

# Some notes on the Tropical Dry Evergreen Forest Of South India

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## **Acknowledgements**

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## **Introduction**

The Tropical Evergreen forest of the east coast of India has been variously studied since it was recognized as a forest type in Champion's classification of Indian forests (Champion 1936). Initial studies gave species lists for various remnants (Shankaranarayan & Dabholkar 1959), (Sebastine & Ellis 1967) as well as attempts to describe the physiognomic character of the vegetation (Marlange & Meher-Homji 1965), (Legris and Blasco 1972), (Blasco and Legris 1973). Reference to the disturbed nature of the vegetation was often noted, as well as the absence of any of the primary forest. Subsequently an attempt to redefine the forest type was made (Meher-Homji 1973), (Meher-Homji 1986), based on a species association with *Albizia amara*. This work continued and hypotheses were put forward as to the origin of the forest type (Meher-Homji 1974) and also to the cline inland towards the dry deciduous type (Meher-Homji 1977).

In the next decade energy was devoted to studying the remnant forest in Point Calimere; here interesting ecological characteristics of seed dispersal and animal interactions were noted (Balasubramanian and Bole 1993a), (Balasubramanian and Bole 1993b). Lately quantitative ecological analyses of sacred groves around the Pondicherry region have been undertaken and comparisons with other tropical dry forests in the world made in terms of species number and basal area (Visalakshi 1995), (Parthasarathy & Kartikeyan 1996).

However within all of these works a clear picture of the ecological dynamics of the TDEF has not emerged and it is the intention of this paper to contribute to this.

## **Outline of Forest Environment**

The TDEF has been described by various authors as a thin belt of forest existing on the south-eastern seaboard of peninsular India. It is generally held that the forest extends from Vishakhapatnam in the north to Ramanathapuram in the south, and in a belt between 60 km wide (Champion 1936) or 30 km wide (Gamble 1967)

The climate of the region is tropical dissymmetric (Meher-Homji 1973). In contrast to the rest of peninsular India, where the rains are concentrated in the summer months (June to first half of October), the rainy season is spread over the months June to December - January. The rains are light from June to September, becoming heavy from October to December, resulting mainly from depressions formed in the Bay of Bengal. Consequently the peak of the rainy season is not found in the middle of the year, as elsewhere, but towards the later parts, somewhere between October-November.

The average annual rainfall of the area is around 1250 mm, but variation is found as one travels north-south. After the rainy period the dew formation in the months of January and February can be heavy, and may be a significant factor in the formation of this forest type. However no clear reason has been put forth although it is assumed that some climatic feature is responsible (Meher-Homji 1974).

The soils of the region are red ferralitic or alluvial clays of varying kinds. The vast majority of the remnant vegetation occurs on the red soils, as this is the least productive land for agriculture. It is assumed that in pre-human times the forest would have occurred on all soil types, with consequent variation in species composition.

Within the geographic region granite hillocks are found up to a height of 160 m. The bedrock has been described as Charnockite. The vegetation is often heavily disturbed, but as the hillocks have no agricultural value they are covered in forest, degraded to a varying degree.

## **The Remnant Areas**

The remnants are to be found in three major forms: - sacred groves, reserve forests on the plains, and reserve forests around and on hillocks. Of these three forms the forest found outside of the sacred groves is very obviously impacted by human factors, such as browsing, lopping, grazing, long since removal of any sizeable trees, and constant removal of firewood. The reserve forests are of sizes 1000-2000 acres and consequently have potential as future forests that can sustain wildlife (Balasubramanian and Bole 1993a & 1993b). The forest found within the sacred groves can be relatively undisturbed, however the sizes of the groves are very small ranging from less than an acre to little more than ten.

## **Mammals of the forests**

The forest in the plains supports a number of small mammals including the Mongoose (*Herpestes edwardsi*), Pale hedgehog (*Paraechinus coromandra*), Indian fox (*Vulpes bengalensis*) and the Jackal (*Canis aureus*). The hillocks around Chinglepet and Madurantagam support a variety of larger mammals: Porcupine (*Hystrix indica*), Civet cat (*Viverricula indica*), Pangolin (*Manis crassicaudata*), Honey badger (*Mellivora capensis*). Further inland the hillocks around Gingee that rise to 650m additionally support the Indian giant squirrel (*Ratufa indica*), Ruddy Mongoose (*Herpestes smithi*), Sloth bear (*Melursus ursinus*) and the Wild boar (*Sus scrofa*). In Point Calimere both the Black buck (*Antelope cervicapra*) and the Chital (*Axis axis*) are found. Of the monkeys, the Bonnet Macaque (*Macaca radiata*) is found all over, where as the Common langur (*Presbytis entellus*) is restricted to the hills. See appendix 1 for full list of mammals.

## **Other animals of the forest type**

The reptiles of the forest have never been listed, although the monitor lizard (*Varanus bengalensis*) is found in nearly all areas, and various other lizards are present, as well as around 18 species of snake. See appendix 2 for list of reptiles.

The bird population has been recorded for Point Calimere; it has also been studied in Marakanam forest and the total number of species is thought to be around 80, including seasonal migrants. This excludes water birds. See appendix 3 for list of birds.

