

Floristic Diversity, Conservation Status and Economic Value of Miniature Sacred Groves in Kanyakumari District, Tamil Nadu, Southern Peninsular India

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Abstract: The plant diversity of southern peninsular India has recently been reduced to a great extent due to anthropogenic disturbance and environmental degradation. Disturbance was the major factor responsible for fragmentation of forest vegetation; as a result of this, there is a preponderance of small patches, some of them still preserved as sacred groves because of strong religious beliefs held by the indigenous people of this region. It is thought that one of the prime utilities of sacred groves is the protection and occasional supply of medicinal plants on a sustainable basis. Most of the medicinal plants were confined to these groves only. During the study period we inventoried 201 miniature sacred groves covering an area of 13.1 ha. Among these, 10 sacred forests are present in Agastheeswaram, 11 in Thovalai, 72 in Kalkulam, and 108 in Vilavancode taluk. The floristic richness of the sacred groves in Kanyakumari district was analysed. A total of 329 species belonging to 251 genera of 100 families were enumerated from the miniature sacred forests of Kanyakumari district. Of these, 42 species were endemic, 40 very rare, 47 rare, and 16 endangered. Since there is minimal exploitation of these groves, they are considered a home to certain rare, endangered, and endemic plants and are rich in biodiversity. These sacred groves are closely related to the social and cultural life of a people and a number of cultural rites and religious rituals have perpetuated the status of a sacred grove, which has ensured the protection of the sacred grove vegetation in pristine condition.

Key Words: Medicinal plants, plant diversity, religious beliefs, sacred grove, Tamil Nadu, vegetation profile

Introduction

Loss of biodiversity of tropical forests is mainly due to degradation and destruction of habitat by anthropogenic activities, is now recognised as a global problem (Wilson, 2000). In many areas, conservation of biodiversity and maintaining landscape productivity are being taken up on a priority basis, for restoration of degraded communities by planting fast growing, indigenous, and native plant species (Solbrig, 1991). One of the important challenging tasks for ecologists is to understand the relationship between biodiversity and functioning of ecosystems (Younes, 1992; Davis & Richardson, 1995). The high rate of extinction of tropical species is aggravated by the clearing of forestland and conversion into agricultural

cropland. Harvesting non-timber forest products, selective extraction of plants and animals, biological invasion, and monoculture threaten to erode biodiversity seriously (Myers, 1993; Phillips & Gentry, 1994; Phillips, 1995, 1997; Sundarapandian, 1997; Sundarapandian & Swamy, 1997, 2000; Swamy et al., 2000; Mishra et al., 2003; Mishra et al., 2004; Sundarapandian et al., 2005; Mishra et al., 2005a, 2005b). Reorientation of the attitudes of people towards maintaining biodiversity is of utmost importance (Ramakrishnan et al., 1998; Mishra et al., 2003).

Sacred groves (forest) are a group of trees or a patch of vegetation protected by the local people through religious and cultural practices evolved to minimise

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destruction (Israel et al., 1997). The sacred groves are thought to be a rich source of medicinal, rare, and endemic plants, as refugia for relic flora of a region and as centres of seed dispersal (Whittaker, 1975; Jeeva et al., 2005; Jeeva et al., 2006; Jeeva et al., 2007). Haridasan & Rao (1985-87) have reported some valuable species confined to sacred groves only. Plant wealth and self-conservation potential of sacred groves are impressive enough for them to be acknowledged as 'mini biosphere reserves' (Gadgil & Vartak, 1975).

The people worship the sacred trees associated with sacred forests. These trees are either medicinal or edible plant species and they are protected by the indigenous people because of their cultural and religious importance (Israel et al., 1997). Taboos and myths attributed with the sacred groves protect them from anthropogenic disturbances. In recent years, these tracts of virgin forests have been considered a dispensary of medicinal plants, a gene bank of economic species, and a laboratory for environmentalists (Gadgil & Vartak, 1975; Ramanujam & Kadamban, 2001; Ramanujam & Praveen Kumar Cyril, 2003; Jeeva et al., 2006; Laloo et al., 2006).

Despite the vast and varied flora in southern Western Ghats of Tamil Nadu, the biodiversity of the sacred groves has not been explored sufficiently. Raj & Sukumaran (1997), Swamy et al. (1998), Williams (2004), Jeeva et al. (2005a, 2005b), Kingston et al. (2006), Prakash et al. (2006), and Jeeva et al. (2006a) have studied the phytodiversity of the region. Nayar (1959), Lawrence (1960), Henry and Swaminathan (1981), Sundarapandian and Swamy (1997), and Swamy et al. (2000) explored the vegetation of Kanyakumari district, but they paid attention to forests other than sacred groves. Plant diversity and conservation status of some sacred groves of Kanyakumari district were studied by Raj and Sukumaran (1997) and Sukumaran (1997) with limited objectives.

Most of the people of Kanyakumari district are following their ancestral religion and conserving the sacred groves as a part of their tradition and culture. They have vast ethnobotanical knowledge and they utilise the precious plant wealth sustainably (Kiruba et al., 2007). In recent years, people's needs and greed have resulted in a weakening of religious beliefs, and these virgin tracts of forest patches are on the way to extinction. There is an urgent need for extensive research

studies on plant diversity and conservation status of precious plant wealth to develop an appropriate strategy for conservation of plant resources.

In view of this, the present study was conducted in several miniature sacred groves to document floristic diversity and conservation status and to highlight botanical significance.

Materials and Methods

The present study was conducted in Kanyakumari district of Tamil Nadu, southern peninsular India (77°15'-77°30' E, 8°30'-8°15' N), located in part of southern Western Ghats. It occupies an area of about 1684 km², which is 1.29% of the total geographical area of the state. This district is comprised of 4 taluks, namely Agastheeshwaram, Thovalai, Kalkulam, and Vilavancode. Topographically, it has prominent natural features such as richly varied and crowded vegetation, majestic undulating hills with surrounding plains, colourful seashores, and coconut plantations, which make splendid landscapes (Kiruba et al., 2006).

During field visits 201 miniature sacred groves covering an area of 13.1 ha were surveyed (Figure 1) and information was gathered on sacred trees, taboos, deities, festivals, priests, and cultural aspects through personal contacts and questionnaires and by interviewing villagers, temple authorities, and various social organisations. The informants opined about the presence of a variety of deities. Often a rough stone with some carving on it may represent a deity. A deity is considered an essential nature of a god as supremely good or powerful. Some of them seem to be old and traditional and some are recent additions. The male deity associated with the majority of the sacred forest is '*Nagaraja*' and the female deity is '*Mariamman*'. Of 201 sacred groves surveyed so far, 10 groves are in Agastheeswaram, 11 in Thovalai, 72 in Kalkulam, and 108 in Vilavancode taluk.

The climate of the district is favourably warm and humid. The summer is from March to May, followed by the south-west monsoon from June to September. October and November constitute the post-monsoon or retreating monsoon season with frequent thunderstorms. December to February is the north-east monsoon season, and in the remaining months the weather is generally bright. The rainfall varies from 103 to 310 cm and elevation is 1829 msl (Sukumaran, 2002).

