

PLANT DIVERSITY IN AND AROUND PROPOSED SITE FOR
CHEYYUR 4000MW COAL-FIRED POWER PROJECT, KANCHIPURAM

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INTRODUCTION

A rapid plant survey was conducted in around the proposed Cheyyur 4000MW Ultra Mega Power Project in Kanchipuram District, Tamil Nadu, on 01.12.13, 23.12.13 and 30.3.2013. The surveys were conducted along Vilambur, Buckingham Canal, Vaanjimodu, and the Palaiyur Reserve Forest within the project site and the portion of Palaiyur R.F. along which the said project's ash slurry pipeline will reportedly run. During the study, three different vegetation types were observed – namely sand dune vegetation, coastal wetland vegetation and Tropical Dry Evergreen vegetation. This survey has recorded a total of 294 plant species from all the three vegetational types.

SAND DUNE VEGETATION

Sand dune vegetation was seen in two localities namely Vilambur and Vaanjimodu in Gangadevankuppam. These two sand dunes harbour species of Tropical Dry Evergreen Forest (TDEF). One of the important findings of this survey is the collection of *Solena angulata*, which was first described in 1952 and subsequently collected 1967. It has never been collected since. Occurrence of this species in the Vilambur/Buckingham Canal and Vaanjimodu dune complexes make the sand dune an area of conservation importance. Other important plant species include *Garcinia spicata* and *Syzygium alternifolium*. *Garcinia spicata* is the only *Garcinia* species that occurs on the East Coast and is a characteristic species of Tropical Dry Evergreen Forests (TDEFs). Rest of the *Garcinia* species are found in the Western Ghats. *Garcinia spicata* is currently present only in small protected patches along the Coast either in Reserved Forests or in Sacred groves. These populations are highly fragmented, and clearing any one of the patches will make the species

more genetic vulnerable. *Syzygium alternifolium* is a typical species of coastal sandy habitats and its population is critically low.

Sand dunes are a crucial habitat of utmost ecological importance. They serve as shields during coastal calamities such as cyclones and tsunamis. Tourism development and urbanization has flattened vast structures of sand dunes from Chennai to Pondicherry. Studies conducted after the 2004 tsunami indicate that sand dunes played a great protective role in shielding the villages near the coast.

The Cheyyur UMPP proposes to transport coal, raw seawater and effluent through a conveyor belt and pipelines traversing these sensitive sand dunes, including the densely wooded dune complexes on either side of the Buckingham Canal, and the Vaanjimodu. The EIA reports do not anywhere assess the impact of such interference on the integrity of the sand dunes, and on rich flora present in these habitats.

COASTAL WETLANDS

The proposed site has many seasonal and semi-permanent pools, ponds, backwaters and irrigation tanks. These are home to a wide variety of aquatic species. Coastal wetlands are crucial habitat for several plant species belonging to Scrophulariaceae, Commelinaceae, Cyperaceae and Poaceae families. A wild relative of rice - *Leersia hexandra* - was recorded during our research. These wetlands are also important habitat for birds and other animal lives.



*Sand dune vegetation along the Buckingham Canal.
Proposed route for coal conveyor belt.*

CHEYYUR UMPP'S ENVIRONMENTAL DUE DILIGENCE

As part of the study, the project proponent's EIA for power plant and captive port were perused. The report makes no mention of the rich plant biodiversity of the area, including the project sites. The coal conveyor corridor will traverse several sand dunes, including along the Buckingham Canal in Vilambur and the Vaanjimodu dunes in Gangadevankuppam. It would have, therefore, been important to acknowledge the presence of these dunes, develop baseline for resident vegetation and assess impacts. The EIA does not mention the presence of these dunes. Therefore, the question of mentioning the presence of rare vegetation types such as TDEFs or rare plant species on these dunes does not arise.

