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Vascular plant diversity in Neiveli Vadavadhi Karuppar Sacred Grove at Thanjavur district, Tamil Nadu

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ABSTRACT

Neiveli Vadavadhi Karuppar Sacred Grove at Thanjavur district was explored for floristic studies and reported for the first time. Totally 117 plant species belonging to 51 families and 102 genera were recorded in this grove. An important keystone species were also recorded. At present scenario, environmental awareness programme should be implemented among the local community to educate them about the ecological significances of sacred groves for the preparation Conservation and management plan to attain the sustainable biological wealth.

Key words: Tamil Nadu, Sacred grove, Biodiversity Conservation, threatened plants

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INTRODUCTION

Nature worship has been a key force of shaping the human attitudes towards conservation and sustainable utilization of natural resources. Such traditional practices have been invariably operating in different parts of India (Anthwal *et al*., 2006). Sacred groves are the tracts of virgin forest that were left untouched by the local inhabitants, harbour rich biodiversity, and are protected by the local people due to their cultural and religious beliefs and taboos that the deities reside in them (Gadgil and Vartak, 1975; Khiewtam and Ramakrishnan, 1989; Ramakrishnan, 1996; Chandrashekara and Sankar 1998, Kanowski *et al*. 1999). Sacred groves are the traditional natural museum with live specimens conserved by the local community through religious practice (Karthikeyan and Tangavelou, 2011). It is believed that these sacred virgin forests date back to thousands of years when human society was in the primitive state. Gadgil and Vartak (1975) have traced the historical link of the sacred groves to the pre- agricultural, hunting and gathering stage of societies. These virgin forests are believed to be pre-Vedic in origin and the area of sacred groves ranges from few square meters to several hectares. Sacred groves serve as a home for several birds and mammals and indirectly have symbiotic relationship with other animal species conservation (Islam *et al*. 1998). Sacred groves are the repositories of rare and endemic species and can be regarded as the remnant of the primary forest left untouched by the local inhabitants and protected then due to the belief that the deities reside in these forests. Many people have described sacred groves in different ways. However, there is an evident fact that wherever sacred groves existed, indigenous traditional societies have spiritual relationships with the existing physical environment sustained them. The role of sacred groves in the conservation of biodiversity has long been recognized (Kosambi, 1962; Gadgil and Vartak, 1976; Haridasan and Rao, 1985; Khan *et al*. 1997; 2008). In India, several reports have been discussed on the floristic wealth of sacred groves from several states including Tamil Nadu. In this paper, the floristic wealth of Neiveli Vadavadhi Karuppar Sacred Grove from Thanjavur of Tamil Nadu state was reported here first time in order to prepare the conservation and management plan for the biodiversity protection in India.

MATERIALS AND METHODS

Study Area

The study area Neiveli Vadavadhi Karuppar Sacred Grove covers an area of about 5 hectares and located nearly 9 km away from Thanjavur town of Thanjavur district, Tamil Nadu. Geographically, it is lying between 10º25.195' N latitude and 079º09.106'078º46.292' E longitude. Temperature is moderately high and the average temperature during summer is 34°C and fewer less in winter. The average humidity ranged from 31 to 33% during November to December. Annual rainfall is ranging from 850 to 1000 mm. However, during the two decades the district has experienced rainfall only below normal. Most of the rains occur during north east monsoon. Soil is a ferruginous type with admixture of limestone. The soil is shallow in rocky areas and deeper in valley with little or no humus. The vegetation of Neiveli Vadavadhi Karuppar Sacred Grove is tropical dry evergreen forest type (Champion and Seth, 1968).

Intensive field surveys were made during the year 2011-2012 to explore the floristic composition and the conservation status of the Neiveli Vadavadhi Karuppar Sacred Grove of Thanjavur district, Tamil Nadu. All the plant specimens available in the study areas were collected for authenticity and the herbarium specimens are prepared by following the methodology of Jain and Rao (1976). Photographs were also taken. The herbarium specimens were identified with the help of the Flora of the Presidency of Madras (Gamble and Fischer, 1915 - 1936), The Flora of British India (Hooker, 1872 - 1897) and The Flora of Tamil Nadu Carnatic (Matthew, 1981). The Flora of Tamil Nadu by Henry *et al*. (1987 and 1989) and Nair and Henry (1983) has been referred for the correct botanical names for the specimens identified. The herbarium specimens were prepared for all the plants and deposited at Bio-Science Research Foundation, Pondicherry for reference.