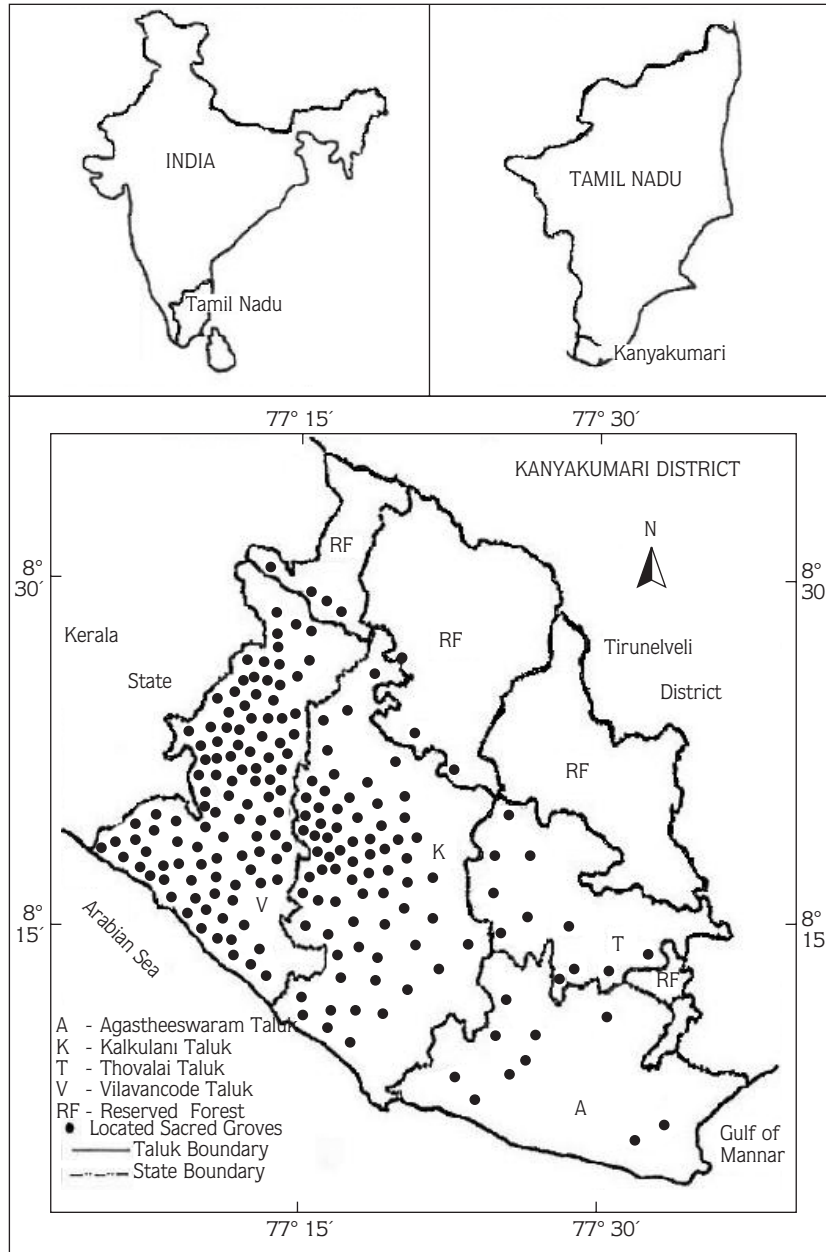


Figure 1. Map showing the experimental study site and location of sacred groves.

The soil of the district is broadly classified into 2 major groups, namely red and alluvium soils. Red soil is further classified into red loam and sandy soils. Alluvium soil is divided into coastal and river alluvium soils. The area of the district occupied by red soil is greater than that occupied by alluvial soil. The black colour of the forest soil is mainly due to high contents of humus and minerals.

The population of Kanyakumari district is 11,37,181 according to the census record. Tamil and Malayalam are the main languages used by the population. Hindus and Christians form a sizeable percentage of the population of the district and there are a number of Muslim dominated belts. The cast system in the society has weakened to a great extent especially after independence because of the growth of education and improvements in transports and

communication. 'Nadar' is the major community of this district. Some of the other communities in the district are *Nanjil Nadu Vellalars*, *Paravas*, *Mukthavas*, *Vilakki Thalanyar*, *Asari*, *Chackarevars*, *Kerala Mudalis* etc. Rice (*Oryza sativa*) is the staple food of the rich and poor alike in the district. Some poor people use tapioca (*Manicot esculenta*) as food. Beverages like tea and traditional coffee (using ginger and palm sugar) are widespread even in the rural areas of the district (Raj, 2003).

Fourteen types of forests from luxuriant tropical wet evergreen to tropical thorn forests occur in this district because of the diverse nature of the landscape. The total forest cover is estimated to be 30.2% of the total geographical area of the district and the forests of the district are verdant and virgin forests and are said to be 75 million years old (Champion & Seth, 1968).

The forests consist of soaring and lofty trees of *Mesua ferrea* L. and *Vitex altissima* L. to smaller trees of *Dillenia pentagyna* Roxb., climbers, shrubs, valuable herbs, a variety of orchids, canes, indigenous palms and cycas, and it is also rich in algae, fungi, lichens, bryophytes, and pteridophytes. The important timbers are *Tectona grandis* L.f., Rose wood, Vengai, and Aini and this district is worth mentioning here for the easy availability and quality of the above timbers. The district is not only rich in floristic diversity but also harbours many wildlife species of mammals, birds, reptiles, amphibians, and fishes.

An extensive floristic survey was carried out in the sacred groves between May 1999 and April 2002. Out of 201 sacred groves surveyed during the present study, 40 floristically rich sacred groves (10 groves from each taluk) were studied ecologically in detail. During the study, plant species belonging to various life forms were recorded, and specimens of flowering plants were collected and identified taxonomically with the help of different floras (Beddome, 1868-1874; Hooker, 1872-1894; Gamble & Fischer, 1915-1935; Nair & Nayar, 1986-1987; Mohanan & Henry, 1994; Matthew, 1999) and by using field keys devised by Pascal & Ramesh (1987).

The Herbaria of Botanical survey of India, Southern Circle, Coimbatore; Kerala Forest Research Institute, Peechi; Tropical Botanical Garden and Research Institute, Trivandrum, Kerala; and Botany Department of Scott Christian College, Nagercoil, were consulted for correct identification of plant specimens. The nomenclature of

species follows the regional flora. Lists of endangered, rare, and endemic plants found in the sacred groves were prepared with the help of published works of IUCN (1980, 1994), Ahmedullah & Nayar (1986), Nayar & Sastry (1990), Ramesh & Pascal (1991), Nayar (1996), and Subbarayalu & Velmurugan (1999). The voucher specimens were prepared as per the methods given by Martin (1995), and deposited in the herbarium (SCH) of Scott Christian College, Nagercoil, Tamil Nadu, India.

Results

Taxonomically, a total of 329 plant species belonging to 251 genera and 100 families were recorded in 40 miniature sacred forests in Kanyakumari district (Appendix). Among these, 139 (42.25%) were trees, 95 (28.88%) shrubs, 79 (24.01%) herbs, and 16 (4.86%) climbers including lianas. Of the 100 families, 98 belonged to angiosperms and 2 to gymnosperm families such as Cycadaceae and Gnetaceae. Fabaceae was the dominant family, with 14 genera and 18 species, followed by Euphorbiaceae and Moraceae (15 species each), Acanthaceae and Rubiaceae (12 species each), Apocynaceae, Mimosaceae, and Verbenaceae (10 species each), and Arecaceae, Caesalpiniaceae, and Combretaceae (8 species each).

Among the dicots of angiosperms, 134 species (40.73%) were polypetalae; among them were 70 trees, 38 shrubs, 23 herbs, and 3 climbers. One hundred and nine plants of Gamopetalae members were observed (33.13%); of these, 29 were trees, 42 shrubs, 28 herbs, and 10 climbers. Out of 47 species (14.28%) of monochlamydeae, 25 were trees, 9 shrubs, 12 herbaceous species, and 1 climber. Thirty-nine species (11.25%) of *monocots* from 17 families were identified; among them were 12 trees, 8 shrubs, 16 herbs, and 1 climber. Two species (*Cycas circinalis* L. and *Gnetum ula* Brongn.) were reported from gymnosperms.

From the sacred groves of Vilavancode taluk, 297 plant species belonging to 225 genera and 95 families were recorded. Of these, 121 species were trees, 87 shrubs, 73 herbs, and 16 climbers. The dominance of lofty trees, lianas, and climbers had resulted in the majestic appearance of climax vegetation. Of total species content, 21 species were recorded exclusively in this taluk. Fabaceae was the dominant family, with 16 species, followed by Rubiaceae (12 species),

Euphorbiaceae (11 species), Acanthaceae, Mimosaceae, and Verbenaceae (10 species each), Apocynaceae and Moraceae (9 species each), and Caesalpiniaceae and Malvaceae (8 species each). Many families (44) were represented by a single species.

The sacred groves of Kalkulam taluk had 286 plant species belonging to 218 genera and placed in 93 families. Among these, 112 were trees, 87 shrubs, 73 herbs, and 14 climbers. There were 15 species present exclusively in this taluk. *Petiveria alliacea* L. (Phytolaccaceae), a shrub species reported from a single sacred grove in this taluk, is an addition to the flora of Tamil Nadu. The rural people use the root essence of this plant for cold and fever and it also has some antipyretic properties. Fabaceae and Euphorbiaceae were the dominant families (15 species each). Other important families were Acanthaceae and Rubiaceae (11 species each), Moraceae and Verbenaceae (10 species each), Mimosaceae (9 species), and Arecaceae (8 species). Nineteen families had 2 species each and 41 families were monospecific.

