

PART I : GENERAL INFORMATION

1	Name of the Institute / University / Organization submitting the Project Proposal	Central Sericultural Research and Training Institute, Berhampore, West Bengal, Pin - 742101
2	Status of the Institute (s)	-
3	Name (s) and designation (s) of the Executive Authority of the Institute / University forwarding the application	Dr. B.B.Bindroo Director
4	Project Title (Under Central Sector Scheme –CSS-2107) For XII plan.	Forewarning of Mulberry Diseases in Eastern and North Eastern India
5	Category of the Project	R& D
6	Specific Area	Mulberry disease management
7	Duration	5 Years for XII plan (2012 – 2017)
8	Total cost:	Rs. 7,71, 800 /-
9	Is the Project single Institutional or multi-institutional	Institutional
10	If the Project is multi – institutional please furnish the following :	

11. Project Summary

Mulberry (*Morus alba* L.) is affected by large number of pathogens and insect pests throughout the year in Eastern and North Eastern India. Major constrains of successful mulberry cultivation is scanty rainfall, low agricultural inputs and out break of pests and diseases. Timely cultural operation like, pruning, application of recommended doses of FYM and chemical fertilizers, field sanitation and timely application of pesticides/insecticides / fungicides not only increase productivity and quality of leaf but also increase cocoon productivity and quality. Moreover, selection of proper broad spectrum, cost effective and ecofriendly fungicides is the best option for sustainability of the industry.

Powdery mildew (*Phyllactinia corylea*), leaf rust (*Peridiopsisora mori*), bacterial leaf spot (*Xanthomonas campestris* pv. *mori*) and *Myrothecium* leaf spot (*Myrothecium roridum*), *Pseudocercospora* leaf spot (*Pseudocercospora mori*) are major foliar diseases of mulberry in the eastern and northeastern region of India. In Foliar diseases reduce 10-15% leaf yield and quality. Besides feeding of diseased leaf affects cocoon productivity and quality. This huge loss in leaf and cocoon productivity and quality can be minimized by taking up appropriate disease management practices in time. Among the commercially exploited mulberry varieties Powdery mildew (PMLD) , *Pseudocercospora* leaf spot (PLS) , Bacterial leaf spot(BLS), and *Myrothecium* leaf spot(MLS) disease is very common in Gangetic plain of West Bengal, but in Kalimpong Leaf rust (LR) is predominating. In Koraput and Ranchi incidence of PMLD is prominent, but in Rangpoo both PMLD and LR are dominant. In North East India Rust is predominant in Jorhat, Aizawl, Dimapur, Imphal, but severity varies in different seasons. Disease is the interaction between a virulent pathogen, susceptible host and environmental variables. Thus development of weather based disease forewarning system in mulberry will help to take disease management measures well in advance

before the epidemic. The disease forecasting model is to be exploited in order to develop a precise spray schedule for cost effective management of mulberry diseases in Eastern and North Eastern India. Long term

disease data base would be recorded. Action would be taken to control new diseases , if recorded in any locality in Eastern and North Eastern India. *Acremonium roseogriseum*, a new fungal pathogen was collected Aizawl (Identified from IARI Delhi) will be studied for its control measure. Due to climatic change disease forecasting models and disease calendar as developed in the XIth plan period is to be fine tuned at the end of XII th plan period (2012 – 2017).

PROFORMA – I
PART II : PARTICULARS OF INVESTIGATORS

12	<p>Name Dr. S. K. Dutta Date of birth : 20.04.1957 Sex Male Indicate whether Principal Investigator / Co-investigator Principal Investigator Designation & Department Scientist-C, Mulberry Pathology Section Institute / University : Address Central Sericultural Research and Training Institute, Berhampore, West Bengal, Pin - 742101</p>
	<p>Name Mr. N. K. Das Date of birth 05.06.1954 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C, MBG Section Institute / University : Address Central Sericultural Research and Training Institute, Berhampore, West Bengal, Pin - 742101</p>
	<p>Name Dr. M. D. Maji Date of birth 18.05.1956 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C, Institute / University : Address Regional Sericulture Research Station (Annex) Central Silk Board, Kalimpong, W.B.</p>
	<p>Name Dr. S.P.Chakraborty Date of birth 04.05.1954 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C Institute / University : Address Research Extension Centre, Nabagram, Murshidabad</p>
	<p>Name Mr. A. K. Dutta Date of birth 27.11.1955 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C Institute / University : Address Research Extension Centre, Bagmara, Malda, W. B</p>
	<p>Name Dr. D.Pandit Date of birth 16.12.63 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C Institute / University : Address Research Extension Centre, Mahespur Raj, Jharkhand</p>
	<p>Name Mr. S. T. Lepcha Date of birth 13.08.1958 Sex Male Indicate whether Principal Investigator / Co-investigator Co Investigator Designation & Department Scientist-C Institute / University : Address Research Extension Centre, Rangpo, Sikkim</p>

Name	Mr. S.K.Misro
Date of birth	23.07.1965
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Regional Sericultural Research Stn., Koraput, Orissa
Name	Dr. A.H.Naqvi
Date of birth	01.08.1962
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Regional Sericultural Research Stn., Ranchi, Jharkhand
Name	Mr. M. Shankar
Date of birth	01.11.62
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Regional Sericultural Research Station, Jorhat, Assam
Name	Dr. Anukul Borah
Date of birth	06.02.1958
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Regional Sericultural Research Station, Jorhat, Assam
Name	Dr. G.B.Singh
Date of birth	01.09.58
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Research Extension Centre, Agartala, Tripura
Name	Mr. B.N.Choudhuri
Date of birth	17.02.1967
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Research Extension Centre, Aizawal, Mizoram

Name	Dr. L. Somen Singh
Date of birth	01.02.1965
Sex	Male
Indicate whether Principal Investigator / Co-investigator	Co Investigator
Designation & Department	Scientist-C
Institute / University : Address	Research Extension Centre, Imphal, Manipur

13 No. of Projects being handled by each Investigator at present

1.	Dr. S. K. Datta	1
2.	Mr. N. K. Das	2
3.	Dr. M. D. Maji	1
4.	Dr. S. P.Chakraborty	1
5.	Mr. A. K. Datta	1
6.	Mr. S. T. Lepcha	1
7.	Mr. S. K. Misro	1
8.	Dr. A.H.Naqvi	1
9.	Dr. D.Pandit	1
10.	Mr.M.Shankar	2
11.	Dr. A. Borah	1
12.	Dr. G.B.Singh	1
13.	Mr. B. N. Choudhuri	1
15.	Dr. L. Somen Singh	0

14 Proposed Research Fellows

Junior Research Fellow- 2 nos.

- Recording of disease incidence and meteorological data at farmers field in West Bengal.

PART III : TECHNICAL DETAILS OF PROJECT

15. Introduction:

Incidence of disease and pests is one of the major hindrances of sericulture activity in Eastern and North Eastern India. Large number of pathogens and insect pests infects mulberry plants throughout the year. Cultural operation like, pruning, application of recommended doses of FYM and chemical fertilizers, field sanitation and application of pesticides/insecticides / fungicides in time not only increase productivity and quality of leaf but also increase cocoon productivity and quality. Moreover, selection of proper broad spectrum, cost effective and ecofriendly pesticides / fungicides is the best option for sustainability of the industry

. Like other plants mulberry is infected by fungi, bacteria, virus, mycoplasma and nematode (Yokoyama, 1962; Rangaswami *et al.*, 1978; Sengupta *et al.*, 1990; Yashihiko, 1995). Major diseases of mulberry in the Eastern and North Eastern states (Maji, 2002, 2003) are powdery mildew, fungal leaf spot, bacterial leaf spot, leaf rust and root knot disease. Leaf yields was studied by Sikdar and Krishnaswami, 1980; Sengupta *et al.*, 1990 and assessment of quality in terms of nutrition was studied by Chanturia, 1968, Umesh Kumar, 1991 Feeding of diseased leaves prolongs larval period and resulting yield of cocoon (Noamani *et al.*, 1970; Umesh Kumar *et al.*, 1993). Loss of leaf yield due to leaf spot, powdery mildew and leaf rust diseases is 46.80%, 20.45% and 17.35 % respectively at maximum disease severity (Anonymous, 1996). Besides these, disease also reduces leaf quality leading to poor silkworm rearing and crop loss up to 54.56% and 55.59% at maximum severity of leaf spot and powdery mildew diseases (Qadri *et al.*, 1998; 1999). Crop loss due to disease and pests was recorded in FAO (1967) . Earlier studies indicated that weather has significant correlation with mulberry disease development in Eastern and North Eastern India. Application of spray schedule in Eastern and North Eastern India can control mulberry diseases of different agro climatic condition..

15.1 Definition of Problem:

Most of the farmers in India are marginal and having limited land holdings in Eastern and North Eastern India. Leaf yield loss due to powdery mildew, leaf rust and leaf spot is about 46.8%, 20.45% and 17.35% respectively in the eastern region of India. Besides, diseases also reduces nutritive quality of the leaves drastically leading to poor growth of silk worm and crop loss up to 54.58%, 53.35% at maximum disease severity level of powdery mildew and leaf spot thereby reducing income by Rs. 13,044/- and Rs. 13,290-/- per ha respectively

Forewarning will help farmers to take up timely preventive / control measures more efficiently and effectively, which in turn should reduce the number of spraying, there by saving money and

environment. Publicity and recommendation of package of forewarning system will give awareness. During survey (In XIplan) in Eastern and North Eastern India one endophytic fungus (*Acremonium roseogriseum*) (Identified from IARI, Delhi) infecting leaves of Aizawl district. Severity and control measure is to be checked. Bio assay shows 53% loss of cocoon yield in comparison with control. Which is yet to be studied. In addition to this disease forecasting models developed in the XIth plan to be fine tuned at the end of XIIth plan period.

