CHAPTER-2
REVIEW OF LITERATURE

2.1: Introduction:

Review of literature is an important part of a research work. Neuman (2000) states that literature review is based on the assumption that knowledge accumulates and we learn and build on what others have done.

Therefore, in this chapter, an attempt is being made to discuss the studies made so far on various aspects of sericulture. The chapter begins with the history and evolution of sericulture followed by a discussion on the impact of various types of sericulture activities on employment generation. Sericulture also is a key to income generation. Therefore, the next section discusses the varied ways through which sericulture leads to income generation, while the last section is devoted to discussing the problems faced by people associated with sericulture activities.

2.2: History and Evolution of Sericulture:

The dictionary meaning of Sericulture is silk worm breeding. The word ‘Sericulture’ is derived from the Greek word ‘Sericos’ meaning silk and the English word ‘culture’ meaning ‘rearing’. Sericulture, therefore, refers to the “conscious mass-scale rearing of silk producing organisation to obtain silk” (Kumar et al., 2007).
Sericulture has a long history. Undoubtedly, China is the home land of silk. No other country in the world has the history of silk so closely woven with it. More than 4500 years ago, a Chinese empress Si Ling Shi; wife of the emperor Huang-Ti discovered how to unravel silk cocoon. “One day, when Si Ling Shi was sitting in the garden to enjoy her cup of tea, suddenly she saw a worm like caterpillar in a nearby mulberry bush. She observed fine shining filament of lovely golden colour being exuded through the worm’s mouth, which the worm wrapped it around itself to make a cocoon. She was utterly impressed and she plucked the cocoon, which fell accidently to her hot cup of tea. When she tried to remove the cocoon from her cup, the silk stuck into her fingers. This incident gradually resulted in raising mulberry and the worms from egg stages to silk weaving” (Ramana, 1987). The Chinese tried to keep the rearing of silkworm and silk production as a secret. In this regard, by following Gechhati, it may be stated that in China one may be hanged to death if any one attempted to send eggs of silkworms out of the country, because the national policy of China considered the technique of silk production as top secret. (Gechhati et al, 2000). However, in the year 555 AD, China’s secrecy about sericulture was disclosed and it was introduced to other parts of the world. It is believed that, the first country after China to learn the secret was Korea, where Chinese immigrants started sericulture in about 1200 B.C. Next, it spread to Japan—according to another source, war was instrumental in bringing the silk industry to Japan during the 3rd century B.C when Semiramus, a general in the army of Empress Singu-Kongo, invaded and conquered Korea. Gradually, the silk industry reached Tibet when a Chinese princess, married the King of Khotan. From Tibet, the industry penetrated to India and Persia—according to Anglo-American
historians, the art of sericulture reached India in about 140 B.C through Tibet when Indians started cultivating mulberry and to rear silkworm in the areas flanking the rivers Brahmaputra and Ganges.

By the 4th century A.D., the art of sericulture fully developed in India and Central Asia. During the 6th century A.D., promotion of sericulture in Tibet and Italy was begun by two Roman monks who learnt and mastered the art of sericulture. With the passing of time, sericulture industry was diffused from Italy to France. Consequently, in France in the year 1340, a noble French man brought the silkworm eggs and the mulberry-tree seeds to introduce silk rearing activity. (Krishnaswami, 1988).

Now, sericulture is one of the most important rural, agro-based, cottage industries in a number of countries like India, Italy, and France. However, China is still retaining its topmost position in production. Japan, which is an important silk producer in the world, face serious problems generated by the process of industrialization, high cost of labour, shortage of cultivable land for host plants, etc. but the domestic consumption of silk in Japan is on the increase. Therefore, to meet the demand and supply gap of silk, Japan has converted itself to a silk importer country instead of exporter. This shift in Japan has helped to develop the sericulture industry in India and other developing countries. The growth of sericulture in all these countries have been favoured by factors like low cost of labour, favourable climatic condition and availability of cultivable land. Thus, India has the potentiality to increase its silk product export through horizontal
expansion, (that is, by utilization of unused lands) and vertical growth, (that is, by crop stability through technology development and quality improvement) which can ultimately lead to foreign exchange earnings (Chattapadhyay, 2000). Today, India is the second largest silk producing country in the world and it is the only country in the world that produces all the four varieties of silk.

