



Diversity of Vascular Plants Associated with Wetland Paddy Fields (*Vayals*) of Wayanad District in Western Ghats, India

Parameswaran Prajeesh^{*1}, MK Ratheesh Narayanan² and N Anil Kumar¹

¹BioDIVA Research Group, MS Swaminathan Research Foundation, Community Agrobiodiversity Centre, Puthoorvayal, P. O., Meppadi, Wayanad, Kerala, India

²Department of Botany, Payyanur College, Edat P. O., Payyanur, Kannur, Kerala, India

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Abstract: A study was conducted in Wayanad District of Kerala, India during 2011-2012 to document the diversity of vascular plants associated with wetland paddy fields (*vayals*). The plants were recorded from the paddy fields and paddy levees; stream sides, parts of homesteads, wasteland and road sides in the immediate vicinity of the paddy fields. One Hundred and Eighty Nine (189) genera (178 Angiosperm genera-nearly 20% of the total genera reported from the District and 11 Pteridophyte genera) were recorded. The total number of species recorded was 319 (308 Angiosperms, 11 Pteridophytes) which included 233 herbs, 40 shrubs, 17 climbers and 29 trees. Seventy Two (72) families (66 Angiosperms, 6 Pteridophytes) were recorded and the highest number of species was represented by Cyperaceae (34) followed by Poaceae (33), Asteraceae (27), Fabaceae (25), Scrophulariaceae (18) and Malvaceae (13).

Key Words: Paddy Fields, Vayal, Wayanad, Western Ghats

Introduction

There have been many efforts in recording the flora of wetlands of Kerala (Joseph, 2002; John Thomas *et al.*, 2003; Sabu and Babu, 2007; Sanil Kumar and John Thomas, 2007; John *et al.*, 2009; Sujana and Sivaperuman, 2008), but a literature survey shows that the flora associated with the paddy fields of Kerala has not been discussed separately and in detail. There were many short studies conducted throughout the paddy fields of Wayanad and most of them remain as 'grey' literature (Anon, 2001; Pramod, 2002; Abdul Salam, 2004; Reshmi, 2005; Rijula, 2006; Prajeesh, 2009; Anju, 2010). The 'grey' literature covers the documents which are not readily available via conventional bibliographical circuits, either unpublished or published for the intention of a restricted audience (Debachere, 1995) and includes project/technical reports, surveys etc. Ratheesh Narayanan (2009) had listed the wild edible plants associated with paddy fields of Wayanad. This paper attempts to give an account of the vascular plants associated with wetland paddy fields (locally known as *Vayal*) of Wayanad District of Kerala State.

The significance of the study of biodiversity associated with agro-ecosystems is two-fold as the maintenance of biological diversity is essential for productive agriculture, and ecologically sustainable agriculture is in turn essential for maintaining biological diversity (Pimental *et al.*, 1992). Tomita *et al.*, (2003) also suggests that harmonizing agricultural productivity with biological diversity should be the ultimate goal of the analysis of paddy vegetation. Bambaradeniya *et al.*, (2003) had a documentation of the overall biodiversity associated with a wetland paddy ecosystem of Sri Lanka. The total number of faunal biota recorded consists of 494 species of invertebrates, 103 species of vertebrates, while the flora included 89 species of macrophytes, 39 genera of microphytes and 3 species of macrofungi. The fauna and flora recorded from the rice field were also observed to follow a uniform pattern of seasonal colonization and succession during successive rice cultivation cycles. Kosaka *et al.* (2006) had quantified the plant diversity in paddy in Savannakhet Province of Laos. The study involved the inventory of the plants and

*Corresponding Author:

Parameswaran Prajeesh,
BioDIVA Research Group,
MS Swaminathan Research Foundation,
Community Agrobiodiversity Centre,
Puthoorvayal, Meppadi, Wayanad, Kerala, India

the classification of vegetation types. The relationship between paddy vegetation and subsistence livelihoods was described by identifying exploited species and also the cultivated species, beneficial species, rare species, and harmful species (major weeds). Weeds are a major constraint on crop production, yet they may be regarded as an important component of the agro-ecosystem, many of them are useful too. Out of 158 paddy weed species collected in a study from West Bengal, 124 were regarded as useful according to available literature. The weeds on paddy levees satisfy various functions for food, medicine, prevention of soil erosion, livestock feed, landscaping, and aesthetics. A study in a small watershed area in Kerala had recorded 6 species of Cyanobacteria, 28 Algae, 12 rooted hydrophytes, 7 free-floating hydrophytes and 55 other vasucular plant species from the paddy fields. (Datta and Banerjee, 1978; Yamaguchi and Umemoto, 1996; Gopikuttan and Kurup, 2004). Katsue *et al.* (2005) noted that the paddy levees, the earthen bunds between the paddy plots are also important in the context of biodiversity present. These earthen bunds play various roles in cultural landscapes, e.g. (1) space for water retention, (2) footpath, (3) source for hay to be fed to cattle, (4) property boundary, (5) space for landmark trees, (6) drying space for harvesting rice and (7) space for crops etc. The names of the different parts of the levees and the diverse management practices vary from location to location and reflect the special relationship between the people and the land. However, this kind of close relationship between the people and the traditional elements in the landscape, once typical to each area, is rapidly disappearing.

The study site: Wayanad, Kerala, Western Ghats

Wayanad District of Kerala is an east sloping, gently undulating, medium elevation plateau abruptly descending in the west to Kerala plains but merging imperceptibly with the Mysore plateau to the east (Fig.1). It is a mountainous plateau with an altitudinal range of 700 and 2100 meters above MSL and between north latitude 11° 27' and 15° 58' and East longitude 70° 47' and 70° 27'. Agriculture is the main source of livelihood for more than 85 % of the total population in the District. Wayanad is unique for its rich wealth of flora and diverse ethnic cultures (Nadesapanicker *et al.*, 2010). The District is 2,131 square kilometres in size (2,12,966 ha)

with a population of 7,80,619 (4.7% of the State's population) contributes significantly to the foreign exchange earnings of the State through major cash crops such as coffee, pepper, ginger tea, turmeric, arecanut and cardamom. Wayanad has the highest population of Scheduled Tribes (ST) in Kerala State (37.4%) and the tribal population includes twelve different tribal groups which constitute 17.4% of the total population of the District (ORGCCI, 2011). The District maintains 78,787 ha of forest and 1,70,613 ha of land for agricultural use (10,230 ha under paddy). 10,932 ha of land are put on non-agricultural use and 112 ha are barren uncultivable land (DES, 2012-13). Wayanad has a salubrious climate with a mean average rain fall of 2,322mm and with mean temperature range 18°C to 29°C. The relative humidity may go up to 95 per cent during the southwest monsoon period (National Informatics Centre).