From the sacred groves of Thovalai taluk 101 species belonging to 87 genera and 45 families were recorded. Thirty species were trees, 35 shrubs, 34 herbs, and 2 climbers. Only 3 species were exclusively recorded from this area. Fabaceae and Mimosaceae were the dominant families (7 species each), followed by Acanthaceae (6 species), Apocynaceae, Euphorbiaceae, Malvaceae, and Rubiaceae (5 species each), Moraceae (4 species), and Amarantaceae, Caesalpiniaceae, Meliaceae, Poaceae, and Verbenaceae (3 species each), 10 families had 2 species, and 22 families were monospecific.

From the groves of Agastheeshwaram taluk, 101 plant species belongs to 92 genera and 51 families were recorded. Mimosaceae ranked first in terms of species content (7 species), followed by Acanthaceae and Euphorbiaceae (6 species each), Moraceae (5 species), Anacardiaceae, Apocynaceae, Malvaceae, Rubiaceae, and Rutaceae (4 species each), Arecaceae, Asclepiadaceae, Caesalpiniaceae, Fabaceae, Meliaceae, and Poaceae (3 species each), Asteraceae, Lamiaceae, and Sapotaceae (2 species each), and 33 families were represented by only 1 species. The endemic and endangered wetland species of *Justicia beddomei* (Clarke.) Ben. and *Nymphaea pubescens* Willd. were confined to the groves of Agastheeshwaram taluk.

From the above findings it is evident that the sacred groves of Vilavancode taluk had the highest species richness, followed by groves in Kalkulam, Thovalai, and Agastheeshwaram taluks. The life forms also followed a similar trend. Weak stemmed plants are totally absent in the groves of Thovalai and Agastheeshwaram taluks, which may be attributed to the reduction in the number of trees and elimination of bushy vegetation caused by anthropogenic disturbances or climatic factors.

The sacred groves are a repository of certain rare, endangered, and endemic taxa. The endemics were about 8% of the total species content of all the sacred groves inventoried during the present study. Habit-wise distribution of rare, endangered, and endemic species revealed that the majority of species fall under small trees and/or shrubs (Appendix). Out of 329 species studied, 41 species belonging to 34 genera and 23 families were endemic and 103 species belonging to 83 genera and 55 families were rare and endangered.

Among the 41 endemic plants, 2 species were endangered, 10 rare, and 25 very rare. Of these, 30 were tree species, 8 shrubs, 2 herbs, and 1 climber. Ebenaceae and Moraceae had the highest number of endemic species (5 species each), followed by Clusiaceae (4 species), and Caesalpiniaceae, Dipterocarpaceae, Flacourtiaceae, Melastomaceae, Meliaceae, and Rubiaceae (2 species each), whereas 15 families had a single species.

The groves also harbour 103 rare and endangered plant species, among them 64 were trees, 20 shrubs, 16 herbs, and 3 climbers. Moraceae was dominant in terms of species composition and it had 11 species, followed by Fabaceae (7 species), Ebenaceae (5 species), Clusiaceae, Combretaceae, and Euphorbiaceae (4 species each), and Meliaceae, Rubiaceae, and Rutaceae (3 species each); 13 families were represented by 2 species, whereas 33 families were monospecific.

Most of the plants recorded from sacred groves in Kanyakumari district are economically important. The medicinal plants ranked first, with 194 species, while 34 species were of timber value and 19 species were regarded as minor forest produce. Many multipurpose species were also reported from groves. Of these, 23 species are used as timber and medicine, 34 species as medicine and minor forest produce, 18 species as minor forest products and timber, and 10 species as timber, medicine, and minor forest produce.

Discussion

The present study revealed that the sacred groves of Kanyakumari district represent the remnants of relic and unique vegetation of the tropical forests. Fabaceae, with 18 species and 14 genera, was largest family, and dominated the groves. Euphorbiaceae, Moraceae, and Acanthaceae were the co-dominant families. The genus *Ficus* is predominantly present in all the sacred groves. Gadgil et al. (1996) also reported that ficus is the most revered tree of the orient and no species is traditionally felled. In the present study, species content was encountered from 40 sacred groves; the maximum number of vascular plants was recorded from Vilavancode taluk (297 species), followed by Kalkulam (286 species), and Thovalai and Agastheeshwaram (101 species each) taluks. The varied edapho-climatic conditions caused due to undulating topography could be responsible for the high species richness in the groves of Vilavancode and Kalkulam taluks in Kanyakumari district.

The distribution of sacred groves is unequal in all 4 taluks and the numbers of plants recorded are also varied. Drude (1890) emphasised the dependency of various life forms on climate; emphasis was given to perenniating organs and mode of propagation. The biological spectrum reflects the adaptation of plants to the environment and primary climate (Smith, 1980). Since plant life forms are related to the environmental

conditions, the biological spectrum is an indicator of prevailing environment in an ecosystem (Meher-Homji, 1981). The occurrence of similar biological spectrums in different regions indicates similar environmental conditions.

The floristic composition of the sacred groves indicates the pre-existence of climax vegetation in the area (Vartak et al., 1986). As such, these groves serve the vital function in preservation of plant species that have become very rare or extinct elsewhere.

The study confirms an old phytogeographic history, as 12 species were present altogether in the vegetation. Asiatic elements were the dominant ones, with 88 species, and the pantropical elements, with 47 species, occupied the co-dominant position, followed by the 42 species endemic to the Western Ghats and southern Western Ghats as the co-dominant group. Altogether, these groups comprised almost 54% of the vegetation and dominated and this showed that this region has been bestowed with a good natural vegetation for a long time (Figure 2). It can be argued that the rest of the species were drawn from the neighbouring phytogeographical domains. The remaining elements occupied a low position, compared to the above.

The findings of the present study on the phytogeographical elements of these groves showed a predominance of Asiatic elements. Among the endemics,

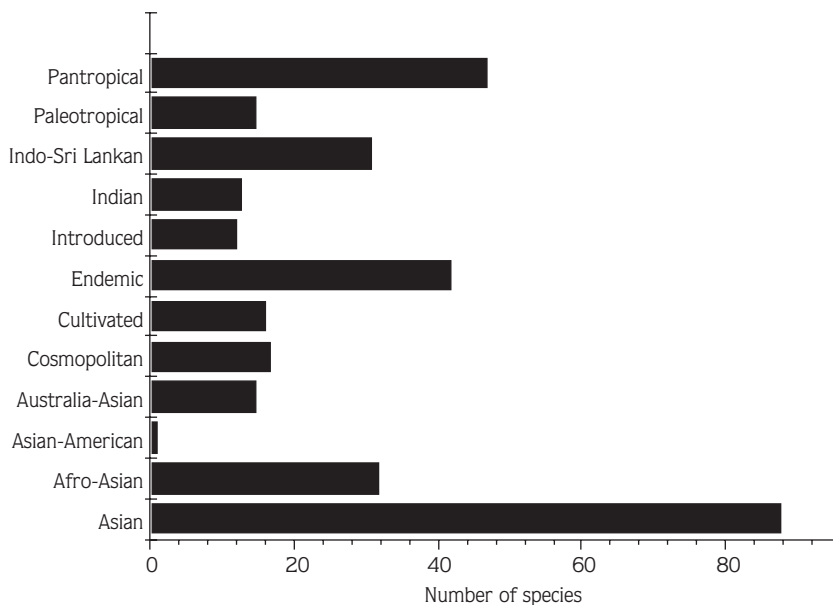


Figure 2. Distribution of phytogeographical elements of sacred groves in Kanyakumari district.

Artocarpus hirsutus Lam., *Asteriastigma macrocarpa* Bedd., *Atlantia monophylla* (L.) Correa., *Caesalpinia mimosoides* Lam., *Diospyros ebenum* Koen., *Hydnocarpus laurifolia* (Dennst.) Sle., *Naregamia alata* Wight & Arn., *Persea macrantha* (Nees.) Kosterm., and *Tetracera akara* (Burm.F.) Merr. were widely distributed throughout the study area and their presence in different types of vegetation reflects their wide adaptability. The species that are highly sensitive to ecological perturbation and their distribution had been narrowed down.

