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RESEARCH ARTICLE

FLORISTIC DIVERSITY OF SREEDHARAN CHUMARATH MANA SACRED GROVE IN MUTHUTHALA PANCHAYATH, PALAKKAD DISTRICT, KERALA, INDIA

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Abstract

The present investigation on the floristic diversity of sacred groves of Sreedharan Chumarathumana, Muthuthala Panchayath, Pattambi Taluk, Palakkad district, Kerala resulted in the documentation of 126 important medicinal plants. The conservation of such precious sacred groves is an urgent need for future generation.

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Introduction:-

Traditionally, the local people have been preserving small patches of relatively dense forests that have been dedicated to a god or goddess or ancestral spirits as 'sacred groves' and they act as treasure houses for large numbers of endemic and rare plants of the region (Sujana & Sivaperuman, 2008). Sacred groves are very important in upholding traditions and beliefs in order to protect and conserve unique forest patches which represent the relict vegetation of the concerned area (Chandrashekhara & Sankar, 1998). Sometimes, they are also known as natural museums of giant trees, treasure houses of threatened species, dispensaries of medicinal plants, regulators of water sheds, recreation centers for urban life, veritable gardens for botanists, gene banks of economic species, paradise for nature-lovers and laboratory for environmentalists (Gadgil & Vartak, 1975). One of the most important traditional uses of sacred groves was that it acted as a repository for various Ayurvedic medicines, in modern times, it have become biodiversity hotspots.

In India, nature worship dates back to the pre-Vedic period (5000 B.C.) and is based on the proposition that all creations of nature have to be protected. In India, different religions having different traditions, beliefs, and rituals are associated with conservation of biodiversity and forests. In Hindu religion, it is a traditional belief that nature shows a reverence for five basic elements i.e., Earth (Prithvi), Fire (Agni), Water (Jal), Air (Wayo) and Space (Akash). All the five elements are treated as a body of God and are worshipped. These five elements are protected for religious, cultural and spiritual reasons. There are many studies entitled to further quantify this ethics, which leads to biodiversity conservation and sustainable ecosystem (Chandrashekhara & Sankar, 1998).

Around 1,00,000 to 1, 50,000 sacred groves are reported in India (Malhotra et al. (2007). In India, the highest number of sacred groves (5000) has been reported to be present in state of Himachal Pradesh followed by Kerala and Chhattisgarh. The erstwhile state of Kerala, alone, has over 2000 sacred groves locally known as Sarpakavu or pambum kavu (Rao et al., 2011). In the recent past, due to change of socio-economic conditions and land use systems, many sacred groves are threatened and altered, both in terms of size, vegetation structure and species composition.

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In Kerala, it is the common practice among Hindus to assign a part of their land near the Tharavadu or house as the abode of goddess Durga or serpent god Naga or Shastavu and the place is called Kavuvu, Sarpa kavuvu or Pambum kavuvu. It is considered as the islands of biodiversity and relics of past vegetation. These contain large numbers of Rare, Endemic, Endangered and Threatened floras and faunas. It also includes economically and medicinally important plants.

Sreedharan Chumarathumana sacred grove is located at Muthuthala Panchayath, Pattambi Taluk, Palakkad district, Kerala. The sacred grove extends near half acre area (pers. Comm. with Sri. Sreedharan Nambuthirippad). There is a small temple for the god of 'Naga' in the middle of the sacred grove worshiped by them based on their indigenous cultural and religious beliefs. Every year, in 'Ayilyam' (believes to be the star of 'Nagadevatha') star of Malayalam month 'Kanni', they celebrate the festival of Goddess.

Sacred groves have presently attracted the attention of environmentalists, geneticists, botanists for their undisturbed natural conditions, which has made them repositories of valuable germplasm of medicinal plants, and endangered and endemic plant species (Anthwal et al., 2006). This paper deals with the rare and important medicinal angiospermic plants in the sacred grove.

Materials and Methods:-

Intensive field surveys were carried out during 2019–2020, covering pre-monsoon, monsoon and post-monsoon seasons (Figure 1). Specimens of each species of flowering plants were collected along with necessary field data. The collected specimens were identified with the help of local peoples and scientific names with the help of taxonomists / scientists. Lists of plants found in the sacred grove were prepared.

