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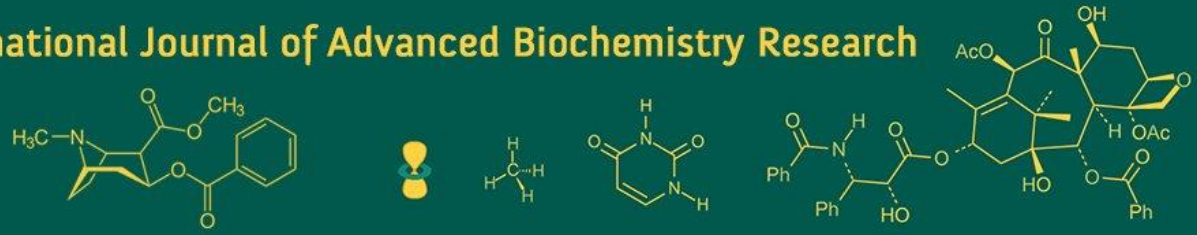

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Training need assessment of eri silkworm Rearers in Golaghat district of Assam

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Abstract
An assessment of the needs of the eri silkworm rearers was made in the year 2022 for planning the suitable means of training programme towards scientific silkworm rearing practices. The study was conducted in 8 selected villages from the Golaghat district of Assam with 160 randomly selected silkworm rearers through the scheduled interview and the tool of data collection was research schedule. The collected data were analyzed by using suitable statistical tools. It could be observed that majority (60%) of the rearers exhibited medium level of training need in eri silkworm rearing. A greater part of silkworm rearers desired need-based training at village level once in a year for a period of one week at pre crop season in the afternoon time and also practical utility training with amenities like stipend, transportation, free boarding and teaching through demonstration using local language. Training needs regarding raising of host plants, seed collection and propagation method were reported as first priority by the rearers with mean score of 1.40 and 2.30 respectively. Majority of the rearers perceived to get training on mother moth examination (MS 3.00) followed by surface sterilization of eggs (MS 2.96). Regarding training needs on eri silkworm rearing, selection of eco-races was given first priority with a mean score of 2.98 and harvesting of cocoon was regarded as least (MS 1.47). Similarly, training on grading of cocoons was ranked first (MS 2.79) and cocoon storage method was given less priority. About 22.86% of the respondents were shown little interest on attending training programme on eri silkworm rearing technology.

Keywords: Eco-races, Eri, surface sterilization, training needs

Introduction
Sericulture is one of the agriculture-based industries which basically involve rural masses for production of silk. The cultivation process of silk seeks diverse operations to be performed in farming and non-farming sector throughout the year and ensures periodic income even with small holdings. The cultivation of silkworm plays an important part in development of rural people as it blends with farming systems and has the ability to induce attractive income all time round (Dewangan, 2016) [3]. Sericulture industry can be seen as an effective socio-economic tool for inclusive growth and for creation of gainful employment to the rural and unemployed youth which helps to uplift the socio-economic status of small and marginal farmers (Seshagiri and Raju, 2019) [10]. Assam is one of the traditional states where all the four varieties of silk *viz*. eri, muga, mulberry and tasar are commercially exploited since time immemorial. In the year 2022-23, India produced 36,582 MT of raw silk out of which the contribution with regard to Assam was 5721 MT (Anon., 2023a) [1]. The silk produced by eri silkworm is regarded as third most vital silk in the world after mulberry and Chinese tasar (Suryanarayana, 2005) [11]. Eri culture is mostly popular among the rural women folk and being considered as an additional income of the family to fulfill their requirement. Many factors are directly or obliquely connected to the successful yielding of high-quality silk with training and motivation being the crucial element. Mass production of high-quality silk requires training and motivation. Training is the process of acquiring new skills, attitudes and knowledge related to preparing for employment and increasing productivity in the profession. Training needs assessment process helps determine the priority of changes in knowledge, skill, attitude and behavior that will provide the greatest on achieving organizational or individual goals (Sajeev *et al.*, 2021) [9].

