DOI:10.26524/krj258

Kong. Res. J. 5(1):73-92, 2018
Publisher: Kongunadu Arts and Science College, Coimbatore.

http://krjscience.com

RESEARCH ARTICLE

DIVERSITY AND CONSERVATION OF PLANT RESOURECES OF TIRUMALAIAH GUTTA SACRED GROVE, WANAPARTHY, TELANGANA, INDIA

Sadasivaiah, B.[1]*, M. Sharath Goud[1], R. Devilal[1], M. Laxmikanth[1], A. Narasimha[1], M. Uday Kumar[1], A. Ramakrishna[1], L. Paramesh[1], P. Bharath Simha Yadav[1], B. Raghavendra[1], G. Janaki[1] and M. Sridhar Reddy[2]

[1]Department of Botany, Government Degree College (Men), Wanaparthy – 509 103, Telanagana
[2]Department of Environmental Science, Yogi Vemana University, Kadapa, Andhra Pradesh.

ABSTRACT

Tirumalaiah Gutta sacred grove is situated near Wanaparthy, Telanagana with dry deciduous and scrub forests and huge rock boulders. The study yields a total of 467 taxa belonging to 283 genera and 81 families. Of the 467 taxa, 332 are dicots, 129 are monocots and 6 are pteridophytes. Of the 81 families, Poaceae is the largest family with 77 taxa, followed by Fabaceae (51), Cyperaceae (25), Asteraceae (24), Rubiaceae (19) and Acanthaceae (18). A total number of 34 endemic taxa at different levels are recorded of which, *Alysicarpus mahabubnagarensis* is endemic to Mahabubnagar district, *Chryopogon velutinus* is endemic to Kadapa district of Andhra Pradesh, Rathnagiri hills of Maharashtra and Wanaparthy district of Telangana; *Euphorbia senguptea* and *Rostellularia vahlii* var. *rupicola* are endemic to Eastern Ghats. From the inventory it has been resulted in a total of 16 taxa which was identified and found as addition to the flora of Telangana state after a perusal of literature. *Ceropegia spiralis, Caralluma stalagmifera*, *Tripogon purpurascens, Chrysopogon velutinus* are some of the significant taxa of the study. Good number of insectivorous plants were also recorded from the study area. The "Sanjeevani" is mythical herb mentioned in the Ramayana as a wonderful medicinal plant was present in this area. A total number of 382 taxa can be considered as economically important.

Keywords: Tirumalaiah Gutta sacred grove, Telanagana, Conservation.

1. INTRODUCTION

Biodiversity is the totality of genes, species and ecosystem in a region. Biodiversity interacting with the physical environment form the foundation of sustainable development. The worldwide destruction of the natural environment by population explosion, urbanization, industrialization and habitat fragmentation has led to a tremendous loss of biological diversity over the past few decades. Population pressures and concomitant unscientific and unsustainable extraction of resources especially of timber, medicinal herbs, fuel wood and fodder from forests has alarming consequences on conservation of these resources. Overexploitation is likely to severely reduce the population sizes below the critical level and consequently the survival of the species *per sec*.

Flora refers to "the plants present in a particular geographic region or an area at a particular time, generally the naturally occurring or indigenous plants". Such flora will serve as documented inventory of plants and as a historic datasets for future monitoring of native plant species. According to conservation biologists, 25% of all species could become extinct during the next 20-30 years. The cause for the loss of species is numerous but the most important is the loss and fragmentation of natural habitats. The International Union for the Conservation of Nature (IUCN) is the world's main authority on the conservation status of species (1). The 2008 update of the IUCN Red List cover 44,838 species including 8,457 plant species classified under different threats. The existing information on Endemic, Rare, Endangered and Threatened (ERET) species is very thin and often provides inadequate data. There is a need to revive the red lists based on sound datasets as opined (2,3). In the context of unabated loss of biodiversity due to human interference, plant taxonomists throughout the world are documenting flora at different levels-national, regional, local, etc.

2. NEED OF STUDY

Sacred groves are the patches of native vegetation traditionally protected by local communities, and are unique, and significant, examples of in situ biodiversity conservation (4). The nature of religiousness associated with sacred groves suggests that the practice of sacred groves dates back to the nomadic hunter-gatherer age of human history (5). It is generally believed that, owing to their religious significance, sacred groves are better protected and managed, and hence harbor

*Correspondence: Sadasivaiah, B., Department of Botany, Government Degree College (Men), Wanaparthy – 509 103, Telanagana.
E. mail: sadasivaiahbyalla@gmail.com

richer plant diversity than other forests (6), though this has not been substantiated through systematic floristic and quantitative studies.

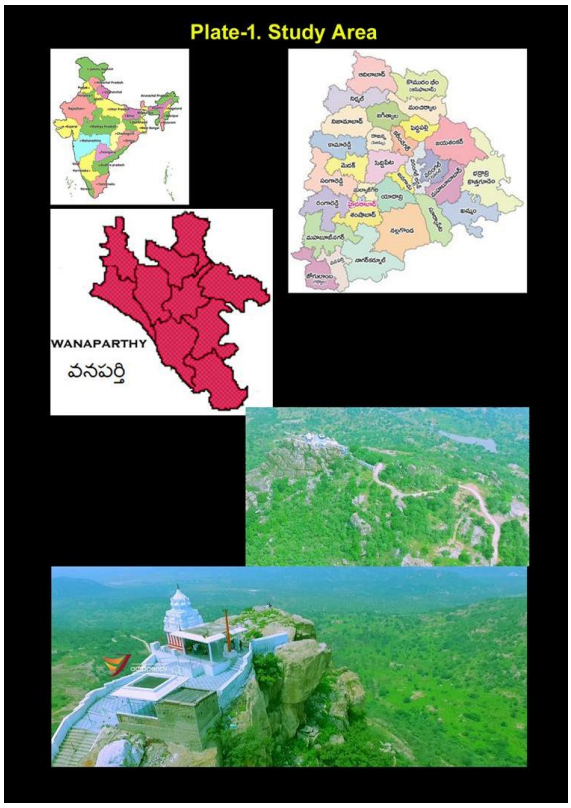
Tirumalaiah Gutta sacred grove is situated near Wanaparthy, Telanagana. No floristic and conservation works were done in this sacred grove. Hence the present work has undertaken.

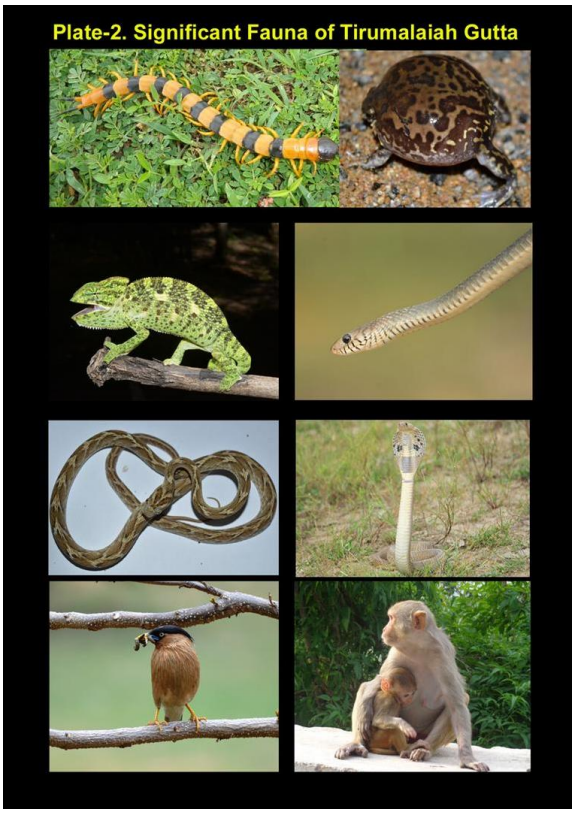
3. STUDY AREA

Wanaparthy is one of the districts of Telangana situated in southern part. The name of town itself indicates that, once upon a time it was with forests (Vanam-Forest; Parthy-Village). Tirumalaiah Gutta is one of the sacred groves of Telangana located 5 km away from Wanaparthy town. The lord Venkateswara is in the name of Tirumalanatha swamy present at the top of the hill worshipped by the local people for the past 300 years (Plate-1). According to the history of Wanaparthy Samsthan, the temple was built by the Raja Wanaparthy in 18th century. Sravanamasam (August-September) of every year nearly 2lakhs of people visited this temple.

The climate of the study area is that January, February and March months are pleasant with moderate winds from southeast with an average temperature varies from 24˚ to 28˚C. April and May are the hottest months of the year with the mean temperature of 35˚C-45˚C. The maximum temperature during this season ranges between 45˚C and 26˚C. During the succeeding four months, the wind blows from western side and brings fairly good rainfall. By the end of September, the wind is light and pleasant forecasting the onset of north-east monsoon. From November to February the temperature falls as low as 10˚C. The average rainfall of Tirumalaiah Gutta is about 100cm and is mostly due to south-west monsoon.

The forests of Tirumalaiah Gutta can be broadly categorized into three types: dry deciduous, scrub type and plantations. Dry deciduous forests are dominated by *Anogeissus latifolia, Chloroxylon switenia, Dalbergia lanceolaria, Deccania pubescens, Gyrocarpus americanus*. Scrub is usually confined to the base of hills and generally in the peripheries of much disturbed and degraded dry deciduous forests. On the western side of the sacred grove, scrub predominates and seen with species like *Acacia catechu, Dichrostachys cinerea, Diospyros chloroxylon, Maytenus emarginata,* etc. It is not only home for plants and also for various animals. The important animal species are represented in Plate-2.





