

## **ABSTRACT**

**Title of the thesis: A study on quality aspect of Eri culture for the socio-economic development of the Bodos in Kokrajhar District**

**Jogesh Deuri, Department of Sericulture, BTAD, Assam**

Sericulture is one of the prominent practice in the North Eastern (NE) States of India which provides subsidiary income for the rural people. Out of eri, muga and mulberry culture, ericulture plays a significant role in rural livelihood and economy of the State. Kokrajhar District of BTAD (Bodoland Territorial Area Districts), Assam has a prominent role in ericulture wherein a major number of farmers are involved. In Kokrajhar, the production and utilization of eri silk is in upward trend in recent years with an increasing number of area under plantation, DFLs consumption, reeling of cocoon and raw silk production. As per the recent survey by Directorate of Sericulture, BTC, Kokrajhar, out of 16465 sericulture families in Kokrajhar, 15396 families are engaged in ericulture only.

Till date, this sector remains as a cottage industry and considered as part time venture for livelihood and income generation for eri rearers. Besides other issues, non-availability of sufficient quality leaves in all areas throughout the year has emerged as prime limiting factor for large scale commercialization of ericulture. The eri silkworm is polyphagous, i.e. it takes the leaves of a number of food plants. Among the various food plants, castor (*Ricinus communis*) and kesseru (*Heteropanax frgrans*) are considered as the prime food plants. But these are annual crops and it involves huge investment in terms of recurring cost of cultivation and land. Tapioca (*Manihot esculanta*) another perennial food plant of eri silkworms is also cultivated by some farmers in some specific pockets of Kokrajhar, but it has not been used

commercially in large scale. In the context of Kokrajhar District, there has not been any proper studies available regarding the quality parameters of tapioca leaves and the cocoon quality of eri silkworms fed on these leaves. As a result, the use of tapioca plant in ericulture has not gained popularity among the local farmers. If properly introduced, tapioca can be a potential perennial food plant for eri silkworm rearing.

Therefore, the present study was initiated to find out the feasibility of tapioca as an alternative food plant for rearing of eri silkworm in Kokrajhar through the biochemical analysis of leaves and by evaluating the rearing performances, which are very important for the socio-economic development of the people associated with it. Castor was also taken for the study to compare it with the tapioca. The study was conducted during 2012 to 2014. Biochemical compositions were analysed from the tender, semi-tender and mature leaves of castor and tapioca collected in equal amounts in four seasons, viz. summer (Jul-Aug), autumn (Oct-Nov), winter (Dec-Feb) and spring (May-Jun). The average of four seasons were taken for the study. The content of chemical constituents like total soluble protein, total carbohydrates, total soluble sugars, crude fibre content, moisture content, total phenol contents, tannins, free amino acid and lipid were estimated on dry weight basis by following standard procedures. The experiments were conducted in the laboratory of Biotechnology Division and Eri Silkworm Division, Central Muga Eri Research & Training Institute, Lahdoigarh, Jorhat, Assam, India.

To ascertain the quality of eri cocoon and silk yarn in respect of castor and tapioca as food plant, experiment were conducted following standard methodology of the CMER&TI, Central Silk Board (Sarmah, 2004). Rearing performance was carried out maintaining 3 replications and 200 worms was kept per replication. From the cocoons generated, silk yarns were produced and the physical properties were analyzed.

To study the role of ericulture in the socio-economic development of the Bodo people in Kokrajhar District, data were obtained by a questionnaire by conducting a survey on eri farmers and eri cocoon traders in Kokrajhar. Secondary data on status

of ericulture in Kokrajhar was collected from Directorate of Sericulture, BTAD, Assam and the Regional Office, Central Silk Board, Guwahati. The primary and secondary data thus obtained were compiled, statistically analyzed and inferences drawn for establishing sector-wise status of sericulture in Kokrajhar District.

In respect of quality parameters of the leaves of castor and tapioca plants, it is observed that the leaf biochemical compositions vary significantly between the two types of plants as well as among four different seasons. The overall biochemical compositions of castor leaves are found superior than the tapioca leaves. Significantly higher amount of crude protein, lipid, crude fibre and sugar are found in the leaves of castor. The amount of total carbohydrate, phenol and free amino acids are also found higher in castor leaves but the differences are insignificant. However, moisture percent and tannin are higher in tapioca than castor. Although found to be inferior to castor in terms of biochemical constituents, tapioca still possess the essential qualities of a suitable food plant for eri silkworms.