To make any training meaningful and effective, identifying the area of farmer's interest, design and development of curriculum that suit to the existing real conditions of farmers is one of the crucial steps of training needs assessment (Rahman *et al*., 2018) [8]. Various improved and innovative technologies were also developed by scientists and researchers of different research institutes for increasing production and productivity. Although to a large extent, the new technology and methods have been understood and practiced by a number of sericulture farmers today, the training need still exists to educate them further and also others who are yet to take it, so that the average production could be further improved. Keeping in view the above facts into consideration, the present study was undertaken to assess the training needs of eri silkworm rearers in the Golaghat district of Assam.

Materials and Methods

The present study was conducted in the Golaghat district of Assam purposively as the region occupies a higher position in terms of eri raw silk production (146.99 MT) in Assam (Anon., 2023b) [2]. The respondents for the study were chosen using a purposive and random sample approach. Among 35 districts of Assam, Golaghat is purposively selected for the present study as Golaghat district is one of the major silk-producing districts of Assam. Out of 8 development blocks in the Golaghat district, 4 developmental blocks *viz*., Podumoni block, Morongi block, Dergaon block and Gamariguri block were chosen purposively for the study because of the availability of the eri silkworm rearers population. A total of 160 respondents were selected for the present study from the 8 villages under the 4 Developmental Blocks based on the selection criteria of the study. The training needs of silkworm rearers were measured by developing a structured schedule on the basis of package of practices of silkworm rearing. To calculate the overall training need, three-point continuum scales consisting of 'very essential', 'essential', and 'not so essential' were used. The score assigned was 3 for very essential, 2 for essential, and 1 for not so essential, respectively. After calculating the total score and mean scores of each item, the rank values were assigned and for preference of training in a particular area the below mentioned scale was adopted:

Training need assessment of eri silkworm rearers

The training need is operationalized as the gap between farmer's present knowledge and desired knowledge of specific sericulture operations. Training need assessment (TNA) is the process of identifying whether a training need exists and, if so, what training is necessary to fill the gap. The degree of training need was assessed using Ramulu's (1992) scale, with appropriate adjustments.

Very essential	2.34 -3.00	Mean score
Essential	1.67-2.33	Mean score
Not so essential	1.00 -1.66	Mean score

Training needs of silkworm rearers were measured by constructing a structured schedule based on the package and practices of scientific eri silkworm rearing and a ranking system was used. To calculate the overall training needs respondents were asked to select items under each element, three-point continuum scales was used consisting of 'very essential', 'essential', and 'not essential' and the score assigned were 3, 2 and 1 respectively. The frequencies of each answer category were discovered, and the corresponding frequencies were multiplied by the score assigned to it. As a result, the total score for each component was acquired and translated into a percentage. In the end, training need was categorized as low, medium and high on the basis of mean and standard deviation.

Assessment of training need of silkworm rearer in scientific eri silkworm rearing practices

The primary training need components identified for the study were raising of host plants, management of host plants, plant protection measures, silkworm seed production, silkworm rearing, disease and pest management during silkworm rearing and post cocoon technology. The respondents were distributed based on their perceived training needs of particular practices under each component.

Results

Training needs of the eri silkworm rearers in scientific eri culture technologies

The data presented in Table 1 and Fig. 1 revealed that majority (60.00%) of the eri rearers exhibited medium level of training need, followed by 22.86% of the eri rearers exhibited low level of training need while about 17.14% of eri rearers exhibited high level of training need, respectively.

Table 1: Distribution of eri silkworm rearers according to their overall training need

Sl. No.	Category	Range (Years)	Frequency	Percentage (%)	Mean	SD
1	Low	Below 124.12	16	22.86		
2	Medium	124.12 to 144.76	42	60.00	134.44	10.32
3	High	Above 144.76	12	17.14		

It may be expected that the primary factors influencing the overall training needs of eri silkworm rearers were a lack of scientific understanding, less extension interaction, and less social participation, as a result of which they lack up-to-date information on new technologies. However, eri rearers wanted to study new technology in order to expand their knowledge and skills.

