Sericulture in Assam. the Processes and Trends in Production

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I. INTRODUCTION

Sericulture activities are concentrated in Assam in 9098 Sericultural villages involving 185291 families spread over all the twenty-three districts of Assam (Govt. of Assam 2018). Though the state produces all commercially viable silk worms the share of Muga and Eri is about 88 per cent of total silk production in the state. Depending on the nature of Muga cocoon production, the entire state is broadly divided into seed cocoon zone (lower Assam) and commercial cocoon zone (upper Assam). It is observed that almost one fourth of total Muga of the State has been produced by Dhemaji and Lakhimpur districts while similar dominance is observed in Karbianglong district in case of Eri production. On the other-hand all commercial activities of silk products are concentrated in Sualkuchi, which is popularly known as silk town of Assam. It is seen that all communities and castes in upper Assam rear Muga worm. It is however; mainly practiced by the Ahom in upper Assam and *Rabhas,* Kacharis and *Garos* in south of lower Assam. The eastern border of Goalpara district is the extreme limit of Muga growing area. Record shows that platinum century ago there were 330, 1604, 589, 231, 17, 216 and 4364 acres of Muga host plantations in Goalpara, Kamrup, Darang, now gong, Sibsagar and Lakhimpur district respectively which shows the relative importance of the districts in Muga cocoon production (Chowdhuri,1982). The eastern part of Goalpara and south west of Kamrup district (such as, Luki, Bangaon and Boko) constitute the most prolific Muga seed cocoon growing areas. These cocoons are procured by the growers for reeling cocoon. The *Garo, Kachari* and *Rabha* tribes are the chief producers of seed cocoon but these people are unacquainted with the reeling of Muga cocoon. Hahim, Gahalkhana, Khetri are also important sources of supply of healthy seed cocoons (Thengavalu, 1984). Sipajar in Darang district was once an important Muga growing area. Now gong district produces small quantities of Muga cocoon. The most important Muga cocoon growing areas are Lakhimpur, Dhemaji, Dibrugarh and Sibsagar districts. It is mainly grown in south of Jorhat and south east of Sibsagar subdivision chiefly by Ahom community. Sapekhati, Namrup, Nitaipukhuri, etc. are the places where good seed cocoons can be obtained. Teok, Jhanji, Namti, Naharani etc. are healthy Muga Cocoon growing areas. In Dibrugarh district, Jamira, Lorua Mauza, are important Muga breeding tracts. In Lakhimpur district, Ghilamara, Azad, Narayanpur, Dhakuakhana and in Dhemaji, Machkhowa, Pachim Dhemaji, Siripani, Simen Sapari, Bardoloni etc. are very important for commercial cocoon production. This culture is practiced assiduously in these areas by all section of the people. In the State both in case of Muga and Eri it is observed that there is a high production gap in seed cocoon production and requirement. Table 3.1 clearly indicates the existence of such gap. In the year 2003 the gap in case of Muga production was 31 lakhs cocoon i.e. 28.8 per cent of total seed cocoon demanded while it was 5.5 lakhs i.e. 6.4 per cent of total Eri seed cocoon demanded. Though the production of Eri seed cocoon is more or less satisfactory, the production of Muga seed cocoon falls short, which in turn has hampered the growth of the industry. This shortfall cannot be met as Muga is not available anywhere else in the world.

Table 1.1
Silkworm Production in Assam (in Lakhs)

Year	Muga		Eri	
	Production	Demand	Production	Demand
2000	77	102	81	89
2001	74	103	82	88
2002	82	108	83	90.2
2003	79	110	85	90.95

Source: Cited in R. Begam, (2003).

II. PROCESSES IN SERICULTURE

This section deals with various activities related in sericulture. The practices and production processes at different stages of sericulture has been described in detail so as to serve as a backdrop to the subsequent analysis.

1.Host plants of Muga and Eri Silk Worm

Muga and Eri are polyphagous silk worms, which feed on several varieties of food plants (Table: 1.2 and 1.3). Som (Machilus bombycina) and Sualu (Litsaea polyantha) are the primary Muga host plant extensively used in Upper and Lower Assam respectively. These two host plants are available in natural state, particularly in areas bordering the hill regions. The complex interaction between geology, ecology and climate is the particular characteristic of this region and the flora has adapted to this situation (Chowdhuri, 1982; Thangarvalu et-al, 1988; Dutta, 1998). Som and Sualu, which grows in forests from seeds, are used for Muga culture in certain areas. In the surveyed area only, *Som* is planted but *Sualu* is also available in the planted area, which grows wild. The total host plant area in the surveyed area is 44.174 hectare. Considering the shape and size of *Som*, it is locally named as Naharpatiya, Jampatiya and Azarpatiya. The Naharpatiya Som is considered to be the best for rearing of Muga worm. Different host plants produce different size and volume of cocoon. Generally cocoon from *Sualu* fed worms are larger in size but not as stiff and compact as those fed on *Som* (Dutta, 1998). Dighloti (Litsaea Salicfolia), Mejankari (Litsaea Citrata), Patihonda (Cinnamomum obtusifolcium) etc. are secondary host plants. Besides Bhumloti (Symptocos grandiflora), Bagari (Ziziphus jujuba), Bajramani (Xanthoxylum alatum) etc are also used when leaves are scarce. These trees are not generally cultivated but are utilized if available in nearby areas which are grown naturally. Different host plant produces silk of different colour

Castor (Ricimus Communis) and kesseru (Heteroponax fragrans) are primary host plants for Eri worm. Tapioca or Cassava (Manihot utilisima), *Bar Kesseru* (Ailanthus excelsa), Bhotera (Jatropha Curcus), Korha (Sapium engenifolicum), Bajramoni (Xanthoxylum rhesta) etc. are also used for Eri as secondary host plant (Table: 1.3).

Annual and perennial varieties of castor are well distributed throughout the North-East region. Different varieties of castor plant viz, plain green, plain red, bloomy green and bloomy red exist. The plain varieties are good for rearing of Eri Silkworm (Tangavalu, 1988). Kessuru is found throughout the region extending to about 3500 ft and in the absence of castor leaves, the Eri Silkworm is reared on this plant as a next choice. Topica is mostly cultivated in Khasi and Garo Hills to use its leaves for feeding Eri Silkworm and the root as staple food which is rich in starch content. *Payam* and *Gamari* are popular in Khasi and Jayanthia hills. These trees are tall; perennial and their height are controlled by annual pruning.