RESULTS AND DISCUSSION

In the present study area, totally 117 species belonging to 51 plant families and 102 genera were recorded (Table 1). Among habit wise distribution, herbs were the dominant form represented by 38 % with 45 species followed by trees (28 % with 33 species), shrubs (17 % with 20 species), climbing herbs (15 % with 17 species) and climbing shrubs (2 % with 2 species). Among family wise distribution, Euphorbiaceae was the dominant plant family represented by 21 % with 11 species followed by Caesalpiniaceae (11 % with 11 species), Acanthaceae, Mimosaceae and Rubiaceae (9 % with 5 species each), Amaranthaceae, Apocynaceae, Boraginaceae, Cucurbitaceae and Fabaceae (8 % with 4 species each). Among the top 10 genericwise distribution, *Cassia* and *Euphorbia* were the dominant plant genera represented by 16 % with 4 species each followed by *Ficus* and *Phyllanthus* (12 % with 3 species each), *Acacia, Albizia, Barleria, Capparis* and *Carissa* (8 % with 2 species each) and *Abrus* (4 % with single species). Floristic study of vegetation is important to determine the distribution of food plants for wildlife (Ejtehadi *et al*., 2005) and prerequisite for much fundamental research in tropical community (Jayakumar *et al*., 2011). The present findings are comparable with other studies in sacred groves of Tamil Nadu and other regions of India. In Tamil Nadu, several studies with respect to floristic inventory were reported includes 260 species in 176 genera and 62 families from Malliganatham (John Britto *et al.*, 2001a), 224 species in 175 genera and 63 families from Vamban (John Britto *et al.*, 2001b), 35 species in 32 genera and 22 families (Sridhar Reddy and Parthasarathy, 2006), 77 species in 61 genera and 30 families (Mani and Parthasarathy, 2006) from 4 SG s of Coromandel coast, 265 species from 50 SG s collectively (Karthikeyan and Tangavelou, 2011), 106 species belonging to 97 genera and 54 families from Manganampatti, Nadiamman and Suranviduthi village (Vinothkumar *et al.*, 2011) of Pudukottai district, 98 species in 38 families and 76 genera from 33 sacred groves of Theni district (Manikandan *et al.*, 2011), 98 species in 87 genera and 43 families from 11 miniature SG Sukumaran and Jeeva, (2008) of Kanniyakumari district, 133 plant species from sacred groves in Pallipatty village of Maduari district (Ganesan *et al*., 2007). In addition, Sambandan and Dhatchanamoorthy, (2012) reported 59 species in 55 genera and 30 families from Karaikal. Thus, floristic diversity assessment is significant at local and regional levels to understand the present status and to make effective management strategies for conservation (Jayakumar *et al*., 2011).

The vegetation of the selected sacred groves is a tropical dry evergreen forest type comprises the species include *Albizia amara, Atalantia racemosa, Euphorbia antiquorrum, Memecylon umbellatum, Morinda pubescens, Stychnos nux-vomica* etc. This is due to the presence of typical, characteristic and preferential evergreen tree species Meher-Homji (1974). The presence of big lianas such as *Ventilago maderaspatana, Mimosa intsia* and *Combretum albidum* revealed the undisturbed status of the vegetation. Key stone species found in this Sacred Grove includes *Borassus flabellifer, Ficus benghalensis, Memecylon umbellatum* which harbors a number of birds and other survival of many

other species. Keystone species play a crucial role in biodiversity conservation through key functions that they perform in an ecosystem often they are also socially or culturally valued (Ramakrishnan, 2001), used not only for managing pristine ecosystems (Ramakrishnan 1992) but also for building up biodiversity in both natural and human-managed ecosystems through appropriately conceived rehabilitation strategies (Wali 1992; Lamb and Tomlinson 1994) that will ensure people's participation (Ramakrishnan *et al* 1994). The threatened medicinal plants recorded from Neiveli Vadavadhi Karuppar Sacred Grove include *Aegle marmelos*, *Strychnos potatorum*, *Madhuca longifolia*. Hence it concluded that the present study area with high species diversity tends to preserve its biodiversity.