15.2 Origin of the Proposal / Rationale of the Study:

Farmer's field of different agro-climates specially of eastern and north-eastern states involving RSRS & RECs of Eastern and North eastern States does not have specific control measure for mulberry diseases applicable with specific spray schedule. Hence this project to apply specific spray schedule and to collect feed back data in different locations of West Bengal, Jharkhand, Orissa, Chhattisgarh, Sikkim, Assam, Nagaland, Mizoram and Tripura. Foliar diseases of mulberry cause considerable loss in leaf yield and quality of all the ruling mulberry cultivars of eastern and northeastern regions during different crop seasons. Hence timely management of diseases is prerequisite which necessitates accurate economic and timely management. Moreover publicity of recommended package will give awareness in different locations. Survey and Surveillance of different diseases in Eastern and North Eastern India along with recording of meteorological parameters will help in preparation of long term broad spectrum data base of Eastern and North East India. New fungal pathogen, *Acremonium roseogriseum* collected Aizawl (Identified from IARI Delhi) will be studied its severity and control measure. Due to climatic change disease forecasting models as developed in the XIth plan period is to be fine tuned at the end of XII th plan and more models to be developed when severity of disease is > ETL in addition to this existing month wise disease calendar (as developed in the XI th plan period) to be fine tuned a at the end of XII th plan period.

15.3. Relevance to the Current Issues and Expected outcome:

For successful management of diseases, fore warning of disease is an indispensable tool for making farmers aware well in advance about the possible disease severity and extent of crop loss. In absence of forecasting, the farmers have no other alternative but to start control operations after appearance of the disease. Besides, repeated spray of fungicides increased the cost of cultivation of the farmers. It will help stakeholders to take up timely preventive / control measures to minimize

loss and increase sustainability of crop success which in turn will increase their income in Eastern and North Eastern India. A new endophytic fungus (*Acremonium* sp.) collected from Aizawl and identified from IARI, New Delhi. Bio assay indicates 53% loss of cocoon yield in comparison with control. Action would be taken to control new diseases, if recorded in any locality in Eastern and North Eastern India.

15.4. Objectives:

- 1) Collection of disease incidence (In weekly interval) and meteorological data (day wise) from Eastern and North Eastern India.
- 2) Publicity and recommendation of package of forewarning system in different locations.
- 3) Development of long term and broad spectrum data base for disease and meteorology of Eastern and North Eastern India at the end of XII th plan.
- 4) 6) Due to climatic change existing disease forecasting models to be fine tuned at the end of XII th plan and more models to be developed when severity of disease is > ETL.
- 5) Due to climatic change existing disease calendar (as developed in the XIth plan period) to be fine tuned a at the end of XII th plan.

16. REVIEW OF STATUS OF RESEARCH AND DEVELOPMENT ON THE SUBJECT

16.1. INTERNATIONAL STATUS

Correlation and regression for prediction of rust severity in Bahawalpur and Multan districts of Pakistan were studied by Umer Jamshed et al (2008) . The models were validated by contrasting the predicted disease severity with actual data. Disease results from the interaction of a pathogen with its host but the intensity and extent of this interaction is markedly affected by the environmental factors and host genotype. It is due to environment that some diseases are prevalent in certain area and their activities restricted to certain part of the year. Seem,(1995) suggested geographical information system for localized pest prediction. The disease forecasting is very much essential for timely application of pesticide to prevent / minimize the crop loss. In agricultural crops viz. Potato, tomato and grapes weather-based forecasting system has already been developed (Van Everdingen, 1926; Krause and Massie, 1975; Madden *et al.* 1978; Pitbalado, 1992) . Huaccho (1999) suggested a global geo reference database of potato production.

13.2. NATIONAL STATUS

Foliar diseases viz. powdery mildew, leaf rust and leaf spot (fungal & bacterial) causes 10-15% leaf yield loss in the eastern region of India (Maji, 2006). Different scientists had worked in correlation of meteorology and disease severity. (Padmanaban, 1965; Nagrajan and Singh, 1975; Saxena and Lal, 1984; Bhattacharya *et al.* 1982; Shanta, 1960; Magar and Kurundkar, 2005; Krishnaven *et al.*, 2008). In mulberry, Siddaramaiah *et al.* (1978) reported that temperature around 24-26°C and relative humidity above 60% are favourable for *Cercospora* leaf spot development. Govindaiah *et al.* (1989) reported that 24-26°C temperature and 60-70% relative humidity are favourable for powdery mildew while 20-25°C temperature and higher atmospheric humidity are conducive for leaf rust development. Pratheesh Kumar *et al.* (2000) developed weather-based forecasting models of leaf rust disease. Maji *et al.* (2002) developed forecasting model for prediction of bacterial leaf spot caused by *Xanthomonas campestris* pv. *mori* for the Gangetic plains of West Bengal. Maji *et al.* (2002) reported that bacterial leaf spot has significant correlation with minimum temperature and relative humidity and number of rainy days. Maji *et al.* (2008) reported that bacterial leaf spot has significant correlation with minimum temperature and minimum relative humidity and number of rainy days, powdery mildew has positive correlation with maximum relative humidity and negative with minimum temperature, but *Myrothecium* and *Pseudocercospora* leaf spot did not show significant correlation with any of the meteorological factors. Dutta *et al* (2011) reported that in Aizawl of North East India incidence of Powdery mildew (PMLD) , Leaf rust (LR) and *Myrothecium* leaf spot

(MLS) is very common Dutta et al during 2010 reported the major mulberry pests and diseases of West Bengal and its control measure.

Dutta et al (2011) reported that the meteorological parameters of Dimapur (Nagaland) show different indices depending on the severity of leaf rust of that zone and maximum severity was observed during November (16.89 PDI).

16.3 IMPORTANCE OF THE PROPOSED PROJECT IN THE CONTEXT OF CURRENT STATUS

Leaf yield loss due to powdery mildew, leaf rust and leaf spot is about 46.8%, 20.45% and 17.35% respectively in the eastern region of India. Besides, diseases also reduces nutritive quality of the leaves drastically leading to poor growth of silk worm and crop loss up to 54.58%, 53.35% at maximum disease severity level of powdery mildew and leaf spot thereby reducing income by Rs. 13,044/- and Rs. 13,290/- per ha respectively.

As per recommendation of spray schedule (To be developed in XI Plan) cost effective management to control diseases in Eastern and North Eastern India is to be recommended. Acremonium sp. collected Aizawl (Identified from IARI Delhi) will be studied its severity and control measure will be proposed. It is a new endophytic fungus collected from Aizawl. Action would be taken to control new diseases , if recorded in any locality in Eastern and North Eastern India.

16.4. ANTICIPATED PRODUCT, PROCESS/TECHNOLOGY, PACKAGES, INFORMATION OR OTHER OUTCOME FROM THE PROJECT AND THEIR EXPECTED UTILITY

- Implementation of the recommended package to control diseases with special reference to Eastern and North Eastern India.

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

The investigating group has necessary expertise to implement the project.

16.6. LIST OF FIVE EXPERTS IN INDIA IN THE PROPOSED SUBJECT AREA:

N. A

17. WORK PLAN

17.1 Methodology

A. Location of the experiment:

Eastern India

West Bengal:	1) CSRTI, Berhampore	Farmers' field in Murshidabad
	2) REC, Nabagram	Farmers' field in Birbhum district
	3) REC, Bagmara	Farmers' field in Malda district
	4) RSRS, Kalimpong	Farmers' field in Kalimpong
Sikkim:	5) REC, Rangpo	Farmer's field in Sikkim
Orissa:	6) RSRS, Koraput	Farmers' field in Koraput
Jharkhand:	7) RSRS, Ranchi	Farmers' field in Ranchi
	8) REC, Mahespur Raj	Farmers' field in Mahespur Raj
Chhattisgarh:	9) REC, Singhanpur	Farmer's field in Chhattisgarh

North Eastern India

Assam	10) RSRS, Jorhat	Farmers' field in Jorhat
Nagaland	11) REC, Dimapur	Farmers' field in Nagaland
Manipur	12) REC, Imphal	Farmers' field in Imphal
Mizoram	13) REC, Mizoram	Farmers' field in Mizoram
Tripura	14) REC, Agartala	Farmers' field in Tripura

I- Disease assessment:

- Each coordinating centre will collect the disease incidence and severity data from three villages with three farmers of each village.
- In each village data will be collected from three farmers' fields.
- The plot size/farmer will be 20 cents to 1 acre.
- Mulberry varieties / age / spacing / pruning / cultural operations etc. should be somewhat similar.
- Disease severity data will be collected at weekly interval.
- Foliar disease incidence will be recorded from fixed 5 plants, 4 in 4 corners leaving border plants and 1 from the centre.
- Diseases incidence will be recoded from 3 fixed branches of each plant.
- In each branch, the total numbers of healthy and diseased leaves will grade in to 0 - 5 scale on the basis of percent of leaf area infected.

0 = healthy leaf,
1 = 1 - 5 % leaf area infected
2 = 6 - 10 % leaf area infected
3 = 11 - 25 % leaf area infected
4 = 26 - 50 % leaf area infected
5 = 51 and above leaf area infected

Infection percentage or percent incidence and percent of disease index will be calculated by following formula.

1. Infection percentage or percent incidence (P. I.)

$$\text{P.I.} = \frac{\text{Total number of infected leaves}}{\text{Total number of leaves studied}} \times 100$$

2. Percentage disease index (PDI.)

$$\text{PDI.} = \frac{\text{Sum of all individual disease rating}}{\text{-----}} \times 100$$

Total no. of leaves assessed x Max. Grade (i.e. 5)

II. Meteorological data to be recorded:

The following meteorological data will be recorded daily from weather station of the respective test centers.

- Daily maximum and minimum temperature (°C)
- Daily maximum and minimum relative humidity (%)
- Daily Rainfall (mm)
- Rainy days
- Daily bright sunshine hour
- Daily average wind velocity (kmph)

B. Publicity of disease forewarning in Eastern and North Eastern India.

Printing and distribution of Pamphlet for disease incidence (State wise / month wise) for awareness of spray schedule as per recommended package through the concerned centre.