4. METHODOLOGY

The present study aims at a first ever systematic attempt towards a fine scale assessment of the plant resources of Tirumalaiah Gutta Sacred Grove based on filed explorations.

Field explorations were conducted intensively for a period of 3 years, during 2013-2016 covering all the seasons. All the plant taxa encountered in the sampled quadrates were listed and representative specimens of every taxon were collected in quadruplicates. Specimens were then poisoned, dried and were made into herbarium according to methodology described by Santapau (7), Jain and Rao (8), Forman and Bridson (9). Identification of the specimens was done by the following Gamble and Fischer (10), Pullaiah (11) and further confirmed in certain cases, by comparing with the herbarium material housed at SKU; Botanical Survey of India Deccan Regional Circle, Hyderabad (BSID). A critical care should be taken in the confirmation of endemic, threatened taxa and new distributional records. Every attempt has been made in to study the habitat, soil, elevation, vegetation type, associates etc., which were recorded carefully in the field itself. With the help of local people and based on secondary literature, plants with medicinal importance were identified and the relevant information is documented.

All the endemic and threatened taxa recorded from the area were revisited with update population numbers. Apart from the recorded threatened taxa, significant taxa under different threat have also been analyzed following the latest version (3.1) of IUCN threat categories. The threatened and important endemic species were collected and grown in the Botanical Garden of Government Degree College, Wanaparthy and the sapling were distributed to the plant lovers.

Awareness is needed to conserve any biological resources at any point especially for local people who are residing in the forests or very near to forest areas. The importance of flora and fauna of Tirumalaiah Gutta and its conservation was explained by the research team headed by Dr. Sadasivaiah, to the local people through printed pamphlets, print and electronic media especially at the time of heavy pilgrimage. A team of 80 students along with Forest Department officials were checked and eradicated all the plastic covers and other plastic materials from the pilgrims and vendors at the time of Sravanamasam. All the collected plastic covers were deposited at Municipal Office, Wanaparthy.

5. RESULTS AND DISCUSSION

5.1. Floristic Analysis

In the present study, a total number of 467 wild and naturalized vascular plant taxa comprising 457 species and 10 intraspecific taxa were recorded in Tirumalaiah Gutta Sacred Grove. They are included in 283 genera and 81 families. Of the 467 taxa, 332 (71%) were dicots (208 genera), 129 (27.6%) were monocots (69 genera) and 6 (1.2%) were pteridophytes (06 genera). The enumerated species are presented in Table-1.

Table 1. Floristic Analysis of Tirumalaiah Gutta Sacred Grove

	Families	Genera	Species
Dicotyledons	66	208	383
Monocotyledons	09	69	129
Pteridophytes	06	06	21
Total	81	283	467

All the recorded 467 taxa are presented in Table-2 along with their botanical name, family and use value. All the taxa are arranged in alphabetical order by their families. The use value is abbreviated.

5.2. Analysis of Families and Genera

Analysis at family level revealed that Poaceae is the largest family with 77 taxa, followed by Fabaceae (51), Cyperaceae (25), Asteraceae (24), Rubiaceae (19) and Acanthaceae (18). Of the 81 families recorded in the present study, 34 are monotypic, viz., represented by only one species. Of these, 24 are dicot families, 3 are monocots and 6 are pteridophytes. A total of 09 families are represented with two species, 32 are represented by 3-15 species. The significant plant taxa are represented in Plate 4-7.

Table 2. List of recorded species in Tirumalaiah Gutta sacred grove.

S. No.	Name of the Taxon	Family	Habit	Use
1	*Andrographis paniculata* (Burm.f.) Nees	Acanthaceae	H	M, O
2	*Barleria cristata* L.	Acanthaceae	H	M, O
3	*Barleria prionitis* L.	Acanthaceae	S	M, O
4	*Blepharis maderaspatensis* (L.) B. Heyne ex Roth	Acanthaceae	H	M
5	*Blepharis integrifolia* (L.f.) E. Mey & Drege ex Schinz	Acanthaceae	H	M
6	*Dipteracanthus patulus* (Jacq.) Nees	Acanthaceae	H	O

7	*Dipteracanthus prostratus* (Poiret) Nees	Acanthaceae	H	M
8	*Hygrophila schulii* (Buch.-Ham.) M.R. Almeida & S.M. Almeida	Acanthaceae	H	M
9	*Indoneesiella echioides* (L.) Sreem.	Acanthaceae	H	M
10	*Indoneesiella longipedunculata* (Sreem.) Sreem.	Acanthaceae	H	M
11	*Justicia glauca* Rottl.	Acanthaceae	H	
12	*Lepidagathis cristata* Willd.	Acanthaceae	H	M
13	*Dicliptera paniculata* (Forssk.) I. Darbysh	Acanthaceae	H	M
14	*Rhinacanthus nasutus* (L.) Kurz.	Acanthaceae	H	M
15	*Rostellularia crinita* (Nees) Nees	Acanthaceae	H	
16	*Rostellularia simplex*Wight	Acanthaceae	H	
17	*Justicia vahlii* Roth var. *rupicola* Ellis	Acanthaceae	H	
18	*Justicia vahlii* Roth	Acanthaceae	H	
19	*Actiniopteris radiata* (Sw.) Link	Actiniopteridaceae	H	M
20	*Adiantum incisum* Forssk.	Adiantaceae	H	M
21	*Agave americana* L.	Agavaceae	S	Fibre
22	*Alangium salvifolium* (L.f.) Wangerin	Alangiaceae	T	M
23	*Achyranthes aspera* L.	Amaranthaceae	H	M
24	*Achyranthes aspera* L. var. *sicula* L.	Amaranthaceae	H	
25	*Aerva javanica* (Burm.f.) Juss. ex Schult.	Amaranthaceae	H	M
26	*Aerva lanata* (L.) Juss.	Amaranthaceae	H	M
27	*Allmania longepedunculata* (Trimen) Gamble	Amaranthaceae	H	E
28	*Allmania nodiflora* (L.) R. Br. ex Wight	Amaranthaceae	H	E
29	*Allmania nodiflora* (L.) R. Br. ex Wight. var. *roxburghii* Wight	Amaranthaceae	H	E
30	*Alternanthera sessilis* (L.) R. Br. ex DC.	Amaranthaceae	H	E
31	*Amaranthus viridis* L.	Amaranthaceae	H	E
32	*Celosia argentea* L.	Amaranthaceae	H	E
33	*Gomphrena serrata* L.	Amaranthaceae	H	
34	*Pupalia lappacea* (L.) Juss.	Amaranthaceae	H	M
35	*Trichurella monsoniae* (L.f.) Bennet	Amaranthaceae	H	
36	*Crinum asiaticum* L.	Amaryllidaceae	H	O
37	*Crinum defixum*Ker-Gawl.	Amaryllidaceae	H	O
38	*Pancratium longiflora* Roxb. ex Ker Gawl.	Amaryllidaceae	H	O
39	*Pancratium sp.*	Amaryllidaceae	H	O
40	*Pancratium sp.*	Amaryllidaceae	H	O
41	*Pancratium triflorum*Roxb.	Amaryllidaceae	H	O
42	*Annona squamosa* L.	Annonaceae	T	M
43	*Carissa carandas* L.	Apocynaceae	S	E
44	*Carissa spinarum* L.	Apocynaceae	S	E
45	*Catharanthus pusillus* (Murray) G. Don	Apocynaceae	H	M
46	*Wrightia tinctoria* (Roxb.) R. Br.	Apocynaceae	T	M
47	*Aponogeton natans* (L.) Engl.	Aponogetonaceae	H	O

48	*Amorphophallus sylvaticus* (Roxb.) Kunth	Araceae	H	M
49	*Theriophonum infaustum* N.E. Br.	Araceae	H	O
50	*Theriophonum minutum* (Willd.) Baill.	Araceae	H	O
51	*Borassus flabellifer* L.	Arecaceae	T	TADDY
52	*Phoenix sylvestris* (L.) Roxb.	Arecaceae	T	TADDY
53	*Aristolochia indica* L.	Aristolochiaceae	C	M
54	*Calotropis gigantea* (L.) Dryand	Asclepiadaceae	S	M
55	*Caralluma adscendens* (Roxb.) R.Br. var. *attenuata* (Wight) Grav. & Mayur.	Asclepiadaceae	H	M
56	*Caralluma stalagmifera* Fischer	Asclepiadaceae	H	M
57	*Ceropegia spiralis* Wight.	Asclepiadaceae	H	M
58	*Gymnema sylvestre* (Retz.) R.Br. ex Schultes	Asclepiadaceae	C	M
59	*Hemidesmus indicus* (L.) R.Br.	Asclepiadaceae	C	M
60	*Hemidesmus indicus* (L.) R.Br. var. *pubescens* (Wight & Arn.) Hook.f.	Asclepiadaceae	C	M
61	*Oxystelma esculentum* (L.f.) Sm.	Asclepiadaceae	C	M
62	*Pentatropis capensis* (L.f.) Bullock	Asclepiadaceae	C	M
63	*Pergularia daemia* (Forssk.) Chiov.	Asclepiadaceae	C	M
64	*Sarcostemma acidum*	Asclepiadaceae	C	M
65	*Tylophora fasciculata* Buch.-Ham.	Asclepiadaceae	H	M
66	*Tylophora indica* (Burm.f.) Merr.	Asclepiadaceae	C	M
67	*Wattakaka volubilis* (L.f.) Stapf	Asclepiadaceae	C	M
68	*Acanthospermum hispidum* DC.	Asteraceae	H	M
69	*Ageratum conyzoides* L.	Asteraceae	H	M
70	*Bidens bipinnata* L.	Asteraceae	H	O
71	*Blainvillea acmella* (L.) Philipson	Asteraceae	H	M
72	*Blumea mollis* (D.Don) Merr.	Asteraceae	H	
73	*Dicoma tomentosa* Cass.	Asteraceae	H	M
74	*Echinops echinatus* Roxb.	Asteraceae	H	
75	*Eclipta prostrata* (L.) L. Mant.	Asteraceae	H	M
76	*Emilia sonchifolia* (L.) DC.	Asteraceae	H	M
77	*Epaltes divaricata* (L.) Cass.	Asteraceae	H	
78	*Glossocardia bosvallea* (L.f.) DC.	Asteraceae	H	M
79	*Grangea maderaspatana* (L.) Poir.	Asteraceae	H	
80	*Lagascea mollis* Cav.	Asteraceae	H	F
81	*Oligochaeta ramosa* (Roxb.) Wagenitz	Asteraceae	H	
82	*Parthenium hysterophorus* L.	Asteraceae	H	M
83	*Sclerocarpus africanus* Jacq.	Asteraceae	H	O
84	*Senecio tenuifolius* Burm.f.	Asteraceae	H	O
85	*Sphaeranthus idicus* L.	Asteraceae	H	M
86	*Tagites erecta* L.	Asteraceae	H	Escape
87	*Tridax procumbens* L.	Asteraceae	H	M
88	*Vernonia albicans* DC.	Asteraceae	H	

