CHAPTER I

INTRODUCTION

The origin and history of sericulture is indeed very old and is a miracle of early industrial development. Legendary proof testify a clue that a Chinese Express Xi-Ling-Shi was at the root of the discovery of natural silk in the year 2640 B.C. i.e. during the reign of Emperor Chin Shih Huang Ti (Chowdhury, 1992). Ever since, sericulture remained a hidden treasure of China for thousands of years because death penalty was the lawful step meted to the exporters of silk in China during that time. The art of sericulture consequently was smuggled out to Europe by two European monks carrying the silkworm eggs and mulberry seeds in their walking sticks. Marco Polo, the renowned traveller from the West, came through the Silk Road to the South-East Asian countries, the longest commercial route of the ancient world (Chowdhury, 1970, 1984). Marco Polo also described clearly in his book "il Millione" about the silk trade in China and its export to Europe via the Silk Road (map 1.1). Thus, sericulture became wide spread over the continents.

Sericulture is deemed to be an agro based cottage industry per excellence, the main end product being the raw silk. This natural raw silk is the most precious textile fibre produced by the silkgland of silkworm. Diversified textile luxuries and classed goods are produced from silk. The superiority of silk fabric as textile product has been recognised since time immemorial and even today no other fabric can match its lustre, softness and exquisite natural colour. In fact,
Legend to the silk route (Road) of ancient world

Han Emperor Wu Ti (Di) opened the "Silk Road" in 138-118 BC and led from Xian in Shanxi province through Lanchou to Dun Huang, where it divided into two. The Northern Road passed through Turfan crossed the Pamir Mountains and led to Ferghana and to Kazhakh Steppe, the Southern road went past lake Lop Nor, along the Southern edge of Taklamakan desert, through Yarkhand and across the Pamir Mountains (in the Northern part) continuing to Batrica and from there to Parthia, India and the near East to Antioch (Antakya of modern Turkey), Parthia had the trade route of one thousand miles long. The "Silk Road" later changed its route. Numerous sub-routes branched off, thus establishing trade links between neighbouring countries like North Western and Eastern India with China and Central Asia—upto the Constantinople—then melting point of East and West.

During the Ming dynasty (1368-1644), the "Silk Road" was virtually abandoned.

[Source: Silk and Sericulture, Dr. S.N. Chowdhury, 1992, Directorate of Sericulture, Govt. of Assam]
1.1 SILK ROUTE (ROAD) OF ANCIENT WORLD

NOT TO SCALE

LENGTH OF THE ROUTE: SIX THOUSAND MILES (APPROXIMATELY)

POSITION OF MODERN ASSAM IN THE ANCIENT WORLD:
sericulture is a well developed science on the one hand and a fine art on the other, which involves many phases of operation, namely, food, plant cultivation, silkworm rearing and other post cocoon processing such as silk reeling, twisting, dyeing, weaving, printing and finishing.

In the global scenario, the present day sericulture industry is facing a very important challenge from the nylon and other synthetic fibres. In comparison to synthetic fibres, the natural silk fibres have certain drawbacks. The drawbacks of raw silk yarn are its inconsistency in size, lousiness (split fibres) and presence of knots (Aruga, 1994). The nylon and other synthetic fibres do not have such defects. However, natural silk has its own special charm. In comparison to synthetic fibres natural silk has greater affinity for various dyes and high hygroscopicity. Higher affinity for various dyes facilitates the diversification of finished textile products and high hygroscopicity offers comfortable wearing both in summer and winter seasons. Moreover, raw silk fibres are always superior to synthetic fibres because of its lustre, exquisite natural colour, softness and fineness. As such, mankind has always adored silk and will continue to highlight it in the future and that is the basis of sericulture industry, its potentiality and prospects for future development.

1.1 Present status of world silk industry

At present, 58 countries all over the world are actually engaged in various sericultural activities (Table 1.1, map 1.2). China
TABLE 1.1 Sericulture Countries

1. Afghanistan  
2. Algeria  
3. Argentina  
4. Bangladesh  
5. Bhutan  
6. Brazil  
7. Bulgaria  
8. Burma  
9. Chile  
10. China  
11. Columbia  
12. Congo  
13. Egypt  
14. Ethiopia  
15. France  
16. Ghana  
17. Greece  
18. Hungary  
19. India  
20. Indonesia  
21. Iran  
22. Italy  
23. Ivory Coast  
24. Japan  
25. Kenya  
26. Korea (North)  
27. Korea (South)  
28. Laos  
29. Lebanon  
30. Madagascar  
31. Malaysia  
32. Mauritius  
33. Mexico  
34. Morocco  
35. Nepal  
36. Nigeria  
37. Pakistan  
38. Papua New Guinea  
39. Paraguay  
40. PRK  
41. Peru  
42. Philippines  
43. Poland  
44. Romania  
45. Spain  
46. Sri Lanka  
47. Syria  
48. Tanzania  
49. Thailand  
50. Tunisia  
51. Turkey  
52. Uganda  
53. U.S.S.R.  
54. Venezuela  
55. Vietnam  
56. Yugoslavia  
57. Zambia  
58. Zimbabwe
12 SERICULTURAL MAP OF WORLD

DISTRIBUTION OF WILD MUGA SILKMOTH 🐣
A. INDONESIA: SUMATRA, BORNEO
B. INDIA: NORTH-EAST INDIA
C. BANGLADESH: SYLHET
D. NORTH BURMA

19 INDIA
20 INDONESIA
21 IRAN
22 ITALY
23 IVORY COAST
24 JAPAN
25 KENYA
26 KOREA (NORTH)
27 KOREA (SOUTH)
28 LAOS
29 LEBANON
30 MADAGASCAR
31 MALAYSIA
32 MAURITIUS
33 MEXICO
34 MOROCCO
35 NEPAL
36 NIGERIA
37 PAKISTAN
38 PAPUA NEW GUINEA
39 PARAGUAY
40 PERU
41 PHILIPPINES
42 POLAND
43 ROMANIA
44 SPAIN
45 SYRIA
46 TANZANIA
47 THAILAND
48 TUNISIA
49 TURKEY
50 UGANDA
51 USSR
52 VENEZUELA
53 VIETNAM
54 YUGOSLAVIA
55 ZAMBIA
56 ZIMBABWE
maintains its glorious first position in mulberry raw silk production, while India superseded Japan in this regard and occupied prestigious second position in 1987. The other three top mulberry raw silk producing countries in order of higher production are U.S.S.R., Republic of Korea and Brazil.