2 Rearing of Muga and Eri

Muga silk worm is semi domesticated and multivoltine. Rearing is done out door in open air and hatching and mounting is done indoors. Five to six brood Muga is reared in a year. These brood bear the name of vernacular month of Assamese calendar in which they are reared (Table: 1.4). *Katia* and Jethua are the two important commercial broods which furnish the bulk of reeling cocoons. The rest of the broods are seed broods of which Bhadia and *Jarua* brood are the most important because these brood supplies seed to the extensively reared *Katia* brood which produces highest quantities of reeling cocoon in the state. The Bhadia broods are extensively reared in Kamrup Nawgong and Gualpara district from which the Muga rearer of upper Assam collects seed (Dutta, 1998).

Foothills area of Garo hills, Naga hills and Cachar hills are the main seed growing areas for Muga. The traditional rearers of upper Assam collect their seed cocoon from these zones for commercial rearing during spring and autumn. Now a days few areas of

upper Assam namely Dumduma, Tingrai, Naharkatia, Sasani, Sapekhati etc have also started producing seed cocoon. With a view to collect dfls the rearers reach the seed zone in advance and camp in the locality to ensure quality seeds.

In the study area the following characteristics were considered for selecting healthy seeds by the rearers:

(i) Dark green colour of mature larvae.
(ii) Copper colored head of the larvae.
(iii) Presence of two excreta in the posterior abdominal segment in the fifth instars larvae.
(iv) Uniform growth of the larvae.
(v) No symptom of diseases.
(vi) Both side strong swings of the worms at touch on the lateral part of the body.

Table: 1.4
Nature of Different Broods of Muga Silk Worm

Brood	Month of Rearing	Quality of cocoon	Silk from 1000 cocoon (in grams)	Purpose of the brood	Remarks
Katia (Autumn)	Oct-Nov	Best cocoon, good reelingproperty.612 Meters thread per cocoon.	250	Mainly for silk, reared in upper Assam	Most important brood of commercial cocoon.
Jarua (Winter)	Dec-Feb	Poorest cocoon.265 meters thread per cocoon.	150	Mainly for seed	Important for seed. Rearing hazardous.
Jethua (Spring)	May-June	Good cocoon. Next to *Katiya* in quality. 546 meters thread per cocoon.	200	Mainly for silk, reared in upper Assam	Next important brood for commercial cocoon.
Aherua (Late spring)	June-July	Inferior cocoon, Difficult rearing.460 meters thread per cocoon.	180	Seed	Reared mainly in Kamrup district for *katiya* brood of upper Assam
Bhadia (Late summer)	Aug-Sept	Reeling difficult. Silk Inferior,448 meters per cocoon	150	Seed	Reared mainly in kamrup district for *katiya* brood of upper Assam

Source: S.N Chowdhuri (1982), Muga Silk Industry, Directorate of Sericulture, Government of Assam.

Table: 1.5
Time Requirement in Muga Rearing

Stages	Minimum days	Maximum days
Hatching	7	10
Worm stage	26	40
Spinning Cocoon	4	7
In the cocoon	14	21
As a moth (upto laying eggs)	3	3
Total	54	81

Source: G. A Watt, Dictionary of Economic Product of India. Govt. Printing Press, Calcutta, Vol.6 Part 111 (1893) (Reprint 1972), Cosmo Publishers Delhi, pp. 179.

The rearers generally collected seed cocoon from Bharpak (peak of the harvest) stock where the ratio of male and female is equal. After collection of seed cocoons, they are loosely packed with dry straw. The seed cocoons are transported during night or early morning hours to avoid thermal shocks. After reaching home the rearers remove the cocoon from basket and store them in bamboo cages known as *Soja* in a safe place inside the grainage site. After commencement of moth emergence, the moths are allowed to couple naturally and the coupling pairs are tied on *kharika*. After mating for 24 hours the male moth flies away and the female begins to lay eggs. As soon as egg laying is completed, the female moths are removed and the *kharika* is taken down, placed in round cylindrical bamboo or cane made case (*khora*). The traditional rearer uses the eggs up to third day. Before placing the worm on the feeding trees, the trees are thoroughly cleaned by removing all obstacles including enemies of worms. The rearers in order to satisfy God for having a successful harvesting perform prayers at the rearing site. After the function *Khrikas* are either hung on the upper branch of the tree or tied around the trunk of the tree. For preventing downward movement of the worm, the rearers tie a coil of straw rope or bark of banana

plant on the trunk of the tree (*Garibandh)* Soon after exhaustion of the leaves in the tree, the worm comes down along the trunk and gathers around the Garibandh. Then worms are transferred to a fresh tree through triangular shaped bamboo plate called Chalani and this process continues until the worms are matured. Muga worm undergo four moults during the entire larval period. The worm remains motionless for about 36 hours at each moult. These moults are known as Chi-ura, Dui chal kata, Tini chul cata, Maiki chal kata or Bor chul *kata*. Matured larvae become brighter, make a rustling sound when rubbed with fingers and descend down the tree at dusk. Then they are picked up by the rearers and placed on *Jali* for spinning Cocoon. A *Jali* contains dry leaves of Mango, Jack-fruit, plantain etc. Placing of number of cocoons in *Jali* depends upon its size and usually about 400 to 500 worms are placed in one *Jali*. In the initial day of harvest the rearers again perform a ceremonial function called *Kalikamata* at the rearing site. From placing the *Kharikas* on the feeding trees to spin cocoon, the worm usually takes 25-32 days to attain matured stage in hot season and 55 to 60 days in cold season. The complete life cycle of the worms last about 54 days in hot season and 81 days in the cold season (Table: 1.5). On an average, a rearer conducts two to four rearing in a year. In the study area it is seen only 4 per cent rearers rear five brood in a year while 57 per cent and 39 per cent rearers rear one and two brood respectively (Table: 1.6).

Table: 1.6
Rearing Intensity of Rearers in Muga and Eri Worm Rearing (2005)

Muga		
One(brood)	two(brood)	Three to five(brood)
12 (56)	68 (34)	20 (10)
Eri		
110 (55)	80 (40)	10 (5)

Note: Figure in the bracket indicate percentage of respective column.
Source: Field Survey, 2005.