Table – 1

S. No.	Botanical Names	Families	Habit
1	*Abrus precatorius* L. ssp. *precatorius*	Fabaceae	Climbing herb
2	*Abutilon indicum* (L.) ssp. *indicum*	Malvaceae	Shrub
3	*Acacia nilotica* (L.) Del. *indica* (Benth.) Brenan	Mimosaceae	Tree
4	*Acacia polyacantha* Willd.	Mimosaceae	Tree
5	*Acalypha indica* L.	Euphorbiaceae	Herb
6	*Acanthospermum hispidum* DC.	Asteraceae	Herb
7	*Aegle marmelos* (L.) Corr.	Rutaceae	Tree
8	*Aerva lanata* (L.) A.L.Juss.	Amaranthaceae	Herb
9	*Agave cantula* Roxb.	Agavaceae	Shrub
10	*Ageratum conyzoides* L.	Asteraceae	Shrub
11	*Alangium salvifolium* (L.f.) Wangerin.	Alangiaceae	Tree
12	*Albizia amara* (Roxb.) Boivin	Mimosaceae	Tree
13	*Albizia lebbeck* (L.) Benth.	Mimosaceae	Tree
14	*Alternanthera sessilis* (L.) R.Br.ex DC.	Amaranthaceae	Herb
15	*Alysicarpus monilifer* (L.) DC.	Fabaceae	Herb
16	*Anisomeles malabarica* (L.) Kuntz	Lamiaceae	Herb
17	*Anogeissus latifolia* (Roxb. ex DC.) Watt ex Guil & Perr	Combretaceae	Tree
18	*Aristida adsensionis* L. var. *adsensionis*	Poaceae	Herb
19	*Aristolochia indica* L.	Aristolochiaceae	Climbing herb
20	*Asparagus racemosus* Willd.	Asparagaceae	Climbing herb
21	*Atalantia monophylla* (L.) Corr.	Rutaceae	Tree
22	*Azadirachta indica* A.Juss.	Meliaceae	Tree
23	*Azima tetracantha* Lam.	Salvadoraceae	Tree
24	*Bambusa arundinacea* (Retz.) Willd.	Poaceae	Tree
25	*Barleria buxifolia* L.	Acanthaceae	Herb
26	*Barleria cuspidata* Hegne ex Nees.	Acanthaceae	Herb
27	*Bauhinia racemosa* Lam.	Caesalpiniaceae	Tree
28	*Benkara malabarica* (Lam.) Tirven.	Rubiaceae	Tree
29	*Blepharis maderaspatensis* (L.) Roth.	Acanthaceae	Herb
30	*Boerhavia diffusa* L.	Nyctaginaceae	Herb
31	*Borassus flabellifer* L.	Arecaceae	Tree
32	*Bridelia retusa* (L.) Sprengel.	Euphorbiaceae	Tree
33	*Bryenia retusa* (Dennst.) Alston	Euphorbiaceae	Tree
34	*Cadaba fruticosa* (L.) Druce.	Capparaceae	Shrub
35	*Capparis brevispina* DC.	Capparaceae	Shrub
36	*Capparis divaricata* Lam.	Capparaceae	Shrub
37	*Caralluma attenuata* Wight & Arn.	Asclepiadaceae	Herb
38	*Cardiospermum halicacabum* L.	Sapindaceae	Climbing herb
39	*Carissa carandas* L.	Apocynaceae	Shrub
40	*Carissa spinarum* L.	Apocynaceae	Shrub
41	*Carmona retusa* (Vahl) Masam.	Boraginaceae	Shrub
42	*Cassia auriculata* L.	Caesalpiniaceae	Shrub
43	*Cassia fistula* L.	Caesalpiniaceae	Tree
44	*Cassia occidentalis* L.	Caesalpiniaceae	Herb
45	*Cassia tora* L.	Caesalpiniaceae	Herb
46	*Cassine glauca* (Rottb) Kuntze. var. *glauca*	Celastraceae	Tree
47	*Cassytha filiformis* L.	Lauraceae	Climbing herb
48	*Catharanthes roseus* (L.) Don.	Apocynaceae	Herb
49	*Catunaregam spinosa* (Thunb.) Tirven.	Rubiaceae	Shrub
50	*Cayratia pedata* (Lour.) A.L.Juss.	Cucurbitaceae	Climbing herb
51	*Cissus quadrangularis* L.	Vitaceae	Climbing shrub
52	*Citrullus colocynthes* (L.) Schrader	Cucurbitaceae	Climbing herb
53	*Clausena dentata* (Willd.) Roemer	Rutaceae	Shrub
54	*Cleome viscosa* L.	Cleomaceae	Herb
55	*Clerodendron inerme* (L.) Gaertn.	Verbenaceae	Shrub
56	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	Climbing herb
57	*Cocculus hirsutus* (L.) Diels	Cucurbitaceae	Climbing herb
58	*Coldenia procumbens* L.	Boraginaceae	Herb
59	*Combretum albidum* G. Don.	Combretaceae	Climbing herb
60	*Commelina benghalensis* L.	Commelinaceae	Herb

