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A preliminary floristic survey of Baisipalli wildlife sanctuary, Odisha, India

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ABSTRACT

Present study documented floristic diversity of Baisipalli wildlife sanctuary with a preliminary survey. Total of 202 indigenous Angiospermic species belonging to 163 genera under 68 families were recorded, out of which 170 (84%) were dicot plant species and 32 (16%) were monocot plant species. According the habit, 87 (43%) tree species, 68 (34%) herb species, 24 (12%) climber species and 23 (11%) shrub species were documented. Findings of the present study will be useful for further phytosociological and ethobotanical studies of the sanctuary.

Figures : 02 References : 21 Table : 01
KEY WORDS : Baisipalli wildlife sanctuary, Floristic survey, Species composition,

Introduction

There are 551 wildlife sanctuaries in India covering 3.64% of geographical area of the country and 19 of them are located in Odisha[11]. Wildlife sanctuaries are rich in floristic diversity and composed of many economically important species[10] and also have diversity in terms of utilitarian values like wild edibles, timber, tannin and gum yielding species *etc.*[20]. Sanctuary forests show good regeneration status compared to other forests, but frequent interference by local people cause reduction on its growth and thereby impact on both animal and plant diversity[6]. The activities like forest fire, grazing and overexploitation of plants for livelihood degrade the plant diversity in sanctuary areas and results in invasion of many non-native species, which inhibit regeneration of native tree species[19].

Wildlife sanctuaries are IUCN category IV protected areas, designated for protecting wildlife and its habitat. Baisipalli wildlife sanctuary is one among the 551 wildlife sanctuaries in India, located in Nayagarh district of Odisha state. It is a home for diverse fauna like leopard, gaur, nilgai, bear, porcupine, barking deer, giant squirrel, pangolin etc. The sanctuary provides livelihood for the local indigenous communities. Overexploitation of economically important plant species in wildlife sanctuaries are threat to habitat destruction and loss of associated biodiversity. Documentation of floristic diversity of wildlife sanctuary is need of the time for sustainable use of resources and development of management plans.

Wildlife sanctuaries of Odisha show rich floristic diversity and species composition[5]. Local communities basically depend upon sanctuary forests for food, health care and livelihood. This causes threat to plant community in general and medicinal plants in particular due to overexploitation[12]. Sanctuary flora is under threat due to anthropogenic activities for different purposes of maintaining livelihood[16]. Documentation of floristic information of wildlife sanctuaries in Odisha is an urgent need for sustainable use and conservation of biodiversity. Though some fragmentary reports on floristic diversity of Baisipalli sanctuary in Odisha is available[4], no systematic survey is done till date. Thus present study was conducted with the objective to survey and document floristic composition of “Baisipalli wildlife sanctuary” in terms of

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TABLE-1: List of Angiospermic species recorded in Baisipalli wildlife sanctuary, Odisha.

Scientific Name of species	Local Name	Family	Habit
Abutilon indicum	Pedi pedika	Malvaceae	Herb
Acacia catechu	Khaira	Mimosaceae	Tree
Achyranthes aspera	Apamaranga	Amaranthaceae	Herb
Aegle marmelos	Bela	Rutaceae	Tree
Ageratum conyzoides	Pokasungha	Asteraceae	Herb
Ailanthus excelsa	Mahalimba	Simaroubaceae	Tree
Alangium salvifolium	Ankula	Alangiaceae	Tree
Albizia lebbeck	Siriso	Mimosaceae	Tree
Alstonia scholaris	Chhatiana	Apocynaceae	Tree
Amaranthus spinosus	Kanta saga	Amaranthaceae	Herb
Amaranthus viridis	Khada saga	Amaranthaceae	Herb
Amorphophallus bulbifer	Bana olua	Araceae	Herb
Andrographis paniculata	Bhuin nimba	Acanthaceae	Herb
Annona reticulata	Ramphala	Annonaceae	Tree
Annona squamosa	Ata	Annonaceae	Shrub
Anogeissus acuminata	Phasi	Combretaceae	Tree
Anogeissus latifolia	Dhaura	Combretaceae	Tree
Anthocephalus chinensis	Kadamba	Rubiaceae	Tree
Antidesma acidum	Nunnunia	Euphorbiaceae	Tree
Argemone mexicana	Agara	Papaveraceae	Herb
Asparagus racemosus	Satamuli	Liliaceae	Climber
Atylosia scarabaeoides	Bana kulathi	Fabaceae	Climber
Azadirachta indica	Limba	Meliaceae	Tree
Bambusa arundinacea	Kanta baunsa	Poaceae	Tree
Barleria cristata	Daskarada	Acanthaceae	Herb