89	*Vernonia cinerea* (L.) Less.	Asteraceae	H	M
90	*Vicoa indica* (L.) D.C.	Asteraceae	H	O
91	*Xanthium indicum* Koenig	Asteraceae	S	M
92	*Dolichandrane atrovirens* (Roth) K.Schum.	Bignoniaceae	T	T
93	*Dolichandrane falcata* (Wall. ex DC.) Seem.	Bignoniaceae	T	
94	*Stereospermum tetragonum* DC.	Bignoniaceae	T	T
95	*Heliotropium strigosum* Willd.	Boraginaceae	H	
96	*Trichodesma indicum* (L.) R. Br.	Boraginaceae	H	M
97	*Trichodesma sedgwickianum* S.P. Benerjee	Boraginaceae	H	
98	*Opuntia stricta* (Haw.) Haw.	Cactaceae	H	E
99	*Bauhinia racemosa* Lam.	Caesalpiniaceae	T	M
100	*Cassia fistula* L.	Caesalpiniaceae	T	M
101	*Chamaecrista absus* (L.) H.S. Irwin & Barneby	Caesalpiniaceae	H	M
102	*Chamaecrista mimosoides* (L.) Greene	Caesalpiniaceae	H	M
103	*Chamaecrista pumila* (Lam.) V. Singh	Caesalpiniaceae	H	M
104	*Hardwickia binata* Roxb.	Caesalpiniaceae	T	T
105	*Pterolobium hexapetalum* (Roth) Sant. & Wagh	Caesalpiniaceae	C	
106	*Senna auriculata* (L.) Roxb.	Caesalpiniaceae	S	M
107	*Senna sophora* (L.) Roxb.	Caesalpiniaceae	S	M
108	*Senna uniflora* (Mill.) H.S. Irwin & Barneby	Caesalpiniaceae	H	
109	*Cadaba fruticosa* (L.) Druce	Capparaceae	S	M
110	*Capparis divaricata* Lam.	Capparaceae	T	E, M
111	*Capparis roxburghii* DC.	Capparaceae	C	M
112	*Capparis sepiaria* L.	Capparaceae		
113	*Maerua oblongifolia* (Forssk.) A. Rich.	Capparaceae	C	M
114	*Polycarpaea corymbosa* (L.) Lam.	Caryophyllaceae	H	
115	*Cleome aspera* Koen. ex DC.	Cleomaceae	H	M
116	*Cleome monophylla* L.	Cleomaceae	H	M
117	*Cleome viscosa* L.	Cleomaceae	H	M
118	*Anogeissus latifolia* (Roxb.ex DC.) Wall. ex Bedd.	Combretaceae	T	T
119	*Commelina benghalensis* L.	Commelinaceae	H	M
120	*Commelina maculata* Edgew.	Commelinaceae	H	F
121	*Cyanotis fasciculata* (B. Heyne ex Roth) Schult. & Schult. f.	Commelinaceae	H	
122	*Cyanotis tuberosa* (Roxb.) Schultes & Schult. f.	Commelinaceae	H	M
123	*Murdannia edulis* (Stokes) Faden	Commelinaceae	H	F
124	*Murdannia nudiflora* (L.) Brenan	Commelinaceae	H	F
125	*Tonningia axillaris* (L.) Kuntze	Commelinaceae	H	F
126	*Argyreia sericea* Dalzell	Convolvulaceae	C	M
127	*Argyreia setosa* (Roxb.) Choisy	Convolvulaceae	C	M
128	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	H	M
129	*Ipomoea barlerioides* (Chosy) Benth. ex C.B. Clarke	Convolvulaceae	C	
130	*Ipomoea carnea* Jacq. ssp. *fistulosa* (Choisy) D.Austin	Convolvulaceae	S	O
131	*Ipomoea coptica* (L.) Roth ex Roem. & Schult.	Convolvulaceae	C	

132	*Ipomoea wightii* (Wall.) Choisy	Convolvulaceae	C	
133	*Jacquenmontia paniculata* (Burm.f.) Hallier f.	Convolvulaceae	C	O
134	*Merremia tridentata* (L.) Hallier f.	Convolvulaceae	H	M
135	*Merremia tridentata* (L.) Hallier f. ssp. *hastata* (Desr.) Oostr.	Convolvulaceae	C	M
136	*Rivea hypocrateriformis* (Desr.) Choisy	Convolvulaceae	C	M, E
137	*Rivea ornata* Choisy	Convolvulaceae	C	M
138	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	C	M
139	*Ctenolepis garcinii* (L.) C.B. Clarke	Cucurbitaceae	C	M
140	*Cucumis pubescens* Willd.	Cucurbitaceae	H	E
141	*Diplocyclos palmatus* (L.) Jeffrey	Cucurbitaceae	C	M
142	*Mukia maderaspatana* (L.) Roemer	Cucurbitaceae	C	M
143	*Cuscuta reflexa* Roxb.	Cuscutaceae	C	
144	*Bulbostylis barbata* (Rottb.) Kunth ex C.B. Clarke	Cyperaceae	H	F
145	*Cyperus corymbosus* Rottb.	Cyperaceae	H	F
146	*Cyperus difformis* L.	Cyperaceae	H	F
147	*Cyperus distans* L.f.	Cyperaceae	H	F
148	*Cyperus haspan* L.	Cyperaceae	H	F
149	*Cyperus iria* L.	Cyperaceae	H	F
150	*Cyperus pulchellus* R.Br.	Cyperaceae	H	F
151	*Cyperus rotundus* L.	Cyperaceae	H	F, M
152	*Cyperus rubicundus* Vahl	Cyperaceae	H	F
153	*Cyperus teneriffae* Poir.	Cyperaceae	H	F
154	*Fimbristylis alboviridis* C.B. Clarke	Cyperaceae	H	F
155	*Fimbristylis argentea* (Rottb.) Vahl	Cyperaceae	H	F
156	*Fimbristylis bisumbellata* (Forssk.) Bubani	Cyperaceae	H	F
157	*Fimbristylis dichotoma* (L.) Vahl	Cyperaceae	H	F
158	*Fimbristylis quinquangularis* (Vahl) Kunth	Cyperaceae	H	F
159	*Fuirena capitata* (Burm. f.) T. Koyama	Cyperaceae	H	F
160	*Fuirena ciliaris* (L.) Roxb.	Cyperaceae	H	F
161	*Kyllinga bulbosa* P. Beauv.	Cyperaceae	H	F
162	*Kyllinga nemoralis* (Forst. & Forst.f.) Dandy ex Hutchins. & Dalziel	Cyperaceae	H	F
163	*Lipocarpha sphacelata* (Vahl) Kunth	Cyperaceae	H	F
164	*Mariscus clarkei* T. Koyama	Cyperaceae	H	F
165	*Cyperus paniceus* (Rottb.) Boeckeler	Cyperaceae	H	F
166	*Cyperus squarrosus* L.	Cyperaceae	H	F
167	*Lipocarpha squarrosa* (L.) Goetgh.	Cyperaceae	H	F
168	*Scleria lithosperma* (L.) Sw.	Cyperaceae	H	F
169	*Dioscorea pentaphylla* L.	Dioscoreaceae	C	M
170	*Drosera burmannii* Vahl	Droseraceae	H	Insectivorous
171	*Drosera indica* L.	Droseraceae	H	Insectivorous
172	*Diospyros chloroxylon* Roxb.	Ebenaceae	T	M
173	*Diospyros melanoxylon* Roxb.	Ebenaceae	T	M
174	*Eriocaulon quinquangulare* L.	Eriocaulaceae	H	