Eri culture is carried out traditionally during village women's leisure time. Though almost all castes practice Eri culture, it has remained a subsidiary occupation with the Indo-mongoloid and Tibeto-Bhutan races of the valley especially among the tribal of the plains and hills (Chowdhuri, 1982). Eri Silkworm is reared indoor. Its life cycle is more or less same to Muga culture. A complete life cycle lasts about 44 days in summer and 85 days in winter (Sarkar, 1988). Ericulture is widely diffused in the villages of the hills and plains. The Meches and *Kachries* in the northern part of the valley and the karbis, Boros, Garos, Syntens in the southern part are engaged in Eri culture as a subsidiary occupation. North Cachar, Karbianglong, Kamrup, Gualpara, Darang, Lakhimpur and Dhemaji and Jorhat district are the chief Eri cocoon growing areas in the State. In the Eri industry men hardly perform any activity in entire rearing, spinning and weaving process and thus women participation is dominant. Eri culture is practiced usually during leisure period so no actual labor hour is needed to spend in rearing. Generally, the rearer collects the seed cocoon either from within the village or within the district at the rate of Rs. 15-20 for each eighty cocoon (one Pon). The rearers generally utilize 8 to 80 cocoons in one brood. After collecting, seeds are placed on a bamboo basket and kept in safe place. The emerging moths are allowed to mate and the mating couple is tied on *kharika* where they lay eggs. Layed eggs are tied in a piece of cloth and are hung under the roof until they hatch. When the eggs are hatching out, the tender worms are placed on a bamboo tray. A few tender top leaves plucked from the castor plant are spread over the worms. As the worms advance in age, older and older leaves are given. Rearers give two-to-four-time feed in a day. During the entire larval period, the worms moult four times and gradually grow big and bigger in size. When the larvae are in fourth moult, they stop eating, become motionless and the head is raised a little and the body shortened. This state may last for 24 to 48 hours. In the study area, branch feeding is also noticed and it is observed that the matured larvae ascend to the top of the branch and then they are collected to be placed on *Jali* for cocoon spinning. In the study area only few rearers rear more than three brood and maximum rearer i.e. 55 per cent rearer rear only one broad (Table: 1.6). It is also noticed that there is no separate rearing house for either Muga or Eri rearing. Generally, the rearers rear the silk worms in their own residence.

3Reeling of Muga Cocoon

After harvesting, Post Cocoon technology is started with stifling. Stifling is done through exposing the cocoons to sun rays which partially kills the chrysalides. For stifling the reelers also spread the Muga cocoon in the sample households on a bamboo mat or bamboo sieve and keep it above the fire. In the study area it was noticed that generally more than 80 per cent of commercial Muga Crops are sold to the commercial reelers of Sualkuchi, Muga Raw Material Bank and Reeling Co-operative societies and the remaining cocoons are retained either for seed purpose or domestic reeling purpose. Often the agents of Sualkuchi reeler advance cash for purchase of Muga seed cocoons to poor rearers and reserve their Muga crops and keep them as captive rearers who can never sell their cocoon to any other persons. Muga reeling cocoon are usually sold in thousand. To stabilize and ensure a gainful price now Raw material Bank of Central Silk Broad fixes price in accordance to the recommendation made by local Advisory Committee.

Muga Silk reeling involves cocoon stifling, degumming and Reeling. Degumming is a process by which the gumy substance is softened and compact filaments are released for reeling. Degumming process is completed by boiling the cocoon with an alkaline solution for about 15 to 30 minutes depending on the strength of alkaline solution, compactness and freshness of the cocoons. The sample reelers are using the ashes of some leave, wood and bark of some trees for degumming. The sample reelers add to boiling solution some slipery substances such as core of Owtenga (Dilenia Lridica), Simlu bark, (bombex malabaricum), Agaru leaves (side), Lata Sug (Malva arrenis) etc. for easy tracing of the filament. This helps reducing the abrasion on the reelers arm as a consequence of the rubbing action of the filament while reeling (Chowduri, 1970; 1978; 1982). The essential conditions for good reeling as expressed by the sample rearers are

(I) The natural filament should come off easily on being pulled out

(II) The filament should come out in a continuous line without breaking.

(III) Good cocoon quality.

It was also observed in the sample area that almost the entire commercial reeling of Muga Silk was carried out on very primitive machine called Bahir or Bhawri. It was noticed that two men were required for reeling on *Bhawari*, one-person deflosses the cocoons and draws the filaments of 8 to 10 cocoons and passes it on to the other person; the second person on receiving the yarn twists in on the fore arm before winding the yarn on the spindle. On an average two men can reel 100 gm / per day. New reeling machine, like Chowdhuri reeling machine, though more effective still has not received enthuastetic adoption from the traditional reelers. Table: 1.7 shows comparative performance of different reeling machine. From the point of view of quantity of production, Chowdhuri type and RHRS–III type reeling machines are preferable for Muga reeling and in terms of quality, Bhawri is superior to the other machines. It is also seen that the quatum of silk obtained from the cocoons varies from brood to brood (Table: 1.8). The Table: 1.8 shows the randita and randita of *Katia* brood is 4000 cocoon, *Jethua* brood is 4500 cocoon and that of Jaruah*, Aherua* and *Bhadia* are 5500, 6000, 6500 respectively in the sample area. It was also observed that the randita is different in different reeling machine and it is high in case of traditional reeling machine (Table: 1.8). However, there was no single modern reeling machine that was used in the sample area.

Table: 1.7

Comparative Performance of Different Muga Reeling Machines

Type of reeling machine	Silk yarn production (gm/8hours)
Bhir	137.4
Chowdhuri	160
Trivedi	118
Bharali	76.1
CMERS	114.8
Golden Muga	105
RMRS I	117.6
RMRS-II	150.7
RMRS-III	160

Source: Thangavalu (1998): Hand Book of Muga Culture, Pp. 93

Table: 1.8
Randita of Muga and Eri in Different Reeling /Spinning Appliances

Reeling/Spinning Appliance	Muga (in numbers)				
	Jethua	Aherua	Bhadia	Katia	Jarua
Bhawari	4500	6000	6200	4000	5800
CSBRM	4200	5700	5900	3700	5400
	Eri (in kgs)				
Takuri	1.25	NA	1.3	1.2	NA
CSBRM	1.2	NA	1.2	1.15	NA