Results and Discussion:-

A total of 126 species belonging to 118 genera under 43 families (Table 1, Figures 2,3,4) were reported. This is 6.5% of the species described in the flora of Palakkad District (Vajravelu, 1990; Sasidharan, 2004; Anilkumar, 2015) and 2.35% of the flora of the Kerala state (Sasidharan 2004, 2013).

Table 1:- List of flowering plants observed in the study area.

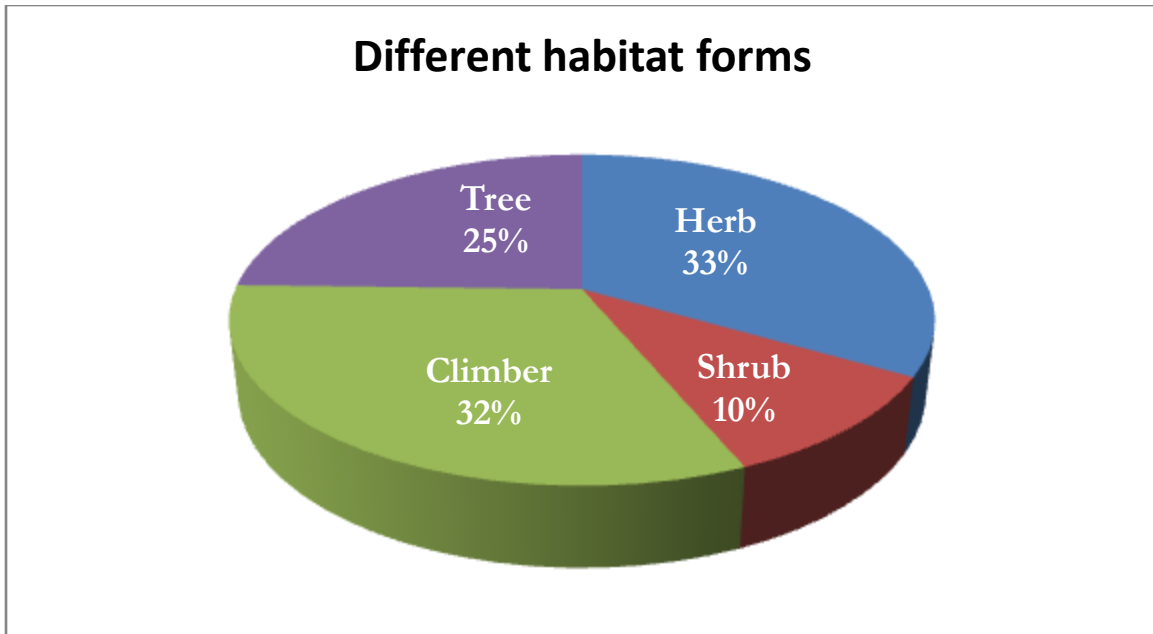
Sl. No.	Scientific name	Family	Habit	Local name	No. of mature individuals
1.	<i>Abrus precatorius</i> L.	Fabaceae	Climber	Kunni	3
2.	<i>Abutilon persicum</i> (Burm.f.) Merr.	Malvaceae	Herb	Oorakam	1
3.	<i>Acalypha indica</i> L.	Euphorbiaceae	Herb	Kuppameni	>30
4.	<i>Acampe praemorsa</i> (Roxb.) Blatt. & McCann	Orchidaceae	Herb	Maravazha	3
5.	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Kadaladi	>30
6.	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Euphorbiaceae	Herb	Cherula	>30
7.	<i>Ailanthus triphysa</i> (Dennst.) Alston	Ailanthaceae	Tree	Matti	1
8.	<i>Alangium salvifolium</i> (L.f.) Wang. ssp. <i>hexapetalum</i> (Lam.) Wang.	Alangiaceae	Shrub	Ankolam	>30
9.	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Tree	Ezhilam pala	1
10.	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Herb	Kaattuchema	7
11.	<i>Anamirta cocculus</i> (L.) Wight & Arn	Menispermaceae	Climber	Garaphala	7
12.	<i>Aristolochia indica</i> L.	Aristolochaceae	Climber	Karlayam, Karalakam	3
13.	<i>Artocarpus incisus</i> (Thunb.) L.f.	Moraceae	Tree	Kadaplavu, kadachakka	1
14.	<i>Barleria prionitis</i> L.	Acanthaceae	Herb	Kanchanara	7