## **Some notes on the ecology of the TDEF**

Within the tropics the concept of primary succession is erroneous if considered within the classical concept of ecology as taught within the European and American schools. In those schools the clean sheet created by the advance of the ice sheet in the glacial periods is not applicable to the tropical environment. The concept of pioneer vegetation, leading through various stages to a climax is misleading. The vegetation of the tropics is more a case of a fluid vegetation continuum that responds to the changing climate, slowly, over long periods of time.

Therefore the concept of primary pioneer vegetation is not valid. The opportunities for this type of vegetation are limited to the presence of relatively small scale natural disasters such as forest fire, prolonged drought, or in the case of coastal vegetation, damage by cyclonic winds. Rather than calling it pioneer vegetation it should be considered as opportunistic, or at least it should be recognized that it is secondary succession taking place.

Having said this, it is also true that the vegetation of this area has long been subject to anthropogenic influences and, over this period of at least two millennia, the make-up of this forest type will have changed to reflect this consistent input. The shifting agriculture, which will have expanded and contracted with the minor variations in climate, would have periodically left many areas of fallow land to be recolonized by the forest.

It might be impossible to discern a pure ecological system for the TDEF, however a number of observations can be made to give a feel for the forest type. It is fair to assume that for this

area, allowing for variation due to edaphic factors, there exists a climax type of the vegetation. Meaning, that given a large enough area, and stable climatic conditions, there is a vegetation complex that this forest type will head towards over succeeding generations. The strongest impression that is left for us is found within the temple groves. Although they are never pristine, and always of a small size, it is within them that we are able to detect at least an outline of the climax of this vegetation type, which we can call the TDEF.

This climax vegetation has broad common characteristics, which can be noted, allowing that in every case there are exceptions to the rule. It is an example of convergent evolution, where different plant species have solved the environmental conundrum for this particular area with similar adaptations.

The species are evergreen, responding to rainfall with new flushes of leaves.

The leaves are coriaceous, simple; approximately 6 cm by 3 cm, often waxy on the upper surface, and the venation is concealed to a greater or lesser extent.

The flowers are small, 1 cm in diameter, white, with perfume.

The seeds are contained within small fruits, around 1 cm in diameter, edible by birds.

The habit of the trees is generally to have around two meters of clean bole and then to branch; the general height is between 4 and 8 meters.

Some trees exhibit buttressing.

The flowering season is between February and August.

The fruiting season is April to September.

The plants are slow growing and the wood is generally dense and hard.

Thorns are absent – although to this there are four or five notable exceptions.

If these characteristics are accepted, then within a piece of remnant vegetation, one can discern which are the species of the original forest and which are opportunistic species that are responding to the disturbances that, in the main, have been implemented by man. Within the opportunistic species there are also grades and common characteristics that can be discerned, most notably the presence or absence of thorns, and the life form; the shrubs and stragglers are often found in the more disturbed areas.

## **The Study**

The study that this paper is based upon was conducted from March 1993 - April 2000 and involved surveys of 37 sites. Some areas have been thoroughly surveyed by systematic methods, e.g. Marakanam, but for the vast majority species lists showing presence or absence were collated for the areas on multiple visits. Specimens from each geographical area were collected in flowering and fruiting stage and the specimens are stored in the herbarium in Auroville. The identifications were verified by visiting botanists.

The surveys were conducted by a group of people ranging in size from 3-7, walking through the areas and identifying species; unknown species were collected for subsequent identification. All angiosperms were noted.

## **Analysis of survey data**

The results of the surveys were arranged in a database and the survey locations were sorted into site types, either as groves (13 sites), plains forests (7 sites), or hillocks (17 sites). Percentage occurrence was calculated for each species with respect to each site type. This value, along with other field observations, was used to ascribe a ranking for each species with respect to each site type

The ranking was as follows:

- 1 – commonly associated with the site type
- 2 – occasionally associated with the site type
- 3 – rarely associated with the site type
- 0 – not associated with the site type

If the species had a ranking of 1 or 2 for each of the 3 site types they were ascribed to the core species of the TDEF. These species can be considered to be the generalists.

If a species was outside of this criterion it was then assigned to one or more of the site types as common species if it had a rating of 1, or as an occasional species if it had a rating of 2. These species can be considered as specialists that are adapted to, or require, some specific environmental constraint or condition.

Field observations were then used to ascribe species to a further 4 site types: Coastal, Riverine, Tank bunds, and Wayside.

The full list is given in table 1 of plants ascribed a place in any of the site types.

**Table 1:**  
**Woody and auxiliary species of the Tropical Dry Evergreen Forest**

Ty = Type (bul-bulb, cl-climber, e-epiphyte, l-liana, p-palm, suc-succulent,sh-shrub, ss-subshrub,st-straggler,tw-twiner,tr-tree,tub-tuberous,v-vine).

