

Floristic Richness of the Tropical Coast of Northern Andhra Pradesh along Bay of Bengal, a Treasure to be Conserved

Rao M. V., Joshi S. C., Balaji M.

Abstract—Coastal zone combines terrestrial, marine and atmospheric factors and gives rise to unique landforms that play an important role in long-term sustainability of the hinterland and economy of maritime nations. World over, efforts have been put forth to understand plants of the seacoasts. In India also, plants of several geographical entities have been well documented, but works devoted to plant communities of the vast tropical coast of India and its States are still insufficient. Therefore, an inventory of plants flourishing in a stretch of ~450km of the Coastal Regulatory Zone I encompassing a total of 84 villages in 6 revenue Districts of northern Andhra Pradesh ($15^{\circ}42'06''\text{N}$, $80^{\circ}51'03''\text{E}$ to $19^{\circ}05'51''\text{N}$, $84^{\circ}47'44''\text{E}$) along Bay of Bengal was carried out. The study revealed presence of a total of 364 species belonging to 225 genera under 71 families. In addition to inventory, zonation pattern, ethnobotany, and certain interesting ecological facts are included.

Keywords—Ecology, Ethnobotany, Inventory, Tropical coast, Zonation.

I. INTRODUCTION

COASTAL zone is a long, broad and vast geographic area extending from sea edge far inland. This ever dynamic region combines terrestrial, marine and atmospheric factors to give rise to unique land forms such as mud flats, sand dunes, rocky headlands, lagoons, tidal creeks, wetlands and estuaries [16]. These varied land forms support a number of critical ecosystems such as marsh/ sand/ rock strands, salt marshes, mangals, sea grass meadows and coral reefs that harbor a myriad microbial, plant and animal populations. All these ecosystems together form a buffer zone protecting the land from potential impacts of storms, erosion, subsidence (from sea water), inundation (from freshwater), sea level rise, etc. [1]. Thus, coastal zone performs a leading bioengineering role

Malladi Venkateswara Rao is Scicneit-D working in Wood Biodegradation (Marine) Centre, Institute of Wood Science and Technology, via Yoga Village, Beach Road, A.U. Post, Visakhapatnam, India, PIN-530003 (phone: 91-891-2704502; fax: 91-891-2793022; e-mail: mvrao@icfre.org).

Suresh Chandra Joshi is an Officer of Indian Forest Service of 1980 Kerala Cadre, is Director, Institute of Wood Science and Technology, Malleswaram Post, Bengaluru, India, PIN-560003 (phone: 91-80-23341731; fax: 91-891-23340529; e-mail: dir_iwst@icfre.org).

M. Balaji is Scientist-D in Wood Biodegradation Centre (Marine) mentioned above (phone: 91-891-2704502; fax: 91-891-2793022; e-mail: mbalaji@icfre.org).

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in the long-term sustainability of the adjoining hinterland on one hand and plays a strategic role in the economy of nations with a large shoreline like India on the other [26]. Coastal tracts of four distinct geographical ranges influenced by tides in the country were declared as Coastal Regulatory Zone [17]. Of these, the landward stretch between 0-500m from high tide line is referred to as Coastal Regulatory Zone I (CRZ I).

World over, a good deal of effort has been put forth for a very long time to understand the said plant communities from different perspectives [16], [30], [1]. In India also, plant resources of several geographical entities (that may at times include coastal zone too) including that of Andhra Pradesh have been well documented by several researchers right from Wight [37] to Karthikeyan et al. [13] and Roxburgh [27] to Pullaiah [19], respectively. However, works exclusively dealing with plant communities of the vast sea board of India as well as Andhra Pradesh are rather limited [3], [26].

Of the various ecosystems mentioned above, the strands and mangals occupy a major stretch of the tropical sea coast of India and harbour a mosaic of vegetation variable in structure and composition at each location depending upon a number of factors such as topography, climate, nature and rate of erosion/deposition and sea level changes [38]. In order to maintain the resilience of the entire coastal area in general and the tropical coastal ecosystems in particular, base line information, especially on indigenous plant communities and their status is highly essential [31], [26]. Therefore, an attempt was made to collect information in this line from the northern half of Andhra Pradesh coast ($15^{\circ}42'06''\text{N}$, $80^{\circ}51'03''\text{E}$ to $19^{\circ}05'51''\text{N}$, $84^{\circ}47'44''\text{E}$) adjoining Bay of Bengal and collate the same with certain interesting facts noticed on the ecology of the area.

II. MATERIAL AND METHODS

As many as 84 localities along the CRZ I ~450km in northern Andhra Pradesh bound by the Bay of Bengal on the east were surveyed (Table I, Fig. 1). After reaching a particular place, 2-3km stretch of the beach was perambulated either way from a central point by two persons each, unless interrupted by geographical barriers; to cover the vegetated CRZ I. In the case of mangals, boats were employed to survey the areas. During the course, habitat, growth form, flowering and fruiting aspects of each plant species and the region of its zonation were recorded while various floral twigs or whole plant specimens were collected simultaneously. All the

specimens so collected were poisoned soon after a day's survey [11]. For recording the zonation of strand vegetation and mangal flora, the classifications of [24], [25] were followed, respectively. The classification of the former authors was also taken as the basis for distinguishing different vegetation types existing along the coast. Information on any end use of the collected plants was obtained from guides/village elders at each place. On returning to the camp, the specimens were kept open ventrally for three hours and later segregated, labeled and prepared into herbarium. Subsequently, the voucher specimens were identified with

help of standard keys viz. [10], [19]-[23], [34]-[36] besides comparison at the Botanical Survey of India, Kolkata. Finally, the herbarium was deposited in Wood Biodegradation Centre (Marine), Visakhapatnam of the Institute of Wood Science and Technology. All plants in the inventory were organized into families as per Bentham and Hooker' [4] classification and into genera/species in ascending order of the English alphabets within each family. Field collection number as well as other details of the first representative specimen of a plant species were cited in the inventory detailed.

TABLE I
LOCALITIES OF CRZ I OF NORTHERN A. P. SURVEYED

Sl.	District	Localities				
I	Srikakulam	1. Lakshmpuram	2. Donkuru	3. Kapasukkudi	4. Battivanipalem	5. Kothavanipalem
		6. Chinakarriwanipalem	7. Pedakarriwanipalem	8. Iddavanipalem	9. Kalingapatnam	10. Ontur
		11. Gollagondi	12. Baruva kothur	13. Battikaluru	14. Donkalapadu	15. Nuvvalarevu
		16. Bhavanapadu	17. Mulapeta	18. Geddalapalem	19. Cheruvugatlapeta	20. Jagannadhapuram
		21. Ummilada	22. Jogampeta	23. Rajarampuram	24. Kalingapatnam (south)	25. Matsylesam
		26. Mogadalapadu	27. Pukkallapeta	28. Balarampuram	29. Dibbalapalem	30. D. matsylesam
		31 Kochherla	32. Allivalasa	33. Donupeta	34. Chintapalle	35. Konadapeta
		36. Bhimunipatnam	37. Chepala uppada	38. Thimmapuram		
		39. Kapula uppada	40. Sagara durga	41. Yarada	45. Bangarammapalem	
II	Vizianagaram	42. Chippada	43. Pudimadaka	44. Kotha kodur	46. Rajayyapeta	47. Pentakota
		48. Kumarapuram	49. Uppada	50. Hope Island	51. Chollangi	52. Raathi kalava
III	Visakhapatnam	53. Masanitippa	55. Kothapalem	56. Sacramento	57. Neelarevu	58. Molletimoga
		54. Matlatippa	60. Surasani yanam	61. Rameswaram	62. Yedlarevu	63. Komaragiripatnam
		59. Siri Yanam	65. Kesanapalli	66. Sankaraguptam	67. Antarvedi	68. Chinamayinivanipalem
IV	East Godavari	64. Odalarevu	70. Mollaparru	71. Perupalem	72. China gollapalem	73. Peda gollapalem
		69. Mella pallipalem	75. Kruthivennu pallipalem	76. Sathrampadu	77. Pedapatnam	
V	West Godavari	74. Vorlagonditippa	78. Palakayatippa	79. Bandar Fort	80. Malayakaya lanka	81. Divi point
		83. Nachugunta				82. Sorlagondi
VI	Krishna	84. Yelichetla dibba				

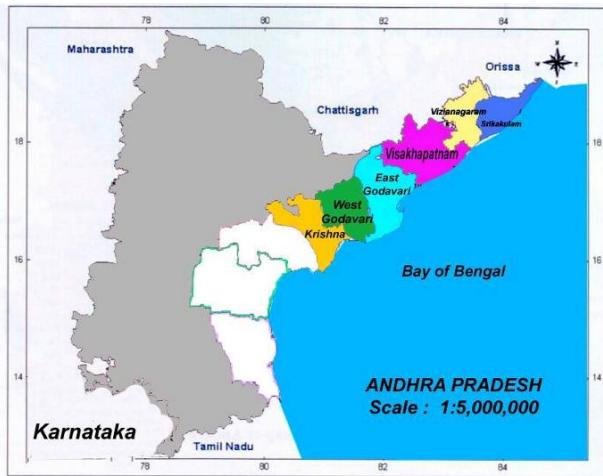


Fig. 1 Coastal Districts of northern A. P. surveyed for flora in CRZ I

III. RESULTS

A. Inventory

Of the total CRZ I surveyed along the northern Andhra Pradesh, vegetation of "Type 4A SS 1 Strand sand" was most dominant while "Type 4A SR 2 Strand Rock" only occasional and "Type 4A SC 3 Strand coral" almost absent. Besides strand sand vegetation, luxurious mangroves were present as tidal forests mainly in Godavari and Krishna deltas in addition to that in 21 hitherto unreported mangals existing as fragmented habitats representing degraded ecosystems in almost all the Districts within the survey area (Table II).

TABLE II
FRAGMENTED MANGAL HABITATS HITHERTO UNREPORTED FROM CRZ I OF NORTHERN A. P.

Sl.	District	Localities			
		1.	2.	3.	4.
I	Srikakulam	Nuvvula revu	Bhavanapadu		
II	Vizianagaram	Nil			
III	Visakhapatnam	Port area	Gangavaram	Kotha koduru	Bangarammapalem
IV	East Godavari	Raja nagaram	Uppada	Surasani yanam	Rameswaram revu
		Yedla revu	Odala revu	Kesanapalli gollapalem	Antarvedi
V	West Godavari	Mella pallipalem	Perupalem		
VI	Krishna	Peda gollapalem	Vorlagonditippa	Kruthivennu pallipalem	Sathrampadu
		Pedapatnam			

An inventory of a total of 2148 plant specimens could be made during the entire survey. On identification, the inventory revealed a floristic composition of 364 species belonging to 225 genera under 71 families (Table III). Of these, 279 (75%) species under 179 (80%) genera and 62 (87%) families belong to Dicotyledone and 85 (25%) species under 46 (20%) genera and 9 (13%) families to Monocotyledone (Fig. 2).