Sericulture is providing ample employment opportunities to the labour force in the under-developed and developing countries. Owing to this over 25 countries in Asia, Africa and South Africa are at present taking keen interest in the development of sericulture. In contrast to this, a reverse trend can be observed in the industrially and economically developed countries like France, Italy, Spain, Japan and South Korea, which were once major silk producing countries in the world. But demand for raw silk and silk finished products is in fact increasing day by day in the developed countries, due to the excellent features of the natural silk in comparison to the synthetic fibres as mentioned earlier. This growing trend of the world silk industry has opened up new vistas for flow of fund from industrially developed countries to the labour-rich underdeveloped and developing countries. But to take the advantage of the present trend of world silk industry the underdeveloped and developing countries have to improve the quality of their raw silk and silk finished products. In addition to low paid rural labour force, the third world countries have favourable weather conditions, unpolluted natural environment and ever important bio-diversity which can be fully exploited in the improvement of silkworm strains and its food plant species through genetic upgradation and breeding.
Despite these tremendous prospects and potentialities for development of sericulture industry in the third world countries, sericulture remained an age-old cottage industry due to lack of research and development. As a consequence, they could not improve the quality of raw silk and finished goods through technological evolution and modernization. Certain technologically developed countries like Italy, France, Switzerland, Federal Republic of Germany, Britain and South Korea are regularly importing raw silk from developing countries for their silk processing industries and capturing a world market by producing classic and quality finished products. It is worth-mentioning that in the past few years some sort of "silk-craze" has been developed world-wide among the consumers and this has encouraged the third world countries to develop sericulture.

Among the developing countries, India and Thailand have made positive efforts in developing technologies for manufacturing classic and quality silk products, which has obviously enhanced their export potential. According to U.N. experts, the world raw silk production will continue to increase in the years to come. We may conclude from the above facts that the future prospect of world silk industry is very bright.

1.2 Present status of Indian silk industry

In the global textile parlance the term "silk" refers to the silk of mulberry origin, as the bulk of world silk production —
constituting 95 per cent is mulberry silk (Ullal and Narasimhana, 1987). But silk in India customerily refers to four varieties of silk, namely, mulberry tasar, eri and muga. Thus, India has the unique distinction of being the only country in the world, which is producing all these four varieties of silk commercially.

The origin of sericulture in India, however, was lost in antiquity. Traces of tasar silk fabric tied around an urn had been found in Maharastra, believed to have been buried four thousand years ago (Chowdhury, 1985). According to some historians, raw silk was exported from India to Rome during the reign of Kaniska in 58 B.C. (Sampath, 1992). Some others believe that the art of sericulture had its origin in South-East Asia or even in the Himalayan foot hills where the eco-climatic conditions are more congenial for proper growth and development of silkworms and its food plants (Chowdhury, 1985). Even today, diverse forms of silkworm races are found in the Himalayan foot hills and North-East Region of India (Gogoi and Goswami, 1995a, '96c). Moreover, the vernacular name applied to the various silkworm races which are found in the legend and literature, fable and folklore of India, indicates that the introduction of sericulture might have taken place at some remote period. Thus, it is evident from the above facts that India has its own history of sericulture. In its long history Indian sericulture has passed through ages of ups and downs known from its great prosperity as well as adversity.

Though efforts were made to patronise silk culture in India, in the 18th, 19th and early past of the 20th century by the Britishers
when the sericulture suffered a serious set-backs, during that period it started to revive back to the path of prosperity after the world war II is over in 1945. Thus the sericulture industry of India, which had a glorious historical past once again entered a new golden era. India has made thereafter rapid progress in production of raw silk and diversified finished goods during the last two decades. India is now poised for a great leap forward in the sericultural development with its rich silkworm and food plant bio-diversity backed by congenial eco-climatic conditions and much needed low-cost labour resources.

Silk is the way of life for the Indian people. It has become inseparable part of Indian culture, tradition and economy over thousands of years. In the social and religious occasions silk apparels are used, particularly by the woman-folk. The fine quality Indian finished silk products are well-known world wide. The following are some of the Indian silk goods having international reputation — the expertly designed brocades of Varanasi, the luxurious crepes, georgettes and chiffons of Karnataka, the tie and dye craft of Andhra Pradesh, Gujarat and Orissa, the delicate silks of Kashmir, pure brilliant fabrics of Bandej, temple silks of Kancheepuram, strong and glittering golden yellow muga silk and warm and comfortable eri silk clothes of Assam. The development of modern printing textile technology has created new dimensions for diversification of Indian silk products. These printed silk goods have increased the market demand for the bulk of Indian export along with the masterly designed traditional handloom products.
At present, 23 Indian states are involved in the production of silk (Table 1.2, map 1.3). Among these, Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir are traditional and others are non-traditional sericultural states. Prospects of introduction of sericulture in the newer regions are being studied and surveyed by the Central Silk Board and introduction of sericulture in certain areas has already been started on pilot basis. Indian sericulture is distributed both in temperate and tropical zones. Temperate sericulture is limited to Kashmir, sub-Himalayan and other hilly regions. The rest of India practises tropical sericulture. In the temperate region, sericulture can be practised only once in a year i.e., during spring season but in tropical region sericulture can be practised throughout the year.

Sericulture is an ideal enterprise in India because of quick and high returns with minimum investment which fits well into the Indian socio-economic structure. In the recent times, economists and scientific community working on sericulture, have highly recommended to the planners, policy makers and administrator in India to reorganise sericulture in the most effective way for rural reconstruction and progress and prosperity of the rural society. Once, sericulture was considered to be a subsidiary occupation in India. But this notion has been changed and today it is considered to be the most remunerative vocation as reflected from the increased acreage of food plant cultivation and higher raw silk production every year (Table 1.3). This has been made possible through the development and introduction of new technology in all the phases of sericultural activities. It is
### TABLE 1.2 Sericulture States of India