The EIA for the power plant mentions a road link to NH45 and a railway corridor. But it does not present any details about the land use, flora of the road and rail corridor and likely impacts. Given the rich flora observed in the region, this

THE TROPICAL DRY EVERGREEN FOREST (TDEF)

The Palaiyur Reserve Forest is a Tropical Dry Evergreen Forest patch measuring about 347.58 acres. TDEFs are a rare vegetational type and are highly fragmented. TDEF plays an important role from the coastal production, livelihood, life support and ecological points of views. Several rare species such as *Adenia wightiana*, *Dyschoriste dipressa*, *Osbeckia zeylanica*, *Polygala rosmarinifolia*, *Polygala telephioides* and *Pleurostylia wightii* were recorded during our visit. We also observed forest department efforts in promoting the diversity of the area by planting *Terminalia bellerica*, *Terminalia chebula* and *Semicarpus anacardium*. Many of these trees have grown to reasonably good size. Interfering with such TDEF forest patch is detrimental to coastal ecology.

The area adjoining Palaiyur R.F. is very fertile where paddy is cultivated at least two times a year.

The Comprehensive EIA for the power plant mentions that 9.83 hectares of Reserved Forest will be acquired. The absence of an impact assessment is incorrectly justified by an unsubstantiated statement that "The forest land to be acquired has mainly plantations of consuarina, and dense forest is not observed. No endemic, rare or threatened species are observed on the forest land to be acquired for the project. As a part of the project, greenbelt will be developed, which will improve the vegetal cover in the area."

As noted earlier, this survey has found a number of rare, species of plants in the project area of the power plant, port and conveyor corridor.

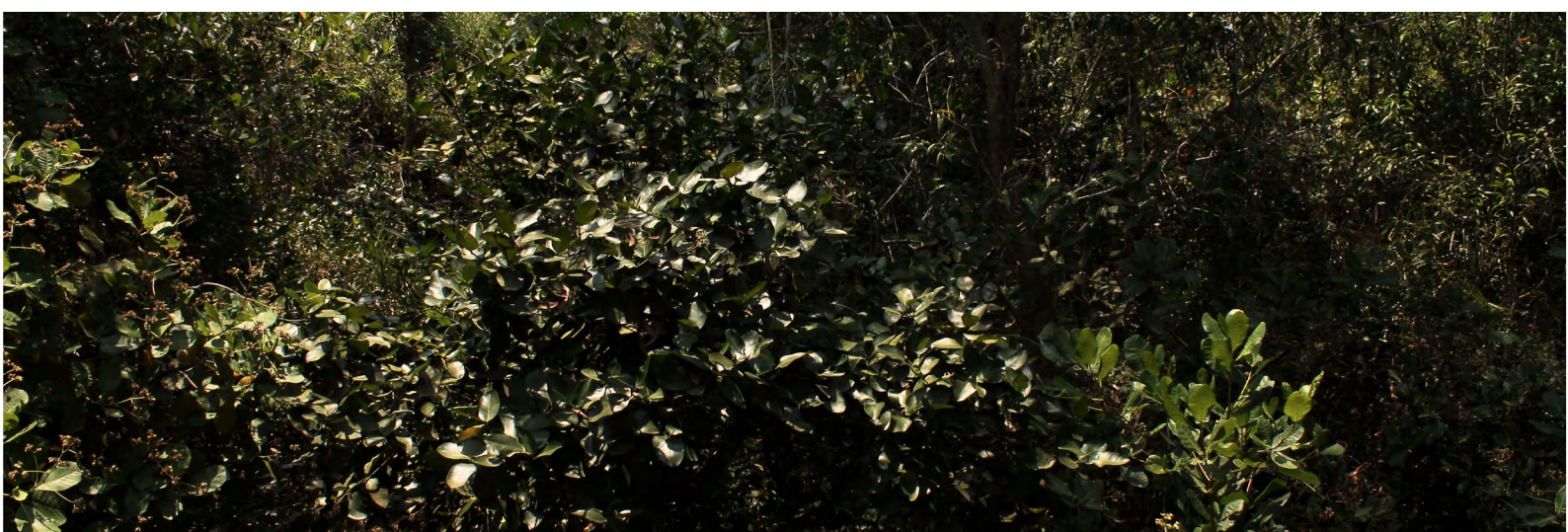
The project documents do not contain an assessment of impacts on vegetation – including the TDEF, wetland vegetation, agricultural crops and sand dune vegetation – and assumes that