Sericulture in India is as old as the ancient Indian culture. Western historians believe that silk came to India from China through the famous ‘silk road’ via Khotan in 140 B.C. However, according to Indian scholars, silk was found in the foothills of the sub-Himalayas even before that period. References to the use of silk in India have been made in the famous Indian epics, Ramayana and Mahabharata. It appears in Mahabharata as one of the greatest luxury items brought to the court of the Pandavas after conquest of the world. In Mauryan period (4th and 2nd century B.C), there was a trade of silk in China (Venkatanarasaiyah, 1992). Historians also confirm that during the period of Kanishka, there was a flourishing trade of Indian silk with Rome and Greece. The industry gradually progressed and developed and during the time of the Mughals, it became prosperous. During British colonialism, the East India Company took further steps necessary for the development of sericulture in India. They exported raw silk to England and imported finished silk products from the U.K to India. However, during the time of East India Company, sericulture industry passed through several ups and downs in its journey towards prosperity. It must be mentioned that sericulture in India owes a great deal to Tippu Sultan- a ruler of former Mysore state in the 18th century (Sandhyarani, 1998). It was he who,
initiated its speedy growth and development during the British rule. Nevertheless, the industry attained its real place only after the country gained independence in 1947 (Lakshmanan et al, 2005). The South Indian states- Karnataka, Andhra Pradesh and Tamil Nadu are the important silk producing (especially mulberry) states of India.

In India, Lefroy (1915) was the first person to start investigation on the silkworm and sericulture at Pusa Institute, New Delhi. In 1945, Government of India established a ‘Silk Development Directorate’ for looking after the interest of the industry. In independent India, the Central Silk Board (CSB) was constituted and inaugurated on 28th April, 1949 (Gochhati, 2000).

After the construction of CSB, the various states developed sericulture industry according to plans and schemes formulated by State Sericulture Departments and the CSB. The other prominent states involved in sericulture in India are- Karnataka, Andhra Pradesh, Tamil Nadu (for mulberry), Assam (for Muga and Eri), Meghalaya (Muga and Eri). Beside these, Chattishgar, Kashmir and some parts of north India are famous for producing Mulberry and Tasar silk.

Importantly, Assam is the only state, which produces Muga in the world market. This Muga silk is very closely interlinked with the evolution of the Assamese culture and traditions, but its growth fails to be a part of an authentic recorded history. The Muga worm culture is not known outside this region. However, Das (2002) argues that the traditional Muga culture finds mention in the British history
and those Assamese engaged in the art were referred to as the cocoon rearers. This implies that Muga cultivation existed even before the time of British rule in Assam.

In addition, some references retrieved from the ancient Sanskrit literature suggest that certain types of wild silk were cultivated in Assam since time immemorial. These evidences are supported by historians namely Abul-Fajal and Abul-Faizin (1600AD) who states that the silk products of Assam were indigenous, excellent and resemble the quality of Chinese silk. In addition, Kautilya’s ‘Arthasastra’ too stated that different places of Kamrupa (Assam) produced three types of silk such as Dakala as Muga, Khauma as Eri and Patorna as pat. Historians of Ahom period also made references to silk during the 17th century. Schoff also stated that the silk industry originated in Manipur. He also said that Manipur was the homeland of silkworms of mulberry and from Manipur it went to China (Das, 2002).