C. Application of fungicide as per recommended package in Eastern and North Eastern India .

Application of fungicide (as per disease calendar / forecasting model) in different locations through the concerned centre. Fungicide to be applied as per recommended package

<i>Slno.</i>	<i>Disease</i>	<i>Causal organism</i>	<i>Control</i>
1	Powdery mildew	<i>Phyllactinia corylea</i>	0.1% Carbendazim
2	Myrothecium leaf spot	<i>Myrothecium roridum</i>	0.1% Carbendazim
3	Pseudocercospora leaf spot	<i>Pseudocercospora mori</i>	0.1% Carbendazim
4	Bacterial leaf spot	<i>Xanthomonas campestris p.v. mori</i>	0.01% Plantomycin
4	Brown leaf rust	<i>Peridiopsora mori</i>	0.2% Mancozeb
5	Yellow leaf rust	<i>Aecidium mori</i>	0.2% Mancozeb

Effective spraying would be done prior to execution. Uniform coverage of mulberry field by fungicide @ 180 litre/acre. Safe period for 8 – 10 days to be followed. Spraying would be done as per recommended spray schedule. As prophylactic measure 0.1% Carbendazim (BAVISTIN) can control Powdery mildew, Myrothecium leaf spot and Pseudocercospora leaf spot disease but, 0.01% Plantomycin for Bacterial leaf spot and 0.1% Indofil M- 45 (MANCOZEB) for leaf rust is recommended. Considering the severity 2nd spray of fungicide is recommended after 15 days of 1st spray.

D. Collection of disease data(PDI) in weekly interval and meteorological data (day wise) from locations of Eastern and North Eastern India and compilation.

Concerned centres (RSRs and RECs) will collect data and will sent in the main Institute for compilation. Field data of Murshidabad district will be collected from the main institute.

E. Study on the severity of one new endophytic fungus (*Acremonium roseogriseum*), collected from Aizawl.

I. Disease severity (PDI) to be studied in 0 – 5 point scale.

II. In vitro cultural characters to be studied and study of pathogenicity.

Diseased host tissue from the advancing margin of the symptoms are selected for isolation of pathogen. Samples are cut in to small bits of 2/5 mm. and surface sterilized with 0.1% mercuric chloride. Bits are then

washed with sterile distilled water and later transferred to petriplates with PDA (peeled potato 200 g, dextrose 20 g, agar 15 g and distilled water 1L) media in laminar flow chamber . Plates are then incubated at 25 – 28 °C

In order to study pathogenicity of the fungal isolates, seven days old culture on PDA medium was scraped by sterile brush and suspend in sterile distilled water to obtain 1×10^6 conidia/ml. Young, healthy vigorously growing mulberry variety S1635 was inoculated with pathogen suspension on lower surface of leaves with hand sprayer. Inoculated plants were covered with polythene bag for 48 hrs. After that inoculated plants shifted to glass house for disease development

H. Existing disease forecasting models to be fine tuned at the end of XII plan period.

Due to climatic change existing disease forecasting models of West Bengal (Bacterial leaf spot and Pseudocercospora leaf spot for Murshidabad, Myrothecium leaf spot for Malda, Bacterial leaf spot for Birbhum, and leaf rust for Kalimpong), Odisha (Leaf rust for Koraput), Tripura (Powdery mildew for Agartala) and Nagaland (Powdery mildew, Myrothecium leaf spot and leaf rust for Dimapur) to be fine tuned at the end of XII plan period, based on long term data base.

I. Existing disease calendar to be fine tuned at the end of XII plan period

Due to climatic change existing disease forecasting calendar to be tuned at the end of XIIth plan period.

17.2 ORGANISATION OF WORK ELEMENTS

SL. NO.	NAME	DESIGNATION	TIME TO BE SPENT	WORK TO BE DONE
1	Dr. S. K. Dutta Principal Investigator	Scientist-C	50%	<ul style="list-style-type: none"> •Co-ordination and implementation of the project. •Compilation of disease & meteorological data of co-ordinating units •Collection of feed back data of application of fungicide and recording of disease incidence/severity at farmers field in Murshidabad district. •Detection of severity and control measure for newly identified fungus (<i>A.roseogriseum</i>) for Aizawl.
2	Mr. N. K. Das Co Investigator	Scientist-C	10%	<ul style="list-style-type: none"> •Statistical analysis of the disease & meteorological data.
3	Dr. M.D.Maji Co Investigator	Scientist-C	10%	<ul style="list-style-type: none"> •Execution and implementation of the project at RSRS, Kalimpong.

4	Dr. S.P.Chakraborty Co Investigator	Scientist-C	10%	•Execution and implementation of the project in Birbhum district.
5	Mr. A. K. Dutta Co Investigator	Scientist-C	10%	•Execution and implementation of the project in Malda district.
6	Dr. D.Pandit Co Investigator	Scientist-C	10%	•Execution and implementation of the project at REC, Mahespur Raj.
7	Mr. S. T. Lepcha Co Investigator	Scientist-C	10%	•Execution and implementation of the project at REC, Rangpo, Sikkim.
8	Dr. S.K.Misro Co Investigator	Scientist-C	10%	•Execution and implementation of the project at RSRS, Koraput, Orissa.
10	Dr. A.H.Naqvi Co Investigator	Scientist-C	10%	•Execution and implementation of the project at RSRS, Ranchi, Jharkhand.
11	Mr.M.Shankar Co Investigator	Scientist-C	10%	•Execution and implementation of the project at RSRS, Jorhat, Assam.
12	Dr. A. Borah Co Investigator	Scientist-C	10%	•Execution and implementation of the project at REC, Dimapur, Nagaland.
13	Dr.G.B.Singh Co Investigator	Scientist-C	10%	•Execution and implementation of the project in REC, Agartala, Tripura.
14	Mr. B.N.Choudhuri Co Investigator	Scientist-C	10%	•Execution and implementation of the project in REC, Aizwal, Mizoram.
15	Dr. L. S.Singh Co investigator	Scientist-C	10%	•Execution and implementation of the project in REC, Imphal, Manipur.

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

NIL

**17.4 SUGGESTED PLAN OF ACTION : Management of mulberry diseases of Eastern and
FOR UTILIZATION OF THE North eastern India for sustainable development of
EXPECTED OUTCOME FROM THE sericulture.
PROJECT**

17.5. TIME SCHEDULE OF ACTIVITIES GIVING MILESTONES

Sl. No.	Milestone / Activity	Expected Date of		Expected Outcome / visible/measurable indicator
		Starting	Completion	
1	Collection of diseases severity meteorological data	April,2012	January,2017	Generate disease & meteorological factors database of different agroclimatic regions.
3	Publicity and recommendation of package for disease forewarning.	December,2012	Aug.,2014	For awareness of different mulberry diseases in different locality and control measure.
5	Procurement of equipments	Oct,2012	Mar. 2014	Generation of meteorological database of different agroclimatic regions.
6	Application of fungicides as per recommended package of practices.	Oct,2012	January,2017	Data for application of fungicide and control of disease indifferent locality
7	Study (both in vivo and in vitro) of the fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.	Oct,2012	Feb,2013	<i>Acremonium roseogriseum</i> (identified from IARI,New Delhi)growing in Aizawl will be studied for its severity and pathogenicity.
8	Data compilation of main station and coordinating units	Oct, 2012	Dec, 2016	Disease severity will be compared before and after application of fungicide.
9	Data analysis Development of calendar and fine tuning of models.	Jan,2017	Feb,2017	Disease severity will be compared before and after application of fungicide.
10	Preparation of final report	March,2017	March,2017	Prepare final report of the project.

17.6. TIME SCHEDULE OF ACTIVITIES GIVING MILESTONES

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1	Collection of diseases severity meteorological data	April,2012	January,2017	Generate disease & meteorological factors database of different agroclimatic regions.
3	Publicity and recommendation of package for disease forewarning.	December,2012	Aug.,2014	For awareness of different mulberry diseases in different locality and control measure.
5	Procurement of equipments	Oct,2012	Mar. 2014	Generation of meteorological database of different agroclimatic regions.
8	Data compilation of main station and coordinating units	Oct, 2012	Dec, 2016	Disease severity will be compared before and after application of fungicide.
9	Data analysis Development of calendar and fine tuning of models.	Jan,2017	Feb,2017	Disease severity will be compared before and after application of fungicide.
10	Preparation of final report	March,2017	March,2017	Prepare final report of the project.

17.7. Month wise Work Calendar

(For the year 12 -13)

Sl. No.	Month	Work
1	April	1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory 3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
2	May	1) Submission of Part – 10 (Final report) for CSS-2107 for XI plan. 2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory 4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
3	June	1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory. 3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
4	July	1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory. 3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
5	August	1) Training to the personal/ Co investigators of the Co-ordinating centers on data recording, calculation and analysis and application of fungicide 2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory 4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
6	September	1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory. 3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.
7	October	1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad 2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory 4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India. 5)Study (both in vivo and in vitro) of endophytic fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.
8	November	1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district. 2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.

