Pro-forma for Submission of Concluded Research Project
(To be submitted separately for each project)

1. Project code and title:

MOT 3601: "*Skill Gap Analysis and Capacity Building of Sericulture Extension Workers and Farmers in Traditional and Non-Traditional States*"

2. Names of the Project Investigators (including coordinator in case of collaborative projects)

Investigator	Name	Designation	Time Spent (%)
Executive Authority	Dr. Kanika Trivedy	Director	5%
Principal Investigator	Mr. Shafi Afroz (Upto 29.1.18) Dr. Manjunatha G R (Fr. 29.01.18)	Scientist-B	60%
Co-Investigator	Dr. Manjunatha G R	Scientist-B	10%
Co-Investigator	Dr. S. Chanda (Upto 22.11.16) Dr. Tapati Datta Biswas	Scientist-D	5%
Co-Investigator	Dr. Dipesh Pandit	Scientist-D	5%
Co-Investigator	Shri Bimal Chandra Ray	Scientist-D	5%

3. Duration (Date of Start) - (Scheduled Date of Completion):

1.5 year (November, 2016 – April, 2018)

4. Name(s) of the Institute(s) and Address:

Central Sericultural Research and Training Institute, Central Silk Board, Ministry of Textiles, Govt. of India, Berhampore – 742101, Murshidabad, West Bengal

5. A list of Objectives / Goals (clearly indicating how far they have been achieved; indicating the difficulties / reasons in case of achievement gap):

Objectives:

i. To document job profile of the extension workers involved in sericulture activities and their engagement for each of the activity.

ii. To identify the skill requirements for the extension workers and farmers for each activity.

iii. To determine the skill gap of the extension workers and farmers involved in different sericulture activities.

iv. To design capacity development programme to target the skill requirements of the extension workers and farmers.

6. Introduction:

With the changing times, the face of the sericulture is also changing, wherein the need-of-the-hour is to equip the extension workers to meet the growing demands of the sericulture with respect to new technologies and methodologies. At the same time farmers should also fortified with improved skills to make them efficient in sericultural practices. The skill based capacity development of the extension workers and farmers is utmost important to improve the performance in sericulture activities.

Skills or competencies according to Vreyens and Shaker (2005) are observable abilities that manifest from an individual indicating how to do something. Skills are an important means to increasing incomes and sustainable livelihoods for the poor (World Bank, 2004). According to Eskola and Gasperini (2010) skills development "is central to improving rural productivity, employability and income-earning opportunities, enhancing food security and promoting environmentally sustainable rural development and livelihoods''. Therefore there is need of particular skill to achieve the goal or aim. If one is not succeed in achieving the goal then there is gap between the expected and existing skill of an individual, which is called as Skill Gap. In other words, it is the perceived mismatch between the needs of individuals for skilled talent and the skills possessed by the available workforce. This skill gap can be identified by a method called as Skill Gap Analysis. In other words, skill gap analysis can be defined as an evaluation method for determining the training needs of an individual, group or organization. Hence this analysis reveals the difference between the required and the existing skill levels and then strategies can be recommended for closing the gap.

Sericultural institutes and State Governments engaged a large number of technical assistants and extension agents respectively, to improve the cocoon production. They are mainly involved in dissemination of latest package of practice, advisory services, etc. Now-a-days the demand of silk is sky-scraping so there is need to pick up the production pace of silk from the current level. Hence it is very crucial to identify the gap in skills of extension workers as well as farmers. And the outcome of this must be used to design the capacity development programme for the extension workers and farmers to fulfil the high silk demand of the country.

Hence in an attempt to design capacity development programme for sericulture, it is important to determine the current level of the technical skills of farmers and skills of the extension workers to ascertain their strengths and weaknesses. This led to the identification of skills gaps and where resources and energy need to be channelled for capacity development. Therefore this research project was initiated with identifying the skills of extension workers and farmers in sericulture so that need-based capacity development programme can be formulated.

7. Methodology Adopted:

The research project had a direct approach to measure the skill gap of extension workers and farmers. The project was undertaken with the extension workers and farmers who were under the Central Sericultural Research and Training Institute (CSR&TI), Berhampore (WB) jurisdiction in West Bengal, Bihar and Jharkhand. Two districts from both traditional state and two from non-traditional states were selected purposefully where mulberry based sericulture is under practice. There were 50 technical assistants of different CSB units of eastern India as extension workers was interviewed for the study. Besides, 200 farmers from traditional state and 100 farmers from non-traditional states were selected randomly for the study. Hence, total respondents were consisting of 50 extension workers and 300 farmers in the project area. The research design selected for this study was descriptive and analytical. The objective-wise work plan had been detailed below:

7.1. To document job profile of the extension workers involved in sericulture activities and their engagement for each of the activity.

Job profile is the document of general tasks, roles and responsibilities an individual should have in a position. For documentation, following guidelines and references were reviewed to identify the roles of extension workers for the development of sericulture.

- Job description guidelines of Newcastle University, United Kingdom
- Mandates of RSRS/RECs recommended by CSB committee
- Job Chart for the various cadres in the Central Silk Board
- Agroforestry Extension Manual for Kenya

The primary information for the roles of extension workers was obtained from all the scientists of the CSR&TI, Berhampore (WB) through an open-ended questionnaire (Annexure-I). All of them were asked to list all the roles/responsibilities of the extension workers required for the improvement of sericulture. Later they were asked to rank the roles/responsibilities which were mentioned by them. In order to find the sequence of the

roles of the extension workers based on importance, Garrett ranking technique was used. Garrett ranking technique was used since all the items were not ranked by all the experts. Therefore, the method of combining of incomplete order of merit ranking as suggested by Garrett (1979) was followed. By using this technique, the order of the merits given by the experts was changed into ranks by using the following formula:

$$\text{Percent Position} = [(R_{ij}-0.5)]/N_j \times 100,$$

where R_{ij}- rank given for i^{th} factor by j^{th} respondent; and N_j- number of factors ranked by j^{th} respondent.

After obtaining the percent position, the mean score value was obtained from the Garret table. Based on the mean score, ranking was given to the role/responsibilities identified for the extension workers.

7.2. To identify the skill requirements for the extension workers and farmers for each activity

The skills are required for the cultivation of mulberry plantation as well as rearing of silkworms. Hence, there was need to identify the different essential skills for different sericulture activities. To achieve this objective, experts from CSR&TI, Berhampore were consulted to list the skills required by the extension workers as well as the farmers for mulberry cultivation and silkworm rearing.

The list of skills was to be identified as per suggestions of the experts and review of secondary sources of information of sericulture. Based on primary and secondary information, skills for different sericulture practices were identified. These skills were used to prepare the skill charts for mulberry cultivation and silkworm rearing.

7.3. To determine the skill gap of the extension workers and farmers involved in different sericulture activities.

Skill Gap Analysis is an evaluation tool for determining the training needs of an individual, group or organizations. In other words, such analysis reveals the differences between the required and the existing skill levels and then strategies can be recommended for closing the gap.