It is believed that the sericulture activities of Assam were started by the tribal people especially by the Bodos during the early period. Even today, Bodo people are closely associated with production of Muga and Eri. However, as mentioned earlier, there is no authentic historical record about the origin of silk industry in Assam. Hence, it is very difficult to find out the actual period from which silk has been produced in Assam. However, it can be mentioned again that Muga silk is produced only in Assam.
2.3: Sericulture and Employment Generation:

Sericulture, with its vast potential for employment generation in rural areas, plays a vital role in reducing rural poverty and unemployment. It is a labour intensive industry, which can be very effective in creating new job opportunities and producing supplemental income to the rural youth. Among cottage and village industries, sericulture is the largest employer after handlooms (Hanumppa, 1986; Venkatarasaiiah, 1992). Out of the 5,76,000 villages of India in which sericulture provides employment to about 6 million persons, most of them belong to the weaker sections of the society (Indian Silk, 1987). However, most of the activities in silk production are in the informal sector and are menial in nature. Approximately, 90% of the employment generated goes either to the landless or to the marginal farming families who worked as hired labourers in the families engaged in sericulture (Sinha, 1989). The employment avenues in sericulture industry may broadly be divided into two types: direct employment which relates to employment in mulberry cultivation, silkworm rearing and cocoon production, and indirect employment, which includes reeling of cocoons, twisting, warping, dyeing and weaving (Chelladundi, 1999; Narayana et.al., 1978). The nature of the former activities is rural while the latter is either semi-urban or urban (Narayana et.al., 1978).

In his study, ‘Employment generation in sericulture’ Chelladundi (1999) discussed the role of sericulture in generating income and employment in a very clear cut manner-as an employment intensive occupation of low investment,
especially for the rural people (Bipin Behari, 1974). Ample labour and a small land base encourage farmers to practice sericulture as an occupation subsidiary to agriculture that fits well in the country’s development programme in increasing rural. Mulberry sericulture dominates the sericulture industry in India. One hectare of mulberry cultivation can generate 13 work years, that is, 4745 workdays in a year (Dantwala, 1979). It is estimated that the art of sericulture can generate employment @ 11 man days per kg of mulberry raw silk production (in on farm and off farm activities) throughout the year. Simultaneously, it is also presumed that one man-year employment is generated by producing one kg of vanya silk, which means that one family in vanya sector can get sustainable employment if they produce just 1.0 kg of vanya raw silk (Planning Commission Report, 2000). It has also been estimated that every acre of sericulture practiced under irrigated condition has a potential to employ 247 men and 193 women round the year. Studies have also shown that the small-scale mulberry farms provides ample scope for employment of own family labour and suggests that it bears potential to solve the problem of seasonal unemployment (Jayaram et al, 1998). This study suggests that one hectare of mulberry plantation creates employment to approximately 13 persons throughout the year. For production of one kg of raw silk, 11 man-days are required and can employ 30 man-days for production of fabric. Employment potentialities of different crop enterprise, which contribute to the growth of agricultural income, can be calculated by the ratio of used land of a particular crop enterprise and the generation of employment within the enterprise as well as in the processing of that crop in the same production line (Benerjee, 1977). Besides, the on-farm activities alone creates 4.17 man-days of employment whereas, 11.4 man-
years in off-farm sector for various activities (Vijay kumar, et al, 2007). The whole sericulture industry include different on-farm and non-farm activities and these having diversified nature of silk involves heterogeneous group (Sandhya Rani, 1998). Again different scholars have different calculations Sekharappa (1989), calculates that one hectare of irrigated land generates 13 work years annually in mulberry cultivation, silkworm rearing, silk reeling, twisting and weaving, while Usha Rani (2007) argues that the whole sericultural activity including plantation and rearing can generate 481.79 man days in a year. In a nutshell, as an agro-based, labour-intensive, export-oriented cottage industry, sericulture can generate high employment and income per unit of land.

Sericulture also involves both types of labour such as family as well as hired labour. The use of family labour reduces the cost of production. The involvement of family labour under both types of irrigated and other mulberry cultivation is about 46%(Laksmi et al.1999). In the Rayalaseema district of Andhra Pradesh, the use of family labour in mulberry cultivation and silkworm rearing accounts for 68% (Narayanan, 1979). Thus, sericulture activity has a very significant effect on the employment of family labour. Also, farm labour is able to find employment all the year round by combining work in mulberry cultivation with silkworm rearing. Thus, per acre of mulberry cultivation and silkworm rearing generates 300 working days for a farm labourer (Ramana, 1987).