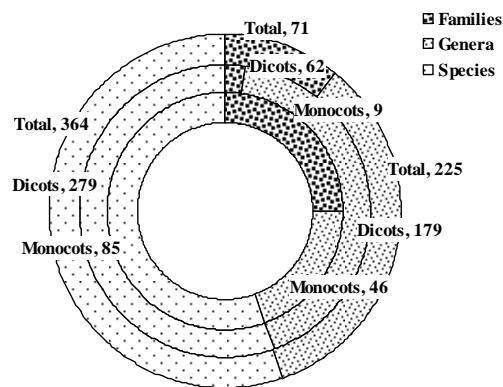


Fig. 2 Floristic composition

TABLE III
INVENTORY OF PLANT COMMUNITIES OF CRZ I OF NORTHERN A. P.

Sl.No.	Species [Local name]	Herbarium No.	Native/ Exotic	Habit at	Growth form	Flow ering	Fruiti ng	Plant part	Used in
1. MINISPERMACEAE									
1	<i>Cocculus hirsutus</i> (L.) Diels [Dusara theega]	322	N	P	L				
2	<i>Tinospora cordifolia</i> (Willd.) Hook. f. & Thoms. [Thippa theega]	328	N	P	L			Root paste; Whole plant extract	Blood pressure, Leuco-derma; Snake/Scorpion bite
2. CAPPARIACEAE									
3	<i>Capparis zeylanica</i> L. [Uppi]	339	N	P	L	Nov	Nov		
3. CLEOMACEAE									
4	<i>Cleome aspera</i> Koen. ex DC.	1283	N	P	H		Aug		
5	<i>C. gynandra</i> L.	616	E	P	H	Aug	Aug		
6	<i>C. viscosa</i> L. [Kukka vaminta]	375	E	P	H	Mar	Mar	Root paste	Blisters, Boils
4. VIOLACEAE									
7	<i>Hybanthus enneaphylloides</i> (L.) F. v. Muell. [Ratna purusha]	42	N	P	H	Sep	Sep	Whole plant paste	Snake bite
5. POLYGALACEAE									
8	<i>Polygala arvensis</i> Willd. [Khoto]	1229	N	P	H	Jun		Whole plant extract	Fever, Snake bite
6. CARYOPHYLLACEAE									
9	<i>Polycarpha corymbosa</i> (L.) Lam. [Rajuma]	415	N	P	H	Mar	Mar	Whole plant extract	Fever
7. PORTULACACEAE									
10	<i>Portulaca oleracea</i> L. [Pappu kura]	364	E	P	H		Nov	Whole plant extract	Burns, Cuts, Wounds
11	<i>Portulaca quadrifida</i> L. [Sanna pappu kura]	365	E	P	H	Nov	Nov		
12	<i>P. pilosa</i> L. var. <i>tuberosa</i> (Roxb.) Sivarajan [Paayila aaku]	12	N	Halo	H	Aug	Aug		
13	<i>P. wightiana</i> Wt. & Arn.	1267	N	P	H	Aug	Aug		
8. MALVACEAE									
14	<i>Abutilon indicum</i> (L.) Sweet [Thuthura benda]	1916	N	P	S		Feb		
15	<i>Hibiscus ovalifolius</i> (Forssk.) Vahl	1269	N	P	H		Aug		
16	<i>H. tiliaceus</i> L. [Attu kanara]	2532	N	MA	T	Dec		Roots	Diuretic, Pimples
17	<i>Pavonia odorata</i> Willd.	936	N	P	H	Aug	Aug		
18	<i>P. zeylanica</i> (L.) Cav.	663	N	P	H	Aug	Aug		
19	<i>Sida acuta</i> Burm. f. [Paraasu kampa]	556	E	P	H			Root paste	Blisters, Boils, Bone fracture
20	<i>S. cordata</i> (Burm. f.) Borssum [Gayapu aaku]	32	N	P	H	Sep		Leaf poultice	Cuts, Wounds, Snake bite
21	<i>S. cordifolia</i> L. [Chiru benda]	15	N	P	H	Aug	Aug	Root extract	Nerve tonic
22	<i>Thespesia populnea</i> (L.) Sol. ex Corr. [Ganga raavi]	1900	N	P	T	Jun		Bark extract; Leaf	Arthritis; Stomach ailments

9. STERCULIACEAE							
23 <i>Waltheria indica</i> L. [Nalla benda]	944	E	P	H	Aug	Whole plant powder	Cuts, Wounds
10. TILIACEAE							
24 <i>Brownlowia tressa</i> (L.) Kosterm.	2529	N	MA	T	Jul	Jul	
25 <i>Corchorus tridens</i> L.	522	E	P	H	May	May	
26 <i>Triumfetta rhomboidea</i> Jacq.	38	E	P	H	Sep	Sep	
11. ZYGOPHYLLACEAE							
27 <i>Tribulus terrestris</i> L. [Chinna palleru]	428	E	P	H	Mar	Mar	
12. RUTACEAE							
28 <i>Glycosmis pentaphylla</i> (Retz.) DC. [Golugu]	368	N	P	S	Nov	Leaf paste	Diabetes
29 <i>Toddalia asiatica</i> (L.) Lam. [Erra gokiri]	1140	N	P	S			
13. SIMAROUBACEAE							
30 <i>Ailanthus excelsa</i> Roxb. [Pedda maanu]	71	N	P	T		Bark	Febrifuge
14. MELIACEAE							
31 <i>Azadirachta indica</i> A. Juss. [Vepa]	2685	N	P	T	Feb	Apl	Leaf extract, Seed oil Vermicide
32 <i>Xylocarpus granatum</i> Koenig [Pedda senuga]	1521	N	M	T	Aug	Aug	Bark; Seed paste Diarrhoea; Insecticide
33 <i>X. mekongensis</i> Pierre [Senuga]	2661	N	M	T	Aug	Aug	
15. RHAMNACEAE							
34 <i>Zizyphus oenoplia</i> (L.) Mill. [Parimi]	329	N	P	S	Nov	Leaf extract; Bark paste	Bone fracture; Eczema
16. VITACEAE							
35 <i>Cissus quadrangularis</i> L. [Nalleru]	961	N	P	L	Aug	Aug	Whole plant paste Bone fracture
17. SAPINDACEAE							
36 <i>Allophylus serratus</i> (Roxb.) Kurz. [Kaki bira]	29	N	P	S	Sep	Sep	Ripe fruiets Digestion
37 <i>Dodonaea viscosa</i> (L.) Jacq. [Adavi bandaru]	937	N	P	S			Leaf poultice Bone fracture
38 <i>Sapindus emarginata</i> Vahl [Kunkudu]	2693	N	P	T			Ripe fruiets Skin and Hair cleansing
18. ANACARDIACEAE							
39 <i>Anacardium occidentale</i> L. [Jeedi maamidi]	380	E	P	T	Mar	Mar	Bark extract; Ripe fruits Leprosy sores; Scurvy
19. FABACEAE							
40 <i>Abrus precatorius</i> L. [Guruvinda]	359	N	P	S	Nov	Seed paste	Leucoderma, Snake bite
41 <i>Aeschynomene indica</i> L. [Jeeluga]	347	N	P	H	Nov	Nov	
42 <i>Alysicarpus monilifer</i> (L.) DC. [Amera]	569	N	P	H	Jul	Jul	Whole plant paste Bristols, Boils
43 <i>A. vaginalis</i> (L.) DC.	954	N	P	H			
44 <i>Atylosia scarabaeoides</i> (L.) Benth. [Adavi uluva]	930	N	P	H	Aug		
45 <i>Clitoria ternatea</i> L. [Sanku puvvu]	1405	N	P	L	Aug	Aug	Flower extract; Root paste Diabetes; Filariasis
46 <i>Crotalaria albida</i> Heyne ex Roth	459	N	P	H	Mar	Mar	
47 <i>C. hirsuta</i> Willd.	1151	N	P	H	Feb	Feb	
48 <i>C. laburnifolia</i> L. [Pedda giligichcha]	357	N	P	S	Nov	Nov	Root paste Scorpion sting
49 <i>C. medicaginea</i> Lam.	568	N	P	H	Jul		
50 <i>C. pallida</i> Ait.	341	E	P	H	Nov	Nov	
51 <i>C. prostrata</i> Rottl. ex Willd. [Sangula gulla]	442	N	P	H	Mar	Mar	
52 <i>C. retusa</i> L.	801	E	P	H	Sep	Sep	
53 <i>C. verrucosa</i> L. [Chinna giligichcha]	815	N	P	H	Sep	Sep	Leaf poultice Scabs
54 <i>Dalbergia spinosa</i> Roxb. [Chillingal]	1498	N	MA	S	Aug		
55 <i>Derris scandens</i> (Roxb.) Benth.	1501	N	MA	L	Aug	Aug	
56 <i>D. trifoliata</i> Lour. [Nalla theega]	383	N	MA	H			Bark, Root Insecticide
57 <i>Desmodium gangeticum</i> (L.) DC.	637	N	P	H	Aug	Aug	
58 <i>Glricea sepium</i> (Jacq.) Kunth ex Wolp. [Seema ganuga]	410	E	P	T	Mar		
59 <i>Goniogyne hirta</i> (Willd.) Ali	645	N	P	H	Aug		
60 <i>Indigofera colutea</i> (Burm. f.) Merr.	1147	N	P	H	Feb	Feb	
61 <i>I. glabra</i> L.	822	N	P	H	Sep	Sep	
62 <i>I. linifolia</i> (L. f.) Retz.	943	E	P	H			
63 <i>I. linnaei</i> Ali	612	E	P	H	Jul	Jul	
64 <i>I. oblongifolia</i> Forssk.	939	N	P	H	Aug		
65 <i>I. trita</i> L. f.	462	E	P	H	Mar		
66 <i>Rothia indica</i> (L.) Druce	39	N	P	H	Sep	Sep	
67 <i>Stylosanthes fruticosa</i> (Retz.) Alston	950	N	P	H	Aug		
68 <i>Tephrosia pumila</i> (Lam.) Pers.	416	N	P	H	Mar	Mar	
69 <i>T. purpurea</i> (L.) Pers. [Thella vempali]	393	N	P	H			Leaf poultice, Fruit paste; Root paste Headache, Eczema; Arth-ritis; Snake/ Scorpion bite
70 <i>T. spinosa</i> (L. f.) Pers.	602	N	P	H	Jul		
71 <i>T. villosa</i> (L.) Pers.	819	N	P	H	Sep	Sep	
72 <i>Vigna sublobata</i> (Roxb.) Bairig.	507	N	P	H	May	May	
73 <i>V. trilobata</i> (L.) Verdc. [Pilli pesara]	549	N	P	H	May		Leaf extract Fever
74 <i>Zornia diphylla</i> (L.) Pers.	426	N	P	H	Mar	Mar	
75 <i>Z. gibbosa</i> Spongog [Hunnali]	935	N	P	H	Aug	Whole plant paste	Diarrhoea
20. CAESALPINIACEAE							

