

Bivoltine: Rs. =1,56,600=00

Three kg cocoons each of 2 hybrids from three farmers each season from the 16 centres will be purchased for test reeling purpose.

12 centres x 2 Seasons x 2 hybrids x 3 farmers x 3 kg @Rs.300 = 1,29,600=00

5 centres x 1 season x 2 hybrids x 3 farmers x 3 kg @Rs.300 = 27,000=00

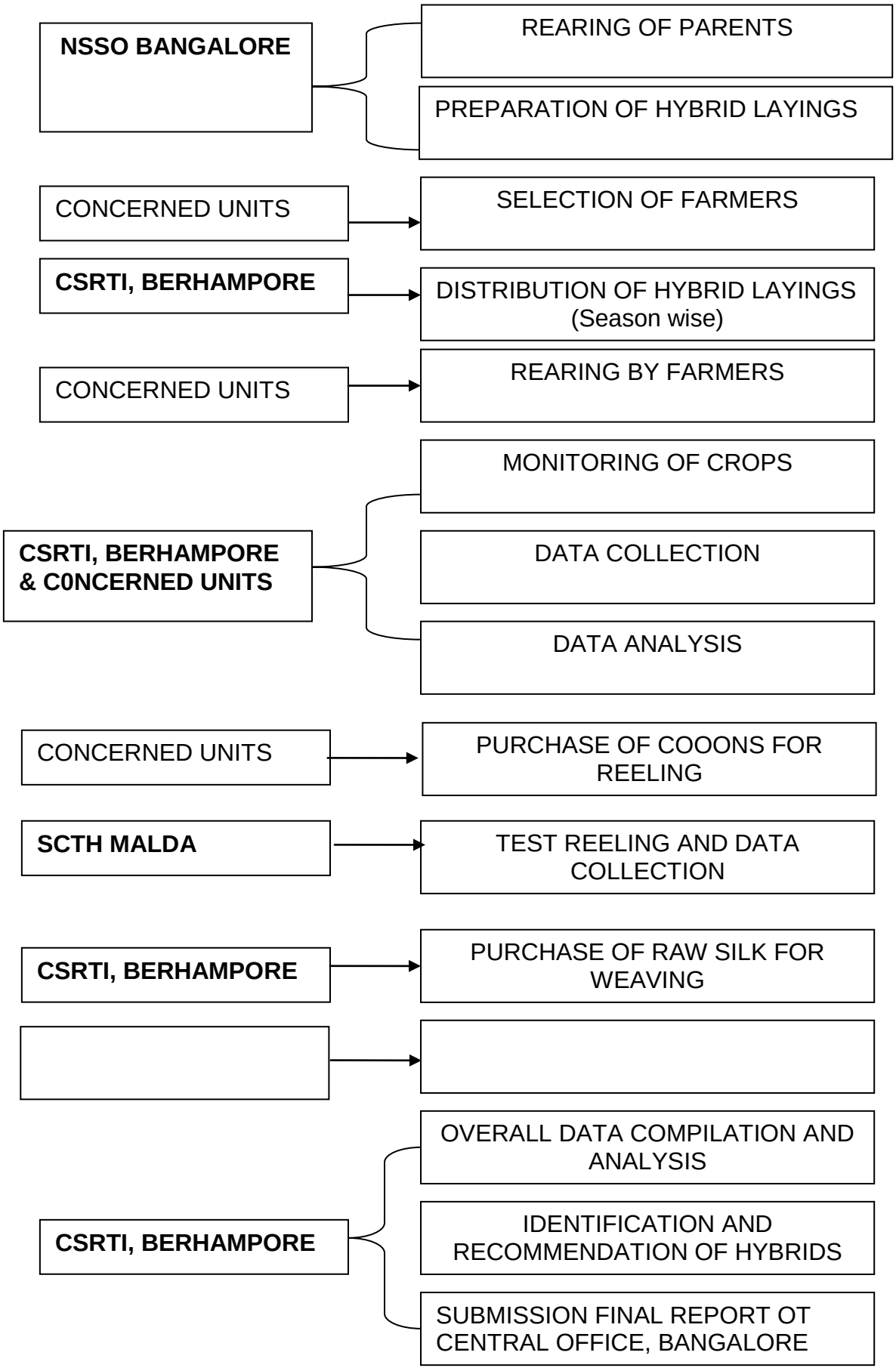
Multi x Bi: Rs. 1,44,000 =00

Three kg cocoons each of 3 hybrids from 3 farmers in each season from the 14 centres from 3 farmers will be purchased for test reeling purpose