From the Table 2, it is revealed that training needs regarding raising of host plants, which is mainly annual in nature, seed collection and selection (MS 1.40) was reported as their first priority by the eri rearers. Preparation of land ranked second. Seed treatment and sowing of seed ranked third and fourth respectively. Although, according to category of preferences, all the subject areas were considered as not so essential by the respondents. However, as regards to perennial plantation, propagation method (MS 2.30) was given the first rank by the respondents, whereas the preparation of nursery bed was ranked second and spacing and main field preparation ranked third and fourth, respectively. Similarly, transplanting, seed sowing, maintenance of nursery, selection of land, seed collection and selection and seed treatment were reported by the eri

rearers as the least important for training needs priority (V, VI, VII, VIII, IX, X), respectively.

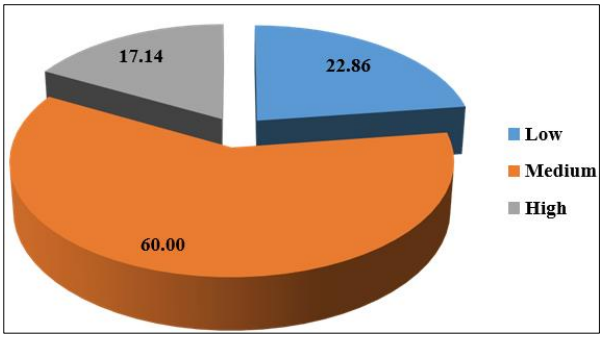

Fig 1: Distribution of the eri silkworm rearers according to their overall training need

Table 3 indicated the training needs of the eri silkworm rearers in the area of management of host plants. Priority-wise training needs of respondents included use of manure and fertilizer (I rank), training, pruning and pollarding (II rank), harvesting of leaves (III rank), intercultural operation (IV rank), and irrigation (V rank), respectively based on their mean scores.

With regards to training needs regarding plant protection measures, Table 4 revealed that identification of pests and diseases in host plants were ranked first with mean score 2.69. Whereas, the respondents have given second priority on the use of plant protection measures to control pests and diseases (MS 2.59).

The training needs of the respondents with regard to silkworm seed production are shown in Table 5. Out of total nine subject areas for training needs, the respondents identified six subject areas as very essential. The table also revealed that the respondents prioritized training on mother moth examination with mean score of 3.00 followed by surface sterilization of eggs (2.96) whereas pairing and de-pairing of moth (2.13) was given least importance.

The data in Table 6 stated the training needs of the eri rearers regarding silkworm rearing. A sum of eleven subjects was given to the respondents to recognize for training. The respondents pin pointed six topics as very essential, three as essential and two as not so essential for training. It was found that respondents wanted training on selection of eco races of eri silkworm (MS 2.98) which ranked first and harvesting of cocoon was ranked last (1.47).

Training needs of eri rearers on disease and insect control in silkworm rearing are shown in Table 7. It revealed the priority-wise training needs of eri rearers in the field of calculation of quantity, method and time of using pesticide (MS 2.93), management of pests and diseases during silkworm rearing (MS 2.84) and identification of pests and diseases during silkworm rearing (MS 2.69) were ranked 1st, 2nd and 3rd, respectively based on mean scores.

Training needs in the areas of post-cocoon technology are presented in Table 8. It is revealed that the grading of cocoon got maximum mean score 2.79, hence ranked first whereas method of storage of cocoon was given least priority with a mean score of 1.90.

Discussion

It was observed from the study that the majority of the eri silkworm rearers required training on various areas of silkworm rearing. With regards to the raising of host plants, the propagation method was given 1st rank and perceived as "very essential" by the majority of eri rearers. The cause might be due to lack of scientific understanding. In the studied areas, the majority of eri rearers lack permanent plantations. The eri silkworm feeds primarily on castor leaves that naturally grow along roadsides or in backyard areas. A huge portion of the eri rearers prioritized training on seed selection and collection of host plants which might be due to lack of knowledge about quality seeds for yearly plantation. The rearers also preferred training on spacing as there were varied spacing for cultivating different silkworm hosts plants which were unknown to rearers. Thus, it can be concluded that the rearers desired training in order to acquire essential information and establish a permanent plantation.

Regarding the management of host plants, nutrient management was placed first for training needs since it plays a vital influence on the quality yield of any plant. Manures and fertilizers are the most essential sources of plant nutrients, and they have a direct impact on the growth and development of host plants. Similarly, training, pruning, and pollarding were ranked second. The farmers may have prioritized these problems because they wanted to maximize their profits by proper maintenance of the plants resulting in successful harvest. Respondents also indicated a preference for training concerning leaf harvesting which could be attributed to lack of knowledge about the right method and timing of harvesting.

