

FLORISTIC ENUMERATION OF SRI VENKATESWARA ZOOLOGICAL PARK FOR THE FUTURE CONSERVATION OF BIODIVERSITY



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ABSTRACT:

Sri Venkateswara Zoological Park is a protected area of an ex-situ conservation for certain fauna and in-situ conservation of natural floral biodiversity comes under Sri Venkateswara Biosphere Reserve Forest situated in the Seshachalam Hill ranges of Southern Eastern Ghats of Peninsular India. Floristic studies of protected areas is very much essential to enumerate the plant species for future generations and to maintain Sustainable Biodiversity Conservation. The systematic floristic studies for three years resulted a total of 802 plant species include Bryophytes (2), Pteridophytes (13), Gymnosperms (5) along with major taxa of angiosperms (782) includes dicotyledons 639 and monocotyledons 143. Distribution of species to that of the other districts and regional floras showed a great diversity in the ratio of dicots to monocots equally to that of Kurnool and Chittoor Districts floras. Species diversity is closely related with Anantapur, Kurnool, Chittoor districts as the largest genera Euphorbia (15), Justicia (12) and Cyperus (10) and also with largest family Leguminosae (108) (Fabaceae). It also represents red listed species in natural conditions with Pterocarpus santalinus, Santalum album along with 11 other threatened category species in the zoo park. Hence, it is very essential to enumerate and enlist the flora of a protected area for the sustainable conservation for future generation.

KEY WORDS: protected area, sustainable, biodiversity, *Pterocarpus santalinus*, *Santalum album*, threatened.

INTRODUCTION:

Protected areas are the key tools for the conservation of Biological diversity as established in the Convention on Biological Diversity. IUCN defines “the protected area as a clearly defined geographical space, recognized, dedicated and managed through legal or other effective means to achieve the long term conservation of nature with associated ecosystem services and cultural values”. National parks are the protected areas come under

Category II of CBD. Zoological parks are established as the centers for conservation, training and education with the main purpose of protection, study and research on wild life and education on biodiversity. *Ex-situ* conservation of biological diversity outside the natural habitats includes plant and animal collections, botanical gardens, zoological parks, wild life research facilities and germ plasm collections of wild and domestic taxa. A zoological park is principally of an environmental in nature committed to high quality conservation will be authorized to continue their activities, to understand the value of biodiversity of wild flora and fauna, ecosystems and the interdependence of all living organisms on earth including human being. Man's survival is intimately related with availability of the plant wealth and also acquiring scientific knowledge about the flora and vegetation of a region is essential with emphasis on distribution and status of rare and endangered species for future generations.

All protected areas should aim to conserve the composition, structure, function and evolutionary potential of Biodiversity, contribute to regional conservation strategies as core reserves, buffer zones, corridors, stepping stones for majority of species, to maintain diversity of land scape or habitat, associated species and ecosystems; geomorphology and geology; provide regulatory ecosystem services, including buffering against the impacts of climate change; conserve natural and scenic areas of national and international significance for cultural, spiritual and scientific purposes; facilitate low impact scientific research activities and ecological monitoring related to consistent with the values of the protected area; and help to provide educational opportunities in the management approaches (CNPPA & IUCN., 1992; 1993; 1994).

ABOUT THE SELECTED STUDY AREA- S.V. ZOOLOGICAL PARK: (Fig 1-3)

The study area Sri Venkateswara Zoological Park is a protected area for *in-situ* conservation of natural flora and *ex-situ* conservation of certain fauna as a part of conservation of Biodiversity. Sri Venkateswara Zoological Park is situated between the latitudes of 13° 37' 59.52" to 13° 37' 33.6 " North and longitudes of 79° 21' 7.28" to 79° 21' 43.2" East with an average elevation of 749 feet MSL altitudinal range. S.V. Zoological park is surrounded by Tirupati towards North, Cherlopalli bypass road and Regional Science Centre towards East, Sreevari mettu on Western side and Tirumala, Kalyanidam, Cherlopalli and Pudipatla towards South as boundaries. Zoo park area generally comprises with daily temperatures ranging from 16° C – 45° C, and an average annual rainfall about 934 mm received mainly from North east monsoon. S.V Zoological Park is a part of S.V. Wild life sanctuary of S.V. National park in the Seshachalam Hill Ranges of Southern Eastern Ghats of Peninsular India with geographical area of 5532 acres (2212 Ha) (22 sq km). The Zoo Park has been established on the modern concepts of Zoo management of protected areas founded on 29.09.1989 and opened to the public on 30.04.1993 to facilitate captive breeding of the endangered and threatened animals and rehabilitate them with a special focus on endemic fauna and educate visitors about wildlife conservation through mythological theme nearer to the natural habitat. (http://forest.ap.nic.in /SVZP_Introduction.htm).

The Zoo Park is developed into enclosures, enclaves and Moats named Kishkindha vanam Angada Dweep-*Macaca speciosa* (Stumptailed macaque), Vali Dweep-*Macaca mulatta* (Rhesus macaque), Sugreeva Dweep-*Macaca radiata* (Bonnet macaque), Karthikeya vanam or Mayur Vanam-*Pavo cristatus* (Common Peafowl), *Anthropoides virgo* (Demoiselle Crane), Swanra Harini Vanam or Mareecha Vanam-*Axis axis* (Chital or Spotted deer), Chitra

