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Sthalavrikshas (temple trees): the indicator species for remnant flora of Tamil Nadu, India

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ABSTRACT

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Plant worship has been an important anthropological activity since pre-historic period. This practice invariably found throughout the world and in India is attested from Indus valley civilization period. Culturally rich Tamil Nadu followed this customary practice with religious faiths and customs. One such religious worship is known as sthalavriksha (sthal: locality, vriksha: tree) in temples. A very few field studies were conducted on sthalavriksha practice and its role on social, ecological and environmental impacts, in particular geographical distribution of ancient flora was unexplored. Sthalavriksha acts as an indicator species of local flora of that time. Present study aims to explore the remnant flora of Tamil Nadu. Survey of 1165 temples in the state revealed presence of 112 sthalavriksha species. During the study, several interesting facts on the past distribution of sthalavriksha species were recorded.

Key-words: Sthalavrikshas, remnant flora, Tamil Nadu, plant worship.

INTRODUCTION

"Sthalavriksha" is referred to a plant (mostly single tree) which is equally venerated from time immemorial by the devotees as holy as the presiding deity of a temple (Gunasekaran & Balasubramanian 2005). 'Sthalavriksha' represents tree of the locality (sthal - place; vriksha - tree) in Sanskrit. A majority of the temple legends (*Sthalapuranam*) and histories of temple (*Sthalavralaru*) indicate that the deity is first found under the sthalavriksha plant and the area was a forest of that particular plant for example in Madurai *Neolamarckia cadamba* (kadambu), in Thalasankadu *Butea monosperma* (palasu), in Mylapore, Nagur, Nagapattinam, Vedaranyam and Parakkaiare *Calophyllum inophyllum* (punnai), in Chidambaram *Excoecaria agallocha* (thillai), in Thirunelveli *Bambusa arundinacea* (mungil), in Viralikadu *Dodonaea viscose* (virali) and in Thiruthuraipundi (vilvam) *Aegle marmelos*. After the construction of temples, these plants were treated as sthalavriksha or temple tree (sacred plant). A few studies have been conducted on sthalavrikshas and most of them have referred their role in Tamil literature, medicinal uses and myths (Aravanan 1984, Sobitharaj 1994, Thirugnanam 1995, Amirthalingam 1998, Gunasekaran & Balasubramanian 2012). Only those referred as temple plants are the source for history of plant science in Tamil Nadu (Samy 1978) that too based on secondary sources. Hence, present field based study was initiated in Salim Ali Centre for Ornithology and Natural History during 2002-2006.