Barleria prionitis	Daskeranta	Acanthaceae	Herb
Barleria strigosa	Banamalli	Acanthaceae	Herb
Barringtonia acutangula	Hinjal	Barringtoniaceae	Tree
Bauhinia purpurea	Barada	Caesalpiniaceae	Tree
Bauhinia vahlii	Siali	Caesalpiniaceae	Climber
Boerhavia diffusa	Kharkharia	Nyctaginaceae	Herb
Bombax ceiba	Simili	Bombacaceae	Tree
Borassus flabellifer	Tala	Arecaceae	Tree
Boswellia serrata	Salai	Burseraceae	Tree
Bridelia retusa	Kashi	Euphorbiaceae	Tree
Buchanania lanzan	Chara	Anacardiaceae	Tree
Butea monosperma	Palasa	Fabaceae	Tree
Butea superba	Lata palasa	Fabaceae	Climber
Calotropis gigantea	Arakha	Asclepiadaceae	Shrub
Calotropis procera	Arakha	Asclepiadaceae	Shrub
Calycopteris floribunda	Kokundia	Combretaceae	Tree
Careya arborea	Kumbhi	Barringtoniaceae	Tree
Caryota urens	Salpa	Arecaceae	Tree
Casearia elliptica	Khakada	Flacourtiaceae	Tree
Cassia fistula	Sunari	Caesalpiniaceae	Tree
Cassia occidentalis	Kala chakunda	Caesalpiniaceae	Herb
Cassia tora	Dhala chakunda	Caesalpiniaceae	Herb
Catharanthus pusillus	-	Apocynaceae	Herb
Celosia argentia	Lobanga	Amaranthaceae	Herb
Centella asiatica	Thalkudi	Apiaceae	Herb
Chloris barbata	-	Poaceae	Herb
Chloroxylon swietiana	Bheru	Rutaceae	Tree

Chromolaena odorata	Pokasungha	Asteraceae	Shrub
Chrysopogon aciculatus	Guguchia	Poaceae	Herb
Cipadessa baccifera	Nahalmali	Meliaceae	Shrub
Cissampelos pareira	Okanabindu	Menispermaceae	Climber
Cleistanthus collinus	Karada	Euphorbiaceae	Tree
Cleome gynandra	Gandhali	Capparaceae	Herb
Cleome monophylla	Ranga sorisa	Capparaceae	Herb
Cleome rutidosperma	Bana sorisa	Capparaceae	Herb
Cleome viscosa	Banasorisha	Capparaceae	Herb
Clerodendrum viscosum	Madhvi	Verbenaceae	Shrub
Clitoria ternatea	Aparajita	Fabaceae	Climber
Coccinia grandis	Kunduri	Cucurbitaceae	Climber
Combretmum roxburghii	Atundi	Combretaceae	Climber
Commelina benghalensis	Kaniseera	Commelinaceae	Herb
Costus speciosus	Gaigendalia	Zingiberaceae	Herb
Crateva adansonii	Baruna	Capparidaceae	Tree
Cuscuta reflexa	Nirmuli	Cuscutaceae	Climber (Parasitic)
Cynodon dactylon	Duba	Poaceae	Herb
Cyperus corymbosus	Mutha	Cyperaceae	Herb
Cyperus rotundus	Mutha	Cyperaceae	Herb
Dalbergia paniculata	Barabakulia	Fabaceae	Tree
Dalbergia sissoo	Shishu	Fabaceae	Tree
Datura metel	Kaladudura	Solanaceae	Shrub
Datura stramonium	Dudura	Solanaceae	Shrub
Dendrocalamus strictus	Salia baunsa	Poaceae	Tree
Dendrophthoe falcata	Madang	Loranthaceae	Shrub (Parasitic)