With regards to training needs regarding plant protection measures, it revealed that "very essential" are as identified were pest and disease identification in host plants, use of plant protection measures to control pests and diseases and calculation of quantity, method and time of using pesticide. The rearers were unaware of pests, various disease preventive approaches and information on the right time and ways of using pesticides, as well as the negative implications of chemicals.

With respect to silkworm seed production, it is observed that the rearers perceived training as very essential in various aspects i.e. mother moth examination, surface sterilization of egg, synchronization of moth emergence, incubation of egg and storage and re-use of male moth because seeds are the foundation of the sericulture industry. In the studied area, the rearers generally grow and prepare the required eri seeds on their own without employing any scientific techniques, which leads to disease outbreaks whereas in case of mulberry silkworm the seed was supplied by thestate department. Since rearing of disease-free quality seed is utmost important for the production of quality cocoons, therefore, appropriate training in these areas were indicated by the respondents.

In view of silkworm rearing, the eri silkworm rearers emphasized training in the selection of eco- races of eri silkworm, the issue could be lack of understanding or awareness regarding eri silkworm eco races. Some eri rearers have never even heard of eco-races. The eri silkworm rearers also emphasized training on disinfection of rearing house and appliances, bed cleaning methods and spacing; they lack scientific information about disinfection and bed cleaning. They have been rearing eri silkworm in traditional methods for a long time, which has exposed the silkworm to different diseases, causing them tremendous loss. Again, maintaining perfect environmental conditions at various stages of rearing has a substantial impact on larval

growth. The reason for giving priority by the silkworm rearers on these subjects for training might be due to the heavy mortality of young larvae which put them at a great loss. Eri rearers expressed interest in training on incubation and black boxing to learn on proper development of the embryo and uniform hatching of larvae. With reference to disease and pest management during silkworm rearing, the eri silkworm rearers prioritized the training needs to control the severity of pest and disease spread by taking certain preventive and control measures. This might be probably heavy crop loss faced by them due to pests and diseases.

Table 2: Distribution of eri silkworm rearers according to training needs on host plant raising (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
Raising of host plant (Annual)											
1.	Preparation of land	3	4.29	5	7.14	62	88.57	81	1.16	II	NSE
2.	Seed Collection & selection	6	8.57	16	22.86	48	68.57	98	1.40	I	NSE
3.	Seed treatment	0	0	9	12.86	61	87.14	79	1.13	III	NSE
4.	Pit preparation and Sowing	0	0	6	8.57	64	91.43	76	1.09	IV	NSE
Raising of host plant (Perennial)											
1.	Propagation method	24	34.29	43	61.43	3	4.29	161	2.30	I	E
2.	Selection of land	0	0	27	38.57	43	61.43	97	1.39	VIII	NSE
3.	Preparation of Nursery bed	9	12.86	59	84.29	2	2.86	147	2.10	II	E
4.	Seed collection& selection	3	4.29	15	21.43	52	74.29	91	1.30	IX	NSE
5.	Seed treatment	0	0	7	10.00	63	90.00	77	1.10	X	NSE
6.	Seed sowing	5	7.14	30	42.86	35	50.00	110	1.57	VI	NSE
7.	Maintenance of nursery	4	5.71	23	32.86	43	61.43	101	1.44	VII	NSE
8.	Main field preparation	10	14.29	38	54.29	22	31.43	128	1.83	IV	E
9.	Spacing	8	11.43	47	67.14	15	21.43	133	1.90	III	E
10.	Transplanting	2	2.86	38	54.29	30	42.86	112	1.60	V	NSE

TS=Total Score, MS= Mean Score, CP=Category of Preferences

Table 3: Distribution of the eri silkworm rearers according to training needs on management of host plants (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Irrigation	3	4.29	19	27.14	48	68.57	95	1.36	V	NSE
2.	Interculturaloperations	0	0	26	37.14	44	62.86	96	1.37	IV	NSE
3.	Nutrient management	15	21.43	50	71.43	5	7.14	150	2.14	I	E
4.	Training, pruning, pollarding	19	27.14	40	57.14	11	15.71	148	2.11	II	E
5.	Harvesting of Leaves	7	10.00	48	68.57	15	21.43	132	1.89	III	E