61	*Commiphora caudata* (Wight & Arn.) Engl.	Burseraceae	Tree
62	*Curculigo orchioides* Gaertn.	Hypoxidaceae	Herb
63	*Cuscutta reflexa* Roxb.	Convolvulaceae	Climbing herb
64	*Cymphostemma setosum* (Roxb.) Alston	Vitaceae	Climbing herb
65	*Cympobogon citratus* (DC.) Stapf	Poaceae	Herb
66	*Cynodon dactylon* (L.) Fers	Poaceae	Herb
67	*Cyperus rotundus* L.	Cyperaceae	Herb
68	*Derris scandens*(Roxb.) Benth.	Fabaceae	Climbing shrub
69	*Dichrostachys cinerea* (L.) Wight & Arn.	Mimosaceae	Tree
70	*Dioscorea oppositiolia L*.	Dioscoreaceae	Climbing herb
71	*Dodonaea viscosa* L.	Combretaceae	Shrub
72	*Eclipta prostrata* (L.) L.	Asteraceae	Herb
73	*Ehretia pubescens* Benth.	Boraginaceae	Tree
74	*Erythroxylum monogynum*Roxb.	Erythroxylaceae	Tree
75	*Euphorbia antiquorrum* L.	Euphorbiaceae	Shrub
76	*Euphorbia hirta* L.	Euphorbiaceae	Herb
77	*Euphorbia tirucalli* L.	Euphorbiaceae	Shrub
78	*Euphorbia tortilis* Rottler ex Ainslie	Euphorbiaceae	Shrub
79	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	Herb
80	*Ficus benghalensis* L.	Moraceae	Tree
81	*Ficus racemosa* L.	Moraceae	Tree
82	*Ficus religiosa* L.	Moraceae	Tree
83	*Fimbristylis* sp.	Cyperaceae	Herb
84	*Flacourtia indica* (Burm.f.) Merr.	Flacourtiaceae	Tree
85	*Glinus oppositifolius* (L.) DC.	Aizoaceae	Herb
86	*Gloriosa superba* L.	Liliaceae	Climbing herb
87	*Glycosmis pentaphylla* (Retz) DC.	Rutaceae	Shrub
88	*Gomphrena serrata* L.	Amaranthaceae	Herb
89	*Hedyotis pyberula* (G.Don) Arn.	Rubiaceae	Herb
90	*Heliotropium indicum* L.	Boraginaceae	Herb
91	*Hemidesmus indicus* (L.) R.Br. var. *indicus*	Periplocaceae	Climbing herb
92	*Hemionitis arifolia* (Burm.f.) Moore	Hemionitidaceae	Herb
93	*Hibiscus micranthus* L.f.	Malvaceae	Herb
94	*Holoptelea integrifolia* (Roxb.) Planchon	Ulmaceae	Tree
95	*Hybanthes enneaspermus* (L.) F. Muell.	Violaceae	Herb
96	*Hyptis suaveolens* (L.) Poit	Lamiaceae	Herb
97	*Indigofera linnaei* Ali	Fabaceae	Herb
98	*Indonesiella echioides* (L.) Sreemadh.	Acanthaceae	Herb
99	*Justicia simplex* D.Don.	Acanthaceae	Herb
100	*Lepizanthes tetraphylla* (M.Vahl) Radlk.	Sapindaceae	Tree
101	*Leptadenia reticulata* (Retz.) Wight & Arn.	Asclepiadaceae	Climbing herb
102	*Leucas aspera* (Willd.) Link.	Lamiaceae	Herb
103	*Mollugo pentaphylla* L.	Molluginaceae	Herb
104	*Morinda pubescens* J.E.Smith var. *pubescens*	Rubiaceae	Tree
105	*Phyllanthus amarus* Schum & Thonn	Euphorbiaceae	Herb
106	*Phyllanthus debilis* Klein ex Willd.	Euphorbiaceae	Herb
107	*Phyllanthus maderaspatensis* L.	Euphorbiaceae	Herb
108	*Sansevieira roxbhurgiana* Schultes & Schultes	Agavaceae	Herb
109	*Securinega leucopyrus* (Willd.) Muell. Arg.	Euphorbiaceae	Shrub
110	*Strychnos nux-vomica* L.	Loganiaceae	Tree
111	*Syzygium cumini* (L.) Skeels	Myrtaceae	Tree
112	*Tamarindus indica* L.	Caesalpiniaceae	Tree
113	*Tarenna asiatica* (L.) Kuntze ex K. Schum. var. *asiatica*	Rubiaceae	Shrub
114	*Tribulus lanuginosus* L.	Zygophyllaceae	Herb
115	*Tridax procumbens* L.	Asteraceae	Herb
116	*Tylophora indica* (Burm.f.) Merr.	Asclepiadaceae	Climbing herb
117	*Wrightia tinctoria* (Roxb.) R.Br.	Apocynaceae	Tree

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