The skill gap of the extension workers and farmers was identified by the skill competency assessment. The list of skills which was obtained in objective 3 formed the basis of skill competency assessment. The competency assessment focuses on how well the

respondents were performing skills in relation to specified performance standards of sericulture practices.

The skills competency measurement for both the extension workers and farmers was a Likert scale questionnaire developed from the skill chart and with the relevant literature on skills essential to sericulture. The questionnaires (Annexure-I) consisted of questions eliciting information on the basis of the skill assessment competency level from poor (1), fair (2), good (3), very good (4) and to excellent (5). Total and mean perception scores was computed for each skill item for each respondents, after which a cut-off means score (x) of 3.5 [(1+2+3+4+5) /5+0.5)] was used to differentiate between the skills gap for both the extension workers and farmers. It was rated as $x > 3.5$ called as skilled and competent and $x < 3.5$ called as skill deficient. Content and face validity of the questionnaire was established by the expert on sericulture of CSR&TI, Berhampore. The Cronbach's alpha reliability coefficient was 0.92. Questionnaires were administered from May 2017 to October 2017.

7.4. To design capacity development programme to target the skill requirements of the extension workers and farmers

UNDP defines capacity development as 'the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time'. Capacity is about growth: growth of the individual in knowledge, skills and experience. It can be achieved suitably when it will be based on their actual need.

A practical training manual was design for the capacity development programme. This manual was an outline of the content of capacity development for the extension workers as well as the farmers. This manual was practical oriented which focused on:

- Procedure for organizing appropriate training programme
- Target specific skills for different mulberry activities
- Target specific skills for different silkworm rearing activities
- Monitoring and evaluation of training programme

It provided an overall view of what to be taught and how it should be taught to ensure that the training covers all the necessary needs of the trainees. This need-based curriculum was developed through task analysis and skill gap analysis.

8: Observations / Results duly indicating the output in terms of adding to knowledge; know-how / new packages/ practices / processes /products / innovations developed and their utility and advantages; etc.,

8.1. To document job profile of the extension workers involved in sericulture activities and their engagement for each of the activity.

After using the above mentioned methodology, eight roles had been identified for the extension workers. On those eight roles, Garrett ranking technique was used to indicate the order of the role, which is mentioned below in the table 8.1.1:

Table 8.1.1: Roles of Extension workers for sericulture development

Sl. No.	Dynamic Roles (Extension services)	Mean	Rank
01.	To conduct front line demonstration of new technologies at the farmers' level on their farm.	65.4	I
02.	To conduct survey of the sericultural farmers' field and crops regularly.	61.9	II
03.	To act as resource person for the information about sericulture and modern technologies.	58.8	III
04.	To organize extension communication programme for the new methods and technologies.	57.0	IV
05.	To organize human resource development programme to supports the current and future needs of the farmers.	46.0	V
06.	To get the feedback for the adopted technologies from the farmers and convey same to the experts.	44.7	VI
07.	To coordinate with other departments for satisfactory working relationships of the institute and farmers.	42.1	VII
08.	To prepare technical report for all the conducted programmes and other activities.	26.0	VIII

Inference: The identified roles of the extension workers can be suitably used for the technical assistants of the CSB units as well as other state governments extension staffs so that they work for the sericulture development in a meaningful direction. Their work allotment can be reflected on these roles.

8.2. To identify the skill requirements for the extension workers and farmers for each activity

Skills identified for mulberry cultivation as well as silkworm rearing were listed below which was prepared with the primary information from the experts of CSR&TI, Berhmapore and also reviewed other secondary sources of sericulture. These listed skills can be used to prepare the skill charts.

Table No. 8.2.1: Identified Skills of Mulberry cultivation are as follows:

SI. No.	Sericulture Activities	Skills
01.	Site selection	• Location of the mulberry farm • Soil requirements for mulberry
02.	Nursery Management	• Selection of cutting materials • Cuttings Treatment • Layout and bed preparation • Planting of cuttings in the nursery • Nutrient Management • Transplanting
03.	Mulberry Plantation	• Selection of mulberry variety suitable to field situation • Knowledge of planting method based on recommendation • Time of inter-cultural operation of the mulberry field • Application of Organic manure • Gap filling
04.	Irrigation Management	• Knowledge of water requirement of mulberry farm • Interval of irrigation
05.	Nutrient Management	• Knowledge on recommended dose of nutrient application • Method of fertilizer application • Knowledge of integrated nutrient management
06.	Intercultural Operations	• Knowledge of pruning • Weeding operations like methods and intervals
07.	Disease Management	• Ability to identify the signs of diseases • Identify the symptoms of particular diseases in the mulberry plants • Knowledge of chemicals or other methods to control the disease • Ability to prepare the chemical solution for spraying
08.	Pest Management	• Ability to identify the signs of pests attack in mulberry plants • Identify the symptoms of particular pest in the mulberry plants • Knowledge of different methods to control the pest • Ability to prepare the chemical solution for spraying
09.	Leaf Harvesting and Preservation	• Selection of leaf for feeding different instars • Time of leaf harvesting • Preservation of harvested leaf

Table No. 8.2.2: Identified Skills of Silkworm Rearing are as follows:

SI. No.	Sericulture Activities	Skills
01.	Disinfection Management	• Materials for disinfection purpose • Time of disinfection for a upcoming crop • Ability to select an appropriate disinfectant • Ability to estimate the quantity of disinfectant as per requirement (floor area) • Ability to prepare the disinfectants with correct formulation • Knowledge of applying procedure
02.	Hygiene Management	• Hygiene during entering in rearing house • Clean the rearing bed using bed cleaning net • Pick up of diseased / unequal / suspected disease worms and putting it in formalin water • Disinfecting the hand after picking the diseased worms • Spreading of polythene sheet / vinyl sheet for the collection of bed refuse • Disposal of refuse in a pit
03.	Rearing House Management	• Rearing house construction with appropriate specification and proper height • Maintenance of proper aeration and ventilation • Planting trees surrounding the rearing house to keep it cool • Selection of rearing house for young & late age silkworm larvae
04.	Incubation	• Selection of dfls for rearing in upcoming season • Knowledge of precautions for transportation of eggs • Knowledge of environmental conditions during incubation • Awareness of Black Boxing procedure, duration and exposure timing • Knowledge of technique of brushing of dfls
05.	Young Age Silkworm Rearing	• Ability to maintain the environmental conditions during I-II instars • Brushing capacity and no. of trays required for young age silkworms / spacing • Identification of the moulting and moult out worms • Knowledge of cleaning method
06.	Late Age Silkworm Rearing	• Ability to maintain the environmental condition for late age silkworm rearing • Knowledge of quantum of leaf feeding at different instars • Frequency of leaf feeding during different instars • Maintenance of bed spacing with respect to no. of dfls