Wayanad comes under High range agro-ecological zone, one among the 13 categories given by Kerala Agricultural University (2011). This classification was based on the altitude (Type II - More than 500 m above MSL); rainfall (Pattern I - Both the southwest and northeast monsoons are active and moderately distributed, southwest monsoon with June maximum, south of 11°N latitude/ Or / Pattern II-Poorly distributed rainfall, southwest monsoon with July maximum and concentrated in 3-4 months, northeast monsoon relatively weak, North of 11° N Latitude); soil type (Red Loam) and topography (Model III with narrow valleys, steep gradient hills and steep slopes). Predominantly Wayanad paddy fields are cultivated by one crop in the southwest monsoon, commencing in July and harvested in December (*Nancha*). The *Puncha* season is also cultivated with rice in lesser areas, between January and May. The genetic diversity in paddy is also notable with over 20 landraces cultivated presently in the District. Speciality varieties like *Gandhakasala*, *Jeerakasala*-two Geographical Indications from Wayanad (Geographical Indication Registry, 2010); medicinal varieties like *Navara*, *Chennellu* and a handful of other varieties which are having peculiarities in response to flood, drought, pest and diseases are cultivated and conserved by the rural and tribal farmers. Almost the entire District is drained by Kabani River and its three main tributaries viz. Panamaram, Mananthawady

and Tirunelli and they carved the present landscape of Wayanad. Two other tributaries of Kabani include Bavelipuzha and Noolpuzha. Kabani River is one of the three east flowing rivers in Kerala and is an important tributary of Cauvery River of the Karnataka State. Other drainages in the District are Chaliyar and Valapattanam. The main tributaries of the Panamaram River are Kavadam puzha, Kadaman thodu, Venniyode puzha, Karapuzha and Narassipuzha (Vinayachandran and Joji, 2007). The paddy fields of Wayanad are fed by these drainages. The floristic exploration of the District had recorded a total of 2034 species of Angiosperms which forms nearly 49% of the flora of the Kerala State and more than 10% of the flora of India. The study had reported a total of 596 endemic taxa in which 491 are endemic to Western Ghats. 338 taxa are endemic to southern Western Ghats of which 59 are restricted to Kerala and 15, exclusive to the District (Ratheesh Narayanan, 2009).

It is believed that the name Wayanad is said to be derived from *Waynad* meaning upperland or from *Vayalnadu* meaning land (*Nadu*) of paddy fields (*Vayal*) or from *Vananadu* meaning land of forests (*Vanam*) (Gopalan Nair, 1911). Paddy fields of Wayanad, are known to shelter numerous species of plants and animals of different use value. The occurrence of medicinal plants is high in the fields and they are the chief source of several wild food species. The faunal diversity associated with paddy fields is also rich and plays a significant role in controlling harmful insects/pests attack (Nadesapanicker et al., 2010). The tribal people used to collect several edible greens from paddy fields. It was observed that the tribal communities possess more knowledge about multiple uses of wild edible plants as they depend mainly on forest for their daily life. They utilize the resources in a sustainable manner by maintaining them as renewable resources. The tribal communities are accessing total of 372 wild edibles which includes 102 leafy greens with (18 associated with paddy fields), 40 species of wild mushrooms, 5 species of crabs, 39 species of fishes and 5 types of honey (Ratheesh Narayanan et al., 2004). The characteristics of the paddy fields of Wayanad have been given by Girigan et al., (2004). Valleys surrounded by low range undulating hills characterize a typical *Vayal* in Wayanad (Fig.2). The farmers, especially of *Kurichya*

Adivasi community classify *Vayals* into three viz., *Kuni Vayal*, *Kundu Vayal* and *Koravu Vayal* on the basis of their understanding about the soil texture, percolation and retention of water and so on. *Kuni Vayal* is the gentle slope on the foothills that meets flat low land with less mud content and has low water holding capacity. *Kundu Vayal* is the flat clayey field located in the valley bottoms and with more water retention capacity. *Koravu Vayal* is a swampy variant of *Kundu Vayal*. According to the *Kurichiya*, most of the wild food plants which they used to collect are seen in and around *Kuni Vayals*.

Materials and Methods

This data collection was done from the paddy plots which were marked for studying the plant diversity and its composition across the gradient of agricultural intensification, along 34 selected sites in Vellamunda, Panamaram, Kaniyambetta, Kottathara, Poothadi and Pulppally Grama Panchayaths of Wayanad District. Prior Informed Consents were collected from the farmers to work at their fields. During the study it was difficult to demarkate the paddy 'associated' landscapes since the *Vayals* are highly interconnected with adjoining canals, streams, homesteads, home gardens, waste land, forest land and sometimes fragmented by roads and other land use. For this purpose, this study was confined to the Paddy Fields-either cultivated or non-cultivated (PF) and Paddy Levees-the earthen bunds in between the fields (PL); stream sides, parts of homesteads, waste land and road sides-all in the immediate vicinity of the paddy fields (Paddy Adjacent-PA) (Figs. 2 & 3).

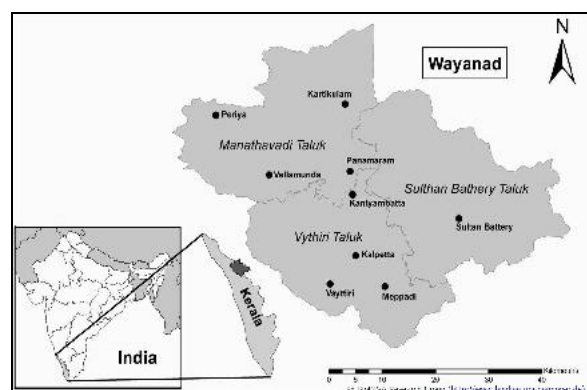


Fig.1: Location of Wayanad



Fig.2: A Paddy Landscape of Wayanad

Results and Discussion

A total of 319 speceis of vascular plants were recorded with 308 Angiosperms which is 15% of the total species reported from the District (Ratheesh Narayanan, 2009) and 11 Pteridophytes (Table 1). 319 species included 233 herbs, 40 shrubs, 17 climbers and 29 trees (Fig.4). Seventy Two (72) families (66 Angiosperm families-38% of the total families reported from the District and 6 Pteridophyte families) were recorded and the highest number of species was represented by Cyperaceae (34) followed by Poaceae (33), Asteraceae (27), Fabaceae (25), Scrophulariaceae (18) and Malvaceae (13) (Fig.5). Sixty Six (66) other vascular plant families together represented 169 plants, less than 10 species per each family. Six (6) Pteridophyte families represented with a total

of 11 species. One Hundred and Eighty Nine (189) genera (178 Angiosperm genera-nearly 20% of the total genera reported from the District and 11 Pteridophyte genera) were recorded. The species representation was as follows:

Cyperus (13); *Lindernia* (10); *Fimbristylis* (9); *Sida* (7); *Ipomea*, *Ludwigia* and *Solanum* (6 each); *Eriocaulon*, *Ficus*, *Leucas*, *Limnophila* and *Rotala* (5 each); *Alternanthera*, *Blumea*, *Paspalum* and *Pycreus* (4 each); *Cleome*, *Crotolaria*, *Echinochloa*, *Erythrina*, *Hibiscus*, *Justicia*, *Oldenlandia*, *Panicum*, *Persicaria* and *Sacciolepis* (3 each). Twenty Eight (28) genera represented 2 species each and 135 genera represented 1 species each (Fig.6). Widely cultivated crops like coffee, coconut and arecanut; seasonal crops - rice, banana, ginger, yams, tubers, legumes and other vegetables are not included in the checklist. Six (6) other cultivated species found near the paddy fields are; *Artocarpus hirsutus*, *Artocarpus heterophyllus*, *Hibiscus rosa-sinensis*, *Ipomoea batatas*, *Ipomoea turbinata* and *Mangifera indica*. Five (5) species viz., *Aeschynomene indica*, *Lantana camara*, *Mikania micrantha*, *Parthenium hysterophorus* and *Wedelia trilobata* are found as the most common invasive weeds.

Table 1: Checklist of vascular plants associated with wetland paddy fields of Wayanad

S.No.	Scientific Name	Family	Common Name	Place of Occurrence
1	<i>Achyranthes aspera</i> (L.) var. <i>aspera</i>	Amaranthaceae	Kadaladi	PL, PA
2	<i>Acmella calva</i> (DC.) R.K. Jansen	Asteraceae	-	PL, PA
3	<i>Acmella uliginosa</i> (Sw.) Cass.	Asteraceae	Palluvedanachedi	PL, PA
4	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Cheroola	PL, PA
5	<i>Aeschynomene indica</i> L.	Fabaceae	Nellithali	PA
6	<i>Ageratum conyzoides</i> L.	Asteraceae	Appa	PL, PA
7	<i>Alloterospis cimicina</i> (L.) Stapf in Prain	Poaceae	-	PF, PL
8	<i>Alternanthera brasiliana</i> (L.) Kuntze	Amaranthaceae	-	PL, PA
9	<i>Alternanthera pungens</i> Kunth in HBK	Amaranthaceae	Minnankanni	PL, PA
10	<i>Alternanthera sessilis</i> (L.) R. Br. ex DC.	Amaranthaceae	Ponnamkanni	PL, PA
11	<i>Alternanthera tenella</i> Colla (Lem.) Veldkamp var. <i>versicolor</i>	Amaranthaceae	-	PA
12	<i>Alysicarpus vaginalis</i> (L.) DC.	Fabaceae	Nila orila	PA
13	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kuppacheera	PA
14	<i>Amaranthus viridis</i> L.	Amaranthaceae	Mullancheera	PA
15	<i>Aponogeton appendiculatus</i> van Bruggen	Aponogetonaceae	-	PF
16	<i>Artemisia nilagirica</i> (Clarke) Pamp., Nuovo. Giorn.	Asteraceae	Karpoora thulasi	PA
17	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Anjili	PA
18	<i>Artocarpus hirsutus</i> Lam.	Moraceae	Plaavu	PA
19	<i>Arundinella purpurea</i> Hochst. ex Steud.var. <i>purpurea</i>	Poaceae	-	PA
20	<i>Asclepias curassavica</i> L.	Asclepiadaceae	Kammalchedi	PA
21	<i>Asystasia dalzelliana</i> Sant.	Acanthaceae	-	PA
22	<i>Axonopus compressus</i> (Sw.) P. Beauv.	Poaceae	Kaalappullu	PF, PL
23	<i>Azolla pinnata</i> R. Br	Salviniaceae	-	PF
24	<i>Bacopa monnieri</i> (L.) Pennell	Scrophulariaceae	Brahmi	PF, PL
25	<i>Bambusa bambos</i> (L.) Voss in Vilmorin, Blumengartn.	Poaceae	Mula	PA
26	<i>Basella alba</i> L.	Basellaceae	Vashalacheera	PA
27	<i>Bergia capensis</i> L.	Elatinaceae	-	PL, PA
28	<i>Bidens biternata</i> (Lour.) Merr. & Sherff ex sherff.	Asteraceae	Kandonekkuthi	PL, PA
29	<i>Biophytum reinwardtii</i> (Zucc.) Klotzsch. var. <i>reinwardtii</i>	Oxalidaceae	Mukkuti	PF, PL, PA
30	<i>Blumea axillaris</i> (Lam.) DC.	Asteraceae	-	PL, PA