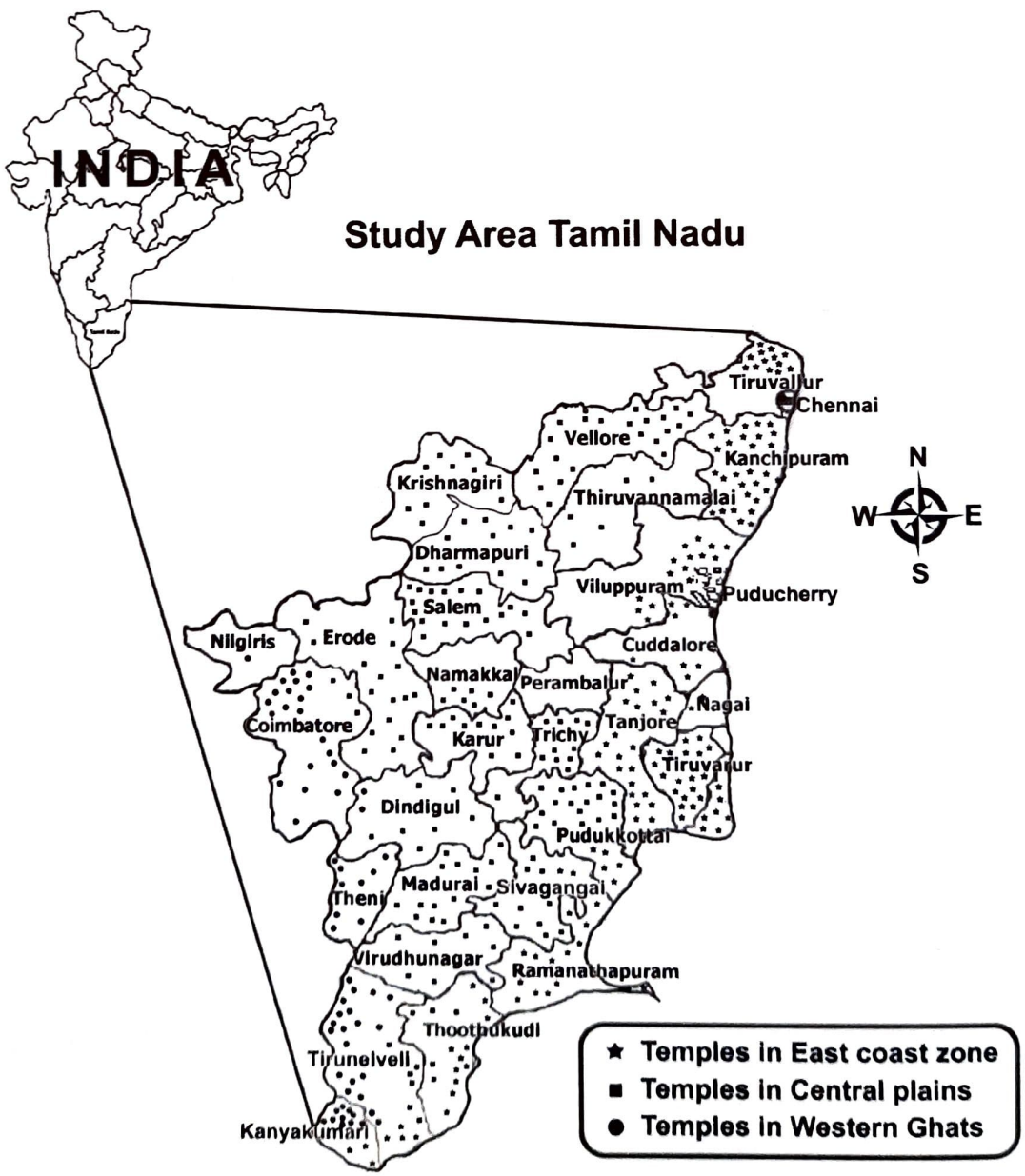
MATERIAL AND METHODS

A total of 1165 temples distributed in 32 districts of Tamil Nadu and the adjoining Puducherry state

including Karaikal region were surveyed. Age of the temples surveyed varies from <100 years to > 1000 years for instance 378 them are > 1000 years old, 470 are 500-1000 years old and the remaining 312 are 100-500 years old, while five temples are below 100 years. A GPS (Global Positioning System) instrument was used to identify the exact latitude, longitude and altitude of the temples. Sthalavriksha specimens were collected and identified to species and variety level on the basis of Flora of the Presidency of Madras (Gamble 1986) and latest scientific names were referred on Flora of Tamil Nadu (Nair and Henry 1983, Henry et al. 1987, 1989). After confirming the botanical identity, the plant specimens were deposited in the Herbarium of Salim Ali Centre for Ornithology and Natural History, Coimbatore.

RESULTS

Tamil Nadu is located between 8° 05¢ and 13° 35¢ North latitudes and 76° 15¢ and 80° 20¢ East longitudes and covers an area of 1,30,058 sq km. Tamil Nadu is the southernmost state in India with wide range of landscapes such as East Coast, Central Plains and Western Ghats (Text Figure 1). Temples are found in all these geographical locations. In most of the temples, local plants are represented as sthalavrikshas. Thus the presence of a particular sthalavriksha species in a temple indicates the past occurrence of the species in the locality.



Text figure 1. Map showing temples surveyed in different geographical region in Tamil Nadu.

Table 1. Zone-wise occurrence of sthalavriksha species in Tamil Nadu.