Desmodium oojeinensis	Bandhana	Fabaceae	Tree
Desmodium triflorum	Kansinsa	Fabaceae	Herb
Dillenia aurea	Chhota rai	Dilleniaceae	Tree
Dillenia pentagyna	Bada rai	Dilleniaceae	Tree
Dioscorea alata	Khabma alu	Dioscoreaceae	Climber
Dioscorea oppositifolia	Pani alu	Dioscoreaceae	Climber
Dioscorea pentaphylla	Kadaba alu	Dioscoreaceae	Climber
Dioscorea puber	Kosa alu	Dioscoreaceae	Climber
Dioscorea wallichii	Tunga alu	Dioscoreaceae	Climber
Diospyros malabarica	Mankadakendu	Ebenaceae	Tree
Diospyros melanoxylon	Kendu	Ebenaceae	Tree
Eclipta prostrata	Bhrungaraj	Asteraceae	Herb
Elephantopus scaber	Mayurachulia	Asteraceae	Herb
Eleusine indica	Ana mandia	Poaceae	Herb
Eragrotis cilianensis	-	Poaceae	Herb
Erythrina variegata	Paladhua	Fabaceae	Tree
Eulaliopsis binata	Sabai	Poaceae	Herb
Euphorbia hirta	Chitakuti	Euphorbiaceae	Herb
Evolvulus alsinoides	Bichhamalia	Convolvulaceae	Herb
Ficus benghalensis	Bara	Moraceae	Tree
Ficus hispida	Tambala	Moraceae	Tree
Ficus racemosa	Dimiri	Moraceae	Tree
Ficus religiosa	Osta	Moraceae	Tree
Flemingia chapper	Rani dantakathi	Fabaceae	Shrub
Gardenia latifolia	Kataranga	Rubiaceae	Tree
Garuga pinnata	Pita moi	Burseraceae	Tree
Gloriosa superba	Agnisikha	Liliaceae	Climber

Gmelina arborea	Gambhari	Verbenaceae	Tree
Grewia tiliifolia	Dhamana	Tiliaceae	Tree
Haldina cordifolia	Kuruma	Rubiaceae	Tree
Helicteres isora	Modimodika	Sterculiaceae	Shrub
Heliotropium indicum	Hatisundha	Boraginaceae	Herb
Hemidesmus indicus	Anantmula	Periplocaceae	Climber
Heteropogon contortus	Sinkula	Poaceae	Herb
Holarrhena pubescens	Kurei	Apocynaceae	Shrub
Ipomoea obscura	-	Convolvulaceae	Climber
Ipomoea pes-tigridis	Billenandi	Convolvulaceae	Climber
Ischaemum rugosum	Tuli	Poaceae	Herb
Ixora pavetta	Telakuruma	Rubiaceae	Tree
Justicia adhatoda	Basanga	Acanthaceae	Shrub
Kalanchoe pinnata	Amarpoi	Crassulaceae	Shrub
Lagerstroemia reginae	Pani patuli	Lythraceae	Tree
Lagerstroemia parviflora	Sidha	Lythraceae	Tree
Lantana camara	Naguari	Verbenaceae	Shrub
Leucas aspera	Goyosa	Lamiaceae	Herb
Leucas cephalotes	Goyosa	Lamiaceae	Herb
Limonia acidissima	Kaitha	Rutaceae	Tree
Litsea glutinosa	Jayasandha	Lauraceae	Tree
Ludwigia hyssopifolia	Bana labanga	Onagraceae	Herb
Madhuca indica	Mahula	Sapotaceae	Tree
Mallotus philippensis	Kamalagundi	Euphorbiaceae	Tree
Mangifera indica	Amba	Anacardiaceae	Tree
Martynia annua	Baghanakhi	Martyniaceae	Herb
Millettia extensa	Arkawla	Fabaceae	Climber