TS=Total Score, MS= Mean Score, CP=Category of Preferences

Table 4: Distribution of the eri silkworm rearers according to training needs on plant protection measures (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Identification of pests and diseases in host plants	48	68.57	22	31.43	0	0	188	2.69	I	VE
2.	Use of plant protection measures to control pests and diseases	41	58.57	29	41.43	0	0	181	2.59	II	VE

TS = Total Score, MS = Mean Score, CP = Category of Preferences

Table 5: Distribution of the Eri silkworm Rearers according to training needs on silkworm seed production (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Disinfection of grainage house and appliances	47	67.14	23	32.86	0	0	187	2.67	V	VE
2.	Selection and collection of seed cocoon	18	25.71	52	74.29	0	0	158	2.26	VII	E
3.	Storage of seed cocoon	17	24.21	53	75.71	0	0	157	2.24	VIII	E
4.	Synchronization of moth emergence	54	75.71	16	24.28	0	0	194	2.77	IV	VE
5.	Pairing and depairing of eri silkmoth	12	17.14	55	78.57	3	4.29	149	2.13	IX	E
6.	Storage and re use of male moth	40	57.14	30	42.86	0	0	180	2.57	VI	VE
7.	Mother moth examination	70	100	0	0	0	0	210	3.00	I	VE
8.	Surface sterilization of eggs	67	95.71	3	4.29	0	0	207	2.96	II	VE
9.	Incubation of egg	61	87.14	9	12.86	0	0	201	2.87	III	VE

TS=Total Score, MS= Mean Score, CP= Category of Preferences

Table 6: Distribution of eri silkworm rearers according to training needs regarding silkworm rearing (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Selection of ecoraces of eri silkworm	68	97.14	2	2.86	0	0	208	2.98	I	VE
2.	Disinfection of rearing house and rearing appliances	54	77.14	16	22.86	0	0	194	2.77	II	VE
3.	Black boxing	26	37.14	44	62.86	0	0	166	2.37	V	VE
4.	Brushing of newly hatched larvae	0	0	43	61.43	27	38.57	113	1.61	X	NSE
5.	Maintenance of environmental conditions during rearing	47	67.14	18	25.71	5	7.14	182	2.60	III	VE
6.	Rearing method	8	11.43	60	85.71	2	2.86	146	2.09	VIII	E
7.	Feeding frequency, schedule and quantity of feeding	12	17.14	56	80.00	2	2.86	150	2.14	VII	E
8.	Bed cleaning method and spacing	41	58.57	21	30.00	8	11.43	173	2.47	IV	VE
9.	Moulting care	0	0	49	70.00	21	3.00	119	1.70	IX	E
10.	Collection of ripened worm and mounting	24	34.29	43	61.43	3	4.29	161	2.30	VI	VE
11.	Harvesting of cocoon	7	10.00	19	27.14	44	62.86	103	1.47	XI	NSE

TS=Total Score, MS= Mean Score, CP= Category of Preferences

Table 7: Distribution of eri silkworm rearers according to training needs regarding disease and pest management during silkworm rearing (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Identification of pests and diseases during Silk worm rearing	51	72.86	16	22.86	3	4.29	188	2.69	III	VE
2.	Management of pests and diseases during Silk worm rearing	59	84.29	11	15.71	0	0	199	2.84	II	VE
3.	Calculation of quantity; method and time of using pesticide	65	92.86	5	7.14	0	0	205	2.93	I	VE

TS=Total Score, MS= Mean Score, CP=Category of Preferences

In respect of post cocoon technology, the grading of cocoons was given 1st rank and perceived as "very essential" by the eri rearers. This could be because people are not aware of the cocoon grading system, which reflects the quality of raw silk. Due to lack of understanding in this area, rearers were unable to determine the quality of raw silk, making it impossible for them to obtain a good price for the cocoon.