175	*Acalypha alnifolia* Klein ex Willd.	Euphorbiaceae	H	M
176	*Acalypha ciliata* Forssk.	Euphorbiaceae	H	M
177	*Acalypha indica* L.	Euphorbiaceae	H	M
178	*Croton bonplandianum* Baill.	Euphorbiaceae	H	M
179	*Euphorbia fusiformis* Buch.-Ham. ex D.Don	Euphorbiaceae	H	M
180	*Euphorbia hirta* L.	Euphorbiaceae	H	M
181	*Euphorbia indica* Lam.	Euphorbiaceae	H	M
182	*Euphorbia senguptae* N.P.Balakr. & Subr.	Euphorbiaceae	H	M
183	*Phyllanthus amarus* Schum. & Thonn.	Euphorbiaceae	H	M
184	*Phyllanthus kozhikodianus* Sivar. & Manilal	Euphorbiaceae	H	M
185	*Phyllanthus maderaspatensis* L.	Euphorbiaceae	H	M
186	*Phyllanthus reticulatus* Poir.	Euphorbiaceae	S	M
187	*Phyllanthus rheedei* Wight	Euphorbiaceae	H	M
188	*Phyllanthus virgatus* G. Forst.	Euphorbiaceae	H	M
189	*Sebastiniana chamaelea* (L.) Muell.-Arg.	Euphorbiaceae	H	M
190	*Abrus precatorius* L.	Fabaceae	C	M
191	*Aeschynomene indica* L.	Fabaceae	H	MISC.
192	*Alysicarpus bupleurifolius* (L.) DC.	Fabaceae	H	F
193	*Alysicarpus bupleurifolius* (L.) DC. var. *gracilis* (Edgew.) Baker	Fabaceae	H	F
194	*Alysicarpus hamosus* Edgew.	Fabaceae	H	F
195	*Alysicarpus mahabubnagarensis* Raghava Rao et al.	Fabaceae	H	F
196	*Alysicarpus monilifer* (L.) DC.	Fabaceae	H	F
197	*Alysicarpus pubescens* Law. ex Wight	Fabaceae	H	F
198	*Alysicarpus roxburghianus* Thoth. & A. Bramanik	Fabaceae	H	F
199	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	M
200	*Cajanus cajan* (L.) Millsp.	Fabaceae	H	Escape
201	*Cajanus scarabaeoides* (L.) Thours	Fabaceae	C	WR
202	*Crotalaria hebecarpa* (DC.) Rudd.	Fabaceae	H	F
203	*Crotalaria hirsuta* Willd.	Fabaceae	H	O, F
204	*Crotalaria medicaginea* Lam.	Fabaceae	H	M
205	*Crotalaria pusilla* Heyne ex Roth	Fabaceae	H	
206	*Crotalaria ramosissima* Roxb.	Fabaceae	H	M
207	*Crotalaria willdinowiana* DC.	Fabaceae	H	
208	*Dalbergia lanceolaria* L. f.	Fabaceae	T	T
209	*Dalbergia latifolia* Roxb.	Fabaceae	T	T
210	*Dalbergia paniculata* Roxb.	Fabaceae	T	T
211	*Desmodium triflorum* (L.) DC.	Fabaceae	H	F
212	*Dysolobium pilosum* (Willd.) Marechal	Fabaceae	C	F
213	*Galactia tenuiflora* (Klein ex Willd.)Wight &Arn.	Fabaceae	C	
214	*Gliricidia sepium* (Jacq.) Kunth ex Walp.	Fabaceae	T	O
215	*Indigofera astragalina* DC.	Fabaceae	H	M
216	*Indigofera barberi* Gamble	Fabaceae	H	

217	*Indigofera caerulea* Roxb.	Fabaceae	H	
218	*Indigofera cordifolia* B. Heyne ex Roth	Fabaceae	H	O
219	*Indigofera hirsuta* L.	Fabaceae	H	
220	*Indigofera linifolia* (L. f.) Retz.	Fabaceae	H	F
221	*Indigofera linnaei* Ali	Fabaceae	H	M
222	*Indigofera trita* L. f.	Fabaceae	H	
223	*Pongamia pinnata* (L.) Pierre	Fabaceae	T	M
224	*Rhynchosia capitata* (B. Heyne ex Roth) DC.	Fabaceae	H	F
225	*Rhynchosia densiflora* (Roth) DC.	Fabaceae	C	F
226	*Rhynchosia minima* (L.) DC.	Fabaceae	H	M
227	*Rhynchosia rufescens* (Willd.) DC.	Fabaceae	C	F
228	*Rhynchosia suaveolens* (L.f.) DC.	Fabaceae	H	F
229	*Stylosanthes fruticosa* (Retz.) Alston	Fabaceae	H	F
230	*Stylosanthes scabra* Vog.	Fabaceae	S	F
231	*Tephrosia pumila* (Lam.) Pers.	Fabaceae	H	F
232	*Tephrosia purpurea* (L.) Pers.	Fabaceae	S	M
233	*Tephrosia strigosa* (Dalz.) Sant. & Mahesh.	Fabaceae	H	F
234	*Tephrosia villosa* (L.) Pers.	Fabaceae	H	M
235	*Teramnus labialis* (L. f.) Sprengel	Fabaceae	C	
236	*Teramnus mollis* Benth.	Fabaceae	C	
237	*Vigna aconitifolia* (Jacq.) Marechal	Fabaceae	H	F
238	*Vigna trilobata* (L.) Verdc.	Fabaceae	H	F
239	*Zornia diphylla* (L.) Pers.	Fabaceae	H	M
240	*Zornia gibbosa* Span.	Fabaceae	H	M
241	*Chloroxylon swietenia* DC.	Flindersiaceae	T	M
242	*Canscora alata* (Roth) Wall.	Gentianaceae	H	
243	*Enicostemma axillare* (Poir. ex Lam.) A. Raynal	Gentianaceae	H	M
244	*Gyrocarpus americanus* Jacq.	Hernandiaceae	T	M
245	*Isoites coromandeliana*	Isoitaceae	H	
246	*Anisochilus carnosus* (L.f.) Wall. ex Benth.	Lamiaceae	H	M
247	*Anisomeles indica* (L.) Kuntze	Lamiaceae	S	M
248	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	H	M
249	*Leucas aspera* (Willd.) Link	Lamiaceae	H	M
250	*Leucas decemdenta* (Willd.) R. Br. ex Smith	Lamiaceae	H	M
251	*Ocimum americanum* L.	Lamiaceae	H	M
252	*Ocimum tenuiflorum* L.	Lamiaceae	H	M
253	*Orthosiphon rubicundus* (D.Don) Benth.	Lamiaceae	H	M
254	*Plectranthus barbatus* Andr.	Lamiaceae	H	M
255	*Utricularia aurea* Lour.	Lentibulariaceae	H	Insectivorous
256	*Utricularia caerulea* L.	Lentibulariaceae	H	Insectivorous
257	*Utricularia scandens* Benj.	Lentibulariaceae	H	Insectivorous
258	*Aloe vera* (L.) Burm. f.	Liliaceae	H	M, O
259	*Asparagus racemosus* Willd.	Liliaceae	C	M

260	*Chlorophytum laxum* R. Br.	Liliaceae	H	M
261	*Chlorophytum tuberosum* (Roxb.) Baker	Liliaceae	H	M
262	*Drimia indica* (Roxb.) Jessop	Liliaceae	H	M
263	*Gloriosa superba* L.	Liliaceae	C	M, O
264	*Iphigenia indica* (L.) A. Gray ex Kunth	Liliaceae	H	M
265	*Ledebouria revoluta* (L.f.) Jessop	Liliaceae	H	M
266	*Urgenia raogibikei* Hemadri	Liliaceae	H	
267	*Strychnos potatorum* L.f.	Loganiaceae	T	M
268	*Dendrophthoe falcata* (L.f.) Ettingsh.	Loranthaceae	S	M
269	*Ammannia baccifera* L.	Lythraceae	H	
270	*Ammannia multiflora* Roxb.	Lythraceae	H	
271	*Aspidopterys cordata* (Heyne ex Wall.) A. Juss.	Malphigiaceae	C	M
272	*Herissantia crispa* (L.) Brizicky	Malvaceae	H	M
273	*Abutilon indicum* (L.) Sweet	Malvaceae	S	M
274	*Hibiscus vitifolius* L.	Malvaceae	H	O
275	*Gossypium arborium* L.	Malvaceae	S	
276	*Hibiscus lobatus* (Murr.) Kuntze	Malvaceae	H	M
277	*Hibiscus ovalifolius* (Forssk.) Vahl	Malvaceae	S	M
278	*Malvastrum coromandelianum* (L.) Gracke	Malvaceae	H	
279	*Pavonia odorata* Willd.	Malvaceae	H	M
280	*Pavonia procumbens*	Malvaceae	H	M
281	*Pavonia zeylanica* (L.) Cav.	Malvaceae	H	M
282	*Sida acuta* Burm.f.	Malvaceae	S	M
283	*Sida cordata* (Burm.f.) Borssum	Malvaceae	H	M
284	*Sida cordifolia* L.	Malvaceae	S	M
285	*Sida ovata* Forssk.	Malvaceae	S	M
286	*Sida spinosa*	Malvaceae	H	M
287	*Marsilea minuta* L.	Marsileaceae	H	O
288	*Azadirachta indica* A. Juss.	Meliaceae	T	M
289	*Cissampelos pareira* L. var. *hirsuta* (Buch.-Ham.ex DC.) Forman	Menispermaceae	C	M
290	*Cocculus hirsutus* (L.) Diels	Menispermaceae	C	M
291	*Tinospora cordifolia* (Willd.) Meirs ex Hook. f. & Thomson	Menispermaceae	C	M
292	*Acacia auriculiformis* A. Cunn. ex. Benth.	Mimosaceae	T	O
293	*Acacia eburnea* (L.f.) Willd.	Mimosaceae	T	
294	*Acacia ferrugenia* DC.	Mimosaceae	T	
295	*Albizia amara* (Roxb.) Boivin	Mimosaceae	T	F
296	*Dichrostachys cinerea* (L.) Wight & Arn.	Mimosaceae	S	
297	*Gisekia pharnaceoides* L.	Molluginaceae	H	E
298	*Glinus lotoides* L.	Molluginaceae	H	
299	*Glinus oppositifolius* (L.) A. DC.	Molluginaceae	H	
300	*Mollugo nudicaulis* Lam.	Molluginaceae	H	