Mimosa pudica	Lajakuli	Mimosaceae	Herb
Mimusops elengi	Baula	Sapotaceae	Tree
Mitragyna parvifolia (	Mitikinia	Rubiaceae	Tree
Momordica charantia	Kalara	Cucurbitaceae	Climber
Morinda pubescens	Aachhu	Rubiaceae	Tree
Mucuna pruriens	Baidonko	Fabaceae	Climber
Murraya paniculata	Kamini	Rutaceae	Shrub
Naringi crenulata	Benta	Rutaceae	Tree
Nyctanthes arbortristis	Gangashiuli	Oleaceae	Tree
Ocimum canum	Bana tulasi	Lamiaceae	Herb
Ocimum sanctum	Tulasi	Lamiaceae	Herb
Oxalis corniculata	Ambiliti	Oxalidaceae	Herb
Paederia foetida	Prasaruni	Rubiaceae	Climber
Pergularia daemia	Hunturi	Asclepiadaceae	Climber
Phoenix acaulis	Bana khajuri	Arecaceae	Shrub
Phoenix sylvestris	Khajuri	Arecaceae	Tree
Phyllanthus emblica	Anla	Euphorbiaceae	Tree
Phyllanthus fraternus	Bhuinanla	Euphorbiaceae	Herb
Plumbago zeylanica	Chita pari	Plumbaginaceae	Shrub
Pongamia pinnata	Karanja	Fabaceae	Tree
Portulaca oleraceae	Badabalbalua	Portulacaceae	Herb
Protium serratum	Nimburumoi	Burseraceae	Tree
Pterocarpus marsupium	Piashala	Fabaceae	Tree
Pterospermum xylocarpum	Giringa	Sterculiaceae	Tree
Rauvolfia serpentina	Patalagaruda	Apocynaceae	Herb
Rhynchostylis retusa	-	Orchidaceae	Herb (Epiphyte)

Ricinus communis	Jada	Euphorbiaceae	Shrub
Saccharum spontaneum	Kasatandi	Poaceae	Herb
Saraca asoca	Ashoka	Caesalpiniaceae	Tree
Schleichera oleosa	Kusuma	Sapindaceae	Tree
Semecarpus anacardium	Bhalia	Anacardiaceae	Tree
Shorea robusta	Shala	Dipterocarpaceae	Tree
Sida acuta	Bajramuli	Malvaceae	Herb
Sida cordata	Bajramuli	Malvaceae	Herb
Smilax zeylanica	Mutri	Smilacaceae	Climber
Solanum nigrum	Nunununia	Solanaceae	Herb
Solanum virginianum	Beji baigana	Solanaceae	Herb
Soymida febrifuga	Rohini/Suama	Meliaceae	Tree
Spermacoce articularis	Sana gharpodia	Rubiaceae	Herb
Sphaeranthus indicus	Gudur	Asteraceae	Herb
Spilanthes calva	Haladigundi	Asteraceae	Herb
Spondias pinnata	Ambada	Anacardiaceae	Tree
Stachytarpheta jamaicensis	Jalajali	Verbenaceae	Herb
Sterculia urens	Gendula	Sterculiaceae	Tree
Streblus asper	Sahada	Moraceae	Tree
Strychnos nux-vomica	Kochila	Strychnaceae	Tree
Symplocos racemosa	Lodha	Symplocaceae	Tree
Syzygium cumini	Jamu	Myrtaceae	Tree
Tamarindus indica	Tentuli	Caesalpiniaceae	Tree
Tectona grandis	Shaguan	Verbenaceae	Tree
Tephrosia purpurea	Kolathia	Fabaceae	Herb
Terminalia alata	Sahaja/Asana	Combretaceae	Tree
Terminalia arjuna	Arjuna	Combretaceae	Tree