Source: field Survey, 2005

4. Spinning of Eri

Prior to spinning in the sample area, the cocoons are cleaned by removing chrysalis skin. Clean cocoon contains 100% silk. Stifling is usually done by exposing the cocoons to sunrays for one or two days. For degumming, cocoons are boiled in a soda of potash solution. Sample rearers use, plantain leaves or leaf ashes, wood ashes, paddy straw ashes and pieces of green papaya for dissolving certain portion of the adhering gum round the filament. Such process of degumming adds certain solvent colour to the cocoons and hence, the yarn is also colored. It is observed that soda gives a brown colour, pulses and plant ashes impart a creamy luster and papaya pieces provide a whitish luster. When filaments come off easily to the pull, boiling becomes sufficient. Over boiling weakens the filament and results in the layers of the filament coming off in lumps. Sufficient boiled cocoons are washed in cold water several times to remove the solvent. Then the washed cocoon is spread and dried. The cocoons are then used for spinning with *Takuri* or other appliance. *Takuri* is the simplest appliance of Eri spinning and very popular among common rearers. *Takuri* has one spindle with weighted end. To this the free end of the thread drawn out of the dry or wet Eri cocoon is attached and then spun around with a twist of the hand. In this way, the thread is drawn out evenly with the fingers until the spindle fills sufficiently. The thread formed in the spindle is then, wound off and the same spindle is put to use once again, for fresh length of thread. On an average the sample spinners spin only 55 gm in a day. It is seen that despite, introducing some improve spinning appliance like Chowdhuri Charka, Das Charka Ambar Eri spinning Charka etc. *Takuri* the primitive appliance is most popular. The comparative spinning efficiency and different spinning appliances are shown in Table: 1.9 which clearly indicates that Das Charka is most efficient, which can reel about 2500 meter in a day. In the sample households 100 per cent spinning was done by *Takuri*.

Table: 1.9
Efficiency of Different Eri Spinning Appliances

Appliance	Production per 8 hours
Das type Eri spinning charka	2500 mteres(30s)
Chodhury type Eri spping Charka	2300 mteres(40s)
Bhagalpur Chraka	1400 mtres (18s)
Old Charka	824 metres (30s)
Takuli	420 mtres(30s)

Note: Figure in the bracket indicate the number of cocoons
Source: Chowdhuri, (1982), Eri Silk Industry, North East Council.

5. Silk Weaving in Assam

Assam has highest number of handlooms i.e. 1.9 million in the country. The weaving operation is individualistic and confined to the female members of the households. About 15000 commercial looms (mostly silk) exist only in Sualkuchi and cotton loom in Hujai and some areas of Cachar District (Chowdhuri, 2001; OKDISD, 2001). Tribal women work mostly on lion loom. They have their special designs and motifs, styles and colour combinations. They use vegetable dyes which are derived from leaf and root, bark and fruit.

The south bank of Kamrup district has about 13000 Eri cloth weavers. Ramdia near Hajo, Raha in Nagaon district, Majuli island of Jurhat district, majority of rural area in Lakhimpur and Dhemaji districts, many places of Kukurajar and Karbi Anglong districts have Eri weaving activities (Chowdhuri, 2001)

The Directorate of Handloom textile has about 55 Weavers Extension Service Center (WESC) and 64 Weaving Training Classes (WTC) and 12 Handloom Production Unit (HPU). NEHHDC is organizing weaving centers for production of cloth for export purpose. The Assam Textile Institute (ATI) is the

only institute in the state imparting training in certificate and diploma courses in textile technology. The Handloom Research and Designed Centre (HRDC) is engaged in R & D of designed technology (Chowdhuri, 2001).

In the sample household there were 275 hand looms and around 88 per cent of these hand looms were traditional hand loom while only 12per cent used fly shuttle for weaving. It was also observed that 89 per cent of handlooms in the sample area were used for domestic fabric production. It was observed that one weaver could weave about 2.5 meter of Muga fabric and about 1 meter of Eri fabric in a day. However, the actual amount of fabric in a day depends upon the nature and compactness of the design.

III. MARKETING OF SILK

Marketing of silk products take place in several stages. Products at all stages have both internal and global demand. The demand for reeling cocoon and commercial cocoon as well as silk fabrics is very high. But in comparison, demand for silk production is less and as a result the prices of silk products fluctuate frequently.

1. Seed Cocoon

The annual demand for Muga seed cocoon is estimated to be about one core, but the supply is far short of actual demand. At present the Government Basic Seed Farm produces about five lakhs seed only, thus for the seed cocoon the rearers have to depend largely on individual growers. The present price of 1000 seed cocoon is Rs.1000. The sample households produced 39700 seed cocoons in the year 2005 and all of these were sold to the nearby rearers. Eri seed cocoon is generally collected from individual rearers at a price of Rs.15-20 for each eighty cocoon. However, in case of Eri production too it was observed that there was an annual short fall of 5 lakhs cocoon in the year 2003 (Table: 1.1).

2. Reeling Cocoon

The price of reeling cocoon fluctuates according to harvesting season. It is observed in Table: 3.10 that the price of reeling cocoon was at its peak in the year 1995 i.e. Rs.800 for each 1000 cocoon then with a lot of ups and down the prices rested at Rs.580 in 2005, which shows an annual increasing rate of 4.38% during the period of 1985-2005. Generally, Sualkuchi traders influence the price of reeling cocoon because of their monopoly in this trade. In order to regulate the price of cocoon for the convenience of rearers and reelers Government has started Raw Material Bank for purchase of Muga cocoons. In the sample area it was seen that the rearers sold their cocoon at Rs.520 in 2005 which was much lower than the prevailing market price.

3. Muga Wastes

The State produces about 25000 kg. of Muga wastes derived out of reeling operation. At present the price of wastes in the rearers house is Rs.90-120.These wastes are used in the sample villages for spinning yarn, while these wastes have a very high demand for blending with Eri or polyester fiber, out of which very high-quality fabric is produced.

Table: 1.10

Price Trend of Muga Silk Cocoon, Yarn and Fabrics (in Rs)

Year	Cocoons. (Per 000)	Yarn. (per kg.)	Mekhela/Chadar. (pair)
1991.00	350.00	2250.00	750.00
1992.00	400.00	2500.00	1000.00
1993.00	500.00	3000.00	1250.00
1994.00	750.00	4000.00	1500.00
1995.00	800.00	4500.00	2000.00
1996.00	750.00	4000.00	2000.00
1997.00	400.00	4500.00	2200.00
1998.00	450.00	4000.00	2200.00
1999.00	400.00	3000.00	2300.00
2000.00	450.00	3000.00	2400.00
2001.00	480.00	3600.00	2400.00

2002.00	550.00	3200.00	2800.00
2003.00	550.00	3600.00	2800.00
2004.00	580.00	3200.00	3200.00
2005.00	580.00	4400.00	3500.00

Source: (i) P.C Dutta (1998) Problems and Prospects of Muga Production, Assam. Agro Economic Research Centre for North-East India. Assam Agriculture University, Jorhat, pp.77. (ii) Indian Silk (2003), August; Indian Silk (2004), December; Indian Silk, (2005), December

4 Yarn

About one third of the total production of Muga cocoon in the State is reeled in Sualkuchi annually. Reeling is done by women on *Bhawari.* The price of Yarn was highest in the year 1997 i.e. Rs.4500 per kg while in the year 2005 it was Rs.4400 showing an annual growth rate of 6.37 per cent during the period of 1995-2005. In the sample household the price of yarn was found to be Rs.2800, which shows a huge difference between market prices and price received by the sample rearers.

