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Leaf to Loom: A Comprehensive Review of Host Plant Diversity in Vanya Sericulture (Tasar, Eri, Muga)

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Based on the feeding behaviour of silkworms, sericulture can be broadly classified into mulberry and non-mulberry. Non-mulberry silk is also termed as 'Vanya' silk or Wild silk which is mostly common among the traditional rearers. Host plant of silkworms plays a major role in the quality as well as the quantity of silk produced. The non-mulberry silkworms are eri (*Samia ricini*), Muga (*Antheraea assamensis*), temperate tasar (*Antherara myllita*) and tropical tasar (*Antherara proylei*). Since non-mulberry silkworms are polyphagous in nature, thus on the basis of host plant preference the host plants can be classified as primary, secondary and tertiary. Non-mulberry sericulture is mostly practised by the tribal and local community. They depend upon this sector for their livelihood. Therefore, a keen knowledge of the host plants will help the farmers to increase the number of rearing cycles in a year which in turn will lead to increase in the productivity and yield.

Keywords: Sericulture, mulberry, non-mulberry, vanya silk, host plant, tropical tasar, temperate tasar, eri, muga, farmers livelihood.

Introduction

Sericulture is an agro-based cottage industry which involves cultivation of host plants, rearing of silkworms, reeling and spinning of cocoons for quality silk yarn. It has been acknowledged as an important sector of economy, particularly because of its potential for quicker returns within a shorter duration of time. Based on the feeding behaviour of the silkworms, sericulture is broadly classified into two distinct sectors viz. mulberry and non-mulberry. Mulberry sericulture is concerned with the rearing of mulberry silkworm for production of pure silk and non-mulberry sericulture is concerned with the production of different varieties of 'Vanya' or wild silks by rearing eri (*Samia ricini*), muga (*Antheraea assamensis*), tropical tasar (*Antheraea myllita*) and temperate tasar (*Antheraea proylei*) silkworms. Non-mulberry sericulture is also known as forest or 'vanya' or wild sericulture which holds a great promise for the agro industries. It is uniquely suited to the economy and social structure of developing countries because of its minimum investment requirement, high employment and foreign exchange earning potential. Food plant plays a major role in silk production. The growth, development and economic characters of silkworms are influenced to a great extent by a variety of food plants and nutritive contents of the foliage.

Host Plant

Host plant is a primary factor in sericulture industry. The availability of the host plant with quality leaves play a very important role in the rearing of silkworm. The numbers of cycle to be reared in a year and the total number of silkworms or disease free layings (dfls) to be reared per batch depends greatly upon host plant leaf availability in that area. Good agronomic practices play a vital role in the production of quality leaves. The host plant selection behaviour or feeding preferences are largely mediated by the presence and distribution of secondary metabolites in plants. These chemicals in the foliage are classified

according to their effect on the behaviour and host-plant selection by insects. The host plants have profound effect on survival, rate of food intake, digestion and assimilation. The amount and quality of food intake by the silkworm larvae influence different parameters like growth rate, larval duration, survival rate and reproductive potential. It was stated that the quality of leaf influences the growth and development of silkworm and overall silk production.

Host Plants of Eri Silkworm

Eri silkworm (*Samia ricini*) is a multivoltine and polyphagous species, which feeds on diversified host leaves. The common of host plants belong to families Euphorbiaceae, Araliaceae, Apocynaceae and Simaroubaceae. It feeds over 29 species of host plants. Castor (*Ricinus communis* L.) and Kesseru (*Heteropanax fragrans* Seem.) are the major food plants of eri silkworm. There are several secondary host plants also viz., tapioca (*Manihot esculenta*), Barpat (*Ailanthus grandis* Baiu.), Barkesseru (*Ailanthus excelsa* Roxb.), Payam (*Evodia flaxinifolia* Hook.), etc. which are used for rearing of eri silkworms during the scarcity of primary host plants. Although mulberry dominates the global silk market, among the non-mulberry silks, eri is extensively utilized as a dazzling white natural fibre with thermal properties. India is the largest producer of eri silk in the world as 96% of total eri silk is produced in India. The primary, secondary and tertiary host plants of eri silkworm are listed clearly in Table 1 .

