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In this issue

Editorial

Assam is the largest silk producing state in the country alone contributes about 99% of the total raw silk from Muga silkworm (Antheraea assama Ww). This silk is supposed to be one of the costliest fabrics in the textile world and presently the silk industry alone is providing livelihood to approximately 30,000 families in the state. The muga silkworm farmers are going through a tough time due to lack of land for host plants owing to deforestation and landuse change, fluctuations in weather parameters, high price of cocoons, lack of awareness among the farmers about disease free layings (DFL) and absence of integrated pest management (IPM) technique for controlling the pests population, shortage of manpower, knowledge gap of advance technology. Another major challenge to the silk industry is lack of well- organized seed sector and organized marketing facilities. Owing to these setbacks the production of muga silkworm has declined drastically. Therefore, it is crucial to build awareness and better knowledge of the biology of muga silkworms and its host plants for the muga silk industry of Assam to thrive with improved productivity. There is a pressing need to popularize new technologies among the silkworm rearers or farmers of the rural villages for widespread adoption from laboratory to field which will benefit the farmers to understand the nitty-gritty of silkworm rearing in a scientific manner and its marketing.

The golden Muga silk Culture of Assam is as old as Assamese culture. Even today it occupies a very important place in life and culture of Assamese people. In this report an attempt has been made to highlights the problem and prospects of the study is based upon some primary and secondary data. According to this data, Muga culture is still practiced by the traditional rearers on scattered home plants in a limited scale instead of commercial block plantation. So, it becomes a duty to the government to promote the industry growth and prosperity.

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Golden Muga Silk

Muga Culture, Present Status and Prospects

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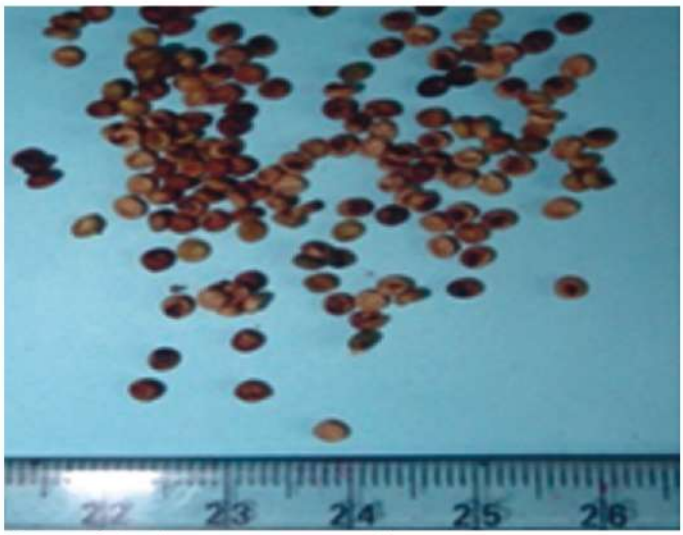
Assam occupies a unique position in the global sericulture map for its monopoly in producing the golden muga silk. The silk is produced by a silk insect, Antheraea assama Ww. Syn. Antheraea assamensis Helfer (1837) which is by and large found in North East India in general and Brahmaputra valley of Assam in particular. Rearing of muga silkworm and weaving of muga silk is an age old tradition of the people of Assam since the Ahom regime (1228-1828) which prospered and thrived to become an integral part of the socio-economic life of the people of Assam. It is also believed that the muga culture was brought to Assam by the Tai Ahoms in 1228 AD from 'Punj Kong' village of Northern Burma. Later they patronized the silk for use as royal attire.

The muga silk which possesses certain unique characteristics such as its glossy fine texture, durability, low porosity, highest tensile strength, humidity absorption quality and the muga yarn cannot be bleached or dyed hence its natural golden colour is retained. Lustre of this silk increases after every wash. Muga yarn is also said to be have UV radiation protective property, for which it was used for making umbrella.Apart from weaving traditional mekhela sador, muga silk has been reported to be used as a potential suture biomaterial for swift wound healing, aircraft tyres, bulletproof jackets and parachute ropes. Thus, the demand of muga silkworm is increasing day by day. Its unique properties have made it bag the status of being the second most expensive silk in the world. In 2007, muga got the geographical indications tag and a GI logo has been granted for trademark purposes in 2014.