15.	<i>Bauhinia scandens</i> L. var. <i>anguina</i> (Roxb.) Ohashi	Fabaceae	Climber	Nagavalli	2
16.	<i>Blepharis maderaspatensis</i> (L.) Roth.	Acanthaceae	Herb	Murikootippacha	>30
17.	<i>Blumea membranacea</i> Wall. ex DC. var. <i>membranacea</i>	Asteraceae	Herb	Bhoothamkolli	9
18.	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Herb	Thazhuthama	>30
19.	<i>Breynia retusa</i> (Dennst.) Alston	Euphorbiaceae	Shrub	Aattacherukola	6
20.	<i>Briedelia retusa</i> (L.) A. Juss.	Euphorbiaceae	Tree	Kaini	2
21.	<i>Briedelia stipularis</i> (L.) Blume	Euphorbiaceae	Climber	Vallikaini	4
22.	<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	Tree	Plasu	5
23.	<i>Canavalia gladiata</i> (Jacq.) DC.	Fabaceae	Climber	Valpayar	6
24.	<i>Canthium angustifolium</i> Roxb.	Rubiaceae	Shrub	Kattaramullu	9
25.	<i>Canthium rheedei</i> DC.	Rubiaceae	Shrub	Edalimaram	5
26.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Climber	Uzhinja	2
27.	<i>Caryota urens</i> L.	Arecaceae	Tree	Aanapana	3
28.	<i>Cassia fistula</i> L.	Fabaceae	Tree	Kanikonna	2
29.	<i>Cayratia pedata</i> (Lam.) A. Juss. ex Gagnep.	Vitaceae	Climber	Corivalli	11
30.	<i>Centrosema molle</i> Benth.	Fabaceae	Climber	Kattupayar	9
31.	<i>Chassalia curviflora</i> (Wall. Ex Kurz.) Thw. var. <i>ophioxyloides</i> (Wall.) Deb & Krishna	Rubiaceae	Herb	Vellakurinji, Amalpori	>30
32.	<i>Chionanthus mala-elengi</i> (Dennst.) P.S. Green	Oleaceae	Tree	Mala elengi	1
33.	<i>Chromolaena odorata</i> (L.) King & Robins	Asteraceae	Herb	Communist pacha	>30
34.	<i>Cissus repens</i> Lam.	Vitaceae	Climber	Chunnambu valli	3
35.	<i>Cleome burmannii</i> Wight & Arn.	Capparaceae	Herb	Kattukadugu	12
36.	<i>Cleome viscosa</i> L.	Capparaceae	Herb	Aadunarivela	10
37.	<i>Clerodendrum infortunatum</i> L.	Lamiaceae	Shrub	Peruku	>30
38.	<i>Clitoria ternatea</i> L.	Fabaceae	Climber	Sankhupushpam	14
39.	<i>Cocos nucifera</i> L.	Arecaceae	Tree	Thengu	5
40.	<i>Commelina diffusa</i> Burm. f.	Commelinaceae	Herb	Vazhaparuthipoo	12
41.	<i>Cosmostigma racemosum</i> (Roxb.) Wight	Apocynaceae	Climber	Vattolam	5
42.	<i>Cryptolepis buchananii</i> Roem. & Schult.	Apocynaceae	Climber	Palvally	11
43.	<i>Curculigo orchioides</i> Gaertn	Hypoxidaceae	Herb	Nilappana	8
44.	<i>Curcuma haritha</i> Mangaly & M. Sabu	Zingiberaceae	Herb	Kattumanjal	>30
45.	<i>Cyanthillium cinereum</i> (L.) H.Rob.	Asteraceae	Herb	Poovam kurinjila	18
46.	<i>Cyclea peltata</i> (Lam.) Hook. f. & Thoms.	Menispermaceae	Climber	Padavalli, Padakizhangu, Padathali,	7
47.	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Climber	Kaattukavath	4
48.	<i>Diploclisia glaucescens</i> (Blumes) Diels.	Menispermaceae	Climber	Malathangi	2
49.	<i>Diplocyclos palmatus</i> (L.) Jeffrey.	Cucurbitaceae	Climber	Sivalingakaya	9