76	<i>Caesalpinia bonduc</i> (L.) Roxb. [Gachchakaya]	350	N	P	L	Mar	Leaf powder	Malaria
77	<i>Cassia auriculata</i> L. [Thangedu]	952	N	P	H	Aug	Aug	
78	<i>C. occidentalis</i> L. [Kasinda]	46	E	P	S	Mar	Mar	Root extract; Root paste
79	<i>C. tora</i> L.	639	E	P	H	Aug	Aug	Filariasis
21. MIMOSACEAE								
80	<i>Acacia auriculiformis</i> A. Cunn. ex Benth. [Sarkari thumma]	335	E	P	T	Nov	Leaf extract	Liver problems, Jaundice
81	<i>A. nilotica</i> (L.) Delile [Nalla thumma]	809	N	P	T	Sep	Bark paste	Snake bite
82	<i>Mimosa pudica</i> L. [Atthi patthi]	373	E	P	H	Nov	Leaf paste	Filariasis, Ring worm
83	<i>Pithecellobium dulce</i> (Roxb.) Benth. [Seema chintha]	340	N	P	T		Root paste	Rabies
84	<i>Prosopis chilensis</i> (Molina) Stuntz.	999	E	P	T	Feb	Feb	
22. RHIZOPHORACEAE								
85	<i>Bruguiera cylindrica</i> (L.) Bl. [Urudu]	3	N	M	T	Jun	Jun	
86	<i>B. gymnorhiza</i> (L.) Savigny [Kandriga]	853	N	M	T	Aug	Aug	Fruits
87	<i>Ceriops decandra</i> (Griff.) Ding Hou [Thogara]	847	N	M	S	Mar	Mar	
88	<i>C. tagal</i> (Perr.) Robins. [Thogara]	2528	N	M	S	Aug	Aug	Bark extract
89	<i>Rhizophora apiculata</i> L. [Ponna]	855	N	M	T	Nov	Nov	Malaria
90	<i>R. mucronata</i> Poir. [Uppu ponna]	1493	N	M	T	Aug		Fruits
23. COMBRETACEAE								
91	<i>Lumnitzera racemosa</i> Willd. [Thanduga]	844	N	M	S	May	May	
24. MYRTACEAE								
92	<i>Eugenia bracteata</i> (Willd.) Roxb. ex DC.	916	N	P	S	Aug		
25. LYTHRACEAE								
93	<i>Ammannia baccifera</i> L.	505	N	P	H	May	May	
94	<i>A. multiflora</i> Roxb.	480	N	P	H	Mar	Mar	
95	<i>Rotala densiflora</i> (Roth ex Roem. & Schult.) Koehne	458	N	P	H			
26. SONNERATIACEAE								
96	<i>Sonneratia alba</i> J. Sm. [Pedda kaalinga]	843	N	M	T	Nov	Nov	
97	<i>S. apetala</i> Buch.-Ham. [Kaalinga]	846	N	M	T	Nov	Nov	
27. ONAGRACEAE								
98	<i>Ludwigia perennis</i> L.	481	E	P	H	Mar	Mar	
28. TURNERACEAE								
99	<i>Turnera ulmifolia</i> var. <i>angustifolia</i> (Mill.) Willd.	439	N	P	H	Mar	Mar	
29. PASSIFLORACEAE								
100	<i>Passiflora foetida</i> L. [Thella jumuki]	367	E	P	H	Nov	Nov	
30. CUCURBITACEAE								
101	<i>Citrullus colocynthis</i> (L.) Schard. [Verri putchcha]	540	N	P	L	May	Fruit powder	Helminthicide
102	<i>Coccinia grandis</i> (L.) Voigt. [Kaki donda]	305	N	P	H	Nov	Nov	
103	<i>Cucumis melo</i> L.	2338	N	P	L			
104	<i>Momordica charantia</i> L.	658	N	P	L	Aug		
105	<i>Mukia maderaspatana</i> (L.) Roem. [Noogu dosa]	308	N	P	L	Nov	Nov	
31. CACTACEAE								
106	<i>Opuntia elatior</i> Mill. [Bomma jemudu]	2688	N	X	S			
107	<i>O. stricta</i> (Haw.) Haw. [Jemudu]	2689	E	X	S			
108	<i>O. vulgaris</i> Mill. [Naga jemudu]	2690	N	X	S			
32. AIZOACEAE								
109	<i>Gisekia pharnaceoides</i> L. [Dhanthi koora]	526	N	P	H	May	May	
110	<i>Sesuvium portulacastrum</i> (L.) L.	6	N	Halo	H	Jun		
111	<i>Trianthemum portulacastrum</i> L. [Galijeru]	430	N	P	H	Mar	Mar	
112	<i>T. triquetra</i> Rottl. ex Willd.	1969	N	P	H	Feb		
33. MOLLUGINACEAE								
113	<i>Glinus oppositifolius</i> (L.) A. DC.	431	N	P	H	Mar	Mar	
114	<i>Mollugo cerviana</i> (L.) Ser.	390	N	P	H	Mar		
115	<i>M. disticha</i> (L.) Ser. [Verri chatarasi]	41	N	P	H	Sep	Sep	
116	<i>M. nudicaulis</i> Lam.	691	N	P	H	Aug		
117	<i>M. pentaphylla</i> L. [Verri chatarasi]	355	N	P	H	Nov	Nov	
34. APIACEAE								
118	<i>Centella asiatica</i> (L.) Urban [Saraswathi aaku]	399	N	P	H	Mar	Mar	Leaf powder; Whole plant extract
35. ALANGIACEAE								
119	<i>Alangium salvifolium</i> (L. f.) Wang [Ooduga]	920	N	P	S		Root bark; Whole plant extract	Dog bite; Fever
36. RUBIACEAE								
120	<i>Benkara malabarica</i> (Lam.) Tirveng. [Pedda malli]	692	N	P	S			
121	<i>Canthium praviflorum</i> Lam. [Balusu]	1102	N	P	H		Leaf extract; Root extract	Fever; Diarrhoea
122	<i>Hedyotis affinis</i> Roem. & Schult.	445	N	P	H	Mar	Mar	
123	<i>H. aspera</i> Heyne ex Roth	404	N	P	H	Mar	Mar	
124	<i>H. biflora</i> (L.) Lam.	934	N	P	H	Aug	Aug	
125	<i>H. herbacea</i> L.	1443	N	P	H	Aug		
126	<i>H. puberula</i> (G. Don.) Arn.	50	N	P	H	Sep	Sep	
127	<i>H. caerulea</i> Wight & Arn.	13	N	P	H	Aug	Aug	

