



OCURRENCE OF LAC INSECTS AND THEIR HOST PLANTS IN TAMIL NADU AND KERALA

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ABSTRACT

Occurrence of natural populations of lac insects (Hemiptera: Tachardiidae) were observed on *Amherstia nobilis* at Thrissur of Kerala; on *Albizia saman* at Madurai, Salem, Vellore and Thiruvallur of Tamil Nadu and on *Ficus religiosa* at Erode and Vellore of Tamil Nadu. Dead lac insects were observed on *A. saman*, at Thenkasi and Theni in Tamil Nadu. *Albizia saman*, *Albizia lebbek*, *Ficus religiosa*, *Ficus bengalensis* and *Ziziphus mauritiana* were the most common lac host plants found in surveyed areas, but lac insect populations were observed only at some locations. The survey led to identification of two new species of *Kerria*. The molecular analysis based on *cox1* sequence classified the collected lac insects from Tamil Nadu and Kerala under *rangeeni* strain. Newly collected lac insect lines from Tamil Nadu and Kerala clustered with *K. lacca* in phylogenetic tree. Hence, there is a need for a detailed survey in unexplored parts. The study also revealed that Madurai and Thrissur accessions did not perform well in Jharkhand. Agroecological region wise survey and maintenance is suggested for conserving lac associated faunal and floral diversity.

Key words: *Kerria*, lac insect, lac hosts, *Amherstia nobilis*, *Albizia saman*, *Ficus religiosa*, *cox1*, phylogenetics

Lac insects belong to the family Tachardiidae; species of the lac insect belonging to genus *Kerria* are commercially important, as they produce resin, dye and wax. Lac derived materials find numerous applications in industrial sectors like food, pharmaceuticals, cosmetics, perfumes, polishes, varnishes, paints, adhesives, jewelry and in textile dye. Lac insects require specific plant species as host for their survival. More than 400 lac host plants had been documented (Sharma et al., 1997). Economically important lac insect species are distributed in tropical and subtropical areas of South and Southeast Asia. India is the global leader in lac production. Lac and lac related products earned foreign exchange of around 568 crore rupees in 2013-14 (Yogi et al., 2014). Lac in India is cultivated mainly in Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Odisha and parts of some other states, derived mainly from *Kerria lacca*.

India is the home of the *Kerria* spp. Twenty out of the 27 species of this genus are from India (Sharma et al., 2006). However, natural populations of other species of *Kerria* are distributed throughout India. *Kerria communis* had been reported from south India viz., Andhra Pradesh, Goa, Karnataka, Kerala and Tamil Nadu whereas; *Kerria lacca mysorensis* had been

reported from Karnataka. The Indian lac insect, *Kerria lacca* (Kerr), can be further distinguished into two infra subspecific forms (strains), the *rangeeni* and *kusmi* on the basis of differences in lifecycle, host plant preference and quality of lac produced. *Rangeeni* is characterized by unequal duration of bivoltine life cycle and preference of *palas* (*Butea monosperma*) as host, whereas *kusmi* by and large has equi-durational life cycle prefer *kusum* (*Schleichera oleosa*) as host. The major host plants of *K. lacca* include *palas*, *kusum*, *ber*, *Ficus* spp., red gram (*Cajanus cajan*) and *Flemingia semialata* (Sharma and Ramani, 2010; Ghosh et al., 2014; 2017).

Tamil Nadu and Kerala, do not contribute to lac production. In 1980s, lac used to be cultivated on *kusum* plantation at Vannathiparai, Theni district. Before 1950s, lac was also cultivated on *Shorea talura* at Thali, Deverbetta. In Kerala, natural populations of *Kerria* are found and several traditional ayurvedic medicines and health formulations of the state incorporate lac. Both the states are important from lac insect genetic resource standpoint. Surveys were undertaken to locate natural lac insect populations in both the states. Populations of collections from these two states were cultured at Ranchi for morphological and molecular

studies. Details of the distinct populations found are presented in this paper.