31	<i>Blumea belangeriana</i> DC.	Asteraceae	-	PL, PA
32	<i>Blumea lacera</i> (Burm. f.) DC.	Asteraceae	-	PL, PA
33	<i>Blumea laevis</i> (Lour.) Merr.	Asteraceae	-	PL, PA
34	<i>Brachiaria miliiformis</i> (J. Presl ex C. Presl) A.	Poaceae	-	PL
35	<i>Bulbostylis barbata</i> (Rottb.) Kunth ex Clarke in Hook. f.	Cyperaceae	-	PL
36	<i>Butea monosperma</i> (Lam.) Taub. in Engl. & Prantl, Naturl.	Fabaceae	Chamatha	PA
37	<i>Canscora diffusa</i> (Vahl) R. Br. ex Roem. & Schult.	Gentianaceae	Jeerakappullu	PA
38	<i>Canscora pauciflora</i> Dalz.	Gentianaceae	-	PA
39	<i>Capparis brevispina</i> DC.	Capparidaceae	Soppu	PL, PA
40	<i>Capsicum frutescens</i> L.	Solanaceae	Kaanthaarimulaku	PA
41	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Uzhinja	PA
42	<i>Caryota urens</i> L.	Arecaceae	Choondappana	PA
43	<i>Centella asiatica</i> (L.)	Apiaceae	Kudakan/Muthil	PF, PL, PA
44	<i>Centrosema molle</i> Benth.	Fabaceae	-	PA
45	<i>Certopteris thalictroides</i> (L.) Brongn.	Pteridaceae	-	PF
46	<i>Chamaecrista nictitans</i> (L.) Moench ssp. <i>patellaria</i> (Collad.) Irwin & Barneby var. <i>glabrata</i> (Vogel) Irwin & Barneby	Fabaceae	-	PA
47	<i>Chenopodium album</i> L.	Chenopodiaceae	Vasthucheera	PL, PA
48	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae	Kaattayamodakam/ Mannennachedi	PL, PA
49	<i>Christella dentata</i> (Forsk.) Browney & Jermy	Thelypteridaceae	-	PA
50	<i>Chromolaena odorata</i> (L.) King & Robins.	Asteraceae	Communist pacha	PA
51	<i>Cleome burmannii</i> Wight & Arn.	Capparidaceae	Kaattukadugu	PL, PA
52	<i>Cleome monophylla</i> L.	Capparidaceae	Uppucheera/ Kaattukadugu	PL, PA
53	<i>Cleome viscosa</i> L.	Capparidaceae	Kaattukadugu	PL, PA
54	<i>Clerodendrum infortunatum</i> L.	Verbenaceae	Periyalam	PA
55	<i>Coldenia procumbens</i> L.	Boraginaceae	Nilamparanda	PA
56	<i>Colocasia esculenta</i> (L.) Schott in Schott & Endl.	Araceae	Vayalchembu	PA
57	<i>Commelina benghalensis</i> L.	Commelinaceae	-	PL, PA
58	<i>Commelina diffusa</i> Burm. f.	Commelinaceae	-	PL, PA
59	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore.	Asteraceae	Appooppanthadi	PA
60	<i>Crotalaria pallida</i> Dryand.	Fabaceae	Kilukki	PA
61	<i>Crotalaria quinquefolia</i> L.	Fabaceae	Kilukki	PA
62	<i>Crotalaria retusa</i> L.	Fabaceae	Kilukki	PA
63	<i>Cryptocoryne retrospiralis</i> (Roxb.) Kunth	Araceae	Panjithaalu	PF, PL
64	<i>Curculigo orchioeds</i> Gaertn., Fruct.	Hypoxidaceae	Nilappana	PA
65	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Moodillathali	PA
66	<i>Cyathocline purpurea</i> (D. Don) O. Ktze.	Asteraceae	-	PA
67	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	Cherukadaladi	PL, PA
68	<i>Cyclosorus interruptus</i> (Wild.) H. Ito	Thelypteridaceae	-	PA
69	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Karuka	PF, PL, PA
70	<i>Cynoglossum zeylanicum</i> (Vahl ex Hornem.) Thunb. ex Lehm.	Boraginaceae	-	PA
71	<i>Cyperus compactus</i> Retz.	Cyperaceae	-	PF, PL, PA
72	<i>Cyperus cyperinus</i> (Retz.) Sur.	Cyperaceae	-	PF, PL, PA
73	<i>Cyperus difformis</i> L.	Cyperaceae	-	PF, PL, PA
74	<i>Cyperus digitatus</i> Roxb.	Cyperaceae	-	PF, PL, PA
75	<i>Cyperus distans</i> L. f.	Cyperaceae	-	PF, PL, PA
76	<i>Cyperus exaltatus</i> Retz.	Cyperaceae	-	PF, PL, PA
77	<i>Cyperus haspan</i> L.	Cyperaceae	-	PF, PL, PA
78	<i>Cyperus iria</i> L.	Cyperaceae	-	PF, PL, PA
79	<i>Cyperus javanicus</i> Houtt.	Cyperaceae	-	PF, PL, PA
80	<i>Cyperus paniceus</i> (Rottb.) Boeck.	Cyperaceae	Muthangappullu	PF, PL, PA
81	<i>Cyperus pilosus</i> Vahl, Enum.	Cyperaceae	-	PF, PL, PA
82	<i>Cyperus rotundus</i> L.	Cyperaceae	-	PF, PL, PA
83	<i>Cyperus tenuispica</i> Steud.	Cyperaceae	-	PF, PL, PA
84	<i>Deparia petersenii</i> (Kunze) Kato	Woodsiaceae	-	PA
85	<i>Desmodium triflorum</i> (L.) DC.	Fabaceae	-	PL, PA
86	<i>Desmodium triquetrum</i> (L.) DC.	Fabaceae	-	PL, PA
87	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	-	PL
88	<i>Dimeria lawsonii</i> (Hook.f.) C.E.C. Fisch.	Poaceae	-	PF, PL
89	<i>Diospyros peregrina</i> (Gaertn.) Gurke in in Engl. & Prantl	Ebenaceae	Panachi	PA
90	<i>Diplazium esculentum</i> L.	Athyriaceae	-	PA
91	<i>Diplocyclos palmatus</i> (L.) Jeffrey	Cucurbitaceae	Neyyunni	PA
92	<i>Drosera indica</i> L.	Droseraceae	-	PL
93	<i>Drymaria cordata</i> (L.) Willd. ex Roem. & Schult. ssp. <i>diandra</i> (Blume) Duke	Caryophyllaceae	-	PA
94	<i>Echinochloa colona</i> (L.) Link	Poaceae	-	PF, PA
95	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Poaceae	-	PF, PA
96	<i>Echinochloa stagnina</i> (Retz.) P. Beauv.	Poaceae	-	PF, PA
97	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Kayyuni	PL, PA
98	<i>Eleocharis dulcis</i> (Burm. f.) Trimen ex Hensch.	Cyperaceae	-	PF, PA
99	<i>Elephantopus scaber</i> L.	Asteraceae	Anachuvadi	PL, PA
100	<i>Eleusine indica</i> (L.) Gaerntn.	Poaceae	Thina	PF, PA
101	<i>Emilia sonchifolia</i> (L.) DC.	Asteraceae	Muyalcheviyan	PL, PA
102	<i>Eragrostis tenella</i> (L.) P. Beauv. ex Roem. & Schult.	Poaceae	-	PF, PL, PA
103	<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.	Poaceae	-	PF, PL, PA
104	<i>Eriocaulon heterolepis</i> Steud.	Eriocaulaceae	-	PF, PL
105	<i>Eriocaulon quinangulare</i> L.	Eriocaulaceae	-	PF, PL
106	<i>Eriocaulon sexangulare</i> L.	Eriocaulaceae	-	PF, PL
107	<i>Eriocaulon truncatum</i> Bunch.-Ham. ex Mart. in Wall.	Eriocaulaceae	-	PF, PL
108	<i>Eriocaulon wayanadense</i> Vivek, Swapna & Suresh	Eriocaulaceae	-	PF