Among the common species, 49 species were distributed in sacred groves of all 4 taluks. This accounts for about 15% of the total species content, and indicates a great deal of diversity in the groves. The sacred groves also contain a number of cultivated plant species such as *Areca catechu* L., *Anacardium occidentale* L., *Callophyllum inophyllum* L., *Caryota urens* L., *Cocos nucifera* L., *Dioscorea bulbifera* L., and *Polyalthia longifolia* (Sonner.) Thw., which might have been brought from the nearby agricultural field through seeds dispersed by birds. Apart from this, wild relatives of cultivated plants are also found in these groves.

In the present study, 41 endemic and 103 rare and endangered plants were inventoried from the sacred groves. Of these, 16 species are listed as endangered in Western Ghats. The rare, endangered, and endemic species are also reported from sacred groves of different parts of the country and many valuable species are found in sacred groves only (Haridasan & Rao, 1985-87; Ganesh et al., 1996; Jeeva & Anusuya, 2005; Jeeva et al., 2006b). Undoubtedly, the sacred groves are a refuge for rarity and endemism.

The majority of sacred groves species were used medicinally. Such plants contributed much towards the health care of indigenous people settled in the vicinity. There is no alternative to traditional health care for the majority of indigenous tribal and rural communities, and so it plays a significant role in their health care. The sacred grove at Pasamur village near Vedanthangal bird sanctuary is situated on a low hillock composed of rock boulders. It provides favourable microenvironment conditions for *Amorphophallus sylvaticus* (Roxb.) Kunth., which is considered a rare species (IUCN, 1994), and about 120 species of angiosperms grow harmoniously. The hillock with the keystone species of *Ficus* is functioning like a refuge for this rare, medicinal plant; its

tuber is extensively used for the treatment of piles (Maheswaran et al., 1995).

Keystone species refers to a species that is critical for the survival of several other species in the community, whereas *Flagship species* are the dominant species of the community, which serve as markers. *Ficus benghalensis* L., *Ficus religiosa* L., *Artocarpus heterophyllus* Lam., and *Artocarpus hirsutus* Lam. were keystone species recorded from the sacred groves. The flagship species found in the groves were *Antiaris toxicaria* (Pers.) Lesch., *Diospyros ebenum* Koen., *Mesua ferrea* L., and *Vateria indica* L.

Conclusion

This study revealed that a number of valuable plant species are found in the sacred groves, and if conservation measures are not introduced in the near future there may be a great loss of plant diversity. Thus, there is ample scope for further research on plant diversity, community attributes, and natural regeneration. Detailed ethnobotanical surveys, biodiversity explorations, and research and pooling data from such investigations could be helpful in developing suitable measures for conserving precious plant wealth. The findings of these studies will help in the development of improved plantation technology using appropriate species for plantation. The reorientation of local indigenous communities towards restoration of traditional knowledge through environmental awareness programmes by the Government of India will be an effective strategy for conservation of plant resources to a desired extent.

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Appendix. Distribution, economic value and conservation status of plant species of different habits in sacred groves of 4 taluks in Kanyakumari district.

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Abrus precatorius</i> L.	Fabaceae	Shrub	19	16	1	1	Pan	M	C
<i>Abutilon indicum</i> (L.) Sw.	Malvaceae	Shrub	34	12	3	-	Pan	M	C
<i>Acacia planifrons</i> Wight & Arn	Mimosaceae	Tree	31	6	-	3	Pan	FT	C
<i>Acacia caesia</i> (L.) Willd.	Mimosaceae	Shrub	9	4	1	-	As	FM	C
<i>Acacia sinuta</i> (Lour) Merr.	Mimosaceae	Shrub	5	1	2	1	As	M	OC
<i>Acalypha fruticosa</i> Forssk.	Euphorbiaceae	Shrub	37	14	-	6	As, Af	M	C
<i>Acalypha indica</i> L.	Euphorbiaceae	Herb	53	36	2	4	Pan	M	C
<i>Actinodaphne maderaspatana</i> Bedd. ex Hk.	Lauraceae	Tree	9	11	-	-	As	FT	R
<i>Achyranthes aspera</i> L.	Amarantaceae	Herb	44	36	7	4	Pan	M	C
<i>Adenanthera pavonina</i> L.	Mimosaceae	Tree	12	7	1	-	As	FMT	C
<i>Aerva lanata</i> (L.) Juss. ex Sch.	Amarantaceae	Herb	33	41	2	-	As, Af	M	C
<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Tree	42	19	6	2	As	FM	C
<i>Agave cantala</i> Roxb.	Agavaceae	Shrub	41	27	4	6	I	F	C
<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	Tree	19	15	-	4	Pan	M	
<i>Alangium salvifolium</i> (L.f.) Wang.	Alangiaceae	Tree	4	2	-	-	Pal	M	OC
<i>Albizia amara</i> (Roxb.) Boi.	Mimosaceae	Tree	4	14	1	-	As, Au	M	C
<i>Albizia chinensis</i> (Osbeck) Merr.	Mimosaceae	Tree	27	19	-	1	As	M	C
<i>Albizia lebbek</i> (L.) Willd.	Mimosaceae	Tree	42	21	7	6	Pal	M	C
<i>Albizia odoratissima</i> (L.f.) Benth.	Mimosaceae	Tree	18	34	2	1	As	M	C
<i>Aloe vera</i> L.	Aloaceae	Herb	53	36	3	2	As, Af	M	C
<i>Alpinia calcarata</i> Roscoe.	Zingiberaceae	Herb	9	4	-	-	Cul	M	OC
<i>Alpinia galanga</i> Sw.	Zingiberaceae	Herb	4	1	-	-	As	M	En
<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	Tree	19	12	2	1	As	FM	OC
<i>Amaranthus caudatus</i> L.	Amarantaceae	Herb	9	7	-	-	Cul	M	OC
<i>Amaranthus spinosus</i> L.	Amarantaceae	Herb	11	7	2	-	Cul	M	C
<i>Amorphophallus sylvaticus</i> (Roxb.) Kunth	Araceae	Herb	7	3	-	-	In, S	M	R
<i>Anacolosia densiflora</i> Bedd.	Olacaceae	Tree	1	4	-	1	As	M	OC
<i>Anacardium occidentale</i> L.	Anacardiaceae	Tree	56	31	2	4	Cul	M	OC
<i>Anamirta cocculus</i> (L.) Wight. & Arn.	Menispermaceae	Liana	27	11	-	-	As	M	OC
<i>Annona squamosa</i> L.	Annonaceae	Tree	19	23	-	-	Cul	FM	C
<i>Andrographis elongata</i> (Vahl) T.And.	Acanthaceae	Herb	16	16	4	-	As	F	C
<i>Andrographis paniculata</i> Burm.f. Wall.	Acanthaceae	Herb	96	63	9	6	In	M	C
<i>Anogeissus latifolia</i> (Roxb. ex Dc.) Wall. ex. Nees.	Combretaceae	Tree	9	-	2	-	In, S	M	R
<i>Anisomeles malabarica</i> (L.) R.Br.	Lamiaceae	Herb	4	-	-	-	As, Af	M	R
<i>Antiaris toxicaria</i> (Pers.) Lesch.	Moraceae	Tree	1	-	-	-	E	M	VR
<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Climber	38	19	1	-	I	F	C
<i>Areca catechu</i> L.	Arecaceae	Tree	6	10	-	-	In, S	M	C
<i>Aristolochia bracteolata</i> Lam.	Aristolochiaceae	Herb	4	1	-	-	Cos	M	OC
<i>Aristolochia indica</i> L.	Aristolochiaceae	Shrub	8	3	-	1	In, S	M	OC
<i>Artabotrys zeylanicus</i> Hook.f. & Thoms.	Annonaceae	Climber	4	1	-	-	In, S	FM	OC
<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Tree	13	21	-	1	E	FMT	R
<i>Artocarpus hirsutus</i> Lam.	Moraceae	Tree	42	33	1	-	E	FMT	R
<i>Artocarpus lacucha</i> Roxb. ex Buch. Ham.	Moraceae	Tree	-	1	-	-	E	M	VR

Appendix. (continued)