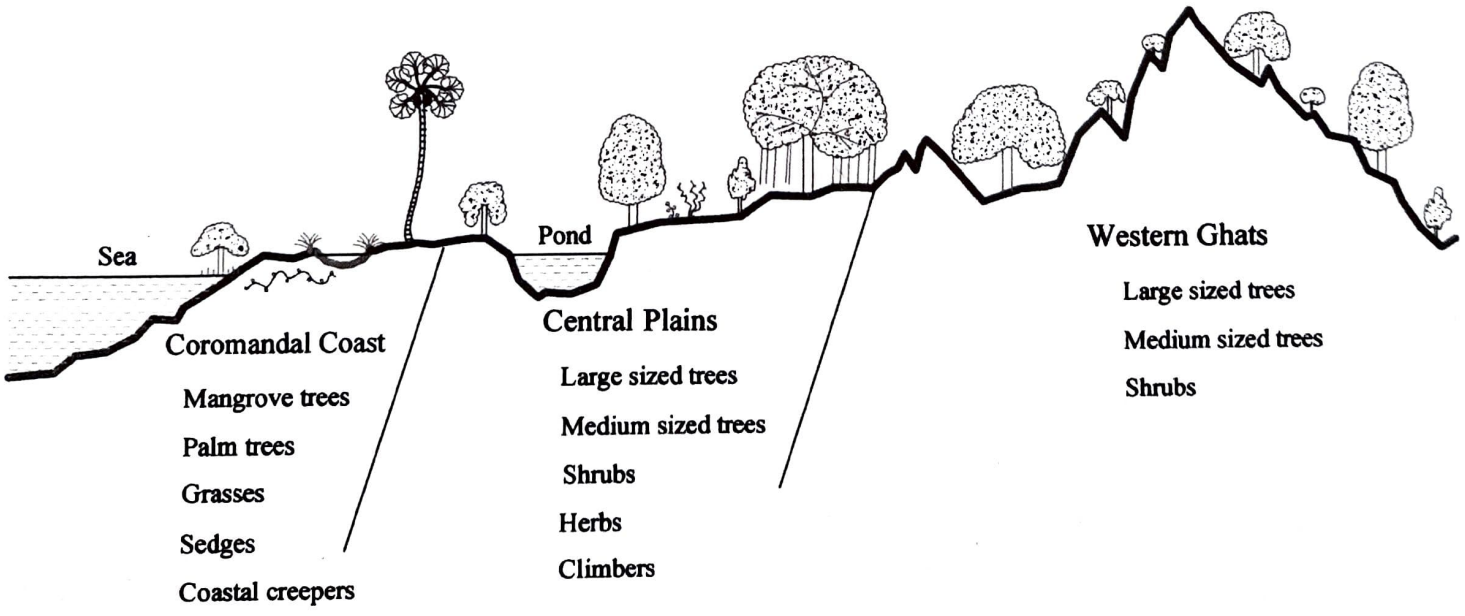
Total No. of sthalavriksha species recorded	S. No.	Zones	Number of sthalavriksha species recorded in the zone	% of occurrence
112	A	East Coast	75	67
	B	Central Plains	68	61
	C	Western Ghats	27	24

The distributional pattern of sthalavrikshas reveal interesting plant geography of ancient Tamil country. The result represents the climax vegetation of Tamil Nadu before a millennium and it opens new vista to understand the past geographical distribution of plants. Many factors viz., climate, soil and rainfall influenced the distribution of sthalavrikshas. Temples surveyed in the coastal zone includes river deltas, sand and marshy regions, central Plain comprised of plateaus, wetlands and riparian habitats and undulated terrains. Western Ghats region comprised of hillocks, hills and high ranges.

Sthalavrikshas recorded in Tamil Nadu are represented by various growth forms. Although certain species have disappeared due to habitat destruction, they are thriving in the locality, as sthalavrikshas for instance in Viralikadu, *Dodonaea viscose* (virali). The common distributional pattern documented in the temples is as follows: 1) the coastal region harboured mangrove trees, grasses, sedges, and palms; 2) Central plains with abundant herbs, shrubs, climbers, medium sized trees and large sized trees; and 3) the Western Ghats comprising of shrubs, medium sized trees and large sized trees. Several sthalavriksha species are found to be zone specific. Table 1 indicates the occurrence pattern of sthalavrikshas.