Terminalia bellirica	Bahada	Combretaceae	Tree
Terminalia chebula	Harida	Combretaceae	Tree
Thespesia lampas	Banakapasia	Malvaceae	Shrub
Thysanolaena maxima	Phulajhadu	Poaceae	Shrub
Tragia involucrata	Bichhuati	Euphorbiaceae	Herb
Tridax procumbens	Bishalyakarani	Asteraceae	Herb
Triumfetta rhomboidea	Bananalita	Tiliaceae	Herb
Urena lobata L.subsp. s*inuata*	Bilakapasira	Malvaceae	Herb
Vanda tessellata	Malanga	Orchidaceae	Herb (Epiphyte)
Vernonia cinerea	Badi pokasunga	Asteraceae	Herb
Vitex leucoxylon	Chadheigudi	Verbenaceae	Tree
Vitex negundo	Begunia	Verbenaceae	Tree
Wendlandia heynei	Tilei	Rubiaceae	Tree
Woodfordia fruticosa	Dhatuki	Lythraceae	Shrub
Xanthium indicum	-	Asteraceae	Herb
Zizyphus mauritiana	Barakoli	Rhamnaceae	Tree
Zizyphus oenoplia	Kantei koli	Rhamnaceae	Shrub

its floristic diversity for future use.

Materials and Methods

Study site

Earlier 'Baisipalli Reserve Forest' which was declared as sanctuary for the purpose of protecting and propagating wildlife in 1981, spreads in an area of 168.35 km^2 within 20º 23.8Ê-20º 31.3Ê N latitude and 84º 35.4Ê-84º 48.5Ê E longitudes. The sanctuary is under Deccan peninsula bio-geographic zone, Eastern plateau province and Eastern ghat sub-division as per Rodger and Panwar's bio-geographic classification of India (1988). Baisipalli Wildlife Sanctuary (BWS) is under the administrative control of Divisional Forest Officer (DFO), Mahanadi wildlife division, Odisha. Entire area of BWS is included in 'Mahanadi Elephant Reserve', established in 2002 and "Satkosia tiger reserve", established in 2007, for conservation of Elephant and Royal Bengal Tigers respectively. BWS is located close to 'Satkosia gorge sanctuary' and acts as a home for diverse fauna like leopard, gaur, nilgai, bear, porcupine, barking deer, giant squirrel, pangolin etc.[21].

Topographically BWS is an undulated hilly mountain system with dense forest cover, few seasonal streams, valleys and some human habitations. Soil of BWS is mainly alluvium type and rocks found are Khondalite, Granulite and Acid Charnockite. Average annual rainfall ranges from 1000mm to 1750mm with 80 annual average rainy days. Temperature ranges in from 40º C to 45.5º C in summer and 10º C to 13º C in winter season. Total sanctuary area is considered as core area and 3 km peripheral area from its boundary is buffer area. There are 18 revenue villages located in core areas and 43 villages in buffer areas. Majority of human population