<table>
<thead>
<tr>
<th>State</th>
<th>Type of culture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-mulberry</td>
</tr>
<tr>
<td></td>
<td>Muga</td>
</tr>
<tr>
<td>1. Andhra Pradesh</td>
<td>-</td>
</tr>
<tr>
<td>2. Arunachal Pradesh</td>
<td>+</td>
</tr>
<tr>
<td>2. Assam</td>
<td>+</td>
</tr>
<tr>
<td>4. Bihar</td>
<td>-</td>
</tr>
<tr>
<td>5. Himachal Pradesh</td>
<td>-</td>
</tr>
<tr>
<td>6. Jammu &amp; Kashmir</td>
<td>-</td>
</tr>
<tr>
<td>7. Karnataka</td>
<td>-</td>
</tr>
<tr>
<td>8. Maharashtra</td>
<td>-</td>
</tr>
<tr>
<td>9. Manipur</td>
<td>-</td>
</tr>
<tr>
<td>10. Madhya Pradesh</td>
<td>-</td>
</tr>
<tr>
<td>11. Mizoram</td>
<td>+</td>
</tr>
<tr>
<td>12. Meghalaya</td>
<td>+</td>
</tr>
<tr>
<td>13. Nagaland</td>
<td>+</td>
</tr>
<tr>
<td>14. Orissa</td>
<td>-</td>
</tr>
<tr>
<td>15. Punjab</td>
<td>-</td>
</tr>
<tr>
<td>16. Tamil Nadu</td>
<td>-</td>
</tr>
<tr>
<td>17. Tripura</td>
<td>-</td>
</tr>
<tr>
<td>18. Uttar Pradesh</td>
<td>+</td>
</tr>
<tr>
<td>19. West Bengal</td>
<td>+</td>
</tr>
<tr>
<td>20. Rajasthan</td>
<td>-</td>
</tr>
<tr>
<td>21. Gujarat</td>
<td>-</td>
</tr>
<tr>
<td>22. Kerela</td>
<td>-</td>
</tr>
<tr>
<td>23. Sikkim</td>
<td>-</td>
</tr>
</tbody>
</table>

*Introduced recently*
## TABLE 1.3 Production of Raw Silk in India (tones)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mulberry</th>
<th>Non-Mulberry</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Tasar</td>
<td>Eri</td>
<td>Muga</td>
</tr>
<tr>
<td>Year</td>
<td>Mulberry</td>
<td>Non-Mulberry</td>
<td>Grand Total</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1971-72</td>
<td>2046</td>
<td>314</td>
<td>168</td>
</tr>
<tr>
<td>1972-73</td>
<td>2215</td>
<td>361</td>
<td>143</td>
</tr>
<tr>
<td>1973-74</td>
<td>2421</td>
<td>257</td>
<td>141</td>
</tr>
<tr>
<td>1974-75</td>
<td>2434</td>
<td>402</td>
<td>115</td>
</tr>
<tr>
<td>1975-76</td>
<td>2541</td>
<td>360</td>
<td>123</td>
</tr>
<tr>
<td>1976-77</td>
<td>2686</td>
<td>423</td>
<td>106</td>
</tr>
<tr>
<td>1977-78</td>
<td>3186</td>
<td>434</td>
<td>56</td>
</tr>
<tr>
<td>1978-79</td>
<td>3752</td>
<td>281</td>
<td>120</td>
</tr>
<tr>
<td>1979-80</td>
<td>4193</td>
<td>384</td>
<td>183</td>
</tr>
<tr>
<td>1980-81</td>
<td>4593</td>
<td>265</td>
<td>135</td>
</tr>
<tr>
<td>1981-82</td>
<td>4801</td>
<td>257</td>
<td>147</td>
</tr>
<tr>
<td>1982-83</td>
<td>5214</td>
<td>284</td>
<td>213</td>
</tr>
<tr>
<td>1983-84</td>
<td>5681</td>
<td>418</td>
<td>270</td>
</tr>
<tr>
<td>1984-85</td>
<td>6895</td>
<td>444</td>
<td>279</td>
</tr>
<tr>
<td>1985-86</td>
<td>7029</td>
<td>464</td>
<td>352</td>
</tr>
<tr>
<td>1986-87</td>
<td>7905</td>
<td>548</td>
<td>392</td>
</tr>
<tr>
<td>1987-88</td>
<td>8455</td>
<td>463</td>
<td>522</td>
</tr>
<tr>
<td>1988-89</td>
<td>9683</td>
<td>358</td>
<td>565</td>
</tr>
<tr>
<td>1989-90</td>
<td>10905</td>
<td>465</td>
<td>589</td>
</tr>
<tr>
<td>1990-91</td>
<td>11487</td>
<td>484</td>
<td>624</td>
</tr>
<tr>
<td>1991-92</td>
<td>N.A.</td>
<td>329</td>
<td>704</td>
</tr>
<tr>
<td>1992-93</td>
<td>N.A.</td>
<td>382</td>
<td>726</td>
</tr>
<tr>
<td>1993-94</td>
<td>N.S.</td>
<td>299</td>
<td>766</td>
</tr>
<tr>
<td>1994-95</td>
<td>13913</td>
<td>257</td>
<td>800</td>
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<tr>
<td>1995-96</td>
<td>12884</td>
<td>194</td>
<td>745</td>
</tr>
<tr>
<td>1996-97</td>
<td>12927</td>
<td>231</td>
<td>861</td>
</tr>
</tbody>
</table>

Source: Central Silk Board
N.A. = Not available
note-worthy that an ambitious multipurpose National Sericulture Project has been launched by the Government of India in 1989-90, the main objective of which is to upgrade the quality of Indian silk and to increase the quantity of raw silk production to the level of 15,000 tonnes by 1994-95 through Research and Development.

The infra-structural facilities in India for silk reeling, throwing, twisting and weaving are made available. Silk reeling in India is done in charkhas, cottage basins and filatures. Silk weaving is mainly undertaken on handlooms. About 65 percent of Indian silk is woven on handlooms, 30 per cent on traditional powerlooms and the rest 5 per cent is woven on modern silk weaving factories. A total ten spun silk mills are there in India for production of spun silk yarn from silkwastes. Three of them, namely, Channapatna (Karnataka), Jagi Road (Assam) and Bhagolpur (Bihar) are under public sector and the remaining seven are under private sector. Major silk printing centres are located in Bombay, Varanasi, Delhi and Bangalore. India exports diversified sericultural products to the traditional and non-traditional markets.

About 90 per cent of the country's total mulberry raw silk production comes from the traditional states. The rest is produced in the non-traditional states, namely, Assam, Bihar, Gujarat, Himachal Pradesh, Kerela, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan and Uttar Pradesh. The major tasar raw silk producing states are Bihar, Orissa, Madhya Pradesh, Andhra Pradesh, West Bengal while minor amount of tasar raw silk is also produced by Maharashtra and Uttar Pradesh.
Pradesh. Major states of eri raw silk productions are Assam, Meghalaya, Manipur and Bihar, while Arunachal Pradesh, Mizoram, Tripura, Nagaland and Orissa are also producing on a small scale. Manipur, Nagaland, Mizoram, Arunachal Pradesh, Himachal Pradesh, Uttar Pradesh, Assam, Meghalaya and Jammu and Kashmir are producing oak tasar silk.