effects will be nil as pollution control measures will be implemented. This is particularly problematic as a coal fired thermal plant of this size can be expected to have significant impacts on the botanical resources of the region. Further, critical components such as the conveyor corridor and the ash slurry pipeline traverse ecologically sensitive and vulnerable plant diversity hotspots such as the dunes and the TDEF.

The project documents and the Environmental Clearance issued by the Ministry of Environment & Forests do not appreciate the botanical importance of the project and study areas. The diversion of such forests to non-forest uses without as much as an inventory of plant species to assess the diversity and health of the ecosystem is ill-advised.

The EIA reports' approach to conservation and livelihood is most ceremonial – such as by setting up Green Endowment Fund and Fishermen Endowment Welfare Fund. These funds will be of little value when the coastal ecology and livelihood of coastal people is damaged, and such funds cannot be of any help when the last remaining natural habitats of rare plant species is threatened by land-use change and pollution.

The gaps in data and analyses in the project documents and the silence of the Environmental Clearance on critical issues relating to health of the botanical resources in the region throw into question the robustness of environmental due diligence for the project.



Garcinia population

DISCUSSION

The wetlands on and around which the plant is located, the sand dunes traversed by the coal conveyor pipeline and the TDEF patches traversed by the proposed ash slurry pipeline are all ecologically sensitive and integral to the natural resilience of the region in terms of weathering extreme climate events and of biodiversity. The special ecological and botanical credentials of this area makes it an area of conservation importance.

The location of the power plant, captive port and the alignment of the coal corridor is inappropriate from a botanical perspective, and will lead to irreversible losses of plant genetic diversity.

RECOMMENDATIONS

It is advisable to locate the plant in a non-ecologically sensitive site in line with siting guidelines of the Ministry of Environment & Forests.

The presence of rare species of plants such as *Solena angulata* qualifies this area to be protected as an area of conservation importance.

PLANTS ON VILAMBUR SAND DUNE

	LIST OF THE PLANT	FAMILY
1	<i>Acacia auriculiformis</i>	Fabaceae
2	<i>Anacardium occidentale</i>	Anacardiaceae
3	<i>Aristida setacea</i>	Poaceae
4	<i>Asparagus racemosus</i>	Asparagaceae
5	<i>Azadirachta indica</i>	Meliaceae
6	<i>Boerhavia diffusa</i>	Nyctaginaceae
7	<i>Borassus flabellifer</i>	Arecaceae

PLANTS IN BUCKINGHAM CANAL

	LIST OF THE PLANT	FAMILY
1	<i>Abrus precatorius</i>	Fabaceae
2	<i>Acacia auriculiformis</i>	Fabaceae
3	<i>Achyranthes aspera</i>	Amaranthaceae
4	<i>Allophylus serratus</i>	Sapindaceae
5	<i>Anacardium occidentale</i>	Anacardiaceae
6	<i>Aristida setacea</i>	Poaceae
7	<i>Asparagus racemosus</i>	Asparagaceae
8	<i>Azadirachta indica</i>	Meliaceae
9	<i>Boerhavia diffusa</i>	Nyctaginaceae
10	<i>Borassus flabellifer</i>	Arecaceae
11	<i>Buchanania axillaris</i>	Anacardiaceae
12	<i>Bulbostylis barbata</i>	Cyperaceae
13	<i>Bulbostylis pulchella</i>	Cyperaceae
14	<i>Canthium coromandelicum</i>	Rubiaceae
15	<i>Capparis zeylanica</i>	Capparaceae
16	<i>Carissa spinarum</i>	Apocynaceae
17	<i>Casuarina equisetifolia</i>	Casuarinaceae