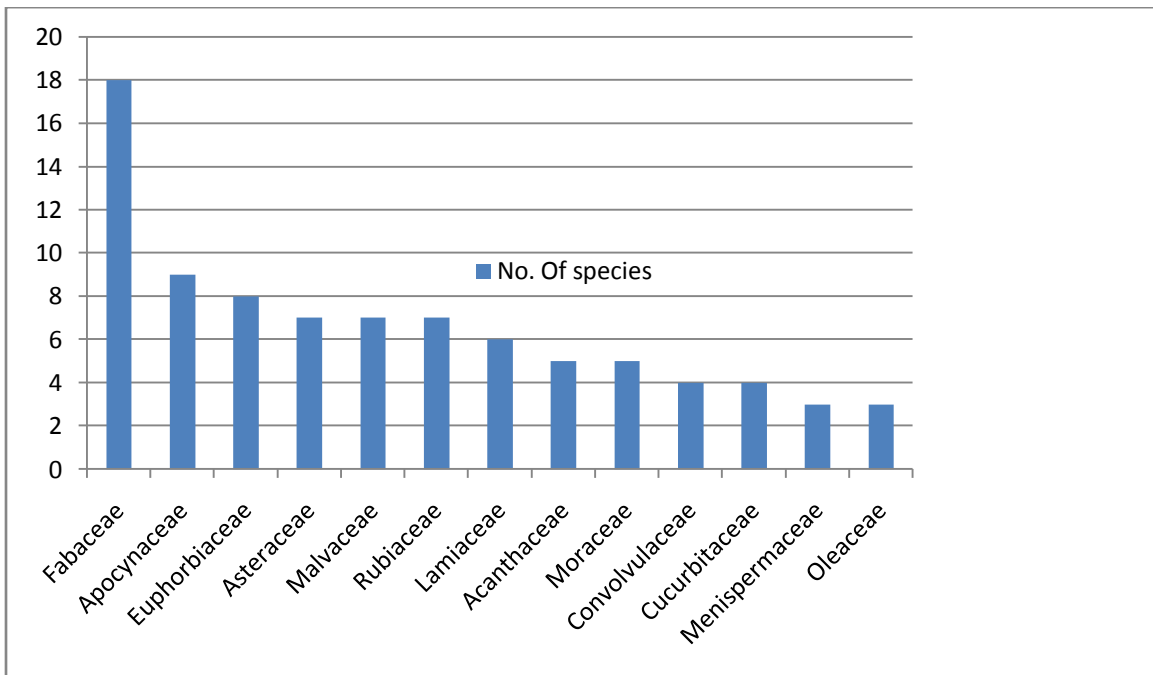
50.	<i>Dipteracanthus prostratus</i> (Poir.) Nees	Acanthaceae	Herb	Thuppalampotti	14
51.	<i>Ecbolium viride</i> (Forssk.) Alston	Acanthaceae	Herb	Koranda	8
52.	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Anachuvadi	>30
53.	<i>Erythrina strica</i> Roxb.	Fabaceae	Tree	Murukku	1
54.	<i>Ficus exasperata</i> Vahl	Moraceae	Tree	Parakam	2
55.	<i>Ficus hispida</i> L. f.	Moraceae	Tree	Thondi	3
56.	<i>Ficus virens</i> Aiton	Moraceae	Tree	Cherla maram	1
57.	<i>Flacourtia indica</i> (Burm.f.) Merr.	Flacourtiaceae	Tree	Vayyamkatha	6
58.	<i>Gliricidia sepium</i> (Jacq.) Kunth ex Walp.	Fabaceae	Shrub	Seemakonna	2
59.	<i>Gloriosa superba</i> L.	Liliaceae	Climber	Branthan poo	7
60.	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Shrub	Panal	13
61.	<i>Geodorum densiflorum</i> (Lam.) Schltr.	Orchidaceae	Herb	7
62.	<i>Hemidesmus indicus</i> (L.) R. Br.	Apocynaceae	Climber	Nannari	>30
63.	<i>Hibiscus hispidissimus</i> Griff.	Malvaceae	Herb	Mattippuli	10
64.	<i>Holigarna arnottiana</i> Hook.f.	Anacardiaceae	Tree	Cheru	3
65.	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Fabaceae	Tree	Aaval	2
66.	<i>Holostemma ada-kodien</i> Schult.	Apocynaceae	Climber	Adapathiyan	9
67.	<i>Hybanthus enneaspermus</i> (L.) F.v. Muell.	Violaceae	Herb	Orithalthamara	8
68.	<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Herb	Natapoochedi	17
69.	<i>Ichnocarpus frutescens</i> (L.) R. Br.	Apocynaceae	Climber	Paalvally	13
70.	<i>Ipomoea obscura</i> (L.) Ker-Gawl.	Convolvulaceae	Climber	Thiruthali	8
71.	<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	Climber	Pulichuvadi	3
72.	<i>Ixora coccinea</i> L.	Rubiaceae	Herb	Kaattuthechi	2
73.	<i>Jasminum coarctatum</i> Roxb.	Oleaceae	Climber	Kaattumulla	14
74.	<i>Justicia japonica</i> Thunb.	Acanthaceae	Herb	Neelathumba	>30
75.	<i>Lantana camara</i> L.	Lamiaceae	Shrub	Poochedi	>30
76.	<i>Leea indica</i> (Burm. f.) Merr.	Leeaceae	Shrub	Choriyanthali	6
77.	<i>Leucaena leucocephala</i> (Lam.) de Wit.	Fabaceae	Tree	Subabul	3
78.	<i>Luffa cylindrica</i> (L.) Roem.	Cucurbitaceae	Climber	Peechingha chedi	6
79.	<i>Macaranga peltata</i> (Roxb.) Muell.-Arg.	Euphorbiaceae	Tree	Vatta	4
80.	<i>Mallotus philippensis</i> (Lam.) Muell.-Arg.	Euphorbiaceae	Tree	Sindooram	2
81.	<i>Mangifera indica</i> L.	Anacardiaceae	Tree	Mavu	6
82.	<i>Merremia vitifolia</i> (Burm. f.) Hall. f.	Convolvulaceae	Climber	Dridarashrapacha	11
83.	<i>Mikania micrantha</i> Kunth	Asteraceae	Climber	Vayara	>30
84.	<i>Mimosa diplotricha</i> C. Wight ex Sanvalle var. <i>inermis</i> (Adelb.) Veldk.	Fabaceae	Climber	Anathottavadi	>30
85.	<i>Mimosa pudica</i> L.	Fabaceae	Herb	Thottavadi	>30
86.	<i>Momordica dioica</i> Roxb. ex Willd.	Cucurbitaceae	Climber	Kattpaval	12
87.	<i>Mukia maderaspatana</i> (L.) Roem.	Cucurbitaceae	Climber	kasappuchedi	14