The mulberry silk is produced by domesticated *Bombyx mori* L. which is an univoltine, bivoltine, multivoltine, monophagous insect. Two local races of mulberry silkworm namely, *Bombyx texor* (Borpat) and *Bombyx fortunatus* (Sarupat), are also found in Assam (Borthakur, 1992). A wild mulberry silkworm (*Bombyx religiosa*) is found in Assam and another wild type *Bombyx madarina* is found in China and Japan (Gogoi, 1980). Mulberry silkworms feed on leaves of *Morus* species only. The tasar silk is produced by *Antheraea mylitta* Drury and *Antheraea proylei*, the tropical and temperate tasar silkworm respectively. The main food plants of tasar silkworms are *Terminalia tomentosa*, *Terminalia arjuna* and *Shorea robusta*. A wild counterpart of tasar silkworm has been collected by us (Gogoi and Goswami, 1997) recently from *Melastoma melabathricum*. The eri silk is produced by eri silkworm *Philosamia ricini* whereas its wild counterpart is called *Philosamia cynthia* which is also found in Assam. Eri silkworm mainly feeds on *Ricinus communis*, *Heteropanax fragrans*, *Ailanthus glandulosa*, *Manihot utilissima* etc. *Philosamia cynthia* was also exclusively collected from *Mighloti* (*Litsaea salicifolia* Roxb.) plants (Gogoi and Goswami, 1998b), Eri silk unlike others is a spun silk.
1.3 Muga culture of Assam

Among all the four silk varieties, golden yellow muga silk is the most elegant, strong and durable which is indigenous to the North-Eastern Region in general and Assam in particular (map 1.4). Muga silkworm (*Antheraea assama* Westwood, family — Saturniidae) is exclusively endemic to the North-Eastern Region of India possibly because of the congenial eco-climatic conditions prevalent around its natural habitat. Muga culture is thus a traditional avocation of the Assamese people, constituting an inseparable component of their socio-economic life and cultural heritage for centuries together.

The muga silkworm is polyphagous and feeds on the leaves of several kinds of tree species, which are abundantly found in the natural habitat of the region. The muga food plants are also classified into primary, secondary and tertiary types, depending upon the various qualitative and quantitative aspects of the plants and feeding behaviour of the insects in relation to the ultimate production of quality silk fibre. Som (*Machilus bombycina* King) and Soalu (*Litsaea polyantha* Juss) are used as primary food plants. Secondary food plants of muga silkworms are Dighloti (*Litsaea salicifolia* Roseb), Mejankari (*Litsaea citrata* Blume), Chapa (*Magnolia sphenocarpa* Panchapa (*Michelia oblonga*), Titachapa (*Michelia champaka*), Patichanda (*Actinodaphne obovata* Blume). The tertiary food plants are namely Bogori (*Zigyphus jujuba* Mill), Bhomtoli (*Celastrus monosperma* Hook), Bajramani (*Xanthoxylon rhesta* DC), Gomari (*Gmelina arborea* Roxb.) Kotholua (*Cyclicodaphne nitida* Hook.f.), Gonsoroi (*Cinnamomum glanduliferum* Meissn), and Tejpat (*Cinnamomum tamala*).
The *Antheraea assama* Westwood is multivoltine and, therefore, rearing is conducted around the year to maintain the continuity for seed production. The semi-domesticated muga silkworms are reared outdoor and rearing can be done in six broods in a year. The different broods are Jethua or Spring (April/May), Aherua or summer (June/July), Bhodia or late summer (August/September), Kotia or Autumn (October/November), Aghonia or late Autumn (November/December) and Jarua or Winter (January/February/March). The Jethua and Kotia are commercial broods and the other four are the seed broods. Traditionally seed cocoons are produced in Lower Assam and the commercial cocoons are raised in Upper Assam. The reeling cocoons produced in Upper Assam are transported to Sualkuchi in the Kamrup district for reeling of muga silk yarn and weaving of various kinds of golden, yellow muga silk fabrics.

Muga culture is mainly confined to the State of Assam which produce 95% of the total muga raw silk. In addition to Assam, except Manipur and Tripura other four states of North-Eastern Region i.e. Meghalaya, Arunachal Pradesh, Nagaland and Mizoram are also involved in muga culture. However, muga culture has been recently introduced into the Coochbehar district of West Bengal where Soalu plants (*Litsaea polyantha* Juss) are found to have grown abundantly in the natural state. A research extension centre has been established there in May 1988 under the Regional Muga Research Station at Boko, Assam, to study the prospects of muga culture in this new zone. It has been established that muga culture in this new zone is quite promising (B.B. Singha, 1991). Though the commercial muga culture is mainly confined
to the North Eastern region of India the muga silkmoth (*Antheraea assama* Westwood) is also distributed in the other Indian states such as Himachal Pradesh, Uttar Pradesh, Sikkim, Gujarat, Pondicherry and Sylhet in Bangladesh, Sumatra, Borneo of Indonesia (G.S. Arora & I.J. Gupta, 1979) and Mungaur of North Burma (L. Gogoi, 1961).

The muga silk cloth can be nominated to be called the "King of the fabric" due to its strongness, durability, exquisite and elegant lustrous natural golden colour (Gogoi and Goswami, 1998a) Muga silk is strongest of all the natural silks. Tenacity of RMRS-VI reeled yarn of muga silk in 5.201 g/d (S.K. Sengupta et al., 1991) that of eri silk is 3-3.50 g/d; machine reeled tropical tasar silk is 1.8-2.562 g/d, oak tasar is 2.8-3.0 g/d (S.K. Majhi et al. 1991) and machine reeled mulberry silk is 3.8-4.1 g/d (T.N. Sonwalkar, 1991). Tenacity of muga silk fibre can be further increased if muga reeling technology can be improved through automation and modernization. The oak tasar is finer than the tropical tasar (10 denier). Muga silk is as fine as oak tasar (4 denier). Eri silk is the finest 2.2-2.5 denier among non-mulberry silks (S.K. Majhi et al. 1991). The filament denier of bivoltine mulberry silk is 2.30 and multivoltine ranges from 2.40-2.46 (T.N. Sanwalkar, 1991). Moisture regain capacity of muga silk is the highest i.e. 30% (S.N. Chowdhary 1992) followed by 13 per cent in eri, 12 per cent in tasar and 11 per cent in mulberry fibre (Neeru Saluja et al. 1993). Due to the highest tenacity, muga silk is the strongest and most durable among the natural silks. Muga silk fibre also has the highest hygroscopicity as mentioned above and therefore, muga silk cloth is comfortable to wear and hygenic. There is a traditional
belief amongst the Assamese people that muga silk cloth improve the quality of the skin and even can cure certain skin diseases. Due to this belief Assamese women are fond of muga silk cloth as a measure of beauty care. The scientific validity of the belief can be explained in this way that muga silk cloth due to its high hygroscopicity keep the skin dry by absorbing moisture thereby inhibiting the fungal and bacerial growth responsible for skin diseases. Other notable qualities of muga silk fibre are highly bad-conductor of electricity, easily blendable with Ramie, cotton and polyester. Moreover, muga silk can retain its crystallinity, bad conductivity, hardness, golden yellow colour and other qualities upto a temperature of 200°C. Many physical change of muga silk fibre has been observed when it is dropped in iodine and florin (M.N. Bora, 1993). Therefore, muga silk fibre has opened up a new vista in various modern technology development in addition to its use as the best textile fibre.