07.	Disease Management	• Identify signs of diseases in silkworms at young and late age silkworms • Ability to identify the symptoms of particular diseases • Disposing of diseased silkworms properly • Maintenance of equal size worms throughout the rearing • Minimize the chance of disease incidence • Application of bed disinfectants to prevent the spread of diseases
08.	Mounting & Harvesting	• Identification of matured larvae • Density of mounting • Maintenance of environment condition for mounting • Harvesting of the cocoon after pupation • Sorting of cocoons
09.	Record keeping and marketing	• Recording the temperature and relative humidity on day-to-day basis during rearing • Record keeping of number of dfls, race, brushing date, diseases and rearing period, maintenance cost, leaf supplied, bed disinfectant applied, etc. • Knowledge of markets for cocoon and silk sale outside the village or in the cities

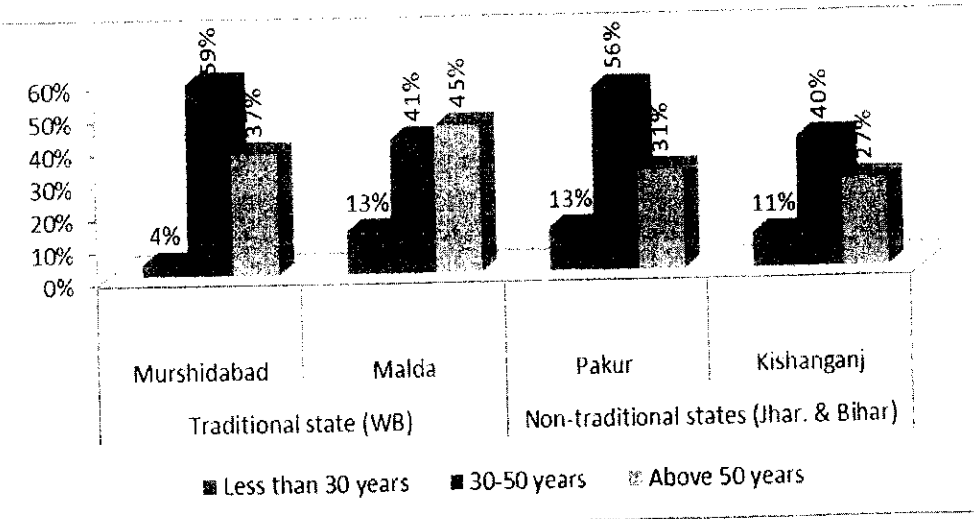
Inferences: Training for the farmers of Eastern India at Seri Resource Centres (SRCs), RSRS and RECs should be given based on the skill charts for effective utilization of the trainings for maximum benefit of the farmers.

8.3. To determine the skill gap of the extension workers and farmers involved in different sericulture activities.

The socio-economic condition of the farmers was collected from the farmers through structured questionnaire. The results obtained from the project area are presented below:

8.3.1. Age of the Respondents

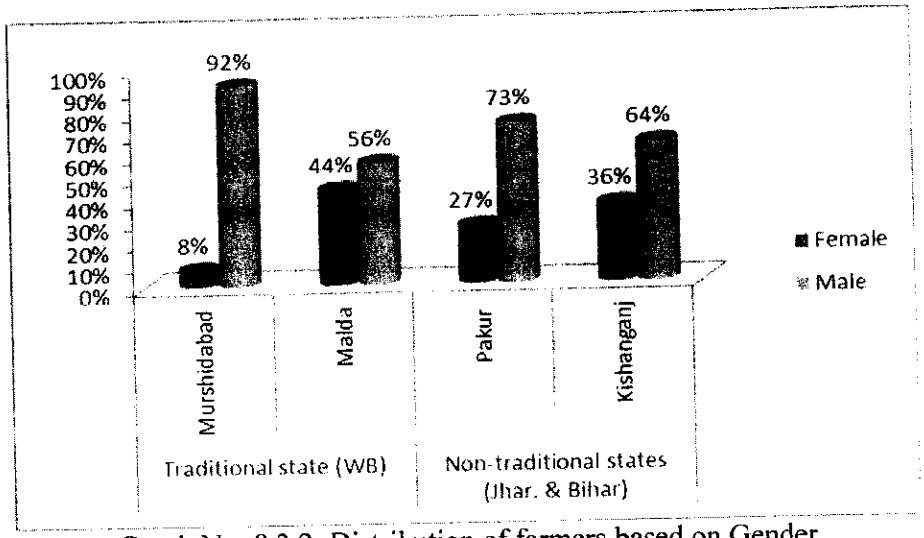
The average age of the farmers from both the traditional and non-traditional states was 45.7 years, i.e., middle aged farmers (Graph no. 8.3.1). For such type of farmers, the training should be of adult-learning style (andragogy) rather than pedagogy learning style.



Graph No. 8.3.1: Distribution of farmers based on Age

8.3.2. Gender of the Respondents

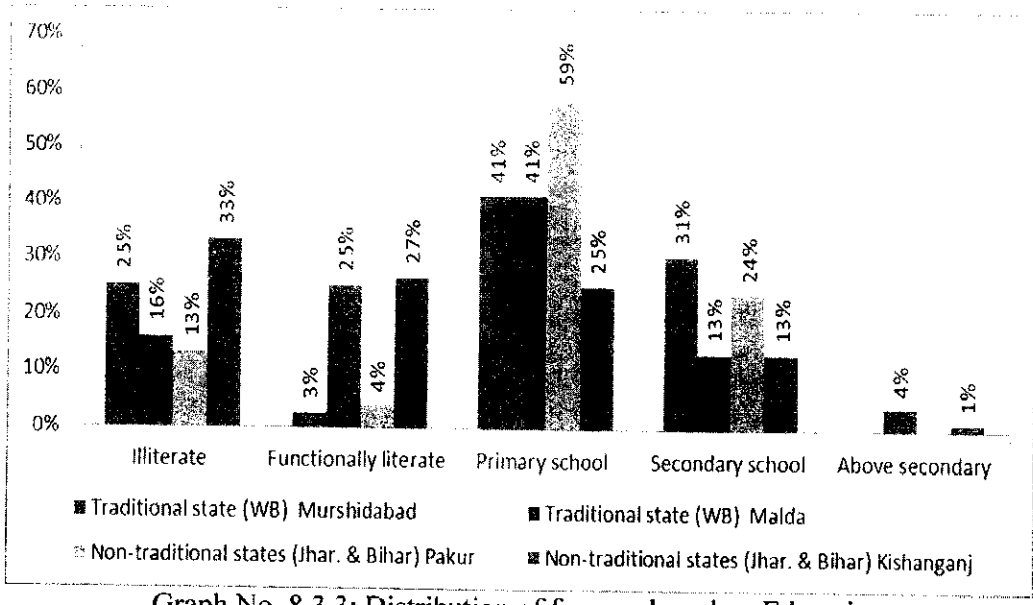
Although sericulture is women friendly livelihood, but in both traditional and non-traditional states sericulture is dominated by male farmers (Graph no. 8.3.2). Training of farmers should be given based on need for a given region or it should be gender neutral so that training should met need of exact target group.