Table 1: host plant of eri silkworm

Status of Food Plants	Host Plants	Family
Primary	<i>Ricinus communis</i> L.	Euphorbiaceae
	<i>Heteropanax fragrans</i> (Roxb.) Seem.	Araliaceae
Secondary	<i>Manihot esculenta</i> , Crantz.	Euphorbiaceae
	<i>Evodia fraxinifolia</i> , Hook.	Rutaceae
	<i>Ailanthus excelsa</i> , Roxb.	Simaroubaceae
	<i>Ailanthus grandis</i> , Prain.	Simaroubaceae
	<i>Ailanthus glandulosa</i> , Desf.	Simaroubaceae
Tertiary	<i>Ailanthus tryphisa</i> , (Dennst.) Alston.	Simaroubaceae
	<i>Carica papaya</i> , L.	Caricaceae
	<i>Celastrus monospermus</i> , Roxb.	Celastraceae
	<i>Cinnamomum cecicodaphne</i> , Meissn.	Lauraceae
	<i>Cinnamomum glanduliferum</i> , (Wall) Meissn. <i>Coriaria nepalensis</i> , Wall.	Lauraceae
	<i>Gmelina arborea</i> , Roxb.	Coriariaceae
	<i>Hodgsonia heteroclite</i> , (Roxb.) Hook	Verbenaceae
	<i>Jatropha curca</i> , L.	Cucurbitaceae
	<i>Jatropha multifida</i> , L.	Euphorbiaceae
	<i>Micromelum pubescens</i> , Blume.	Euphorbiaceae
	<i>Oroxylum indicum</i> (L.) Benth. ExKurz.	Rutaceae
	<i>Plumeria acutifolia</i> , Poir.	Bignoniaceae
	<i>Plumeria rubra</i> , L.	Apocynaceae
	<i>Sapium eugenifolium</i> , Buch.-Ham. Ex Hook.	Apocynaceae
	<i>Sapium sebiferum</i> , Roxb.	Euphorbiaceae
	<i>Zanthoxylum alatum</i> , Roxb.	Euphorbiaceae
	<i>Zanthoxylum rhesta</i> , Roxb.	Rutaceae
	<i>Zizyphus mauritiana</i> , Lamk.	Rutaceae
	<i>Mechelia champaca</i> , L.	Rhamnaceae
	<i>Artocarpus heterophyllus</i> , Lam.	Magnoliaceae
<i>Spathodea companulata</i> P Beauv.	Moraceae	
<i>Ficus benghalensis</i> , L.	Bignoniaceae	
<i>Terminalia catappa</i> , L.	Moraceae	
<i>Daucus carota</i> , L.	Combretaceae	

Host Plants of Muga Silkworm

Muga silk is produced by the silkworm *Antheraea assamensis* Helfer. It is a polyphagous insect feeding on a wide range of plants. The food plants have wide distribution throughout the North-eastern India and in some parts of Northern India. These plants are widely available in the states of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttaranchal, Uttar Pradesh, Gujarat, West Bengal and Pondicherry and sporadically available in Arunachal Pradesh. Muga silkworm feeds on a wide range of plants viz., som (*Persea bombycina*) and soalu (*Litsea monopetala*) being the primary host plants, and dighloti (*Litsea salicifolia*) and mejankori (*Litsea citrata*) as the secondary host plants. A few other minor host plants viz., *Cinnamomum glaucescens*, *Actinodaphne obovata*, *Michaela champa*, *Zizyphus jujuba*, *Xanthoxylum rehsta*, *Celastrus monosperma* are also available and are considered tertiary in nature. The list of host plants of muga silkworm is mentioned in Table 2

