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A Study on Sustainable Agriculture Practices and Their Role in Enhancing Sericulture Yield Through Bio Resource Conservation in N.E. India

Dr. Anup Kumar Doley[1] & Doly Boruah[2]

[1]*Assistant professor, Department of Zoology, Majuli College, Majuli, Assam, India.*
[2]*Assistant professor, Department of Zoology, North Bank College, Ghilamara, Assam, India*

Corresponding Author: Dr. Anup Kumar Doley

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ABSTRACT:

Sericulture is a sustainable form of cottage industry in northeast India which supports the livelihood of thousands of rural households. However, unsustainable agricultural practices threaten the ecological balance and productivity of sericulture. Silk is one of the valuable treasures of northeast India. The sericulture and silk industry can obtain ecological, economic and social benefits to the country. Sericulture is the source of sustainable livelihoods for the sericulture farmers and it can create many more employment to workers. The main objectives of the sustainable agriculture practices are to produce the crops in harmony with the nature without doing the loss to the environment and can improve income and living standard of the people living in the rural areas. This seminar thesis reviews the role of sustainable agriculture practices in enhancing sericulture yield through bio resource conservation in northeast India. The study synthesizes literature on organic farming, integrated nutrient and pest management, agroforestry, water conservation and improving the mulberry and non-mulberry silk production. This paper also deals with the integration of traditional knowledge systems with modern ecological approach of sericulture.

Keywords: Sustainable, Bio-Resource, Conservation, Sericulture.

INTRODUCTION:

Sericulture is a sustainable form of cottage industry in northeast India which supports the livelihood of rural people. The rich biodiversity and traditional farming systems of northeast India provide a fertile ground for sustainable agriculture practices. But the climate change, deforestation, soil degradation and water scarcity have emerged as critical challenges. Sericulture plays a significant role in the rural economy due to its contribution to the silk industry. Sericulture is practiced traditionally from ancient time, which is a major source of livelihood and agro-based eco-friendly, economic activity of the people of northeast India (Saha *et.al.* 2012 and Peigler and Naumann). India is the largest Eri silk producer in the world producing 96% of the total production (Kumar and Gangwar, 2010) and more than 90% of the total Eri silk produced in India are produced by the north eastern states

(Sarmah and Chakravarty, 2008). All the four kinds of commercially exploitable silk namely, mulberry silk, eri silk, tasar silk and golden muga silk are found in the place of northeast India.

Today sericulture has gained new importance as agro-economic practice for rural development, generation of self-employment and empowerment of women and also expert more earning. Like agriculture, sericulture plays an important role in transformation of rural economy as it assures wider scope in terms of regular employment opportunities and periodic return round the year (Lakshmanan *et. al*., 1997, 1998 a, 2000). Mulberry culture or moriculture is a labor-intensive industry in all its phases, namely, cultivation of host plants, rearing of silkworm, silk reeling and other post cocoon processes such as twisting, dyeing, weaving, printing and finishing. Sericulture is mainly practiced in north-eastern region of India. The states of Assam, Meghalaya, Arunachal Pradesh, Tripura, Nagaland and Manipur account for nearly 98% contribution. Ericulture has been recognized as an important practice from the view point of income and employment generation through production of silk and by- products obtained from rearing of eri larvae and pupae.

Use of fertilizers and pesticides greatly helps in enhancing the production and productivity of crops. But overuse of chemical pesticides and fertilizers have drastic impact on environment, by affecting soil fertility, water hardness, development of insect resistance etc. thus, use of bio-pesticides and bio- fertilizers can play a major role in dealing with these challenges in a sustainable way (Gupta, 2010). The primary food plant of eri silkworm is castor. By the use of insecticides from chemical origin with different modes of action in management of different feeding habits of pest complex of castor might have induced detrimental effect on different life stages of eri silkworm. Hence, bio- pesticides need to be followed by adopting eco-friendly approaches for the management of pests of castor system. Bio-pesticides are termed as eco- friendly pesticides that are obtained from naturally occurring substances namely microbes and plants. Use of bio-pesticides in a wider way potentially benefits to agriculture, natural ecosystem and public health.

OBJECTIVES:

The primary objectives of this study on- A review on sustainable agriculture practices and their role in enhancing sericulture yield through bio resource conservation in northeast India are:

1. To examines sustainable agriculture practices that can conserve bio resources and enhance sericulture productivity in this ecologically sensitive region.
2. To explore the sustainable development of sericulture in order to produce the crops in harmony with the nature without doing the loss to the environment,

improve income and living standards of the people living in the rural areas.

3. To analyses government policies and initiatives for supporting the silk industry and their effectiveness in promoting sustainable sericulture practices.
4. To propose conservation strategies and promote the integration of traditional knowledge with modern scientific methods for enhancing the productivity and conservation of sericulture.

SUSTAINABLE AGRICULTURE PRACTICES IN SERICULTURE:

Sericulture which is the rearing of silkworm for the production of silk, fits perfectly in sustainable agricultural practices since it has versatile ecological and social impacts. This practice implies planting of host plants (such as mulberry, castor, som and soalu), which are the main sources of food for the silkworm and it is known to have much implication on environment. The planting of silkworm host plants has the benefits of protecting the soil and fertility.