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Asparagus racemosus</i> Willd.	Asparagaceae	Shrub	82	37	7	6	As	M	C
<i>Asteriastigma macrocarpa</i> Bedd.	Flacourtiaceae	Tree	3	3	-	-	E	MT	En
<i>Asystasia gangetica</i> (L.) T.And	Acanthaceae	Herb	16	9	2	1	Pal	FM	C
<i>Atlantia monophylla</i> (L.) Correa	Rutaceae	Tree	7	3	-	1	E	MT	R
<i>Atlantia racemosa</i> Wight. & Arn.	Rutaceae	Tree	2	4	-	1	In	M	R
<i>Azadiracta indica</i> A.Juss.	Meliaceae	Tree	84	54	6	9	In	M	C
<i>Azima tetracantha</i> Lam	Salvadoraceae	Shrub	1	4	-	1	In	FM	OC
<i>Bambusa arundinacea</i> (Retz.) Roxb.	Bambusaceae	Tree	4	2	-	-	As	M	C
<i>Barleria buxifolia</i> L.	Acanthaceae	Shrub	86	42	8	9	As	M	C
<i>Bauhinia racemosa</i> Lam.	Caesalpiniaceae	Tree	14	8	-	1	Pal	M	OC
<i>Begonia malabarica</i> Lam.	Begoniaceae	Herb	1	4	-	-	In, S	M	R
<i>Bhesa indica</i> (Bedd.) Ding	Celastraceae	Tree	2	2	-	-	E	T	VR
<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Herb	81	19	5	4	In, S	M	C
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Herb	98	51	2	1	As	M	C
<i>Bombax ceiba</i> L.	Bombacaceae	Tree	2	3	-	-	As	M	En
<i>Borassus flabellifer</i> L.	Arecaceae	Tree	11	9	-	6	As, Af	M	C
<i>Bothriochloa pertusa</i> (L.) A.	Poaceae	Herb	12	5	1	2	As, Af	F	C
<i>Bereynia vitis-idaea</i> (Burm.f.) Fisher	Euphorbiaceae	Shrub	-	19	3	2	As, Af	M	OC
<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	Tree	2	-	-	-	As	M	VR
<i>Butea parviflora</i> Roxb.	Fabaceae	Liana	4	8	-	-	As	FM	R
<i>Caesalpinia mimosoides</i> Lam.	Caesalpiniaceae	Shrub	11	1	1	-	E	M	OC
<i>Calamus rotang</i> L.	Arecaceae	Climber	6	4	-	1	In, S	M	En
<i>Calophyllum apetalum</i> (Willd.)	Clusiaceae	Tree	1	-	-	-	E	M	VR
<i>Calophyllum inophyllum</i> L.	Clusiaceae	Tree	12	9	4	3	As	M	C
<i>Calophyllum polyanthum</i> Wall. ex Cho.	Clusiaceae	Tree	1	-	-	-	E	FT	VR
<i>Calotropis gigantea</i> (L.) R.Br.	Asclepiadaceae	Shrub	76	41	6	5	As	M	C
<i>Calycopteris floribunda</i> Lam.	Combretaceae	Shrub	-	6	-	-	As	M	R
<i>Canthium angustifolium</i> Roxb.	Rubiaceae	Shrub	11	4	2	1	In	F	C
<i>Canthium dicoccum</i> Gaertn.	Rubiaceae	Tree	20	11	1	-	As	T	C
<i>Canthium parviflorum</i> Lam.	Rubiaceae	Shrub	14	3	-	-	As	M	OC
<i>Capparis sepiaria</i> L.	Capparidaceae	Shrub	5	11	-	-	As	M	OC
<i>Capparis zeylanica</i> L.	Capparidaceae	Shrub	45	7	-	-	Pan	M	OC
<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Herb	8	9	-	-	Pan	M	OC
<i>Caryota urens</i> L.	Arecaceae	Tree	11	6	-	-	As	M	OC
<i>Casearia esculenta</i> Roxb.	Flacourtiaceae	Tree	7	2	-	-	As, Au	FM	OC
<i>Cassia fistula</i> L.	Caesalpiniaceae	Tree	19	26	-	-	As	M	C
<i>Cassia occidentalis</i> L.	Caesalpiniaceae	Shrub	8	5	1	2	As	M	C
<i>Cassia siamea</i> Lam.	Caesalpiniaceae	Tree	3	-	-	2	As	M	OC
<i>Cassia tora</i> L.	Caesalpiniaceae	Shrub	9	6	3	-	Pan	M	C
<i>Catheranthus roseus</i> (L.) G.Don.	Apocynaceae	Herb	2	19	7	3	I	M	C
<i>Centella asiatica</i> (L.) Urban.	Apiaceae	Herb	89	40	1	-	Pan	M	C
<i>Chromolaena odorata</i> (L.) King & Robi.	Verbenaceae	Shrub	13	2	-	9	I	M	OC
<i>Chukrasia tabularis</i> A.Juss.	Meliaceae	Tree	-	-	4	1	As	T	R
<i>Cinnamomum verum</i> Presl.	Lauraceae	Tree	6	2	-	-	As	M	OC
<i>Cissampelos pareira</i> L.	Menispermaceae	Shrub	5	-	1	-	Pan	M	OC
<i>Cissus quadrangularis</i> L.	Vitaceae	Shrub	38	19	2	4	As	M	C
<i>Clausena indica</i> (Dalz.) Oliver.	Rutaceae	Tree	-	-	6	1	In	FM	R
<i>Cleome gynandra</i> L.	Cleomaceae	Herb	26	19	-	2	Pan	M	C
<i>Cleome viscosa</i> L.	Cleomaceae	Herb	19	7	-	-	Pan	M	C
<i>Clerodendrum inerme</i> (L.) Gaertn.	Verbenaceae	Shrub	83	14	-	-	As	M	C
<i>Clitoria ternatea</i> L.	Fabaceae	Shrub	34	27	2	-	Pan	M	C
<i>Coccinia grandis</i> (L.) Voigh.	Cucurbitaceae	Herb	24	8	-	1	Cul	M	C
<i>Cocos nucifera</i> L.	Arecaceae	Tree	6	5	-	-	Pan	M	C
<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	46	23	4	-	As, Af	F	C
<i>Commelina erecta</i> L.	Commelinaceae	Herb	19	28	-	-	Pan	F	C
<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	97	61	2	-	Pal	F	C
<i>Commiphora caudata</i> (Wight & Arn.) Eng.	Burseraceae	Tree	10	4	-	1	As	FM	OC
<i>Cordia obliqua</i> Willd.	Cordiaceae	Tree	7	2	-	-	As	FT	OC

Appendix. (continued)