MATERIALS AND METHODS

Survey and collection of lac insects and host plants: Surveys were carried out in Tamil Nadu and Kerala. Surveys were undertaken during 4 to 17th July, 2011; 15 to 24th July, 2013; 7 to 21st July, 2014 and 26th October to 4th November, 2015. Before survey, information on the occurrence of lac insects was acquired from organizations viz., Botanical Survey of India, Coimbatore; Zoological Survey of India, Chennai; Agricultural Universities and State Forest Department about lac insect/ host plant availability. The lac insect populations were located through visual observations and through binoculars, especially on reported lac host species. If lac insects were noticed, then the branch/ twigs having the lac insect colonies were cut by using secateurs and covered with moistened cotton plugs at both the ends to avoid dehydration and kept in the 60 mesh synthetic net with proper label. Altitude, latitude and longitude of the location were marked using GPS (Garmin Oregon®550). If, proper lac insect stage (larviposition) was not observed, visits were made subsequently to the respective places for collection and its conservation at appropriate stage.

Collected lac insects were brought to ICAR-Indian Institute of Natural Resins and Gums (ICAR-IINRG), Ranchi and inoculated live on potted plants of *Flemingia macrophylla* in National Lac Insect Germplasm Centre (NATLIGEC). Lac insect samples collected from Madurai and Thrissur were identified at ICAR-Indian Agricultural Research Institute, New Delhi, on morphological basis. Evaluation of biological attributes of lac insects collected from Madurai and Thrissur were carried out during *baisakhi* (summer season) crop 2013 and 2014.

Molecular analysis of lac insects: Molecular analysis for barcoding the new lac insects collected from Thrissur (Kerala), Madurai, Salem and Puliampatty (Tamil Nadu) was carried out at ICAR-IINRG, Ranchi. Genomic DNA was isolated from the lac insects using HiMedia Insect DNA preparation kit following manufacturer's instructions. The genomic DNA was amplified with *cox1* primers (BCF1: 5'-GATATT GGA TTT ATA TAT TTA TAT RKA GG-3' and BCR1: 5'-GGTGACCAAAAAATCAGAATAAATG-3') designed for lac insects based on universal primers. The PCR mixes of 25 µl contained, 25 ng of template DNA, 0.25 mM of each dNTP (Fermentas Inc, MD,

USA), 10 pico moles of each primer, 1.25 units of *Taq* DNA polymerase (Fermentas Inc., MD, USA). All the PCR reactions were carried out in a thermal cycler (Sensoquest, Germany) programmed with the following cycling condition: one cycle of initial denaturation at 95 °C for 5 min; 35 cycles of denaturing at 95 °C for 30 sec; annealing at 54 °C for 30 sec and extension at 72 °C for 1 min; final extension step of 7 min at 72 °C. The PCR products thus obtained were sequenced at Xcelris Labs Ltd, Ahmedabad. The sequences were analyzed using Geneious (6.1.8) software (Kearse et al., 2012) and submitted to GenBank. Phylogenetic tree of these samples were constructed along with already reported 53 COI sequences (from ICAR-IINRG) using Mega version 6 (Tamura et al., 2013). The GenBank accession numbers of lac insect lines from IINRG, Ranchi used for construction of phylogenetic tree are from HQ323758 to HQ323810.

RESULTS AND DISCUSSION

Host plants

Sixteen districts from Tamil Nadu and five districts from Kerala were surveyed. Visual survey was made in the peripheral areas and a numbers of host plants were observed (Tables 1, 2). Natural population of lac insect was observed on *Albizia saman* (Jacq.) F. Muell., *Ficus religiosa* L. and *Amherstia nobilis* (Wall.). *A. saman* commonly known as Rain tree in English and belati-siris in Hindi is an eye-catching, semideciduous, nitrogen fixing tree belongs to family Mimosoideae (Fabaceae). It has heavy branching with wide spreading crown and attains a height of 30 m. It grows well in 0-1300 m altitude with mean annual temperature of 20-35 °C and mean annual rainfall 600-3000 mm. It is normally found on neutral to moderately acid soils and can grow on light or heavy soils and tolerates infertile or waterlogged conditions.

Ficus religiosa commonly known as *peepal* or *pipal* tree is an evergreen or deciduous tree, belongs to family Moraceae. It can grow 20 m tall with wide-spreading branches without aerial roots from the branches. Fruit fig, is a favorite amongst birds. It grows well in up to 1520 m altitude with mean annual temperature of 16-35°C and mean annual rainfall 500-5000 mm. It grows well on a wide variety of soils but prefer deep, alluvial sandy loam with good drainage. It is also found on rock crevices.