	LIST OF THE PLANT	FAMILY
18	<i>Catunaregam spinosa</i>	Rubiaceae
19	<i>Cereus pterogonus</i>	Cactaceae
20	<i>Cissus quadrangularis</i>	Vitaceae
21	<i>Cissus vitiginea</i>	Vitaceae
22	<i>Commelina sp</i>	Commelinaceae
23	<i>Croton bonplandianum</i>	Euphorbiaceae
24	<i>Desmodium sp.</i>	Fabaceae
25	<i>Desmodium triflorum</i>	Fabaceae
26	<i>Dicerma biarticulatum</i>	Fabaceae
27	<i>Eragrostis unioloides</i>	Poaceae
28	<i>Eucalyptus tereticornis</i>	Myrtaceae
29	<i>Eugenia bracteata</i>	Myrtaceae
30	<i>Euphorbia corrigioloides</i>	Euphorbiaceae
31	<i>Evolvulus alsinoides</i>	Convolvulaceae
32	<i>Fimbristylis tenera</i>	Cyperaceae
33	<i>Flacourtia indica</i>	Salicaceae
34	<i>Flueggea leucopyrus</i>	Phyllanthaceae
35	<i>Gloriosa superba</i>	Colchicaceae
36	<i>Gmelina asiatica</i>	Lamiaceae
37	<i>Hedyotis herbacea</i>	Rubiaceae
38	<i>Hemidesmus indicus</i>	Apocynaceae
39	<i>Hybanthus enneaspermus</i>	Violaceae
40	<i>Indigofera trifoliata</i>	Fabaceae
41	<i>Jasminum angustifolium</i>	Oleaceae
42	<i>Justicia prostrata</i>	Acanthaceae
43	<i>Leersia hexandra</i>	Poaceae
44	<i>Leucas aspera</i>	Lamiaceae
45	<i>Leucas diffusa</i>	Lamiaceae
46	<i>Ludwigia adscendens</i>	Oenotheraceae
47	<i>Manilkara hexandra</i>	Sapotaceae
48	<i>Memecylon umbellatum</i>	Melastomataceae

	LIST OF THE PLANT	FAMILY
49	<i>Merremia tridentata</i>	Convolvulaceae
50	<i>Murdannia spiralis</i>	Commelinaceae
51	<i>Pandanus tectorius</i>	Pandanaceae
52	<i>Pergularia daemia</i>	Apocynaceae
53	<i>Perotis indica</i>	Poaceae
54	<i>Phoenix humilis</i>	Arecaceae
55	<i>Phyllanthus debilis</i>	Phyllanthaceae
56	<i>Polycarpaea corymbosa</i>	Caryophyllaceae
57	<i>Polygala arvensis</i>	Polygalaceae
58	<i>Rivea hypocrateriformis</i>	Convolvulaceae
59	<i>Sida cordata</i>	Malvaceae
60	<i>Sida cordifolia</i>	Malvaceae
61	<i>Solena angulata</i>	Cucurbitaceae
62	<i>Spermacoce articularis</i>	Rubiaceae
63	<i>Spermacoce hispida</i>	Rubiaceae
64	<i>Spermacoce ocymoides</i>	Rubiaceae
65	<i>Stylosanthes mucronata</i>	Fabaceae
66	<i>Syzygium cumini</i>	Myrtaceae
67	<i>Tarenna asiatica</i>	Rubiaceae
68	<i>Tephrosia maxima</i>	Fabaceae
69	<i>Toddalia asiatica</i>	Rutaceae
70	<i>Tragia involucrata</i>	Euphorbiaceae
71	<i>Vernonia cinerea</i>	Asteraceae
72	<i>Vitex negundo</i>	Lamiaceae
73	<i>Waltheria indica</i>	Malvaceae
74	<i>Ziziphus oenoplia</i>	Rhamnaceae

PLANTS ON VAANJIMODU SAND DUNE (GANGADEVAN KUPPAM)