Graph No. 8.3.2: Distribution of farmers based on Gender

8.3.3. Education of the Respondents

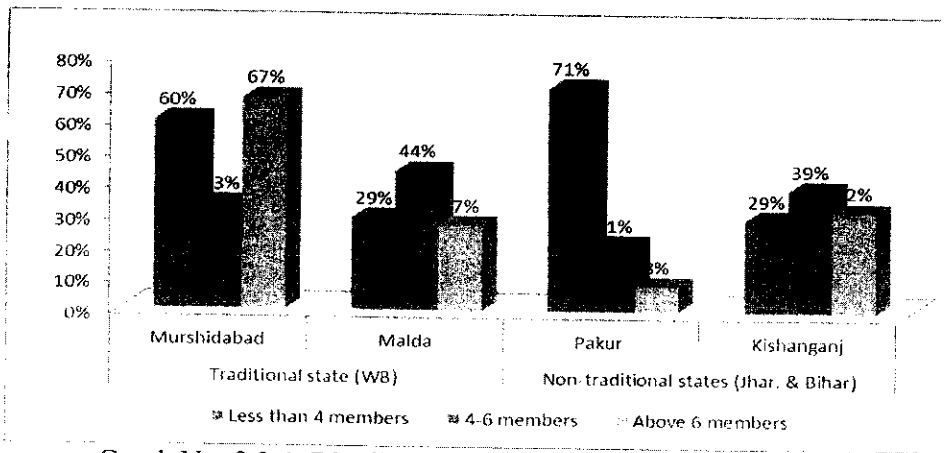
Most of the farmers had primary education both in traditional and non-traditional states (Graph no. 8.3.3). The training should be simple practical oriented rather theory-oriented training to match their education profile. Besides the practical exposure of the more the farmers as their learning will be more on the principle "*Seeing is believing*".



Graph No. 8.3.3: Distribution of farmers based on Education

8.3.4. Family size of the Respondents

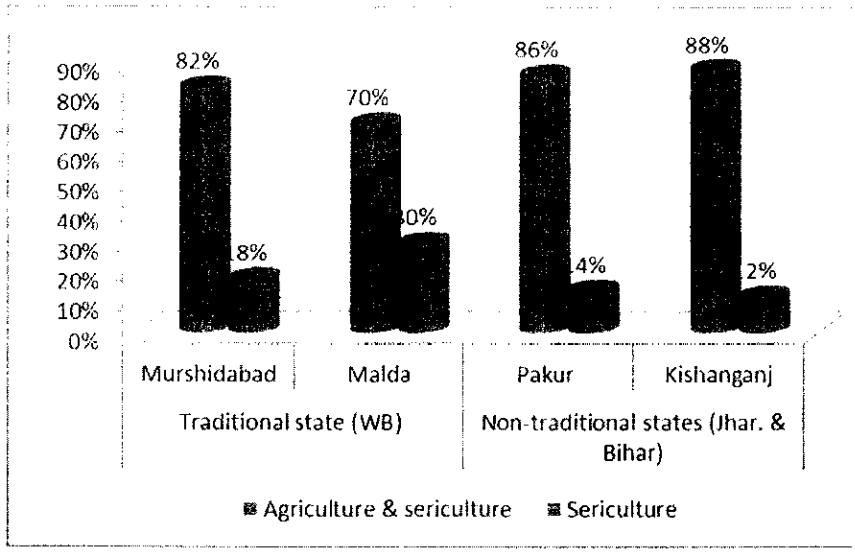
Almost all the sampled farmers' family was small, i.e., they have less than 4 members in their family and nuclear family in both traditional and non-traditional states (Graph no. 8.3.4). Although sericulture is labor-intensive enterprise but there is lack of family labour in the study area. Hence there is need of such technologies and methodologies in sericulture where labour requirement is comparatively low.



Graph No. 8.3.4: Distribution of farmers based on family size

8.3.5. Source of Income of the Respondents

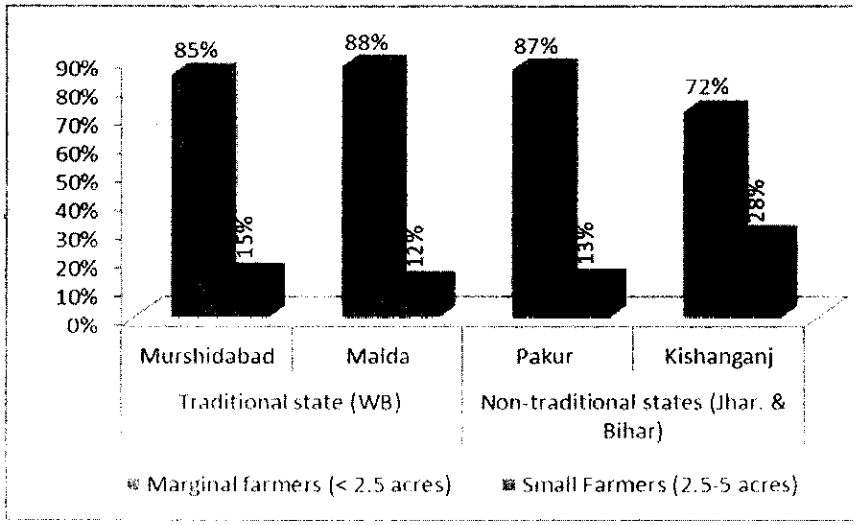
In both traditional and non-traditional states, agriculture was the major source of income but in traditional states sericulture was contributing more as a source of income (8.3.5). Therefore, it is needed integrate the sericulture in agriculture in both the states for adoption of new technologies.



Graph No. 8.3.5: Distribution of farmers based on Source of Income

8.3.6. Land Holdings of the Respondents

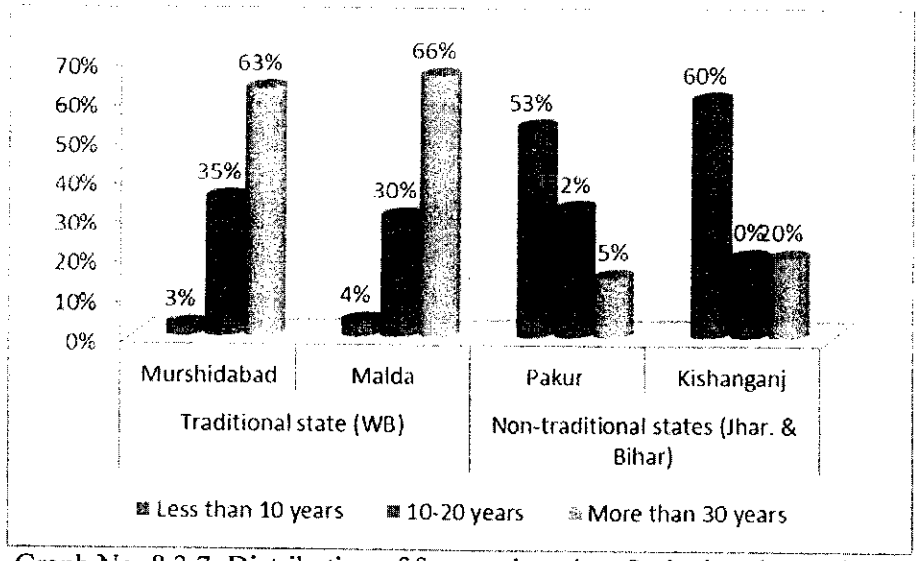
In both traditional and non-traditional states, farmers were mostly marginal farmers, i.e., less than 2.5 acres of land which was used for both agricultural crops and mulberry plantation (8.3.6). Most of the farmers were have less than 0.5 acre of land for mulberry plantation.