Koota Vanam-*Perdicula asiatica* (Jungle bush quail), *Galloperdix lunulata* (Painted spur fowl), *Francolinus pondicerianus* (Grey Partridge), *Lophura nycthemera* (Silver pheasant), Suka Nivas or Vihanga Vanam or ChitraKoota Vanam-*Gallus soneratti* (Grey junglefowl), *Psittacula krameri* (Roseringed parakeet), *Psittacula cyanocephala* (Blossom Headed Parakeet), *Pistilacula himalayana* (Slaty Headed Parakeet), *Placeus phillippinus* (Indian Baya), Kanithi Vanam-*Cervus unicolor* (Sambar), Gokulam-*Boselaphus tragocamelus* (Nilgai or Blue bull), Krishna Mruga Vanam-*Antelope cervicapra* (The Blackbuck or The Indian antelope), Mruga Vanam-*Tetracerus quadricornis* (The Fourhorned Antelope), Grasa Mruga Vanam-*Gazella gazella* (Chinkara), Vruka Vanam-*Canis lupus linnaeus* (Wolf), Bhagela Vanam-*Panthera pardus* (Leopard), Shakti Vanam-*Panthera tigris* (Linnaeus) (The tiger), Bharat Vanam-*Panthera leo* (Linnaeus) (The Lion), Vyaghra Vanam-*Panthera tigris tigris* (White Tiger), Dandaka aranya-*Hyaena hyaena* (Striped Hyena), Damanaka Vanam-*Vulpes bengalensis* (Indian fox), Shunaka Vanam-*Cuon alpinus* (Dhole), Karataka Vanam-*Canis aureus linnaeus* (Jackal), *Hystrix indica* (The Indian Porcupine), Jambavantha Vanam-*Melursus ursinus* (Sloth Bear), Varaha Vanam-*Sus scrofa* (Wild Boar), Nala Neela Dweepam-*Theropithecus gelada* (Baboon), Airavatha Vanam-*Elephas maximus* (The Indian Elephant), Makara Nivas-*Crocodylus palustris* (Marsh crocodile), Emu-*Dromaius novaehollandiae* (Emu), Neela Vanam-*Common Langur*, Koorma Nivas-*Gochelone elegans* (Starred tortoise), *Melanochelys trijuga* (Indian pond terrapin), Manasa Sarovar-*Ardea purpurea* (Purple Heron), *Mycteria leucocephala* (Painted Stork), *Threskiornis aethiopica* (White Ibis), *Anser indicus* (Barheaded Goose), *Tadorna ferruginea* (Brahminy Duck), *Anas acuta* (Pintail), *Anas creca* (Common Teal), *Nettapus coromandeliannus* (Cotton Teal), *Dendrocygna javanica* (Lesser Whistling Teal), *Sarkidiornis melanotos* (Comb Duck), *Amaurornis phoenicurus* (White Breasted Water Hen), *Porphyrio porphyrio* (Purple Moorhen), *Anser owser* (Greytag Goose), *Anas querquedula* (Garganey), *Anasclypeata* (Shoveller), Kalindi Sarovar-*Pelecanus phileppensis* (roseus), (Spotted billed pelican or Grey pelican), Padma Kheli Sarovar-*Ciconia episcopus* (White-necked stork).