109	<i>Erythrina stricta</i> Roxb.	Fabaceae	Mullumurikku	PA
110	<i>Erythrina subumbrans</i> (Hassk.) Merr.	Fabaceae	Murikk	PA
111	<i>Erythrina variegata</i>	Fabaceae	Mullumurikku	PA
112	<i>Euphorbia hirta</i> L.	Euphorbiaceae	-	PL, PA
113	<i>Euphorbia rosea</i> Retz.	Euphorbiaceae	-	PL, PA
114	<i>Ficus exasperata</i> Vahl	Moraceae	Therakam	PA
115	<i>Ficus hispida</i> L. f.	Moraceae	Paarakam	PA
116	<i>Ficus microcarpa</i> L. f.	Moraceae	Ithi	PA
117	<i>Ficus racemosa</i> L.	Moraceae	Athi	PA
118	<i>Ficus religiosa</i> L.	Moraceae	Arayal	PA
119	<i>Fimbristylis acuminata</i> Vahl	Cyperaceae	-	PF, PL, PA
120	<i>Fimbristylis aestivalis</i> Vahl var. <i>aestivalis</i>	Cyperaceae	-	PF, PL, PA
121	<i>Fimbristylis dichotoma</i> (L.) Vahl.	Cyperaceae	-	PF, PL, PA
122	<i>Fimbristylis eragrostis</i> (Nees & Meyen) Hance	Cyperaceae	-	PF, PL, PA
123	<i>Fimbristylis ferruginea</i> (L.) Vahl.	Cyperaceae	-	PF, PL, PA
124	<i>Fimbristylis narayanii</i> C.E.C. Fisch.	Cyperaceae	-	PF, PL, PA
125	<i>Fimbristylis pseudonarayanii</i> Ravi & Anil Kumar	Cyperaceae	-	PF, PL, PA
126	<i>Fimbristylis quinquangularis</i> (Vahl) Kunth	Cyperaceae	-	PF, PL, PA
127	<i>Fimbristylis schoenoides</i> (Retz.) Vahl	Cyperaceae	-	PF, PL, PA
128	<i>Floscopa scandens</i> Lour.	Commelinaceae	-	PL, PA
129	<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt	Euphorbiaceae	Klaavu	PA
130	<i>Fuirena ciliaris</i> (L.) Roxb.	Cyperaceae	-	PF, PL, PA
131	<i>Fuirena umbellata</i> Rettb.	Cyperaceae	-	PF, PL, PA
132	<i>Geissaspis cristata</i> Wight & Arn.	Fabaceae	-	PF, PL, PA
133	<i>Geissaspis tenella</i> Benth. Var. <i>tenella</i>	Fabaceae	-	PF, PL, PA
134	<i>Glinus oppositifolius</i> (L.) A. DC	Molluginaceae	Kaippanjeerakam	PF, PL, PA
135	<i>Gliricidia sepium</i> (Jacq.) Kunth ex Walp.	Fabaceae	Sheemakkonna	PA
136	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	-	PA
137	<i>Gnaphalium polycaulon</i> Pers.	Asteraceae	-	PA
138	<i>Grangea maderaspatana</i> (L.) Poir. in Lam	Asteraceae	-	PL, PA
139	<i>Grevillea robusta</i> Cunn. in R. Br.	Proteaceae	-	PA
140	<i>Hedyotis neesiana</i> Arn.	Rubiaceae	-	PA
141	<i>Heliotropium indicum</i> L.	Boraginaceae	-	PL, PA
142	<i>Heliotropium keralense</i> Sivarajan & Manilal.	Boraginaceae	-	PL, PA
143	<i>Hewittia malabarica</i> (L.) Suresh in Nicolson et al.	Convolvulaceae	-	PA
144	<i>Hibiscus hispidissimus</i> Griff.	Malvaceae	Paichappuli	PA
145	<i>Hibiscus lobatus</i> (Murr.) O. Ktze.	Malvaceae	-	PA
146	<i>Hibiscus rosa-sinensis</i> L. var. <i>rosa-sinensis</i>	Malvaceae	Chembarathi	PA
147	<i>Hiptage benghalensis</i> (L.) Kurz	Malpighiaceae	Seethamp	PA
148	<i>Holigarna arnottiana</i> Hook. f.	Anacardiaceae	Cheru	PA
149	<i>Hopea parviflora</i> Bedd.	Dipterocarpaceae	Thambakam	PA
150	<i>Hopea ponga</i> (Dennst.) Mabb.	Dipterocarpaceae	Irumbakam	PA
151	<i>Hydnocarpus pentandra</i> (Buch.-Ham.) Oken	Flacourtiaceae	Marotti	PA
152	<i>Hydrolea zeylanica</i> (L.) Vahl.	Hydrophyllaceae	-	PA
153	<i>Hygrophila ringens</i> (L.) Steud.	Acanthaceae	-	PF
154	<i>Hygrophila schullii</i> (Buch.-Ham.) M. R. & S. M. Almeida	Acanthaceae	Vayalchulli	PF, PL
155	<i>Hypericum japonicum</i> Thunb. ex Murr. in L.	Hypericaceae	Manikkaaya	PF, PL
156	<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Naatappoochedi	PL, PA
157	<i>Indigofera endecaphylla</i> Jacq.	Fabaceae	-	PA
158	<i>Indigofera prostrata</i> Willd.	Fabaceae	-	PA
159	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	Madhurakkizhangu/ Chakkarakkizhangu	PA
160	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	-	PA
161	<i>Ipomoea carnea</i> Jack. ssp. <i>fastuosa</i> (Mart. ex Choisy) Austin	Convolvulaceae	Kolambi	PA
162	<i>Ipomoea obscura</i> (L.) Ker-Gawl.	Convolvulaceae	Thiruthaali	PA
163	<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	-	PA
164	<i>Ipomoea turbinata</i> Lagasca	Convolvulaceae	Nithyavazhuthana	PA
165	<i>Isachne miliaceae</i> Roth	Poaceae	-	PF, PL
166	<i>Ischaemum indicum</i> (Houtt.) Merr., ssp. <i>indicum</i> var. <i>indicum</i>	Poaceae	-	PF, PL
167	<i>Ischaemum wayanadense</i> Ravi, N. Mohanan & Shaju	Poaceae	-	PF, PL
168	<i>Juncus prismatocarpus</i> R. Br. ssp. <i>leschenaultii</i> (Gay ex Laharpe) Kirschner	Juncaceae	-	PF, PL
169	<i>Justicia betonica</i> L. var. <i>betonica</i> Hook.f.	Acanthaceae	-	PA
170	<i>Justicia japonica</i> Thunb.	Acanthaceae	-	PL, PA
171	<i>Justicia procumbens</i> L.	Acanthaceae	-	PL, PA
172	<i>Kyllinga bulbosa</i> P. Beauv.	Cyperaceae	-	PL
173	<i>Kyllinga nemoralis</i> (J. R & G. Forst.) Dandy ex Hutch. & Dalz.	Cyperaceae	-	PL
174	<i>Lagerstroemia microcarpa</i> Wight	Lythraceae	Venthekku	PA
175	<i>Lantana camara</i> L. var. <i>aculeata</i> (L.) Moldenke	Verbenaceae	Kongini	PA
176	<i>Laportea interrupta</i> (L.) Chew	Urticaceae	Choriyanam	PL, PA
177	<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Thumba	PL, PA
178	<i>Leucas beddomei</i> (Hook. f.) Sunojkumar & Mathew	Lamiaceae	-	PL, PA
179	<i>Leucas ciliata</i> Benth. ex Wall.	Lamiaceae	-	PL, PA
180	<i>Leucas lavandulifolia</i> J.E. Smith in Rees	Lamiaceae	-	PA
181	<i>Leucas vestita</i> Benth. in Wall. var. <i>vestita</i>	Lamiaceae	-	PA
182	<i>Limnophila aquatica</i> (Roxb.) Alston	Scrophulariaceae	-	PF, PL, PA
183	<i>Limnophila aromatica</i> (Lam.) Merr.	Scrophulariaceae	Maanganaari	PF, PL, PA
184	<i>Limnophila chinensis</i> (Osbeck) Merr.	Scrophulariaceae	Maanganaari	PF, PL, PA
185	<i>Limnophila indica</i> (L.) Druce	Scrophulariaceae	-	PF, PL, PA
186	<i>Limnophila repens</i> (Benth.) Benth. in DC.	Scrophulariaceae	-	PF, PL, PA
187	<i>Lindernia anagalis</i> (Burm. f.) Pennell	Scrophulariaceae	-	PF, PL, PA
188	<i>Lindernia antipoda</i> (L.) Alston in Trimen	Scrophulariaceae	-	PF, PL, PA
189	<i>Lindernia caespitosa</i> (Blume) Panigrahi	Scrophulariaceae	-	PF, PL, PA