5 Muga Fabric

Muga fabric is generally sold at per *than* of eleven meters × one meters. The price of a *than* varies from Rs.920 to 1200 according to quality. In the sample household the fabric is sold as *Mekhela* and *Sadar*. The prices vary from door to door and from village to village. The average price of a pair of *Mekhla Sadar* in sample household was Rs.1200 to 1600 in 2005. The market price of a pair of *Mekhla Sadar* in the year 2005 was Rs.3500 which shows a 24.454 per cent annual increasing rate of price during the period of 1995-2005 (Table: 1.10). Marketing of Muga fabric has not faced any difficulty in view of high internal demand.

Duplicate Muga yarn prepared from Tassar silk by furnishing Muga colour is gaining much popularity among the weavers of Sualkuchi. Due to lower price of Tassar silk and extensive use of the yarn, the weavers now are gaining more. Without having the durability as Muga yarn, extensive use of Tassar yarn for earning more profit, the wearers of Sualkuchi are cheating the consumer. The customers are not able to distinguish the blended Muga fabric from a pure one and unknowingly pay higher price for a low-quality product. Private traders export Muga fabric to other parts of the country by collecting the fabrics from Sualkuchi. Government marketing agency like the Assam Govt. Marketing Cooperation, the Assam Khadi and Gramado Board etc. are taking initiative to popularize Muga silk fabrics in other parts of the country through their show rooms and emporiums. The present production of Muga silk hardly meets the internal demand and hence it is yet to be enlisted as a foreign exchange earner. The decorative items, bed covers, cushion covers, the artful decoration and fineness of Muga and Eri fabrics have got adequate attention in foreign countries. Due to dominance of private traders in marketing Muga silk cocoons as well as fabrics, the actual producers are being exploited and do not get a reasonable price for their products.

6. Marketing of Eri Products

Assam alone produces 88 per cent of national Eri silk production and almost the entire output is consumed in the State itself. Till the end of the nineteenth century, there was a regular trade in Eri cocoon between this region and Calcutta and about 25,000 kilograms of Eri cocoon were exported to Europe. These cocoons were mainly collected from upper Assam. The Eri fabrics produced in upper Assam also were procured by traders in exchange of commodities and they were traded outside the state. Assam had a good trade relation with Bhutan. Records reveal that as early as seventy years back 2000 pieces of Eri cloth and Eri yarn valued at Rs. 43000 were exported to Bhutan annually (Chowdhuri, 1982). The substitution of Eri by mill made cloth from Europe led to the reduction in production and price of Eri fabric in Assam. After installation of spun silk mill in Europe towards the end of nineteen century the demand for Eri cocoon increased sharply. About 1.5 lakhs kilograms of cocoon were exported to these mills. But this trend did not last for long due to lack of organized market procurement as well as adulteration of cocoon by traders (Chowdhuri, 1982).

South Kamrup is the main spinning and wearing center for Eri cocoons. The wearers utilize a large

quantity of cocoon, mostly procured from the local weekly market, a sizeable quantity of cocoons come from Meghalaya as well. Cocoon is also available in the Bhutan fair. In upper Assam, the rearers utilize the cocoons for household use. A bulk of the cocoon was consumed by Jagi Road spun silk mill which was established in 1962; after closer of the mill, the Eri rearers were compelled to sell the cocoons at a through away price. Though the per kg Eri price has risen at rapid pace i.e. around Rs.25 in 1982 to Rs.500 of in the year 2005. The prices of Eri Yarn and Eri wrapper had increased from around Rs. 100 to Rs. 1200 and Rs. 150 to Rs. 1400 respectively during the same period (CSB – 2005). The traditional rearers are still receiving a very moderate price.

In the sample households it was observed that Eri was generally produced for own consumption. But the rearers sell their products if it is available. The average price of per Erisalsng in the sample household was Rs.580 with high price variance of 49.23. The price varies from rearer to rearer and village to village. This clearly indicates the underdeveloped nature of silk market in the State.

IV. TRENDS IN PRODUCTION OF MUGA AND ERI SILK

Assam continues to be the largest producer of Muga and Eri silk in the nation (Table: 1.11). During the period 1973-2002, the share of Assam both in Muga and Eri production was exclusively dominant i.e. 100 per cent in 1973, 98 per cent in 1991 and 96 per cent in 2000 in case of Muga Production and it was 95.6 per cent in 1973, 53.6 per cent in 1991 and 44.26 per cent in 2000 in case of Eri production. North Eastern state together produced 93 per cent of the total Eri production of India in1951-52 which declined to 70.08 per cent in 2000. During this period the total national production increased from 93 million tons to 682 million tones (Table: 1.11). The share of non-mulberry silk production clearly indicates the dominance of the state in Vanya Silk production. Table: 1.11 also shows the dominant nature of North East in Vanya Silk production. During 1950-51, the share of North Eastern states was 93 per cent in Eri production which increased to 100 per cent in 1972 and with little ups and down the share continued to be as high as 98 per cent in 1996. But in 1999-2000 it declined to 70.085 per cent. During this period production increased from 93 million tons to 682.5 million tones with an annual growth rate of 12.69.