Table 2: host plant of muga silkworm

S.No.	Common / Local name	Scientific name
1	Som	<i>Persea bombycine</i> Kost
2	Soalu	<i>Litsea monopetala</i> Roxb
3	Dighloti	<i>Litsea salicifolia</i> Roxb.
4	Mejankori	<i>Litsea citrate/cubeba</i> Pers
5	Kathalua	<i>Litsea nitida</i> Roxb.
6	Champa	<i>Michelia champaca</i> Linn.
7	Panchapa	<i>Magnolia champaca</i> Linn.
8	Patihond	<i>Actinodaphne obovate</i> Blume
9	Sugandh Kokila	<i>Cinnamomum glauscence</i> Nees
10	Kapoor	<i>Cinnamomum camphara</i> L Presl
11	Tejpat	<i>Cinnamomum albiforum</i> Nees.
12	Ganasarai	<i>Cinnamomum glanduliferum</i> Meissn.
13	Chhamejam	<i>Cinnamomum obtusifolium</i> Ness.
14	Gambhar	<i>Gmelia arborea</i> Roxb
15	Kaula	<i>Persea odoratissima</i> Ness.
16	Baghnala	<i>Actinodaphne angustifolia</i> Ness.
17	Borsoppa	<i>Michelia oblonga</i> Wall
18	Bajramoni	<i>Zanthoxylum rhesta</i> D.C
19	Ber	<i>Ziziphus jujuba</i> Lamk
20	Bhumlati	<i>Celastrus monosperma</i> Roxb.
21	Ludh	<i>Michelia oblonga</i> wall.
22	Lodh	<i>Symplocos ramosissima</i> wall.
23	Symplocas	<i>Symplocos grandiflora</i> wall

Tropical Tasar Silkworm Host Plant

Antheraea mylitta Drury is a semi-domesticated sericigenous insect which produces the world famous Indian tropical tasar silk. It is widely distributed in the natural forests located at different altitudes over central India. Being polyphagous, the silkworm usually feeds on the leaves of primary food plants such as Asan (*Terminalia alata* W. & A.), Arjun (*Terminalia arjuna* W. & A.) and Sal (*Shorea robusta* Gaertn). However, more than two dozens of secondary host plants are also available in the natural forests of Indian tropical tasar belt of which Ber (*Ziziphus jujuba* Gaertn), Sidha (*Lagerstroemia parviflora* Roxb.), Axlewood (*Anogeissus latifolia* Wall.), Bahada (*Terminalia belerica* (Gaertn) Roxb.) and Jamun (*Syzygium cumini* (L.) Skeels) are the most abundant species. Since feeding of nutritionally enriched leaves directly influences better growth and development of silkworm larva as well as the quality and quantity of silk production, establishment of food plant specificity of silk insect along with evaluation of the commercial parameters in each food plant during different seasons is highly essential for increasing the production of raw silk and seed cocoons. The list of host plants of tasar silkworm is mentioned in Table 3

Table 3: host plant of tropical tasar silkworm

Status of Food Plant	Host Plants	Family
Primary	<i>Terminalia arjuna</i>	Combretaceae
	<i>Terminalia tomentosa</i>	Combretaceae
	<i>Shorea robusta</i>	Dipterocarpaceae
Secondary	<i>Anogeissus latifolia</i>	Combretaceae
	<i>Hardwickia binata</i>	Fabaceae
	<i>Lagerstroemia parviflora</i>	Lythraceae
	<i>Zizyphus jujube</i>	Rhamnaceae
	<i>Zizyphus mauritiana</i>	Rhamnaceae
	<i>Artocarpus lakoocha</i>	Moraceae
Tertiary	<i>Bauhinia variegata</i>	Fabaceae
	<i>Bombax ceiba</i>	Malvaceae
	<i>Buchanania latifolia</i>	Anacardiaceae
	<i>Canthium didymum</i>	Rubiaceae
	<i>Careya arborea</i>	Lecythidaceae
	<i>Carissa carandas</i>	Apocynaceae
	<i>Celastrus paniculatus</i>	Celastraceae
	<i>Chloroxylon sweitenia</i>	Rutaceae
	<i>Cipadessa fruticosa</i>	Meliaceae
	<i>Dalbergia sissoo</i>	Fabaceae
	<i>Diospyros lanoxylon</i>	Ebenaceae
	<i>Dodonea viscosa</i>	Sapindaceae
	<i>Embelica officinalis</i>	Phyllanthaceae
	<i>Ficus bengalensis</i>	Moraceae
	<i>Ficus benamina</i>	Moraceae
	<i>Ficu hispida</i>	Moraceae
	<i>Ficus religiosa</i>	Moraceae
	<i>Ficus retusa</i>	Moraceae
	<i>Ficus tsjakela</i>	Moraceae
	<i>Ficus tsiela</i>	Moraceae
	<i>Gardenia lucida</i>	Rubiaceae
	<i>Garuga pinnata</i>	Burseraceae
	<i>Lagerstroemia indica</i>	Lythraceae
	<i>Lagerstroemia speciosa</i>	Lythraceae
	<i>Madhuca indica</i>	Sapotaceae
	<i>Melastoma malabathricum</i>	Melastomataceae
	<i>Messua ferrea</i>	Calophyllaceae
	<i>Mimusops elangi</i>	Sapotaceae
	<i>Prynus domestica</i>	Rosaceae
	<i>Pterocarpus marsupium</i>	Fabaceae
	<i>Rhizophora caseolaris</i>	Lythraceae
	<i>Semecarpus anacardium</i>	Anacardiaceae
	<i>Shorea talura</i>	Dipterocarpaceae
<i>Syzygium cumini</i>	Myrtaceae	
<i>Syzygium jambos</i>	Myrtaceae	
<i>Tectona grandis</i>	Lamiaceae	
<i>Terminalia bellercia</i>	Combretaceae	
<i>Terminalia catappa</i>	Combretaceae	
<i>Terminalia chebula</i>	Combretaceae	
<i>Terminalia paniculata</i>	Combretaceae	
<i>Zizyphus rugosa</i>	Rhamnaceae	
<i>Zizyphus xylopyrus</i>	Rhamnaceae	