A total of 112 species of sthalavrikshas were recorded in the state. Of 75 species recorded in the East Coast zone, 34 species are exclusive to this zone and out of 68 species documented in the Central Plains, 26 species are exclusive to this zone. In the Western Ghats, 27 species were found of which 8 species are exclusive to this zone. Both in East Coast and Central Plains 25 species were found (A+B), 2 species are found both in the East Coast and Western Ghats (A+C) and 3 species were found in both Central Plains and Western Ghats (B+C), while 14 species were found in all the three zones (A+B+C) (Table 2).

Sthalavrikshas distribution in the East Coast: Tamil Nadu state has a long coast line with the Bay of Bengal in the east, Andhra Pradesh in the north and Indian Ocean in the south. Most of the districts in Tamil Nadu are partially bounded by the sea coast. Revenue



Text Figure 2. Growth forms of sthalavrikshas and geographical distribution.

Table 2. Distributional patterns of sthalavrikshas in different zones.

S. No.	Sthalavriksha species	East Coast	Central Plains	Western Ghats
1.	*Acacia chundra* (Roxb. ex.Rottl.) Willd.	1	-	-
2.	*Acacia farnesiana* DC.	1	-	-
3.	*Acacia leucophloea* (Roxb.) Willd.	1	-	-
4.	*Aegle marmelos* (L.) Corr. Serr.	75	232	21
5.	*Alangium salvifolium* (L.f.) Wang.	2	1	-
6.	*Albizia amara* (Roxb.) Boivin	-	2	2
7.	*Albizia lebbeck* (L.) Benth.	1	-	-
8.	*Andropogon pumilus* Roxb.	1	-	-
9.	*Artabotrys hexapetalus* (L.f.) Bhandari	1	-	-
10.	*Artocarpus heterophyllus* Lam.	7	6	1
11.	*Artocarpus hirsutus* Lam.	-	-	1
12.	*Atalantia monophylla* (L.) Corr.	1	-	1
13.	*Azadirachta indica* Adr. Juss.	1	2	3
14.	*Bambusa arundinacea* (Retz.) Willd.	2	4	-
15.	*Bauhinia acuminate* L.	-	1	-
16.	*Bauhinia purpurea* L.	1	2	-
17.	*Bauhinia racemosa* Lam.	5	1	-
	Borassus flabellifer L.	4	9	-
19.	*Butea monosperma* (Lam.) Taubert	3	2	-
20.	*Cadaba fruticosa*(L.) Druce	1	-	-
21.	*Calamus rotang* L.	1	-	-
22.	*Calophyllum inophyllum* L.	15	14	-
23.	*Calotropis procera* (Ait.) R. Br.	1	1	-
24.	*Canthium parviflorum* Lam.	-	-	2
25.	*Capparis divaricata* Lam.	-	3	1
26.	*Capparis zeylanica* L.	-	1	-
27.	*Carissa carandas* L.	-	2	-
28.	*Carissa spinarum* L.	-	-	1
29.	*Cassia fistula* L.	10	12	-
30.	*Citrus aurantifolia* (Christm. & Panz.) Swingle	1	1	-
31.	*Citrus pennivesiculata* (Lush.) Tanaka	1	-	-
32.	*Cocos nucifera* L.	1	-	-
33.	*Commiphora caudate* (Wight &Arn.) Engl.	1	1	-
34.	*Cordia domestica* Roth.	1	-	-
35.	*Corypha umbraculifera* L.	1	-	-
36.	*Crateva magna* (Lour.) DC.	3	7	-
37.	*Crescentia cujeta* L.	-	1	-
38.	*Dichrostachys cinerea* (L.) Wight & Arn.	-	2	-
39.	*Diospyros Montana* Roxb.	1	-	-
40.	*Dodonae aviscosa* L.f.	-	1	-
41.	*Ehretia ovalifolia* Wight	-	1	-
42.	*Ensete edule* Horan.	1	1	-