301	*Mollugo pentaphylla* L.	Molluginaceae	H	
302	*Ficus benghalensis* L.	Moraceae	T	M
303	*Ficus mollis* Vahl	Moraceae	T	M
304	*Ficus rumphii* Blume	Moraceae	T	M
305	*Eucalyptus globulus* Labill.	Myrtaceae	T	M
306	*Syzygium cumini* (L.) Skeels	Myrtaceae	T	E
307	*Boerhavia diffusa* L.	Nyctaginaceae	H	M, E
308	*Boerhavia erecta* L.	Nyctaginaceae	H	M, E
309	*Ximenia americana* L.	Olacaceae	T	M
310	*Jasminum auriculatum* Vahl	Oleaceae	C	O
311	*Jasminum arborescens* Roxb.	Oleaceae	C	O
312	*Nyctanthes arbor-tristis* L.	Oleaceae	T	M, O
313	*Ludwigia perennis* L.	Onagraceae	H	
314	*Oxalis corniculata* L.	Oxalidaceae	H	M, E
315	*Passiflora foetida* L.	Passifloraceae	C	E
316	*Martynia annua* L.	Pedaliaceae	H	
317	*Pedalium murex* L.	Pedaliaceae	H	M
318	*Sesamum radiatum* Schumach. & Thonn.	Pedaliaceae	H	WR
319	*Plumbago zeylanica* L.	Plumbaginaceae	H	M, O
320	*Alloteropsis cimicina* (L.) Stapf	Poaceae	H	F
321	*Andropogon pumilus* Roxb.	Poaceae	H	F
322	*Apluda mutica* L.	Poaceae	H	F
323	*Aristida adscensionis* L.	Poaceae	H	
324	*Aristida funiculata* Trin. & Rupr.	Poaceae	H	F
325	*Aristida hystrix* L.f.	Poaceae	H	F
326	*Aristida redacta* Stapf	Poaceae	H	
327	*Aristida setacea* Retz.	Poaceae	H	MISC.
328	*Arthraxon lanceolatus* (Roxb.) Hochst. var. *echinatus* (Nees) Hackel	Poaceae	H	F
329	*Arundinella nervosa* (Roxb.) Nees ex Hook. et Arn.	Poaceae	H	F
330	*Brachiaria distachya* (L.) Stapf	Poaceae	H	F
331	*Brachiaria ramosa* (L.) Stapf	Poaceae	H	F
332	*Brachiaria remota* (Retz.) Haines	Poaceae	H	F
333	*Brachiaria reptans* (L.) C. Gardner & C.E. Hubb.	Poaceae	H	F
334	*Chloris barbata* Sw.	Poaceae	H	F
335	*Chloris quinquesetica* Bhide	Poaceae	H	F
336	*Chloris virgata* Sw.	Poaceae	H	F
337	*Chrysopogon fulvus* (Spr.) Chiov.	Poaceae	H	F
338	*Chrysopogon velutinus* (Hook.f.) Bor	Poaceae	H	F
339	*Coelachyrum lagopoides* (Burm.f.) Senaratna	Poaceae	H	F
340	*Cynodon dactylon* (L.) Pers.	Poaceae	H	M
341	*Dactyloctenium aegyptium* (L.) P. Beauv.	Poaceae	H	F
342	*Dactyloctenium aristatum* Link Hort.	Poaceae	H	F
343	*Dendrocalamus strictus* (Roxb.) Nees	Poaceae	H	MISC.

344	*Dichanthium annulatum* (Forssk.) Stapf	Poaceae	H	F
345	*Dichanthium foveolatum* (Del.) Roberty	Poaceae	H	F
346	*Digitaria abludens* (Roemer & Schult.) Veldkamp	Poaceae	H	F
347	*Digitaria bicornis* (Lam.) Roemer & Schult.	Poaceae	H	F
348	*Digitaria ciliaris* (Retz.) Koel.	Poaceae	H	F
349	*Digitaria longiflora* (Retz.) Pers.	Poaceae	H	F
350	*Digitaria tomentosa* (Willd.) Henr.	Poaceae	H	F
351	*Dimeria orissae* Bor	Poaceae	H	F
352	*Echinochloa colona* (L.) Link	Poaceae	H	F
353	*Eragrostiella bifaria* (Vahl) Bor	Poaceae	H	F
354	*Eragrostiella walkeri* (Stapf) Bor	Poaceae	H	F
355	*Eragrostis ciliaris* (L.) R.Br.	Poaceae	H	F
356	*Eragrostis pilosa* (L.) Beauv.	Poaceae	H	F
357	*Eragrostis riparia* (Willd.) Nees	Poaceae	H	F
358	*Eragrostis tenella* (L.) P. Beauv. ex Roemer & Schult.	Poaceae	H	F
359	*Eragrostis tremula* Hochst.ex Steudel	Poaceae	H	F
360	*Eragrostis unioloides* (Retz.) Nees ex Steudel	Poaceae	H	F
361	*Eragrostis viscosa* (Retz.) Trin.	Poaceae	H	F
362	*Eriochloa procera* (Retz.) C.E. Hubb.	Poaceae	H	F
363	*Hackelochloa granularis* (L.) Kuntze	Poaceae	H	F
364	*Heteropogon contortus* (L.) Beauv. ex Roemer & Schultes	Poaceae	H	MISC.
365	*Heteropogon fischerianus* Bor	Poaceae	H	MISC.
366	*Ischaemum rugosum* Salisb.	Poaceae	H	F
367	*Iseilema anthephoroides* Hackel	Poaceae	H	F
368	*Iseilema laxum* Hackel	Poaceae	H	F
369	*Iseilema prostratum* (L.) Nees	Poaceae	H	F
370	*Lophopogon tridentatus* (Roxb.) Hackel	Poaceae	H	F
371	*Melanocenchris jacquemontii* Jaub.& Spach	Poaceae	H	F
372	*Microchloa indica* (L.f.) Beauv.	Poaceae	H	
373	*Oropetium thomaeum* (L.f.) Trin.	Poaceae	H	
374	*Oryza rufipogon* Griff.	Poaceae	H	WR
375	*Oryza sativa* L.	Poaceae	H	Escape
376	*Panicum trypheron* Schultes	Poaceae	H	F
377	*Paspalidium flavidum* (Retz.) A. Camus	Poaceae	H	F
378	*Paspalidium geminatum* (Forssk.) Stapf	Poaceae	H	F
379	*Paspalum scrobiculatum* L.	Poaceae	H	E
380	*Paspalum vaginatum* Sw.	Poaceae	H	WR
381	*Pennisetum pedicellatum* Trin.	Poaceae	H	WR
382	*Perotis indica* (L.) Kuntze	Poaceae	H	F
383	*Rhynchelytrum repens* (Willd.) C.E.Hubb.	Poaceae	H	F,O
384	*Sacciolepis indica* (L.) Chase	Poaceae	H	F
385	*Schizachyrium exile* (Hochst.) Pilg.	Poaceae	H	F

386	*Sehima nervosum* (Rottler) Stapf	Poaceae	H	F
387	*Setaria intermedia* Roemer & Schult.	Poaceae	H	WR
388	*Setaria pumila* (Poir.) Roemer & Schult.	Poaceae	H	WR
389	*Setaria verticillata* (L.) P. Beauv.	Poaceae	H	WR
390	*Sorobolus coromandelianus* (Retz.) Kunth	Poaceae	H	F
391	*Sporobolus indicus* (L.) R.Br. var. *diander* (Retz.) Jovet & Guedes	Poaceae	H	F
392	*Sporobolus indicus* (L.) R.Br. var. *fertilis* (Steud.) Jovet & Guedes	Poaceae	H	F
393	*Tragus roxburghii* Panigr.	Poaceae	H	F
394	*Tripogon bromoides* Roemer & Schultes	Poaceae	H	F
395	*Tripogon purpurescens* Duthie	Poaceae	H	F
396	*Urochloa panicoides* P. Beauv.	Poaceae	H	F
397	*Polygala chinensis* L.	Polygalaceae	H	
398	*Polygala elongata* Klein ex Willd.	Polygalaceae	H	
399	*Polygala erioptera* DC.	Polygalaceae	H	
400	*Polygala javana* DC.	Polygalaceae	H	
401	*Polygonum plebeium* R.Br.	Polygonaceae	H	
402	*Portulaca pilosa* L.	Portulacaceae	H	E
403	*Ventilago denticulata* Willd.	Rhamnaceae	C	M
404	*Ziziphus mauritiana* Lam. var. *fruticosa* (Haines) Sebastine & Balakr.	Rhamnaceae	S	E
405	*Ziziphus oenoplia* (L.) Mill.	Rhamnaceae	C	M
406	*Ziziphus xylopyra* (Retz.) Willd.	Rhamnaceae	T	M
407	*Psydrax dicoccos* Gaertn.	Rubiaceae	T	M
408	*Canthium coromandelicum* (Burm.f.) Alston	Rubiaceae	S	M
409	*Catunaregum spinosa* (Thunb.) Tirveng.	Rubiaceae	S	M
410	*Deccania pubescens* (Roth) Tirveng.	Rubiaceae	T	
411	*Gardenia latifolia* Aiton	Rubiaceae	T	E
412	*Haldinia cordifolia* (Roxb.) Ridsd.	Rubiaceae	T	M
413	*Hedyotis affinis* Roemer & Schultes	Rubiaceae	H	
414	*Hedyotis aspera* Heyne ex Roth	Rubiaceae	H	
415	*Hedyotis corymbosa* (L.) Lam.	Rubiaceae	H	
416	*Hedyotis herbacea* L.	Rubiaceae	H	
417	*Hedyotis puberula* (G.Don) Arn. & Pugill.	Rubiaceae	H	
418	*Ixora pavetta* Andrews.	Rubiaceae	T	M
419	*Morinda angustifolia* Roxb.	Rubiaceae	T	
420	*Morinda pubescens* J.E. Smith	Rubiaceae	T	M
421	*Pavetta indica* L. var. tomentosa (Roxb. ex Sm.) Hook.f.	Rubiaceae	T	M
422	*Spermacoce articularis* L.f.	Rubiaceae	H	
423	*Spermacoce hispida* L.	Rubiaceae	H	
424	*Spermacoce latifolia* Aubl.	Rubiaceae	H	
425	*Spermacoce pusilla* Wall.	Rubiaceae	H	
426	*Cardiospermum canescens* Wall.	Sapindaceae	C	M