88.	<i>Naregamia alata</i> Wight & Arn.	Meliaceae	Herb	Nilanaragam	>30
89.	<i>Naringi crenulata</i> (Roxb.) Nicolson	Rutaceae	Tree	Mahavilvam	14
90.	<i>Ocimum americanum</i> L.	Liliaceae	Herb	Kattuthulasi	5
91.	<i>Olea dioica</i> Roxb.	Oleaceae	Tree	Vayala	8
92.	<i>Pancratium triflorum</i> Roxb.	Amaryllidaceae	Herb	Kattulli	11
93.	<i>Passiflora foetida</i> L.	Passifloraceae	Climber	Poochappazham	3
94.	<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	Herb	Chuvannakizhanelli	13
95.	<i>Physalis angulata</i> L.	Solanaceae	Herb	Njottanjodian	2
96.	<i>Plumbago indica</i> L.	Plumbaginaceae	Shrub	Chethikoduveli	1
97.	<i>Pogostemon purpurascens</i> Dalz.	Lamiaceae	Herb	Poothachida	2
98.	<i>Pothos scandens</i> L.	Araceae	Climber	Paruvakodi	>30
99.	<i>Pseudarthria viscida</i> (L.) Wight & Arn.	Fabaceae	Herb	Movila	12
100.	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tree	Venga	2
101.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Herb	Sarpagandhi	7
102.	<i>Rothea serrata</i> (L.) Steane & Mabb.	Lamiaceae	Shrub	Cheruthekku	5
103.	<i>Santalum album</i> L.	Santalaceae	Tree	Chandanam	1
104.	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Tree	Poovam	5
105.	<i>Sida cordata</i> (Burm. f.) Borss.	Malvaceae	Climber	Vallikurumthotti	15
106.	<i>Sida cordifolia</i> L.	Malvaceae	Herb	Anakurumthotti	6
107.	<i>Smilax zeylanica</i> L.	Smilacaceae	Climber		4
108.	<i>Sterculia guttata</i> Roxb. ex DC.	Malvaceae	Tree	Anathondi maram, pottakkala	8
109.	<i>Streblus asper</i> Lour.	Moraceae	Tree	Paravamaram	4
110.	<i>Strychnos nux-vomica</i> L.	Loganiaceae	Tree	Kanjiram	5
111.	<i>Synedrella nodiflora</i> (L.) Gaertn.	Asteraceae	Herb	Mudian pacha	>30
112.	<i>Tabernaemontana alternifolia</i> L.	Apocynaceae	Shrub	Koonampla	3
113.	<i>Tamarindus indica</i> L.	Fabaceae	Tree	Valanpuli	1
114.	<i>Tectona grandis</i> L.	Lamiaceae	Tree	Thekku	14
115.	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Herb	Kalakomban	4
116.	<i>Teramnus labialis</i> (L.f.) Spreng.	Fabaceae	Climber	Cherukattuzhunnu	7
117.	<i>Tiliacora acuminata</i> (Poir.) Miers ex Hook.f. & Thoms.	Malvaceae	Climber	Valli kanjiram	18
118.	<i>Tinospora cordifolia</i> (Willd.) Miers.	Menispermaceae	Climber	Chitamruth	7
119.	<i>Tragia involucrata</i> L.	Euphorbiaceae	Climber	Cherukoduthuva	5
120.	<i>Triumfetta rhomboidea</i> Jacq.	Asteraceae	Herb	Oorpam	16
121.	<i>Tylophora indica</i> (Burm. f.) Merr.	Apocynaceae	Climber	Vallippala	2
122.	<i>Urena lobata</i> L.	Malvaceae	Herb	Kuruva chedi	4
123.	<i>Xenostegia tridentata</i> (L.) Austin & Staples.	Convolvulaceae	Climber	Thalaneeli	9
124.	<i>Zanthoxylum rhetsa</i> (Roxb.) DC	Rutaceae	Tree	Mullilam	1
125.	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Zingiberaceae	Herb	Mala-inchi	>30
126.	<i>Ziziphus oenoplia</i> (L.) Mill.	Rhamnaceae	Shrub	Thodali	12