The geographic isolation of muga silkworm indicates that this insect has special requirement of geo-climatic conditions such as high humid temperate climate for its survival and growth and the availability of food plants in the region. Muga silkworm is polyphagous on certain species of Lauracae family majority of which are grown in the forests of NE region. Among the various food plants they feed primarily on *Persea bombycina* (King ex Hook. f.) Kost (*Som*) and *Listea monopetala* (Roxb.) Pers. (*Soalu*). The list of secondary food plants are *Listea salicifolia (Dighloti)*, *Listea cubeba (Mejankori)*, *Actino-daphnae obovata (Potihonda)*, *Cinnamomum glanduliferum (Gandhsarai) Michelia champaca (Champa)*, *Zizyphus jujube (Bogori)*, *Xantho-xylum rhesta (Bajromani)*, *Symphocous grandifolia (Bhamloti)*, *Gamelia arborea (Gamari)* and *Mangolia sphenocarpa (Pan chopa)*. Traditional rearers prefer Som plants for rearing of silkworm in the sumonis (muga silkworm foee plants area).

Rearing of Muga silk worm in Sumani

The muga silkworm is wild in origin and distributed throughout the dense forest of foot hills of Meghalaya, Nagaland, Arunachal Pradesh and Bhutan bordering Assam. The wild muga silkworms are known to grow on Soalu plants in lower Assam and foot hills of Meghalaya which usually undergo pupal diapauses during winter season whereas the stocks grown on Som plants in upper Assam and adjoining foothills of Nagaland and Arunachal Pradesh do not undergo pupal diapauses. Although attempts have been made to domesticate the muga silkworm, the insect has not been successfully domesticated, rather maintained under semi domestic conditions. The semi domesticated nature of the insect means the cocooning and grainage operations are only done indoor and rearing of larvae is performed in the host plants. Being multivoltine, six broods of muga silk worm can be reared in a year. According to Assamese calendar the broods are locally known as Chatua (February-March) – early spring, Jethua (May-June) – Spring, Aherua (June-July) – early summer, Bhodia (August-September) – Summer, Kotia (October-November) – late summer or early winter and Jarua (December-January) – Winter. Harvest of cocoons is better in the Kotia variety, followed by the Jethua brood. The cocoon output of the other broods is nominal and they are mainly used for seed cocoons. The Kotia and Jethua crops are named as commercial crops, Chatua and Bhodia as seed crops and Aherua and Jarua as pre-seed crops.



Eggs of *Antheraea assamensis*

The muga silk worm larvae are reared in outdoor condition therefore they are exposed to seasonal climate change, rainfall, strong wind and soaring temperature besides the attack of various predators, pests and pathogens resulting in heavy loss of silk worm particularly in early three instars. Although several workers experimentally performed indoor rearing of muga silkworm using different types of rearing devices but did not get effective result because of infestation and difficulties in keeping the leaves of twigs of food plants fresh.

Cocoon of wild muga

The pre seed and seed crops are generally reared in South Kamrup (Mirza, Bijaynagar, Palasbari, Rani, Chaygaon and Boko) and Goalpara near Meghalaya where wild stocks of A. assamensis are brought down from hills to the plains as seed cocoons for rearing in spring and autumn when ecological conditions are optimum for commercial rearing. The rearers from upper Assam prefer to collect seeds from lower Assam for better result of commercial crop. But unabated deforestation, unsustainable fuel wood extraction, shifting cultivation, encroachment into forest land for agriculture and settlements, forest fire etc., have resulted in huge decline of wild population of this silkworm species. 'Inbreeding depression' is another major cause of decline in muga silk production, rearing of single species in the same place for more than three to four generations shows an

inherent tendency of the reduction of viability of the silkworm and their adaptability to variation in environmental factors.