Ratnala et al.(1990) studies the employment of human labour in sericulture across different size of the farms in Andhra Pradesh. In their studies they found that human labour utilization was more in smaller farms compared to larger farms.
because of greater attention paid on each activity. They observe a direct relationship between utilization of hired labour and the land holding size. Again, it is a sector or an activity which not only provides periodical income within a short time but also gives continuous income throughout the year (Lakshmanan et al., 1998).

As noted above, India also produces non mulberry silk, which accounts for 10% of the total non-mulberry silk production and has monopoly in the production of Muga silk- golden yellow silk. India has the unique features of being the only country in the world producing all four commercial varieties of natural silk. It is the only country where rare and golden-hued silk, that is, Muga is produced in the Brahmaputra valley of Assam (Indian Silk, 1988).

Assam is the only state in India which produces all four varieties of silk: Eri, Muga, Tassar and Mulberry. Although, Assam produces all of these product, but it concentrates basically in the production of Muga and Eri. It is the leading producer of Eri (327 tones) and Muga (57 tones) silk in the country (Goel, 1999). Therefore Muga and Eri are produced and silkworm rearing and production constitute the prime occupation of the tribal people of Assam. Tassar production has started in Assam only recently. Non mulberry sericulture is basically related with the indigenous tribal people. Eri is known as poor man’s silk. At present, the industry is employing people who are economically backward. So, in the state of Assam, sericulture (Muga & Eri) has an immense role in reducing rural poverty by generating employment.
Benchamin and Jolly (1987) also identified Eri culture as an occupation of ‘low investment and high output’ which acts as a source of employment and income. Eri culture can generate employment to a number of people in the various stages, partially or fully, especially for women. When the growth of Eri textile industries are considered scientifically and commercially, this scope increases further. (Das, 2009). P. C. Das in his study entitled ‘A Study of Muga Culture with reference to Income and Employment in Kamrup District’ tried to find out the share of Muga culture in employment generation through the use of primary data. He found that 26.87% of the people in study area adopt Muga as their primary occupation. But it had the limitation that it did not estimate the employment generation capacity of Muga per unit of output or area under host plant.

In the broader sense, sericulture or silk industry generates both direct and indirect employments. Thousands of families in Assam have been directly or indirectly engaged in various Eri culture activities like sowing of seeds, plantation of host plants, maintenance of plants, plucking of leaves from planted and widely grown trees, feeding and rearing of silkworm up to cocoon stages, spinning of yarn, weaving of fabrics, marketing of cocoons (intermediate products) and cloths, etc. (Das, 2006). There is again a considerable scope for generation of employment among the unskilled village workers such as in the rearing activities, preparation of Chaloni¹, Kharika², Baboo box, etc. Similarly, in case of other activities such as reeling, weaving, marketing creates not only indirect employment opportunities, their by-products also lead to indirect employment among village tribals. If the job

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Note: 1. Chaloni: A small bamboo tray used in rearing.  
2. Kharika: Bundle of lean thatch or straw on which moths lay eggs.
opportunities created in the construction of grainage hall, rearing houses, reeling machine and weaving equipments with all their forward and backward linkages are considered, then silk industry is seen to create a number of additional employment opportunities.

Again, if the income derived from the sericulture industry is distributed fairly and uniformly, then there should be an increase of certain types of consumer goods industry, which can be produced domestically. For example, furniture, utensils, by-cycles, etc. These goods have the additional advantages that these are made by relatively labour intensive techniques. Again these are evaluated by taking into account their entire ramification and linkages. As a result, it surely establishes final good industries and appropriate employment (Narasakiag, 1999).