Sericulture fits to the organic farming practices. Since it reduces the chances of using synthetic fertilizers and pesticides that causes harm to the environment during agricultural activities. Organic farming emphasizes the use of organic manure, bio fertilizers and natural pest control methods. In host plants cultivation, vermicompost, green manure and compost tea enhance soil health and leaf quality. Reduced chemical inputs result in healthier silkworms and higher cocoon yield. The quality of leaves provided to the worms for feeding has been considered as the prime factor that determines the yield and quality of cocoons. It has been observed that quality of leaves is greatly influenced by the leaves genotype. Better the quality of leaves, greater would be the chances of getting the good cocoon crop (Ravikumar, 1988)

Integrated pest management (IPM) reduces dependence on synthetic pesticides by employing biological control, crop rotation and resistant plant varieties. This ensures a safer environment for silkworms, which are highly sensitive to chemical residues. Also integrated nutrient management (INM) combines organic and inorganic fertilizers to optimize nutrient availability. In sericulture, applying balanced nutrient improves leaf yield and nutritional content, supporting robust silkworm growth.

Agroforestry systems integrate sericulture with multipurpose trees, improving microclimates, enhancing biodiversity and preventing soil erosion. Shade from trees can also reduce heat stress on host plants and silkworms. Some of the water conservation techniques such as drip irrigation, rainwater harvesting, and mulching conserve water resources vital for host plant cultivation. Efficient water use prevent stress on plants and ensures

consistent leaf quality.

Traditional farming practices in northeast India emphasize harmony with nature. Ethnic communities use organic compost, traditional pest repellents, and intercropping, which align well with sustainable agriculture. These practices should be scientifically validated and integrated into broader sericulture development programs.

Table: Sustainable Practices in Sericulture

Sustainable Practice	Description	Impact On Silk Production	Impact On Silk Quality
Organic sericulture	Use of various organic farming techniques and avoiding synthetic chemicals and fertilizers.	It may reduce short-term yield but promotes long-term sustainability.	Produce eco-friendly, high-quality silk.
Integrated pest management (IPM)	Use natural predators and biological controls instead of chemical pesticides.	It may reduce crop losses due to pests and Environmental damage.	Enhances silk quality by avoiding pesticide residues.
Waste reduction and recycling	Use techniques for recycling sericulture waste, such as leaves and excreta compost.	Lowers production costs and promotes sustainability.	Has minimal direct impact on silk quality but contributes to overall eco-friendliness.
Integrated nutrient management (INM)	Use combines organic and inorganic fertilizers.	Improves leaf yield and robust silkworm growth.	Produce high quality silk.

IMPORTANCE OF BIO RESOURCE CONSERVATION IN SERICULTURE:

Bio resources such as soil, water, host plants (such as mulberry, castor, som and soalu) and biodiversity are foundational to sericulture. Conservation of these resources ensures the availability of quality leaf yield, which directly influences silkworm health and cocoon quality. Loss of biodiversity and soil fertility degrades the sericulture ecosystem, leading to declining yields and economic instability among farmers.

The government promotes sericulture under various schemes like the North East Region Textile Promotion Scheme (NERTPS) in order to conserve the sericulture. The SERI-FED CENTER play a significant role in the production, economic development and conservation of sericulture under various schemes and projects. They provide modern instruments which make easier to processing of various silk products. They provide a wide range of market to the product of silk textile. The conservation and economic development of Sericulture are interlinked. By practicing some conservation strategies like agroforestry, host plant cultivation, community-based

rearing, developing disease resistant breed and conducting some awareness programs, we can conserve sericulture.

Table: List of silkworm species found in north-east India.

Sl. No.	Common name	Scientific name
1	Muga silkworm	*Antheraea assamensis*
2	Eri silkworm	*Philosamia ricini*
3	Mulberry silkworm	*Bombyx mori*
4	Tasar silkworm	*Antheraea mylitta*

Fig: (a) Tasar silk-worm, (b) Tasar cocoon, (c) Tasar raw-silk

Fig: Muga silkworm

Fig: Muga cocoon

Fig: Mulberry silkworm

Fig: Mulberry cocoons

Fig: Eri silkworm

Fig: Eri cocoon

Fig: Different Type of Cocoon and Their Yarn

DISCUSSION AND CONCLUSION:

Sericulture plays an important role in the process of economic development of India. This sector is more profitable to the economy directly or indirectly. The transformations in this sector are being induced by factors like new found interest of the organized sector, new and improved technologies, mechanized farming, rapid growth of contract farming, organic farming etc. The spread of sericulture farming practices and performance of sustainable rural development are both essential parts in many rural areas. The sustainable practices, including organic farming and IPM, have addressed environmental concerns, making silk production more eco-friendly. Government should set clear policies and strategies that aim to promote sericulture industry in India. The Sericulture Research and Extension institutes should create regionally adaptable breeds in order to enhance silk

quality and productivity. The sericulture industry has witnessed significant transformations through recent innovations, profoundly impacting both silk production and quality enhancement. As the industry continues to evolve, ongoing research and development will be essential in further refining these technologies and practices. In conclusion, the recent innovations in sericulture not only promise a brighter future for silk production but also reinforce the industry's role in sustainable development and rural empowerment on a global scale.

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