		<p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Study (both in vivo and in vitro) of endophytic fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.</p>
9	December	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4) Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres.</p> <p>5)Study (both in vivo and in vitro) of endophytic fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.</p>

17.8. Work Calendar (2013-14)

Sl. No.	Month	Work
1	January	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres.</p> <p>6)Study (both in vivo and in vitro) of endophytic fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.</p>
2	February	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres.</p> <p>5)Study (both in vivo and in vitro) of endophytic fungus, <i>Acremonium roseogriseum</i> , collected from Aizawl.</p>
3	March	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4) Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
4	April	<p>1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute</p>

		<p>and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
5	May	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
6	June	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
7	July	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
8	August	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
9	September	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
10	October	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p>

		<p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
11	November	<p>1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
12	December	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>

17.9. Work Calendar (2014-15)

Sl. No.	Month	Work
1	January	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the ulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
2	February	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
3	March	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p>

		<p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4) Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
4	April	<p>1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
5	May	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
6	June	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
7	July	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p> <p>4)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
8	August	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p> <p>5)Printing of pamphlets and distribution and demonstration for forewarning by the concerned centres</p>
9	September	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p>

		<p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p>
10	October	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar ,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p>
11	November	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p>
12	December	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p>

17.10. Work Calendar (2015 -16)

Sl. No.	Month	Work
1	January	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
2	February	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
3	March	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4) Data compilation (both disease and meteorology) of Murshidabad and 14 coordinating units of Eastern and North East India.</p>
4	April	<p>1)Collection of disease severity data (Weekly)form Panchgram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>

5	May	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
6	June	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
7	July	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
8	August	<p>1) Application of Plantomycin (agricultural antibiotic) 0.01% @ 180 litre / acre in the mulberry field of Sarbanagar,Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
9	September	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
10	October	<p>1) Application of BAVISTIN (Carbendazim) 0.1% @ 180 litre / acre in the mulberry field of Sarbanagar, Kutubpur and Buradanga area of Murshidabad</p> <p>2)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>3)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory</p> <p>4)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
11	November	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>
12	December	<p>1)Collection of disease severity data (Weekly)form Panch gram area (Sarbanagar , Kutubpur and Buradanga) of Murshidabad district.</p> <p>2)Collection meteorological data (Day wise)from AWS of the Institute and also from manual observatory.</p> <p>3)Data compilation (both disease and meteorology) of Murshidabad and 14 co ordinating units of Eastern and North East India.</p>

17.11. Work Calendar (2016 -17)

Sl. No.	Month	Work
1	January	Data analysis , preparation of long term data base, fine tuning of models with statistical analysis, Preparation of new calendar
2	February	Data analysis , preparation of long term data base, fine tuning of models with statistical analysis, Preparation of new calendar
3	March	Submission of Final report (Part – 10)

17.12. Project Implementing Agency/ Agencies

Name of the Agency	Address of the Agency	Proposed Research Aspects	Proposed Amount	Cost Sharing (%)
Central Silk Board	BTM Layout, Madivala, Bangalore - 560 068	Development of Weather Based Forewarning System of Mulberry Diseases	Rs 7,71,800	
Total :			Rs 7,71,800	

PART IV: BUDGET PARTICULARS

18. **BUDGET (In rupees):** [In case of multi-institutional project, the budget details should be provided separately for each of the institute]

A. Non-Recurring (e.g. equipments, accessories, etc.) :

Sl. No	Item	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total
1	Automatic Weather Station (For Jorhat)	--	2,50,000	--	--	--	2,50,000
1	Knapsack sprayer (6 nos)	10,000	--	--	--	--	10,000
	Refrigerator	15,000					15,000
	Rainguage (6 nos)	15,000					15,000
2	Stevenson screen-2nos	30,000	-	-	--	--	30,000
3	Max. & Min. Thermometer(6 nos)	8,400	-	-	--	--	8,400
4	Dry. & Wet bulb Thermometer(6 nos)	8,400	-	-	--	--	8,400
5	Laptop 1	-	50,000	--	--	--	50,000
	Sub total A:	86,800	3,00,000	--	--	--	3,86,800

B. Recurring:

B1. Manpower

Sl. No.	Position	Nos	Consolidated emoluments	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total
1	JRF	-	-	-	-	-	-	-	-
	Sub total B1:		-	-	-	-	-	-	-

B2. Consumables:

Sl. No.	Item	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total

1	Stationeries	15000	15000	15000	5,000	5,000	55000
2	Chemicals & Fertilizer	10,000	20,000	20,000	20,000	10,000	80,000
3	Glassware	0	0	0	0	0	0
	Sub total B2	25000	35000	35,000	25,000	15,000	1,35,000

Other Items:

S. No.	Item	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total
B3	Travel	15000	45000	45000	45000	5000	155000
B4	Contingency	15000	15000	15000	15000	5000	65000
B5	Overhead charges/ Publicity	20,000	10,000	0	0	0	30000
	Sub total ;B1+B2+B3+B4+B5	75,000	1,05,000	95,000	85,000	25,000	3,85,000
	Grand Total	1,61,800	4,05,000	95,000	85,000	25,000	7,71,800

Total budget for CSS – 2107For XII plan	Rs 7,71,800
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PART V: EXISTING FACILITIES:

19. AVAILABLE EQUIPMENT AND ACCESSORIES TO BE UTILIZED FOR THE PROJECT:

Sl No.	Name of the Equipments/ Accessory	Make	Model	Funding Agency	Year of Procurement
1	Stevenson screen			CSB	2005
2	Anemometer			CSB	2006
3	Sunshine recorder			CSB	-
4	Raingauge (Self recording and Manual)			CSB	2007
5	Open Pan Evaporometer			CSB	2005
6	Soil Thermometer			CSB	2010
7	Dry bulb thermometer			CSB	2010
8	Wet Bulb Thermometer			CSB	2010
9	Max. Thermometer			CSB	2010
10	Min.Thermometer			CSB	2010
11	AWS (Automatic WeatherStation) For Kalimpong and Koraput			CSB	2011
11	AWS (Automatic Weather Station) (Supplied by India Meteorological Department,Pune) for Main Institute.			Free of cost	2011

PART VI : REFERENCES

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**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (In Block letters) : **Dr. S.K.DUTTA**
2. Designation : Scientist- C
3. Department / Institute / University : Central Sericultural Research and Training
Institute, Berhampore-742101, WB.
4. Date of birth : 20.04.1957
5. Sex : Male
6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
University of North Bengal	M. Sc	1981	Botany (Spl. Pteridology)	1 st .
Visva Bharati University	Ph. D	1985	Mycology and Plant Pathology	--

7. Awards:
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]

9. Memberships/ Fellowships : [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) :
Books : 1
Research Papers, Reports : 23 + 3
General articles

List of important publications whose contents can be used in the proposed area of work :

(1) S.K.Dutta,M.D.Maji,S.K.Mukherjee and A.K.Bajpai (2010) Major mulberry pests and diseases of West Bengal and their control measure. Proceedings on State Level Work shop on” Dissemination of Setriculture know how from Lab to Land”on 27th – 28th January,2010.at Kaliachwak ,Malda.pp. 10 – 13.

(2) M.D.Maji,S.K.Dutta and C.Maji (2010) Epidemiology and prediction of brown leaf rust of mulberry caused by Peridiopsisora mori. Abstract. National Symposium on Perspective in plant health management, held on 14th – 16th December,2010 at Anand Agricultural University, Anand , Gujrat pp.61.

(3)S.K.Dutta, M.D.Maji,A.Ghosh,S.Roy Choudhury,B.Choudhuri,and M.K.Majumdar (2011) Study on different disease severity of mulberry (Morus albaL.) in different seasons of Aizawl district (Mizoram) Abstract. International Symposium on “ System intensification towards food and environmental security”at BCKV, Mohanpur on 24th -27th February,2011 pg. 301.

(4) M.D.Maji, S.K.Dutta, N.K.Das and C.Maji (2011) Epidemiology on prediction of Powdery mildew of mulberry caused by Phyllactinia corylea. Abstract. International Symposium on “ System intensification towards food and environmental security”at BCKV, Mohanpur on 24th -27th February,2011 pg. 209.

(5) S.K.Dutta, M.D.Maji,A.Ghosh,S.Roy Choudhury,B.Choudhuri,and M.K.Majumdar and B.B.Bindroo (2011) Survey on disease severity of mulberry (*Morus alba*L.) in different seasons of Aizawl district (Mizoram) Journal of Crop and Weed 7(2); pg.253.

(6) S.K.Dutta, M.D.Maji,M.K.Ghosh,A.Borah and B.B.Bindroo(2012) Study on correlation between meteorological variables and severity of Leaf rust of mulberry in Dimapur(Nagaland)- National Symposium on approaches to maximizing crop productivity at Institute of Agricultural science, University of Calcutta on 12 – 14 th January,2012- Book of Abstracts pg. 97.

(7) S. K, Dutta, M K. Ghosh, and B.B.Bindroo (2012) Study on severity of Powdery Mildew disease of mulberry in Eastern And North Eastern India; National Conference on “Recent Trends in Plant Sciences” organized by Tuljaram Chaturchand College, Baramati (Maharashtra), scheduled to be held during 3-5 February, 2012.Abstract of proceedings Pg.87.

(8) S. K.Dutta, M.D.Maji,, M.K.Ghosh and B.B.Bindroo (2012) Scenario of mulberry (*Morus alba L.*) diseases in Murshidabad district and its prophylactic measure State Level Seminar on “Advancement of Biological Science towards sustainable development”held at Berhampore Girls’ College, Berhampore,W.B. from 29th to 30th March, 2012; OP – 16.

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project
1	PIG-5829 Genome analysis of muga silkworm host plants (Som and Soalu) DNA profiling of certain elite genotypes using molecular markers and development of mapping populations. (Collaborative with SBRL, Kodathi) as CI	CSB	2004 to 2007	4 Scientists	Budget allotted at CMER&TI, Lahdoigarh.
2	Under CSS- 2107 (Central Sector Scheme) Development of forecasting and forewarning system of mulberry diseases.	CSB	2009 to 2012 (March)(During XI Plan period)	15 Scientists and 2 JRFs	18.06 Lakh

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

- (1) At P2 BSF, Dhubulia – Maintenance of mulberry plants (S1) and cultural operation as per crop schedule of West Bengal was done. Rearing of P2 dfls as per requirement of P1 seed cocoon and production of P1 dfls to supply diseases free seeds to the selected seed rearers.
- (2) At RMRS, Boko (Assam) Maintenance of GPB of muga food plant (*Persea bombycina*) was done in eight morphotypes of som plants (from S1 to S8) were maintained in the GPB plot. (Plot no7 of RMRS, Boko) Maintenance of Kessuru plants (*Hetetropanax fragrans*) at the nursery bed of RMRS,Boko was done. Survey identification and control of muga food plant diseases was done. Anew report was made in the canker rot disease of som plant. A mass multiplication technique of vegetative propagation of som plant was developed to fulfill annual action plan of RMRS Boko.(Expansion of area under high yielding morphotype of som plant).
- (3) At CSR&TI Berhampore working as sectional In charge of Mulberry pathology section.