Graph No. 8.3.6: Distribution of farmers based on Land holdings

8.3.7. Experience of the Respondents

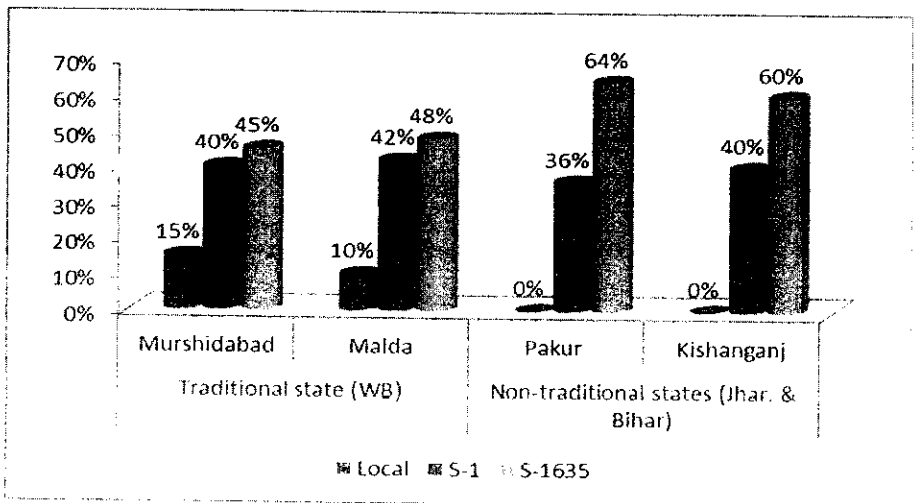
In non-traditional states, farmers were less experienced in sericulture compared to traditional states (8.3.7). The training of farmers should be designed in such a way that it can address the different needs of the farmers of particular regions.



Graph No. 8.3.7: Distribution of farmers based on Sericultural experience

8.3.8. Mulberry variety cultivated by the Respondents

In non-tradtional states farmers had only high yileding mulberry variety (S1635 & S1) in their mulberry garden (Graph no. 8.3.8). But the tradtional states farmers were still cultivating the local varieties of mulberry. Although they were having more acres of high yileding mulberry variety but still local variety was seen along with the high yileding mulberry variety.

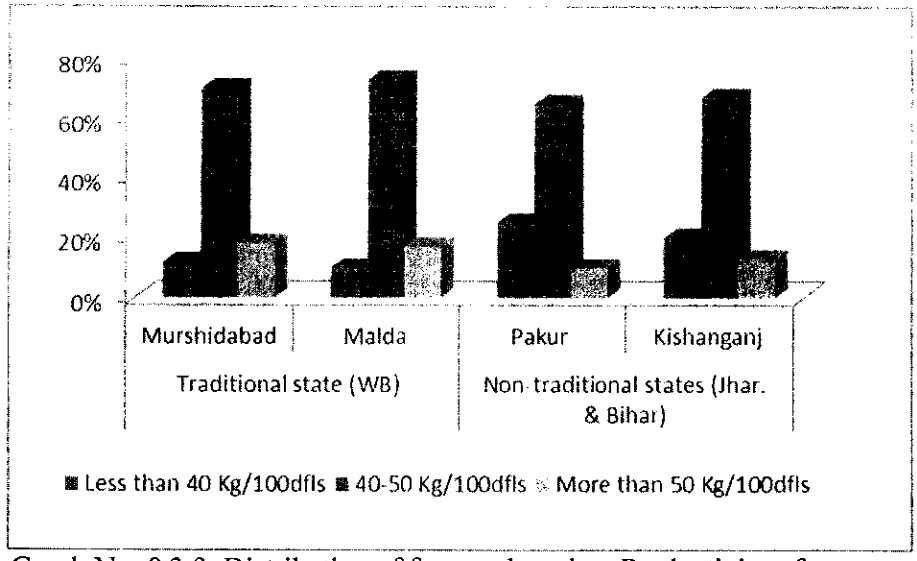


Graph No. 8.3.8: Distribution of farmers based on Mulberry variety grown

8.3.9. Productivity of cocoons of the Respondents

In case of productivity of the cocoons, both the tarditional and non-traditional states, it was in the range of 40-50 Kg/100 dfls (Graph no. 8.3.9). Although new methodologies and technologies are going with fast rate developed by research institute but the productivity is

not much staisfactory. Training should be focussed more on to increase the productivity of the cocoons.



Graph No. 8.3.9: Distribution of farmers based on Productivity of cocoons

8.3.10. Sericulture Skills of the Respondents

These were some of the basic information mentioned above for the sampled farmers for the project. These farmers were practicing sericulture in Eastern India. It was an attempt made to find out the skill level of the sericulture farmers of this region.

8.3.10.1. Mulberry cultivation Skills of the Respondents

The skill level for mulberry cultivation was measured and it was found that most of the farmers were skill deficient (Table No. 8.3.1). But the farmers of non-traditional states were found more skilled compared to the traditional farmers. Framers of traditional states were still cultivating mulberry with old practices. There is huge scope of increasing the productivity of mulberry leaves with modern practices in both traditional and non-traditional states. The extension workers of in this region were found skilled but there is need of requirement of continuous refresher training to update the farmers.

8.3.10.2. Silkworm rearing Skills of the Respondents

The skills of the silkworm rearing were also measured for these regions. It was found that most of the farmers in both the traditional and non-traditional states were also skill deficient (Table no. 8.3.2). Farmers were comparatively more skilled in non-traditional states. In traditional states, farmers were practicing sericulture with the old practices compared to non-traditional states where farmers had adopted some of the new methodology and practices

of sericulture. Extension workers were skilled for silkworm rearing but need regular training for updating their knowledge and skills.