A. nobilis is an extremely rare introduced ornamental tree, considered as the 'queen of the

Table 1. Lac host plants found in Tamil Nadu

Place	Surveyed areas	Host plants observed	Period
Coimbatore	Tattamangalam, Kollangode Kalappatti, Kondaiyanpalayam, Ellapalaiyam, Annur, Pongalur, Udumalaipettai, Pollachi & Coimbatore South.	<i>A. catechu</i> , <i>A. lebbek</i> , <i>A. saman</i> , <i>B. monosperma</i> , <i>Ficus</i> sp., <i>P. ferrugenum</i> , <i>Prosopis juliflora</i> & <i>Ziziphus mauritiana</i>	July, 2011
Erode	Satyamangalam, Gopichettipalayam & Perundurai	<i>A. saman</i> , <i>Ficus</i> sp. <i>P. juliflora</i> , & <i>Z. mauritiana</i>	July, 2011
Tirupur	Kangeyam and Dharapuram		July, 2011
Madurai	Madurai North, Thirumangalam, Periyur, Usilampatti & Madurai South		July, 2011
Virudhunagar	Kariyapatti, Aruppukkottai, Kovilpatty, Rajapalayam & Srivilliputtur	<i>A. saman</i> , <i>Ficus</i> sp. & <i>P. juliflora</i>	July, 2011
Thoothukudi	Ettaiyapuram & Ottappidaram	<i>A. saman</i> , <i>Ficus</i> sp. <i>P. juliflora</i> & <i>Z. mauritiana</i>	July, 2011
Thirunelveli	Palayamkottai, Ambasamudram, Alangulam, Thenkashi, Senkottai & Sivagiri	<i>A. saman</i> , <i>Ficus</i> sp. <i>P. juliflora</i> & <i>Z. mauritiana</i>	July, 2011
Theni	Andipatti, Theni Town, Uttamapalayam, Kambam, Kudalur, Surulipatti & Periyakulam	<i>A. saman</i> , <i>Butea frondosa</i> & <i>S. oleosa</i>	July, 2011
Dindigul	Chinnalapatti, Gandhigram, Sembatti, Vattlakundu, Nilakottai, Konappati, Kopalpatty, Nattam, Sendurai, Oddanchattram & Palani	<i>A. saman</i> , <i>A. lebbek</i> , <i>Ficus</i> sp., <i>P. ferrugenum</i> , <i>P. juliflora</i> & <i>Z. mauritiana</i>	July, 2011
Coimbatore	Thdiyalar, Karamadai, Mettupalaiyam, Forest College and Research Institute, TNAU	<i>Acacia</i> species viz., <i>Acacia leucophloea</i> (white bark <i>acacia</i>), <i>Acacia mellifera</i> , <i>A. chundra</i> and <i>A. nilotica</i> . Other lac host plants viz., <i>Albizia saman</i> , <i>A. lebbek</i> , <i>Ficus</i> sp., <i>Prosopis cineraria</i> , <i>Prosopis juliflora</i> . A thorn less <i>Ziziphus glabrata</i>	July, 2014
Erode	Puliyampatty, Sathyamangalam, Thenkumarada, Bannari, Dhimbam, Hasanur, Thalamalai, Bhavanisagar, Sushilkuttai, Thenkumarada, Gopichettipalayam & Bhavani	<i>A. lebbek</i> , <i>A. saman</i> , <i>Butea monosperma</i> , <i>Desmodium pulchellum</i> , <i>Ficus</i> spp, <i>Flemingia grahamiana</i> , <i>Schleichera oleosa</i> , <i>Shorea talura</i> (patches) <i>Ziziphus glabrata</i> (thornless) & <i>Ziziphus mauritiana</i> .	July, 2014
Salem	Servarayan hills (Yercaud, Karadiyur, Navalur, Kuppanur & Vazhapadi)	<i>A. lebbek</i> , <i>A. saman</i> , <i>B. monosperma</i> , <i>Ficus</i> sp, <i>P. ferrugenum</i> , <i>S. oleosa</i> , <i>Spatholobus perviflorus</i> , <i>S. talura</i> & <i>Ziziphus mauritiana</i> ,	July, 2014
Dharmapuri	Dharmapuri, Pennagaram, Hogenakkal, Palakkodu, Rayakottai & Denkanikota	<i>Acacia</i> sp, <i>A. lebbek</i> , <i>A. saman</i> , <i>Ficus</i> spp & <i>Prosopis juliflora</i> ,	July, 2014

Table 1 (Contd...)