Muga production of Assam increased from 0.58 lakh kg in 1938 to 0.91 lakh kg in 2002-2003 (Table: 1.13). This clearly indicates the stagnancy in Muga production over the past few decades. During 1938-2002, the Muga production in Assam grew only at the exponential rate of 0.38% per annum. Decade wise analysis of data reveals that there is a wide fluctuation in Muga production. During 1938-50 and 1971-80 the state experienced a negative growth rate. The maximum annual exponential growth rate was observed to be 4.18 per cent during 1961-1970. The last decade of twentieth century experienced an exponential growth rate of 2.53 percent per annum (Table: 1.14). Production reached its peak in 1957 i.e. 0.95 lakhs kg. In the very next year, it sharply decreased to 0.035 lakhs kg. Then with lots of fluctuation it reached at 0.91 lakhs kg in 2002-2003, (Table: 1.13 and Figure: 1.1)'

Table: 1.11
State Wise Production of Muga and Eri Silk

States	Production (in tonnes) 1973		Production (in tonnes) 1991		Production (in tonnes) 2000		Production (in tonnes) 2005	
	Muga	Eri	Muga	Eri	Muga	Eri	Muga	Eri
Assam	41	87	69	335	82	467	99	480
Arunachal	NA	NA	1	5	.2	8.25	1.388	3
Bihar	NA	3	NA	24	NA	NA	NA	22
Mizorum	NA	NA	NA	1	NA	NA	.45	NA
Meghlaya	NA	NA	NA	115	2.4	.3	4.45	22.3
Nagaland	NA	NA	NA	21	.017	28	3.25	28
West Bengal	NA	NA	NA	11	.08	NA	1.2	NA

Manipur	NA	NA	NA	109	NA	179	NA	462
Tripura	NA	1	NA	3	NA	NA	NA	NA
India	41	91	70	624	84.697	682.55	102	1316

Note: NA = Not available

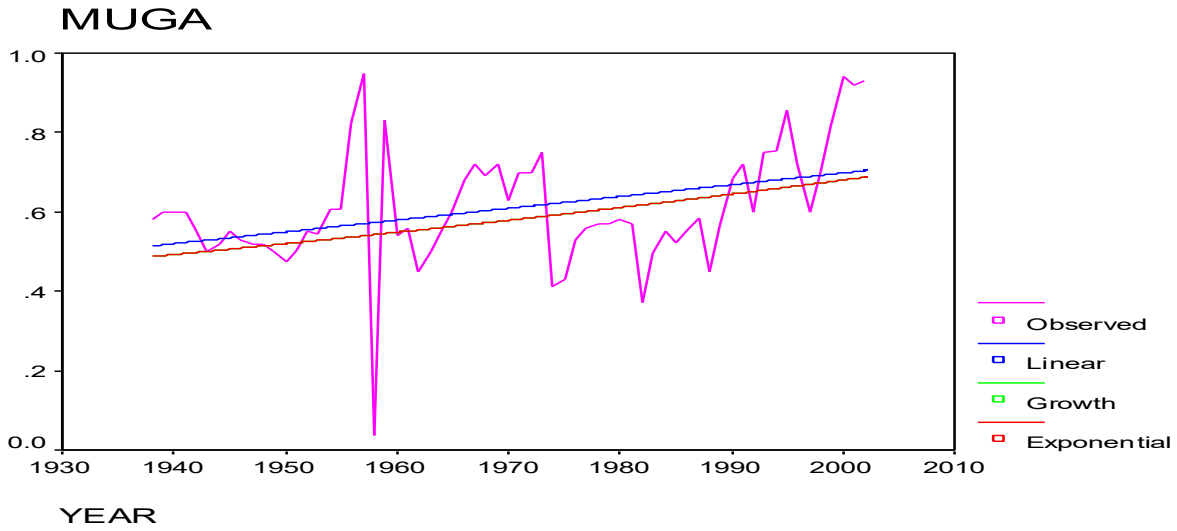
Source: (i) Regional Development Office, Central Silk Board, Guwahati. (ii) NEDFi, Databank Quarterly (2007)

The Eri raw silk production in the state increased from 100 MT in 1981 to 462 MT in 2002-2003 experiencing a 15.18% annual growth rate (Table: 1.15 and Table: 1.16). During the period 1991-2003 the state experienced an annual growth rate of 9.71 per cent in Eri silk production,. The exponential growth rate of Eri raw silk during 1980-2003 was 0.065 while it was 0.11 during the period of 1980-1990 and 0.065 during the period of 1991-2001 (Table: 1.16 and Figure: 1.2).

District -wise analysis (Table: 1.17) indicate that almost all district is involved in Sericulture activities. Table: 1.17 shows that Muga production was 0.557 lakhs kg in 1991 which increased to about .9148 lakhs kg in 2003 at an annual growth rate of 4.94 per cent.

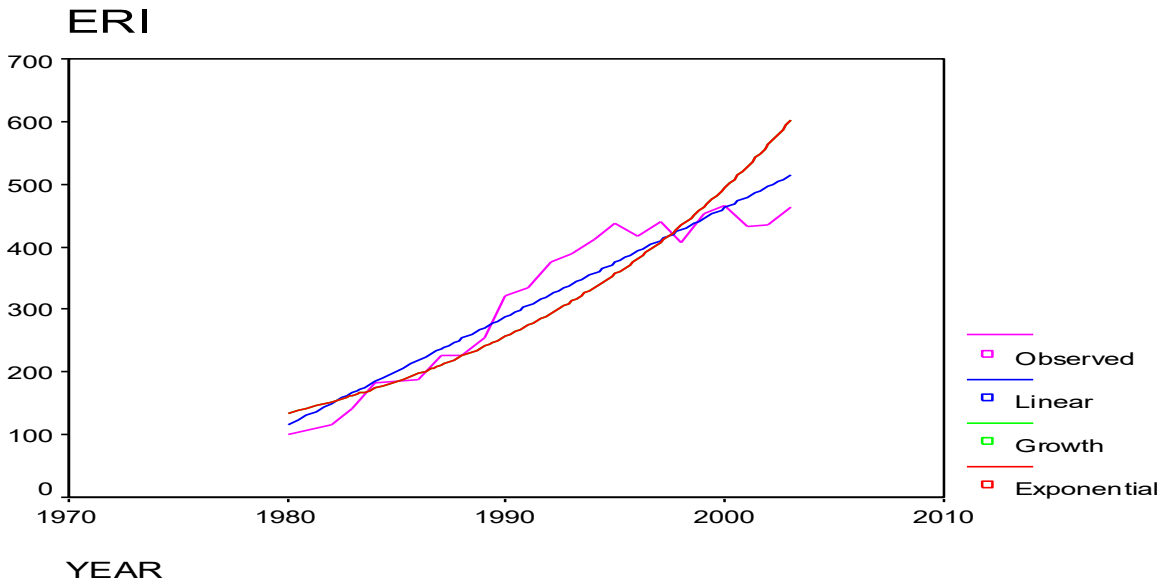
In the year 2003, highest number Muga was produced in N. Lakhimpur (18.97 per cent) district followed by Sibsagar, (17.17 per cent), Dibrugarh (16.8 per cent) and Dhemaji (9.36 per cent) districts. It was also observed that N. Lakhimpur and Dhemaji district together produced about 28 per cent of total Muga production in the state in the year 2003. Table: 3.18 shows that number of families involved in Eri production had increased marginally from 122572 to 132033 during 1991-2003.The number of families in Muga culture had decreased from 26757 to 23543 thereby showing a negative annual growth rate of -0.009 during the same period. In 2003, the highest number of family involved in Eri rearing was in Karbianglong district i.e. 14579 (11.04 per cent) followed by Jorhat i.e. 12061 (9.05 per cent), N. Lakhimpur i.e. 11932 (9.04per cent) and Dhemaji district i.e. 11833 (8.94 per cent) in 2003. In case of Muga growing family, highest number was involved in N. Lakhimpur district i.e. 6997 (29.73 per cent) followed by Jorhat 6540 (27.78 per cent), Dhemaji 3583 (15.22 per cent) and Sibsagar district 2162 (9.19per cent) in 2003. The Muga silk host plant was 1951.52 hectares in 1992 which increased to 5745 in 2002 at annual growth rate of 14.95 per cent while the Eri host plant increased to 5745.56 hectares from 1680.55 hectares with an annual growth rate of 18.6 during the same period (Table: 1.19).