About 30,000 families are engaged in the muga culture in Assam. The traditional weavers generally weave female apparel like Mekhela Cador, Riha and plain clothes for both male and female from muga yarn using throw-shuttle looms to meet household demands. Commercial weaving of muga fabrics is concentrated in Sualkuchi and Palashbari of Kamrup district of Assam, where fly-shuttle looms are used. Apart from the government sericulture farms, the traditional rearers are rearing of muga silkworm owing to their emotional attachment with the culture. However, the young generations of the rearer's family lack interest in continuing the culture as the industry projects an image which is much laborious, low-tech profession and success is unpredictable. Muga silk is also produced in Meghalaya, Arunachal Pradesh, Manipur, and Nagaland in small scale. The production of muga raw silk is fluctuated between 62 - 232 MT during the period 1995 - 2019. Despite huge efforts the production of muga raw silk could not be multiplied to two folds only in last sixty years unlike mulberry and eri silks. The non-availability of the required quantity of quality seeds during commercial seasons has been identified as a major constraint of the industry.

Dark reddish brown colour of male muga moth

Chestnut brown colour of female muga moth

Assam alone needs more than one crore DFLs of muga per anum of which only 5-6% is produced under the supervision of experts while the rest are produced by farmers themselves based on traditional knowledge. Thus, the quality of seeds produced by the farmers may not be adequate in comparison to the commercial seeds. Environmental pollution and indiscriminate application of pesticides in Muga-Tea-Agro ecosystem have direct impact on low production of muga raw silk. Unlike mulberry silkworm, the hybrid variety of muga silkworm is not available except the attempt to infuse vigour of wild moths by tying the virgin females outside the grainage house during traditional rearing. Therefore, harnessing hybrid vigour by crossing genetically distinct and high yielding population should be the future goal for better future of this industry. For example, ex-situ conservation of muga germplasm, the first of its kind 'Muga Wildlife Sanctuary' was established on 5th June, 2013, in the fringe areas of Rangijora of Kuklung Forest range by demarcating 100 acres of forest land.

At present, business of the golden silk is worth of Rs 200 Crore but the industry can grow up to 10 times of its current size with strategic planning. There is a huge prospect for muga silk industry of Assam as the demand for natural fibre has grown considerably in the global market. The elegant lustrous natural colour and durability is the strength of muga silk fibre.

Therefore, there is every possibility to explore the national and international market by developing the production base of muga raw silk. The average price of raw muga silk is Rs. 5000. 00/kg. There is lot of scope to develop this agro-based craft of Assam by modernisation oftraditions through transfer of technology to the grass-root level. There is a need to popularise new technologies among the farmers for widespread adoption in the field. Moreover, the image of the industry has to be changed from its present rustic, low-tech profession to a modern high tech industrial activity through research and development.

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NEWS Clippings

2,479 rhino horns, ivory, animal parts to go up in flames in Assam soonSenior officials said that the Environment and Forest Department has sought permission from Assam govt to destroy the rhino horns, ivory & body parts of protected animals stored in various treasuriesAs many as 2,479 pieces of rhino horns stockpiled in Assam government treasuries will be destroyed by consigning them to flames in public, a minister said on Thursday after a cabinet meeting.

Assam Health Minister Keshab Mahanta said that the cabinet in its meeting chaired by Chief Minister Himanta Biswa Sarma has decided that out of the 2,623 rhino horns, 2,479 pieces preserved in government treasuries across the state will be destroyed at a public function soon.

Senior forest and wildlife officials said that following a Gauhati High Court order dated December 13, 2010, the Environment and Forest Department has sought permission from the state government to destroy the rhino horns, ivory and body parts of other protected animals stored in various treasuries in different districts.

Assam's Additional Principal Chief Conservator of Forest (Wildlife), Mahendra Kumar Yadav, said the process to verify the rhino horns, ivory and body parts of various protected animals seized from poachers, smugglers or extracted from dead animals over the last four decades and kept in government treasuries in districts, is now in the last phases.

"Recommendations of a state-level committee constituted in July for the purpose and the state government's advice would be considered before the burning of these remains," said Yadav, who is also the state's Chief Wildlife Warden (CWW).

Environment Calendar

July 3, World Birds' Day: - This day is celebrated all over the world to bring awareness about the role of various birds in the environment and to protect them from extinction.

July 11, World Population Day- Population has to be given special attention, as it is an ever-increasing problem especially in India.

September 16 World Ozone Day-The United Nations declared this day as the International Day for the Preservation of the Ozone Layer. It is the day the Montreal Protocol was signed.

September 28, Green Consumer Day-The problems of consumerism and its impact on the environment is an area of major concern in today's world. Awareness building on the importance of recycling-reusing-reducing should be taken up seriously.