Krishnagiri	Thali, Deverbetta & Hosur	<i>Acacia auriculiformis</i> , <i>A. lebbek</i> , <i>A. saman</i> , <i>B. monosperma</i> , <i>Ficus benghalensis</i> , <i>Ficus religiosa</i> , <i>Mallotus phillippensis</i> , <i>P. ferrugenum</i> , <i>P. juliflora</i> , <i>S. talura</i> (patches) & <i>Z. mauritiana</i>	July, 2014
Madurai and Dindigul	Mulaiyur, Alanganallur, Palamedu, Madurai North, Azhagarkovil, Vadipatty, Kodai road, Dindigul & Oddanchattram	<i>A. lebbek</i> , <i>A. saman</i> , <i>B. monosperma</i> , <i>Ficus sp.</i> , <i>M. phellippensis</i> , <i>S. oleosa</i> & <i>Z. mauritiana</i>	July, 2014
Tirupur and Coimbatore	Dharapuram & Palladam	<i>A. lebbek</i> , <i>A. saman</i> , <i>Ficus spp.</i> , <i>P. juliflora</i> & <i>Z. mauritiana</i>	July, 2014
Chennai	Vandalur Zoo & Chennai	<i>A. saman</i> , <i>Ficus spp.</i> , <i>P. ferrugenum</i> & <i>Ziziphus spp.</i>	October, 2015
Kanchipuram	Sriperumpudur	<i>Acacia spp.</i> , <i>A. saman</i> , <i>Ficus spp.</i> , <i>P. ferrugenum</i> & <i>Ziziphus spp.</i>	October, 2015
Vellore	Jawadhu hills at different places viz., Amirthi, Jamnamarathur etc., Kavalur forest area, Alangayam, Yelagiri forest hills, Arcot & Arakkonam	<i>Acacia spp.</i> , <i>A. lebbeck</i> , <i>A. saman</i> , <i>B. monosperma</i> , <i>Ficus spp.</i> , <i>M. philippensis</i> , <i>P. ferrugenum</i> , <i>S. oleosa</i> , <i>Ziziphus spp.</i> & <i>Ziziphus mauritiana</i>	October, 2015
Thiruvellore	Thiruvellore, Rathnagiri Kanikapuram & Thiruthani hills	<i>Acacia spp.</i> , <i>A. saman</i> , <i>Ficus spp.</i> , <i>P. ferrugenum</i> & <i>Ziziphus spp.</i>	October, 2015

Table 2. Lac host plants found in Kerala

Place	Surveyed areas	Host plants observed	Period
Thrissur	Peechi, Mannuthy, Pudukad, Thrissur Town, State Museum & Zoo, Pullazhi, Vadakkencherry	<i>Acacia catechu</i> , <i>A. saman</i> , <i>A. lebbek</i> , <i>A. nobilis</i> , <i>A. squamosa</i> , <i>Ficus spp.</i> , <i>P. ferrugenum</i> , <i>S. oleosa</i> & <i>Z. mauritiana</i>	July, 2011
Palakkad	Alattur, Chitali, Palakkad Junction & Malampuzha	<i>A. saman</i> , <i>A. lebbek</i> , <i>B. monosperma</i> , <i>Ficus spp.</i> , <i>P. ferrugenum</i> & <i>Z. mauritiana</i>	July, 2011
Thrissur	Peringavu, Kunnamkulam, Kadangod, Mannuthy, Pudukad, Chalakudi, Pariyaram & Vazhachal	<i>A. auriculiformis</i> , <i>A. lebbek</i> , <i>C. surinamensis</i> , <i>Ficus sp.</i> , & <i>M. penduliflorus</i>	July, 2013
Malappuram	Perrintalmanna, Malappuram, Manjeri, Nilambur, Tirurangadi, Kottakkal, Kalapakancheri & Velancheri		July, 2013
Wayanad	Sultan Bathery, Kalpatta & Vythiri,		July, 2013
Kozhikode	Thamarassery, Kunnamangalam, Kozhikode & Beypore		July, 2013