The weaving industry in Assam generates a significant number of employments in rural areas. Especially Sualkuchi cluster provides employment to 13,827 hired weavers. Out of which 10,496 are female weavers coming from the different parts of the state (Baisya, 2005). The traditional handloom industry has provided direct employment to 21,250 weavers and 8,917 helpers at Sualkuchi. If different units related to weaving is taken into consideration then the number of persons employed totals approximately 36,000 persons. (Statement collected from office of the Assistant Director Handloom& Textile, Kamrup)
2.4. Sericulture as a Tool for Income Generation:

As stated above, sericulture as a rural based cottage industry is very suitable especially for the weaker sections of the society-a labour intensive industry, which “is rightly called ‘Kalpavikha’ or the ‘Kamdhenu’ of the poor and downtrodden” (Ramana 1987).

It is well known that income earned from agriculture in India is seasonal. In rural areas, sericulture not only provides periodical income but as already mentioned it gives continuous income throughout the whole year. It is a highly remunerative cash crop with rich dividends. In fact, sericulture is the only cash crop which provides frequent and attractive income in the tropical states of the country throughout the country. Therefore, the small farmers can adopt this technique for their advantage. The average annual income per hector of mulberry cultivation is around Rs. 40,000/- which is substantially high when compared to that of the other tropical crops. “Mulberry has been replacing important crops in many regions of India, for example, it has replaced sugarcane in Karnataka, horticulture in Jammu and Kashmir, Jute in West Bengal, grapes in Andhra Pradesh and several other crops including rice and wheat elsewhere. Therefore, for the small and marginal farmers, sericulture is the most suitable industry specially those who live below the poverty line” (Sandhya Rani, 1998).

Sericulture plays a vital role in transferring wealth from richer sections to the poorer sections of the society. Generally, silk is consumed by the rich people and
therefore, money spent on this directly goes to the different sections of the people who are involved in the different stages of sericulture such as rearing, reeling, weaving, etc (Narasaiah, et al.1999).

Similarly, Muga and Eri also generate a profitable income during a very short period of time say 5 years. It is estimated that by incurring approximately Rs. 50,000/- and Rs. 10,000/- in Muga and Eri respectively, one can earn up to Rs. 4 - 5 lakhs in Muga and between Rs. 28000-30,000/- in the case of Eri in one crop in one hectar of land. It considers only two activities, that is, plantation and rearing, but these depend upon the suitability of the environment especially in the case of Muga. It is to be noted here that this earning is estimated without the use of scientific techniques, but if scientific techniques are used, then expenditure will increase but income will also increase. Thus, Muga and Eri production leads to income generation (Bhatta, 2009). These findings validate the research of Dilip Das, who has showed as to how the Muga industry generates high income during a very short period of time. In short, sericulture is a potential sector which can raise economic status of the farming community and also in earning foreign revenues (Thapa and Shrestha, 1999).

Of the total share of income distribution in the sericulture sector, a major portion is earned by the primary producers, that is the farmers (54.6%) who produces cocoons followed by the traders (17.8%), weavers (12.3%), twisters (8.7%) and reellers (6.6%). The average income of the rearer depends on the area of land holding, rearing of silkworms, technology adoption and available infrastructure.
The sericulturists get substantial income of, Rs.15,000/- to 20,000/- per year if they strictly follow the advocated technologies in time (Vijay Kumar et al, 2007).

In the case of Muga and Eri also reeler, spinner, weaver, trader earns a considerable amount of money. Assam has the largest concentration of weavers in India. Weaving is linked with the culture and tradition of Assam. As stated earlier, the name of Assam for its handloom weaving industry is also found in the Ramayana where it has mentioned Assam as the land of ‘Cocoon rearers’ (Silknet, 2004). Sualkuchi in Kamrup district is called as ‘Manchester of the East’. The village Sualkuchi is the largest weaving cluster of Asia. Weaving is the primary occupation in Sualkuchi and another important feature of Sualkuchi is the engagement of the whole family in weaving (Das, 2008).