M = Core species    G = Groves    P = Plains forest    H = Hillocks

C = Coastal Groves    Gi = Ginge area    R = Riverine    E = Eri/Tank bund

W = Wayside

T = Present    C = Common    O = Occasional

Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
FABACEAE	<i>Abrus precatorius</i>	tw	T	C	C	C					
MIMOSACEAE	<i>Acacia caesia</i>	st	T	O	O	O					
MIMOSACEAE	<i>Acacia chundra</i>	tr			O						
MIMOSACEAE	<i>Acacia horrida</i>	tr			O	O					
MIMOSACEAE	<i>Acacia leucophloea</i>	tr			C						
MIMOSACEAE	<i>Acacia nilotica</i> ssp. <i>indica</i>	tr								T	
MIMOSACEAE	<i>Acacia torta</i>	st		O							
PASSIFLORACEAE	<i>Adenia wightiana</i>	v	T	O	C	O					
RUTACEAE	<i>Aegle marmelos</i>	tr									T
MELIACEAE	<i>Aglaia elaeagnoidea</i>	tr		O			T				
ALANGIACEAE	<i>Alangium salviifolium</i>	tr		O	O					T	T
MIMOSACEAE	<i>Albizia amara</i> ssp. <i>amara</i>	tr	T	O	C	C					
MIMOSACEAE	<i>Albizia lebbeck</i>	tr	T	O	O	O					T
MIMOSACEAE	<i>Albizia odoratissima</i>	tr			O						
SAPINDACEAE	<i>Allophylus cobbe</i>	st	T	O	O	C					
ANACARDIACEAE	<i>Anacardium occidentale</i>	tr									T
ANNONACEAE	<i>Annona squamosa</i>	sh									T
COMBRETACEAE	<i>Anogeissus latifolia</i>	tr			O						
STILAGINACEAE	<i>Antidesma ghesaembilla</i>	sh			O						
CONVOLVULACEAE	<i>Argyrea cymosa</i>	st									T
CONVOLVULACEAE	<i>Argyrea osyrensis</i>	st						T			
ARISTOLOCHIACEAE	<i>Aristolochia bracteata</i>	tw					T				
ARISTOLOCHIACEAE	<i>Aristolochia indica</i>	tw	T	O	O	O					
ASPARAGACEAE	<i>Asparagus racemosus</i>	tw	T	C	C	C					
RUTACEAE	<i>Atalantia monophylla</i>	tr	T	C	C	C					
RUTACEAE	<i>Atalantia racemosa</i>	tr						T			
MELIACEAE	<i>Azadirachta indica</i>	tr	T	C	C	C					T
SALVADORACEAE	<i>Azima tetracantha</i>	sh		O	O						
ACANTHACEAE	<i>Barleria longiflora</i>	ss				C					
ACANTHACEAE	<i>Barleria nitida</i>	ss						T			
ACANTHACEAE	<i>Barleria noctiflora</i>	sh		O							
ACANTHACEAE	<i>Barleria prionitis</i>	ss				O					
LECYTHIDACEAE	<i>Barringtonia acutangula</i>	tr							T	T	
BASELLACEAE	<i>Basella alba</i>	tw			O						
CAESALPINIACEAE	<i>Bauhinia racemosa</i>	tr			C	C					
CAESALPINIACEAE	<i>Bauhinia tomentosa</i>	sh						T			
RUBIACEAE	<i>Benkara malabarica</i>	sh	T	O	C	C					
BOMBACACEAE	<i>Bombax ceiba</i>	tr									T
ARECACEAE	<i>Borassus flabellifer</i>	p	T	C	O	O				T	T
EUPHORBIACEAE	<i>Breynia retusa</i>	sh			O						
EUPHORBIACEAE	<i>Breynia vitis-idaea</i>	sh			O						
EUPHORBIACEAE	<i>Bridelia retusa</i>	tr									T
ANACARDIACEAE	<i>Buchanania axillaris</i>	tr			C						
FABACEAE	<i>Butea monosperma</i>	tr			O	O				T	T
CAPPARACEAE	<i>Cadaba fruticosa</i>	sh	T	O	C	C					
CAPPARACEAE	<i>Cadaba trifoliata</i>	sh		O							
CAESALPINIACEAE	<i>Caesalpinia bonduc</i>	st		O							T



Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
ARECACEAE	Calamus rotang	p						T			
CLUSIACEAE	Calophyllum inophyllum	tr						T			
ASCLEPIADACEAE	Calotropis gigantea	sh									T
COMBRETACEAE	Calycopteris floribunda	st			O						
FABACEAE	Canavalia cathartica	tw	T	O	O	O					
OPILIAEAE	Cansjera rheedii	st		O	C						
RUBIACEAE	Canthium parviflorum	sh	T	O	C	C					
CAPPARACEAE	Capparis brevispina	sh	T	C	C	C					
CAPPARACEAE	Capparis divaricata	sh			O						
CAPPARACEAE	Capparis rotundifolia	st						T			
CAPPARACEAE	Capparis sepiaria	st		O	O						
CAPPARACEAE	Capparis zeylanica	st	T	O	O	O					
ASCLEPIADACEAE	Caralluma adscendens	suc			O	O					
ASCLEPIADACEAE	Caralluma attenuata	suc	T	O	O	O					
ASCLEPIADACEAE	Caralluma lasiantha	suc			O						
ASCLEPIADACEAE	Caralluma umbellata	suc							T		
SAPINDACEAE	Cardiospermum halicacabum var. lur	v									T
SAPINDACEAE	Cardiospermum halicacabum var. mic	v									T
LECYTHIDACEAE	Careya arborea	tr									T
APOCYNACEAE	Carissa salicina	sh			O						
APOCYNACEAE	Carissa spinarum	sh	T	C	C	C					
BORAGINACEAE	Carmona retusa	sh	T	C	C	O					
FLACOURTIACEAE	Casearia elliptica	sh		O	O						T
CAESALPINIACEAE	Cassia fistula	tr	T	O	O	O				T	
CAESALPINIACEAE	Cassia montana	sh				O					
CELASTRACEAE	Cassine glauca	tr		O	O						T
LAURACEAE	Cassytha filiformis	tw	T	O	C	C					
CASUARINACEAE	Casuarina equisetifolia	tr									T
APOCYNACEAE	Catharanthus roseus	ss					O				
VITACEAE	Cayratia carnosia	st						T			
VITACEAE	Cayratia pedata	v	T	O	O	O					
ULMACEAE	Celtis philippensis	tr							T		
CACTACEAE	Cereus pterogonus	sh									T
OLEACEAE	Chionanthus mala-elengi	tr	T	C	C	O					
ANTHERICACEAE	Chlorophytum tuberosum	tub				C					
FLINDERSIACEAE	Chloroxylon swietenia	tr			C						
MENISPERMACEAE	Cissampelos pareira	tw									T
VITACEAE	Cissus pallida	v					C				
VITACEAE	Cissus quadrangularis	st	T	C	C	C					
VITACEAE	Cissus repens	v		O							
VITACEAE	Cissus vitiginea	v	T	C	O	C					
RUTACEAE	Clausena dentata	sh		O	O						
EUPHORBIACEAE	Cleistanthus collinus	sh			O	O					
VERBENACEAE	Clerodendrum inerme	sh						T			
VERBENACEAE	Clerodendrum phlomides	sh									O
FABACEAE	Clitoria ternatea	tw									T
CUCURBITACEAE	Coccinia grandis	v		C	O						
MENISPERMACEAE	Cocculus hirsutus	tw	T	C	C	C					
COCHLOSPERMACEAE	Cochlospermum religiosum	tr							T		
COMBRETACEAE	Combretum ovalifolium	l	T	C	C	O					
BURSERACEAE	Commiphora berryi	tr									T
BURSERACEAE	Commiphora caudata	tr							T		
BORAGINACEAE	Cordia monoica	tr				C					
BORAGINACEAE	Cordia myxa	tr		O	O						T
CAPPARACEAE	Crateva magna	tr	T	C	O	O					
AMARYLLIDACEAE	Crinum latifolium	tub							T		
PERIPLOCACEAE	Cryptostegia grandiflora	st			O						
CUCURBITACEAE	Ctenolepis garcinii	v		O		O					
CUCURBITACEAE	Cucumis melo	v			O						

Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
HYPOXIDACEAE	Curculigo orchioides	tub	T	O	O	C					
ORCHIDACEAE	Cymbidium aloifolium	e						T			
FABACEAE	Dalbergia lanceolaria	tr	T	O	C	O					
FABACEAE	Dalbergia latifolia	tr						T			
RUBIACEAE	Deccania pubescens var. pubescens	tr						T			
CAESALPINIACEAE	Delonix elata	tr									T
LORANTHACEAE	Dendrophthoe falcata	sh		C	C		T				
FABACEAE	Derris ovalifolia	l		O			T				
FABACEAE	Derris scandens	l		C	C		T				
MIMOSACEAE	Dichrostachys cinerea	tr			C	O					
EUPHORBIACEAE	Dimorphocalyx glabellus	sh		O	O						
DIOSCOREACEAE	Dioscorea oppositifolia	tw	T	O	C	C					
DIOSCOREACEAE	Dioscorea pentaphylla	tw				O					
DIOSCOREACEAE	Dioscorea tomentosa	tw				O					
EBENACEAE	Diospyros affinis	tr						T			
EBENACEAE	Diospyros chloroxylon	tr		O	O						
EBENACEAE	Diospyros ebenum	tr	T	C	C	C					
EBENACEAE	Diospyros ferrea	tr	T	C	C	C					
EBENACEAE	Diospyros melanoxylon	tr			C						
EBENACEAE	Diospyros montana	tr		O							
CUCURBITACEAE	Diplocyclos palmatus	v		O	O						
SAPINDACEAE	Dodonaea viscosa var. angustifolia	sh			O	O					
BIGNONIACEAE	Dolichandrone falcata	tr			O						
EUPHORBIACEAE	Drypetes porteri	tr						T			
EUPHORBIACEAE	Drypetes sepiaria	tr	T	C	C	C					
ACANTHACEAE	Ecbolium ligustrinum	ss	T	O	O	O					
BORAGINACEAE	Ehretia pubescens	tr			C	C					
FABACEAE	Erythrina suberosa	tr						T			
ERYTHROXYLACEAE	Erythroxylum monogynum	sh			O						
MYRTACEAE	Eugenia bracteata	sh		O			T				
ORCHIDACEAE	Eulophia epidendraea	bul		C	O						
EUPHORBIACEAE	Euphorbia antiquorum	sh			C	C					
EUPHORBIACEAE	Euphorbia nivulia	tr			O						
EUPHORBIACEAE	Euphorbia tirucalli	sh									T
EUPHORBIACEAE	Euphorbia tortilis	sh						T			
MORACEAE	Ficus albipila	tr						T			
MORACEAE	Ficus amplissima	tr		O							T
MORACEAE	Ficus arnottiana	tr				O					
MORACEAE	Ficus benghalensis	tr		C	O						T
MORACEAE	Ficus hispida	sh									T
MORACEAE	Ficus microcarpa	tr						T			
MORACEAE	Ficus mollis	tr				C					
MORACEAE	Ficus religiosa	tr								T	T
MORACEAE	Ficus tinctoria	tr									T
MORACEAE	Ficus tsjakela	tr					O				
STERCULIACEAE	Firmiana colorata	tr				O					
FLACOURTIACEAE	Flacourtia indica	sh	T	O	C	O					
FABACEAE	Galactia tenuiflora	tw									T
CLUSIACEAE	Garcinia spicata	tr		C	C		T				
RUBIACEAE	Gardenia gummifera	sh			O						
RUBIACEAE	Gardenia latifolia	sh				O					
RUBIACEAE	Gardenia resinifera	sh						T			
BURSERACEAE	Garuga pinnata	tr						T			
EUPHORBIACEAE	Givotia rottleriformis	tr				O					
COLCHICACEAE	Gloriosa superba	cl	T	C	C	C					
RUTACEAE	Glycosmis mauritiana	sh	T	C	C	O					
VERBENACEAE	Gmelina asiatica	sh	T	C	O	O					
TILIACEAE	Grewia carpinifolia	l	T	C	C	C					
TILIACEAE	Grewia flavescens	st				C					

Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
TILIACEAE	Grewia hirsuta	sh			O	O					
TILIACEAE	Grewia orbiculata	st				O					
TILIACEAE	Grewia tiliifolia	tr						T			
ASCLEPIADACEAE	Gymnema sylvestre	l	T	O	O	C					
HERNANDIACEAE	Gyrocarpus americanus	tr			O	C					
ORCHIDACEAE	Habenaria roxburghii	bul			O						
CAESALPINIACEAE	Hardwickia binata	tr									T
STERCULIACEAE	Helicteres isora	sh				O					
PERIPLOCACEAE	Hemidesmus indicus	tw	T	C	C	C					
BIGNONIACEAE	Heterophragma adenophyllum	tr									O
MALVACEAE	Hibiscus purpureus	sh						T			
MALVACEAE	Hibiscus tiliaceus	tr					T				
STERCULIACEAE	Hildegardia populifolia	tr						T			
LINACEAE	Hugonia mystax	st	T	O	C	C					
RUBIACEAE	Hymenodictyon orixense	tr						T			
APOCYNACEAE	Ichnocarpus frutescens	tw	T	C	C	C					
COLCHICACEAE	Iphigenia indica	tub				C		T			
CONVOLVULACEAE	Ipomoea fistulosa	st								T	
CONVOLVULACEAE	Ipomoea sepiaria	tw	T	O	C	O					
CONVOLVULACEAE	Ipomoea staphylina	l				O					
RUBIACEAE	Ixora pavetta	sh	T	C	C	O					
OLEACEAE	Jasminum angustifolium	tw	T	C	C	C					
OLEACEAE	Jasminum auriculatum	tw		O	C						
OLEACEAE	Jasminum azoricum var. azoricum	st						T			
OLEACEAE	Jasminum cuspidatum	sh			O						
EUPHORBIACEAE	Jatropha glandulifera	sh									T
EUPHORBIACEAE	Jatropha gossypifolia	sh									T
EUPHORBIACEAE	Jatropha tanjorensis	sh									T
ACANTHACEAE	Justicia adhatoda	sh									T
CUCURBITACEAE	Kedrostis foetidissima	v		O	O						
ASTERACEAE	Kleinia grandiflora	ss						T			
ANACARDIACEAE	Lannea coromandelica	tr	T	O	O	C					T
VERBENACEAE	Lantana camara var. aculeata	sh									T
VERBENACEAE	Lantana camara var. splendens	sh									T
SAPINDACEAE	Lepisanthes tetraphylla	tr	T	C	C	C					
ASCLEPIADACEAE	Leptadenia reticulata	tw									T
RUTACEAE	Limonia acidissima	tr									T
CELASTRACEAE	Loeseneriella obtusifolia	st						T			
SAPOTACEAE	Madhuca indica	tr		O						T	T
CAPPARACEAE	Maerua oblongifolia	st		C							
EUPHORBIACEAE	Mallotus philippensis	sh		O							T
EUPHORBIACEAE	Mallotus repandus	st						T			T
EUPHORBIACEAE	Mallotus rhamnifolius	sh		O							T
EUPHORBIACEAE	Mallotus stenanthus	sh						T			
SAPOTACEAE	Manilkara hexandra	tr	T	C	C	O					
CELASTRACEAE	Maytenus emarginata	sh	T	O	C	C					
MEMECYLACEAE	Memecylon umbellatum	sh	T	C	C	C					
CONVOLVULACEAE	Merremia hederacea	tw			O						
ANNONACEAE	Miliusa eriocarpa	sh		O							
MIMOSACEAE	Mimosa intsia	st			C	O					
SAPOTACEAE	Mimusops elengi	tr									T
RUBIACEAE	Mitragyna parvifolia	tr							T	T	
CUCURBITACEAE	Momordica charantia	v		O		O					
RUBIACEAE	Morinda pubescens var. pubescens	tr		C							T
FABACEAE	Mucuna gigantea	l							T		
FABACEAE	Mucuna pruriens	tw		O							
CUCURBITACEAE	Mukia maderaspatana	v		C		O					
RUTACEAE	Murraya paniculata	sh		O							
RUBIACEAE	Mussaenda tomentosa	sh						T			

Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
OCHNACEA	Ochna lanceolata	sh						T			
OCHNACEAE	Ochna obtusata	sh		O	O						T
OLACACEAE	Olax scandens	st			O	O					
OPILIAEAE	Opilia amentacea	st		C	O						
CACTACEAE	Opuntia dillenii	sh	T	O	O	O					
CACTACEAE	Opuntia monacantha	sh									T
FABACEAE	Ormocarpum sennoides	sh			O	C					
MENISPERMACEAE	Pachygone ovata	tw								T	
RUTACEAE	Pamburus missionis	tr		O						T	
PANDANACEAE	Pandanus fascicularis	sh									T
PASSIFLORACEAE	Passiflora foetida	v	T	O	O	O					
RUBIACEAE	Pavetta indica	sh		O							
ASCLEPIADACEAE	Pentatropis capensis	tw									T
ASCLEPIADACEAE	Pergularia daemia	tw									T
ARECACEAE	Phoenix pusilla	p	T	O	C	O					T
ARECACEAE	Phoenix sylvestris	p								T	T
EUPHORBIACEAE	Phyllanthus emblica	tr									T
EUPHORBIACEAE	Phyllanthus pinnatus	sh						T			
EUPHORBIACEAE	Phyllanthus polyphyllus	tr			O						
EUPHORBIACEAE	Phyllanthus reticulatus	sh	T	O	O	O					T
NYCTAGINACEAE	Pisonia aculeata	st						T			
MIMOSACEAE	Pithecellobium dulce	tr									T
MORACEAE	Plecosperrum spinosum	st		O	O						
RUTACEAE	Pleiospermium alatum	tr		O							
CELASTRACEAE	Pleurostyliya opposita	sh			O		T				
ANNONACEAE	Polyalthia cerasoides	sh			O						
ANNONACEAE	Polyalthia coffeoides	sh						T			
ANNONACEAE	Polyalthia korinti	sh			O						
ANNONACEAE	Polyalthia longif. var.pendula	tr									T
ANNONACEAE	Polyalthia longifolia	tr									T
ANNONACEAE	Polyalthia suberosa	sh		O							
FABACEAE	Pongamia pinnata	tr							T	T	T
URTICACEAE	Pouzolzia auriculata	sh						T			
VERBENACEAE	Premna alstoni	sh	T	O	O	C					
VERBENACEAE	Premna corymbosa	sh				O					
VERBENACEAE	Premna serratifolia	sh					T				
VERBENACEAE	Premna tomentosa	sh				O					
MIMOSACEAE	Prosopis juliflora	tr									T
RUBIACEAE	Psilanthus wightianus	sh			O	C					
RUBIACEAE	Psydrax dicoccos	tr	T	O	C	O					
FABACEAE	Pterocarpus marsupium	tr			O						
CAESALPINIACEAE	Pterolobium hexapetalum	st			C	C					
STERCULIACEAE	Pterospermum canescens	tr	T	C	C	O					
STERCULIACEAE	Pterospermum xylocarpum	tr		O		C					
ICACINACEAE	Pyrenacantha volubilis	l		O	O		T				
RUBIACEAE	Randia dumetorum	sh	T	C	C	C					
APOCYNACEAE	Rauvolfia tetraphylla	sh									T
CELASTRACEAE	Reissantia indica	st	T	O	O	C					
FABACEAE	Rhynchosia courtallensis	st				O					
CONVOLVULACEAE	Rivea hypocrateriformis	l	T	C	C	C					
CELASTRACEAE	Salacia chinensis	sh			C		T				
SALVADORACEAE	Salvadora persica	tr					T				
DRACAENACEAE	Sansevieria roxburghiana	bul	T	C	O	O					
SANTALACEAE	Santalum album	tr		O							T
SAPINDACEAE	Sapindus emarginata	tr	T	O	C	C					
EUPHORBIACEAE	Sapium insigne	tr		O							
ASCLEPIADACEAE	Sarcostemma intermedium	st	T	O	C	C					
HYACINHACEAE	Scilla hyacinthina	tub			O	C					
RHAMNACEAE	Scutia myrtina	st	T	O	O	C					