Table 2. continued

43.	*Euphorbia nivulia* Buch.-Ham.	1	-	-
44.	*Excoecaria agallocha* L.	1	-	-
45.	*Ficus religiosa* L.	10	17	-
46.	*Ficus benghalensis* L.	2	12	-
47.	*Ficus microcarpa* L.f.	-	-	1
48.	*Ficus mollis* Vahl	-	1	-
49.	*Ficus nervosa* Heyne ex. Roth	-	1	-
50.	*Ficus racemosa* L.	1	3	-
51.	*Ficus virens* Aiton	-	1	-
52.	*Guettarda speciosa* L.	1	2	-
53.	*Holoptelea integrifolia* (Roxb.) Planch.	-	1	-
54.	*Imperata cylindrical* (L.) Raeusch., var *major* (Nees) Hubbard ex. Hubbard & Vaughan	1	-	-
55.	*Jasminum auriculatum* Vahl	2	-	-
56.	*Jasminum cuspidatum* Rottl.	1	1	-
57.	*Jasminum grandiflorum* L.	1	-	-
58.	*Jasminum sambac* (L.)	1	-	-
59.	*Lepisanthes tetraphylla* (Vahl) Radlk.	-	2	-
60.	*Limonia acidissima* L.	1	1	-
61.	*Madhuca longifolia* (Koen.) Macbr.	13	3	-
62.	*Magnolia grandiflora* L.	-	-	1
63.	*Mangifera indica* L.	11	7	4
64.	*Manilkara hexandra* (Roxb.) Dubard	1	1	-
65.	*Michelia champaca* L.	2	2	3
66.	*Millingtonia hortensis* L. f.	1	-	-
67.	*Mimosa pudica* L.	1	-	-
68.	*Mimusops elengi* L.	4	28	-
69.	*Morinda pubescens* Smith.	-	1	-
70.	*Moringa pterygosperma* Gaetnner, Fruct.	-	1	-
71.	*Murraya koenigii* (L.) Spreng.	-	1	-
72.	*Musa paradisiacal* L.	3	5	-
73.	*Naringi crenulata* (Roxb.) Nicolson	1	2	-
74.	*Neolamarckia cadamba* (Roxb.) Bosser	4	2	1
75.	*Nerium oleander* L.	-	1	-
76.	*Nyctanthes arbor-tristis* L.	5	10	-
77.	*Ochna obtusata* DC. var. *gamblei*. (King ex Brandis) Kanis	1	-	-
78.	*Ocimum tenuiflorum* L.	1	-	-
79.	*Phoenix sylvestris* (L.)	-	1	-
80.	*Phyllanthus emblica* L.	3	5	5
81.	*Pleiospermium alatum* (Wight &Arn.) Swingle	1	-	-
82.	*Pongamia pinnata* (L.) Pierre	1	-	-
83.	*Premna latifolia* Roxb. var. mollissima (Roth) Clake	-	1	-
84.	*Prosopis cineraria* (L.) Druce	18	45	2
85.	*Pterocarpus marsupium* Roxb.	-	1	-
86.	*Punica granatum* L.	-	1	-