	LIST OF THE PLANT	FAMILY
1	<i>Abrus precatorius</i>	Fabaceae
2	<i>Acacia auriculiformis</i>	Fabaceae
3	<i>Anacardium occidentale</i>	Anacardiaceae
4	<i>Aristida setacea</i>	Poaceae
5	<i>Asparagus racemosus</i>	Asparagaceae
6	<i>Asystasia gangetica</i>	Acanthaceae
7	<i>Azadirachta indica</i>	Meliaceae
8	<i>Borassus flabellifer</i>	Arecaceae
9	<i>Canthium coromandelicum</i>	Rubiaceae
10	<i>Cassytha filiformis</i>	Lauraceae
11	<i>Casuarina equisetifolia</i>	Casuarinaceae
12	<i>Cereus pterogonus</i>	Cactaceae
13	<i>Cissus vitiginea</i>	Vitaceae
14	<i>Commelina lanceolata</i>	Commelinaceae
15	<i>Commelina sp.</i>	Commelinaceae
16	<i>Croton bonplandianum</i>	Euphorbiaceae
17	<i>Solena angulata</i>	Cucurbitaceae
19	<i>Dodonaea viscosa</i>	Sapindaceae
20	<i>Eucalyptus tereticornis</i>	Myrtaceae
21	<i>Eugenia bracteata</i>	Myrtaceae
22	<i>Evolvulus alsinoides</i>	Convolvulaceae
23	<i>Garcinia spicata</i>	Cluciaceae
24	<i>Hedyotis herbacea</i>	Rubiaceae
25	<i>Hemidesmus indicus</i>	Apocynaceae
26	<i>Hibiscus furcatus</i>	Malvaceae
27	<i>Hybanthus enneaspermus</i>	Violaceae
28	<i>Ichnocarpus frutescens</i>	Apocynaceae
29	<i>Indigofera trifoliata</i>	Fabaceae
30	<i>Jasminum angustifolium</i>	Oleaceae
31	<i>Leucas diffusa</i>	Lamiaceae

	LIST OF THE PLANT	FAMILY
32	<i>Memecylon umbellatum</i>	Melastomataceae
33	<i>Merremia tridentata</i>	Convolvulaceae
34	<i>Micrococca mercurialis</i>	Euphorbiaceae
35	<i>Mimosa pudica</i>	Fabaceae
36	<i>Morinda pubescens</i>	Rubiaceae
37	<i>Pandanus tectorius</i>	Pandanaceae
38	<i>Perotis indica</i>	Poaceae
39	<i>Phoenix humilis</i>	Arecaceae
40	<i>Sida cordifolia</i>	Malvaceae
41	<i>Spermacoce articularis</i>	Rubiaceae
42	<i>Spermacoce hispida</i>	Rubiaceae
43	<i>Spermacoce ocymoides</i>	Rubiaceae
44	<i>Syzygium cumini</i>	Myrtaceae
45	<i>Syzygium sp.</i>	Myrtaceae
46	<i>Tarenna asiatica</i>	Rubiaceae
47	<i>Tephrosia maxima</i>	Fabaceae
48	<i>Tephrosia villosa</i>	Fabaceae
49	<i>Toddalia asiatica</i>	Rutaceae
50	<i>Tragia involucrata</i>	Euphorbiaceae
51	<i>Triumfetta rhomboidea</i>	Malvaceae
52	<i>Tylophora asthmatica</i>	Apocynaceae
53	<i>Vernonia cinerea</i>	Asteraceae
54	<i>Ziziphus oenoplia</i>	Rhamnaceae