Family	Botanical Name	TY	M	G	P	H	C	Gi	R	E	W
ASCLEPIADACEAE	Secamone emetica	tw			O	O					
EUPHORBIACEAE	Securinega leucopyrus	sh	T	O	C	O					
ANACARDIACEAE	Semecarpus anacardium	tr		O	O						
CAESALPINIACEAE	Senna auriculata	sh			C	C					
CAESALPINIACEAE	Senna occidentalis	ss									T
CAESALPINIACEAE	Senna siamea	tr									T
SOLANACEAE	Solanum trilobatum	v	T	C	O	O					
CUCURBITACEAE	Solena amplexicaulis	v	T	O	O	O					
ANACARDIACEAE	Spondias pinnata	tr			O						
ACANTHACEAE	Stenosiphonium parviflorum	sh						T			
ACANTHACEAE	Stenosiphonium russellianum	sh			C	C					
STERCULIACEAE	Sterculia foetida	tr						T			
STERCULIACEAE	Sterculia urens	tr				O					
BIGNONIACEAE	Stereospermum personatum	tr				O					
MORACEAE	Streblus asper	tr		O	O				T	T	
LOGANIACEAE	Strychnos minor	l	T	C	C	O					
LOGANIACEAE	Strychnos nux-vomica	tr		O	O				T	T	T
LOGANIACEAE	Strychnos potatorum	tr		O							
EUPHORBIACEAE	Suregada angustifolia	sh		O	O						
SYMPHOREMACEAE	Symphorema involucreatum	st	T	O	O	O					
MYRTACEAE	Syzygium caryophyllum	tr					T				
MYRTACEAE	Syzygium cumini	tr	T	C	C	O			T	T	T
CAESALPINIACEAE	Tamarindus indica	tr								T	T
RUBIACEAE	Tarenna asiatica	sh	T	C	C	C					
LORANTHACEAE	Taxillus bracteatus	sh						T			
LORANTHACEAE	Taxillus heyneanus	sh						T			
FABACEAE	Teramnus labialis	tw									T
COMBRETACEAE	Terminalia arjuna	tr							T		
COMBRETACEAE	Terminalia bellirica	tr									T
COMBRETACEAE	Terminalia chebula	tr			O						
COMBRETACEAE	Terminalia paniculata	tr			O						
ARACEAE	Therriophonum fischeri	tub	T	O	O	O					
ARACEAE	Therriophonum minutum	tub			O						
MALVACEAE	Thespesia populnea	tr									T
APOCYNACEAE	Thevetia peruviana	sh									T
MENISPERMACEAE	Tiliacora acuminata	tw								T	
MENISPERMACEAE	Tinospora cordifolia	tw									T
RUTACEAE	Toddalia asiatica	st	T	O	O	O					
EUPHORBIACEAE	Tragia involucrata	tw									T
EUPHORBIACEAE	Tragia plukenetii	tw									T
RUBIACEAE	Tricalysia sphaerocarpa	sh		O	O						
CUCURBITACEAE	Trichosanthes cucumerina	v						T			
ASCLEPIADACEAE	Tylophora indica	tw	T	O	C	C					
HYACINTHACEAE	Urginea indica	tub			O						
APOCYNACEAE	Vallisneria spiralis	st		O							
ORCHIDACEAE	Vanda spathulata	e			O						
ORCHIDACEAE	Vanda tessellata	e			O						
RHAMNACEAE	Ventilago maderaspatana	l	T	C	C	O					
LORANTHACEAE	Viscum orientale	sh		O							
VERBENACEAE	Vitex altissima	tr			C	C					
VERBENACEAE	Vitex leucoxydon	tr							T		
VERBENACEAE	Vitex negundo	sh									T
MELIACEAE	Walsura trifoliolata	tr		C	O						
ASCLEPIADACEAE	Wattakaka volubilis	l		O							T
APOCYNACEAE	Wrightia tinctoria	tr				C					
OLACACEAE	Ximenesia americana	sh						T			
RHAMNACEAE	Ziziphus mauritiana	tr									T
RHAMNACEAE	Ziziphus oenoplia	st	T	O	C	C					
RHAMNACEAE	Ziziphus xylopyra	tr			C	O					

### **Note on identification**

The species were identified with the floras of Matthew and Gamble, with verification through the Flora of Ceylon. Two genera presented particular problems and as such should be noted here so that care is taken when considering the information presented.

The genus of *Cordia* was difficult and so following Nowicke and Miller 1991 in the flora of Ceylon the species identification of the *C. myxa* group was left ambiguous to include the species *C. myxa*, *C. domestica*, *C. dichotoma*, and *C. obliqua*. *C. monoica* was positively identified, although none of the floras remarked upon the obvious diagnostic feature of the smooth greenish bark.

The genus of *Premna* also presented difficulties. *Premna alstoni* was identified from the flora of Ceylon, and then confirmed during a personal visit to the herbarium at Kew Gardens, London. *Premna tomentosa* was identified positively from all floras, but the identification of *P. corymbosa* could only follow Matthew, as in Gamble it is referred to as glabrous, which is the opposite of the collections made, in which the specimens were densely hirsute.

### **Results**

During the survey 915 species of angiosperms were recorded, both native and exotic. The number of herbaceous plants, including grasses and sedges, was 447. For the analysis these and the majority of the sub shrubs were excluded (93 species), as were the species of *Menispermaceae* and *Vitaceae* where the plants were not of a woody nature (9 species). Also excluded were the exotic species that were obviously originally planted or introduced (23 species).

The remaining 343 species were included in the analysis.

## **Summary of Vegetation Components**

In order to aid discussion of the TDEF and its distribution, it has been separated into distinct site types within the range as follows:

Sacred groves that have never been clear felled.

Plains forests, which have at times been treated as woodlots and so, represent secondary regrowth forests.

Hillocks, which occur on charnockite outcroppings within the range to the north of Marakanam, and towards Madras.

Coastal forest on stabilized sand dunes close to the sea.

Also included are categories for riverine vegetation, which is based on conjecture, and wayside and tank bund vegetation. The latter two include many common trees of the area, which are not necessarily indigenous to the region.

All forest types are made up of the core species plus the additional species specific to each type. They have been arranged to reflect the forest type as it is today and as a consequence the lists are not to be confused with the concept of the climax vegetation. When the lists for each forest type are considered they will contain the climax species but also opportunistic species that are now an inextractable element of the forest site type.

## **Core Species of TDEF**

The core species of the TDEF occur throughout the range and can be found in any of the 4 site types (coastal, groves, plains forest, hillocks). They are commonly encountered and as such they can be considered to be the species, which form the backbone of the common ecology of the area. They are the generalist species.