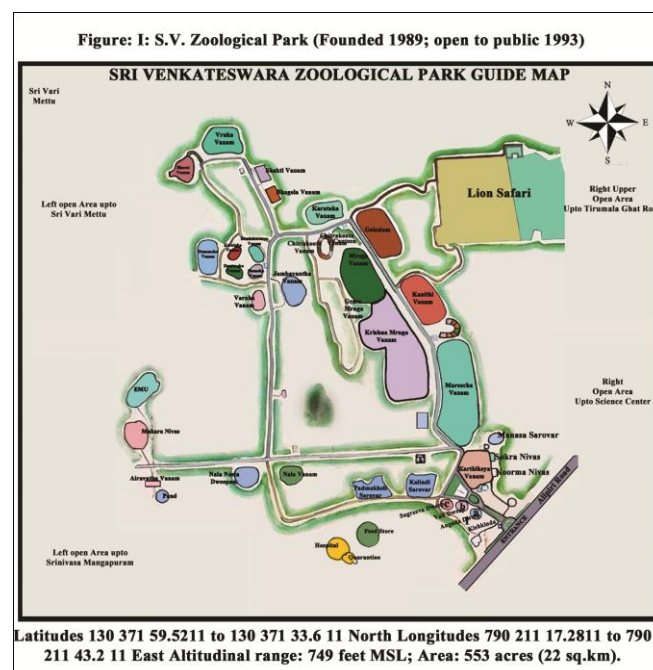


Fig-3: Boundaries of Sri Venkateswara Zoological Park

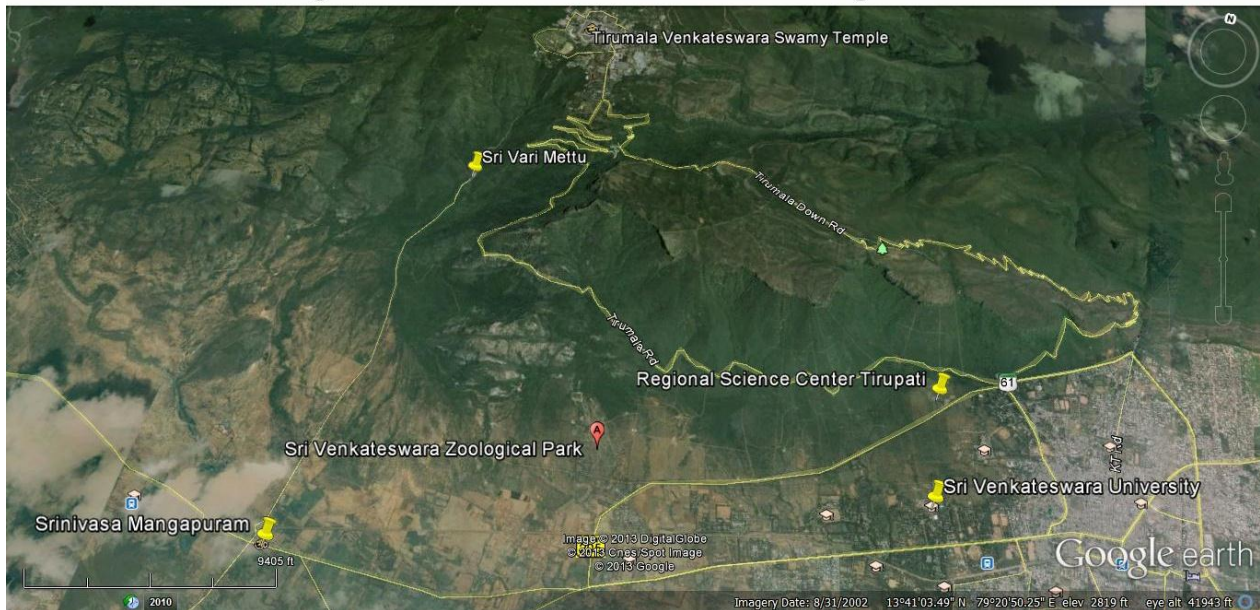


Fig-2: Zoological Park located in S.V.National Park of Southern Eastern Ghats



MATERIALS AND METHODS:

Field work, herbarium preparation and Identification of Taxa:

Intensive field studies were undertaken during different seasons of every year from 2010 to 2013 for a period of 3 years in the S.V. Zoological park, collected the specimens systematically and prepared the herbarium as per the standard method (Jain and Rao (1977) and identified the species following Bentham and Hooker System of Classification with the help of the Flora of presidency of Madras, Flora of Tamilnadu Carnatic, Flora of Nallamalai Hills, Flora of Andhra Pradesh, Flora of Eastern Ghats, Flora of Kurnool, Anantapur, Chittoor and Nellore Districts and also identifications were confirmed, after matching with authentic specimens of the Herbarium, Department of Botany (SVUTY), Sri Venkateswara University, Tirupati. (Gamble and Fisher 1915-1936; Matthew K.M, 1981-1988., Ellis 1966., Venkata Raju and Pullaiah 1995., Pullaiah and Yesoda 1989., Rangacharyulu 1991., Madhava Chetty *et al* 2008., Suryanarayana and Srinivasa Rao., 2002).

Nomenclature:

It was tallied with the latest accepted names, author citations important synonyms and families with "The Plant List Version1, 2010". The representative voucher specimens were numbered and deposited in the herbarium (SVUTY) Department of Botany S. V. University Tirupati.

Floristic Analysis:

A critical analysis has been made with the floristic studies reported from Seshachalam hill ranges. All the taxa were tabulated under four plant groups: Dicotyledons, Monocotyledons, Pteridophytes and Gymnosperms. Families with number of Genera and Species, the Dominant Families with Genera and Species were compared with other regional and district floras. Herbarium specimens 2615 voucher numbers were deposited in the Department of Botany, S. V. University, Tirupati.

RESULTS: (Table: 1-8) (Graphs: 1-3):

Floristic enumeration of the selected area resulted 802 species include Bryophytes (2), Pteridophytes (13), and Gymnosperms (5) along with the Angiosperms (782) with Dicotyledons (639) and Monocotyledons (143). Angiosperms species represented a total of 108 families; Monocots (20), Dicots (88) with monocotyledons to dicotyledon species ratio 1:4.47; genera ratio 1:4.66, family ratio 1:4.40 designated its uniformity in the diversity of monocotyledon species, genera and family. The vegetation type of Zoo denotes the dry deciduous spiny scrub forest dominates with grasses with spiny shrubs and tree species in its overall distribution, Major family represents Leguminosae (108 species Fabaceae) equally to that of the Madras Presidency and flora of Andhra Pradesh. Next largest family Poaceae 68 species is also closely related with the floras of Chittoor, Anantapur, Kurnool and Nellore districts. Top 10 genera more than 10 species; as the largest genus *Euphorbia* with 15 species flowed by *Justicia* 12, *Cyperus* 10 to that of Anantapur, chittoor and Kurnool districts. S.V. Zoological Park also comprises IUCN Red Listed species of Endangered Category 3, vulnerable 7, near Threatened 1, least concerned 94 and not evaluated with one species.

**Table: 1: Floristic Distribution of Genera and Species of Sri Venkateswara Zoological Park
Bentham & Hooker System of Classification: (1862- 1883)**