The rearing performances also reveals that in case of castor fed eri silkworms, the fecundity, larval weight, ERR, cocoon weight (male), cocoon weight (female), shell weight (male), shell weight (female) are highest in spring season and lowest in summer and/or winter season. In case of tapioca fed silkworms, both spring and summer seasons show highest recorded data for the above parameters. However, the lowest values are found mostly in winter season, along with the summer, spring and autumn seasons.

The higher nutritional values and lower anti-nutrient contents (like tannin) in castor could be attributed to the superior economic traits including cocoon yield and silk percentage and found most suitable for ericulture whereas in tapioca the economic traits are recorded least which could be due to poor nutrient contents in leaf. It is also supported by earlier findings (Bongale *et al.*, 1991).

The relationship between quality parameters of castor leaves exhibits positive correlation with all economic traits except that of larval duration which decreased with increase in nutritional content of leaves. Same results are observed in case of

tapioca leaves. Sarmah *et al.* (2011) opined that ERR of eri silkworm is influenced by biochemical compositions of leaves. The weight of larvae and cocoons are significantly influenced by nitrogen and crude protein content of the foliage. This is supported by the present report.

The anti-nutrients like, tannin, phenol etc. has negative impact on the economic traits of eri silkworm. The high level of tannin could cause reduced intake of leaves and digestibility in silkworm as reported by earlier workers (Reed *et al.*, 1982). High phenol content effects on feeding during larval stage as reported by Rao *et al.* (2009) and Anjani *et al.* (2010).

In the present study, the castor leaves are found superior than the tapioca leaves. However, in case of some nutrients, there is no significant differences between castor and tapioca leaves and also the cocoon yield and silk percentage, suggesting that tapioca is also a suitable food plant for eri silkworms.

The quality of cocoons and silk yarns from castor and tapioca fed silkworms shows that there is no significant differences. Although there exists some minor differences in physical properties of silk yarns of the two types, there is no effect in net productivity of eri silk and its market value.

The socio-economic study in terms of ericulture in Kokrajhar reveals that more than 50% of the eri farmers are rearing less than 25 dfls per crop. This specifies a scope for improvement in rural productivity. Moreover, an average cut cocoon production of 10.5 kg/100 dfls indicates tremendous potential for income generation as primary activity. It is also found that almost 34% of the sericulture households are engaged in post-cocoon activities like reeling, spinning and weaving. Out of which, 12% families are using improved reeling and spinning devices. But majority of looms are fly shuttle frame looms without accessories required for improved designs and patterns. A large quantity of eri cocoons are transacted by traders/middleman and sold outside the state. Only 15% of the cocoon are utilized locally. So there is plenty of opportunity for value addition and employment generation in post-cocoon sector.

However, many new sericultural R&D technologies have been adopted during last five years in Kokrajhar. “Platform rearing technique” has been introduced among some farmers. “C2 breed” is also introduced in some places. Wooden collapsible split type mountage is popularized by CSB REC Kokrajhar. Same can be used as brushing tray. Systematic plantation of kesseru, borkesseru and castor has been practiced in many villages. Farmers also avail the community production centre, spinning, weaving, knitting, dyeing centre etc. provided by Govt. and private farms. A cocoon bank has been set up to channelize and organize the marketing of eri cocoons. Collection of cocoon, drying of cocoon and also grading of cocoon are systematically done in the cocoon bank. Besides all these, various promotional events like trade fairs, exhibitions are regularly organized by Govt. and private organizations to boost the marketing of clothes and products of eri silk and silkworm.

The study also reveals some requirements of infrastructure and skill development. These includes, introduction of advanced techniques of spinning, knitting, weaving etc. and improved rearing technology like platform mountage etc. Separate rearing house is also a basic requirement for every farmer to increase their productivity and proper management of eri products.

From the study it is also known that there is suitable scope for product diversification and by-product utilization in eri. Eri silk has diversified fabric products, dyed fabrics as well as blended fabrics. Besides, there is immense scope for food diversification. Different recipes from eri pupa has increasing demand in all the states of NE India. Castor seeds has also good market value. The litter of eri silkworms can be used as manure.

Therefore the study indicates that since tapioca does not have any adverse effect in quality parameters of eri silk fibres, it can suitably be introduced in large scale for ericulture in Kokrajhar District. This will surely boost the net productivity of eri silk yarns and the socio-economic conditions of the eri farmers. This may also have a positive effect on other sectors related to ericulture.