Table No. 8.3.1: Skill gap for Mulberry cultivation of the Respondents

Skills	Farmers		Extension Staffs
	Traditional states	Non-traditional states	
Site selection	3.2	3.4	3.8
Nursery Management	1.9	2.3	3.6
Mulberry Plantation	2.6	2.9	3.8
Irrigation Management	2.7	3.1	3.6
Nutrient Management	2.4	2.7	3.9
Intercultural Operation	3.0	3.2	3.6
Disease Management	2.4	2.6	3.6
Pest Management	2.5	2.8	3.7
Leaf Harvesting Management	3.3	3.4	3.8

Table No. 8.3.2: Skill gap for Silkworm rearing of the Respondents

Skills	Farmers		Extension staffs
	Traditional states	Non-traditional states	
Disinfection Management	2.3	2.9	3.8
Hygiene Management	1.8	2.5	3.9
Rearing House Management	2.1	2.8	3.6
Incubation	2.2	2.3	3.7
Young Age rearing	2.4	2.7	3.9
Late Age Rearing	2.5	2.5	3.7
Disease Management	2.2	2.6	3.6
Mounting and Harvesting	2.9	3.2	3.7
Record keeping and Marketing	1.7	2.1	3.9

8.4. To design capacity development programme to target the skill requirements of the extension workers and farmers

A skill based practical training manual was prepared based on the findings of objective for minimizing the gap in sericulture skills. The manual contains the following:

- Procedure for appropriate training to be conducted for the extension workers as well as the farmers.
- Specific skills for different mulberry activities to meet the exact needs of the farmers for mulberry cultivation.
- Specific skills for different silkworm rearing activities to minimize the gaps for skills in silkworm rearing.
- Monitoring and evaluation of training after completion of the training programme.

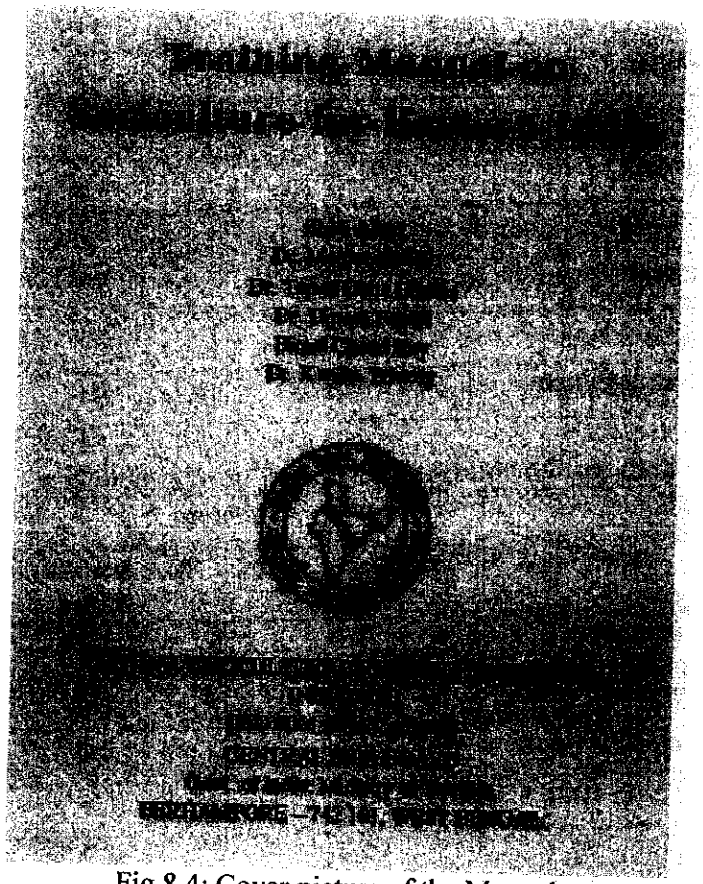


Fig 8.4: Cover picture of the Manual

9. Discussion:

The job profile is an often overlooked instrument for the sericulture extension workers for the development of sericulture. A job description may sound like just more paperwork to be done, but it can help to organize the extension workers to be sure with their roles/responsibilities which are to be performed for the development of sericulture. Similar Terziovski and Dean (1998) stated that improvement in work quality is likely to increase productivity, performance and profits; hence, quality of work is regarded as the most effective dimension affecting the employee's performance. Therefore it is necessary for the

extension worker to work based on the job profile for the development of sericulture. Nikolaou (2003) also reported that work competencies seem to have a strong impact on job performance.

Sericulture is a labour-intensive enterprise which necessitates skilled persons to perform different sericulture practice in an appropriate manner to get good quality raw silk. Local technical skills are crucial for farmers' survival, but it is not enough to make the resource poor compete in an ever expanding market (Asenso-Okyere, 2009). Similarly sericulture farmers should be train to made them skilled enough for the sericulture practices to get quality cocoons. Palmer (2007) criticized the neglect of skills development in the informal economy illuminates the rural environment as worrisome. Therefore farmers should be trained based on the skills requirement to make them competent.

The research identified the technical skills possessed by sericulture farmers as well as extension workers in the wake of baseline studies of knowledge and skills audit on sericulture. The sericulture farmers were skill deficient (score <3.5) for all the skills for mulberry cultivation as well as silkworm rearing. The non-traditional farmers were better than the traditional farmers in possessing the skills for sericulture. The farmers of this region were easily adopting the technologies which were educated to them by the extension workers.

Framers of traditional state were still practicing the old practices. The majority of the famers claimed to have learnt the technical skills from their ancestors and generally resists change with modern practices which was advocated by the extension workers. Similar results were reported by Chandrappa *et al.* (2000) that a large number of sericulturists were low adopters of recommended practices.

The extension workers were skilled and competent for the skills necessary for mulberry cultivation as well as silkworm rearing in Eastern India. Obibuaku (1983) stated that the ability of an extension agent to guide farmers from the awareness stage to the sustained adoption of agricultural innovations was dependent on his training and experience in agriculture and extension methods. It is important that all employees update their knowledge periodically and get acquainted with the ever-changing environment of governance (Saleh, 2016).

Poor skills development has been reported as a hindrance to profitable sericulture enterprise. Hence training is an utmost requirement for the farmers as well as extension

workers on regular basis. A training manual had been prepared in this project by analysing the exact need of skills for sericulture practice of the target group.

10. Inference / Recommendations:

The farmers were found to be skill deficient for mulberry cultivation as well as silkworm rearing. Besides extension workers were skilled but needed regular refresher training for updating. Hence there is requirement a training road map, which is described as follows:

Training road map

Critical Skills	Suggested activities for the road map
Irrigation and Nutrient Management of mulberry	Advice on proper irrigation and nutrient management suitable for particular management. Training area to include irrigation schedule, recommended dose for mulberry with the addition of organic fertilizers. The concept of drip fertigation or new concept can be informed in the training.
Intercultural Operation in mulberry	Very important skills need to be updated to the farmers through training. Demonstration should be given to the farmers for better understanding of the farmers, followed by irrigation of mulberry.
Pest and Disease management of mulberry	Farmers should be trained to identify the signs of pests and diseases. Then there is need to train the farmers to identify the symptoms of particular diseases and pests in the mulberry plants. There is need to give proper knowledge of different methods to control the pests and diseases of mulberry. Demonstration for preparing the chemical solution for controlling the pests and diseases should be given.
Leaf harvesting and preservation of mulberry leaves	Training should be given to harvest the leaves based on the requirement for feeding the silkworms of different age. Similarly demonstration in training should be given for leaf preservation as the leaf harvesting has to be done generally once while feeding needs to be given four times.

