AGRICULTURE & FOOD: E- NEWSLETTER
www.agrifoodmagazine.co.in
e-ISSN : 2581 - 8317 Volume 1 – Issue 12 – December 2019

Exploring the utilization potential of *Ficus* species for cultivation of lac insects (*Kerria* species) in India

Invited article id: 1016

Vaibhav D Lohot*, Jyotirmoy Ghosh, Thamilarasi K, A. Mohanasundaram, Rajagopal N.N, V.V. Thakur and K.K. Sharma
Lac Production Division, ICAR-Indian Institute of Natural Resins and Gums, Namkum, Ranchi-834010 (Jharkhand) India

Ficus species commonly known as 'Fig', is considered as a keystone species in tropical rain forests which is distributed throughout India. Besides commercial uses for fruits (F. carica) and rubber latex (F. elastica) it is also a host plant for lac insects (Kerria spp.) known for producing a resin called 'lac' which finds application in many industrial sectors. Lac cultivation is an important source of income for livelihood of the forest and sub-forest dwellers of Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha. Lac resin is a protective covering over insect body produced by ingesting phloem sap from the host plants. Recent surveys and past reports suggests that Ficus species may serve as an important host for lac cultivation thorough out India.

INTRODUCTION

Ficus L. (Moraceae), commonly known as 'Fig', is considered as a keystone species in tropical rain forests. The species are distributed throughout India from South to North up to the Himalayas at about 2,000 m elevations. North-East region has maximum diversity of the species followed by the Peninsular region and Andaman and Nicobar Islands. It is one of the largest genera in the angiosperms with ca.750 species worldwide and 115 taxa (89 species and 26 infraspecific taxa) in India. The genus is distributed throughout the world primarily in subtropical and tropical regions. The *Ficus* fruits are available throughout the year and relished by insects, birds and animals, therefore plays very fundamental role in ecosystem (Chaudhary *et. al*., 2012). Some *Ficus* species are commercially exploited for fruit (*F. carica*) and rubber latex (*F. elastica*). Besides, few *Ficus* species (*F. benghalensis, F. religiosa, F. glomerata,* and *F. rumphii*) are also served as a host plant for lac insects (*Kerria* spp.) known for producing a resin called 'lac' (Fig. 1). Lac basically consist of three natural components *viz*., resin, dye and wax which finds application in many industrial sectors like food, cosmetic and jewellary, electrical and electronics, pharmaceutical, textile, adhesive, varnish, lacquer and paints etc (Fig. 2). Lac cultivation is an important source of income for livelihood of the forest and sub-forest dwellers of Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and parts of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region (Mukhopadhyay and Muthana 1962; Sharma and Ramani, 2010).

Indian lac insects belong to the family Tachardiidae (=Kerridae), order Hemiptera and superfamily Coccoidea are phytosuccivorous and sessile. Only female synthesize lac resin as a protective covering over its body by ingesting phloem sap from the host plants (Fig. 3 & 4). Lac is the only resin of animal origin and is a natural polymer, exploited for its commercial purposes. Besides providing employment, it is a highly remunerative crop, paying high economic returns to the farmers and country (foreign exchange) through its export. The estimated national production of lac during 2015-16 was approximately 18,746 tons. The total export of lac and its value added products during the year 2015-16 was 7668.42 tons which was valued at 247.55 crore (Yogi *et al*., 2018). Apart from India, lac is also produced in Thailand, Indonesia, parts of China, Myanmar, Philippines, Vietnam, Cambodia etc. and India is the largest producer of lac in the world. The first account of lac insects came from James Kerr in 1781 on *Ficus religiosa* and *Ficus indica* (now *F. benghalensis*) along with *Butea monosperma and Ziziphus mauritiana* from Bihar region (Now Bihar, Jharkhand and some

e-ISSN : 2581 - 8317 Volume 1 – Issue 12 – December 2019

parts of West Bengal). Since then many workers reported *Ficus* species (*F. benghalensis, F. religiosa, F. glomerata, F. rumphii, F. lacor,* and *F. semicordata*) as a host plant for lac insects from different parts of the country (Sharma *et al*., 1997).