128 <i>H. corymbosa</i> (L.) Lam.	1442	N	P	H	Aug	Aug	
129 <i>Hydrophylax maritima</i> L. f.	18	N	P	H	Sep	Sep	
130 <i>Morinda pubescens</i> Sm. [Thogaru]	338	N	P	T	Nov	Nov	
131 <i>Scyphiphora hydrophyllacea</i> Gaertn. [Nara Thanduga]	1519	N	M	T	Aug	Aug	
132 <i>Spermacoce articulatis</i> L. f. [Madana aaku]	24	N	P	H	Sep	Sep	Root extract
133 <i>S. hispida</i> L.	45	E	P	H	Sep	Sep	
134 <i>S. pusilla</i> Wall. [Pachcha noori]	362	N	P	H	Nov	Nov	Leaf paste
37. ASTERACEAE							
135 <i>Ageratum conyzoides</i> L. [Vishamusti]	382	E	P	H	Mar	Mar	Leaf extract; Poultice
136 <i>Blumea solidaginoides</i> (Poir.) DC.	401	N	P	H	Mar	Mar	
137 <i>Centipeda minima</i> (L.) A. Braun & Asch.	446	N	P	H	Mar	Mar	
138 <i>Eclipta prostrata</i> (L.) L. [Gunta kalagara]	371	E	P	H	Mar	Mar	Whole plant extract; Whole plant paste
139 <i>Emilia sonchifolia</i> (L.) DC. [Gayapu aaku]	303	E	P	H	Nov	Nov	Leaf poultice
140 <i>Epaltes pygmaea</i> DC.	1988	N	P	H	Feb		
141 <i>Grangea maderaspatica</i> (L.) Poir. [Nemali padam]	471	E	P	H	Mar	Mar	
142 <i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	1207	N	P	H	Jun		
143 <i>L. sarmentosa</i> (Willd.) Schultz-Bip. ex Kuntze	14	N	P	H	Sep	Sep	
144 <i>Parthenium hysterophorus</i> L.	585	E	P	S	Jul	Jul	
145 <i>Sphaeranthus indicus</i> L. [Boddasaram]	470	N	P	H	Mar	Mar	Leaf paste
146 <i>Tridax procumbens</i> L. [Gaddi chaamanthi]	96	E	P	H	Nov	Nov	Leaf extract; Whole plant paste
147 <i>Vernonia cinerea</i> (L.) Less. [Garitiki]	17	N	P	H	Sep	Sep	Leaf/ Flower extract; Seed powder
148 <i>V. divergens</i> (Roxb.) Edgew. [Kampu rotta]	378	N	P	H	Mar	Mar	
149 <i>Xanthium indicum</i> Koenig	632	N	P	H			
38. GOODENIACEAE							
150 <i>Scaveola sericea</i> Vahl.	991	N	P	S	Nov	Nov	
39. PLUMBAGINACEAE							
151 <i>Plumbago zeylanica</i> L. [Chitra mulam]	344	N	P	S	Nov	Nov	Whole plant paste
152 <i>Aegialites rotundifolia</i> Roxb. [Pocha]	2663	N	M	S	Aug		Blisters, Boils
40. MYRSINACEAE							
153 <i>Aegiceras corniculatum</i> (L.) Blanco. [Guggilam]	811	N	M	S	Mar	Aug	Bark, Seeds
41. SALVADORACEAE							
154 <i>Azima tetracantha</i> Lam. [Uppu kampa]	1683	N	P	S			
155 <i>Salvadora persica</i> L. var. <i>wightiana</i> (Planch. ex Thw.) Verdc.	1022	N	P	T		May	
42. APOCYNACEAE							
156 <i>Carissa carandas</i> L.	664	N	P	S	Aug		
157 <i>C. spinarum</i> L. [Vaka]	945	N	P	S	Aug	Seed powder	Tooth ache
158 <i>Catharanthus roseus</i> (L.) G. Don [Billa ganneru]	33	N	P	H	Sep	Leaf extract; Whole plant extract	Diabetes;
159 <i>Rauvolfia tetraphylla</i> L. [Papata aaku]	337	N	P	S		Nov	Diabetes, Cancer
43. ASCLEPIADACEAE							
160 <i>Calotropis gigantea</i> R. Br. [Tella jilledu]	100	E	P	S	Nov	Latex; Leaf paste; Warmed up leaves	Tooth ache; Withlow; Scorpion sting; Body pains sting, Snake bite
161 <i>C. procera</i> (Ait.) R. Br. [Jilledu]	2305	E	P	S	Jul	Flower bud/ Root powder	Fever
162 <i>Pergularia daemia</i> (Forssk.) Chiov. [Dushtapu theega]	647	N	P	L	Aug	Leaf poultice	Bone fracture, Scabies
163 <i>Sarcobatus carinatus</i> Vahl.	1464	N	P	L	Aug		
164 <i>S. globosus</i> Vahl.	2679	N	Ma	L			
165 <i>Hemidesmus indicus</i> (L.) R. Br.	900	N	P	L	Aug	Aug	
166 <i>Tylophora indica</i> (Burm. f.) Merr. [Gorri pala theega]	72	N	P	L	Sep	Tender twigs; Root paste; Leaf extract	Emetic; Vermicide; Asthma
44. GENTIANACEAE							
167 <i>Enicostema hissopifolium</i> (Willd.) Verdoon.	2303	N	P	H	Jul		
45. BORAGINACEAE							
168 <i>Coldenia procumbens</i> L. [Hamsa padu]	472	N	P	H	Mar	Mar	Whole plant paste
169 <i>Cynoglossum zeylanicum</i> (Vahl ex Hornem) Thunb. ex Lehm.	536	N	P	H	May		Eczema, Psoriasis
170 <i>Heliotropium curassavicum</i> L. [Neela golividhi]	381	N	P	H	Mar	Mar	
171 <i>H. indicum</i> L. [Naga danthi]	490	N	P	H	Mar	Mar	Leaf paste
172 <i>H. marifolium</i> Retz.	609	N	P	H	Jul	Jul	
173 <i>Heliotropium scabrum</i> Retz.	672	N	P	H	Aug	Aug	
174 <i>Trichodesma indica</i> R. Br.	527	N	P	S			
46. EHRETIACEAE							
175 <i>Carmona retusa</i> (Vahl) Masam.	1000	N	P	H	Feb		
47. CONVOLVULACEAE							
176 <i>Argyreia nervosa</i> (Burm. f.) Boj. [Samudra pala]	352	N	P	S	Nov	Nov	Leaves
177 <i>Cressa cretica</i> L.	363	N	Halo	H	Mar	Mar	Carbuncles

178 <i>Evolvulus alsinoides</i> (L.) L. [Vishnu kanthi]	403	N	P	H	Mar	Mar	Whole plant powder; Whole plant paste	Instability, Memory loss; Strengthens gums
179 <i>E. nummularius</i> (L.) L. [Sitamma savaralu]	561	E	P	H			Whole plant paste	Blisters, Boils, Burns
180 <i>Ipomoea pes-caprae</i> (L.) R. Br. [Beda aaku]	53	N	P	L	Sep		Leaves;	Rabbit fodder;
181 <i>I. tuba</i> (Schlecht.) G. Don [Thella theega]	1445	N	P	L	Aug		Whole plant extract	Sterility in females
182 <i>Merremia tridentata</i> (L.) Hall. f. [Elukachevula aaku]	90	N	P	H	Sep	Sep	Leave extract	Rheumatism, Urinary disorders
48. SOLANACEAE								
183 <i>Datura stramonium</i> L. [Ummaeththa]	1161	N	P	H	Feb			
184 <i>Physalis minima</i> L. [Budda busara]	321	N	P	H	Nov	Nov		
185 <i>Solanum melongena</i> L. [Chiru vanga]	553	N	P	H	May		Twig extract	Lung troubles
186 <i>S. melongena</i> L. var. <i>insanum</i> (L.) Prain [Chiru vanga]	56	N	P	S	Sep	Sep		
187 <i>S. trilobatum</i> L. [Mulla mushti]	55	N	P	L	Sep	Sep	Root extract	Fever
188 <i>S. violaceum</i> Orteg.	519	N	P	H	May	May		
189 <i>S. virginianum</i> L. [Verri vanga]	384	N	P	H	Mar		Tender fruit curry	Helminthicide
49. SCROPHULARIACEAE								
190 <i>Bacopa floribunda</i> (R. Br.) Wetst.	444	N	P	H	Mar	Mar		
191 <i>Centranthera tranquebarica</i> (Spreng.) Merr.	2302	N	P	H	Jul			
192 <i>Scoparia dulcis</i> L. [Dashini]	1768	E	P	H	Nov		Whole plant extract	Fever, Kidney stones
50. PEDALIACEAE								
193 <i>Pedalium murex</i> L. [Pedda palleru]	78	E	P	H	Mar	Mar		
51. MARTYNIACEAE								
194 <i>Martynia annua</i> L. [Puligoru chettu]	618	N	P	H	Aug			
52. ACANTHACEAE								
195 <i>Acanthus ilicifolius</i> L. [Alchi]	4	N	MA	S	Jun		Leaf extract	Rheumatism
196 <i>Asystasia gangetica</i> (L.) T. And. [Metta aaku]	306	N	P	H	Mar	Mar		
197 <i>Barleria prionitis</i> L. [Mulla gorinta]	997	N	P	H	Feb		Leaf extract	Gum troubles
198 <i>Blepharis repens</i> (Vahl) Roth	956	N	P	H				
199 <i>Dipteracanthus prostratus</i> (Poir.) Nees	47	N	P	H	Sep	Sep		
200 <i>Ecbolium viride</i> (Forssk.) Alston	981	N	P	H	Feb			
201 <i>Indoneesiella echooides</i> (L.) Sreemadh. [Potti nelavemu]	361	N	P	H	Nov	Nov	Whole plant paste; Root paste	Snake bite; Skin diseases
202 <i>Justicia glauca</i> Rottl. [Konda pindi]	372	N	P	H	Nov	Nov		
203 <i>J. prostrata</i> (C. B. Cl.) Gamble	411	N	P	H	Mar	Mar		
53. VERBENACEAE								
204 <i>Clerodendrum inerme</i> (L.) Gaertn. [Yeti pisinika]	345	N	P	S	Nov	Nov		
205 <i>Lantana camara</i> L. [Gaju kampa]	66	E	P	S	Sep	Sep	Leaf paste; Seed paste	Cuts, Wounds; Snake bite
206 <i>Phyla nodiflora</i> (L.) Greene [Neeti pippali]	84	N	P	H	Sep	Sep	Whole plant paste	Tooth troubles
207 <i>Vitex negundo</i> L. [Nalla vavili]	491	N	P	S			Leaf extract	Scrofula
54. AVICENNIAEAE								
208 <i>Avicennia alba</i> Bl. [Gundu mada]	849	N	M	T	Mar	Nov	Bark sap; Seed paste	Contraceptive; Small-pox
209 <i>A. marina</i> (Forssk.) Vierh. [Tella mada]	5	N	M	T	Aug		Leaves; Roots	Cattle lactation; Minor fish stings
210 <i>A. officinalis</i> L. [Nalla mada]	1026	N	M	T	Jul	Jul	Seed	Ulcers
55. LAMIACEAE								
211 <i>Anisochilus cornosus</i> (L. f.) Wall.	985	N	P	H	Feb			
212 <i>Anisomeles indica</i> (L.) Kuntze	482	N	P	H	Mar	Mar		
213 <i>Hyptis suaveolens</i> (L.) Poir. [Seema thulasi]	304	E	P	H	Nov	Nov	Root extract	Fever
214 <i>Lemna polyrhiza</i> L.	675	N	Hydr o	H			Aug	
215 <i>Leucas aspera</i> (Willd.) Link. [Tella thummi]	336	N	P	H	Nov	Nov		
216 <i>L. stricta</i> Benth.	538	N	P	H	Aug	Aug		
217 <i>Ocimum canum</i> Sims. [Kukka thulasi]	369	E	P	H	Nov	Nov	Leaf extract	Epilepsy
218 <i>O. tenuiflorum</i> L. [Thulasi]	636	N	P	S	Aug	Aug	Leaf extract	Dandruff
219 <i>Orthosiphon pallidus</i> Benth.	484	N	P	H	Mar	Mar		
56. NYCTAGINACEAE								
220 <i>Boerhavia diffusa</i> L. [Atika maamidi]	43	N	P	H	Sep	Sep	Leaf extract; Root powder; Root paste	Fever; Helminthicide; Jaundice, Asthma
57. AMARANTHACEAE								
221 <i>Achyranthes aspera</i> L. var. <i>aspera</i> [Uthareni]	37	N	P	H	Mar	Mar	Whole pant; Root paste	Obesity; Scorpion sting
222 <i>A. aspera</i> L. var. <i>porphyristachya</i> (Wall ex Moq.) Hook. f. [Uthareni]	31	N	P	H	Sep	Sep		
223 <i>Aerva lanata</i> (L.) Juss. ex Schultes [Pindi koora]	653	N	P	H	Aug			
224 <i>A. sanguinolenta</i> (L.) Bl.	990	N	P	H	Feb	Feb		
225 <i>Allmania nodiflora</i> (L.) R. Br. ex Wight var. <i>procumbens</i> Hook. F.	35	N	P	H	Sep	Sep		
226 <i>A. nodiflora</i> (L.) R. Br. ex Wight var. <i>roxburghii</i> Wight	27	N	P	H	Sep	Sep		
227 <i>Alternanthera paronychioides</i> St. Hil.	978	E	P	H	Feb	Feb		