In sericulture industry nothing is wasted. Its by-products are useful in many ways. Mulberry leaves and shoots left by the silkworms form good fodder for the cattle that increases the milk yield. The stifled and much maligned pupae are used in the preparation of dog biscuits, oil, etc. The diet or cooked eri pupae contain 25% oil and 50% protein. The oil and protein powder extracted from these dead pupae can be utilized in manufacturing soaps and in baking industries respectively. It is a rich source of food for poultry, fishery and piggery. The silkworm’s excreta can be used as manure. The rational utilization and disposal of the byproducts help the sericulturists to enhance their economic gains (Ramana, 1987; Sandhya Rani, 1998).
The other valuable by-product such as castor, as a by-product of Eri has a good market price. In Muga reeling too, byproducts are generated and the price of per kg of ghisa (by-product of muga) is Rs.2000/-. Sericulture is therefore regarded as one of the important ways of reducing rural poverty and enhancing prosperity in rural areas. Therefore, it can be considered as an important rural development technique (Narasaiah, 1992). Development of sericulture can also bring about significant changes in the income levels of the small farmers. Moreover, it provides high profit margin. Due to the adoption of sericulture, debts have been decreased and the habits of saving has been incubated (Usha Rani, 2007).

2.5. Sericulture and Rural Development:

In the following discussions, it has been shown as to how sericulture, as an agro-based cottage industry, plays a significant role in the development of the rural economy. The people associated with this industry are rural indigenous and tribal people. Therefore, growth of sericulture can be considered as a suitable instrument for rural development. It has also been discussed that as an agro-based rural industry, sericulture is highly suitable to provide a decent income to the marginal farmers and landless labourers. Thus, it can be repeated that it is a rural based, labour intensive technique; which requires comparatively low investment but yields high and quick returns and foreign exchange earnings (Dutta et. al., 1991) when compared to other cash crops (Gangopadhyay, 2009). “Generally, silk goods
are purchased by the urban rich and middle-class consumers and it is estimated that around 57% of the final value of silk fabrics flows back to the primary producers in rural areas’’ (Gangopadhyay, 2009, p-28). Again, sericulture can be regarded as a sustainable economic activity and it can check migration from rural to urban areas (Gangopadhyay, 2009).

Sericulture is such a type of enterprise that gives continuous income with a high annual turnover of three to four crops in rain fed conditions and five to six crops under irrigated conditions. Different activities such as gardening, plantation, seed production, harvesting of crops and silkworm rearing, etc. of sericulture can generate income and employment throughout the year. Therefore, with the help of such activities of sericulture, it can generate regular and stable income to the rural people. As a result, the standard of living of the poor people are expected to increase (Sandhya Rani, 1998).

Out of the four varieties of sericulture: Eri, Muga, Tassar and Mulberry, Eri is most popular among the rural poor people of Assam. Eri fabric is called ‘poor man’s silk’ because it is much cheaper than Mulberry and Muga (Das, 2009). Thus, the development of Eri sector in Assam is likely to uplift the standard of living of rural communities of Assam.

In short, sericulture as a farm-based enterprise is highly suitable for both large and small land holdings, and requires low capital investment. The very nature of this industry with its rural based on-farm and off-farm activities and enormous
employment generation potential has attracted the attention of many planners and policy makers to recognize the industry as one of the most appropriate strategy for socio economic development of a largely agrarian economy like India (Deuri, 2013).

2.6. Sericulture and women:

Women constitute a little over 50% of the country’s population and most of them are largely rural based, derive their livelihood from agriculture and other land-based activities, either as family members or wage earners. Women have been involved in sericulture activities and play a vital role in various capacities. Nearly 50% of the work force in sericulture are women and they have a dominant role in this sector (Lakshmanan et al., 1999). In indoor activity of sericulture, that is, silkworm rearing, almost 94.67% are women except during the peak period (Sumangala, 2001).