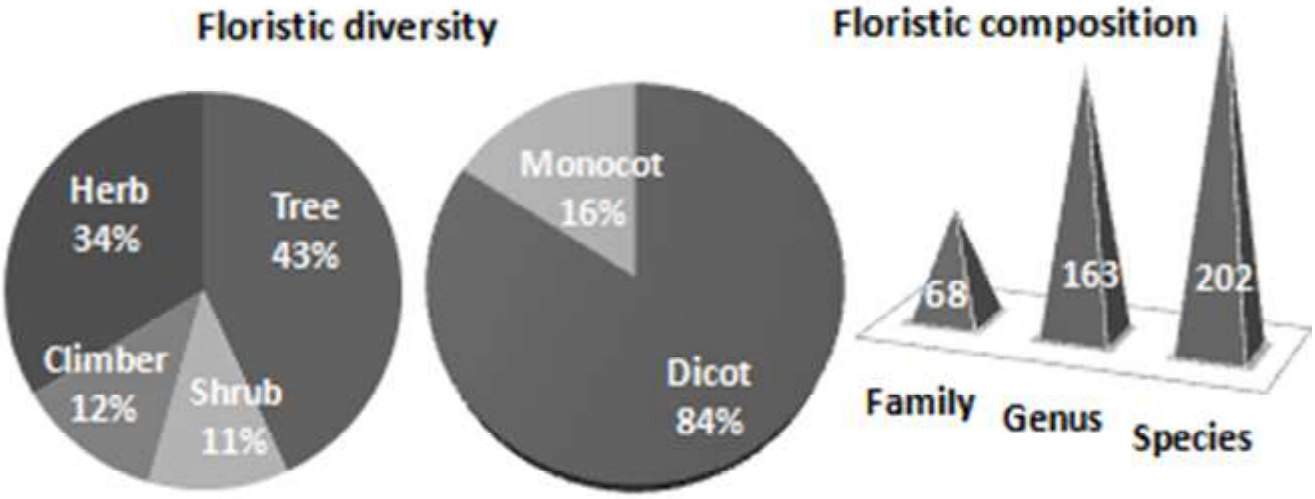

Fig. 1: Graphical representation of floristic diversity of Baisipalli wildlife sanctuary

inhabiting within are tribes. They generally depend upon forests for their livelihood. BWS is managed by two forest ranges, *i.e.* Banigochha East and Banigochha West. The sanctuary area is fully restricted for any kind of recreation activity, wildlife tourism or eco-tourism[4].

Present study was primarily based on field survey which had been carried out during November 2018 to December 2019. Field visits to study site were conducted in different seasons at regular intervals. Different locations of mountainous forests, foothill areas, village sides and croplands were visited during survey. Plant species at flowering stage were investigated, photographed and sample specimen at flowering and fruiting stage were collected for more analysis and documentation. Identification of plant species were done following local floras and modern flora[18, 9, 4, 13, 14].

Results

Preliminary survey on floristic diversity of Baisipalli wildlife sanctuary recorded 202 indigenous Angiospermic species belonging to 163 genera under 68 families. Analysis of species diversity based on plant habit showed 87 (43%) tree species, 68 (34%) herb species, 24 (12%) climber species and 23 (11%) shrub species (Fig. 1).

Present survey documented 170 (84%) dicot plant species and 32 (16%) monocot plant species. The families composed of at least 5 genus and 5 species in a particular family were considered as dominant family (Fig.1). Accordingly, Fabaceae (12), Poaceae (12), Asteraceae (9), Rubiaceae (9), Euphorbiaceae (8), Verbenaceae (6) and Rutaceae (5) were found as dominant families on the basis of genus composition, whereas Fabaceae (15), Poaceae (12), Asteraceae (9), Rubiaceae (9), Euphorbiaceae (9), Combretaceae (8), Caesalpiniaceae (7), Verbenaceae (6), Rutaceae (5), Malvaceae (5), Acanthaceae (5), Lamiaceae (5), Moraceae (5) and Dioscoreaceae (5) were found as dominant families based on species composition. Genus *Dioscorea* (5), *Ficus* (4), *Cleome* (4), *Terminalia* (4), *Cassia* (3) and *Barleria* (3) were dominant genus having at least 3 species, rest of the genus were having 1 or 2 species (Fig. 2).