228 <i>Alternanthera pungens</i> Kunth.	427	E	P	H	Mar	Mar		
229 <i>A. sessilis</i> (L.) R. Br. ex DC. [Ponnaganti koora]	99	N	P	H	Mar	Mar	Root extract; Whole plant paste	Emetic; Bone fracture
230 <i>Amaranthus graecizans</i> L.	422	N	P	H	Mar	Mar		
231 <i>A. spinosus</i> L.	665	N	P	H	Aug	Aug		
232 <i>A. viridis</i> L. [Chilaka thotakura]	391	N	P	H	Mar	Mar	Root extract	Kidney stones
233 <i>Celosia argentea</i> L. [Gurugu]	464	E	P	H	Mar	Mar	Seed powder	Mouth ulcers
234 <i>Digera muricata</i> (L.) Mart. [Chenchali koora]	680	E	P	H	Aug	Aug	Leaf curry	Constipation
235 <i>Gomphrena celosioides</i> Mart.	440	N	P	H	Mar	Mar		
236 <i>Pupalia lappacea</i> (L.) Juss. var. <i>lappacea</i>	44	N	P	H	Sep	Sep		
237 <i>P. lappacea</i> (L.) Juss. var. <i>orbiculata</i> (Heyne ex Wall) Townsend	620	N	P	H	Aug	Aug		
58. CHENOPODIACEAE								
238 <i>Arthrocnemum indicum</i> (Willd.) Moq.	900	N	Halo	H	Mar	Mar		
239 <i>Atriplex repens</i> Roth	1666	N	Halo	H	Feb	Feb		
240 <i>Salicornia brachiata</i> Roxb.	9	N	Halo	H	Aug	Aug		
241 <i>Suaeda fruticosa</i> (L.) Forssk.	858	N	Halo	H	Nov	Nov		
242 <i>Suaeda nudiflora</i> (Willd.) Moq. [Eela koora]	11	N	Halo	H				
243 <i>S. maritima</i> (L.) Dumot [Eela koora]	8	N	Halo	H	Jun			
244 <i>S. monoica</i> Forssk. ex Gmel. [Eela koora]	10	N	Halo	H	Mar	Mar		
59. ARISTOLOCHIACEAE								
245 <i>Aristolochia bracteolata</i> Lam. [Gadida gadapa]	570	N	P	H	Jul			
246 <i>A. indica</i> L. [Gadida gadapa]	48	N	P	L	Nov	Nov	Root paste	Snake bite
60. LAURACEAE								
247 <i>Cassytha filiformis</i> L. [Noolu theega]	330	N	Parasite	L	Nov	Nov	Whole plant paste	Hydrocele
61. EUPHORBIACEAE								
248 <i>Acalypha alnifolia</i> Klein ex Willd.	2	N	P	H	May	May		
249 <i>A. indica</i> L. [Kuppi chettu]	667	N	P	H	Aug	Aug	Leaf extract	Emetic
250 <i>A. lanceolata</i> Willd. [Muripinda]	1	N	P	H	Nov	Nov		
251 <i>A. malabarica</i> Muell.-Arg.	62	N	P	H	Sep	Sep		
252 <i>Breynia vitis-idaea</i> (Burm. f.) Fischer [Tella pulichi]	358	N	P	S	Nov	Nov		
253 <i>Chrozophora rotellieri</i> (Geisel.) Juss.	417	E	P	H	Mar	Mar		
254 <i>Croton bonplandianum</i> Baill. [Nakka thulasi]	97	E	P	H	Nov	Nov		
255 <i>Dimorphocalyx glabellus</i> Thw.	1849	N	P	S	Mar	Mar		
256 <i>Euphorbia chamaesyce</i> L.	941	N	P	H	Aug			
257 <i>E. hirta</i> L. [Chukka mokka]	504	E	P	H	May	May	Whole plant paste	Blisters, Boils
258 <i>E. rosea</i> Retz.	26	N	P	H	Oct	Oct		
259 <i>E. serpens</i> Kunth	630	N	P	H	Aug	Aug		
260 <i>E. tirucalli</i> L. [Kada chemudu]	386	E	X	S			Phylloclade extract	Ear pain Emetic, Purgative; Fish stings, Tooth ache, Ulcers
261 <i>Excoecaria agallocha</i> L. [Thilla]	7	N	M	T	Jun	Jun	Bark extract; Sap	
262 <i>Jatropha curcas</i> L.	2360	E	P	S	Sep			
263 <i>Jatropha glandulifera</i> Roxb. [Nepalam]	16	N	P	S	Mar	Mar		
264 <i>J. gossypifolia</i> L. [Seema nepalem]	454	E	P	S	Mar	Mar	Leaf paste	Blisters, Boils, Cuts, Wounds
265 <i>Phyllanthus amarus</i> Schum. & Thonn. [Nela usiri]	98	N	P	H	Nov	Nov	Whole plant powder	Diabetes
266 <i>P. debilis</i> Klein ex Willd.	21	N	P	H	Oct	Oct		
267 <i>P. fraternus</i> Webster	523	N	P	H	May	May		
268 <i>P. maderaspatensis</i> L. [Nela usirika]	374	N	P	H	Nov	Nov	Whole plant paste	Tooth ache
269 <i>P. rheedii</i> Wt.	433	N	P	H	Mar	Mar		
270 <i>P. reticulatus</i> Poir. [Nalla pulugudu]	61	N	P	S			Leaf extract	Bleeding gums
271 <i>P. rotundifolius</i> Klein ex Willd.	617	N	P	H	Aug	Aug		
272 <i>P. urinaria</i> L. [Erra usirika]	85	N	P	H	Sep	Sep		
273 <i>P. virgatus</i> Forst. f. [Chiru usirika]	356	N	P	H	Nov	Nov	Bark extract	Body swellings
274 <i>Ricinus communis</i> L.	2692	N	P	S				
275 <i>Sebastiania chamaelea</i> (L.) Muell.-Arg. [Bepana boora aaku]	1153	N	P	H	Feb	Feb	Whole plant powder	Fever
276 <i>Securinega leucopyrus</i> (Willd.) Muell.-Arg.	566	N	P	S				
277 <i>S. virosa</i> (Roxb. ex Willd.) Baill. [Suthamantha]	557	N	P	S	Jul			
278 <i>Tragia involucrata</i> L. [Doolagondi]	657	N	P	H	Aug	Aug	Root paste	Skin diseases
62. CASUARINACEAE								
279 <i>Casuarina equisetifolia</i> L. [Sarugudu]	351	E	X	T	Nov			
63. HYDROCHARITACEAE								
280 <i>Halophila beccarii</i> Asch. [Samudrapu nachu]	859	N	Hydro	H	Dec	Dec		
64. AGAVACEAE								
281 <i>Sansevieria roxburghiana</i> Schult. & Schult. f. [Nela kithala]	1266	N	P	H	Aug		Leaf paste; Root paste	Mumps; Snake bite
65. LILIACEAE								
282 <i>Asparagus racemosus</i> Willd. [Pilli peechara]	1265	N	P	H	Aug		Leaf poultice; Root extract; Tuber paste	Scabs; Galactagogue; Leprosy sores
283 <i>Gloriosa superba</i> L. [Konda nabhi]	88	N	P	L	Sep			