Despite tremendous potentialities for developing a monoply market of muga silk yarn and fabric in and outside India, muga silk production could not be increased even to meet the demand of the local people. Science & Technology has enormously progressed but it could not back up the centuries old muga silk industry to transform it into a scientifically organised sector like mulberry industry. It still remained as a rural based, out-dated, premitive cottage industry. The price of the muga cloth is increasing as sky rocketing and is far beyond the reach and purchasing power of the common man. The age-old muga silk industry is deteriorating due to many factors. Different species of muga host plants and their various morphotypes are quickly
depleting from the scene, some are endangered and some others have already become extinct due to environmental degradations. The environmental pollutions of tea, petroleum, cement, coal and fertilizer industries have caused tremendous damage to the rich mugacogenous flora and fauna of Assam (B. Gogoi & B.C. Goswami, 1998a). The ever important wild races of muga silkworm are no more available which were once abundantly found in the foot hills of North Eastern Region and elsewhere. Muga silkworm and its consumption of various food plants biosynthetically leads to the ultimate production of golden yellow muga silk fibre that are unique wealth of the world. It needs affectionate care, protection and conservation for its fullest utilization as the best natural textile fibre in the years to come by transforming the muga culture into a scientifically organized sector like mulberry silk industry.

1.4 Origin and history of muga culture

The origin and subsequent evolution of muga culture cannot be traced with any amount of certainty. However, muga silkworm is believed to be originated in the ancient past in the sub-Himalayan region of North-Eastern Region of India (A.N. Sarkar, 1993). Some other authors, however, believe that muga culture was initially originated in Manipur and later on it was extended in the Border areas of Arunachal Pradesh, Nagaland and Assam (P. Baishya, 1991). Some authors are of the opinion that the Ahom kings introduced muga culture into Assam (S.N. Chowdhury, 1987). Lila Gogoi has written very convincingly in his book "Tai Sanskritir Ruprekha," 1961 that the Ahom
kings introduced muga culture into Assam from Mungaur, a Shan State of North Burma. The word "muga", very likely have originated after the native name of the place Mungaur from where the muga cocoons were probably collected. Scientific validity of this opinion may be proved in two ways. Firstly, muga culture is confined to the Ahom community particularly in Upper Assam and Ahoms are well aquinted with the muga culture. Secondly, there is no genetic variability in muga silkworm race like other exotic breeds of animals. The wild muga silkworm found in the region is quite similar to the domesticated one. After introduction of the muga silkworm it might have gradually adapted to the local conditions here and started feeding on various food plants available in the new environment. The wild muga counterparts (variant) might have subsequently originated from the domesticated one. Unlike muga silkworm, eri and mulberry silkworm which are indigenous to Assam and being cultured since time immemorial have many genetic variability.

Development of sericulture in general and muga culture in particular was actually started under the patronage of the Ahom kings in Assam. Silkworm rearing, reeling and weaving were made compulsory for every household during that time. Special incentives were given to the people who produced silk. Silkworm rearers were exempted from payment of land revenue. During the reign of Swargadeo Pratap Singha (1603-1641) a separate Sericulture Department was created and Mumai Tamuli Borboruah was entrusted to look after the Department. During that time seed cocoon production, commercial cocoon production and reeling and weaving zones were well demarcated. Aherua and Bhodia seed broods were reared chiefly in the district of Kamrup
and the seeds of these two broods were sent to Upper Assam for rearing of Kotia commercial brood. Kotia, Jarua and Jethua broods were reared in Darrang and Sibsagar district. In Lakhimpur district only Jarua and Jethua crops were reared. Reeling and weaving sector was especially established in Sualkuchi in Kamrup district (B.C. Allen 1899). In those days muga silkworm seed channelization was unidirectional, i.e. seed cocoons were prepared invariably in the hilly tracts bordering lower Assam and the reeling cocoons were produced in the Upper Assam.

The weavers of the Ahom kingdom had good reputation and they were employed to supply dress for the Royal family and nobleman. Muga silk yarn was used to prepare various costumes of different designs. A special muga silk was prepared in those days by feeding muga silkworm on 'mejankari' or 'chapa' leaves, which had unique characteristics like glossyness and creamy white character. Mejankari muga silk yarn was used to prepare royal dress for king. This unique mejankari culture no longer exists and its cultural operation has been completely vanished forever.

The first official description related to muga culture has been traced in 1662 which was written by famous English traveller Jean Joseph Taverniar (c.f. S.N. Chowdhury 1981). The first scientific study of muga silk moth was made by Helfer in 1837 (c.f. G.S. Arora & I.J. Gupta, 1979). The glorious muga culture which had flourished fully during the reign of Ahom kings gradually started declining with the invasion of Britishers into Assam. The period of British domination in Assam can be called as the "dark age" for muga culture.
Instead of patronizing this age old muga culture, the British administration introduced disincentive by imposing taxation on som plantations abundant during that time with a motive to earn revenue. As a consequence thousands of som plants had been cut down by the rearers for fear of paying tax. Another reason for this taxation was to clear the lands for the expansion of the tea plantations in place of muga food plants. However, some wise and enthusiastic Britishers tried to develop the muga silk industry but failed to do so. Since then this unique muga culture somehow survived and was continued by the village folk as a part of their primitive culture and tradition without any scientific and technological innovation, administrative support and financial aid entirely depending upon their own knack and experience gained through long trial and error method.

After independance, State Government of Assam has established a muga research station at Titabar in Assam for overall development of muga culture. Later on it was brought under the control of the Central Silk Board in 1972. But it still could not fulfil the aspirations of the muga growers. A sub-station for muga research was also established as early as in 1965 at Dhakuakhana in Lakhimpur district. A Regional Muga Research Station was later established at Mirza which has recently been transferred to Boko at South Kamrup. Of late, a full-fledged Central Muga Research and Training Institute has been approved to be established at Jorhat under Central Silk Board.