DICOTYLEDONS								GYMNOSPERMS			
POLYPETALAE				S.No	Family	G	S	S.No	Family	G	S
S. N	Family	G	S								
1	Magnoliaceae	1	1	49	Passifloraceae	1	1	1	Araucariaceae	1	1
2	Annonaceae	3	4	50	Caricaceae	1	1	2	Cupressaceae	1	1
3	Menispermaceae	4	4	51	Cucurbitaceae	12	14	3	Cycadaceae	1	3
4	Nymphaeaceae	1	2	52	Cactaceae	2	2	Total		3	5
5	a) Nelumbonaceae	1	1	53	Aizoaceae	4	6				
6	Papaveraceae	1	1	54	Apiaceae	1	1	MONOCOTYLEDONS			
7	Capparidaceae	4	6	55	Araliaceae	2	2	S.No	Family	G	S
8	Violaceae	1	1	Total		17	28	.			
9	Bixaceae	1	1	GAMOPETALAE							
10	Cleomaceae	1	5	S.No	Family	G	S	1	Orchidaceae	2	2
11	Polygalaceae	1	5	.				2	b) Marantaceae	1	1
12	Caryophyllaceae	1	2	1	Rubiaceae	21	31	3	c) Cannaceae	1	1
13	Portulacaceae	2	5	2	Asteraceae	36	36	4	d) Musaceae	1	1
14	Clusiaceae	1	1	3	Plumbaginaceae	1	1	5	Amaryllidaceae	2	2
15	Malvaceae	9	1	4	Sapotaceae	2	2	6	Dioscoreaceae	1	2
16	a) Bombacaceae	1	1	5	Ebenaceae	1	5	7	Roxburgiaceae	1	1
17	Sterculiaceae	6	6	6	Oleaceae	4	7	8	Liliaceae	2	2
18	Tiliaceae	3	1	7	Salvadoraceae	1	1	9	a) Asparagaceae	7	12
19	Elaeocarpaceae	1	1	8	Apocynaceae	12	15	10	b) Colchicaceae	1	1
20	Linaceae	1	1	9	Asclepiadaceae	17	22	11	c) Hypoxidaceae	1	1
21	a) Erythroxylaceae	1	1	10	Loganiaceae	1	2	12	Xyridaceae	1	1
22	Malpighiaceae	2	2	11	Gentianaceae	1	1	13	Commelinaceae	3	8
23	Zygophyllaceae	3	3	12	Hydrophyllaceae	1	1	14	Arecaceae	7	7
24	Geraniaceae	1	1	13	Boraginaceae	6	10	15	Typhaceae	1	1
25	a) Oxalidaceae	2	2	14	Convolvulaceae	8	17	16	Araceae	1	1
26	Rutaceae	8	9	15	Solanaceae	5	9	17	Aponogetonaceae	1	2
				16	Scrophulariaceae	4	7	18	Eriocaulaceae	1	2
								19	Cyperaceae	9	27
								20	Poaceae	4	68
										0	

27	Simaroubaceae	2	2	17	Bignoniaceae	8	12	Total		8	14
28	Ochnaceae	1	1	18	Pedaliaceae	3	6			4	3
29	Burseraceae	2	3	19	Acanthaceae	20	39				
30	Meliaceae	2	2	20	Verbenaceae	10	14				
31	Celastraceae	3	4	21	Lamiaceae	11	21				
32	Rhamnaceae	3	5	Total		17	25	Distribution of Bryophytes & Pteridophytes			
33	Vitaceae	3	4			3	9				
34	Sapindaceae	4	5	MONOCHLAMYDEAE				BRYOPHYTES			
35	Anacardiaceae	6	6	S.No	Family	G	S	S.No	Family	G	S
36	Moringaceae	1	1	.				.			
37	a) Fabaceae	2	5	1	Nyctaginaceae	3	6	1	Ricciaceae	1	1
38	b) Caesalpiniaceae	1	2	2	Amaranthaceae	11	19	2	Funariaceae	1	1
39	c) Mimosaceae	1	2	3	Aristolochiaceae	1	1	Total		2	2
40	Rosaceae	1	2	4	Lauraceae	1	1				
41	Droseraceae	1	1	5	Hernandiaceae	1	1	PTERIDOPHYTES			
42	Combretaceae	3	8	6	Proteaceae	1	2	S.No	Family	G	S
43	Myrtaceae	3	4	7	Loranthaceae	2	2	.			
44	Melastomaceae	1	1	8	Santalaceae	2	2	1	Dryopteridaceae	1	1
45	Lythraceae	3	3	9	Euphorbiaceae	22	52	2	Marsileaceae	1	1
46	Onagraceae	1	1	10	a) Ulmaceae	2	2	3	Nephrolepidaceae	1	3
47	Flacourtiaceae	2	2	11	c) Moraceae	2	6	4	Polypodiaceae	1	1
48	Turneraceae	1	1	12	Casuarinaceae	1	1	5	Pteridaceae	4	5
				Total		49	95	6	Salviniaceae	2	2
								Total		10	13

Table: 2: Floristic enumeration of S.V. Zoological Park

S.No.	Division	Family	Genera	Species
1	Bryophytes	2	2	2
2	Pteridophytes	6	10	13
3	Gymnosperms	3	3	5
ANGIOSPERMS		108	482	782
4	Dicotyledons	88	398	639
5	Monocotyledons	20	84	143
Total		119	497	802

Graph: 1: Floristic enumeration of S.V. Zoological Park

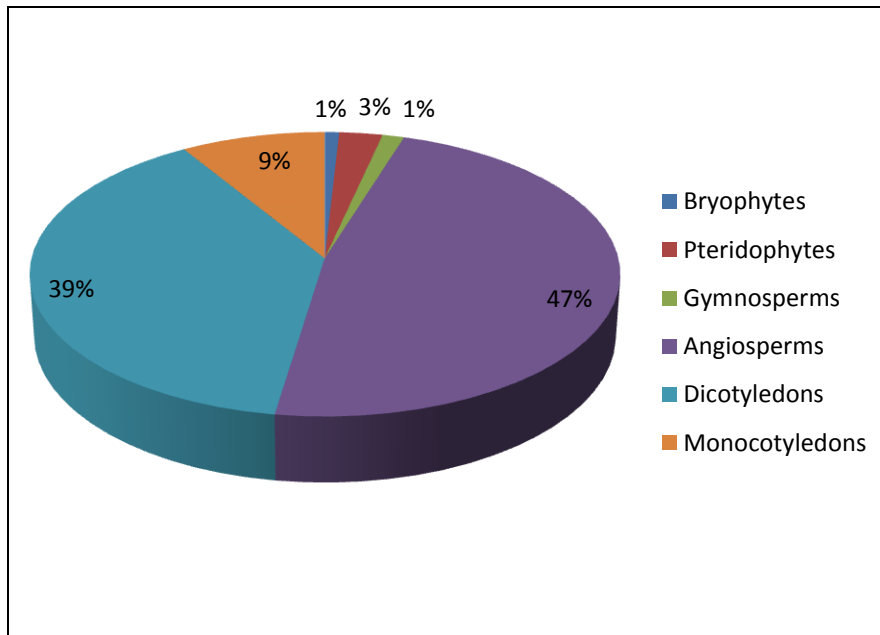


Table: 3. Percentage among Angiosperm families, genera and species

Taxa	Species	%	Genus	%	Family	%
Dicotyledons	639	81.71	398	82.57	88	81.48
Monocotyledons	143	18.29	84	17.43	20	18.51
Total	782		482		108	