flowering tree, for its very gorgeous and appealing flowers. It belongs to the family Caesalpiniaceae and native to Myanmar (Burma). It grows up to 9-12m height and can be raised from cuttings. The tree was introduced in the then Royal Botanical Gardens, Calcutta by Nathaniel Wallich after 1849 and then to

rest of India (Roy, 2009). Most common lac host plants viz., *A. saman* (rain tree), *A. lebbek*, *F. religiosa*, *F. bengalensis* and *Z. mauritiana* were found in surveyed areas. Lac insects were found on the ornamental plant, *A. nobilis* at State Museum and Zoo, Thrissur, Kerala (Fig. 1).



Fig. 1. Lac insects on *A. nobilis* - Thrissur



Fig. 2. Lac insects on *A. saman* - Salem

Sudheendrakumar and Varma (1999) had observed *Kerria* sp on *A. nobilis* in Thrissur, Kerala. It is interesting that lac insect was again observed and collected from the same plant of *A. nobilis* after 13 years. Colonization seemed to have occurred in the recent past and had not spread to the nearby trees of the same species. Natural populations of lac insects were found infesting host plants viz., *Paratachardina sylvestrii* on *Santalum album*, *Casuarina equisetifolia* and *Pongamia pinnata* in Bangalore. *Kerria* sp. was recorded from *Ficus* sp., *Acacia auriculiformis*, *A. nobilis* and *A. saman* in Bangalore, Chitradurga, Thrissur and Palakkad, respectively (Annual report, 2000 unpublished). Wild populations of *Kerria* spp. and *Paratachardina* sp. were recorded from *Ziziphus mauritiana*, *A. saman* and *P. pinnata*, respectively in Madurai (Annual Report, 2002 unpublished). Mohanasundaram (1974) found that the infestations of *K. lacca* and *Aleurocanthus spiniferus* Quaint on grape vines in the Coimbatore area of Tamil Nadu. The lac insect collections from Thrissur and Madurai had been described as *Kerria thrissurensis* and *Kerria maduraiensis*, respectively (Ahmad et al., 2013)

A natural infestation of lac insect covered with wax secretion was found on two trees of *A. saman*, in Madurai. Living and immature lac insect was also found for the first time on trees of *A. saman* at Perambanur, Salem (Fig. 2), at Katpadi, Vellore, Thiruvellore and Madurai. Lac insect was also observed and collected from *F. religiosa* at Vellore and Puliampatty, Erode. Dead lac insect was found at Thenkasi and Theni districts of Tamil Nadu on *A. saman*.

New host plants: A thornless *Ziziphus glabrata* was found and root suckers were collected from Forest College and Research Institute, Mettupalayam. A new

species, *Flemingia grahamiana* was observed and seedlings were collected from Thalamalai area of Satyamangalam forest. A variant of *Schleichera oleosa* having spines on fruit coat and *Palas* seeds having red colour as compared to brown coloured seeds which is commonly available in Jharkhand were observed and seeds were collected from Servarayan hills, Yercaud. Collected seeds, root suckers, saplings have been sown/raised in polythene bags at Institute Research Farm of IINRG, Ranchi for further study.

Lac insects

Biological attributes: Evaluation of two lac insect stocks collected from Madurai and Thrissur were carried out during *baisakhi* (summer season) crop 2013 and 2014. Pre harvest parameters viz., density of settlement, initial mortality and sex ratio were studied. Average density of settlement (62.83 per sq.cm) and initial mortality (24.98%) and sex ratio (99%) were recorded in Madurai stock and post harvest parameters viz., fecundity, cell and resin weight and rainy season lac crops could not be recorded due to 99 per cent male population during summer crop. Whereas, lac insect was collected from Thrissur did not survive due to poor emergence and lesser settlement.

Molecular analysis: Cox1 PCR amplified ~700 bp product in almost all the samples. The PCR products of Madurai and Thrissur are depicted in Fig. 3. The length of good quality cox1 sequences (phred score above 25) obtained after sequencing for Madurai, Thrissur, Puliampatty and Salem (2 samples) were of 585, 594, 547, 508 and 611 bp, respectively. The GenBank accession numbers for cox1 sequences of Thrissur, Madurai, Salem 1, Salem 2 and Puliampatty collections are MG662409 to MG662413, respectively.