Disinfection management for rearing house	Research into disinfection management is suggested more improvement in the disinfection throughout the rearing practices. The use of suitable disinfectants with correct formulation should be suggested through training. Bed disinfectant is an important input which should be suggested through training as well as demonstration. A simple practice for the disinfection process should further be investigated for better crop.
Hygiene Management	Advice should be given for entering in the rearing house. Techniques for management of litters and leaf residue should be advocated to the farmers. Farmers should be trained that how to handle the diseased worms.
Rearing House Management	Training on the establishment of a rearing house should be given to the farmers to know the rearing management based on modern practices. Advice on locally available materials for constructing of rearing house with suitable dimensions.
Young age and late age silkworm rearing	Different instars of the silkworm has specific requirement. It is required to train the farmers in such a way that they can learn about conditions of the silkworms in different stages. Demonstration type of training should be given to the farmers.
Mounting and Harvesting management	This is the final step before getting the cocoons but neglecting simple practices to get the quality cocoons. It is better to train specifically for this like how to mount the matured worms in a suitable chandrike, how much should be the density of worms per square foot, when to harvest and what should be done after harvesting.
Record keeping and marketing	Training of farmers in simple record keeping, management and marketing tips.

11. Applications made for patenting / commercialization if any:

Not Applicable

12. References

Asenso-Okyere K (2009) Building Capacity to Increase Agricultural Productivity and Incomes of Poor Small-Scale Farmers. 2020 Focus Brief on the World's Poor and Hungry People. Washington, DC: IFPRI.

Chandrappa, D., K.B. Umesh and B.K. Nageshchandra (2000) "Costs and Returns of Mulberry Cocoon Production - Shoot Feeding Method", In Proceedings of the National Seminar on Tropical Sericulture 1999, University of Agricultural Sciences, Bangalore, India, 105-107.

Eskola and Gasperini (2010) http://www.fao.org/fileadmin/templates/ERP/docs2010/04PBEducationandSkills.pdf

Nikolaou, I. 2003. Fitting the person to the organization: examining the personality- job performance relationship from a new perspective. *Journal of Management Psychology*. Vol. 18(7):639-648.

Obibuaku, L.O., (1983) Agricultural Extension as a Strategy for Agricultural Transformation. University of Nigeria Press, Nsukka, ISBN: 9789782299086, Pages: 119.

Palmer R (2007) Skills for work? From Skills Development to Decent Livelihoods in Ghana's Rural Informal Economy, International Journal of Educational Development, Vol. 27(4): 397-420.

Saleh, J. M., Man, N., Lafta, A. H., Saleh, M. H., Hassan, S., Nawi, N. M., and Kshash, B. H., (2016) A Review: Training Requirement of Agriculture Extension Officers in Iraq. *Asian Journal of Applied Sciences*, Vol. 9: 34-40

Terziovski, M and Dean, A. (1998) Best predictors of quality performance in Australian service organization. Management Service Quality Vol. 8(5): 359- 366.

Vreyens J. R. and Shaker M. H. (2005) Preparing Market-Ready Graduates: Adapting curriculum to meet the agriculture employment market in Egypt. AIAEE Proceedings of the 21st Annual Conference San Antonio, TX

World Bank (2004) Skills Development in sub-Saharan Africa. World Bank, Washington.

13. Summary:

Sericulture is a skilled based enterprise which requires sufficient skills to obtain good quality of raw silk. Therefore a study was conducted in Eastern India to find out the skills gap in sericulture practices of the farmers as well as extension workers of the CSB units in the aforesaid regions. The data was collected from the 300 farmers of two districts, i.e., Murshidabad and Malda of traditional state (West Bengal) and two districts, i.e., Kishanganj and Pakur of non-traditional states (Bihar and Jharkhand). Besides 50 technical assistants considered as extension workers of this region was also interviewed for the skill gap analysis.

The roles of the extension workers had been suggested in the study so that extension services can be improved for the farmers in an actual way for the development of sericulture. Skills for different sericulture activities (mulberry cultivation and silkworm rearing) were also identified which needed to be target for the farmers of this region to make the training programme fruitful for the farmers. Some of the socio-economic conditions of the farmers of this region were also highlighted during the investigation.

Skills for sericulture were measured by using a Likert scale questionnaire for the farmers and extension workers. It was found that the farmers of traditional as well as non-traditional states were skill deficient (score <3.5) for mulberry cultivation and silkworm rearing. While the extension workers were skilled but required intensive training to update their information with modern practices.

Sericulture production has remained largely unsophisticated in Eastern India, as farmers have very little technical knowledge or skills required for good production of cocoons. There has been some effort either by the extension services or institutions had been made but conscious efforts towards the capacity development for farmers are an urgent requirement. The extension workers were also not much updated with new and modern practices of sericulture. This situation has created multiple challenges, which as a result, has created a limited expansion of cocoon production because farmers make use of only local skills. Other challenges were such as small mulberry farm, poor management of mulberry plantations, little knowledge of disinfection, poor rearing management and hesitant to invest in sericulture. Having poor economic conditions, the sector however, remains in the hands of farmers who are unable to take bold steps for the development of sericulture. They are content with what little benefit the traditional sericulture is able to make for them. With this situation persisting, sericulture may remain crude. If no adequate capacity development

programme for farmers, extension workers and other actors in the production, management, and marketing lines are put in place, things will not change.

Data Collection from the farmers and Extension workers

Data collection from Malda farmers

Data collection from Murshidabad farmers

Data collection from Kishanganj farmers

Data collection from Pakur farmers

Data collection from Extension workers of Kishanganj

Data collection from Extension workers of Pakur

Data collection from Extension workers of Malda

Data collection from Extension workers of Murshidabad

15. Budget utilized (In Rs.):

#	Item	Total (Rs.)
1	Travel	*
2	Paper, Xerox, reports, manual etc	1,303
3	Printer, Software & Computer	82,700
	Total	

**Office vehicle used by the staff of REC Mothabari/ Kamnagar/ Investigators of the project during the survey. Further, travel was made for data collection in the survey/study/visit of other projects/ routine prog. / Extension work of the institute also, which is not incurred separately. Thus, the difference is observed form proposed / allotted budget Rs. 2.40 lakh.*

Certificate

Certified that the Project work has been carried out and financial expenditure incurred for executing the Project are in accordance with the declaration / certification submitted at the time of submission of the Project Proposal and sanction obtained from time to time thereafter as per the revision made.

12. Signature of the

Principal Investigator

Mr. Shafi Afroz
Scientist-B, Extension Divn.

Co-Investigator (s)

21/8/18
Dr. Manjunatha G R
Scientist-B, PMCE Divn.

Date 27.8.18
Dr. Tapati Datta Biswas
Scientist-D, Extension Divn.

Dr. Dipesh Pandit
Scientist-D, PMCE Divn.