Table: 4. Ratios between Monocotyledon vs Dicotyledons families, genera and species

Taxa	Family	Genus	Species
Dicotyledons	88	398	639
Ratio	1 : 4.52 : 7.26		
Monocotyledons	20	84	143
Ratio	1: 4.2 : 7.15		
Total	108	482	782
Dicot/ Monocot	1 : 4.40 : 4.74 : 4.47		

Table-5: Distribution of major Angiosperm families, genera and species

3. a. Top 20 Families				3.b. Top 20 Genera with more than 5 Species			
S.No.	Family	Gen	No. of Sps	S. No.	Genus	Family	No. of Sps
1	<i>Leguminosae</i>	49	108	1	<i>Euphorbia</i>	Euphorbiaceae	15
2	<i>Poaceae</i>	40	68	2	<i>Justicia</i>	Acanthaceae	12
3	<i>Euphorbiaceae</i>	22	52	3	<i>Cyperus</i>	Cyperaceae	10
4	<i>Acanthaceae</i>	20	39	4	<i>Acacia</i>	Mimosaceae	9
5	<i>Asteraceae</i>	36	36	5	<i>Crotolaria</i>	Fabaceae	
6	<i>Rubiaceae</i>	21	31	6	<i>Senna</i>	Caesalpiaceae	

7	<i>Cyperaceae</i>	9	27	7	<i>Fimbristylis</i>	Cyperaceae	
8	<i>Asclepiadaceae</i>	17	22	8	<i>Indigofera</i>	Fabaceae	8
9	<i>Lamiaceae</i>	11	21	9	<i>Eragrostis</i>	Poaceae	7
10	<i>Amaranthaceae</i>	11	19	10	<i>Ipomoea</i>	Convolvulaceae	
11	<i>Convolvulaceae</i>	8	17	11	<i>Phyllanthus</i>	Euphorbiaceae	
12	<i>Apocynaceae</i>	12	15	12	<i>Alysicarpus</i>	Fabaceae	6
13	<i>Malvaceae</i>	9	15	13	<i>Barleria</i>	Acanthaceae	
14	<i>Cucurbitaceae</i>	12	14	14	<i>Corchorus</i>	Tiliaceae	
15	<i>Verbenaceae</i>	10	14	15	<i>Terminalia</i>	Combretaceae	5
16	<i>Tiliaceae</i>	3	13	16	<i>Acalypha</i>	Euphorbiaceae	
17	<i>Bignoniaceae</i>	8	12	17	<i>Cleome</i>	Cleomaceae	
18	<i>Asparagaceae</i>	7	12	18	<i>Commelina</i>	Commelinaceae	
19	<i>Boraginaceae</i>	6	10	19	<i>Diospyros</i>	Ebenaceae	
20	<i>Rutaceae</i>	8	9	20	<i>Ficus</i>	Moraceae	

Graph: 2: Distribution of Major Angiosperm Families, Genera and species

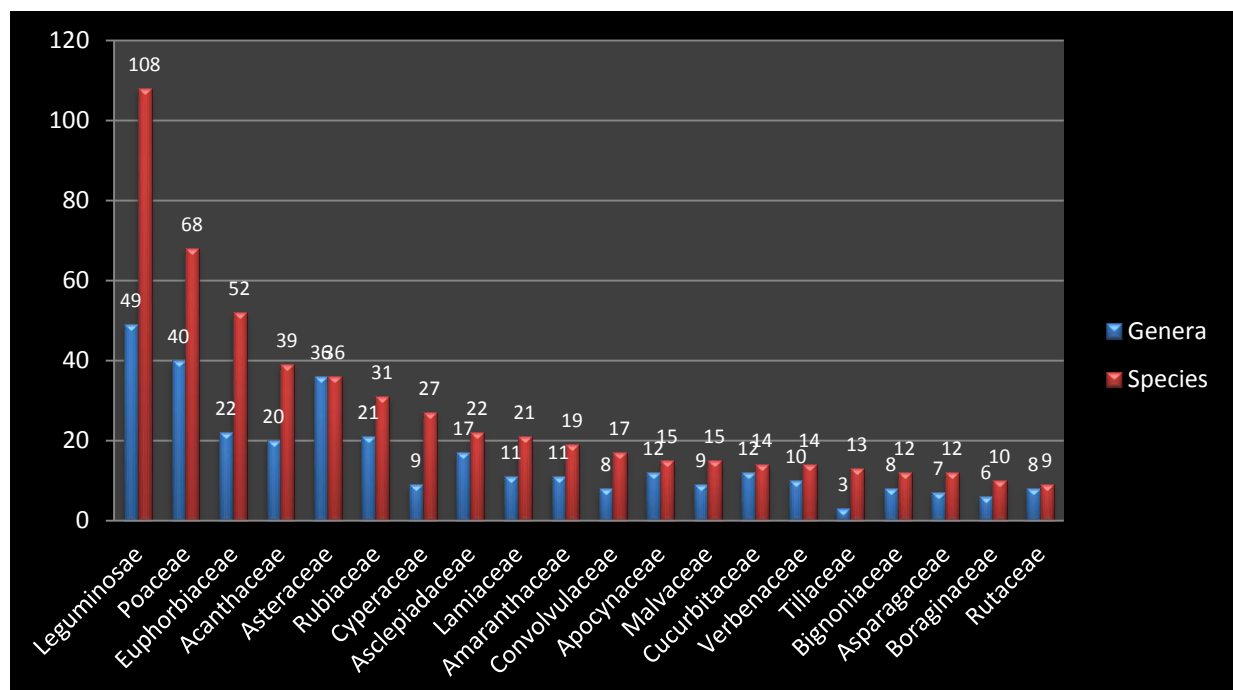


Table-6: Comparative Account of Dominant Families with Flora British India and Regional Floras