Despite preliminary efforts made by the State Sericulture Department, Central Silk Board and the North Eastern Council, the
age-old glorious muga silk culture with unlimited potential could not be transformed into a scientifically solid and organised sector like mulberry silk industry in Karnataka. Crores of rupees have been expended on muga research and development but innovation of any stage of operation of muga culture could not be made so far. Development of suitable host plants, genetically stable improved bivoltine hybrid silkworm race, scientific silkworm seed technology, improved rearing technology, modernization of reeling and weaving technology through automation and sophistication and a good organized market of muga cocoon and finished products in and outside the State with quality consciousness among the sellers and buyers remained as a distant dream. There are many reasons for this unfortunate state of affairs. One of the major reason is that there is no co-ordination among the muga researchers, State Government, Central Silk Board and North-Eastern Council to tackle the various problems of muga culture and to develop it systematically and scientifically.

1.5 Present Status of muga silk industry

It is evident from the table 1.4 that the production trend of mulberry, tasar, and eri raw silk is rising and is satisfactory but production trend of unique muga silk is fluctuating and declining. The highest production of muga raw silk of 94,000 kg was during the year 1958-59 and the lowest of 24,000 kg was in 1978-79. It is really unfortunate that despite tremendous scientific and technological developments in the production of mulberry raw silk in India for last two decades, muga culture could not be fully supported for its
### TABLE 1.4a Present status of Non-Mulberry in India (1996-97)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Particulars</th>
<th>Tasar</th>
<th>Eri</th>
<th>Muga</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of families engaged</td>
<td>1,40,000</td>
<td>1,36,621</td>
<td>29,462</td>
</tr>
<tr>
<td>2</td>
<td>Total area under plantation (ha)</td>
<td>111.68</td>
<td>20,456</td>
<td>3,810</td>
</tr>
<tr>
<td>3</td>
<td>Disease free seed production (lakh nos.)</td>
<td>48.48</td>
<td>145.29</td>
<td>358.25</td>
</tr>
</tbody>
</table>

### TABLE 1.4b Cocoon production Statistics of Non-Mulberry in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Tasar (Lakh Kahan)</th>
<th>Eri (Tonnes)</th>
<th>Muga (Lakh nos.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-94</td>
<td>4.42</td>
<td>1254</td>
<td>3947.38</td>
</tr>
<tr>
<td>1994-95</td>
<td>3.00</td>
<td>1297</td>
<td>3882.10</td>
</tr>
<tr>
<td>1995-96</td>
<td>1.78</td>
<td>1248</td>
<td>3720.84</td>
</tr>
<tr>
<td>1996-97</td>
<td>3.26</td>
<td>1420</td>
<td>3734.20</td>
</tr>
</tbody>
</table>

(1 Kahan = 1280 cocoons)  
(Source: Annual Report, CSB, 1996-97)

### TABLE 1.4c Variety wise non-mulberry silk production and its share in the total silk production of India for three years

<table>
<thead>
<tr>
<th>Year</th>
<th>Variety</th>
<th>Sub total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mulberry</td>
<td>Jar</td>
<td>Muga</td>
</tr>
<tr>
<td>1994-95</td>
<td>13913</td>
<td>257</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(22.7)*</td>
<td>(6.62)*</td>
</tr>
<tr>
<td>1995-96</td>
<td>12884</td>
<td>194</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18.92)*</td>
<td>(8.39)*</td>
</tr>
<tr>
<td>1996-97</td>
<td>12927</td>
<td>231</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(19.86)*</td>
<td>(6.36)*</td>
</tr>
</tbody>
</table>

Source: CSB report

* Share of total non-mulberry silk production
** Share in total silk production in the country
development to increase the production of raw silk to a reasonable height from what it was almost five decades before.

Inspite of a long heritage muga culture in Assam still remain as a traditional cottage industry without much scientific backing. All the credits for sustaining this traditional muga culture can be attributed mainly to the rearers, reelers and weavers. It is they, who kept alive this unique industry as a part of their cultural heritage and subsidiary occupation which is practised in the same age-old manner. Improved technology, like mulberry silk industry in any sphere of operation of muga culture, is yet to be developed. No package of practices for systematic raising of muga host plants with suitable morphotypes based on chemical analysis has been developed as yet. Though techniques of vegetative (clonal) propagation of som and soalu have been well developed (Yadav, 1989; Yadav & Goswami, 1989a, 1990a), it is yet to be percolated down to the rearers level to develop homogeneous som and soalu plantations for successful muga rearing. Studies on rearing performance and feeding behaviour on various host plants naturally available in the region are yet to be initiated for subsequent production of quality fibres. Genetic studies on the improvement of som and soalu has yet to be undertaken. Various diseases of muga host plants and the silkworms, their possible measures of control are yet to be scientifically studied and established.