21.08.2018.
Shri. Bimal Chandra Ray
Scientist-D, MESDP Kishanganj

S. Chanda, 21.8.18
Dr. S. Chanda
Scientist-D

Signature (with comments, if any) of Director / Executive authority

The project has been concluded without any deviation of milestones and obtained the results as per the objectives proposed. From the study, it is observed that the roles of the extension workers had been suggested in the study so that extension services can be improved for the farmers in an actual way for the development of sericulture. Skills for different sericulture activities (mulberry cultivation and silkworm rearing) were also identified which needed to be target for the farmers of this region to make the training programme fruitful for the farmers. Some of the socio-economic conditions of the farmers of this region were also highlighted during the investigation. On the whole, this study is a bench mark reference, based on which Training division may conduct skill upgradation programs.

28-8-18

DIRECTOR I/c
CSR&TI, BERHAMPORE
(Office seal)
निदेशक / Director
केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान
Central Sericultural Research & Training Institute
केन्द्रीय रेशम बोर्ड/Central Silk Board
बहरामपुर-742101/Berhampore-742101
मुर्शिदाबाद(प.बं.)/Murshidabad (W.B.)

Comments of the 48th RAC of CSR&TI Berhampore::

Observations of RAC	Action taken
The outcome of the study should be taken as a bench mark, based on which Training division may conduct skill upgradation programs.	Suggestion noted. A manual on this will be submitted to the Training division for necessary action.
Indentify the correlation between skill level of farmer and cocoon productivity, if possible from the available data.	A positive correlation was observed (r = 0.482) between skill level of farmer and cocoon productivity.

Annexure-I

Central Sericulture Research & Training Institute (CSR&TI), Berhampore (WB)
Central Silk Board, Ministry of Textiles (Govt. of India)

Project Title: Skill Gap Analysis of sericultural Extension workers and Farmers in Traditional and Non-Traditional states (MOT3601)

Age: Years of service:

Post: Place of posting:

Education: Higher Secondary Graduation Post Graduation PhD

Subject Specialization:

Major Training Attended:

1.
2.
3.
4.
5.

Undertaking Works in the current post:

1.
2.
3.
4.
5.
6.
7.
8.

Date: Signature

Central Sericulture Research & Training Institute (CSR&TI), Berhampore (WB)
Central Silk Board, Ministry of Textiles (Govt. of India)

Project Title: Skill Gap Analysis of sericultural Extension workers and Farmers in Traditional and Non-Traditional states (MOT3601)

Name: Age: ☐ yrs. Sex: Male ☐ Female ☐

Address:

Education: Illiterate ☐ Functionally literate ☐ Primary ☐ Secondary ☐ Above ☐

Family size: ☐ Family type: Nuclear ☐ Joint ☐

Economically active family labour ☐ Children involved Yes / No If Yes, No. ☐

Major source of income: Agriculture ☐ Sericulture ☐ Others ☐

Annual Income (in Rs.): Agriculture ☐ Sericulture ☐ Others ☐

Sericulture Experience (in yrs.): _____

Total cultivable Land: ☐ Agriculture: ☐ Sericulture: ☐ Others ☐

Mulberry Variety: _____ Land Breakup (Local_____S1_____S1635_____)

Source of Information for sericulture: Govt. Extn. Personnel ☐ Private Extn. ☐ Friends ☐

NGO personnel ☐ RSP / dfls supplier ☐ Mass media like radio, TV, etc. ☐

MULBERRY CULTIVATION

#	Statement	Competency level				
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Site selection						
01.	Location of the mulberry farm					
02.	Soil requirements for mulberry					
Nursery Management						
03.	Selection of cutting materials					
04.	Cuttings Treatment					
05.	Layout and bed preparation					
06.	Planting of cuttings in the nursery					
07.	Nutrient Management					
08.	Transplanting					
Mulberry Plantation						
09.	Selection of mulberry variety suitable to field situation					
10.	Knowledge of planting method based on recommendation					
11.	Time of inter-cultural operation of the mulberry field.					
12.	Application of Organic manure					
13.	Gap filling					
Irrigation Management skills						
14.	Knowledge of water requirement of mulberry farm					
15.	Interval of irrigation					
Nutrient Management skills						
16.	Knowledge on recommended dose of nutrient application					
17.	Method of fertilizer application					
18.	Knowledge of integrated nutrient management					
Intercultural Operations						
19.	Knowledge of pruning					
20.	Weeding operations like methods and intervals					

#	Statement	Competency level				
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Disease Management in Mulberry plants						
21.	Ability to identify the signs of diseases					
22.	Identify the symptoms of particular diseases in the mulberry plants					
23.	Knowledge of chemicals or other methods to control the disease					
24.	Ability to prepare the chemical solution for spraying					
Pest Management in Mulberry plants						
25.	Ability to identify the signs of pests attack in mulberry plants					
26.	Identify the symptoms of particular pest in the mulberry plants					
27.	Knowledge of different methods to control the pest					
28.	Ability to prepare the chemical solution for spraying					
Leaf Harvesting and Preservation						
29.	Selection of leaf for feeding different instars					
30.	Time of leaf harvesting					
31.	Preservation of harvested leaf					

SILKWORM REARING

#	Statement	Competency level				
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Disinfection Management Skills						
01.	Materials for disinfection purpose					
02.	Time of disinfection for a upcoming crop					
03.	Ability to select an appropriate disinfectant					
04.	Ability to estimate the quantity of disinfectant as per requirement (floor area)					
05.	Ability to prepare the disinfectants with correct formulation					
06.	Knowledge of applying procedure					
Hygiene Management Skills						
07.	How do you enter rearing house					
08.	Clean the rearing bed using bed cleaning net					
09.	Pick up of diseased / unequal / suspected disease worms and putting it in formalin water.					
10.	Disinfecting the hand after picking the diseased worms					
11.	Spreading of polythene sheet / vinyl sheet for the collection of bed refuse					
12.	Disposal of refuse in a pit					
Rearing House Management Skills						
13.	Rearing house construction with appropriate specification and proper height					
14.	Maintenance of proper aeration and ventilation					
15.	Planting trees surrounding the rearing house to keep it cool					
16.	Selection of rearing house for young & late age silkworm larvae					

#	Statement	Competency level				
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Incubation Skills						
17.	Selection of dfls for rearing in upcoming season					
18.	Knowledge of precautions for transportation of eggs					
19.	Knowledge of environmental conditions during incubation					
20.	Awareness of Black Boxing procedure, duration and exposure timing					
21.	Knowledge of technique of brushing of dfls					
Young Age Silkworm Rearing Skills						
22.	Ability to maintain the environmental conditions during I-III instars					
23.	Brushing capacity and no. of trays required for young age silkworms / spacing					
24.	Identification of the moulting and moult out worms					
25.	Knowledge of cleaning method					
Late Age Silkworm Rearing Skills						
26.	Ability to maintain the environmental condition for late age silkworm rearing					
27.	Knowledge of quantum of leaf feeding at different instars					
28.	Frequency of leaf feeding during different instars					
29.	Maintenance of bed spacing with respect to no. of dfls.					