Figure 1.1
Growth Rates of Muga Production (1938-2003)



Source: Table: 1.13

Figure: 1.2
Growth Rates of Eri Production (1980-2003)



Source: Table: 1.15

Table: 1.13
Muga Raw Silk Production in Assam (in lakh kg)

Year	Muga	Year	Muga	Year	Muga
1938	.58	1960	.54	1982	.57
1939	.60	1961	.56	1983	.37
1940	.60	1962	.45	1984	.50
1941	.60	1963	.50	1985	.55
1942	.55	1964	.55	1986	.52
1943	.50	1965	.60	1987	.55
1944	.52	1966	.68	1988	.58
1945	.55	1967	.72	1989	.45
1946	.53	1968	.69	1990	.57
1947	.52	1969	.72	1991	.69
1948	.52	1970	.63	1992	.72
1949	.50	1971	.70	1993	.60
1950	.48	1972	.70	1994	.75
1951	.50	1973	.75	1995	.75
1952	.55	1974	.41	1996	.86
1953	.54	1975	.43	1997	.72
1954	.61	1976	.53	1998	.60
1955	.61	1977	.56	1999	.70
1956	.82	1978	.57	2000	.82
1957	.83	1979	.57	2001	.94
1958	.83	1980	.58	2002	.92
1959	.83	1981	.54	2003	.93

Source: (i) S.N Chowdhuri, (1982), Muga silk Industry, pp-170. (ii) Government of Assam, Statistical Hand Book of Assam, (2002); (2003).

Table: 1.14
Decadal Exponential Growth of Muga Raw Silk

Year	a	t	b	t	R_2
1938-50	-.50	-17.41	-1.66	-4.56	.65
1951-60	-.59	-2.55	1.40	.38	.02
1961-70	-.74	-10.26	4.18	3.62	.62
1971-80	-.45	-3.29	-2.04	-.93	.09
1981-90	-.79	-7.67	2.68	1.62	.25
1991-2002	-.43	-5.10	2.58	2.02	.31
1930-2002	-.65	-12.32	.38	2.72	.11

Note: Modal, log P= a +bt, b = exponential growth rate, t = time
Source: Table: 1.13

Table: 1.15
Eri Raw Silk Production in Assam (1980-2003)

Year	Eri Raw Silk. (in MT)	Year	Eri Raw Silk. (in MT)
1980	100.00	1993.00	389
1982	116.00	1994.00	411
1983	142.00	1995.00	437
1984	182.00	1996.00	418
1986	187.00	1997.00	439
1987	226.00	1998.00	407
1988	226.00	1999.00	453
1989	256.00	2000.00	467
1990	321.00	2001.00	432
1991	335.00	2002.00	434
1992	375.00	2003.00	462

Source: Regional Office, Central Silk Board, Guwahati.
Table: 1.16
Exponential Growth Rate of Eri Silk

Year	Exponential. Growth Rate	Annual Growth Rate
1980-1990	.11	22.1
1991-2003	.028	9.07
1980-2003	.065	16.45

Source: Regional Office, Central Silk Board, Guwahati.

Table: 1.17
District wise Raw Silk Production in Assam (1991-2003)

District	Production (in lakh kgs) (in 1991)		Production (in lakh kgs) (in 1995)		Production (in lakh kgs) (in 2003)	
	Eri	Muga	Eri	Muga	Eri	Muga
Dhuburi	.067 (1.25)	0 (0)	.16 (2.59)	.0001 (.01)	1.282 (2.95)	0 (0)
Goalpara	.146. (2.73)	.005 (.9)	.069 (1.16)	.0384 (5.12)	.687 (1.58)	.0169 (1.85)
Kokurajhar	.3	0	.29	.0006	2.364	.0449