Host Plants of Temperate Tasar Silkworm

The temperate tasar silkworm, known as *Antheraea proylei*, feeds on a variety of food plants like *Quercus incana*, *Q. himalayana*, *Q. semicarpifolia*, *Q. grifithi*, and *Q. serrata*. These food plants are available in the entire sub-Himalayan belt of the country bounds Jammu and Kashmir in North-West to Manipur in the North-east comprising of many other states in

between including Himachal Pradesh and Uttarakhand in North-western part of the nation. The topography of these regions is different from other parts of the country comprising of high terrains, deep gorges and dense forests. Agro-climatic conditions of this region are characterized by severe and prolonged winter. Distribution and cultivation of the oak species varies with the altitude. Sometimes the same species sprouts at different times at different altitudes. Indian oak provides a unique ecosystem having both deciduous and evergreen forests. Among the various species of oak, 16 species are popular and widely distributed in different parts of the country. A total of 10 species are growing in eastern part of the country and 6 species in the Western Himalayas.

Table 4: Host plant of temperate tasar silkworm

Status of Food Plant	Host Plants	Family
Primary	<i>Lithocarpus dealbata</i>	Fagaceae
	<i>Quercus acutissima</i>	Fagaceae
	<i>Quercus floribunda</i>	Fagaceae
	<i>Quercus griffithii</i>	Fagaceae
	<i>Quercus leucotrichophora</i>	Fagaceae
	<i>Quercus semecarpifolia</i>	Fagaceae
	<i>Quercus semiserrata</i>	Fagaceae
Secondary	<i>Castanopsis indica</i>	Fagaceae
	<i>Castanopsis lancaefolia</i>	Fagaceae
	<i>Castanopsis purpurella</i>	Fagaceae
	<i>Lithocarpus fenestrata</i>	Fagaceae
	<i>Lithocarpus xylocarpa</i>	Fagaceae
	<i>Quercus baloot</i>	Fagaceae
	<i>Quercus glauca</i>	Fagaceae
	<i>Quercus kamroopi</i>	Fagaceae
	<i>Quercus lamellosa</i>	Fagaceae
	<i>Quercus lanata</i>	Fagaceae
<i>Salix viminalis</i>	Salicaceae	

Conclusion

Sericulture plays a major role in the economy and social structure of a developing country. The success of sericulture industry primarily depends upon various rearing practices. Among them, host plant maintenance and availability is of utmost importance to increase the productivity as well as the quality of silk produced. This in turn also determines the number of silkworms to be reared per batch and per year. The growth, development and the commercial characters greatly depend on the type and nutritive content of the host plants. Most of the tribal and local people depend upon the non-mulberry or wild silkworm rearing as their livelihood therefore a keen knowledge of primary, secondary and tertiary host plants will help the farmers to increase the number of rearing cycles in a year. Thus, the study of non-mulberry host plant will help the 'Vanya' silk industry to increase production and productivity round the year.

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