66. COMMELINACEAE						
284 <i>Commelinia attenuata</i> Koen. ex Vahl.	348	N	P	H	Nov	
285 <i>C. benghalensis</i> L.	485	N	P	H	Mar	
286 <i>C. diffusa</i> Burm. f.	307	N	P	H	Nov	Nov Leaf/ Seed paste Skin diseases
67. ARECACEAE						
287 <i>Borassus flabellifer</i> L. [Thadi]	2686	E	P	T	Mar	Mar
288 <i>Cocos nucifera</i> L. [Kobbari]	2687	E	P	T	Mar	Mar
68. PANDANACEAE						
289 <i>Pandanus fascicularis</i> Lam. [Mogali]	2691	E	P	S		
69. RUPPIACEAE						
290 <i>Ruppia maritima</i> L.	872	N	Halo	H	Dec	Dec
70. CYPERACEAE						
291 <i>Bulbostylis barbata</i> (Roth) Clarke sub. sp. <i>pulchella</i> (Thw.) T. Koyama	23	N	P	Se	Sep	Sep
292 <i>Cyperus arenarius</i> Retz.	1163	N	P	Se	Feb	Feb
293 <i>C. compressus</i> L.	1579	N	P	Se	Nov	Nov
294 <i>C. conglomeratus</i> Rottb.	1191	N	P	Se	Jun	Jun
295 <i>C. distans</i> L. f. var. <i>distans</i>	685	N	P	Se	Aug	Aug
296 <i>C. esculentus</i> L.	1426	N	P	Se	Aug	Aug
297 <i>C. malaccensis</i> Lam.	315	N	P	Se	Nov	Nov
298 <i>C. pangorei</i> Rottb. [Gangrila mushta]	1908	N	P	Se	Feb	Root paste
299 <i>C. rotundus</i> L. [Thunga]	1485	N	P	Se	Aug	Aug
300 <i>C. stoloniferus</i> Retz.	2383	N	P	Se	Sep	Tuber paste
301 <i>C. tenuiculmis</i> Boeck.	588	N	P	Se	Jul	Galactagogue
302 <i>C. tenuispica</i> Steud.	349	N	Hydro	Se	Nov	Fever
303 <i>Fimbristylis bisumbellata</i> (Forssk.) Bubani	2384	N	P	Se	Sep	Sep
304 <i>F. cymosa</i> R. Br.	318	N	P	Se	Nov	Nov
305 <i>F. dichotoma</i> (L.) Vahl sub. sp. <i>podocarpa</i> (Nees & Meyen) T. Koyama	830	N	P	Se	Sep	Sep
306 <i>F. falcata</i> (Vahl) Kunth	2174	N	P	Se	Jul	Jul
307 <i>F. ferruginea</i> (L.) Vahl	2121	N	P	Se	Jul	Jul
308 <i>F. littoralis</i> Gaudich	1512	N	P	Se	Aug	Aug
309 <i>F. ovata</i> (Burm. f.) Kern.	829	N	P	Se	Sep	Sep
310 <i>F. polytrichoides</i> (Retz.) R. Br.	497	N	P	Se	Mar	Mar
311 <i>F. tomentosa</i> Vahl	499	N	P	Se	May	May
312 <i>Juncellus alopecuroides</i> (Rottb.) Cl.	2157	N	P	Se	Jul	Jul
313 <i>Pycreus polystachyos</i> (Rottb.) Beauv. sub.sp. <i>polystachyos</i>	1714	N	P	Se	Nov	Nov
314 <i>P. pumilus</i> L.	421	N	P	Se	Mar	Mar
315 <i>P. sulcinus</i> (Clarke) Clarke	503	N	P	Se	May	May
316 <i>Rikliella squarrosa</i> (L.) Raynal	316	N	P	Se	Nov	Nov
317 <i>Schoenotlectus juncoidea</i> (Roxb.) Palla	587	N	P	Se	Jul	Jul
71. POACEAE						
318 <i>Aeluropus lagopoides</i> (L.) Trin. ex Thw. [Puvvu gaddi]	863	N	P	G	Mar	Mar
319 <i>Andropogon pertusus</i> (L.) Willd.	65	N	P	G	Sep	Sep
320 <i>Apluda mutica</i> L.	986	N	P	G	Feb	Feb
321 <i>Aristida setacea</i> Retz. [Cheepuru gaddi]	409	N	P	G	Mar	Mar
322 <i>Brachiaria distachya</i> (L.) Stapf [Koranna gaddi]	1781	N	P	G	Nov	
323 <i>B. milliformis</i> (J. Prest. & C. Prest.) A. Chase	603	N	P	G	Jul	Jul
324 <i>B. ramosa</i> (L.) Stapf [Yeduru gaddi]	633	N	P	G	Aug	Aug
325 <i>B. reptans</i> (L.) Gard. & C. E. Hubb.	424	N	P	G	Mar	Mar
326 <i>Chloris barbata</i> Sw.	1126	E	P	G	Feb	Feb
327 <i>C. gayana</i> Stapf	1410	E	P	G	Aug	Aug
328 <i>C. montana</i> Roxb.	2167	N	P	G	Jul	Jul
329 <i>Cynodon dactylon</i> (L.) Pers. [Garika gaddi]	82	N	P	G	Sep	
330 <i>Dactyloctenium aegyptium</i> (L.) P. Beauv.	22	N	P	G	Oct	Oct
331 <i>Desmostachya bipinnata</i> (L.) Stapf [Sadanapu veduru]	1818	N	P	G	Mar	
332 <i>Digitaria abludens</i> (Roem. & Schult.) Veldk.	925	N	P	G	Aug	Aug
333 <i>D. bicornis</i> (Lam.) Roem. & Schult.	51	N	P	G	Nov	Nov
334 <i>D. ciliaris</i> (Retz.) Koeler	423	N	P	G	Mar	Mar
335 <i>Echinochloa colona</i> (L.) Link	565	E	P	G	Jul	
336 <i>Eragrostis ciliaris</i> (All.) Vign.	435	N	P	G	Mar	Mar
337 <i>E. ciliaris</i> (L.) R. Br.	420	N	P	G	Mar	Mar
338 <i>E. ciliata</i> (Roxb.) Nees	501	N	P	G	May	May
339 <i>E. coarctata</i> Stapf	1984	N	P	G	Feb	
340 <i>E. japonica</i> (Thunb.) Trin.	928	N	P	G	Aug	Aug
341 <i>E. tenella</i> (L.) Beauv. ex Roem. et Schultes	331	N	P	G	Nov	Nov
342 <i>E. tenuifolia</i> (A. Rich.) Hochst. ex Steud.	1958	N	P	G	Feb	Feb
343 <i>E. tremula</i> (Lam.) Hochst. ex Steud. [Banka chigurinta]	1960	N	P	G	Feb	Feb
344 <i>E. viscosa</i> (Retz.) Trin. [Banka gaddi]	412	N	P	G	Mar	Mar
345 <i>Eriochloa procera</i> (Retz.) Hubb.	590	N	P	G	Jul	Jul
346 <i>Heteropogon contortus</i> (L.) P. Beauv.	1145	N	P	G	Feb	Feb
347 <i>Imperata cylindrica</i> (L.) Raeusch. [Darbha gaddi]	1430	E	P	G	Aug	Aug
348 <i>Ischaemum rugosum</i> Salisb.	1171	N	P	G	Feb	

349 <i>Iseilema anthephoroides</i> Hack.	929	N	P	G		
350 <i>Myriostachya wightiana</i> (Nees ex Steud.) Hook. f. [Uppu gaddi]	868	N	P	G	Jul	
351 <i>Paspalidium geminatum</i> (Forssk.) Stapf	656	N	P	G	Aug	Aug
352 <i>Paspalum paspalodes</i> (Michx.) Scribner	83	N	P	G	Sep	Sep
353 <i>P. vaginatum</i> Sm.	1414	N	P	G	Aug	Aug
354 <i>Pennisetum pedicellatum</i> Trin.	1159	N	P	G	Feb	Feb
355 <i>Perotis indica</i> (L.) Kuntze [Jerri gaddi]	81	N	P	G	Mar	Mar
356 <i>Phragmites karka</i> (Retz.) Trin.	2257	N	P	G	Jul	Jul
357 <i>Porteresia coarctata</i> (Roxb.) Tateoka [Yelu gaddi]	850	N	P	G	Nov	Nov
358 <i>Saccharum spontaneum</i> L. [Rellu gaddi]	60	E	P	G	Sep	Sep
359 <i>Spinifex littoreus</i> (Burm. f.) Merr. [Ravanasuridi meesaalu]	70	N	P	G	Nov	Nov
360 <i>Sporobolus coromandelianus</i> (Retz.) Kunth	1234	N	P	G	Oct	Oct
361 <i>S. virginicus</i> (L.) Kunth. [Seema gaddi]	1429	N	P	G	Aug	Aug
362 <i>Trachys muricata</i> (L.) Pers. ex Trin.	1232	N	P	G	Jun	Jun
363 <i>Tragus roxburghii</i> Panig.	919	N	P	G	Aug	Aug
364 <i>Zoysia matrella</i> (L.) Merr.	2350	N	P	G	Jul	

N-Native; E-Exotic; P-Psammophyte; M-Mangrove; MA-Mangrove Associate; X-Xerophyte; Halo-Halophyte; Hydro-Hydrophyte; H-Herb; S-Shrub; T-Tree; L-Liana; Se-Sedge; G-Grass

Among Dicotyldone, the twelve families dominant in terms of species richness were *Fabaceae* (36), *Euphorbiaceae* (31), *Amaranthaceae* (17), *Asteraceae* (15), *Rubiaceae* (15), *Acanthaceae* (9), *Lamiaceae* (9), *Malvaceae* (9), *Asclepiadaceae* (7), *Chenopodiaceae* (7), *Convolvulaceae* (7) and *Solanaceae* (7) (Fig. 3).

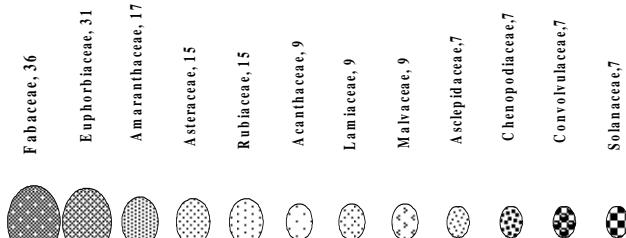


Fig. 3 Floristic dominance of Dicotyldone

Of the Monocotyldone families, *Poaceae* with 47 species was dominant followed by *Cyperaceae* with 27 species (Fig. 4).

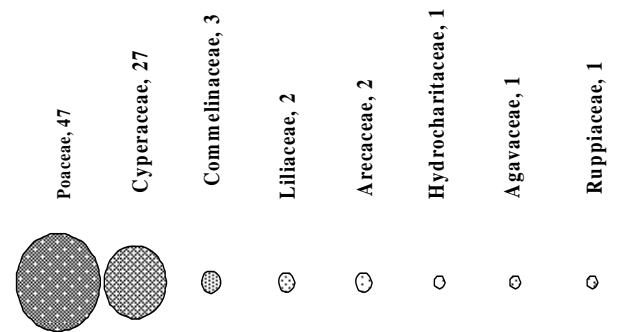


Fig. 4 Floristic dominance of Monocotyldone

In terms of nativity of plants, as many as 306 (84%) species were found to be native while the rest (58, 16%) were exotic (Fig. 5). Among the exotics, a majority (51, 88%) of species fall into the wild category whereas the rest (7, 12%) belong to cultivated group.

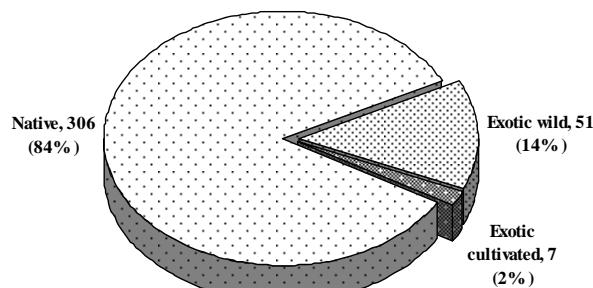


Fig. 5 Nativity of plants

According to their habitat, the flora consisted of 309 (84.89%) psammophytes, 19 (5.22%) mangroves, 16 (4.40%) mangrove associates, 11 (3.02%) halophytes, 5 (1.37%) xerophytes, 3 (0.82%) hydrophytes and a parasite (0.27%) (Fig. 6).

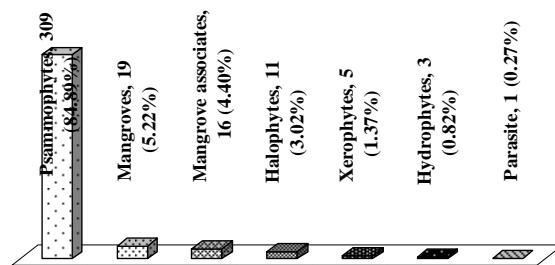


Fig. 6 Nature of habitat

As regards different growth forms, herbs represented by 189 (51.92%) species were dominant followed by shrubs 49 (13.46%), grasses 47 (12.91%), trees 30 (8.24%), sedges 27 (7.42%) and lianas 22 (6.04%) in that order (Fig. 7).