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Corypha umbraculifera</i> L.	Arecaceae	Tree	4	1	-	-	In	MT	OC
<i>Costus speciosus</i> (Koen.) J.E.	Costaceae	Herb	1	4	-	-	As	M	En
<i>Crataeva magna</i> (Lour.) DC.	Capparidaceae	Tree	15	6	2	1	In	M	C
<i>Crossandra infundibuliformis</i> (L.) Ness.	Acanthaceae	Shrub	13	4	1	-	In, S	FM	C
<i>Crotalaria laburnifolia</i> L.	Fabaceae	Shrub	2	-	-	-	In, S	M	R
<i>Crotalaria verrucosa</i> L.	Fabaceae	Shrub	-	3	1	1	In, S	M	R
<i>Croton malabaricus</i> Bedd.	Euphorbiaceae	Tree	-	11	-	-	In	M	R
<i>Cullenia exarillata</i> Robyns.	Malvaceae	Tree	4	-	-	-	In, S	Fm	VR
<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Tree	26	19	-	-	As, Au	M	C
<i>Cycas Circinalis</i> L.	Cycadaceae	Tree	14	6	-	-	As, Af	FM	En
<i>Cyclea peltata</i> (Lam.) Hook.f.	Menispermaceae	Shrub	13	19	-	-	In, S	M	C
<i>Cymbidium aloifolium</i> (L.) Sw.	Orchidaceae	Herb	4	5	-	-	In, S	M	OC
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Herb	98	63	4	5	As	M	C
<i>Cyperus rotundus</i> L.	Cyperaceae	Herb	76	52	8	-	Pan	M	C
<i>Dactyloctenium aegyptium</i> (L.) Beauv.	Poaceae	Herb	3	1	-	-	Cos	F	R
<i>Datura metel</i> L.	Solanaceae	Shrub	21	7	2	-	I	M	C
<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tree	9	6	-	-	As	M	OC
<i>Dendrocalamus strictus</i> (Roxb.) Nees.	Poaceae	Tree	7	14	3	1	Pan	FMT	C
<i>Desmodium gangeticum</i> (L.) DC	Fabaceae	Shrub	31	20	-	-	Pal	M	C
<i>Desmodium motorium</i> (Houtt.) Merr.	Fabaceae	Shrub	5	6	1	-	Cul	M	R
<i>Desmodium triflorum</i> (L.) DC	Fabaceae	Herb	45	9	-	-	Cos	M	OC
<i>Didymocarpus tomentosus</i> Wight.	Gesneriaceae	Herb	-	-	1	-	In	M	VR
<i>Dioscorea alata</i> L.	Dioscoreaceae	Shrub	19	7	-	-	As	FM	C
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Herb	6	10	-	-	Pan	FM	C
<i>Dioscorea oppositifolia</i> L.	Dioscoreaceae	Shrub	14	16	-	-	In, S	FM	OC
<i>Dioscorea pentaphylla</i> L.	Dioscoreaceae	Shrub	4	21	-	-	As	M	OC
<i>Diospyros buxifolia</i> (Blume.) Hie.	Ebenaceae	Tree	1	-	-	-	E	T	VR
<i>Diospyros candolleana</i> Wight.	Ebenaceae	Tree	2	2	-	-	E	MT	OC
<i>Diospyros ebenum</i> Koen.	Ebenaceae	Tree	3	3	-	-	E	T	VR
<i>Diospyros foliolosa</i> Wall.	Ebenaceae	Tree	1	-	-	-	E	T	VR
<i>Diospyrus malabarica</i> (Dser.) Kostel.	Ebenaceae	Tree	6	4	-	-	In, S	M	R
<i>Diospyrus paniculata</i> Dalz.	Ebenaceae	Tree	-	1	-	-	E	FT	VR
<i>Dodonaea viscosa</i> (L.) Jacq.	Sapindaceae	Shrub	7	6	4	1	Pan	M	C
<i>Drypetes sepiaria</i> (Wight & Arn) Pax & Hoffm.	Euphorbiaceae	Tree	4	2	-	-	As, Au	FT	R
<i>Eclipta prostrata</i> L.	Asteraceae	Herb	6	4	-	-	Pan	M	OC
<i>Elaeocarpus serratus</i> L.	Elaeocarpaceae	Tree	19	1	-	-	As	FT	OC
<i>Elaeocarpus tuberculatus</i> Roxb.	Elaeocarpaceae	Tree	19	14	-	1	Pan	FMT	OC
<i>Elephantopus scaber</i> L.	Asteraceae	Herb	38	13	-	1	Pan	M	C
<i>Enicostema axillare</i> (Lam.) Ray.	Gentianaceae	Herb	6	1	-	-	As, Af	M	OC
<i>Erythrina stricta</i> Roxb.	Fabaceae	Tree	11	2	-	-	As	M	C
<i>Euphorbia cyathophora</i> Murr.	Euphorbiaceae	Herb	11	2	-	-	Cos	F	OC
<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herb	69	47	4	6	As	M	C
<i>Euphorbia nivulia</i> (Buch.) Ham.	Euphorbiaceae	Tree	-	1	-	-	As	M	VR
<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	Shrub	14	7	1	-	As, Af	M	OC
<i>Evolvulus alsinoides</i> L.	Convolvulaceae	Herb	53	21	7	-	Pan	M	C
<i>Ficus benghalensis</i> L.	Moraceae	Tree	72	46	8	6	As	M	C
<i>Ficus callosa</i> Willd.	Moraceae	Tree	9	-	-	1	As	T	R
<i>Ficus dalhousiae</i> Miq.	Moraceae	Tree	-	1	-	-	E	M	VR
<i>Ficus exasperata</i> Vahl.	Moraceae	Tree	-	-	4	-	As, Af	M	R
<i>Ficus hispida</i> L.f.	Moraceae	Tree	34	6	-	-	As, Au	M	C
<i>Ficus mollis</i> Vahl.	Moraceae	Tree	-	5	-	-	As	M	R
<i>Ficus racemosa</i> L.	Moraceae	Tree	2	-	-	-	As	M	R
<i>Ficus religiosa</i> L.	Moraceae	Tree	63	38	7	5	Cul	M	C
<i>Ficus talbotii</i> King.	Moraceae	Tree	-	-	-	2	As	M	VR
<i>Ficus tjahela</i> Burm.f.	Moraceae	Tree	-	2	-	-	In, S	FM	VR
<i>Flacourtia indica</i> (Burm.f.) Merr.	Flacourtiaceae	Shrub	24	10	-	-	Pan	M	C
<i>Garcinia gummi - gutta</i> (L.) Robbs.	Clusiaceae	Tree	3	-	-	-	E	M	R
<i>Givotia rotterliiformis</i> Giff.	Euphorbiaceae	Tree	-	2	-	-	Pan	FT	R

Appendix. (continued)

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Gliricidia sepium</i> Jacq.	Fabaceae	Tree	6	-	-	-	As, Af	T	R
<i>Gloriosa superba</i> L.	Liliaceae	Herb	41	34	3	2	As, Af	M	En
<i>Gmelina arborea</i> Roxb.	Verbenaceae	Tree	8	1	-	-	In, S	FT	OC
<i>Gnetum ula</i> Brongn.	Gnetaceae	Liana	1	-	-	-	E	M	VR
<i>Guazuma ulmifolia</i> Lam.	Sterculiaceae	Tree	17	6	-	1	As	M	R
<i>Gymnema hirsutum</i> Wight & Arm.	Asclepiadaceae	Shrub	6	-	-	3	Pal	M	OC
<i>Hedyotis nitida</i> Wight & Arm.	Rubiaceae	Herb	11	7	1	4	In, S	M	C
<i>Helicteres isora</i> L.	Sterculiaceae	Shrub	12	2	-	-	As, Au	M	OC
<i>Heliotropium indicum</i> L.	Boraginaceae	Herb	19	32	5	4	Cos	M	C
<i>Hemidesmus indicus</i> (L.) R.Br.	Periplocaceae	Shrub	52	19	2	4	As	M	En
<i>Hibiscus tiliaceus</i> L.	Malvaceae	Tree	1	-	-	2	Pan	M	R
<i>Holostemma ada-kodien</i> Sch.	Asclepiadaceae	Shrub	-	2	-	-	As	M	En
<i>Holigarna grahamii</i> (Wight) Kurz.	Anacardiaceae	Tree	1	-	-	-	E	FM	VR
<i>Hopea parviflora</i> Bedd.	Dipterocarpaceae	Tree	-	1	-	-	E	M	VR
<i>Hydnocarpus laurifolia</i> (Dennst.) Sle.	Flacourtiaceae	Tree	4	3	-	-	E	M	VR
<i>Hygrophila auriculata</i> (Schum.) Hie.	Acanthaceae	Herb	24	19	-	-	Pan	M	C
<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Herb	89	43	4	6	I	M	C
<i>Ichnocarpus frutescens</i> (L.) R.Br.	Apocynaceae	Shrub	2	4	-	1	As, Au	M	OC
<i>Imperata cylindrica</i> L.	Poaceae	Herb	-	2	-	-	As, Af	M	R
<i>Indigofera uniflora</i> Buch. Ham. ex Roxb.	Fabaceae	Herb	10	4	-	-	E	F	OC
<i>Indioneesiella echioides</i> (L.) Sreem.	Acanthaceae	Herb	-	3	1	-	As	M	R
<i>Ipomoea alba</i> L.	Convolvulaceae	Twining	6	4	-	-	In, S	F	OC
<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Shrub	14	9	-	1	I	M	C
<i>Ipomoea pes - tigris</i> L.	Convolvulaceae	Herb	13	10	1	-	Pan	M	C
<i>Ixora coccinea</i> L.	Rubiaceae	Shrub	72	46	-	-	As	M	C
<i>Jasminium angustifolium</i> (L.) Willd.	Oleaceae	Shrub	63	28	-	-	In, S	M	C
<i>Jasminium multiflorum</i> (Burm.f.) Andr.	Oleaceae	Shrub	3	9	-	-	As	F	OC
<i>Jatropha curcas</i> L.	Euphorbiaceae	Shrub	7	31	3	2	I	M	C
<i>Justicia adhatoda</i> L.	Acanthaceae	Shrub	24	9	-	3	As	M	C
<i>Justicia beddomei</i> (Clarke.) Ben.	Acanthaceae	Shrub	-	-	-	1	As, Af	M	En
<i>Justicia tranquebariensis</i> L.f.	Acanthaceae	Herb	9	6	-	-	In, S	M	OC
<i>Kaempferia galanga</i> L.	Zingiberaceae	Herb	6	2	-	-	As	M	En
<i>Kalanchoe pinnata</i> (Lam.) Pers.	Crassulaceae	Herb	2	-	-	-	Pan	M	En
<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Tree	8	2	4	1	As	FM	C
<i>Lantana camara</i> L.	Verbenaceae	Shrub	51	39	-	-	I	M	C
<i>Lantana indica</i> Roxb.	Verbenaceae	Shrub	19	14	-	-	I	M	C
<i>Lawsonia inermis</i> L.	Lythraceae	Shrub	8	19	-	-	Cul	M	OC
<i>Leea indica</i> (Burm.f.) Merr.	Leeaceae	Shrub	-	4	-	-	As	M	En
<i>Lepisanthes tetraphylla</i> (Vahl.) Radlk.	Sapindaceae	Tree	4	1	-	-	As	FM	R
<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Herb	63	38	3	4	Cos	M	C
<i>Limonia acidissima</i> L.	Rutaceae	Tree	4	8	-	-	As	M	OC
<i>Ludwigia perennis</i> L.	Onagraceae	Herb	4	1	-	-	As, Au	M	R
<i>Madhuca longifolia</i> (Koen.) Mac.	Sapotaceae	Tree	11	6	3	4	In, S	M	C
<i>Mallotus philippensis</i> (Lam.) Mull.	Euphorbiaceae	Tree	12	3	-	-	As, Au	M	C
<i>Mangifera indica</i> L.	Anacardiaceae	Tree	26	18	-	2	As	M	C
<i>Manilkara hexandra</i> (Roxb.) Dub.	Sapotaceae	Tree	1	-	-	-	Pal	M	VR
<i>Melia dubia</i> Cav.	Meliaceae	Tree	2	6	-	-	Pal	M	OC
<i>Memecylon edule</i> Roxb.	Melastomaceae	Shrub	11	5	-	-	Pal	MT	OC
<i>Memecylon umbellatum</i> Burm.f.	Melastomaceae	Shrub	1	-	-	-	E	M	VR
<i>Mesua ferrea</i> L.	Clusiaceae	Tree	-	1	-	-	E	M	VR
<i>Michelia champaca</i> L.	Magnoliaceae	Tree	31	12	-	2	As	M	C
<i>Microcos paniculata</i> L.	Tiliaceae	Tree	1	-	-	-	As, Af	T	VR
<i>Mimosa pudica</i> L.	Mimosaceae	Herb	94	59	2	8	Cos	M	C
<i>Mimusops elengi</i> L.	Sapotaceae	Tree	36	22	1	4	As, Au	M	C
<i>Morinda pubescens</i> J.E.Smith.	Rubiaceae	Tree	44	31	1	2	As	M	C
<i>Morinda umbellata</i> L.	Rubiaceae	Shrub	8	2	-	-	E	FM	R
<i>Moringa pterygosperma</i> Goertn.	Moringaceae	Tree	6	4	-	-	Cul	M	OC
<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	Shrub	4	8	-	-	Pan	M	OC