	(5.62)	(0)	(4.87)	(.08)	(5.44)	(4.91)
Barpeta	.189 (3.54)	.0005 (.09)	.192 (3.23)	.0025 (.33)	1.268 (2.92)	.0050 (.55)
Nalbari	.186 (3.48)	0 (0)	.923 (15.51)	0 (0)	1.264 (2.91)	.0008 (.87)
Kamrup	.176 (3.3)	.0713 (12.80)	.301 (5.06)	.0734 (9.79)	1.829 (4.21)	.0564 (6.17)
Darang	.24 (4.49)	.00007 (.01)	.288 (4.84)	.0001 (.01)	2.469 (5.69)	.0024 (.26)
Sonitpur	1.06 (19.85)	.002 (1.69)	.228 (3.83)	.0068 ((.91)	2.028 (4.67)	.0035 (.38)
Nagaon	.15 (2.81)	.0002 (.36)	.237 (3.98)	.0003 (.04)	2.305 (5.31)	.0049 (54)
Morigaon	.073 (1.37)	.00004 (.04)	.118 (1.98)	.0002 (.03)	.863 (1.99)	0 (0)
Golaghat	.17 (3.18)	.00942 (1.69)	.159 (2.67)	.027 (3.6)	1.557 (3.59)	.0420 (4.59)
Jorhut	.231 (4.33)	.0604 (10.84)	.241 (4.05)	.0051 (.68)	1.400 (3.22)	.0562 (6.14)
Sibsagar	.089 (1.67)	.1234 (22.15)	.284 (4.77)	.158 (15.86)	1.780 (4.1)	.1564 (17.1)
Dibrugarh	.157 (2.94)	.1433 (25.73)	.146 (2.45)	.0599 (7.99)	1.255 (2.89)	.1537 (16.8)
N.Lakhim pur	.15 (2.81)	.108 (19.39)	.299 (5.03)	.1933 (25.77)	1.705 (3.93)	.1682 (18.39)
Dhemaji	.073 (1.37)	NA	.098 (1.65)	.009 (1.2)	2.105 (4.85)	.875 (9.56)
Cachar	.228 (4.27)	.0000 (0)	.14 (2.35)	.001 (.13)	.575 (1.32)	.0009 (.01)
KarbiAngl ong	.394 (7.38)	.0003 (.05)	1.044 (17.55)	0 (0)	12.249 (28.21)	. 0006 (.6)
Karimganj	.045 (.84)	0 (0)	.073 (1.23)	.0003 (.04)	.02 (.05)	0 (0)
Bongaigao n	0 (0)	0 (0)	.12 (2.02)	.0012 (.16)	.448 (1.03)	.0024 (.26)
N.C Hills	.292 (5.470	0 (0)	.245 (4.12)	0 (0)	4.015 (9.26)	0 (0)
Tinchukia	0 (0)	.0316 (5.67)	.197 (3.31)	.0434 (5.79)	2.355 (5.42)	0.1116 (12.2)
Hailakandi	0 (0)	0 (0)	.073 (1.23)	.0001 (.01)	.004 (.01)	.0004 (.04)
Assam	5.34 (100)	.557 (100)	5.95 (100)	.75 (100)	43.42 (100)	.9148 (100)

Note: (i) Figure in the brackets indicates percentages, (ii) NA = Not available.

Source: (i) Hand Book of Assam Sericulture at A Glance (1993), (1995). (ii) Statistical Hand Book of Assam (2003), Govt. of Assam.

Table: 1.18
District-wise Involvement of Family in Sericulture in Assam

District	Family in 1993		Family in 1995		Family in 2003	
	Eri	Muga	Eri	Muga	Eri	Muga
Dhuburi	3499 (2.85)	0 (0)	3277 (2.54)	8 (.03)	2193 (1.66)	0 (0)
Goalpara	1870 (1.53)	495 (1.85)	1584 (3.56)	451 (1.54)	1161 (.88)	267 (1.13)
Kokurajhar	5109 (4.17)	0 (0)	6020 (4.65)	50 (.17)	7365 (5.58)	99 (.42)
Barpeta	6953 (5.67)	428 (1.6)	4418 (4.03)	428 (1.46)	3421 (2.59)	115 (.49)
Nalbari	5897 (4.81)	0 (0)	5767 (2.48)	7 (.02)	3889 (2.95)	26 (.11)
Kamrup	4532 (3.7)	2284 (8.54)	4995 (4.03)	2287 (7.8)	4484 (3.4)	863 (3.67)
Darang	4777 (3.9)	338 (1.26)	3075 (3.86)	341 (.23)	6552 (4.96)	110 (.47)
Sonitpur	4137 (3.38)	232 (.87)	4998 (2.55)	232 (.8)	6066 (4.59)	70 (.3)
Nagaon	6139 (5.01)	160 (.47)	4784 (4.58)	235 (.8)	9428 (7.14)	273 (1.16)
Morigaon	3377 (2.76)	124 (.6)	3158 (7.43)	172 (.59)	2687 (2.04)	15 (.06)
Golaghat	4951 (4.04)	1514 (5.66)	5676 (6.55)	1519 95.18)	9969 (7.55)	438 (1.86)
Jurhut	10025 (8.18)	2888 (10.29)	9210 (5.85)	2947 (10.05)	12061 (9.13)	6540 (27.78)
Sibsagar	3465 (2.83)	6598 (24.66)	8121 (8.14)	5639 (19.19)	7560 (5.73)	2162 (9.18)
Dibrugarh	8555 (6.98)	2482 (9.28)	7254 (5.11)	2486 (8.48)	5501 (4.17)	1212 (5.15)
N. Lakhimpur	8811 (7.19)	4025 (15.04)	10090.((8.14)	5135 (17.51)	11392 (9.04)	6999 (29.73)
Dhemaji	6128 (5)	4390 (16.41)	6338 (5.11)	4405 (15.02)	11833 (8.96)	3584 (15.22)
Cachar	2796 (2.28)	148 (.55)	3355 (2.71)	149 (.25)	2608 (1.98)	57 (.24)
KarbiAnglong	18811 (15.35)	7 (.03)	18543 (14.95)	17 (.06)	14579 (11.04)	24 (.1)
Karimganj	835 (.68)	58 (.22)	1092 (.88)	58 (.2)	497 (.38)	6 (.03)
Bongaigaon	1371 (1.12)	0 (0)	667 (.54)	49 (.17)	1604 (.38)	120 (.51)
N.C Hills	5034 (4.11)	8 (.03)	5735 (4.62)	22 (008)	5012 (3.8)	0 (0)

Tinchukia	4574 (3.73)	555 (2.07)	4353 (3.51)	556 (1.93)	1396 (1.06)	545 (2.31)
Hailakandi	958 (.06)	15 (.06)	514 (.41)	16 (.13)	235 (.18)	18 (.08)
Assam	122527 (100)	26757 (100)	124024 (100)	27209 (100)	132033 (100)	23543 (100)

Note: Figure in the brackets indicates percentages.
Source: (i) Sericulture at a Glance (1993); (1995). (ii) Statistical Hand Book of Assam (2003), Govt of Assam.

Table: 1.19
Availability of Silk host Plant Area in Assam (1992-2002)

Year	Muga. (in hectres)	Eri. (in hectres)	Mulberry. (in hectres)
1992	1951.52	2103.64	1680.55
1993	2098.63	2325.06	1748.88
1994	2302.36	2574.45	1950.17
1995	2624.25	2993.07	2267.42
1996	2986.07	3489.02	2616.304
1997	3278.90	3792.55	2888.72
1998	3523.14	4042.63	3217.32
1999	3915.86	4312.61	3354.31
2000	4418.034	4978.31	3596.241
2001	5007.24	5694.38	3921.46
2002	5745.00	6317.46	5745.56

Source: Directorate of Sericulture, Government of Assam.

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