Table 2. continued

87.	*Ricinus communis* L.	1	-	-
88.	*Salvadora persica* L.	1	-	-
89.	*Santalum album* L.	2	-	2
90.	*Saraca ashoka* (Roxb.) Willd.	-	1	-
91.	*Scaevola plumieri* (L). Vahl	1	-	-
92.	*Schleichera oleosa* (Lour.) Oken	-	-	2
93.	*Securinega leucopyrus* (Willd.) Muell.-Arg.	-	-	1
94.	*Stereospermum chelonoides* (L. f.) in Biblioth.	-	1	-
95.	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	2	5	1
96.	*Stobilanthes kunthiana* (Nees) T. And. ex Benth.	-	-	1
97.	*Streblus asper* Lour.	-	1	1
98.	*Strychnos nux-vomica* L.	1	-	-
99.	*Strychnos potatorum* L.f.	1	-	-
100.	*Syzygium cumini* (L.) Skeels.	2	4	4
101.	*Tabernaemontana divaricata* (L.) R. Br. Ex. Roem. & Schultes	1	-	-
102.	*Tabernaemontana heyneana* Wall.	-	1	-
103.	*Tamarindus indica* L.	2	4	1
104.	*Tarenna asiatica* (L). Kuntz ex. K. Schum.	1	-	-
105.	*Telosma minor* (Andr.) Craib	1	-	-
106.	*Terminalia chebula* Retz.	1	-	-
107.	*Terminalia arjuna* (Roxb.ex DC) Wight &Arn.	1	5	2
108.	*Terminalia bellirica* (Gaerter) Roxb.	-	1	-
109.	*Terminalia catappa* L.	-	1	-
110.	*Vitex negundo* L.	-	1	-
111.	*Wrightia tinctoria* (Roxb.) R. Br.	1	1	1
112.	*Zizyphus mauritiana* Lam.	3	9	1

districts included in this region are Thiruvallur, Chennai, Kanchipuram, Villupuram, Cuddalore, Nagapattinam, Thiruvarur, Thanjavur, Pudukottai, Ramanathapuram, Tuthukudi, Thirunelveli and Kanyakumari. The union territory of Puducherry and its part Karaikalare also situated in the region; Table 2 shows the sthalavrikshas distribution in different zones. The distribution of *Aegle marmelos* is dominant in all zones.

Of the 323 temples surveyed in this region, 264 are Shiva temples, 50 Vishnu temples and nine are other temples. Sthalavriksha species were absent in 54 temples. A total of 81 species of sthalavrikshas were recorded, of which Bengal quince tree was recorded in maximum (n=75) number of temples. *Prosopis cineraria* (n =18), *Calophyllum inophyllum* (n=15) and *Madhuca longifolia* (n=13) are the other dominant sthalavrikshas. Major soil types in this region are sandy loam and red laterite. Shoreline that extends to a few kilometers inland shows predominance of sandy soil. Further inside, red soil and soil with gravel are found. Soil types and surrounding environments are directly correlated with the sthalavriksha species of the locality. Two sub zones are recognized here. Along the coast line *Kandelia candel, Ipomoea pes-caprae*, *Calophyllum inophyllum*, *Excoecaria agallocha* and *Euphorbia nivulia* occurred. All these species are a typical representation of sandy and alluvial soil. Away from the shore towards inland, *Andropogon* sp., *Imperata cylindrica, Cocos nucifera, Borassus flabellifer, Corypha umbraculifera, Jasminum* spp. and *Telosma minor* were recorded. At present *Kandelia candel* and *Ipomoea pes-caprae* have got extinct from the temples.

Sthalavrikshas distribution in Central Plains: Several districts are situated away from the coast and some hillocks are located here. Districts located along

the coastal zone are Thiruvallur, Vilupuram, Kanchipuram, Cuddalore, Thiruvarur, Thanjavur, Pudukottai, Thuthukudi, Thirunelveli and Kanyakumari. Some inland areas also form part of the central plains. Districts completely land locked with other districts are Vellore, Thiruvannamalai, Dharmapuri, Krishnagiri, Selam, Namakkal, Perambalur, Thiruchirapalli, Karur, Madurai, Erode and Sivagangai. Some districts occupy both Western Ghats and Central Plains regions, e.g., Coimbatore, Dindigul, Theni, Virudunagar, Thirunelveli and Kanyakumari.

Red alluvial to black cotton soil in midland and rocky shallow central mountain highlands are common. Most of the temples surveyed (n=729), during the present study are located in this region. This includes 517 Shiva, 163 Vishnu, 18 Amman, 26 Murugan temples and other deity temples. Among the 729 temples surveyed sthalavrikshas were found in 569 temples. A total of 87 sthalavriksha species were recorded in this region. *Aegle marmelos* is the most dominant sthalavriksha occurring in 240 temples, followed by *Prosopis cineraria* (n=49). *Mimusops elengi* in 28 temples, followed by *Ficus religiosa* (n=17) and *Calophyllum inophyllum* (n=14) and *Cassia fistula* (n=12), are prominent sthalavrikshas. Another important observation is the occurrence of 6 cultigens of *Musa paradisiaca* and 6 species of *Ficus* viz., *F. benghalensis, F. religiosa, F. racemosa, F. virens, Ficus nervosa* and *Ficus mollis* sp. in this region. Although, *Mangifera indica* is a predominant sthalavriksha in this region, *Ziziphus mauritiana* was recorded in 9 temples, while *Crateva magna* and *Tamarindus indica* were recorded in 7 temples.