Appendix. (continued)

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Tree	10	6	-	-	As, Au	M	C
<i>Mussaenda belilla</i> Buch. Ham	Rubiaceae	Shrub	6	2	-	-	As	F	OC
<i>Myristica malabarica</i> Lam.	Myristicaceae	Tree	-	1	-	-	E	M	VR
<i>Myxopyrum serratum</i> A.W.Hill	Oleaceae	Shrub	1	-	-	-	E	M	VR
<i>Naregamia alata</i> Wight & Arn.	Meliaceae	Shrub	7	1	7	1	E	M	R
<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	Herb	6	2	-	-	As, Af	M	OC
<i>Nerium oleander</i> L.	Apocynaceae	Shrub	19	8	-	1	Cul	M	C
<i>Nyctanthus arbor - tristis</i> L.	Nyctanthaceae	Tree	13	4	-	-	In	M	OC
<i>Nymphaea pubescens</i> Willd.	Nymphaeaceae	Herb	-	-	-	1	E	M	VR
<i>Ochna obtusata</i> DC.	Ochnaceae	Shrub	2	-	-	11	In, S	M	VR
<i>Ochlandra scriptoria</i> (Dennst.) Fish.	Bambusaceae	Shrub	12	7	-	-	E	FM	R
<i>Ocimum americanum</i> L.	Lamiaceae	Shrub	34	16	-	-	Pan	FM	OC
<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Shrub	12	8	-	-	Cul	FM	OC
<i>Ophiorrhiza mungos</i> L.	Rubiaceae	Shrub	16	27	-	-	As	M	OC
<i>Opuntia dillenii</i> (Ker. Gawl.) Haw.	Cactaceae	Shrub	3	6	-	2	I	M	C
<i>Osbeckia aspera</i> (L.) Bl.	Melastomaceae	Shrub	-	1	-	-	E	M	VR
<i>Pandanus fascicularis</i> Lam.	Pandanaceae	Shrub	6	2	-	-	As, Am	M	OC
<i>Pavetta indica</i> L.	Rubiaceae	Tree	26	4	3	1	As, Au	M	C
<i>Pergularia daemia</i> (Forssk.) Chiov.	Asclepiadaceae	Shrub	14	9	-	-	As, Af	M	OC
<i>Persea macrantha</i> (Ness.) Kosterm.	Lauraceae	Tree	5	-	-	-	E	MT	VR
<i>Petiveria alliacea</i> L.	Phytolaccaceae	Shrub	-	1	-	-	Pan	M	VR
<i>Phoenix loureirri</i> Kunth.	Arecaceae	Shrub	13	18	6	4	As, Af	M	C
<i>Phragmites karka</i> (Retz.)	Poaceae	Shrub	4	2	-	-	In, S	F	OC
<i>Phylla nodiflora</i> (L.) Green	Verbenaceae	Herb	9	14	2	-	Pan	M	OC
<i>Phyllanthus amarus</i> Schum.	Euphorbiaceae	Herb	21	16	-	-	Pan	M	C
<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Tree	4	8	-	1	As	M	C
<i>Phyllanthus reticulatus</i> Poir.	Euphorbiaceae	Shrub	6	2	-	-	As, Af	M	OC
<i>Physalis minima</i> L.	Solanaceae	Herb	22	31	-	-	Cos	M	C
<i>Pilea microphylla</i> (L.) Liebm.	Urticaceae	Herb	43	26	-	-	Pan	M	C
<i>Pinanga dicksonii</i> (Roxb.) Benth.	Arecaceae	Tree	-	1	-	-	E	M	VR
<i>Piper longum</i> L.	Piperaceae	Shrub	8	6	-	-	As	M	OC
<i>Piper nigrum</i> L.	Piperaceae	Shrub	6	13	-	-	In, S	M	OC
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Mimosaceae	Tree	1	-	-	2	I	M	R
<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Shrub	31	11	-	1	Pal	M	C
<i>Polyalthia fragrans</i> (Dalz.) Bedd.	Annonaceae	Tree	-	1	-	-	E	T	VR
<i>Polyalthia longifolia</i> (Sonner.) Thw.	Annonaceae	Tree	9	6	-	-	Cul	T	C
<i>Polyalthia suberosa</i> (Roxb.) Thw.	Annonaceae	Tree	4	2	-	-	Pal	FMT	R
<i>Polygala arvensis</i> Willd.	Polygalaceae	Herb	3	-	-	-	Cos	M	R
<i>Polygonum glabrum</i> Willd.	Polygonaceae	Herb	8	16	5	2	Cos	M	C
<i>Pongamia pinnata</i> (L.) Pierre.	Fabaceae	Tree	19	9	1	1	Pal	M	C
<i>Pothos scandens</i> L.	Araceae	Shrub	32	24	-	-	As, Af	M	C
<i>Pseudarthria viscida</i> (L.) Wight & Arn.	Fabaceae	Herb	-	2	-	-	As, Af	M	VR
<i>Psidium guajava</i> L.	Myrtaceae	Tree	21	6	-	-	Cul	M	C
<i>Psychotria elongata</i> (Wight) Hook.f.	Rubiaceae	Shrub	4	2	-	-	Pan	F	R
<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tree	11	6	-	-	Cos	M	C
<i>Punica granatum</i> L.	Punicaceae	Shrub	3	5	-	-	Cul	M	C
<i>Quisqualis indica</i> L.	Combretaceae	Shrub	14	27	2	-	As	M	OC
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Shrub	1	-	-	-	As	M	En
<i>Reinwardtiodendron anamallayanum</i> (Bedd.) Sald.	Meliaceae	Tree	3	-	-	-	E	MT	VR
<i>Rhinacanthus nasutus</i> (L.) Kurz.	Acanthaceae	Shrub	14	6	-	-	Pan	M	OC
<i>Rhododendron arboreum</i> J.E.Smith	Ericaceae	Tree	4	8	-	-	Cos	MT	R
<i>Rostellularia simplex</i> Wight.	Acanthaceae	Herb	12	8	-	1	As	M	OC
<i>Saccharum spontaneum</i> L.	Poaceae	Herb	4	4	-	-	Pal	M	OC
<i>Sansevieria roxburghiana</i> J. & J.	Agavaceae	Herb	19	7	-	-	As, Af	M	C
<i>Santalum album</i> L.	Santalaceae	Tree	23	19	-	-	As	M	En
<i>Sapindus emarginatus</i> Vahl.	Sapindaceae	Tree	6	2	-	-	As	M	OC
<i>Saraca asoca</i> (Roxb.) Wilde.	Caesalpiniaceae	Tree	2	2	-	-	E	M	En
<i>Sarcostemma acidum</i> (Roxb.) Voi.	Asclepiadaceae	Shrub	4	3	-	1	As, Af	M	OC