427	*Cardiospermum halicacabum* L.	Sapindaceae	C	M
428	*Dodonaea angustifolia* L.f.	Sapindaceae	S	M
429	*Sapindus emarginatus* Vahl	Sapindaceae	T	M
430	*Bacopa monnieri* Wettst.	Scrophulariaceae	H	E, M
431	*Limnophila indica* (L.) Druce	Scrophulariaceae	H	
432	*Lindernia ciliata* (Colsm.) Pennell	Scrophulariaceae	H	
433	*Sopubia delphinifolia* (L.) G. Don	Scrophulariaceae	H	
434	*Striga asiatica* (L.) Kuntze	Scrophulariaceae	H	
435	*Selaginella bryopteris* (L.) Bak.	Selaginellaceae	H	M
436	*Ailanthus excelsa* Roxb.	Simaroubaceae	T	M
437	*Cheilanthus mysorensis* Wall. ex Beddome	Sinopteridaceae	H	
438	*Solanum melongena* L. *var. insanum* (L.) Prain	Solanaceae	S	WR
439	*Helicteres isora* L.	Sterculiaceae	S	M
440	*Melochia corchorifolia* L.	Sterculiaceae	H	
441	*Firmiana simplex* (L.) W. Wight	Sterculiaceae	T	Gum
442	*Waltheria indica* L.	Sterculiaceae	H	M
443	*Melhania incana* Heyne ex Wight & Arn.	Tiliaceae	H	
444	*Corchorus aestuans* L.	Tiliaceae	H	MISC.
445	*Corchorus olitorius* L.	Tiliaceae	H	MISC.
446	*Corchorus trilocularis* L.	Tiliaceae	H	MISC.
447	*Grewia damine* Gaertn.	Tiliaceae	T	E
448	*Grewia flavescens* Juss.	Tiliaceae	T	E
449	*Grewia hirsuta* Vahl	Tiliaceae	S	M
450	*Grewia rhamnifolia* Heyne ex Roth	Tiliaceae	C	M
451	*Grewia tenax* (Forssk.) Fiori	Tiliaceae	S	E
452	*Grewia villosa* Willd.	Tiliaceae	S	E
453	*Triumfetta pilosa* Roth	Tiliaceae	H	
454	*Triumfetta rhomboidea* Jacq.	Tiliaceae	S	
455	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	T	M
456	*Pouzolzia auriculata* Wight	Urticaceae	H	
457	*Lantana camara* L.var. *aculeata* (L.) Mold.	Verbenaceae	S	O, E
458	*Phyla nodiflora* (L.) Greene	Verbenaceae	H	
459	*Premna mollissima* Roth	Verbenaceae	T	
460	*Priva cordifolia* (L.f.) Druce	Verbenaceae	H	
461	*Hybanthus enneaspermus* (L.) F.V. Muell.	Violaceae	H	M
462	*Hybanthus stellerioides* (Domin) P. I. Forst	Violaceae	H	M
463	*Cissus arnottiana* Shetty & P. Singh	Vitaceae	S	M
464	*Cissus quadrangularis* L.	Vitaceae	C	M
465	*Cissus repanda* Vahl	Vitaceae	C	M
466	*Cissus vitiginea* L.	Vitaceae	S	M
467	*Tribulus terrestris* L.	Zygophyllaceae	H	M

Habit: H- Herb; S- Shrub; C- Climber; T- Tree
Use: E- Edible; F- Fodder; M- Medicinal; O- Ornamental; WR- Wild Relative; Misc.- Miscillaneous

Seven herbaceous families are represented with more than 10 genera. Poaceae is the largest family with 42 genera followed by Asteraceae (23), Fabaceae (19), Cyperaceae (14), Acanthaceae (11), Asclepiadaceae (11) and Rubiaceae (10). The top 10dominant families are presented in Fig. 1.

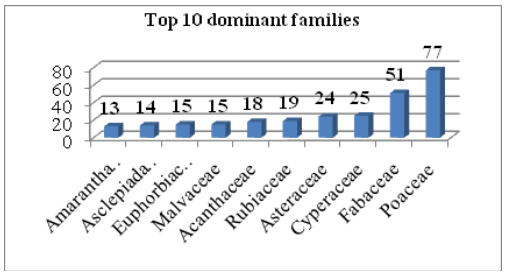


Fig. 1. Top 10 dominant families

5.3. Endemic taxa

A total of 34 endemic taxa at different levels (up to the level of Peninsular India) are recorded from study area. Endemic taxa up to Peninsular India level are presented in a tabular form, along with their earlier distribution (Table-3). Of the 34 taxa, *Alysicarpus mahabubnagarensis* is endemic to Mahabubnagar district of Telangana, *Chryopogon velutinus* is endemic to Kadapa district of Andhra Pradesh, Rathnagiri hills of Maharashtra and Wanaparthy district of Telangana; *Euphorbia senguptea* and *Rostellularia vahlii* var. *rupicola* is endemic to Eastern Ghats.

5.4. New distributional records

The inventory has resulted in a total of 16 taxa are identified and found as addition to the flora of Telangana state after a perusal of literature. The details are provided in Table-4 along with their earlier distribution in India. *Stylosanthes scabra* is reported as new distributional record for Eastern Ghats Eco region. The study has registered *Tripogon purpurascens* as second reports for the state of Telangana after Sadasivaiah (12).

Table 3. List of Endemics recorded in the study area

S. No.	Name of the Taxon	Family	Endemism
1	*Indoneesiella longipedunculata* (Sreem.) Sreem.	Acanthaceae	Peninsular India
2	*Rostellularia crinita* (Nees) Nees	Acanthaceae	Peninsular India
3	*Justicia vahlii* Roth var. *rupicola* Ellis	Acanthaceae	Eastern Ghats
4	*Theriophonum infaustum* N.E. Br.	Araceae	Peninsular India
5	*Caralluma adscendens* (Roxb.) R.Br. var. *attenuata* (Wight) Grav. & Mayur.	Asclepiadaceae	Peninsular India
6	*Caralluma stalagmifera* Fischer	Asclepiadaceae	Peninsular India
7	*Ceropegia spiralis* Wight.	Asclepiadaceae	Peninsular India
8	*Vernonia albicans* DC.	Asteraceae	Peninsular India
9	*Hardwickia binata* Roxb.	Caesalpiniaceae	Peninsular India
10	*Mariscus clarkei* T. Koyama	Cyperaceae	Peninsular India
11	*Euphorbia senguptae* N.P.Balakr. & Subr.	Euphorbiaceae	Eastern Ghats
12	*Phyllanthus kozhikodianus* Sivar. & Manilal	Euphorbiaceae	Peninsular India
13	*Alysicarpus mahabubnagarensis* Raghava Rao et al.	Fabaceae	Eastern Ghats
14	*Alysicarpus pubescens* Law. ex Wight	Fabaceae	Peninsular India
15	*Alysicarpus roxburghianus* Thoth. & A. Bramanik	Fabaceae	Peninsular India
16	*Crotalaria hirsuta* Willd.	Fabaceae	Peninsular India
17	*Crotalaria willdinowiana* DC.	Fabaceae	Peninsular India
18	*Indigofera barberi* Gamble	Fabaceae	Peninsular India
19	*Tephrosia strigosa* (Dalz.) Sant. & Mahesh.	Fabaceae	Peninsular India
20	*Acacia eburnea* (L.f.) Willd.	Mimosaceae	Peninsular India
21	*Andropogon pumilus* Roxb.	Poaceae	Peninsular India
22	*Aristida redacta* Stapf	Poaceae	Peninsular India
23	*Arthraxon lanceolatus* (Roxb.) Hochst. var. *echinatus* (Nees) Hackel	Poaceae	Peninsular India

24	*Arundinella nervosa* (Roxb.) Nees ex Hook. et Arn.	Poaceae	Peninsular India
25	*Chloris quinquesetica* Bhide	Poaceae	Peninsular India
26	*Chrysopogon velutinus* (Hook.f.) Bor	Poaceae	Peninsular India
27	*Digitaria tomentosa* (Willd.) Henr.	Poaceae	Peninsular India
28	*Dimeria orissae* Bor	Poaceae	Peninsular India
29	*Eragrostis riparia* (Willd.) Nees	Poaceae	Peninsular India
30	*Heteropogon fischerianus* Bor	Poaceae	Peninsular India
31	*Iseilema anthephoroides* Hackel	Poaceae	Peninsular India
32	*Lophopogon tridentatus* (Roxb.) Hackel	Poaceae	Peninsular India
33	*Tragus roxburghii* Panigr.	Poaceae	Peninsular India
34	*Tripogon bromoides* Roemer & Schultes	Poaceae	Peninsular India