Out of 126 species, forty two species (33%) are herbs, forty nine species (32%) are climbers, thirteen species (10%) are shrubs and thirty one (25%) are trees. Habitat wise analysis of flora shows comparatively higher percentage of herbs (33%) followed by climbers (32%), trees (25%) and Shrubs (10%). (Figure 5.)



The dominant family is Fabaceae represented by 18 species, followed by Apocynaceae (9), Euphorbiaceae (8), Asteraceae (7), Malvaceae (7), Rubiaceae (7), Lamiaceae (6), Acanthaceae (5), Moraceae (5), Convolvulaceae (4), Cucurbitaceae (4), Menispermaceae (3) and Oleaceae. Nine families viz. Araceae, Anacardiaceae, Arecaceae, Capparaceae, Liliaceae, Orchidaceae, Sapindaceae, Vitaceae and Zingiberaceae have two species each while 21 families were represented by just a single species viz. Ailanthaceae, Alangiaceae, Amaranthaceae, Amaryllidaceae, Aristolochaceae, Commelinaceae, Dioscoreaceae, Flacourtiaceae, Hypoxidaceae, Leeaceae, Loganiaceae, Meliaceae, Nyctaginaceae, Passifloraceae, Phyllanthaceae, Plumbaginaceae, Rhamnaceae, Santalaceae, Smilacaceae, Solanaceae and Violaceae. (Figure 6).