Fig. 3. cox1 PCR product of Madurai and Thrissur samples

Newly collected lac insect lines from Tamil Nadu and Kerala clustered with *K. lacca* in the phylogenetic tree (Fig. 4). However, they have formed a separate sub-cluster and not clustered with LIK0023 and LIK0031 (both *Kerria chinensis* lines).

Comparison of cox1 sequences of new collections with already reported sequences revealed that the collection from Madurai to be *rangeeni* strain of *K. lacca* based on SNP (single nucleotide polymorphism) (unpublished data from our lab). The length of cox1 sequences of other lac insects collected is not sufficient to be determined to which infra-sub specific form they belong based on SNP. However, based on their matching with already reported lac insect lines from IINRG, Ranchi, they were also found to be *rangeeni* insects. Lac insects collected from Pulaimpatty, one sample from Salem and Madurai matched with IINRG lac insect line, LIK0012; another lac insect line from Salem matched with LIK0026 and lac insect from Thrissur matched with LIK0008. All the analyzed lac insect collections from Tamil Nadu and Kerala were of *rangeeni* strain. In the phylogenetic tree all the new collections were sub clustered along with *K. lacca* lines and specifically closely related to LIK0008, lac insect line from Bengaluru, Karnataka. However, the new collection from Thrissur did not cluster with LIK0010, which was also collected from Thrissur in the past

and maintained at NATLIGEC, Ranchi establishing that both the lines could be different.

Lac cultivation

In Tamil Nadu and Kerala, in 1980s lac insects used to be cultivated in the *kusum* plantation at Theni which was also processed at the same location as explored during the survey at Theni district. Presently no incidence of lac insect on this plantation was observed. Scientific lac cultivation may be promoted in this area so that local farmers/people would be benefited with the help of forest department.

Shorea talura, another lac host plant was seen in patches at Thali, Deverbetta, where lac cultivation was carried out before 1970s but not in vogue. *K. lacca mysorensis* was reported to develop 3 generations, in 12-13 months, in South India on *S. talura*. However, the same sub species developed 2 generations, in 12 months in Jharkhand, India on *S. talura* (Varshney, 1976). The local people and forest officials were enquired for the reason of not cultivating lac on *S. talura*. According to the local sources that the pruning is one of the major lac cultivation operation but not practiced now on *S. talura* mainly due to two reasons. First is to prevent deforestation and secondly flowers of *S. talura* are widely offered to worship of Lord Shiva.

The over exploitation of flowers for worshipping by the local people threatened the regeneration of new plantation. Moreover, tree also exploited for its resin (an exudates from branches and trunks) locally called *Sambarani* (in Hindi-*Dhoop*). Resin is used in the preparation of incense sticks as it has essential oils (oleoresin). Due to these reasons forest department has put stringent restrictions on all the activities related to *S. talura*. As a result, farmers abandoned the lac cultivation on *S. talura*. *Kerria lacca mysorensis* is a trivoltine lac insect species which was cultivated on *S. talura* (Varshney, 1976). However, there is no lac cultivation at present on these trees; due to this *K. lacca mysorensis* has become endangered lac insect species (Sharma *et al.*, 2006) and there is every possibility to revive lac cultivation on *S. talura* if we could identify its existence thorough extensive surveys. *Kerria communis* was reported from south Indian states viz., Andhra Pradesh, Goa, Karnataka, Kerala and Tamil Nadu (Mahdihassan, 1923).

Thangam (1961) utilized rain tree as a minor host for *kusmi* lac and cultivated *kusmi* lac on 29 rain trees