Table 4. New distributional records

S. No.	Name of the Taxon	Family	Habit	New to
1	*Justicia vahlii* Roth var. *rupicola* Ellis	Acanthaceae	H	Telangana
2	*Caralluma stalagmifera* Fischer	Asclepiadaceae	H	Telangana
3	*Commelina maculata* Edgew.	Commelinaceae	H	Telangana
4	*Rivea ornata* Choisy	Convolvulaceae	C	Telangana
5	*Cyperus pulchellus* R.Br.	Cyperaceae	H	Telangana
6	*Phyllanthus kozhikodianus* Sivar. & Manilal	Euphorbiaceae	H	Telangana
7	*Alysicarpus pubescens* Law. ex Wight	Fabaceae	H	Telangana
8	*Stylosanthes scabra* Vog.	Fabaceae	S	Eastern Ghats
9	*Teramnus mollis* Benth.	Fabaceae	C	Telangana
10	*Arundinella nervosa* (Roxb.) Nees ex Hook. et Arn.	Poaceae	H	Telangana
11	*Chloris quinquesetica* Bhide	Poaceae	H	Telangana
12	*Chrysopogon velutinus* (Hook.f.) Bor	Poaceae	H	Telangana
13	*Heteropogon fischerianus* Bor	Poaceae	H	Telangana
14	*Paspalum vaginatum* Sw.	Poaceae	H	Telangana
15	*Polygala javana* DC.	Polygalaceae	H	Telangana
16	*Morinda angustifolia* Roxb.	Rubiaceae	T	Telangana

Records of significant herbaceous taxa

5.5. Ceropegia spiralis

This species is reported endemic plant of Peninsular India (Ahembedullah & Nayar, 1987), distributed in Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. In Andhra Pradesh, the species is restricted to Kadapa hills. The present study revealed that it is found in Tirumalaiah Gutta sacred grove. This collection forms the second report of the taxon from different locality after Beddome's collection and extended its distribution from Kadapa to Wanaparthy.

5.6. Caralluma stalagmifera

Caralluma stalagmifera was first described by Fischer from Madras. The distribution of *Caralluma stalagmifera* is Eastern Peninsular India, from Visakhapatnam (Andhra Pradesh) to Ramanthapuram (Tamil Nadu). In the present investigation it is also recorded from the study area. Hence this forms new distributional record for Telangana State.

5.7. Grasses

Tripogon purpurascens was reported from Anantapur and Viziayanagaram districts of Andhra Pradesh, as new distributional record for Peninsular India (13). The present study resulted in its extended distribution from Northern Eastern Ghats to study area. Hence it can be considered as second report for the Peninsular India.

A total of 10 speccies of *Chrysopogon* is recorded from Telangana State (11), six of them are rare in distribution and collection is very poor including *Chrysopogon velutinus*. According to type specimens housed at Herbarium Royal Botanic gardens, Kew, it was collected by Robert Wight in early 19th century around 1819-1826 from Appayapalle in Kadapa district, which was in Mysore state (Presently in Andhra Pradesh) and by Meebold in September 1910 from Badami of Belgam district, which was in Bombay Presidency (Presently in

Karnataka state). Recently 18th November 2010 it was recollected from Badami plateau (14) but there is no subsequent collection of this from Andhra Pradesh, even though many workers sieved the area in their floristic works.

Recently, our team collected this from the study area. The present collection is the subsequent collection after Wight in Andhra Pradesh with gap of 150 years and far away from earlier locality.

5.8. Insectivorous Plants

A total of 9 insectivorous plants recorded from entire Telangna state by Pullaiah (11) of them *Drosera burmannii, D. indica*, *Utricularia aurea, U. caerulea, U. scandens* are reporting from the study area. The richness of insectivorous plants indicated that the study area is with less environmental pollution.

5.9. Resource potenitial taxa

A total of 382 taxa can be considered as economically important. They form 81% of the total recorded plants in the study. Of them, 189 (49.5%) are medicinal plants, 28 are edible plants (7.3%), 113 are under fodder value (29.5%), 9 genetic resource plants for crop plants (2.3%), 31 plants with ornamental properties (8%), 7 species are with timber value (1.8%) and 12 are with miscellaneous (3.1%) uses are utilized by the local people and also recognized based on secondary literature. All the details are tabulated in Table 2. Graphical representation for these taxa presented in Fig. 2.

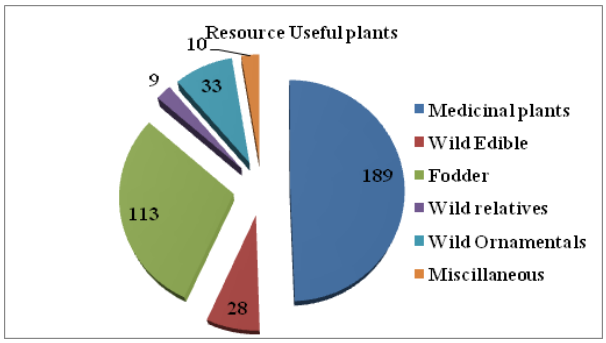


Fig. 2. Resource useful taxa from Tirumalaiah Gutta

5.10. Use Value

Of the recorded 382 economically important species, 365 are recorded with use value one. They included 21 edible plants, 110 fodder value species, 09 wild relatives of crop plants, 175 medicinal plants, 7 timber yielding plants, 20 plants with miscellaneous uses and 23 wild ornamentals. A total of 17 taxa are recorded with use value two.

5.11. Medicinal plants

A total of 189 taxa are having rich medicinal value, they belonging to 54 families. They are including, *Achyranthus apera, Acalypha indica, Aloe vera, Andrographis paniculata, Bacopa monnieri, Cyperus rotundus, Cynodon dactylon, Desmodium triflorum, Eclipta prostrata, Euphorbia hirta, Evolvulus alsinoides, Hybanthus ennaespermus, Hygrophyla auriculata, Leucas aspera, Ocimum tenuiflorum, Plectranthus barbatus, Pedalium murex, Phyllanthus amarus, Plumbago zeylanica, Selaginella bryopteris, Tylophora fasciculata, Vernonia cineria.* The tubers of *Ceropegia spiralis* are edible and used in local medicine for indigestion.

Euphorbiaceae and Asclepiadaceae are the top dominant families with 15 and 14 taxa respectively to medicinal plants, followed by Fabaceae, Acanthaceae, Malvaceae, Asteraceae with 12 species in each. *Adiantum incisum* and *Selaginella bryopteris* are the medicinal Pteridophytes recorded in the study area.

5.12. Wild Edible Plants

Of the 28 edible plant taxa, the species of *Allamania* and *Alternanthera sessilis, Amaranthus viridis, Boerhavia diffusa, Celosia argentea, Hygrophila auriculata,* tender leaves of *Tribulus terrestris* and *Zaleya decandra* are commonly used as leafy vegetables by local and people. The stems of *Caralluma adscendens* and *C. stalagmifera* are eaten as raw food and some time chutney prepared by local people. *Ceropegia spiralis* tubers are edible locally. The ripened fruits of *Opuntia stricta, Grewia flavescens, G. hirsuta, Canthium parviflorum* are edible. *Echinochloa colona, Oryza sativa* and *Paspalum scrobiculatum* grains are used as food grains. All these edible plants belonging to 18 families, of which Amaranthaceae is the dominant family comprising 6 taxa and Tiliaceae with 4 species. Khadar Basha *et al.* (13) reported 47 wild species that yield edible fruits from Southern Eastern Ghats, which are vital for livelihood of local communities.

5.13. Fodder

A good number of fodder species, 113 are recorded from the study. The majority of the fodder species are belonging to Poaceae (60), Cyperaceae (25) and Fabaceae (22). Some of the Fabaceae species like *Rhynchosia capitata, R. minima, R. suaveolens, Stylosanthes fruticosa, S. scabra, Vigna aconotifolia* and *V. trilobata* are the good fodder species. The important fodder grasses are, *Brachiaria ramosa*, *Chrysopogon fulvus, Cynodon dactylon, Dactyloctenium aegyptium, Dichanthium annulatum, Echinochloa colona, Hackelochloa*

granularis, Heteropogon contortus, Panicum trypheron, Pennisetum pedicillatum, Setaria intermedia and *Urochloa panicoides*. Grasses and their importance in NTFP are observed in Western Himalayan forests (15), they reported more than 16 species under fodder value, and some of them are recorded in the present investigation.

5.14. Wild Relatives of Crop plants

A total of nine Wild relatives to crop plants are reported from the study area. *Oryza rufipogon* is the very close relative to cultivated *Oryza sativa* and belongs to primary gene pool (16). *Pennisetum pedicillatum* is relative of Pearl millet distributed in Tirumalaiah Gutta sacred grove. *Panicum repens, P. trypheron* are the wild relative species for proso millet, *Panicum sumatrense.* Out of five wild relatives for Italian millet reported from Telangana, Three of them *Setaria intermedia, S. pumila* and *S. verticillata* are recorded from the present study. *Paspalum vaginatum* is the one wild relative of Kodo millet. The kodo millet, *Paspalum scrobilatum* is commonly found near marshy areas of the study area.

Vigna aconitifolia and *V. trilobata* are the genetic resource species for *Dolichos*. *Sesamum radiatum* is the important genetic resource species for *Sesamum orientale*. *Memordica dioica* is the genetic resource potential species for bitter guard. *Solanum melongena* var. *insanum* is the wild relative of Brinjal and it is used as vegetable by tribal people resided in Nallamalais (12). *Cajanus scarabaeioides* is wild relative of *Cajanus cajan*.