6.a. Comparison of Top 10 Angiosperm Families with regional Floras of India								
S. No	S. V. Zoo Park	Sps	Madras Presidency Gamble (1915-1935)	Sps	Flora of India (B.S.I., Jain, 1989)	Sps	Flora of A.P. T. Pullaiah et al.	Sps
1	Leguminosae	108	Leguminosae	432	Poaceae	1225	Leguminosae	299
2	Poaceae	68	Graminae (Poaceae)	388	Orchidaceae	990	Poaceae	281
3	Euphorbiaceae	52	Rubiaceae	226	Leguminosae	775	Cyperaceae	139
4	Acanthaceae	39	Acanthaceae	202	Asteraceae	754	Euphorbiaceae	126
5	Asteraceae	31	Euphorbiaceae	199	Rubiaceae	495	Acanthaceae	108
6	Rubiaceae	27	Orchidaceae	199	Cyperaceae	499	Asteraceae	105
7	Cyperaceae	22	Compositae (Asteraceae)	189	Euphorbiaceae	419	Rubiaceae	88
8	Asclepiadaceae	21	Cyperaceae	172	Lamiaceae	393	Orchidaceae	69
9	Lamiaceae	21	Labiatae (Lamiaceae)	128	Acanthaceae	379	Lamiaceae	65
10	Amaranthaceae	19	Asclepiadaceae	93	Schrophulariaceae	356	Convolvulaceae	61
6.b. Comparison of Top 10 Dominant Families with Chittoor District Floras								
S. No	S. V. Zoo Park	Sps	Ardhagiri Hemalatha	Sps	Chittoor Chetty et al.	Sps	Chittoor D. Rangachari	Sps
1	Leguminosae	108	Leguminosae	43	Leguminosae	215	Leguminosae	141
2	Poaceae	68	Poaceae	20	Poaceae	150	Euphorbiaceae	58
3	Euphorbiaceae	52	Euphorbiaceae	19	Asteraceae	82	Poaceae	53
4	Acanthaceae	39	Malvaceae	14	Euphorbiaceae	80	Acanthaceae	42
5	Asteraceae	31	Asteraceae	13	Acanthaceae	60	Cyperaceae	40
6	Rubiaceae	27	Acanthaceae	13	Cyperaceae	58	Compositae (Asteraceae)	34
7	Cyperaceae	22	Amaranthaceae	11	Rubiaceae	57	Rubiaceae	33
8	Asclepiadaceae	21	Lamiaceae	11	Lamiaceae	54	Labiatae (Lamiaceae)	25
9	Lamiaceae	21	Cyperaceae	11	Malvaceae	42	Malvaceae & Convolvulaceae	24
10	Amaranthaceae	19	Rubiaceae	10	Convolvulaceae	37	Asclepiadaceae	20
6.c. Comparison of Top 10 Dominant Families with other Districts florals of Andhra Pradesh								
S. No	S. V. Zoo Park	Sps	Nellore Suryanarayana & Srinivasa Rao	Sps	Anantapur T. Pullaiah & N. Yasoda	No. of Sps	Kurnool R.R.V.Raju & T. Pullaiah	Sps
1	Leguminosae	108	Leguminosae	97	Leguminosae	103	Leguminosae	156
2	Poaceae	68	Euphorbiaceae	51	Graminae (Poaceae)	82	Poaceae	111
3	Euphorbiaceae	52	Poaceae	48	Euphorbiaceae	35	Euphorbiaceae	54
4	Acanthaceae	39	Acanthaceae	38	Asteraceae	35	Asteraceae	49
5	Asteraceae	31	Asteraceae	33	Cyperaceae	33	Acanthaceae	45
6	Rubiaceae	27	Rubiaceae	33	Acanthaceae	24	Cyperaceae	32

7	Cyperaceae	22	Cyperaceae	27	Malvaceae	20	Convolvulaceae	30
8	Asclepiadaceae	21	Malvaceae	27	Rubiaceae	19	Lamiaceae	27
9	Lamiaceae	21	Convolvulaceae	23	Convolvulaceae	19	Rubiaceae	27
10	Amaranthaceae	19	Amaranthaceae	17	Amaranthaceae	18	Malvaceae	22

Table: 7. Comparision of Top 10 Genera with other district Floras of Andhra Pradesh