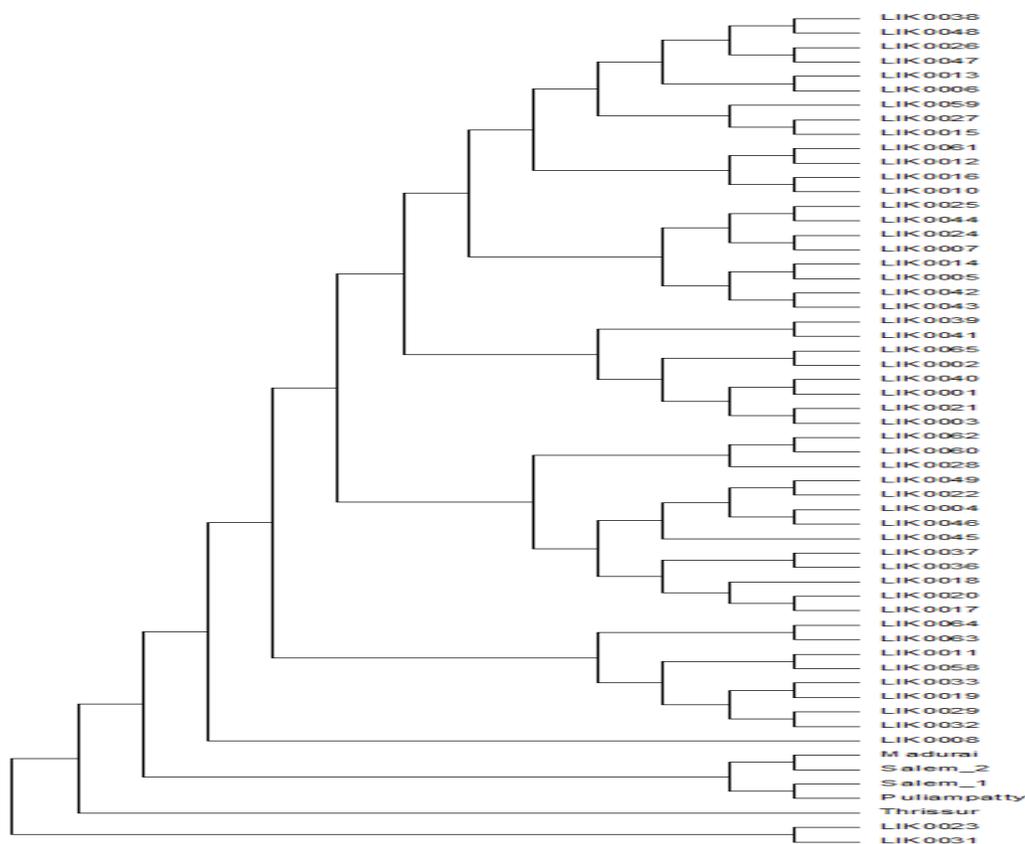


Fig. 4. Phylogenetic tree of lac insect lines based on *cox1* sequences

in Cumbam range, Madurai district. Traditionally lac was cultivated on wild host trees. Since, the introduction of the rain tree took place in Thailand in the beginning of this century and subsequently lac was cultivated in host tree plantations. Today, most local people of Thailand believe rain tree to be indigenous, as it has spread widely over northern Thailand. Rain tree as a host tree plantation for lac cultivation and rice cultivation are combined into an agro-forestry system in the farm household economy, with an increasing demand for lac in the world market (Takeda, 1990). In Kerala, no lac cultivation was practiced in past years at surveyed areas. But, lac (*arakku* in Malayalam) is used as one of the components of several ayurvedic medicines.

NATLIGEC of ICAR-IINRG collects and conserves lac insects of the country. At present, 70 lac insect lines are being conserved live on potted plants of *F. macrophylla* in lac insect field gene bank. After this survey, two more new species of lac insect stocks have been added to NATLIGEC. Based on the molecular analysis (*cox1* sequence) the lac insects collected from various places have been determined to be *rangeeni*

strain of *K. lacca*. The present finding also suggests that, lac insect collected from Madurai and Thrissur did not perform well in Jharkhand climatic condition. It shows that lac-insects are influenced by the environmental conditions. Therefore, ICAR-IINRG, Ranchi has initiated to collect, conserve and document lac insect/host plant genetic resources in Network Project mode at eight Agro Ecological Regions (AER) of India. Surveys are being done for collection and documentation of information / lac insects / host-plants from different AER. The project aims for *in-situ* conservation, multiplication and cultivation of newly collected lac insect lines in the local areas, through on-farm trials and demonstration. It is envisaged to identify new productive lac insects + host plant combinations suitable for a particular region through this project. Agroecological region wise maintenance needs to be continued for conserving valuable lac associated faunal and floral diversity in India.

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