Based on the preference of host-plants by lac insect, host plants are classified into 3 categories (i) 'common' hosts or major hosts; (ii) the 'occasional' hosts; and (iii) the 'rare' hosts. Common host plants of all India importance are *Schleichera oleosa* (Lour.) Oken; *Butea monosperma* (L.) Taub. *and Ziziphus mauritiana* (Lam). Another category in common host is the host of regional importance and for specific purposes. *Ficus* species comes under the category of common host for specific purposes. Lac insect on *Ficus* species has special value being that it can be utilized successfully for tiding over the hot period for the preservation of the *Baisakhi* broodlac (the starting material for next generation) therefore called 'summer broodlac preservers'. *Rangeeni* and *kusmi* are the two strains of Indian lac insect which are classified based on preference of the insect for specific host plants. *Rangeeni* is characterized by unequal duration of bivoltine life cycle and has preference for *palas* (*Butea monosperma*) as host, whereas *kusmi* by and large has equi-durational life cycle prefer *kusum* (*Schleichera oleosa*) as host. The *rangeeni* strain also survives very well on above mentioned *Ficus* species. Moreover, in addition to *rangeeni* strain preference, *F. rumphii* also supports *kusmi* strain.

The *rangeeni* strain's *baisakhi* (summer season) life cycle spans from October to June and *katki* (summer season) life cycle spans from June to October. Till, recent past years, *rangeeni* lac resin (lac obtained from *rangeeni* strain of lac insect) had the major share in India's total lac production. But in today's scenario, it has some survival issues due to hot summer days and parasitoids threat, thereby discontinuing life cycle. Therefore, *Ficus* species may serve as life savers for this *rangeeni* lac insect strain during summer thereby ensuring continuous life cycle for lac production.

Recent surveys and past literature reports states that lac is found on Ficus species practically all over North India (Rajasthan, Punjab, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Bihar, Jharkhand, and West Bengal) and in North East region (Assam and Meghalaya). Recently lac insect was also recorded from Tamil Nadu [Vellore and Puliampatty, Erode], Rajasthan (Udaipur) on *F. religiosa,* in Uttar Pradesh and Kolkata city on few ficus species (not able to identify) (Fig. 5 & 6). Lac insects were also observed on *Ficus benghalensis*, *F. religiosa* and *F. recemosa* at Masigunda, Mahboonagar district, Telangana during 2016. Presence of lac insect species like *K. communis* (Mahadihassan), *K. chamberlini, K. ebrachiata* (Chamberlin), *K.fici fici* (Green), *K. fici jhansiensis* (Misra), *K. lacca mysorensis* (Mahadihassan) were also reported on *Ficus* species (Varshney 1992).

Past literature shows that Kusum (*Schleichera oleosa*) was considered as best host in lac cultivation also good host for summer season lac crop but its occurrence (frequency) throughout India is less. Moreover, not much importance has given to Ficus species for lac cultivation. Occurrence of lac insect species on several *Ficus* species and its distribution throughout India, makes *Ficus* host plant a versatile one and can be placed in 1st category 'common' hosts or major hosts of all India importance. Initiatives for scientific lac cultivation may be taken up at earliest to harness the benefit of lac resin.

e-ISSN : 2581 - 8317 Volume 1 – Issue 12 – December 2019

Fig 1: Lac Resin

Fig 2: Commercial application of lac resin in different products

Fig 3: Nymph of Lac Insects (Crawlers)

Fig 4: Female lac insect

Fig. 5: Indian lac insect (*K. lacca*) Kerr. on Pipal (*Ficus religiosa*)

L

e-ISSN : 2581 - 8317 Volume 1 – Issue 12 – December 2019

Fig. 6: Indian lac insect (*K. lacca*) Kerr. on Barh (*Ficus benghalensis*)

REFERENCES

[1]. Chaudhary L.B., Sudhakar J.V., Kumar A., Bajpai O,, Tiwari R and Murthy G.V.S. (2012). Synopsis of the Genus *Ficus* L. (Moraceae) in India. Taiwania, 57(2): 193-216
[2]. Mukhopadhyay B. and Muthana M.S. (1962). A monograph on Lac. Indian Lac Research Institute, Namkum, Ranchi, Bihar, India.
[3]. Sharma K.K. and Ramani R. (2010). Lac and Lac Research. Recent Advances in Lac Culture (eds.). IINRG, Ranchi.1-11.
[4]. Sharma K.K., Ramani R., and Mishra Y.D. (1997). An additional list of the host plants of lac insects, Kerria spp.(Tachardidae:Homoptera). Journal of Non-Timber Forest Products 4 (3/4), 151-155
[5]. Varshney R.K. (1992). A check list of the scale insects and mealy bugs of South Asia. Part -1. Records of the Zoological Survey of India. Occasional Paper No. 139.
[6]. Yogi R.K., Kumar A. and Singh A. K. (2018). Lac, Plant Resins and Gums Statistics 2016: At a Glance. ICAR-Indian Institute of Natural Resins and Gums, Ranchi (Jharkhand), India. Bulletin (Technical) No. 19/2018. 01-80 pp.