Query Form

1. Name :
2. Organisation/Designation/Mailing Address :
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5. E-mail ID

I would like to search information on following :

Subject	*Keywords*
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3. Pollution	_____
4. Solid waste	_____
5. Natural hazards	_____
6. Energy	_____
7. Sustainable development	_____
8. Deforestation	_____
9. Weather and climate	_____
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11. Urbanisation	_____
12. Landslide	_____
13. Environment education	_____
14. NGOs and environment	_____
15. Others	_____

Signature

N.B.: If you need any information of State of Assam's Environment please fill up the above query form and e-mail/post to us.

Certificate course on Value Addition & Marketing of Non-Timber Forest Products (Animal Origin): Wild Beekeeping

One Month Certificate course on Value Addition & Marketing of Non-Timber Forest Products (Animal Origin): Wild Beekeeping and processing under Green Skill Development Programme (GSDP) was conducted by ENVIS Hub Assam under Assam Science Technology and Environment Council (ASTEC) in association with Green Environment Task Force. The programme was supported by Ministry of Environment, Forest & Climate Change (MoEF&CC) Govt. of India from 23rd January to 21st February, 2021 at Gogamukh, Sowansiri Eco Camp, Dhemaji, Assam. A group of 25 individuals from various youths of the area participated in the month long training workshop. The training imparted basic knowledge and understanding about the wild beekeeping and ways conservation so that it can besides creating job or self employment opportunities for the trainees. Dr. Jaideep Barua Coordinator ENVIS HUB ASSAM & Head i/c Environment Division, Manisha Sarmah and Samiran Kalita of ENVIS Hub Assam were present and other dignitaries were present at the Inauguration Programme. Smt. Kimnei Changsan, ACS, Director ASTE Council, Citra Borthakur, Scientific Officer and Hiamkshi Das, PA, S&T Minister were also visited the training venue and interact with all the participants. After a month long training a valedictory function was organized and the certificates were distributed by ENVIS and GETF officials to participants.

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International Conference on Research in Education and Science (ICRES)

1st to 4th April 2021, Antalya, Turkey

International Conference on Research in Education and Science (ICRES) will take place at Ramada Plaza by Wyndham Antalya Hotel on April 1-4, 2021 in Antalya, Turkey. The hotel accommodation is free for all participants during the conference days.

Organized by: International Society for Technology, Education, and Science (ISTES)
Contact person: Mack Shelley

8th International Conference on Coastal and Ocean Engineering (ICCOE 2021)

3rd to 5th April 2021, Tokyo, Japan

8th International Conference on Coastal and Ocean Engineering (ICCOE 2021) will be held during April 3-5, 2021 in Sophia University, Tokyo, Japan. ICCOE 2021 brings together innovative academics and industrial experts in the field of Coastal and Ocean Engineering to a common forum.

Nowadays, demand for energy is growing. Conventional fossil resources (oil, coal and natural gas) face supply constraints and volatile markets, and concerns about economics and climate change have become widespread. And an abundant and promising source of energy exists in waves, tides and offshore currents and swells. The time to harness it is now!Organized by: Sophia University

Contact person: Ms. Alice Lin
Website: http://www.iccoe.org/

13th International Conference on Climate Change: Impacts & Responses

8th to 9th April 2021, Vancouver, Canada

13th International Conference on Climate Change: Impacts & Responses, UBC Robson Square, Vancouver (8-9 April 2021) Special Focus: Responding to Climate Change as an Emergency.

Organized by: Common Ground Research Networks
Contact person: Elizabeth Costa
Website: https://on-climate.com/2021-conference/call-for-papers

International Conference on Alternative Fuels and Electric Vehicles 2021

17th to 18th May 2021, Pune, Maharashtra, India

International Conference on Alternative Fuels and Electric Vehicles (ICAFEV) 2021 is organized at the Alard College of Engineering and Management, Pune, India on 17-18 May 2021. This international event will provide a platform for various worldwide researchers, scientists and academicians engaged in the field of Alternative Fuels and Electric Vehicles and driving the World towards a sustainable future. ICAFEV 2021 aims to receive only original high quality research papers for this conference.

Contact person: Conference Chair, ICAFEV 2021
Website: https://icafev.com