S.No.	Zoo Park	Sps	Ardhagiri	Sps	Chittoor (1991)	Sps	Chittoor (2008)	Sps
1	<i>Euphorbia</i>	15	<i>Ficus</i>	8	<i>Crotalaria</i>	18	<i>Crotalaria</i>	25
2	<i>Justicia</i>	12	<i>Cassia</i>	7	<i>Cyperus</i>	15	<i>Indigofera</i>	20
3	<i>Cyperus</i>	10	<i>Cyperus</i>	5	<i>Ficus</i>	13	<i>Cyperus</i>	19
4	<i>Acacia</i>	9	<i>Ipomoea</i>	5	<i>Indigofera</i>	13	<i>Cassia</i>	18
5	<i>Crotalaria</i>	9	<i>Indigofera</i>	5	<i>Ipomoea</i>	11	<i>Euphorbia</i>	17
6	<i>Senna</i>	9	<i>Sida</i>	5	<i>Euphorbia</i>	10	<i>Ficus</i>	17
7	<i>Fimbristylis</i>	9	<i>Euphorbia</i>	4	<i>Fimbristylis</i>	10	<i>Ipomoea</i>	16
8	<i>Indigofera</i>	8	<i>Cissus</i>	4	<i>Phyllanthus</i>	10	<i>Acacia</i>	15
9	<i>Eragrostis</i>	7			<i>Rhynchosia</i>	10	<i>Jasminum</i>	13
10	<i>Ipomoea</i>	7			<i>Desmodium</i>	8	<i>Solanum</i>	13
S.No.	Flora of A.P.	Sps	Anantapur (1989)	Sps	Kurnool (1995)	Sps	Nellore (2002)	Sps
1	<i>Crotalaria</i>	44	<i>Euphorbia</i>	14	<i>Euphorbia</i>	16	<i>Indigofera</i>	17
2	<i>Cyperus</i>	33	<i>Cyperus</i>	14	<i>Ipomoea</i>	15	<i>Crotalaria</i>	15
3	<i>Euphorbia</i>	30	<i>Indigofera</i>	12	<i>Crotalaria</i>	14	<i>Cyperus</i>	14
4	<i>Ipomoea</i>	24	<i>Crotalaria</i>	10	<i>Indigofera</i>	14	<i>Cassia</i>	11
5	<i>Indigofera</i>	24	<i>Indigofera</i>	10	<i>Cyperus</i>	11	<i>Euphorbia</i>	10
6	<i>Fimbristylis</i>	23	<i>Fimbristylis</i>	10	<i>Phyllanthus</i>	11	<i>Hedyotis</i>	10
7	<i>Cassia</i>	22	<i>Cassia</i>	9	<i>Cassia</i>	10	<i>Ipomoea</i>	10
8	<i>Ficus</i>	22	<i>Acacia</i>	9	<i>Eragrostis</i>	10	<i>Phyllanthus</i>	9
9	<i>Leucas</i>	20	<i>Grewia</i>	9	<i>Grewia</i>	10	<i>Ficus</i>	8
10	<i>Grewia</i>	18	<i>Ipomoea</i>	9	<i>Acacia</i>	9	<i>Grewia</i>	8

Graph: 3: Top 20 Genera of S.V. Zoological park

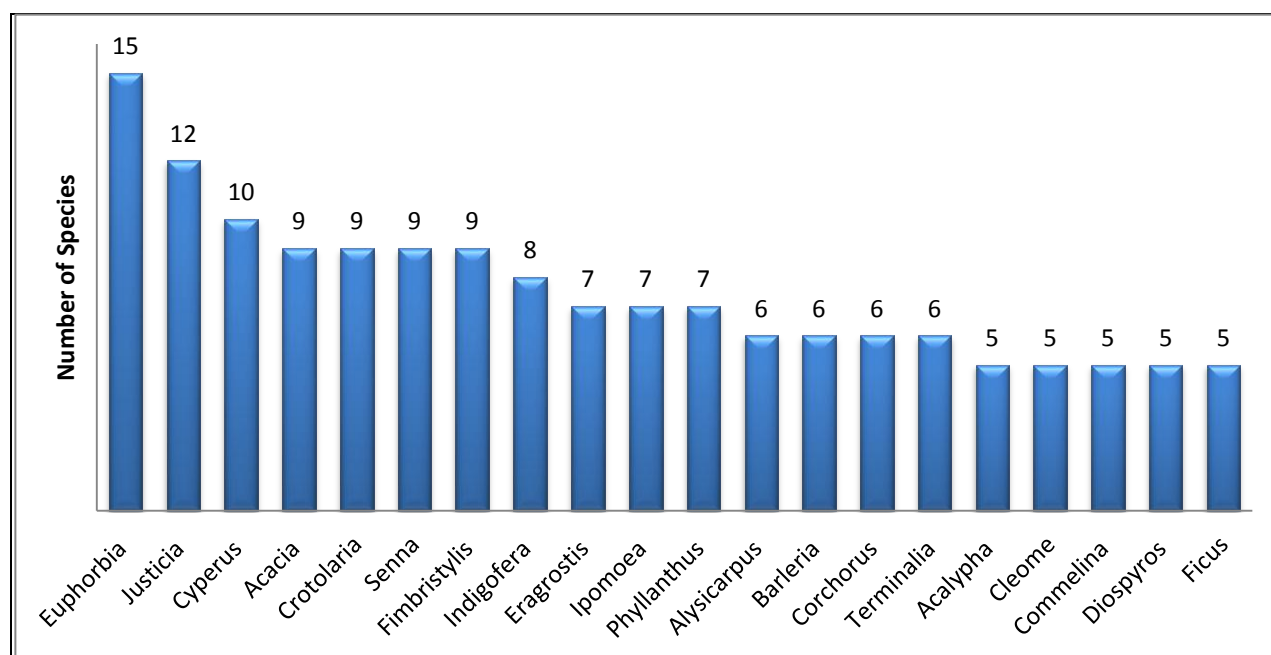


Table: 8. Monocots Vs Dicots % and Ratio of the Zoo Park with other regional floras