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (In Block letters) : **MR. N. K. DAS**
2. Designation : Scientist-C
3. Department / Institute / University : MBG Section, Central Sericultural Research and Training
Institute, Berhampore
4. Date of birth : 05.06.1954
5. Sex : Male
6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
University of Kalyani, Nadia, West Bengal.	M. Sc.	1977	Statistics, Spl.: Sample Survey and Design of Experiments.	II

7. Awards:
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]

9. Memberships/ Fellowships : [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) :
Books :
Research Papers, Reports : 135
General articles :

List of important publications whose contents can be used in the proposed area of work :

1. Pratheesh Kumar, P.M., Maji, M. D., Qadri, S. M. H., Gangwar, S. K., Das, N. K., and Saratchandra, B. (2000) Development of leaf rust (*Peridiopsisora mori*) and dispersal of uridinospores in mulberry (*Morus* sp.). Int. J. Pest Management. **46** : 195-200.
2. Maji, M.D., Qadri, S. M. H., Das, N. K. and Pal S.C. (2002) Meteorological factors in relation to development and prediction of bacterial leaf spot disease of mulberry (*Morus* sp.). Bull. Ind. Acad. of Seric. **6** : 107-114.
3. Maji, M. D., Banerjee, R., Das, N. K., Chakraborty, S. and Bajpai, A K. (2007) Role of meteorological factors on mulberry diseases development. *International Symposium on Agrometeorology and Food Security (INSAFS) held on 18-21 February 2008 at Central Research Institute for Dryland Agriculture, Hyderabad, 500059, India.* Abstr. No. AS9-P12. PP. 208.

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project
1	Development of weather based forewarning system of mulberry diseases (with Mulberry Pathology Section).	CSB	2005 to 2010	8	Rs.39 lacs
2	Development of weather based forewarning system of mulberry pests (with Entomology Section)	CSB	2005 to 2008	10	Rs.30 lacs

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Project	Outcome	Utilisation
A study on impact of specialized training for extension personnel in dissemination of improved sericultural technologies (2002-2004).	Impact of specialized training across different locations <i>vis-à-vis</i> socio-economic strata of sericulturists has been explored. The inadequacies in the existing system of training have been identified.	Possible improvements based upon ground level realities have been suggested. Human resource development programmes at this Institute have suitably been modified.
A study on input resource management for farmers having sericulture as one of the major crops (2000-2003).	Farming models for multiple cropping pattern have been developed. The nature and extent of constraints coming in the way of complete adoption of recommended package of practices have been identified.	New project were taken up keeping in mind the above constraints.
A study on factors influencing sericultural productivity (1996-2000).	Proportional influence of different input factors on sericultural productivity has been determined.	Farmers who are not able to provide all recommended inputs due to their limited resource, are often suggested for prioritizing allocation and judicious application of technical inputs to get maximum benefit.

PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-INVESTIGATOR (S)

1. Full Name (In Block letters) : **Dr. M. D. MAJI**
2. Designation : Scientist-C
3. Department / Institute / University : Regional Sericultural Research Station (Annexe),
Kalimpong, West Bengal
4. Date of birth : 18.05.1956
5. Sex : Male
6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
Visva Bharati, Santiniketan, W. B	M. Sc	1979	Botany spl. in Microbiology	1 st Class 1 st Position
Visva Bharati, Santiniketan, W. B	Ph. D	2000	Studies on Bacterial leaf spot disease of mulberry occurring in West Bengal and its control	

7. Awards:
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]
9. Memberships/ Fellowships: [Not required for in-house personnel]
10. Patents: [Not required for in-house personnel]
11. Publications (Numbers only) :
Books :
Research Papers, Reports: **35**
General articles : **8**

List of important publications whose contents can be used in the proposed area of work:

1. Pratheesh Kumar, P.M., Maji, M. D., Qadri, S. M. H., Gangwar, S. K., Das, N. K., and Saratchandra, B. (2000) Development of leaf rust (*Peridiopsisora mori*) and dispersal of uridinospores in mulberry (*Morus* sp.). Int. J. Pest Management. **46** : 195-200.
2. Maji, M.D., Qadri, S. M. H., Das, N. K. and Pal S.C. (2002) Meteorological factors in relation to development and prediction of bacterial leaf spot disease of mulberry (*Morus* sp.). Bull. Ind. Acad. of Seric. **6** : 107-114.
3. Maji, M. D. and Sarkar, A. (2007) Forewarning calendar of mulberry diseases for the Gangetic plains of West Bengal, *Indian Silk*. **46 (6)** : 12-14.
4. Maji, M. D., Banerjee, R., Das, N. K., Chakraborty, S. and Bajpai, A K. (2007) Role of meteorological factors on mulberry diseases development. *International Symposium on Agrometeorology and Food Security (INSAFS) held on 18-21 February 2008 at Central Research Institute for Dryland Agriculture, Hyderabad, 500059, India. Abstr. No. AS9-P12. PP. 208.*

5. Maji, M. D. and Bajpai, A. K. (2008) Forewarning calendar of mulberry diseases of Orissa. Technical compendium of State Level Workshop on Sericulture Management held on 24-25th April, 2008, Bhubaneswar. PP. 4-7.

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project/ Programme	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project
1	PRP003: Control of mulberry diseases through botanicals and bio-control agents. [Principal Investigator]	Central Silk Board	Oct' 1998- Sept' 2003	Three	42.696 Lakhs
2	PIP- 004: Evaluation of improved mulberry varieties for eastern and north-eastern regions of India. [Co- investigator]	Central Silk Board	1997- 2002	El;even	
3	PIE - 3167: Mulberry germplasm evaluation in relation to quality, quantity and stress tolerance. [Co investigator]	Central Silk Board	2000-2004	Nine	
4	PRP-3314: Field evaluation of botanicals and biocontrol agents against major foliar diseases of mulberry. [Principal Investigator]	Central Silk Board	Aug. 2004 - July, 2006	Four	6.89 Lakhs
5	PIE-3191: Selection of high yielding mulberry varieties for improvement of cocoon production in Gangetic plains of west Bengal and similar regions [Co- investigator]	Central Silk Board	2003-2006	Four	
6	Establishment and evaluation of some castor genotypes (<i>Riccinus communis</i> L) genotypes for their adaptability in eastern part of India [Co- investigator]	Central Silk Board	2006-2009	Three	
7	PIE-3319: Screening of germplasm and raising of progeny towards development of disease resistant mulberry against bacterial leaf spot	Central Silk Board	May2005- Apr.2009	Two	3.27 Lakhs
8	PPA 3358: Organic farming in mulberry- an approach for improvement of silk industry	Central Silk Board	May,06 March,10	Nine	24.12 Lakh
9	PRP-3352: Development of weather based forewarning system of mulberry diseases	Central Silk Board	2005-2010	Ten	54.705 Lakhs

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Sl. No.	Title of the project/ Programme	Outcome	Utilization
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1	PRP003: Control of mulberry diseases through botanicals and bio-control agents. [Principal Investigator]	Identified two effective botanicals and one bio-control agent against three major foliar diseases viz. powdery mildew, <i>Myrothecium</i> leaf spot and bacterial leaf spot.	Selected botanicals and one bio-control agent were evaluated at farmers field in Murshidabad and Malda districts.
2	PIP- 004: Evaluation of improved mulberry varieties for eastern and north-eastern regions of India. [Co-investigator]	Screened region-wise disease resistant mulberry varieties for the Eastern and North-Eastern region of India.	Region-wise disease resistant high yielding varieties were recommended for commercial exploitation.
3	PIE - 3167: Mulberry germplasm evaluation in relation to quality, quantity and stress tolerance. [Co investigator]	Studied disease response of 85 mulberry varieties to major foliar diseases and screened disease resistant genotypes for utilization in future disease resistant breeding programme	Screened disease resistant varieties are recommended for utilization for diseases resistant breeding programme
4	PRP-3314: Field evaluation of botanicals and biocontrol agents against major foliar diseases of mulberry. [Principal Investigator]	Botanical-1 were found effective against Bacterial leaf spot and <i>Myrothecium</i> leaf spot and Botanical – II against Powdery mildew diseases. Biocontrol agent was found effective against both the three diseases.	A project prepared for isolation of active antibacterial and antifungal principles.
5	PIE-3191: Selection of high yielding mulberry varieties for improvement of cocoon production in Gangetic plains of west Bengal and similar regions [Co- investigator]	Screened high yielding disease resistant mulberry genotypes for Gangetic plains of west Bengal and similar regions. Disease response of CT-10 mulberry genotypes was found at par with S-1635.	Recommended CT-44 mulberry genotypes as disease resistant genotypes for Gangetic plains of west Bengal and similar regions.
6	Establishment and evaluation of some castor genotypes (<i>Riccinus communis</i> L) genotypes for their adaptability in eastern part of India [Co- investigator]	Screened high yielding disease resistant castor genotypes for Gangetic plains of west Bengal. Agia local was found resistant to foliar diseases. Prepared Forewarning Calendar of castor diseases.	Damalgiri red and RG-2717 identified as resistant genotypes to foliar diseases. A Forewarning Calendar of castor diseases prepared for taking up timely control measures.
7	PIE-3319: Screening of germplasm and raising of progeny towards development of disease resistant mulberry against bacterial leaf spot (CI)	<i>Maulticaulis</i> and <i>M. rotundiloba</i> identified as bacterial leaf spot resistant genotypes	<i>Maulticaulis</i> and <i>M. rotundiloba</i> may be utilized as source of resistant to bacterial leaf spot for disease resistant breeding programme.
8	PPA 3358: Organic farming in mulberry- an approach for improvement of silk industry [Co- investigator]	Disease response under organic farming condition is under progress.	Generated one disease incidence /severity data.
9	PRP-3352: Development of weather based forewarning system of mulberry diseases [Principal Investigator]	Generated four years disease incidence/ severity & meteorological data of seven Coordinating units at different agroclimatic regions.	Development of mulberry disease forecasting models of different Agroclimatic regions.

PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-INVESTIGATOR (S)

1. Full Name (In Block letters) : **MR. A.K. DUTTA**
2. Designation : Scientist-C
3. Department / Institute / University : Research Extension Centre, Mothabari,
Malda, West Bengal
4. Date of birth : 27.11.1955
5. Sex : Male
6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
Klayani University	M. Sc	1978	Taxonomy in Angiosperm	II nd

7. Awards: NIL
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions: NIL
[Not required for in-house personnel]

9. Memberships/ Fellowships : [Not required for in-house personnel]: NIL

10. Patents : [Not required for in-house personnel] NIL

11. Publications (Numbers only) :
 - Books :
 - Research Papers, Reports : 07
 - General articles : NIL

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project
1	PRP-3352: Development of weather based forewarning system of mulberry diseases	Central Silk Board	2005-2010	10	39.474

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Project	Outcome	Utilisation
Updation of improved package of practices for newly authorized mulberry varieties under irrigated condition.	Application VC (20 mt/ha/yr +AZB 20 kg/ha/yr) + AMF 75 20 kg/ha/yr, once in four year + N168 :P38 :K84 along with PGR performed significantly higher leaf yield in S1635	Exploitation is under progress
Studies on weed management in mulberry under irrigated condition.	Vigna sinensis was found to be promising towards weed control in existing mulberry garden without affecting leaf yield and quality and reduce expenditure towards cost of digging and weeding activity.	----
All India Co-ordinated experiment in mulberry (Phase-II)	MV8 and MV4 was superior than other tested varieties.	Exploitation required
Recommended BV and MV silkworm breeds in West Bengal	MC4 X BC4 and MC1 X MC4 performed better than the traditional multivoltine breed in the commercial seasons.	-
Assessment of phosphorus and requirement of mulberry (Morus alba) on Mitcherich Bray Concept	A ready reconer for phosphatic and potassic fertilizers have been worked out.	Exploitation is under progress
Technology assessment and refinement to IVLP under progress	Under progress	-

PART-VII: BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-INVESTIGATOR(S)

- 1.Full Name (In Block letters) : **Dr. D. PANDIT**
 2.Designation : Scientist-C
 3.Department / Institute / University : Research Extension Centre, Maheshpur raj,
 Jharkhand
 4.Date of birth : 16.12.63
 5.Sex : Male

6. Education (Post Graduation onwards and Professional Career):

Name of the University	Degree Passed	Year of Passing	Subject taken with specialisation	Class/ Division
Bidhan Chandra Krishi Viswavidyalaya	M.Sc.(Ag)	1989	Agricultural Extension	First Class First
-Do-	Ph.D.	1996	-Do-	-

8. Awards [Not required for in-house personnel]

Year	Awards	Agency	Purpose	Nature
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I. Position Held /Research Experience in various Institutions [Not required for in-house personnel]

9.	Membership/ Fellowship :[Not required for in-house personnel]	:	--
10.	Patents: [Not required for in-house personnel]	:	--
11.	Publications (Numbers only)	:	
	Books:	:	1
	Research Papers, Reports	:	17 + 16 = 33
	General Articles	:	06
	Seminar /Symposium/Workshop/ Conference	:	13
	Documents	:	2
	Booklets	:	2
	Calendar	:	1

List of Important publications whose content can be used in the proposed area of work.

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (In Block letters) : **Mr . S. T. LEPCHA**
 2.Designation : Scientist- C
 3.Department / Institute / University : Research Extension Centre, Rongpoo, Sikkim
 4.Date of birth : 13.08.59
 5.Sex : Male

6.Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
North Bengal University	M. Sc	1983	Botany	2 nd

7.Awards:

[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8.Positions Held / Research Experience in various institutions:

[Not required for in-house personnel]

9. Memberships/ Fellowships: [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) :04

- Books :
 Research Papers, Reports : --
 General articles :04

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Project	Outcome	Utilization

PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-INVESTIGATOR (S)

1. NAME :S.K. MISRO
2. EMPLOYEE NO. :04163
3. OFFICIAL DESIGNATION :Scientist-C
4. PROJECT DESIGNATION :CI
5. EXPERTISE AREA :Physiology & Biochemistry
6. INSTITUTE NAME :RSRS Koraput
7. INSTITUTE ADDRESS :Post box No-9,Central silk Board, Koraput
8. TELEPHONE :06852-211306
9. TELEX : No
10. FAX :06852-252606(Contact)
11. DATE OF BIRTH : 23.07.1965
12. SEX :Male
13. EDUCATIONAL QUALIFICATION

HIGHEST DEGREE (DEGREE ONWARDS)	YEAR	UNIVERSITY	COUNTRY	SUBJECT
B.Sc.	1985	Berhampore University, Berhampore	India	Zoology (Hons), Botany & Chemistry
M.Sc.	1987	Andhra university Vishakhapatnam	India	Zoology (Spl - Physiology & Biochemistry)

14. TRAINING UNDERGONE

COURSE NAME/ SUBJECT	ADDRESS OF INSTITUTE	DURATION	PERIOD FROM	TO	SPONSORING AGENCY	REMARKS
Intensive Bivoltine training programme	RSRS Koraput	2 months	25.09.1991	23.11.1991	Departmental	
Refresher course in mulberry sericulture	CSR&TI Mysore	9days	26.11.1993	03.12.1993	Departmental	
JICA	CSR&TI Mysore	2 months	26.06.1996	13.08.1996	Departmental	
Trainers Training programme under spl SGSY	BTSSO	10days	03.11.2003	15.11.2003	Departmental	

15. EXPERIENCE

ORGANISATION/ INSTITUTE	CAPACITY	DURATION	PERIOD		SUBJECT/ AREA	SIGNIFICANT ACHIEVEMENT
			FROM	TO		
Technical Service Centre,PADAGADA, Dt Koraput Odisha	SRA	5yrs 11months	18.01.1991	31.12.1996	Extension	Covered 300 acres of mulberry

						plantation in the Dasamantpur block
BSM&TC, PALLAHADA, Dt Angul, Odisha	SRA	3yrs 10months	01.01.1997	15.11.2000	Tasar Dfl production	Exceeded the old record of the centre in Dfl production during my tenure
BSM&TC, MADHUPUR, Dt Deogarh, Jharkhand	SRO	4Yrs 6months	16.11.2000	07.05.2005	Farm maintenance	Highest average cocoon production of the farm
BSM&TC, NABARANGPUR, Dt Nabarangpur, Odisha	Asst Director	1Yrs 8months	08.05.2005	16.01.2007	Tasar Dfl production & Farm maintenance	Maintained the farm and grainage of the centre.
Silk worm seed production Centre Cum Basic Seed Farm, KORAPUT, Odisha	Scientist-C	3yrs 11months	17.01.2007	15.12.2010	Seed production and farm maintenance	Highest Dfl production of SSPC for the last 10years and highest Basic seed production of BSF for the last 10 years
Regional Sericultural Research Station, Post box No-9, Central silk Board, Koraput	Scientist-C	--	16.12.2010	Continuing	Moriculture section	

16. ACTIVITY

A) PRESENT DISCIPLINE OF WORK :Moriculture

B) PRESENT AREA OF WORK :Moriculture

17. TIME ALLOCATION (IN % & COST (Note : One Week = 2 %) (for one year)

NATURE OF WORK	TIME %	NO. OF WEEKS	COST (RS.IN LAKHS)
Research & Extension	100	52	

18. PROJECTS PURSUED

a) CURRENT PROJECTS/PROJECTS UNDER PROGRESS

SL.NO.	PROJECT CODE	PROJECT TITLE	RESEARCH TIME SPENT %	COST (Rs.Lakh)

1.	CSS-2107	Development of weather based forewarning system of Mulberry Diseases	20	
2	PPS-3435	Studies on micro nutrients for sustained high productivity of quality mulberry in eastern and [North eastern India	10	
3	All India Experiment	AICEM-phase III	10	
4	Validation programme	Validation of technology pertaining to application of Sulphur to augment mulberry production in Sulphur deficient soils	20	
5	Validation programme	Field evaluation of Anti transparent for increasing leaf yield of Mulberry under rainfed condition	10	

b) COMPLETED PROJECTS

PROJECT T CODE	PROJECT TITLE	PERIOD ASSOCIATED WITH THE PROJECT	RESEARCH TIME SPENT %	IMPORTANT CONTRIBUTIONS OF THE SCIENTIST
Nil	Nil	Nil	Nil	Nil

PART VII : BIODATA OF PROJECT COORDINATOR/PRINCIPAL INVESTIGATOR/CO-INVESTIGATOR (S)

1. Full name (in block letters) : **DR. AZFAR HUSAIN NAQVI**
2. Designation : **Scientist –C**
3. Dept./Inst./Univ. : **Regional Sericultural Research Station, Central Silk Board, Ranchi**
4. Date of Birth : **01.08.1962**
5. Sex : **Male**
6. Education (PG onwards& Professional career)

Name of the University	Degree passed	Year of Passing	Subjects taken with specialization	Class/ Div.
Ranchi University, Ranchi	M.Sc.	1987	Zoology, Spl.-Entomology	Ist
-Do- (UGC-JRF)	Ph.D.	1992	Comparative Ecological Studies of Soil Microarthropods in Forest and Grassland Ecosystems of Chotanagpur.	