Muga rearing is traditionally practised under outdoor conditions which exposes the highly sensitive silkworms to natural calamities, harmful pollutants of the environment and various pests and predators.
Occasional storms, hailstorms, frequent heavy showers of rain and high temperature cause 50 percent damage to the muga silkworm during summer months. Moreover, 80 percent of the total damage occurs in the first 2/3 stages of the worms (A.K. Sengupta et al., 1992). A scientifically sound and commercially viable indoor rearing technique like mulberry culture is yet to be established to overcome such environmental effects on muga. The indoor rearing technique which has been recently developed for Chawki rearing of muga silkworm upto the end of 3rd instar stages by RMRS, Boko is not rearers friendly at all and lack commercial viability. The indoor rearing technique that has been developed at the Institute of Advanced Study in Science & Technology, Khanapara is supposed to have prematurely extended to the rearers by the Assam Science Technology and Environment Council is not based on a conclusion of extensive research, covering all aspects of muga rearing authenticated by multilocational trials especially in the commercial muga growing areas of Upper Assam. Further, before transferring this technology to the rearers at the earliest opportunity, it should have been thoroughly discussed in a proper scientific forum for wide acceptance by the scientists involved in the study of muga culture and the commercial adoptability of its indoor rearing by the farmers in muga commercial zones of Assam. A desirable aspect of popularizing muga indoor rearing requires not only the study of rearing performance but all other related multi faceted parameters that support a technology development in an area like muga culture as the muga silkworm is highly sensitive to environmental factors. These further require frequent feed back from the rearers field and then finally transfer the technology in an acceptable form.
Developing a sound indoor rearing technology and its transfer to the rearers is a most welcome step. But before it is transferred to the commercial level from the laboratory research a full proof technology covering all parameters of muga culture must be established. Another problem area of muga culture at present is the non-availability of healthy muga silkworm seed. Unlike mulberry culture, the channel of seed production in muga culture still remains unorganised and haphazardly multidirectional and unscientific. After establishment of a full-fledged Regional Office of the Central Silk Board at Guwahati under which muga seed development project is functioning with branch offices in the various pices of North-Eastern Region, it was expected that the gap between demand and supply of healthy muga silkworm seed will be minimised. But MSDP could produce only a total of 3,59,735 nos. of dfls as on 1990-91, since its inception in 1983-84, against an actual demand of more than one crore dfls every year. This is one of the greatest lacunae in the commercial muga raw silk production. However, CSB could slightly change its strategy to improve the efficiency by producing 1,12,000 dfls in 1992-93 and 2,26,000 dfls in 1993-94. The National Agriculture Commission however, envisaged a production of 1.80 lakh kilograms of muga raw silk per year by 2000 A.D. in Order to meet this target 1.80 crore dfls will be invariably required every year till 2000 A.D. Recently Ministry of textile has sanctioned Rs. 1.72 crore for establishment of 2 commercial grainages which will be able to produce 2 to 4 lakhs commercial muga dfls after 5 years. If this situation of muga dfls production is continued it will be impossible to reach the target of National Commission of Agriculture by the end of this century. This
hard fact immediately demands greater co-ordination and interaction amongst the scientists, government machineries and muga culturists to find out ways and means on a war footing to increase the muga silkworm seed production through efficient implementation of the plans and programmes.

Professional muga silk reeling is still continued in a traditional way in Bhowri, which is mainly confined to Sualkuchi. Das type, Chaudhury-type and Trivedi type reeling machines which are slightly improved over the traditional Bhowri have been developed later but are not used in large scale reeling. These are available in the Government reeling centres only. No sophisticated muga silk reeling device could be developed as yet, which is a major draw back in the production of quality muga silk yarn and quality fabrics. Regional Muga Research Station at Boko fabricated a series of reeling machines among which RMRS-VI is the latest one. This is a good development towards the modernization of muga silk reeling but these are not produced in large scale and made available to the commercial reelers. All types of operation relating to muga silk weaving is also of traditional type. Weaving of muga silk clothes is entirely done by fly-shuttle handlooms without any quality control which is also mainly confined to Sualkuchi. At present there are 2000 handlooms actively engaged in weaving of muga silk fabrics. Modernization through automation and sophistication in the weaving sector is yet to be initiated. Thus, only machine made fine quality muga fabrics can be exported. Therefore, export promotion of quality muga fabric continued to remain unfulfilled. But poor quality
muga fabrics are produced only in the handlooms sector which cannot afford to develop a quality consciousness among the weavers. Therefore, muga fabric does not come near to high class quality fabric for the international market.

Another major problem area of muga silk industry is the absence of a dependable muga cocoon market. That is why the middleman are availing the undue advantage of purchasing the commercial cocoons from the Upper Assam districts and selling the same to the reeler and weavers of Sualkuchi at high profit margin and thereby creating unwanted price-rise of the muga products. The idea of Muga Raw Material Bank of Central Silk Board in the commercial cocoon producing areas became inoperational due to the unorganised transaction procedure and very low government support price. The supreme muga silk fabric despite its unique natural golden colour and exquisite nature, remained confined to the State of Assam due to the lack of quality consciousness among the reelers and weavers of Assam, and systematically organized good marketing facility to encourage the buyers. The prices of thousand (1000) muga, reeling cocoons, per kilogram muga raw silk and per kilogram of muga silkwaste at Guwahati market are in the order of ₹. 500.00, ₹. 2700.00 and ₹. 60.00 respectively (Source : Silk in India, 1992). But at present the price of per thousand muga cocoons ranges from ₹. 800.00 to 1200.00 depending upon the quality and season and price per kg of muga raw silk ranges from ₹. 3500.00 to ₹. 4500.00 depending upon the fineness, neatness, colour and season.
1.6 The Future Prospect of muga silk industry

The golden yellow muga silk industry of Assam has a very bright prospect for future development. The muga culture can be expanded to the entire North and North-Eastern region due to most congenial eco-climatic conditions and geographical position. Muga silkworm rearing can be successfully undertaken particularly in the Sub-Himalayan Region in the North, foot hills of Barail Range and the Shillong Plateau in the North-East due to the ideal habitat of the various muga food plants and congenial ecological conditions. An approach towards organising a National and International network for coordination and interaction between scientists is to be made to survey and study the feasibility of introducing muga culture in the new zones where muga food plants and muga silkworm (*Antheraea assama* Westwood) are naturally distributed. This attempt will definitely help expand the Muga Culture and Research in other parts of the country.

Muga silk yarn and fabric has a very potential internal market in the N.E. region as it is associated with the culture and tradition of its people. A national and international monopoly market of muga finished products can be developed by improving the rearing technology of muga silkworm and modernization of reeling and weaving technology through automation and sophistication. This will not only contribute to the national economy but also create tremendous employment opportunities in muga culture and trade.

Muga silk yarn and muga silk waste can be blended with DMT polyster yarn produced by Bongaigaon Refinery & Petrochemicals Limited.
Muga silk yarn can also be blended with remie, an indigenous bast fibre of the East (S.N. Choudhury, 1987). Moreover, this muga silk can also very well be blended with other natural spun and reeled silks. If blending technology of muga silk fibre with other synthetic fibres and other natural fibres of both plant and animal origin can be properly developed an indefinite varieties of textile products can be obtained suitable for all seasons and acceptable to all. Jagiroad Spun Silk Mill in Assam is producing muga spun silk from muga silk waste and muga cut cocoons. This spun muga silk fibres can also offer scope for blending with the reeled muga silk for ultimate production of various textile finished products with reduced price. Therefore, muga silk industry can back up a totally regional textile industry in Assam which can produce fine finished products of export quality. This will invariably generate ample employment opportunities in the region.