As a cottage industry, sericulture provides ample work for women in the rural areas particularly in silkworm rearing and reeling, while men largely work in fields and in weaving. In major silk producing countries, like China, Japan and Korea, power looms are run by women (Mitra, 1990). Sericulture, because of its unique nature of works, proves to be an ideal activity for women. They can take part in sericulture activities in addition to their regular tasks of taking care of their families. Its operation does not require hard labour. Almost all the sericulture activities, except the tasks of digging, ploughing and carrying heavy loads, which
are strenuous, can be carried out independently by women. Silk worms being delicate; have to be handled with proper care. Thus, the entire process of rearing needs expertise, high skill and patience. As most women possess these qualities to an eminent degree, sericulture provides an opportunity for women to get involved in these activities.

Sericulture is an extensively labour intensive industry and it occupies an important position from the point of view of employment generation and earning additional income to weaker sections (Best & Maier, 2007; Bhatta & Rao, 2003; Geetha & India, 2011; Vijayanthi, 2002). “In this context, the transformation of sericulture industry from subsistence type of operation to a modern scientific system requires the attention of all major players like policy makers, administrators, and personnel associated with the industry. The word personnel mainly refers to women labours who are the full-time workers and who look after silkworm rearing and management and whose contribution is more than that of men in this area”(Kasi, 2013, p-9). Many studies show that in sericulture industry, 50% of labour are women who are involved in mulberry cultivation and silk worm rearing (Gate, 2001, Goyal, 2007, Kasi, 2011, N. Singh, 2006, Srinath, 2008, Thamizoli, 2001, V Vijayalakshmi, 2002).

Sericulture provides tremendous opportunities to the women in the rural areas both in terms of operation performed and time invested. Thus women play a significant role in different stages of sericulture such as plantation, rearing, reeling and weaving etc. as well as decision making process (Roy et al., 2000)
As a labour intensive agro-based industry sericulture generates number of employment. To produce every kg of raw silk, 11 persons are required. Out of which 6 persons are women. Again, in the production chain, out of 60 lakh full time workers, 35-40 lakhs are women (Rama Lakshmi C.S. 2007).

In one of the study conducted by Usha Rani, 2007 shows that the rearing of 300 dfi of one acre mulberry garden in two months generates 96.36% man days of employment, of which 72.70 % are women during two months of time.

Sericulture operations can be divided into two parts- agricultural part involving plantation, rearing etc. which are undertaken in rural areas and the second part is the industrial part related to reeling, twisting, weaving, marketing etc. and these are undertaken in semi urban and urban areas. Women are engaged in both the activities- agricultural and industrial. Although it is generally said that woman are concentrated in silkworm rearing but in reality, it goes beyond that. “Nearly 60% of the labour requirement is met by the women in almost all the traditional sericulture agencies in the world” (Roy et al., 2000). In the above study it was found that most of the women are involved in rearing activity of agricultural unit and spinning and twisting in industrial unit of the sericulture sector. Both these activities are very passionate and delicate work. Women generally feel that worms are very sensitive in nature. “For them, tending the worms is like looking after children. While feeding worms, women take utmost care. Sometimes, they feel that they do not take that much care of their own children. Women consider
bed cleaning and litter cleaning are as a natural thing that they do in case of children, and it requires utmost patience” (Kasi, 2013).

It was found that in one hectar of Mulberry crops, generally 2,760 women work days are generated. Similarly, in one hectar of irrigated Mulberry, 4,631 women workdays are generated in all the activities in sericulture (Sekharappa, 1989). Sericulture has been fully recognized as one of the important households industry in India. Nearly 60% of the people employed in the industry are women (Usha Rani, 2007). It can generate employment up to 11 persons for every kg of raw silk produced, out of which, more than 6 persons are women. Again, in sericulture, more than 60 lakhs persons are employed, out of which 35 to 40 lakhs are women (Rama Lakshmi, 2007). Women have been involved in sericulture activities in different levels such as worker, supervisor and supporting personnel within the family (Venkatesh et. al, 2010).