5.15. Wild ornamentals

In the present study a total of 33 wild plants with ornamental value are recorded. Some of them are already domesticated for the purpose of gardens and domestic uses. *Aloe vera, Barleria cristata, Crinum asiaticum, C. defixum* are commonly cultivated in gardens and in houses. The remaining species are having good ornamental properties. Some of them are potted in our college botanical garden. The members of Acanthaceae, *Barleria cristata, B. prionitis* are shows good reproductive capacity through stem cuttings.

The species of *Pancratium longiflora, P. triflorum* and other *Pancratium* spp. are potential ornamental plants with underground bulbs. The flowers of these species are of showy and large. Very less amount of water is needed for the cultivation of these species. There is an urgent need to domesticate these species and can improve the economy of the local people. Reddy *et al.* (17) reported 356 plants with ornamental value from the forests of Kadapa.

5.16. Miscellaneous use

Out of 382 recorded economically important plants, some of them are treated under miscellaneous uses. Of them, *Aeschynomene indica* (Bio fertilizer), *Aristida setacea, Heteropogon contortus, H. fischerianus* (Brooms), *Corchorus aestuans, C. olitorius and C. trilocularis* (Fibre) and *Dendrocalamus strictus* is used for many things.

5.17. Conservation aspects

A total of 123 species of 455 individuals are growing in the Botanical Garden of Government Degree College (Men), Wanaparthy and some of them are distributed to the plant lovers in the special occasions like Environmental Day, Biodiversity Day etc.

As a part of our research work nearly 800 kg of plastic covers and plastic materials were collected from pilgrims and venders at the time of Sravanamasam in the year 2012. The amount of plastic covers and plastic materials are slowly decreasing following years. In 2016 a total of 123 kg of plastic materials were collected and deposited in the Municipality office at Wanaparthy. The above result indicates the impact of awareness programmes conducted by the research team.

5.18. Conservation strategies

The field observations have strengthened that the herbs are habitat specific especially in the case of Insectivorous plants, some medicinal plants and lithophytes. Forests that are relatively undisturbed seem to possess these varied habitat conditions more. Human disturbance is high in western parts of the sacred grove than eastern part.

Ex-situ maintenance is one of the strategies to conserving the plants. This is mainly in gardens, germ-plasm banks. In the present investigation a total of 94 wild plants are conserving in the Botanical garden of Government Degree College (Men), Wanaparthy. The following key strategies are proposed for effective conservation of plant resources in Tirumalaiah Gutta sacred grove based on the present work sampling inventory.

1. State Forest department and GCC should ensure sustainable harvesting of medicinal plants presenting in the study area. Towards this, intensive training programmes to be organized for tribal and other communities by governmental and non-governmental agencies for promoting awareness.
2. Focus immediate attention on the threatened herbs identified as vulnerable and other categories by the forestry sector.

3. *Ex situ* conservation of identified threatened species of Tirumalaiah Sacred Grove in Tirumalanatha Swamy Eco Park (have been developing adjacent to Tirumalaiah Gutta) and other botanical gardens of the state.
4. Regular monitoring of plant resources of the study area is needed especially in the month Sravanamasam (August-September), where the pilgrim pressure is high.
5. A highly coordinated action-oriented multi-disciplinary approach on plant resources conservation integrating the forest department, Non-Governmental Organizations, scientific bodies at universities, Colleges and research institutions with the co-operation of local communities should be implemented.
6. The area with insectivorous plants needs to be prioritized and conserved by the forest department.

The information accumulated in the present work will be disseminated to the state forest department for further action. The information on threatened plant taxa will be intimated to Botanical Survey of India and IUCN, Plant Specialist Group of Indian Sub-Continent.

6. CONCLUSION

The present study on plant resources of Tirumalaiah Gutta, one of the sacred groves in Telangana has yielded significant results. A total of 467 plant taxa were recorded belonging to 283 genera and 81 families. A total of 16 species are additions to the flora of Telangana state indicated that rich diversity is present in the study area. Of the 81 families recorded in the study area, 34 are monotypic. The dominant family is Poaceae with 77 taxa indicating that the available resources are utilizing by them. A good number of endemic taxa recorded from the study area represent that there is an urgent need to conserve.

Of the 467 plant taxa recorded from the study area, 382 taxa are having on or other use value. Of these, 175 taxa (46%) used as medicinal, 21 (6.8%) are edible, 110 (28.7%) with fodder value, 09 (2.3%) are genetic resource for crop plants, 23 (6%) with ornamental value, 07 (1.8%) with timber value and 20 taxa (5.2%) of miscellaneous uses. A total of 20 taxa are considered threatened in the present study based on the field observations.

We have to protect and conserve the medicinal plants like *Selaginella bryopteris* (Sanjeevani), *Ceropegia spiralis* (Nimmatayi), *Chlorophytum tuberosum* (Safed Musli), *Gymnema sylvestre* (Podapatri), *Asparagus racemosus* (Sathavari). Even though many species of Poaceae, Cyperaceae and Fabaceae are used as fodder among them *Alysicarpus hamosus, Chrysopogon velutinus* are the important and are palatable in all stages of its life. There is a need to develop hybrids from these and to overcome the scarcity of fodder. *Chrysopogon velutinus* is a very rare grass relocated after 150 years from Eastern Ghats and it need to be reintroduce in the similar habitats of the study area and also Eastern Ghats due to its low population.

Instead of using the exotic species of *Pancratium* and *Crinum* as ornamentals, better to use our own species like *Pancratium logiflora*, *P. triflorum, Crinum asiaticum, C. defixum* and other species of *Pancratium* and *Urginea*, which are suitable to our environmental conditions.

If we conserve and utilize these medicinal, fodder and ornamentals the economy of local people will be increased. This area is rich in medicinal plants hence it should be recognized as Medicinal Plant Conservation Area (MPCA) by the Forest Department. The presence of Insectivorous plants, wild edibles, ornamentals, wild relatives to the crop plants indicate that this is the better area for biological tours at school and college level. Action should be taken to protect the plant resources at the time of Sravanamasam due to the heavy pressure from the pilgrims.

A highly coordinated action-oriented multi-disciplinary approach on potential plant resources conservation integrating the forest department, Non-Governmental Organizations, scientific bodies with the co-operation of local communities should be launched at the earliest.

REFERENCES

1. Mrosovsky, N. (1997). IUCN's credibility critically endangered *Nature.* **389**: 436.
2. Lamoreux, J., H.R. Akcakaya, L. Bennum, N.J. Collar, L. Boitani, D. Brackett, A. Brautigam, T.M. Brooks, G.A.B. Fonseca, R. A. Mittermeier, A.B. Rylands, U. Gardenfors, C. Hilton-Taylor, G. Mace, B.A. Stein and S. Stuart, (2003). Value of the IUCN Red List. *Trends Ecol. Evol*. **18**(5): 215-215.
3. Possingham, P.H., S.J. Andelman, M.A. Burgman, R.A. Medellin, L.L. Master and D.A. Keith, (2002.) Limits to the use of threatened species lists. *Trends Eco. Evol*. **17**: 503-506.
4. Sunitha, S. and B.R.P. Rao, (1999). Sacred groves in Kurnool district, Andhra Pradesh. *Paper presented in National seminar on Biodiversity, Taxonomy and Conservation of Flowering Plants.* Calicut, Kerala. pp. 367- 373.

5. Gadgil, M. and V.D. Vartak, (2004). Groves dedicated to the gods. pp. 1-5. *In*: V. Ghate, H. Sane and S.S. Ranade (eds.) Focus on Sacred Groves and Ethnobotany. Prism Publication, Mumbai.
6. Gadgil, M. and V.D. Vartak, (1975). Sacred groves of India: a plea for continued conservation. *J. Bombay Nat. His. Soc.* **72**: 314-320.
7. Santapau, H. (1955). *Botanical collector's Manual.* Calcutta.
8. Jain, S.K. and R.R. Rao, (1977). *Hand Book of Field and Herbarium Methods*. Today & Tomorrow Printers and Publishers, New Delhi.
9. Forman, L. and D. Bridson, (Ed.) (1989). *The Herbarium Handbook*. Royal Botanic Garden, Kew.
10. Gamble, J.S. and C.E.C. Fischer, (1915-35). *Flora of the Presidency of Madras*. London rep. ed. 1957. Calcutta.
11. Pullaiah (2015). Flora of Telangana. The 29th state of India. Vol. 1-3. Regency Publications. New Delhi.
12. Sadasivaiah, B., K.V. Subbaiah and S. Sunitha (2009). *Two New Distributional Records of Poaceae for Peninsular India. J. Eco.Tax. Bot*. **33**(2): 411-413.
13. Khadar, B.S., B. Sadasivaiah and B.R.P. Rao (2009). Wild edible fruit resources in Southern Eastern Ghats of Andhra Pradesh. *Int. J. for. Usuf. Mngt.* **10**(2): 20-25.
14. Gosavi, K.V.C. and S.R. Yadav, (2011). *Poaceae*. In Karol Marhold and Ilse Breitwieser (Ed.). IAPT/IOPB Chromosome data 12. *Taxon.* **60**(6): 1-72.
15. Rawat, R.S. and V. Jishtu, (2006). Non- Timber Forest Produces from Western Himalayan Forests. *J. Non-Timb. For. Prod.* **13**(3): 161-165.
16. Pandravada, S.R., N. Sivaraj, V. Kamala, N. Sunil and K.S. Varaprasad, (2008). Genetic resources of wild relatives of crop plants in Andhra Pradesh-diversity, distribution and conservation. *Proc. A. P. Akademi of Sciences.* **12**(1&2): 101-119.
17. Reddy, S.R., A.M. Reddy and N. Yasodamma, (2012). Exploration of Wild ornamental flora of YSR District, Andhra Pradesh, India. *Indian J. Fundam. Appl. Life Sci.* 192-199.