Hilly mountainous forests of Baisipalli wildlife sanctuary are generally rocky, constituting more tree species and common species are *Shorea robusta, Buchanania lanzan, Cleistanthus collinus, Terminalia alata*, *Madhuca indica etc.* Shrub and climber species are sparsely distributed both in forest and village areas. The common climber species of forest flora recorded were *Asparagus racemosus, Smilax zeylanica, Butea superba, Bauhinia vahlii etc.* and common shrub species were *Flemingia chapper, Holarrhena pubescens, Woodfordia fruticosa etc.* Herbaceous flora was few in numbers on uphill sloppy forests, whereas observed in good diversity on foothills, plain areas near villages and croplands. *Andrographis paniculata, Barleria strigosa* and *Elephantopus scaber* were common herbs in forest flora, whereas *Cynodon dactylon, Desmodium triflorum, Ludwigia hyssopifolia, Cyperus corymbosus, Leucas aspera, Celosia argentea, Sphaeranthus indicus etc.* were very common in and around crop fields located near villages. Some undulated low height sloppy areas were dominated by useful grass species like *Eulaliopsis binata* and *Heteropogon contortus*.

Discussion

It is an important task to save and conserve plant wealth of India for welfare of humanity, which can be achieved by boosting taxonomic research and

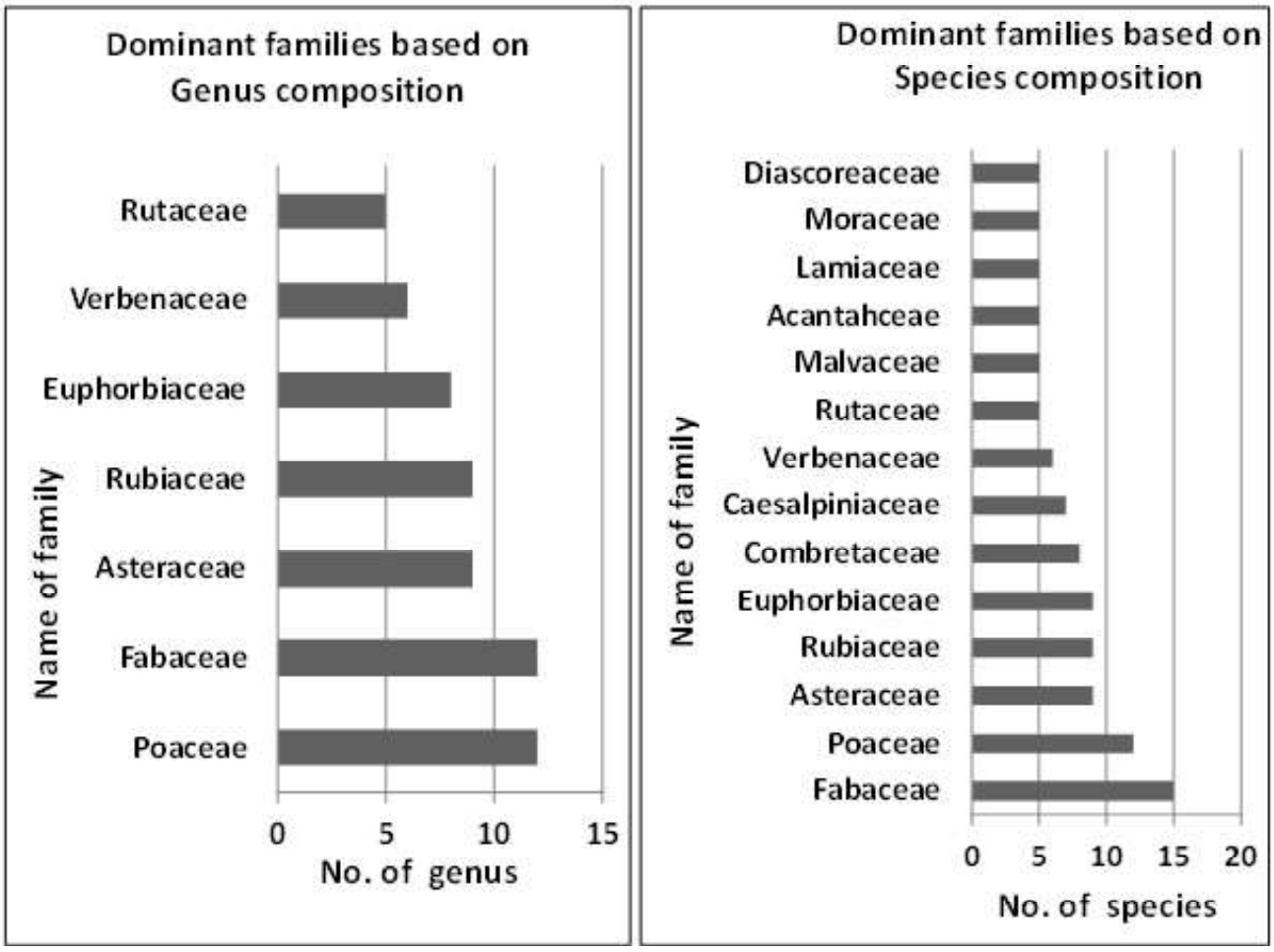

Fig. 2: Graphical representation of dominant families on flora of Baisipalli wildlife sanctuary

acknowledge dedicated taxonomists[15]. A properly designed, carefully monitored and efficiently managed protected area in combination with *ex-situ* conservation methods is necessary for 'zero extinction' of plant species, but lack of inventories within protected areas and ignorance of urgency are among few reasons, behind plant extinction[1]. Gradually growing invasive species within sanctuary area also harms indigenous flora, so departmental funding is required for assessment of vegetation and related studies[2].

Earlier, a study on avifauna diversity of Baisipalli wildlife sanctuary documented the presence of 157 bird species under 56 families, including many rare and migratory species[3]. Another study highlighted occurrence of some anthropogenic activities, for livelihood essentials of local people, inside Baisipalli sanctuary area causes threat to wildlife habitat[17].