190	<i>Lindernia ciliata</i> (Colsm.) Pennell ssp. <i>Ciliata</i>	Scrophulariaceae	-	PF, PL, PA
191	<i>Lindernia crustacea</i> (L.) F.v. Muell.	Scrophulariaceae	-	PF, PL, PA
192	<i>Lindernia hyssopoides</i> (L.) Haines	Scrophulariaceae	-	PF, PL, PA
193	<i>Lindernia oppositifolia</i> (Retz.) Mukerjee	Scrophulariaceae	-	PF, PL, PA
194	<i>Lindernia parviflora</i> (Roxb.) Haines	Scrophulariaceae	-	PF, PL, PA
195	<i>Lindernia rotundifolia</i> (L.) Mukerjee	Scrophulariaceae	-	PF, PL, PA
196	<i>Lindernia viscosa</i> (Hornem.) Merr.	Scrophulariaceae	-	PF, PL, PA
197	<i>Lipocarpa chinensis</i> (Osbeck) Kern	Cyperaceae	-	PF, PL
198	<i>Ludwigia adscendens</i> (L.) Hara	Onagraceae	Mulippannichedi	PF, PL, PA
199	<i>Ludwigia hyssopifolia</i> (G. Don) Exell	Onagraceae	-	PF, PL, PA
200	<i>Ludwigia octovalvis</i> (Jacq.) Raven ssp. <i>sessiliflora</i> (Michx.) Raven	Onagraceae	-	PF, PL, PA
201	<i>Ludwigia perennis</i> L.	Onagraceae	-	PF, PL, PA
202	<i>Ludwigia peruviana</i> (L.) H. Hara	Onagraceae	-	PA
203	<i>Ludwigia prostrata</i> Roxb.	Onagraceae	-	PF, PL, PA
204	<i>Madhuca nerifolia</i> (Moon) H. J. Lam	Sapotaceae	Iluppa	PA
205	<i>Mallotus tetracoccus</i> (Roxb.) Kurz	Euphorbiaceae	Vatta/Porivatta	PA
206	<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	-	PL, PA
207	<i>Mangifera indica</i> L.	Anacardiaceae	Maavu	PA
208	<i>Marselia minuta</i> L.	Marseliaceae	-	PF, PA
209	<i>Mecardonia procumbens</i> (Mill.) Small	Scrophulariaceae	-	PF, PL, PA
210	<i>Melochia corchorifolia</i> L.	Sterculiaceae	-	PL, PA
211	<i>Merremia umbellata</i> (L.) Hall. f.	Convolvulaceae	Vayaravalli	PA
212	<i>Microstachys chamaelea</i> (L.) Muell. Arg.	Euphorbiaceae	-	PA
213	<i>Mikania micrantha</i> Kunth in HBK	Asteraceae	Dhritharaashtrapacha	PA
214	<i>Mimosa diplotricha</i> C. Wight ex Sanvalle	Fabaceae	Aanathottavadi	PA
215	<i>Mimosa pudica</i> L.	Fabaceae	Thottavadi	PA, PL
216	<i>Mitracarpus hirtus</i> (L.) DC.	Rubiaceae	Thaaval	PA, PL
217	<i>Mollugo pentaphylla</i> L.	Molluginaceae	Parppadakappullu	PL, PA
218	<i>Monochoria vaginalis</i> (Burm. f.) Presl	Pontederiaceae	Vayalkkoovalam/ Karimkoovalam	PF
219	<i>Mukia maderaspatana</i> (L.) Roem.	Cucurbitaceae	Uyalamkoochi	PA
220	<i>Murdannia dimorpha</i> (Dalz.) Brueck. in Engl. & Prantl	Commelinaceae	-	PL
221	<i>Murdannia japonica</i> (Thunb.) Faden	Commelinaceae	-	PL
222	<i>Nesaea cordata</i> Hiern in Oliver	Lythraceae	-	PA
223	<i>Nymphaea nouchali</i> Burm.f.	Nymphaeaceae	Ambal	PA
224	<i>Oldenlandia auricularia</i> (L.) K. Schum. in Engl. & Prantl	Rubiaceae	Thaarhaval	PL, PF, PA
225	<i>Oldenlandia corymbosa</i> L. var. <i>corymbosa</i>	Rubiaceae	-	PL, PF, PA
226	<i>Oldenlandia diffusa</i> (Willd.) Roxb.	Rubiaceae	-	PL, PF, PA
227	<i>Osbeckia aspera</i> (L.) Blume var. <i>aspera</i>	Melastomataceae	-	PA
228	<i>Osbeckia wynaadensis</i> Clarke in Hook. f.	Melastomataceae	Athirani	PA
229	<i>Ottochloa nodosa</i> (Kunth) Dandy	Poaceae	-	PL
230	<i>Oxalis corniculata</i> L.	Oxalidaceae	Puliyarila	PF, PA
231	<i>Pandanus amaryllifolius</i> Roxb.	Pandanaceae	Rambha	PA
232	<i>Pandanus canaranus</i> Warb.	Pandanaceae	Kaitha	PA
233	<i>Panicum brevifolium</i> L.	Poaceae	-	PF, PA
234	<i>Panicum paludosum</i> Roxb.	Poaceae	-	PF, PA
235	<i>Panicum repens</i> L.	Poaceae	-	PF, PA
236	<i>Parthenium hysterophorus</i> L.	Asteraceae	Congress pacha	PA
237	<i>Paspalidium flavidum</i> (Retz.) A. Camus in Lecomte	Poaceae	-	PF, PA
238	<i>Paspalum canarea</i> (Steud.) Veldk. var. <i>fimbriatum</i> (Bor) Veldk.	Poaceae	-	PF, PA
239	<i>Paspalum conjugatum</i> Berg.	Poaceae	-	PF, PA
240	<i>Paspalum distichum</i> L.	Poaceae	-	PF, PA
241	<i>Paspalum scrobiculatum</i> L.	Poaceae	-	PF, PA
242	<i>Passiflora foetida</i> L.	Passifloraceae	Aakaashavellari/ Aakaashamutta	PA
243	<i>Pennisetum hohenackeri</i> Hochst. ex Steud.	Poaceae	Maanippullu	PF, PA
244	<i>Pennisetum pedicellatum</i> Trin.	Poaceae	Poochavalan	PF, PA
245	<i>Persicaria barbata</i> (L.) Hara var. <i>barbata</i>	Polygonaceae	-	PA
246	<i>Persicaria chinensis</i> (L.) Gross. in Engl.	Polygonaceae	Pulichappu	PA
247	<i>Persicaria glabra</i> (Willd.) Gomez	Polygonaceae	Kozhivaalan	PA
248	<i>Phyllanthus amarus</i> Schum. & Thonn. in C.F. Schumacher	Euphorbiaceae	Keezharnelli Chuvanna	PL, PA
249	<i>Phyllanthus urinaria</i> L.	Euphorbiaceae	keezharnelli	PL, PA
250	<i>Physalis angulata</i> L.	Solanaceae	Njottanjodiyam	PA
251	<i>Pneumatopteris truncata</i> (Poir.) Holtt.	Thelypteridaceae	-	PA
252	<i>Pogostemon deccanensis</i> (Panigrahi) Press	Lamiaceae	-	PF, PA
253	<i>Polycarpon prostratum</i> (Forssk.) Asch. & Schweinf.	Caryophyllaceae	-	PL, PA
254	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	Ungu	PA
255	<i>Portulaca oleracea</i> L.	Portulacaceae	Kozhuppacheera	PF, PL, PA
256	<i>Pouzolzia zeylanica</i> (L.) Bennett	Urticaceae	-	PA
257	<i>Pseudocyclosorus ochthodes</i> (Kunze) Holtt.	Thelypteridaceae	-	PA
258	<i>Pteris confusa</i> T. G. Walker	Pteridaceae	-	PA
259	<i>Pycneus flavidus</i> (Retz.) Koyama	Cyperaceae	-	PF, PL
260	<i>Pycneus polystachyos</i> (Rottb.) P. Beauv. var. <i>polystachyos</i>	Cyperaceae	-	PF, PL
261	<i>Pycneus puncticulatus</i> (Vahl) Nees in Mart.	Cyperaceae	-	PF, PL
262	<i>Pycneus stamineus</i> Clarke in Hook. f.	Cyperaceae	-	PF, PL
263	<i>Rotala malampuzhensis</i> R.V. Nair ex Cook	Lythraceae	-	PF, PA
264	<i>Rotala indica</i> (Willd.) Koehne in Engl.	Lythraceae	-	PF, PA
265	<i>Rotala macrandra</i> Koehne in Engl.	Lythraceae	-	PF, PA
266	<i>Rotala malabarica</i> Pradeep, Joseph & Sivar.	Lythraceae	-	PF, PA
267	<i>Rotala rotundifolia</i> (Buch.-Ham. ex Roxb.) Koehne in Engl.	Lythraceae	-	PF, PA