Eri rearers in the studied area used to spin the yarn in *takli*, a traditional spinning machine. The majority of the eri rearers did not receive training in this area and were unaware of the improved spinning machine like Choudhury spinning machine, CSTRI spinning machine or solar spinning machine. As a result, they needed training on the new and improved machines. Similarly, eri rearers expressed interest in dyeing methods for eri silk in order to get knowledge about the dyeing process. Utilizing by products for value-added product preparation allows rearers to get more profit. The rearers in the studied locations utilized pupa as a delicious human food but they had never utilized pupa and other by products for other value-added product preparation and wished to learn so that their socio-economic status could be improved. Marketing was one of the mainproblems in different sericulture areas. Due to lack of proper marketing channels, there was exploitation of middlemen in the studied area. As a result, the rearers did not get the exact return. Hence, the eri rearers showed interest to learn about marketing procedures and price behaviour.

Table 8: Distribution of the eri silkworm rearers according to training needs on post- cocoon technology (n=70)

Sl. No.	Main Areas of Training	Degree of Training						TS	MS	Rank	CP
		Very essential		Essential		Not essential					
		F	%	F	%	F	%				
1.	Selection of cocoon	24	34.28	31	44.28	15	21.42	149	2.13	VI	E
2.	Method of storage of cocoon	13	18.58	37	52.86	20	28.57	133	1.90	VIII	E
3.	Grading of cocoon	56	80.00	13	18.57	1	1.43	195	2.79	I	VE
4.	Cooking of cocoon	9	12.86	48	68.57	13	18.57	136	1.94	VII	E
5.	Spinning of cocoon in improved spinning machine	46	65.71	24	34.29	0	0	186	2.66	II	VE
6.	Method of dyeing	48	68.58	17	24.29	5	7.14	183	2.61	III	VE
7.	Utilization of by products for value added product preparation	41	58.57	29	41.43	0	0	181	2.59	IV	VE
8.	Marketing of product	25	35.71	45	64.29	0	0	165	2.36	V	VE

TS=Total Score, MS= Mean Score, CP=Category of Preferences

It can be inferred from the study that the majority of the eri silkworm rearers in the studied area needed training in various aspects of ericulture from host plants cultivation to silk production. More emphasis was given in the areas of plant protection, disinfection, mother moth examination, surface sterilization of egg, synchronization of moth emergence, storage and re-use of male moth under seed production technology; disease and pest management during eri silkworm rearing; and grading of cocoon, spinning of eri cocoon in improved spinning machine, utilization of by product for value-added product preparation and marketing under the area post cocoon technology. The situation might

be due to high involvement in traditional practice and lack of scientific knowledge, less extension interaction, and less social participation, as a result of which they lack up-to-date information on new technologies. On the other hand, rearers wanted to study new technology in order to improve their knowledge and skills on new and improved technologies.

Rabha and Saikia (2021) [7] revealed that majority of the women involved ineri culture need training in the areas like by product utilization, grading of cocoon andsilk, disinfection, pest and disease management of silkworm, plant protection, spinning of silk in modern machineries and disease-free laying preparation. Similar findings were observed by Yadaw and Sharma (2020) [12] who found that the tasar silkworm farmers in Chhattisgarh perceived training in the areas like plant protection measures, processing of cocoons and pest and disease control in silkworm. Mech *et al.* (2010) [5] found almost similar findings while studying training need of rural women in eri culture in Assam province. Prasad *et al.* (2010) [6] reported that the commercial CRC owners expressed training needs on disinfection andhygiene maintenance. Geetha and Devi (2008) [4] observed that the sericulture farmers needed training in areas like disease and pest management, marketing, sericulture economics, sericulture management and rearing management.

Conclusion

Eri culture is a remunerative crop which suits all the categories of farmers from small/marginal farmers with meager resources to large farmers, and has a short gestation period, the returns are quick. Continuous training programmes are very much required to update the knowledge of the farmers which in turn ensures success in the venture. The findings on the extent of training needs of silkworm rearers revealed that the majority of the rearers exhibited a medium level of training needs on eri silkworm culture. It can be concluded that the training programme should be carefully planned, taking into account the requirements, issues, and potential applications of new technology including plant protection, processing of cocoons and pests and disease control both in host plant and silkworm.

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