The most dominant species in this sacred groves are *Acalypha indica*, *Achyranthes aspera*, *Aerva lanata*, *Alangium salvifolium* ssp. *Hexapetalum*, *Blepharis maderaspatensis*, *Boerhavia diffusa*, *Chassalia curviflora* var. *ophioxylodes*, *Chromolaena odorata*, *Clerodendrum infortunatum*, *Curcuma haritha*, *Elephantopus scaber*, *Hemidesmus indicus*, *Justicia japonica*, *Lantana camara*, *Mikania micrantha*, *Mimosa diplotricha* var. *inermis*,

Mimosa pudica, *Naregamia alata*, *Pothos scandens*, *Synedrella nodiflora* and *Zingiber zerumbet*. All the taxa are recorded with more than 30 mature individuals in the area.

Out of the 126, two taxa viz. *Curcuma haritha* and *Holostemma ada-kodien* are strictly endemic to south Indian region of India and of which, *H. ada-kodien* is listed Endangered as per IUCN conservation categories and criterias. Some of the tall trees like *Ficus virens* and *Mangifera indica* of height 25 m are present in the middle of the grove. The most serious threat to the floristic diversity is observed from invasive species, i.e., *Chromolaena odorata*, *Lantana camara*, *Mikania micrantha* and *Mimosa diplotricha* var. *inermis* causing depletion to the indigenous plant diversity.

Out of the 126 taxa recorded, more than 96% of plants are used as important medicinal drug in various systems of medicines and also in folklore medicine. The species like *Centrosema molle* and *Mikania micrantha* are important climbers and used for snake bites (Deepa et al . 2016) and the presence of rare and most important medicinal plant *Rauvolfia serpentina* in the groves enhance the importance of Sreedharan Chumarath Mana sacred grove. We also observed numerous termites nest in the grove (Figure 7)

Conclusion:-

This study revealed the presence of a number of plant species along with medicinal uses in the sacred grove. Sacred groves play a crucial role in soil and water conservation. Many sacred groves hold water resources in the form of springs, ponds, lakes, streams or rivers. The vegetation of the groves itself retains water, soaking it up like a sponge during wet periods and releasing it slowly in times of drought. It is evident that one of the important ecological roles of these groves is to provide a more dependable source of water for the organisms living in and around the sacred grove. In addition, transpiration from the sacred grove vegetation would increase atmospheric humidity and reduce temperature in the immediate vicinity and produce a more favourable microclimate for many organisms. The major threats to these existing ecosystems are habitat destruction, habitat alternation, introduction of exotic species and pollution has resulted in the decline of sacred groves. The conservation of such precious sacred groves is an urgent need for future generation.

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Figure 1:- Sreedharan Chumarath Mana Sacred grove. A.- F. Different views of interior region.



Figure 2:- Colour photographs of species. A. & B. *Abrus precatorius*; C. *Abutilon persicum*; D. *Alangium salvifolium* ssp. *hexapetalum*; E. *Aristolochia indica*; F. *Barleria prionitis*; G. *Blepharis maderaspatensis*; H. *Canavalia gladiata*; I. *Cayratia pedata*; J. *Centrosema molle*; K. *Chromolaena odorata*.



Figure 3:- Colour photographs of species. A. *Clerodendrum infortunatum*; B. *Clitoria ternatea*; C. *Cryptolepis buchananii*; D. *Cyathillium cinereum*; E. *Diplocyclos palmatus*; F. *Ecbolium viride*; G. *Elephantopus scaber*; H. *Geodorum densiflorum*; I. *Glycosmis pentaphylla*; J. *Hemidesmus indicus*; K. *Hibiscus hispidissmus*; L. *Ipomoea pes-tigridis*.



Figure 4:- Colour photographs of species. A. *Lantana camara*; B. *Mimosa pudica*; C. *Momordica dioica*; D. *Naregamia alata*; E. *Passiflora foetida*; F. *Pseudarthria viscida*; G. *Rauvolfia serpentina*; H. *Sida cordata*; I. *Tephrosia purpurea*; J. *Tinospora cordifolia*; K. *Urena lobata*; L. *Zingiber zerumbet*.



Figure 5:- A.- C. Different termite nests observed in Sreedharan Chumarath Mana Sacred grove.

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