7. Awards:
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]

Designation	Place of posting	Period	Duration	Nature of Work
Senior Research Assistant	B.S.M.&T.C.,Kharswan	19.10.1990-04.5.94	3 yrs 6 mth.	Seed production, Extension
Senior Research Officer	C.T.R.&T.I.,Ranchi	16.5.1994-30.5.04	10 years	Research, Extension and Training
Assistant Director	R.E.C.,Gumla	11.6.2004-12.7.07	3 Yrs.1 mth.	Extension
Scientist- C	R.S.R.S.,Ranchi	13.7.2007	Continuing	Research, Extension and Training

9. Memberships/ Fellowships : [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) :

Books : 2 chapters of cytology and breeding-genetics.
 Research Papers, Reports : 40
 General articles : 3

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project

13: Highlights of outcome/ progress of the projects handled during the past 10 years

Project	Outcome	Utilization
AIB 602 : Hybridization studies in <i>Antheraea mylitta</i> , as PI.	Three promising hybrid combination of <i>Antheraea mylitta</i> were generated.	Trial of the hybrids gave encouraging results at Farmers level in different locations. Projects on in situ conservation of parents were planned at the Instt. and by DOS.
AIB 601 : Maintenance of Germplasm Bank of <i>Antheraea mylitta</i> Drury, as Co-PI.	Maintained 4 evolved lines, 3 mutant lines and 9 ecotypes of <i>A. mylitta</i> D, evaluated their biological attributes, studied chiasma frequency of biotypes and F1 progenies.	Continuous nature
PPA 3395: Development of Integrated Nutrient Management Package for Rainfed Conditions of Jharkhand as CI.	A mulberry nutrient management package having reduced doses of chemical fertilizer, vermicompost and azotobacter has been identified.	The package will be recommended to DOS for implementation at farmers' level in the rainfed areas of Jharkhand after validation.

14. Trainings Attended:

Title	Institution	Duration	Year
Ecological Study on Soil Insects and Mites	Department of Entomology and Agricultural Zoology, B.H.U., U.P.	1 week	1987
Identification, collection and preservation of Mites	Department of Arachnology, Z.S.I, Calcutta	3 days	1989
Refresher Training	Central Tasar Research and Training Institute, Ranchi	3 weeks	1991
Resource Development Training under UNDP	Central Silk Board, Bangalore	2 weeks	2003
In Country Training Programme	Central Silk Board and JICA at CSR&TI, Mysore	1 month	2005
RTI Act 2005	National Productivity Council, Chandigarh	2 days	2006
Training Programme on Extension Reforms	State Agricultural Training and Management Training Institute, Ranchi and MANAGE, Hyderabad	4 days	2007
Disciplinary Proceedings Training	Central Silk Board, Bangalore	4 days	2011
Mulberry Silkworm Race Authorization Training	Central Sericultural Research and Training Institute, Berhampore	4 days	2011

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (In Block letters) : **M. SHANKAR**
2. Designation : Scientist- C
3. Department / Institute / University : Regional Sericultural Research Station, Jorhat,, Assam.
4. Date of birth : 01.11.62
5. Sex : Male
6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
Guwahati University	M. Sc	1985	physiology	1 st

7. Awards:
[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]
9. Memberships/ Fellowships : [Not required for in-house personnel]
10. Patents: [Not required for in-house personnel]

11. Publications (Numbers only):
 - Books :
 - Research Papers, Reports : 26
 - General articles :

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator : 6 + 3 + 4= 13 (Both mulberry and non mulberry)

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) : Handled projects in both mulberry and non mulberry both in plant and silkworm side.

**PART VII : BIO DATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (In Block letters) : **Dr. A. BORAH.**
 2. Designation : Scientist- C
 3. Department / Institute / University : Research Extension Centre, Dimapur, Nagaland
 4. Date of birth : 06.02.1958
 5. Sex : Male
 6. Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
Guwahati University.	M. Sc	1981	Zoology (Cell Biology)	1 st .

7. Awards:
 [Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

8. Positions Held / Research Experience in various institutions:
 [Not required for in-house personnel]

9. Memberships/ Fellowships : [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) : 72
 Books :
 Research Papers, Reports: 61
 General articles : 11

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator : As PI-3 as CI-2

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Project	Outcome	Utilization

PART VII: BIODATA OF PROJECT COORDINATOR/PRINCIPAL INVESTIGATOR/CO-INVESTIGATOR(S)

1. Full Name (in Block letters) : **Dr. G.B.SINGH**
2. Designation : Scientist C
3. Department/Institute/University : REC, Agartala, CSR&TI, Berhampore
4. Date of birth : 01-09-1958
5. Sex : Male
6. Education (Post Graduation onwards and professional Career)

Name of the University	Degree passed	Year of Passing	Subjects with Specialization	Calss/ Dvn.
Gorakhpur Uni., U. P	Ph.D	1986	Sericulture Effect of thermal acclimation on fat body metabolism of eri silkworm <i>Philosamia ricini</i> .	-
Gorakhpur Uni., U. P	M.Sc.	1979	Zoology	II nd Div
Gorakhpur Uni., U. P	B.Sc	1977	Zoology, Botany and Chemistry	II nd Div

7. Awards [Not-required for in-house personnel]

7. Positions held/Research Experience in various institutions [Not-required for in-house personnel]

8. Memberships/Fellowships: [Not-required for in-house personnel]

1. Indian Society of Sericultural Science, Palampur, (India).
2. National Academy of Sericulture Science, Bangalore, , (India).
3. Japanese Alumni Association of India (JAAI) New Delhi , INDIA

9. Patents [Not-required for in-house personnel]

10. Publications

- | | |
|--|----|
| a) Books | 07 |
| b) Research Papers, General articles and Reports | 84 |

11. Project(s) submitted/being pursued/carried out by Investigator 18 nos funded by CSB.

12. Highlights of outcome/progress of the project(s) handled during the past 10 years, their outcome and utilization (in 200 words)

- A package of young age silkworm rearing, (from 2 acre garden with 32 crop/ year @ 5000 dfls / batch) was developed. Package being highly successful and popular. More than 250 CRCs were established based on the existing model and lakhs of the farmers are benefited. A model is established at CSRTI, Mysore, which was linked to IVLP programme. It is role model for all the State Governments, CRC owners and NGOs. The team members were recognized and awarded for the development of the package where in myself worked as Team Leader.
- **Established a Model Incubation with dark room unit first of its kind in** Central Silk Board, having capacity to incubate 10,000 dfls / batch. Worked as a team leader and later on became I/C of the unit. It is model for all stake holders.
- **Mature silkworm separator and collector machine was designed, developed & fine-tuned.** Machine saves 45-50 % time for collection of mature worms, it was demonstrated at Training Division, Breed multiplication unit, Technology Validation and Demonstration Center of CSRTI, Mysore and in field at 11 TSCs/3 RSRs/ 8 farmers places. Submitted for patenting, **vide letter No.**

2964/che/2007/ dt. 11.12.2007. Ref No. IPR/4.3.8./07048/2008. Commercialized through NRDC, licensed to M/S Janani Associates, Coimbatore vide letter No. CSB/RTI/PMCE/240/2009-10 Dt. 18.08.2009. More than 300 machines are sold out until date and demand is continued.

- Developed **Plastic rotary moutage grill with the help of Prince Multiplast, Mumbai.** Involved as a team member. The component designed was submitted for Patenting, No. **PAT/4.3.16/07047. Licensed to M/S Prince Multiplast, Mumbai. It was released by the Honorable Member of Parliament during Krishi Mela on 17th March 2007 in the presence of Member Secretary, CSB, Bangalore, Commissioner, DOS Karnataka and other dignitaries.** Teamwork was recognized & awarded by CSB and NRDC. Based on the demand the unit has been included into CDP/PPP assisted programme. Total 1800 sets were sold until date and still demand is continued. Involved as team member.
 - Two types of harvesters were fabricated to harvest the cocoons from the grills of rotary mountages. For small farmers (Manual cocoon harvester) and for large-scale farmers (Pedal operated cocoon harvester). Pedal operated cocoon harvester was submitted for patenting. Patent No. **PAT/4.3.16/07048. Licensed to M/S Janani Associates, Coimbatore. Released by the Honorable Member of Parliament during Krishi Mela on 17th March 2007 in the presence of Member Secretary, CSB, Bangalore, Commissioner, DOS Karnataka and other dignitaries. Team was awarded by CSB and NRDC.** Total 289 units sold till date. Based on the demand the unit has been included into CDP/PPP assisted programme. Worked as team member.
 - As team leader improved the design of existing plastic incubation, frame which accommodate more number of grains and saves missing larvae. **Licensed to M/S Concept Components, Mysore, vide letter No. CSB/RTI/PMCE/10-11 Dt. 28.06.2010. This is essential equipment for all the grainages and CRC. 40,000 (old) & 5000 (new) sets sold and high demand continued.**
 - Development of **sheet for easy handling of loose egg.**
 - Development of **Stands for Rotary mountages.**
1. Faculty members: For M.Sc., Third country training programme, Intensive Bivoltine training programme, NRDC sponsored training programme, Skilled development training programme, Trainers training programme, Post graduate diploma in Sericulture programme and all other structured and ad hoc courses conducted by our training division.
 2. Invited by different States Governments to deliver subject matter lectures at their training schools and in farmers group discussions.
 3. University Examinership: Examiner for M.Sc.
 4. Syllabus preparation: M.Sc. syllabus and course material for Third country training programme.
1. **Patents and Commercialization:** Filed 3 patents, application for 4th is under preparation. Two technologies commercialized.
 - (a) Development of new plastic rotary mountages patent No. and No. PAT/4.3.16/07047.
 - (b) Pedal operated cocoon harvester was submitted for patenting. Patent No. PAT/4.3.16/07048.
 - (c) Mature silkworm separator and collector machine was designed, developed & fine-tuned. Submitted for patenting vide letter No. 2964/che/2007/