Present floristic study is preliminary in BWS, which revealed the richness in species diversity of indigenous flora. Topography and climate of the area favour existence of high number of tree species in the study site. Many species found in the study area are useful on the basis of economic, medicinal and other NTFP (Non Timber Forest Products) values. Plants of sanctuary provide not only food and habitat for wildlife but also livelihood for indigenous people. Their enriched knowledge on ethnobotanical importance of plant species needs to be documented for benefit of humanity. Flora of the sanctuary plays very important role for survival of both fauna and human. However, presence of some invasive species like *Lantana camara, Chromolaena odorata etc.* indicate anthropogenic disturbances within the sanctuary, which needs to be monitored and controlled to conserve natural regeneration of native flora.

Conclusion

Baisipalli Wildlife Sanctuary is truly an asset in terms of floristic diversity. So authorities of sanctuary management need to focus on plant species and give equal importance on conservation of flora as well as fauna. Wildlife organisation also needs to take some actions like, documentation of sanctuary flora through coloured photographs of plant species, develop a herbarium museum and establish a medicinal/useful plants garden near sanctuary area, which could act as resources to

give better platform for students, researchers and field staff engaged in sanctuary protection, to enhance their knowledge on useful plants and easy identification. Subsequently proper identification and easy access of valuable plant species could be done, whenever required for further study. Floristic knowledge among sanctuary management staff and awareness among local people are essential for conservation of plant wealth of sanctuary in particular and wildlife habitat at large. Extensive and exclusive studies should be based on floristic behaviour, usefulness of plant species, ecology, regeneration *etc.* to explore more information, which will be beneficial for proper management, habitat restoration and developmental planning of a sanctuary.

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