L - *Carisa spinarum*, R - *Cyanotis sp*

PLANTS IN PALAYUR RESERVE FOREST

	LIST OF THE PLANT	FAMILY
1	<i>Abrus precatorius</i>	Fabaceae
2	<i>Acacia auriculiformis</i>	Fabaceae
3	<i>Acacia holosericea</i>	Fabaceae
4	<i>Adenia wightiana</i>	Passifloraceae
5	<i>Albizia lebbek</i>	Fabaceae
6	<i>Allmania nodiflora</i>	Amaranthaceae
7	<i>Allophylus serratus</i>	Sapindaceae
8	<i>Alysicarpus monilifer</i>	Fabaceae
9	<i>Alysicarpus vaginalis</i>	Fabaceae
10	<i>Apluda mutica</i>	Poaceae
11	<i>Asparagus racemosus</i>	Asparagaceae
12	<i>Atalantia monophylla</i>	Rutaceae
13	<i>Azadirachta indica</i>	Meliaceae
14	<i>Bauhinia racemosa</i>	Fabaceae
15	<i>Borassus flabellifer</i>	Arecaceae
16	<i>Breynia retusa</i>	Phyllanthaceae
17	<i>Buchanania axillaris</i>	Anacardiaceae
18	<i>Bulbostylis densa</i>	Cyperaceae
19	<i>Butea monosperma</i>	Fabaceae
20	<i>Cajanus scarabaeoides</i>	Fabaceae
21	<i>Capparis brevispina</i>	Capparaceae
22	<i>Carissa carandas</i>	Apocynaceae
23	<i>Carissa spinarum</i>	Apocynaceae
24	<i>Carmona retusa</i>	Boraginaceae
25	<i>Catunaregam spinosa</i>	Rubiaceae
26	<i>Chloris barbata</i>	Poaceae
27	<i>Cissus quadrangularis</i>	Vitaceae
28	<i>Cleome aspera</i>	Capparaceae
29	<i>Combretum albidum</i>	Conmberataceae
30	<i>Crotalaria biflora</i>	Fabaceae

	CROTON BONPLANDIANUM	FAMILY
31	<i>Curculigo orchioides</i>	Euphorbiaceae
32	<i>Cyanotis papilionacea</i>	Hypoxidaceae
33	<i>Cyperus castaneus</i>	Commelinaceae
34	<i>Derris scandens</i>	Cyperaceae
35	<i>Desmodium triflorum</i>	Fabaceae
36	<i>Dicerma biarticulatum</i>	Fabaceae
37	<i>Dioscorea oppositifolia</i>	Fabaceae
38	<i>Diospyros ferrea</i>	Dioscoriaceae
39	<i>Diospyros melanoxylon</i>	Ebenaceae
40	<i>Dodonaea viscosa</i>	Ebenaceae
41	<i>Dyschoriste depressa</i>	Sapindaceae
42	<i>Ehretia pubescens</i>	Acanthaceae
43	<i>Eriocaulon quinquangular</i>	Boraginaceae
44	<i>Eucalyptus tereticornis</i>	Eriocaulaceae
45	<i>Evolvulus alsinoides</i>	Myrtaceae
46	<i>Evolvulus nummularius</i>	Convolvulaceae
47	<i>Ficus benghalensis</i>	Convolvulaceae
48	<i>Flacourtia indica</i>	Moraceae
49	<i>Gloriosa superba</i>	Salicaceae
50	<i>Gmelina asiatica</i>	Colchicaceae
51	<i>Grewia hirsuta</i>	Verbinaceae
52	<i>Grewia orientalis</i>	Malvaceae
53	<i>Gymnema sylvestre</i>	Malvaceae
54	<i>Hedyotis umbellata</i>	Apocynaceae
55	<i>Heliotropium bracteatum</i>	Rubiaceae
56	<i>Hemidesmus indicus</i>	Boraginaceae
57	<i>Heteropogon contortus</i>	Apocynaceae
58	<i>Holoptelea integrifolia</i>	Poaceae
59	<i>Hugonia mystax</i>	Ulmaceae
60	<i>Hybanthus enneaspermus</i>	Linaceae
61	<i>Indigofera linifolia</i>	Violaceae