Commercialized

- (a) Mature silkworm separator and collector machine - Commercialized through NRDC, licensed to M/S Janani Associates, Coimbatore vide letter No. CSB/RTI/PMCE/240/2009-10 Dt. 18.08.2009.
- (b) Improved plastic incubation frame- Licensed to M/S Concept Components, Mysore, vide letter no. CSB/RTI/PMCE/10-11 Dt. 28.06.201

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. NAME : **Dr. S.P.CHAKRABORTI**
 2. EMPLOYEE NO. : **000361**
 3. OFFICIAL DESIGNATION : **Senior Research Officer**
 4. PROJECT DESIGNATION : **Co-Investigator**
 5. EXPERTISE AREA : **Mulberry Breeding & Tissue Culture,**
 6. INSTITUTE NAME : **CSR & TI, Berhampore**
 7. INSTITUTE ADDRESS : **CSR & TI, Berhampore, Murshidabad.**
 8. TELEPHONE : **(O) - 03482 -251046 (R) – 251865**
 9. TELEX : **-**
 10. FAX : **03482 – 251046**
 11. BIRTH YEAR : **04.05.1954**
 12. SEX : **Male**
 13. EDUCATIONAL :

HIGHEST DEGREE (DEGREE ONWARDS)	YEAR	UNIVERSITY	COUNTRY	SUBJECT
B.Sc (Hons.)	1973	Calcutta	India	Botany (Hons.)
M.Sc (Botany)	1976	Calcutta	India	Cytogenetics & Plant Breeding
Ph.D	1981	Calcutta	India	Plant Tissue Culture & Cytogenetics

14. TRAINING UNDERGONE :

COURSE NAME/ SUBJECT	ADDRESS OF INSTITUTE	DURATION	PERIOD		SPONSO-RING AGENCY	REMARKS
			FRO M	TO		
1.Mulberry Breeding	Zhejiang Agri. Univ., Hangzhou, P.R.China	4 months	Mar., 1994	July, 1994	CSB	-
2.Mulberry Breeding and Cultivation	CSR&TI, Mysore	12 days	Nov., 1996	Dec., 1996	CSB	-

COURSE NAME/ SUBJECT	ADDRESS OF INSTITUTE	DURATION	PERIOD		SPONSO-RING AGENCY	REMARKS
			FRO M	TO		
3.Orientation course on "Elementary Research methodology	C S R & T I, Berhampore	03 days	3 rd Jan., 2002	5 th Jan., 2002	C S B	-

and project formulation.”						
4.Short Term Computer Training Course on Computer Application	Community Polytechnic, MIT, Murshidabad.	07 days	07.07.2003	12072 .2003	CSB	-

15. EXPERIENCE :

ORGANISATION/ INSTITUTE	CAPACITY/ DESIGNATION	DURATION	PERIOD		SUBJECT AREA	SIGNIFICANT ACHIEVEMENT
			FROM	TO		
1. CSR&TI and its nested units	SRA	8 years	Sep., 1981	Mar., 1990	Mulberry Breeding	Conducted IET and selected varieties
2. CSR&TI, Berhampore	SRO	14 years	Apr., 1990	Till date	Mulberry Breeding	Developed a protocol for induction of tetraploids Developed one soma clonal variant of S1, which is 26% high yielder than S1. Identified one salt tolerant variety

Publication

8.Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]

9. Memberships/ Fellowships : [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) : : National - 40
Popular article - 9
Seminar/Symposium - 13

72

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator : As PI-3 as CI-2

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project

13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

Project	Outcome	Utilization

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

- Full Name (In Block letters) : **Mr. B.N. CHOUDHURI**
- Designation : Scientist- C
- Department / Institute / University : Research Extension Centre, Central Silk Board,
Aizawl, Mizoram.
- Date of birth : 17/02/1967
- Sex : Male
- Education (Post Graduation onwards & Professional Career)

Name of the University	Degree Passed	Year of Passing	Subjects taken with Specialization	Class / Division
Assam Agricultural University, Jorhat, Assam.	M.Sc (Agri)	1989	Plant Breeding & Genetics.	1st Class.

1. Awards:

[Not required for in-house personnel]

Year	Award	Agency	Purpose	Nature

- Positions Held / Research Experience in various institutions:
[Not required for in-house personnel]

9. Memberships/ Fellowships: [Not required for in-house personnel]

10. Patents : [Not required for in-house personnel]

11. Publications (Numbers only) :

Books : 2
Research Papers, Reports: 4 + 2
General articles : 1

List of important publications whose contents can be used in the proposed area of work :

12. Project (s) submitted / being pursued / carried out by Investigator :

Sl. No.	Title of the project	Funding agency	Duration From To	No. of Scientists / Associates working under the project	Total approved cost of the project
1.	Development of Muga & Eri based intercropping system.	CSB	2005 to 2008	2	Budget allotted at CMER&TI, Lahdoigarh.
2.	Augmentation of Eri and Muga commercial seed production	CSB	2006-08	2	Budget allotted at MSSO, Guwahati.
3.	Cluster Development Project for enhancement of farm income through Mulberry culture in Darrang District of Assam	CSB	2008-09 to 2011-12	2	Budget allotted at CMER&TI, Lahdoigarh.
4.	Cluster Development Project for enhancement of farm	CSB	2008-09 to	2	Budget allotted at CMER&TI,

	income through Eri culture in Udalguri District of Assam		2011-12		Lahdoigarh.
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13. Highlights of outcome / progress of the project (s) handled during the past 10 years, their outcome and utilization (in 200 words) :

- (1) A package of Practices on Eri based inter cropping system was developed for the Eri farmer by adopting which farmer can get better income from the same plot of land.
- (2) Introduced and popularized for the first time in the Darrang District of Assam the new silk worm hybrid i.e CSR2XCSR4 and demonstrated its yield potential and rearing advantages.
- (3) Familiarizes the farmers with silk worm crop protection measures which result in cocoon yield gain upto 34.30% over the existing yield.
- (4) Updated the package of Mulberry cultivation and silk worm rearing with new technological inputs and apprise the farmer by the programme and could achieve the cocoon yield 21.38% more over the package of practices.

**PART VII : BIODATA OF PROJECT COORDINATOR / PRINCIPAL INVESTIGATOR / CO-
INVESTIGATOR (S)**

1. Full Name (in Block letters) : **Dr. L. SOMEN SINGH**
 2. Designation : Scientist-C
 3. Department/ Institute/ University: Central Sericultural Research and Training Institute, Central Silk Board, Berhampore.
 3. Address for Communication : Research Extension Centre, Central Silk Board, Mantripukhri, Imphal-795 002 (Manipur)
 4. Date of birth :01.02.1965
 5. Sex : Male
 6. Education (Post Graduation onwards & Professional Career):

Name of the University	Degree passed	Year of passing	Subjects taken with specialization	Class/Div.
Manipur University	M. Sc.	1989	Life Sciences (Entomology)	I
-do-	Ph. D.	1994	Insect Ecology	-

7. Awards:
 [Not required for in-house personnel]

8. Positions Held / Research Experience in various institutions:
 [Not required for in-house personnel]

Employer	Designation of the post held	Date of joining	Date of leaving

9. Memberships/Fellowships: [Not required for in-house personnel]
 10. Patents: [Not required for in-house personnel]
 11. Publications (Numbers only): 25nos.
 Books: Nil
 Research Papers, Reports: 23nos.
 General articles: 2nos.

List of important publications whose contents can be used in the proposed area of work:

- Singh, L. Somen, Singh, N. I. and Singh K. C., 2009. Identification of high yielding Oak tasar silkworm hybrids. *Journal of Non-Timber Forest Product*, 16(4): 281-284.
- Singh, N.I., Singh, L. Somen and Singh, K. C., 2010. Estimation of general and specific combining ability and heterosis to identify suitable parents in oak tasar silkworm breeds. . *Journal of Non-Timber Forest Product*. 17(3):283-290.

- Singh, N.I., Singh, L. Somen and Singh, K. C., 2011. Characterization and evaluation of oak tasar silkworm genetic resources in India. *Sericologia* 51 (1):1-12.

12. Project(s) submitted/ being pursued/ carried out by Investigator: Nil

Sl. No.	Title of the project	Funding agency	Duration from to	No. of Scientists/ Associates working under the project	Total approved cost of the project

13. Highlights of outcome / progress of the project(s) handled during the past 10 years, their outcome and utilisation (in 200 words):

Two breeds viz., “C₂₇” and “Blue” are evolved through hybridization of oak fed silkworms. These two breeds have been multilocationally tested along with *A. proylei* at REC, Gopeshwor, RTRS, Bhimtal, REC, Umrangso, REC, Kikruma and RTRS, Imphal. Both the evolved breeds performed better than *A. proylei* at all the tested places with C₂₇ performing best by giving average cocoon yield of 49.98 cocoons per dfl. These two breeds are commercially exploited in Uttarakhand (RTRS, Bhimtal) and REC, Kikruma respectively.

PART VIII : 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 an application will be submitted through our institutional bio-safety committee and 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 that any patent(s) or industrial proprietary right(s) on the Invention(s) arising out of the project, shall be taken in the name of Central Silk Board and the Central Silk Board shall have the sole option(s) for including the name(s) of the others in such patent(s) industrial proprietary right(s).
- 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 co-coordinator
[Applicable for inter-institutional projects only]

2. Signature of Executive Authority of Institute with Seal

Date :

Date :

3. Signature of Principal Investigator
Date :

4. Signature of Co-Investigator:
Date :

Handwritten signatures and names of project coordinators, executive authority, principal investigator, and co-investigators. The signatures are in blue ink on a white background. The names are written in blue ink below the signatures. The names are: Alok Kumar Datta, DR. M. D. Maji, (RANUNA DAS), (Dr. S.P. CHAKRABORTY), (N.K. DAS), (Bishup Nath Choudhary), (S. K. Choudhary), and Dr. G. S. Singh. There is also a signature of Dr. D. Parag and REL. MP. Raj.