Sthalavrikshas distribution in Western Ghats region: Certain districts are situated both in Central Plains and Western Ghats, and they are Kanyakumari, Thirunelveli, Virudunagar, Theni, Dindigul and Coimbatore. Sthalavriksha worship is not popular in the Nilgiri district which is dominated by tribal communities. Several temples are situated on the hill tops as well as foothills of the Western Ghats. 'Ultisol' or soil with gravel is the major soil type in the region. A total of 114 temples were surveyed in this region, which included 67 Shiva temples, 28 Vishnu temples, 16 Murugan and 3 Amman temples. Sthalavrikshas were found in 87 temples where *Aegle marmelos* is the prominent species (n=21).

Rare and interesting sthalavrikshas: The *Sthalapuranm* (Temple myth) of Kannayiranathar temple at Thirukarayil in Thiruvarur district mentioned Indian eagle wood (*Aquilaria agallocha*) as the sthalavriksha. The wood contains fragrant resins and it is commercially known as Agar which is a valuable product. Temple legend History of temple (*Sthalavralaru*) and *Devaram* (sacred hymns written in 7th century by saint Ganasambanthar) are referred that eagle wood, (*Aquilaria agallocha*) was the sthalavriksha tree of the temple. These are the only available reference on this tree found in the region before 1,300 years. Interestingly, this species was not found in the temple premises but its present distribution is in northeastern India, Bhutan and Myanmar.

DISCUSSION

Invariably *Aegle marmelos* is under worship in maximum number of temples in all the three regions (East Coast, Central Plains and Western Ghats). *A. marmelos* was found in 75 temples in East Coast, 240 temples in Central Plains and 21 temples in the Western Ghats region, totaling 336 temples in the state. This was followed by *Prosopis cineraria*, occurring in 67 (18 in East Coast and 49 in Central Plains) temples. Sacred value of these species might have lead to the predominant occurrence in the state. Leaves of these plants are used as offerings to the deities, which are considered highly sacred.

In the temples of coastal zone, sthalavrikshas are represented by coastal species e.g., *Kandelia candel* in Mahendirapalli and *Ipomoea pes-caprae* in Uvari. This provides an information about the ancient coastal flora of the region that was once occupied by mangrove vegetation. However, now this region is being utilized for prawn cultivation (in artificial ponds) by removing the mangrove vegetation. It may be mentioned here that in the Suyambulingam temple at Uvari (Tirunelveli District), a creeper *Ipomoea pes-caprae* that is native to coastal sand dunes is the sthalavriksha.

Lord Nataraja temple situated on the bank of the river Kollidam, horbour an interesting sthalavriksha species, known as blinding tree *Excoecaria agallocha*.

E. agallocha (a common brackish water species) is associated with mangrove vegetation and locally well-known as 'thillai'. *E. agallocha* was also recorded as sthalavriksha in Thillaiyambalanathar temple at Thillaivilkam, Thiruvarur District. The closest locality, where this species occurs is Muthupet mangrove forest. Records also indicate that this species was the sthalavriksha in Navakodi Siddhar temple at Kodiakarai (Point Calimere), which is a mangrove locality and now the temple was washed out by repeated cyclones during early sixties in the last century.