Angiosperms	T	D	%	M	%	R	T	D	%	M	%	R	T	D	%	M	%	R	
		No of Species						No of Genera						No of Families					
1	A.P	2601	1927	74.09	674	25.91	2.86	1035	784	75.75	251	24.25	3.12	173	139	80.35	34	19.65	4.09
2	Zoo Park	702	639	81.71	143	18.29	4.47	482	398	82.57	84	17.43	4.74	108	88	18.48	20	18.51	4.40
3	Ardhagiri	299	245	81.94	54	18.06	4.54	210	177	84.29	33	15.71	5.36	59	54	91.53	5	8.47	10.80
4	Chittoor	983	813	82.71	168	17.09	4.84	552	457	82.79	95	17.21	4.81	136	112	82.35	24	17.65	4.67
5	Chittoor	1756	1391	79.21	365	20.79	3.81	879	694	78.95	185	21.05	3.75	176	137	77.84	39	22.16	3.51
6	Anantapur	707	554	78.36	153	21.64	3.62	398	320	80.40	78	19.60	4.10	101	84	83.17	17	16.83	4.94
7	Kurnool	1047	836	79.85	211	20.15	3.96	562	450	80.07	23	4.09	19.57	124	101	81.45	23	18.55	4.39
8	Nellore	926	792	85.53	134	14.47	5.91	525	429	81.71	96	18.29	4.47	142	119	83.80	23	16.20	5.17

D: Dicots; M: Monocots; R: Ratio; T: Total

DISCUSSION:

Floristic enumeration of S.V.Zoological Park has been compared with the floristic studies of Andhra Pradesh and other significant floras of Rayalaseema (Chittoor, Kadapa, Kurnool and Nellore) Districts along with the flora of Ardhagiri hills of Chittoor District; Total number of dicot and monocot species, genera and families. (Table: 8). Revealed that the Andhra Pradesh flora resulted a total of 2601 species to that of 1927 (74.89%) dicotyledons and 674 (25.91%) monocotyledon species. Chittoor district represents a total of 1756 species with 1391 (79.21%) dicots and 365 (20.21%) monocotyledon species; followed by Kurnool district 1047 species with 836 (79.85 %) dicots 211 (20.15 %) monocots; Nellore district represents 926 species with 792 (85.53 %) dicots, 134 (14.47 %) monocots; Anantapur district with lowest number, 707 species to that of 544 (78.36 %) dicots and 153 (21.64 %) monocotyledon species. But it is observed that the distribution of species in the selected area S.V.Zoological Park showed more diversity with 782 Angiosperm species, 639

belongs to dicotyledons with 81.71 % and 143 monocotyledons with 18.29 %. When compared with the ratios between species, genera and families between monocots Vs dicots among other floras it is observed A.P Flora represents monocots Vs dicot species 1:2.86 ; between genera 1:3.12 ; between families 1:4.09; Ardhagiri flora 1:5.4 species; 1: 5.36 genera, 1: 10.80 families; Chittoor district 1: 3.81 species, 1 :3.75 genera; 1:3.51 families; Kurnool with 1 : 396 species; 1: 4.02 genera and 1 :4.39 families; Nellore district with 1: 5.91 species, 1:4.47 genera, 1 :5.17 families, Anantapur district with 1 : 3.62 species, 1: 4.02 genera and 1: 4.94 families. When compare with S.V.Zoological Park Monocots Vs Dicots species ratio 1:4.47; genera. 1:4.74 and between families 1: 4.40 ratios showed its rich diversity compared to other floras of the state, and also shows close relationship with Chittoor, Kurnool and Nellore district floras in the species, genera and families distribution and diversity.

Hence it reveals the distribution of species in all district floras of Rayalaseema and the Andhra Pradesh as a whole is mainly dependent on the geographical and ecological conditions of the region, but not on the extent of area which the species are distributed. Chittoor and Kurnool district are located along the Eastern Ghats represents with rich floral diversity, further it is followed by Nellore district and least in the species distribution in Ananthapur district because of its geographical, ecological and climatic conditions leads for drought conditions to that of desert atmosphere. Whereas Ardhagiri hills which covers most of the area with rocks also represents proportional diversity in monocots Vs dicots equal to that of other floras even though the extent of area is very less than the representative Chittoor District. It signifies in the ratio and percentage between the families of dicots 54 (91.53%) and monocots 5 (8.47 %) with 1:10.80 ratio denotes the less number of monocotyledon families with more number of genera and species diversity which may be possible with the grass species. Zoo Park flora signifies in the ratio of species, genera and families with almost equal as 1: 4.47; 1:4.74 and 1:4.40 compared to that of Chittoor distinct flora except in the total number of species may be due to the small extent of area. But the diversity of the species is very rich with in the prevailed area in terms of Dicotyledons to monocotyledons. The aim of the floristic studies of a protected area resulted in a good number of species with dry deciduous spiny scrub vegetation along with patches of ever green shrubs and small tree species includes rare and endangered species of highly threatened tree *Pterocarpus santalinus* (Red sanders) in its natural habitat.

Many other species shown interest in the diversity as *Capparis* to be studied critically in particular to this region. Studies also necessitated on the forage and food sources of natural birds and other native mammalian species to be conserved more in particular. Many interesting medicinal herbs are distributed in this locality as *Hemidesmus*, *Tylophora*, *Decalepis*, *Gymnema*, *Holostemma*, *Ceropegia*, *Sarcostemma* and *Caralluma* belongs to the family Asclepiadaceae as major species to be conserved for future generations. At the outset floristic enumeration of the S.V.Zoological Park revealed its significant distribution of Angiosperm species which are almost equal to that of the Chittoor district flora with in a small extent of area with much diversity of species. The reason may be the S.V.Zoological park is under conservation since 30 years, and also this area is a forest peripheral of S.V. National Park.

CONCLUSION:

It is recommended for the studies in identification of flora which are the major food source of native birds in different seasons; the species which attract butterflies;

the major food source for various herbivorous species to be conserve and measures for the increase in the area of distribution of all above species.

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