268	<i>Ruellia tuberosa</i> L.	Acanthaceae	-	PA
269	<i>Rungia pectinata</i> (L.) Nees in DC.	Acanthaceae	-	PA
270	<i>Saccharum spontaneum</i> L., Mant.	Poaceae	Kusappullu	PF, PA
271	<i>Sacciolepis indica</i> (L.) A. Chase	Poaceae	-	PF, PA
272	<i>Sacciolepis interrupta</i> (Willd.) Stapf in Prain	Poaceae	-	PF, PA
273	<i>Sacciolepis mysouroides</i> (R. Br.) A. Camus in Lecomte	Poaceae	-	PF, PA
274	<i>Salix tetrasperma</i> Roxb.	Salicaceae	Aatupaala	PA
275	<i>Salvinia molesta</i> D. S. Mitch	Salviniaceae	-	PF, PA
276	<i>Schoenoplectiella juncooides</i> (Roxb.) Palla in Engl.	Cyperaceae	Maanappullu	PF
277	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Kallurukki	PL, PA
278	<i>Senna occidentalis</i> L.	Caesalpiniaceae	Karinthakara	PA
279	<i>Senna tora</i> (L.) Roxb.	Caesalpiniaceae	Thakara	PA
280	<i>Sida acuta</i> Burm. f.	Malvaceae	Aanakkurunthotti	PL, PA
281	<i>Sida alnifolia</i> L.	Malvaceae	-	PL, PA
282	<i>Sida beddomei</i> Jacob	Malvaceae	Vallikkurunthotti	PL, PA
283	<i>Sida cordata</i> (Burm. f.) Borss.	Malvaceae	-	PL, PA
284	<i>Sida cordifolia</i> L.	Malvaceae	-	PA
285	<i>Sida mysorensis</i> Wight & Arn.	Malvaceae	Kurunthotti	PA
286	<i>Sida rhombifolia</i> L.	Malvaceae	Kurunthotti	PL, PA
287	<i>Smithia conferta</i> Smith in Rees	Fabaceae	-	PA
288	<i>Smithia sensitiva</i> Ait.	Fabaceae	-	PA
289	<i>Solanum americanum</i> Mill.	Solanaceae	-	PA
290	<i>Solanum diphyllum</i> L.	Solanaceae	Karimudunga	PA
291	<i>Solanum erianthum</i> D. Don	Solanaceae	Cheruvazhuthina	PA
292	<i>Solanum torvum</i> Sw.	Solanaceae	Kandakaarichunda	PA
293	<i>Solanum violaceum</i> Ortega ssp. <i>Violaceum</i>	Solanaceae	Manithaakkaali	PA
294	<i>Solanum virginianum</i> L.	Solanaceae	Aanachunda	PA
295	<i>Spathodea campanulata</i> P. Beauv.	Bignoniaceae	-	PA
296	<i>Sphaeranthus indicus</i> L.	Asteraceae	Adakkaamaniyan	PF
297	<i>Spilanthes ciliata</i> HBK	Asteraceae	-	PL, PA
298	<i>Spilanthes radicans</i> Jacq.	Asteraceae	Palluvedanachedi	PL, PA
299	<i>Sporobolus piliferus</i> (Trin.) Kunth	Poaceae	-	PF, PA
300	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbenaceae	-	PA
301	<i>Synedrella nodiflora</i> (L.) Gaertn.	Asteraceae	-	PL, PA
302	<i>Tamarindus indica</i> L.	Fabaceae	Puli	PA
303	<i>Tephrosia pumila</i> (Lam.) Pers.	Fabaceae	-	PA
304	<i>Terminalia paniculata</i> Roth	Combretaceae	Maruthu	PA
305	<i>Thunbergia fragrans</i> Roxb.	Acanthaceae	-	PA
306	<i>Trema orientalis</i> (L.) Blume	Ulmaceae	Nukamaram	PA
307	<i>Trianthema portulacastrum</i> L.	Aizoaceae	Vashalacheera	PF, PL, PA
308	<i>Tridax procumbens</i> L.	Asteraceae	-	PL, PA
309	<i>Urena lobata</i> L. ssp. <i>lobata</i>	Malvaceae	Oorppan	PA
310	<i>Urena lobata</i> L. ssp. <i>sinuata</i> (L.) Borss.	Malvaceae	Oorakam	PA
311	<i>Utricularia aurea</i> Lour.	Lentibulariaceae	-	PF, PA
312	<i>Utricularia graminifolia</i> Vahl	Lentibulariaceae	-	PF, PA
313	<i>Vallisneria natans</i> (Lour.) Hara	Hydrocharitaceae	-	PF, PA
314	<i>Vateria indica</i> L.	Dipterocarpaceae	Vellapine	PA
315	<i>Vernonia cinerea</i> (L.) Less.	Asteraceae	Poovamkurunnila	PL, PA
316	<i>Waltheria indica</i> L.	Sterculiaceae	-	PA
317	<i>Wedelia trilobata</i> (L.) A. S. Hitchc.	Asteraceae	-	PL, PA
318	<i>Xanthium indicum</i> Koenig in Roxb.	Asteraceae	Ottukai	PL, PA
319	<i>Zehneria maysorensis</i> (Wight & Arn.) Arn. in Hook.'s var. <i>maysorensis</i>	Cucurbitaceae	Aliyanchappu	PA