9 centres x 3 seasons x 2 hybrids x 3 farmers x 3 kg @Rs.250 = 1,21,500=00

5 centres x 1 season x 2hybrids x 3 farmers x 3 kg @Rs.250 =22,500 =00

FLOW CHART OF ACTIVITIES



PART VI: DECLARATION/ CERTIFICATION

It is certified that

a. The research work proposed in the project does not in any way duplicate the work already done or being carried out elsewhere on the subject.
b. The same project has not been submitted to any other agencies for financial support.
c. The emoluments for the manpower proposed are those admissible to persons of corresponding status employed in the institute/ university or as per the Ministry of science & technology guidelines (Annexure –III).
d. Necessary provision for the project will be made in the Institute in anticipation of the sanction of the scheme.
e. If the project involves the utilization of genetically engineered organism, it is agreed that we will ensure that an application will be submitted through our institutional bio-safety committee and we will declare that while conducting experiments, the bio-safety committee we will declare that while conducting experiments, the bio-safety guidelines of the Department of Biotechnology would be followed in toto.
f. If the project involves field trials/ experiments/ exchange of specimens etc. we will ensure that ethical clearances would be taken from the concerned ethical committees/ competent authorities and the same would be conveyed to the Department of Biotechnology before implementing the project.
g. It is agreed by us that any research outcome or intellectual property right(s) on the invention(s) arising out of the Project shall be taken in accordance with the instructions issued with the approval of the Ministry of Finance. Department of Expenditure, as contained in annexure–V.
h. We agree to accept the terms and conditions as enclosed in Annexure –IV. The same is signed and enclosed.
i. The Institute agrees that the equipment, the basic facilities and such other administrative facilities as per terms and conditions of the grant will be extended to investigators through out the duration of the project.
j. The Institute assumes to undertake the financial and other management responsibilities of the project.

1. Signature of Project coordinator [Applicable for inter-institutional projects only]
Date:

2. Signature of Executive Authority of Institute with Seal
Date:

3. Signature of Principal Investigator
Date:

4. Signature of Co-Investigator
Date:

Name of co-investigators

Dr.Ganashyam Singh: Scientist-D, REC, Bhandra

Dr.N.R.Rao : Scientist-C, RSRS, Koraput

Dr.G.B.Singh : Scientist-D, REC, Agartala

Dr. B.Choudhuri : Scientist-D, REC Aizwal

Dr. Collin Z. Renthlei : Scientist-C, REC, Shillong

Dr.Somen Singh :Scientist-C, REC, Imphal

Dr.A. Borah : Scientist-D, REC, Dimapur

Dr. A. K.Dutta : Scientist-C, REC, Mothabari

Dr.Tapati Dutta Biswas : Scientist-D, REC, Kamnagar

Technical Assistant : Scientist-D, REC, Rajmahal

Dr. D.Pandit : Scientist-D, REC. M.P.Raj.

Dr. Ram Kumar : Scientist-C, REC, Gumla

Dr. D.P. Das Mohapatra: Scientist-C, REC Deogarh

Dr.S.T.Lepcha : Scientist-C, REC, Rangpoo

Dr.Debraj : Scientist-D, RSRS, Jorhat

Technical assistant : REC, Bademaringa

Officers of NSSO

1. Signature of Project Coordinator
   Date:

2. Signature of Executive Authority
   Date:

Annexure-I

Standard Formats for the Collection of the data

Feedback from Farmers

Sl.	Parameters	New hybrid (name to be indicated)	Ruling hybrid (name to be indicated)
1.	Cocoon yield/ 100 DFLs		
2.	Cocoons obtained/ acre of mulberry		
3.	Price/ kg green cocoon		
4.	Impression of the farmers		

Feedback from the seed production unit

Sl.	Parameters	New hybrid (name to be indicated)	Ruling hybrid (name to be indicated)
1.	Moth emergence		
2.	Synchronization		
3.	Egg recovery (gm/ kg of seed cocoon)		
4.	Impression of the graineurs		

Feedback from the reelers

Sl.	Parameters	New hybrid (name to be indicated)	Ruling hybrid (name to be indicated)
1.	Renditta		
2.	Price received		
3.	Grade obtained		
4.	Impression of the reelers		

Feedback from the weavers

Sl.	Parameters	New hybrid (name to be indicated)	Ruling hybrid (name to be indicated)
1.	Suitability of the yarn as warp		
2.	No. of breakages/ 100 beats		
3.	Any other feed back		