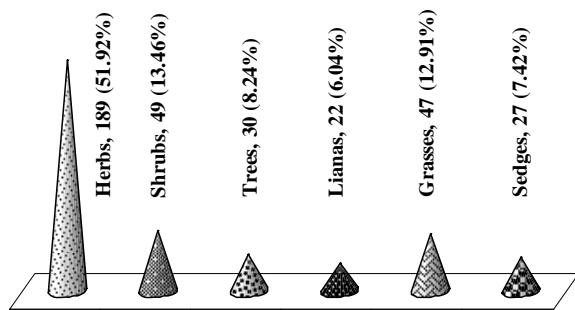


Fig. 7 Growth forms

B. Zonation

The zonation pattern of coastal strand vegetation showed that (I) "Open pioneer zone" supported 20 species from 16 genera within 8 families, (II) "Closed herbaceous zone" harboured 86 species belonging to 30 genera falling into 17 families, (III) "Middle mixed zone" nourished 70 species aggregating to 26 genera belonging to 16 families and (V) "Landward woodland zone" habitated 25 species pertaining to 22 genera in 13 families (Figs. 8, 9). Thus, Closed herbaceous zone contained maximum number of plants followed by Middle mixed zone, Landward woodland zone and Open pioneer zone. The family *Cyperaceae* with 25 species followed by *Poaceae* with 12 species, *Fabaceae* with 11 species and *Rubiaceae* with 10 species dominated the Closed herbaceous zone. The family *Fabaceae* with 14 species followed by *Euphorbiaceae* with 12 species and *Cyperaceae* with 7 species dominated the Middle mixed zone. The family *Euphorbiaceae* with 6 species followed by *Mimosaceae* with 4 species and *Sapindaceae* with 3 species dominated the Landward woodland zone. The families *Cyperaceae* and *Poaceae*, each with 6 species; dominated the Open pioneer zone (Fig. 10).

The zonation pattern of mangroves and associated vegetation revealed that (i) Seaward high salinity zone supported 8 species belonging to 5 genera under 4 families, (ii) Middle moderate salinity zone nurtured 21 species pertaining to 15 genera belonging to 10 families and (iii) Landward low salinity zone sustained 19 species aggregating to 15 genera in 12 families (Figs. 11, 12).

Thus, Middle moderate salinity zone contained maximum number of species followed by Landward low salinity zone and Seaward high salinity zone. The family *Rhizophoraceae* with 4 species dominated the Seaward high salinity zone. The family *Chenopodiaceae* with 5 species followed by *Avicenniaceae* and *Poaceae* each with 3 species dominated the Middle moderate salinity zone. The family *Chenopodiaceae* with 5 species followed by *Meliaceae* with 3 species dominated the Lanward low salinity zone (Fig. 13).

OPEN PIONEER ZONE 12, 110, 129, 142, 143, 180, 239, 240, 291, 301, 312, 313, 316, 317, 352, 353, 359, 360, 361, 364
CLOSED HERBACEOUS ZONE 9, 10, 11, 12, 13, 42, 43, 46, 47, 48, 49, 50, 51, 52, 53, 59, 109, 113, 114, 115, 116, 117, 122, 123, 124, 124, 125, 126, 127, 128, 133, 134, 139, 167, 180, 181, 185, 186, 188, 189, 206, 241, 242, 243, 244, 247, 258, 272, 281, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 336, 337, 338, 339, 340, 341, 342, 344, 355, 359, 361, 362
MIDDLE MIXED ZONE 3, 46, 47, 48, 49, 50, 51, 52, 53, 68, 69, 70, 71, 74, 75, 106, 107, 108, 111, 112, 122, 123, 124, 125, 126, 127, 128, 132, 133, 134, 147, 148, 160, 161, 168, 180, 204, 205, 215, 216, 220, 225, 226, 236, 237, 256, 257, 258, 259, 265, 266, 267, 268, 269, 270, 271, 273, 290, 302, 303, 304, 305, 306, 307, 355, 359, 360, 361, 362
LANDWARD WOODLAND ZONE 16, 22, 36, 37, 38, 39, 61, 80, 81, 83, 84, 130, 155, 187, 204, 205, 260, 262, 263, 264, 270, 278, 286, 287, 288

Fig. 8 Zonation of strand flora
(Numbers correspond to 'Sl. No.' of the species in Table III)

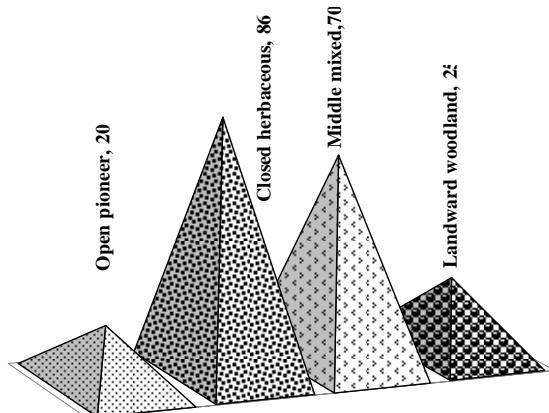


Fig. 9 Zone-wise composition of strand-flora

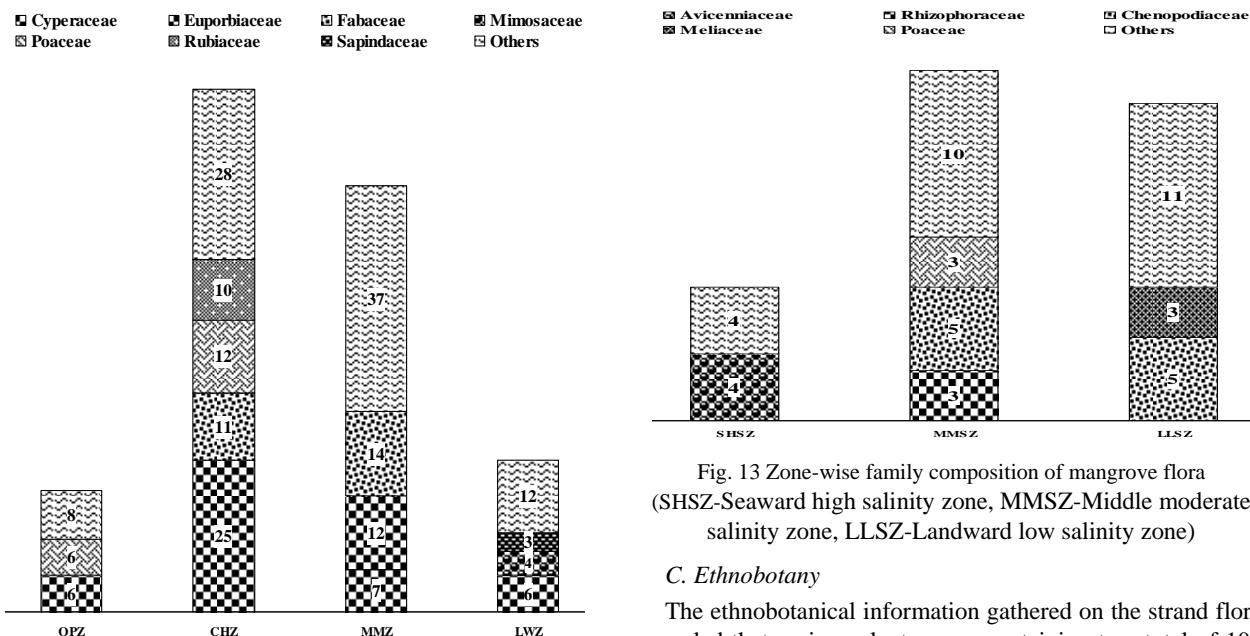


Fig. 10 Zone-wise family composition of strand-flora
(OPZ-Open pionerr zone, CHZ-Closed herbaceous zone, MMZ-Mixed middle zone, LWZ-Landward woodland zone)

SEAWARD HIGH SALINITY ZONE	87, 88, 89, 90, 96, 97, 208, 357
MIDDLE MODERATE SALINITY ZONE	54, 56, 85, 86, 91, 152, 153, 163, 204, 208, 209, 210, 240, 241, 242, 243, 244, 261, 318, 352, 357
LANDWARD LOW SALINITY ZONE	16, 32, 33, 54, 56, 163, 181, 195, 204, 210, 240, 241, 242, 243, 244, 261, 298, 304, 350

Fig. 11 Zonation of mangrove flora
(Numbers correspond to 'Sl. No.' of the species in Table III)

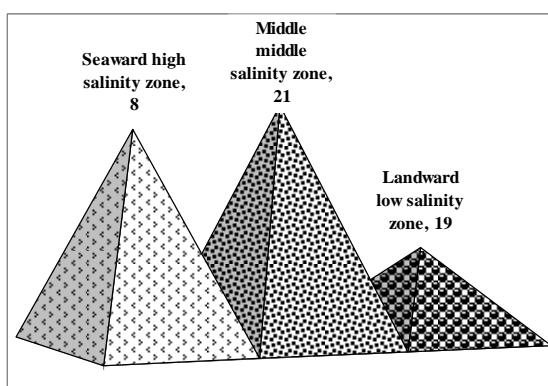


Fig. 12 Zone-wise composition of mangrove flora

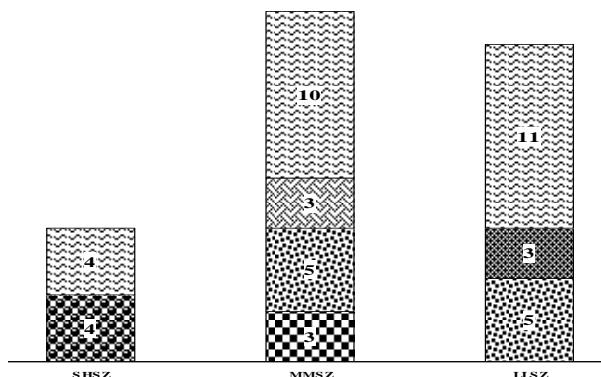


Fig. 13 Zone-wise family composition of mangrove flora
(SHSZ-Seaward high salinity zone, MMSZ-Middle moderate salinity zone, LLSZ-Landward low salinity zone)

C. Ethnobotany

The ethnobotanical information gathered on the strand flora revealed that various plant organs pertaining to a total of 100 species belonging to 84 genera under 43 families carry significant value of varied nature (Table III). Among them, the family *Euphorbiaceae* with 12 species was dominant followed by *Fabaceae* with 9 species, *Asteraceae* with 5 species, *Amaranthaceae*, *Asclepiadaceae*, *Malvaceae* and *Mimosaceae* each with 4 species and *Acanthaceae*, *Caesalpiniaceae*, *Lamiaceae*, *Rubiaceae*, and *Verbenaceae* each with 3 species while rest of the families were represented by 1 or 2 species (Fig. 14).