Large scale plantation of muga host plants through social forestry scheme in the ceiling surplus land of tea gardens and other fellow land, road sides, premises of the various establishments and institutions will not only enable the muga rearers to use these plants but also will protect soil erosion and ecological balance. Multipurpose farms where muga culture along with pisciculture, and poultry farming can be feasible, may be encouraged to grow simultaneously. As the muga pupae are very nutritious food for the poultry and fishes, muga can profitably support both the culture. Inter-cultivation of various horticultural plants along with muga food plants can give more incentives and profits to the muga silkworm rearers in per unit area of land. This aspect of multipurpose muga farming is to be thoroughly studied.
There is a bright prospect of muga by-product industry in Assam. Various by-products of muga silk industry can be utilised to generate different new industries. The unused and old plants, branches after pruning can be utilised as fuel, timber and raw material for pulp and paper industry. Som seeds can be used for preparation of a dye and mejankari seeds, leaves and barks can be used for extraction of a very fine aromatic oil. Guts and sutures can be manufactured from matured muga silkworm which is used for surgical stitching. In addition to use it as food for cattle, fish and poulty, the pupae can also be used for production of oil. This oil can be used for preparation of soap, cosmetic and candle. The refined pupa oil may be used as alternative edible oil and dalda. Pupae and litters are good manure for agricultural and horticultural farms. Moreover, silkworm litters can also be effectively utilised in the bio-gas plant with cowdung. The muga pupae are also utilised as delicious and nutritious food item particularly by the people of the Ahom community of Assam. Thorough and extensive research work is needed to study the efficient use of these muga by-products as raw material for new industries. Thus, muga silk industry in Assam has a very bright prospect for its development in the near future, provided the State Government announces a policy decision in this regard.

With a grand reputation and glorious rich heritage and a bright prospect for future development, golden muga silk industry of Assam at present is undulating with uncertainty and is under great threat of decline and extinction. There are many reasons for this unfortunate
present status. One of the reasons is the environmental degradations caused by deforestation, industrialization, urbanization, population explosion, natural calamities, shifting cultivation, mechanised agriculture and other developmental activities. Different species of muga host plants and their various ecotypes and morphotypes are quickly disappearing from their natural habitat. The bivoltine wild races of muga silkworm which were once abundantly found in the natural state is no more available. This wild races are essential for evolving genetically stable and improved hybrid races with desired characters. Even the cultivated form of muga silkworm is badly affected by the pollutant created by tea, petroleum, fertilizer, coal and cement industries of Assam. Sometimes the entire brood is damaged by such environmental pollution. As a consequence, the traditional muga rearers loss interest on muga culture and go in search of alternative lucrative business. If this present trend of deterioration and decline is continued, this unique muga culture of human civilization will be vanished from the earth forever. like the mejankari culture in the past. Therefore, it is the responsibility of all concerned and need of the hour to protect the unique muga silk culture from further decline and deterioration and conserve it for the future generation to be utilised to its fullest extent.

Scientists, policy makers and the administrators have the greatest role to play to a glorious future of muga silk industry of this country.
1.7 Origin of the present investigation

In spite of immense prospects and potentialities for development of muga silk industry in Assam and other probable areas for muga culture, it remained either static, or gradually declining due to many reasons as discussed earlier. One of the most important reason is that lack of comprehensive studies on the biochemical, morphological, biophysical, taxonomical and methods of propagation in various muga food plants and their morphotypes are not well attended, to revitalise the muga silk industry. All these areas of investigation are important requiring urgent attention to identify and improve some really ideal and reliable types of muga food plants.

Dighloti (*Litsaea salicifolia* Roxb) belongs to the order — Magnolials — Ranales, Family — Lauraceae and type — Perseoideae (Mitra, 1974). It is one of the most important secondary food plant; of muga silkworm, which is found to be evergreen in character. The plant has many advantages for muga silkworm culture, e.g., it is a natural bush, responds well to pruning, rearing supervision and management is convenient. Over and above it is advantageous for rearing of chawki (young stage), late hatched and weak worms (Chowdhury, 1981). Due to the bushy nature of Dighloti, net-rearing is convenient and easy. Chowdhury (1981) called Dighloti, a secondary food plant without assigning any reason thereof.

In some parts of Upper Assam such as Borhat, Sapekhati, Disangpani, Lakwa, Geleki of Sibsagar district and also Timtimia village and other parts of Jorhat district Dighloti is being utilised as a viable
primary food plant both for commercial and seed cocoon production.

Many wild silkworm races are found on Dighloti plant (Gogoi and Goswami, 1995a). This may help in collection of wild races and maintained in the Dighloti farms for breeding and further improvement of muga and other silkworm races (Gogoi and Goswami, 1995b). This may ultimately help in developing the ever important muga germplasm bank and silkworm biodiversity. It has also been proved by previous researchers that *Litsaea salicifolia* Roxb. can profitably be used in the muga silk industry, since the worm reared on it produces cocoons which are in no way inferior to cocoons produced on other food plants (Bora and Sengupta, 1977). There is a general opinion of the private rearers that the weak muga worms of a brood could be transferred from other muga food plants to Dighloti so as to retrieve its vigour and strength and thereby keep production equally high. Due to its evergreen nature, *Litsaea salicifolia* Roxb. can probably replace Soalu (*Litsaea polyantha* Juss) for the whole rearing period particularly during winter months, i.e. November to February every year to maintain continuity of muga silkworm rearing (Chowdhury, 1981; Yadav and Goswami, 1987). During the winter season muga silkworm rearing on Soalu plant becomes unsuitable due to defoliation and poor quality leaf (Yadav and Goswami, 1987).

Unfortunately, in spite of immense possibilities offered by this treasure plant for development of muga silk industry, Dighloti has been neglected so far due to lack of scientific informations based on feeding behaviour and rearing performance of muga silkworm on it. Even in the Government farms this plant is not at all available indicating lack of
concern for its adoption. Moreover, it is a matter of great concern that the plant is fast disappearing from its natural abode due to environmental degradations and other reasons (Gogoi and Goswami, 1995c, '98a). It is high time to conserve this important food plant through systematic and scientific approach before it is too late and motivate the muga rearers to grow Dighloti in a big way for muga rearing.

It is our well-thought out and considered opinion that one of the main reasons for neglecting this important plant is the ignorance of its value and non-availability of good and adequate planting materials coupled with lack of knowledge on effective propagation methods. Moreover, lack of knowledge on feeding behaviour and rearing performance of muga silkworm on Dighloti are some of the other reasons for ignoring this muga food plant diversity.

Therefore, considering all the hidden potentialities of this unique muga food plant, this research programme was undertaken to study the following parameters of the Dighloti (*Litsaea salicifolia* Roxb.) plant.

1. To study the mode of propagation by seeds.
2. To study the mode of propagation by cuttings.
3. To study the mode of propagation by air layerings.
5. To study the comparative bio-chemical composition of the muga food plants.
6. To study the feeding behaviour of muga silkworm during different crop seasons.