As the women are involved in the mulberry sector in south India, similarly in Assam, Muga and Eri are most promising activities and it plays significant roles in uplifting the women in Assam. Since production of Muga and Eri are family enterprises, women perform about 60% of the activities in their household’s compounds and adjacent fields. It is now an accepted fact that women put in more labour not only in production of physical output but also in terms of quality and efficiency. The higher proportion of women participation in Muga and Eri culture is because of certain unique features of silk industry (Das, 2013).
Thus, in the Sericulture sector women get a position to take their own decision making capacity for improving their life style and for giving them greater recognition and status in the family and society (Sandhya Rani, 1998). Government also provides various support programmes for development of women in the sericulture industry. Under the National Sericulture project such as Catalytic Development Project, Government provides special training programmes and also provides subsidies to the Muga and Eri farmers. If these are implemented properly, then women in this sector will be highly benefited.

2.7. Problems of Sericulture:

Although sericulture and silk industry remains as a source of livelihood for the people of the rural areas but still, it is at the subsistence level. In spite of the vast potentiality of the Muga and Eri sector in Assam, most people consider sericulture as a subsidiary occupation. This is because there are certain problems associated with this sector. There is, no doubt, scarcity of raw material which is the major problem, but there are certain other problems faced by the farmers and silkworm rearers. The sericulture industry cannot develop to its potential unless these problems are identified and targeted level of output achieved during planned period (Sandhya Rani, 1998). According to R. E Benjamin (1989), along with other agriculture activities sericulture sector is also affected by floods which are a common scenario in India. Earlier, S. K. Agarwal (1970) also discussed about the flood problems of India—flood affects both food plantation as well as silkworm rearing, which directly affects the production of silk cocoon and silk.
Again in the case of Muga, due to its outdoor nature of rearing, Muga silkworms are exposed to various factors of changing environment of Assam and thus remain prone to number of diseases, pests and predators, besides various bacterial, viral and fungal diseases. Unless prophylactic measures are adopted, the disease outbreak cannot be controlled. The major and serious diseases of Muga silkworm are Pebrin, Grasseric, Flacheric and Muscardine (Das, 2002). And the key constraints of the Muga seed sector in north eastern India are the degeneration of Muga silkworms in the sphere of basic seed cocoon that is, after 2-3 generation, if reared on the same environment, the entire operation has to be renewed every year with fresh seed cocoons (Rahman, 2013). Muga culture is a risky operation and in the Muga silkworm rearing, various natural enemies attack the eggs, larvae, pupae and the adult silkworm and as a result, the rearing activities are badly affected. The major parasites of Muga silkworm are Uzify, locally known as Kunji Makhi and Brachonid fly. The Brachonid fly attacks early instars (1st to 3rd instars) and Uzifly causes damage to full grown worms (4th and 5th instars) . These flies are diurnal visitors. The female of the Brachonid flies lay eggs inside the body of muga larvae and Uzifly deposits eggs on its surface. The incidence of Uzifly occurs throughout the season but it is more intense during the winter and late summer (Choudhury, 1981). Besides, some birds are the main enemy of the worms. Food plants leaves are also affected by bacteria, virus and fungi and damaged by insects that eat the leaves (Hanumppa, 1985).
Amicable climatic condition is the key factor under which the success of sericulture depends. Cool climate throughout the year is a prerequisite for silkworm rearing, cocoon production and high *renditta*. In the said context, P.C Bancel (1981) stated that the environmental conditions and microorganisms often fluctuates the cocoon production rate and damages their qualities. Climatic disturbances upset the sericulture productivity. It is advised to adopt in the hot tropical climate, especially during the summer, new techniques like the use of air coolers, dripping of water on the rearing sheds, arranging the rearing rooms under the shade of big trees, etc. The adoption of these techniques increases the cost of production marginally, but reduces adverse effects on the quantity and quality of the cocoons and increase the level of income (Narasaiah, 1999). Sericulture activities can be improved through research. Therefore, if the new sericulturists fail to utilize the extension services properly, they may get discouraged in their new enterprise, their failure, partial or full may discourage others and upset the process of innovation in introducing and developing the new enterprise (Ramana, 1987).
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