	INDIGOFERA TRIFOLIATA	FAMILY
62	<i>Ixora pavetta</i>	Fabaceae
63	<i>Jasminum angustifolium</i>	Fabaceae
64	<i>Jatropha gossypifolia</i>	Rubiaceae
65	<i>Lannea coromandelica</i>	Oleaceae
66	<i>Lepidagathis cristata</i>	Euphorbiaceae
67	<i>Leucas aspera</i>	Anacardiaceae
68	<i>Leucas diffusa</i>	Acanthaceae
69	<i>Lindernia crustacea</i>	Lamiaceae
70	<i>Lindernia oppositifolia</i>	Lamiaceae
71	<i>Linociera malabarica</i>	Scrophulariaceae
72	<i>Manilkara hexandra</i>	Scrophulariaceae
73	<i>Maytenus emarginata</i>	Oleaceae
74	<i>Memecylon umbellatum</i>	Sapotaceae
75	<i>Merremia tridentata</i>	Celastraceae
76	<i>Mitracarpus villosus</i>	Melastomataceae
77	<i>Mukia maderaspatana</i>	Convolvulaceae
78	<i>Osbeckia zeylanica</i>	Rubiaceae
79	<i>Pachygone ovata</i>	Cucurbitaceae
80	<i>Pavonia zeylanica</i>	Melastomataceae
81	<i>Perotis indica</i>	Menispermaceae
82	<i>Phoenix humilis</i>	Malvaceae
83	<i>Phyllanthus virgatus</i>	Poaceae
84	<i>Pleurostylia wightii</i>	Arecaceae
85	<i>Polycarpaea corymbosa</i>	Phyllanthaceae
86	<i>Polygala rosmarinifolia</i>	Celastraceae
87	<i>Polygala telephioides</i>	Polycarpaceae
88	<i>Premna corymbosa</i>	Polygalaceae
89	<i>Pseudarthria viscida</i>	Polygalaceae
90	<i>Psydrax dicoccos</i>	Verbinaceae
91	<i>Pterocarpus marsupium</i>	Fabaceae
92	<i>Randia malabarica</i>	Rubiaceae

	RHYNCHOSIA CANNA	FAMILY
93	<i>Rivea hypocrateriformis</i>	Fabaceae
94	<i>Sarcostemma acidum</i>	Rubiaceae
95	<i>Scleria lithosperma</i>	Fabaceae
96	<i>Sebastiania chamaelea</i>	Convolvulaceae
97	<i>Secamone emetica</i>	Apocynaceae
98	<i>Semecarpus anacardium</i>	Cyperaceae
99	<i>Senna auriculata</i>	Euphorbiaceae
100	<i>Solanum trilobatum</i>	Apocynaceae
101	<i>Spermacoce articularis</i>	Anacardiaceae
102	<i>Spermacoce hispida</i>	Fabaceae
103	<i>Striga densiflora</i>	Solanaceae
104	<i>Terminalia bellerica</i>	Rubiaceae
105	<i>Terminalia chebula</i>	Rubiaceae
106	<i>Theriphonum minutum</i>	Scraphulariaceae
107	<i>Tinospora cordifolia</i>	Combretaceae
108	<i>Toddalia asiatica</i>	Combretaceae
109	<i>Tragia involucrata</i>	Araceae
110	<i>Trisopogon piculus</i>	Menispermaceae
111	<i>Triumfetta rhomboidea</i>	Rutaceae
112	<i>Ventilago madraspatana</i>	Euphorbiaceae
113	<i>Vernonia cinerea</i>	Poaceae
114	<i>Waltheria indica</i>	Malvaceae
115	<i>Ziziphus oenoplia</i>	Rhamnaceae
116	<i>Zizyphus xylopyrus</i>	Asteraceae
117	<i>Zornia gibbosa</i>	Malvaceae
118	<i>Ziziphus oenoplia</i>	Rhamnaceae
119	<i>Zizyphus xylopyrus</i>	Rhamnaceae
120	<i>Zornia gibbosa</i>	Fabaceae



Toddalia asiatica