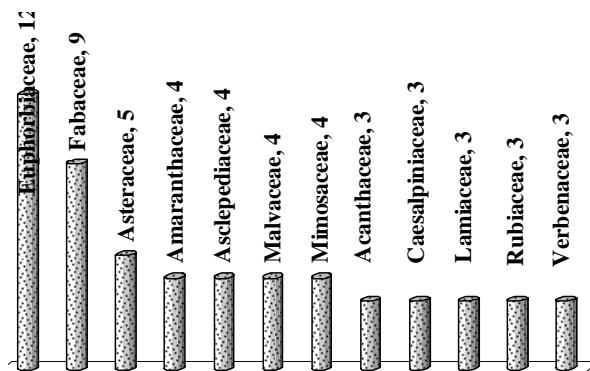


Fig. 14 Strand-flora of ethnobotanical value

Similarly, ethnobotanical information on mangroves and their associates showed that 15 species aggregating to 11 genera under 8 families possessed various plant parts useful for several end purposes (Table III). Among them, *Rhizophoraceae* and *Avicenniaceae* with 3 species each dominated the assemblage while rest of the families included 1 or 2 species (Fig. 15).

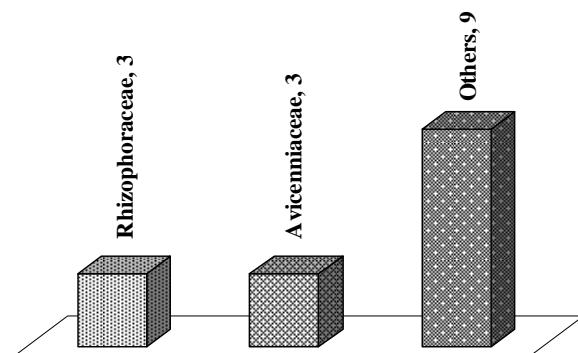


Fig. 15 Mangrove flora of ethnobotanical value

IV. DISCUSSION

Although coastal vegetation and littoral forests fall into the category of "Forests" as per the classification of Indian vegetation [6], [24] the entire coastal stretch inclusive of mangal systems in the region surveyed is not strictly under the jurisdiction of the 'Forest Department', but certain regions thereof under the custody of 'Revenue Department' as well. Further, it is disappointing to note that even the vast vegetated area directly under the purview of forest department is apparently given least importance in terms of its natural composition, strategic position, ecological significance and dynamic role notably due to the absence of revenue yielding vegetative cover (except for cultivated species or planted trees). Earlier observations of [2], [31] that "coastal sand dunes are neglected ecosystems" are very much coinciding with the present findings.

According to [26], the coastal dune ecosystem in Inida supported 338 species belonging to 208 genera under 69 families. But the present inventory confined to a coastal stretch of ~450km within part of a single state itself yielded a better picture of the coastal vegetation even after exclusion of mangroves and associated plants (329 species). Floristic survey in even a single district (Ganjam) of Odisha to the north of Andhra Pradesh resulted in listing of 175 species of plants belonging to 134 genera and 62 families [28]. Similarly, [26] found *Fabaceae* followed by *Poaceae*, *Cyperaceae* and *Asteraceae* to be the dominant families whereas during the present study *Poaceae* followed by *Fabaceae*, *Euphorbiaceae* and *Cyperaceae* were dominant. In Ganjam District, [28] noted *Poaceae* followed by *Euphorbiaceae*, *Cyperaceae* and *Fabaceae* to be dominant. While [26] observed that the composition of herbs, shrubs, trees and lianas was 62%, 21%, 11% and 6% , respectively in India, during the during the present work the same was noted to be 82%, 14%, 8% and 6%, respectively whereas Sahu and Misra (2010) noticed it to be 67%, 12%, 13% and 8%, respectively in Ganjam District. A total of 122 plant species were also found to be occurring in common in Ganjam District of Odisha as well as northern region of Andhra Pradesh chiefly because of geographical continuity of the coastal tracts.

The inventory combined with underlying facts indicates that the predominant sandy coastal ecosystem of the northern

Andhra Pradesh was bestowed, at many places, with wide beaches coupled with well elevated dunes and several major or minor mangals. Presence of a good number (21) of fragmented mangal habitats is perhaps an indication of the prevalence of vast stretches of mangals along the coast of northern Andhra Pradesh during yore. All these ecosystems together harboured rich and varied vegetation accompanied by diverse biological associations. In fact, this coastal system is unique in several ways showering umpteen tangible/intangible benefits to mankind as well as several other life forms and unparalleled in its functions providing a wide array of (1) ecological niches, (2) habitats and (3) breeding and nursery grounds that continuously nurture several trophic chains exclusive for themselves to the CRZ I.

A few peerless features of the region surveyed are the presence of (a) *Acanthus ilicifolius*, *Avicennia marina*, *Hydrophylax maritima*, *Sesuvium portulacastrum* and *Solanum trilobatum* as new distributional records in Srikakulam district, (b) an excellent sand binder, *Pupalia lappacea* var. *orbiculata* (Fig. 16) in Bhimunipatnam, (c) a rare and endemic plant, *Dimorphocalyx glabellus* on the rocky headland at Bangarammapalem (Fig. 17), (d) a new mangrove associate, *Brownlowia tersa*, incidentally a new record to southern India; in the Coringa wildlife sanctuary (Fig. 18) and (e) rare species such as *Aegialites rotundifolia* (Fig. 19), *Ceriops tagal*, *Scyphiphora hydrophyllacea* (Fig. 20), *Xylocarpus granatum* (Fig. 21) and *X. mekongensis* either in Godavari or Krishna mangals.

Yet, a great majority of this "special forest" is unluckily considered as a 'waste land' suitable either for plantation programmes (chiefly casuarinas), pisci-shrimp culture activities or industrial enterprise.

Most of the trees such as *Acacia auriculiformis*, *Anacardium occidentale*, *Borassus flabellifer*, *Casuarina equisetifolia*, *Cocos nucifera*, *Pandanus fascicularis*, *Sapindus emarginatus* and *Thespesia populnea* existing in the Landward woodland zone belonged either to plantations brought up in view of commerce or plants raised for shade or otherwise. It is alarming to notice that plantations were encouraged to be raised up to high tide level at many places along the coast to promote activities of Vana Samrakshana Samithis or to meet other departmental requirements and goals. The inefficiency in offering natural protection and the negative role exercised by coastal plantations, especially Casuarinas was unraveled in a number of earlier instances [7], [12], [29], [18]. So, all these conventional views and approaches should immediately be condemned and wrong practices done away with to resostre the glory and virgin nature of the vast coastal tracts of the land, that in fact are a real boon to man; in the light of the facts already mentioned.

At the time of this survey (2003-2007), the entire sea board of the northern Andhra Pradesh remained mostly pristine uninfluenced and unimpinged by modern human activites, industrial or otherwise but for budding up sea sand mining in Srikakulam District; a major port in Visakhapatnam; GAIL establishment, ONGC drilling operations and a minor port in East Godavari and beach sand poaching in West Godavari.

However, the same is now totally threatened due to allotment of large coastal stretches for coal power plants, atomic power plants, film city, tourist resorts, a major port, marin police stations, naval/ coast guard establishments, a captive port, special economic zones, pharmacy, apparel park, petro corridor, expanding oil drilling activities, oil and gas caverns, satellite launching station, etc.

With these developments, the observation of [39] that “Globally, deforestation continues to threaten topical rain forests” becomes equally applicable to the strand vegetation and mangal forests in the northern half of Andhra Pradesh. Futher, as noticed in the case of rain forests by [9], [5], the threats such as habitat degradation and loss resulting from the said land-use disrupt ecological processes by affecting native strand vegetation and mangal forests ultimately leading to fragmentation and isolation of strand vegetation and mangal forests through the CRZ I under consideration [14], [33].



Fig. 16 *Pupalia lappacea* var. *orbiculata* - a rare plant from Bheemunipatnam coast

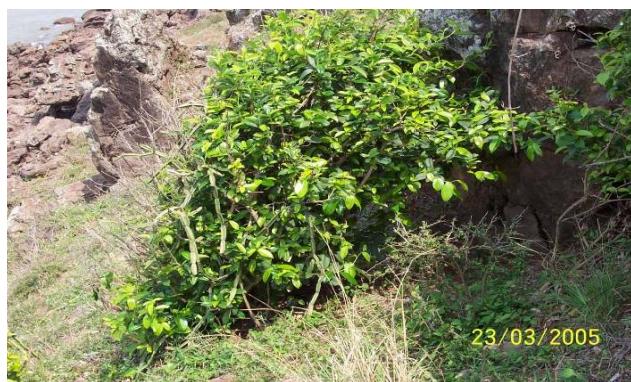


Fig. 17 *Dimorphocalyx glabellus* – a rare plant from Bangarammapalem rocky coast



Fig. 18 *Brownlowia teresa* - a rare mangrove associate from Godavari mangals



Fig. 19 *Aegialites rotundifolia* - a rare mangrove from Krishna mangals



Fig. 20 *Scyphiphora hydrophyllacea* - a rare mangrove from Godavari delta

Fig. 21 *Xylocarpus meknogensis* – a rare true mangrove

In order to aid in the protection and preservation of the characteristic vegetative cover of this divergent coastal system and to incorporate the same in suitable action plans to ensure their *status quo* in the light of drastically mounting up pressure for land for various developmental activities, stabilization of the coastal areas should be achieved by implementing the principle of ‘designing with nature’. Propagation of indigenous vegetation helps to control habitat losses besides bestowing numerous tangible benefits and umpteen intangible ecosystem services. In fact, all coastal vegetation including mangals and fragmented habitats should be declared as “National nature heritage” at once and accorded top priority of conservation through induction of proper training to the foresters for full appreciation of their immense value. In instances where primary coastal vegetative cover cannot be conserved directly, stringent measures to protect human modified landscapes in the form of “countryside habitats” as a last resort (because of take off of different industrial and commercial ventures) should be implemented as extremely important steps to increase the conservation potential of native populations of plants, animals and microbes [8], [15], [9], [32].

V. CONCLUSION

The importance, contribution, role, benefits, economic gains and ecosystem services, etc. of the coastal forest cover should first of all be properly realized by the forest department and action courses required to ensure the due recognition it deserves need be quickly sorted out and implemented *en masse* on a war-footing as several decades have rather lapsed away since the potential of these vital green belt got undermined and rather awkwardly meddled with.

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