PF = Paddy Field; PL=Paddy Levee; PA=Paddy Adjacent

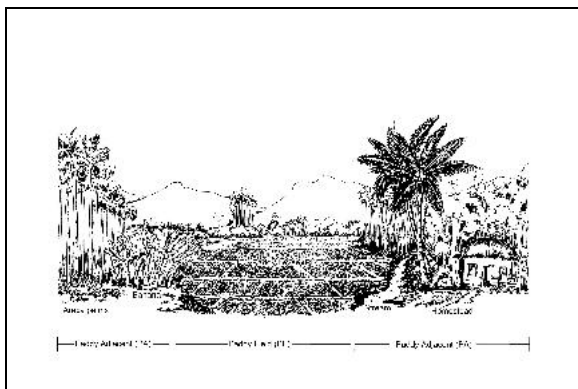


Fig.3: A sketch of the study area

Place of occurrence of the species

Paddy Fields (PF) of these sites were found harbouring 118 species, Paddy Levees (PL) with 150 species and 189 (One Hundred and Eighty Nine) species were found both in PF and PL. Eight (8), Nine (9) and One Hundred and Thirty (130) species were found limited to Paddy Fields (PF), Paddy Levees (PL) and Paddy Adjacent areas (PA) respectively (Fig.7).

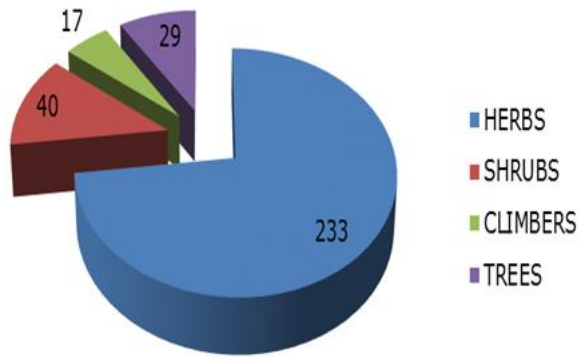


Fig.4: Habit-wise number of species

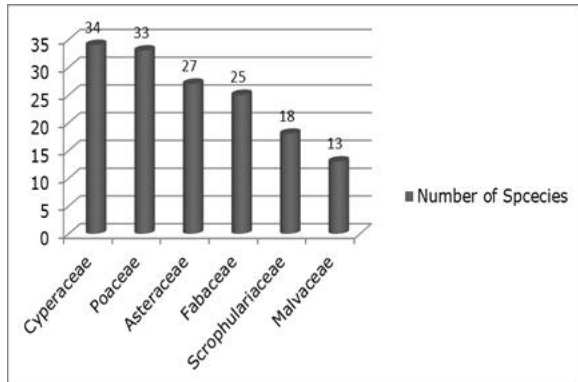


Fig.5: Dominant families with number of species

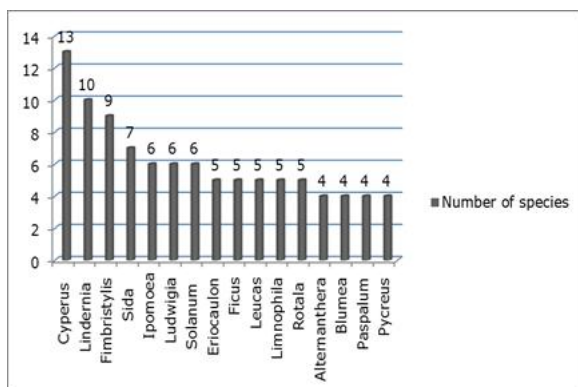


Fig.6: Dominant genera with number of species

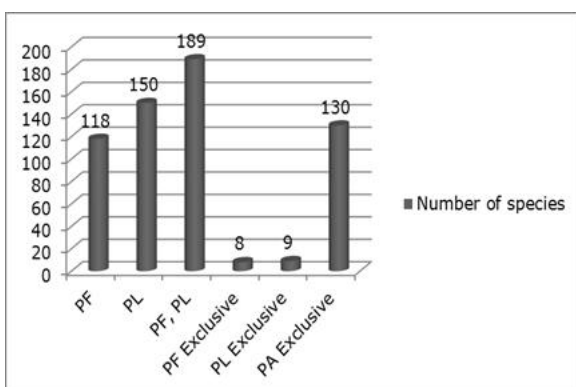


Fig.7: Number of vascular plant species and their place of occurrence

Conclusion

The study shows that the flowering plant diversity of paddy associated landscape is rich and harbours 15% of the total Angiosperm species reported from the District. As an agroecosystem, the rice field provides a range of tangible and intangible services to the local community. Apart from the Regulating, Cultural and Support services, the Provisional supporting services (MA, 2005) provided by this landscape in terms of enhancing biodiversity, sheltering several species of food, fodder, medicinal and other values are significant for the people inhabiting the land. The functions and value of these fields depend importantly upon its management by the land users. It is high time to act in response to the drivers of land use change that happens in these parts of Western Ghats which is evident from the drop of paddy area by 66% (from 30,000 ha to 10,230 ha) during the period 1980-81 to 2012-13 (DES, 1983; DES, 2013).

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