Another sthalavriksha *Calophyllum inophyllum* has been recorded in several temples situated in coastal regions that include the temples of Mylapore, Mamallapuram, Puducherry, Thiruvettakudi, Nagur, Nagapattinam, Vedaranyam and Parakkai. *Tarenna asiatica* is the sthalavriksha in Kameswarar temple at Thiruvidaikazhi and Kodikuzhakar temple at Kodiakarai (near Point Calimere). This sthalavriksha is presently found in Thiruvidaikzhali temple but was found to be uprooted in the Kodiakarai temple, possibly by the cyclone. Ancient records quote that the fern *Actinopteris radiata* '*Kalpanai*' was the sthalavriksha in Koilkannapur, however, at present it is absent at Koilkannapur. Similarly, Agar wood tree *Aquilaria agallocha,* once present in Thirukarayil temple, is now found only in northeastern India, Bhutan and Mayanmar. Indian laburnum, *Cassia fistula,* was recorded in 22 temples. In the Central Plains it was recorded in 14 temples, while *Mimusops elengi* was recorded in 28 temples. In Central Plains *Santalum album* was recorded in one temple.

In the Western Ghats, *Ficus religiosa, Phyllanthus emblica, Syzygium cumini, Mangifera indica, Santalum album, Canthium parviflorum, Albizia amara, Prosopis cineraria, Ficus benghalensis* and *Azadirachta indica* were recorded as sthalavrikshas at the temples located in the foothills. In mid altitude *Artocarpus hirsutus, Pterocarpus marsupium, Michelia champaca* and *Schleichera oleosa* were recorded. Matthew et al. (1983) referred *Artocarpus hirsutus* as a highly exploited endemic tree of Western Ghats. In higher altitude, *Magnolia grandiflora, Strobilanthus kunthiana* and *Dalbergia latifolia* were recorded in the temples of Western Ghats region.

The temple legends (*Sthalapuranam*) and histories of temple (*Sthalavralaru*) imply that the temple(s) were constructed in the forests of the sthalavrikshas and in the majority of the temples sthalavrikshas were worshipped. However, sthalavriksha is the last living individual of that particular locality at present. This is possibly due to of these anthropogenic activities in the region. Hence, it can be concluded that the sthalavriksha is the only living indicator species of remnant flora of that particular locality in Tamil Nadu.

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REFERENCES

Amirthalingam M. 1998. Sacred Trees of Tamil Nadu, C. P. E. Environmental Education Centre, Chennai: 1-316.

Aravanan K.P. 1984. Maravazhipadu Dravida Africa Opeed Parinilayam, Chennai:1-75.

Gamble J.S. 1915-1936. Flora of the Presidency of Madras, Vol. 1-3 Bishen Singh Mahendra Pal Singh, Dehradun: 1-2010.

Gunasekaran M. & Balasubramanian P. 2005. Sthalavriksha worship - A tool in Plant Conservation in Tamil Nadu. In: Kunhikannan. C & Gurudev Singh (Editors) Proceedings of National Strategy for Conservation of Sacred Groves, Institute of Forest Genetics and Tree Breeding, Coimbatore:163-166.

Gunasekaran M. & Balasubramanian P. 2012. Ethnomedicinal uses of Sthalavrikshas (temple trees) in Tamil Nadu, southern India. Ethnobotany Research & Applications 10: 253-268.

Henry A.N., Chitra V. & Balakrishnan N.P. 1989. Flora of Tamil Nadu, India. 3. Botanical Survey of India, Coimbatore: 1-171.

Henry A.N., Kumari G. R. & Chitra V. 1987. Flora of Tamil Nadu, India. 2.Botanical Survey of India, Coimbatore: 1-258.

Nair N.C. & Henry A.N.1983. Flora of Tamil Nadu, India.1. Botanical Survey of India, Coimbatore: 1-184.

Samy B.G.L. 1978. Sources for a history of plant science in India, part IV. "Temple- Plants A Reconnaissance in Transactions of the Archaeological Society of South India, 1965-68, The Archaeological Society of South India, Govt. Museum, Madras: 23-62.

Sobitharaj S.K.K. 1994. Thalamarangal, Sobitham, Chennai:1-86.

Thirugnanam S. 1995. Thirukoil Marangalin Maruthuvapayangal, Selvi Pathipagam, Thiruchi: 1-91.