Appendix. (continued)

Botanical Name	Family	Habit	Number of sacred groves				Phytogeography	E.V.	Status
			T-I	T-II	T-III	T-IV			
<i>Semicarpus anacardium</i> L.	Anacardiaceae	Tree	5	8	-	1	As, Au	M	C
<i>Sida acuta</i> Burm.f.	Malvaceae	Shrub	32	9	2	-	Pan	M	C
<i>Sida cordifolia</i> L.	Malvaceae	Shrub	27	16	-	3	Pan	M	C
<i>Sida rhombifolia</i> L.	Malvaceae	Shrub	41	12	1	-	Pan	M	OC
<i>Smilax zeylanica</i>	Smilacaceae	Shrub	28	6	2	-	As	M	C
<i>Solanum surattense</i> Burm.f.	Solanaceae	Herb	-	14	-	1	As	M	OC
<i>Solanum torvum</i> Sw.	Solanaceae	Shrub	19	3	2	-	Pan	M	C
<i>Solanum trilobatum</i> L.	Solanaceae	Shrub	6	4	-	-	Cos	M	OC
<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	Verbenaceae	Shrub	4	2	1	-	As, Af	M	C
<i>Streblus asper</i> Lour.	Moraceae	Tree	31	19	-	-	As	M	OC
<i>Sterculia balanghas</i> L.	Sterculiaceae	Tree	9	3	-	-	As	MT	OC
<i>Sterculia foetida</i> L.	Sterculiaceae	Tree	11	7	-	-	Cos	M	OC
<i>Sterculia guttata</i> Roxb.	Sterculiaceae	Tree	4	2	-	-	As	FM	OC
<i>Sterculia urens</i> Roxb.	Sterculiaceae	Tree	1	8	-	-	As	M	OC
<i>Strychnos minor</i> Dennst.	Strychnaceae	Shrub	1	-	-	-	In, S	M	VR
<i>Strychnos nux-vomica</i> L.	Strychnaceae	Tree	36	27	-	-	As	M	C
<i>Strychnos potatorum</i> L.	Strychnaceae	Tree	4	2	-	-	As, Af	M	VR
<i>Swietenia mahagoni</i> (L.) Jacq.	Meliaceae	Tree	17	9	-	-	Pan	T	C
<i>Syzygium caryophyllatum</i> (L.) Alston.	Myrtaceae	Tree	1	2	-	-	In, S	M	VR
<i>Syzygium cumini</i> (L.) Ske.	Myrtaceae	Tree	16	14	4	2	In, S	FMT	C
<i>Syzygium zeylanicum</i> (L.) DC.	Myrtaceae	Tree	3	2	-	-	Pan	FM	R
<i>Tabernaemontana divaricata</i> (L.) R.Br.	Apocynaceae	Shrub	7	19	1	-	In	M	OC
<i>Tabernaemontana heyneana</i> Wall.	Apocynaceae	Tree	-	4	-	-	As	M	R
<i>Tamarindus indica</i> L.	Caesalpiniaceae	Tree	12	9	-	-	As, Af	M	C
<i>Tamilnadia uliginosa</i> (Retz.) Tri & Sri	Rubiaceae	Tree	1	-	-	-	E	FM	VR
<i>Tectona grandis</i> L.f.	Verbenaceae	Tree	43	29	-	-	As	M	C
<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Shrub	14	6	1	-	Cul	M	OC
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Tree	19	13	-	-	As	M	C
<i>Terminalia catappa</i> L.	Combretaceae	Tree	4	2	-	-	As	M	OC
<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	6	2	-	-	As, Af	M	R
<i>Terminalia crenulata</i> Roth.	Combretaceae	Tree	3	1	-	-	In	MT	OC
<i>Tetracera akara</i> (Burm.f.) Merr.	Dilleniaceae	Shrub	7	3	-	-	E	FM	R
<i>Thespesia lampas</i> (Cav.) Dalz.	Malvaceae	Shrub	2	6	1	1	Pan	M	C
<i>Thespesia populnea</i> (L.) Soland.	Malvaceae	Tree	9	8	3	1	Cos	M	C
<i>Thevetia peruviana</i> (Pers.) Merr.	Apocynaceae	Shrub	6	2	-	-	Pan	M	OC
<i>Tiliacora acuminata</i> (Lam.) Hook.f.	Menispermaceae	Shrub	19	23	-	-	As	M	C
<i>Tinospora cordifolia</i> (Willd.) Miers	Menispermaceae	Shrub	51	19	-	-	In, S	M	C
<i>Toddalia asiatica</i> (L.) Lam.	Rutaceae	Shrub	41	15	-	-	As, Af	M	OC
<i>Trema orientalis</i> (L.) Blume.	Ulmaceae	Tree	8	14	-	1	As, Af	M	C
<i>Tridax procumbens</i> L.	Asteraceae	Herb	76	51	3	2	Cos	M	C
<i>Tylophora indica</i> (Burm.f.) Merr.	Asclepiadaceae	Shrub	42	34	-	-	Pal	M	C
<i>Urginea indica</i> (Roxb.) Kunth.	Liliaceae	Herb	2	6	-	-	As, Af	M	OC
<i>Uvaria narum</i> (Dunal) Wall. ex Wight & Arn.	Annonaceae	Climber	48	36	-	-	In, S	M	C
<i>Vanda tassellata</i> (Roxb.) Hk. ex G.Don.	Orchidaceae	Shrub	12	7	-	-	As	M	C
<i>Vateria Indica</i> L.	Dipterocarpaceae	Tree	2	1	1	-	E	M	OC
<i>Vitex altissima</i> L.	Verbenaceae	Tree	2	2	-	-	E	MT	R
<i>Vitex negundo</i> L.	Verbenaceae	Shrub	11	1	19	-	As	M	C
<i>Wrightia arborea</i> (Dennst.) Mabb.	Apocynaceae	Tree	3	-	4	-	As	FMT	OC
<i>Wrightia tinctoria</i> (Roxb.) R.Br.	Apocynaceae	Tree	23	-	7	-	As, Au	M	OC
<i>Ziziphus maritima</i> Lam.	Rhamnaceae	Tree	26	1	11	-	Cos	M	C
<i>Ziziphus oenoplia</i> (L.) Mill.	Rhamnaceae	Shrub	9	-	19	-	As, Au	M	C
<i>Ziziphus rugosa</i> Lam.	Rhamnaceae	Tree	6	21	-	-	As	FM	OC
<i>Zornia diphylla</i> (L.) Pers.	Fabaceae	Herb	7	1	4	-	Pan	M	OC

Abbreviations: --: Absent; T-I: Vilavancode taluk sacred groves; T-II: Kalkulam taluk sacred groves; T-III: Thovalai taluk sacred groves; T-IV: Agastheeshwaram taluk sacred groves; E.V: Economic value of the species; Af: Africa; As: Asian; Au: Australia; Cos: Cosmopolitan; C: Common; E: Endemic; En: Endangered; F: Minor forest produce; FT: Minor forest produce and timber; I: Introduced; In: India; M: Medicinal; MFT: Medicinal, minor forest produce and timber; Pan: Pantropical; Pal: Paletropical; S: Sri Lanka; R: Rare; Am: American; VR: Very rare; T: Timber; Oc: Occasional.