Other species may be common within one or two of the specific site types but they are absent from the others and therefore they must have, in relation to the core species a peculiar need or adaptation; thus they are excluded from the group.

### Trees

*Albizia amara* ssp. *amara*, *Albizia lebbek*, *Atalantia monophylla*, *Azadirachta indica*, *Cassia fistula*, *Chionanthus mala-elengi*, *Crateva magna*, *Dalbergia lanceolaria*, *Diospyros ebenum*, *Diospyros ferrea*, *Drypetes sepiaria*, *Lanea coromandelica*, *Lepisanthes tetraphylla*, *Manilkara hexandra*, *Psydrax dicoccos*, *Pterospermum canescens*, *Sapindus emarginata*, *Syzygium cumini*.

### Shrubs

*Benkara malabarica*, *Cadaba fruticosa*, *Canthium parviflorum*, *Capparis brevispina*, *Carissa spinarum*, *Carmona retusa*, *Ecbolium ligustrinum*, *Flacourtia indica*, *Glycosmis mauritiana*, *Gmelina asiatica*, *Ixora pavetta*, *Memecylon umbellatum*, *Opuntia dillenii*, *Phyllanthus reticulatus*, *Premna alstoni*, *Randia dumetorum*, *Securinega leucopyrus*, *Tarenna asiatica*.

### Palms

*Borassus flabellifer*, *Phoenix pusilla*.

### Climbers and Stragglers

*Acacia caesia*, *Adenia wightiana*, *Allophylus cobbe*, *Asparagus racemosus*, *Capparis zeylanica*, *Cassytha filiformis*, *Cayratia pedata*, *Cissus vitiginea*, *Cissus quadrangularis*, *Cocculus hirsutus*, *Combretum ovalifolium*, *Dioscorea oppositifolia*, *Grewia carpinifolia*, *Gymnema sylvestre*, *Hugonia mystax*, *Jasminum angustifolium*, *Passiflora foetida*, *Reissantia indica*, *Rivea hypocrateriformis*, *Sarcostemma intermedium*, *Scutia myrtina*, *Solanum trilobatum*, *Solena amplexicaulis*, *Strychnos minor*, *Symphorema involucreatum*, *Toddalia asiatica*, *Tylophora indica*, *Ventilago maderaspatana*, *Ziziphus oenoplia*.

### Twiners

*Abrus precatorius*, *Aristolochia indica*, *Canavalia cathartica*, *Ichnocarpus frutescens*, *Ipomoea sepiaria*.

### Bulbous/tuberous/orchids

*Caralluma attenuata*, *Curculigo orchioides*, *Gloriosa superba*, *Sansevieria roxburghiana*, *Theriophonum fischeri*.



### **Additional species of the Groves**

The groves are found in varying locations around Pondicherry, Cuddalore and Pudukottai. Invariably they are located on the red ferruginous soils, but occasionally they occur on the alluvial clays. Variation in species between the soil types has been noted in field observations, but nothing has been made of this in this write up as further studies are being carried out at the moment into this variation. However, *Cassine glauca* is often limited to the alluvial areas, as are *Diospyros montana*, *Pamburus missionis*, *Pleiospermium alatum*, and *Streblus asper*. *Santalum album* is found in the hedgerows on the black cotton soils. Much has been said of the protection afforded to the vegetation by the presence of the deity. All that needs to be added to this, is a confirmation that these are the only areas left that contain anything resembling the climax vegetation of the area, and as such, they are extremely valuable in terms of biodiversity conservation.

#### ***Common***

Trees

*Ficus benghalensis*, *Garcinia spicata*, *Morinda pubescens* var. *pubescens*, *Walsura trifoliata*.

Shrubs

*Dendrophthoe falcata*.

Climbers and stragglers

*Coccinia grandis*, *Derris scandens*, *Maerua oblongifolia*, *Mukia maderaspatana*, *Opilia amentacea*.

Bulbous/tuberous/orchids

*Eulophia epidendreaea*.

#### ***Occasional***

Trees

*Aglaia elaeagnoidea*, *Alangium salviifolium*, *Cassine glauca*, *Cordia myxa*, *Diospyros chloroxylon*, *Diospyros montana*, *Ficus amplissima*, *Madhuca indica*, *Pamburus missionis*, *Pleiospermium alatum*, *Pterospermum xylocarpum*, *Santalum album*, *Sapium insigne*, *Semecarpus anacardium*, *Streblus asper*, *Strychnos nux-vomica*, *Strychnos potatorum*.

Shrubs

*Azima tetraantha*, *Barleria noctiflora*, *Cadaba fruticosa*, *Cadaba trifoliata*, *Casearia elliptica*, *Clausena dentata*, *Dimorphocalyx glabellus*, *Eugenia bracteata*, *Mallotus philippensis*, *Mallotus rhamnifolius*, *Miliusa eriocarpa*, *Murraya paniculata*, *Ochna obtusata*, *Pavetta indica*, *Phyllanthus reticulatus*, *Polyalthia suberosa*, *Suregada angustifolia*, *Tricalysia sphaerocarpa*, *Viscum orientale*.

Climbers and Stragglers

*Acacia torta*, *Caesalpinia bonduc*, *Cansjera rheedii*, *Capparis sepiaria*, *Capparis zeylanica*, *Cissus repens*, *Cocculus hirsutus*, *Ctenolepis garcinii*, *Derris ovalifolia*, *Diplocyclos palmatus*, *Hugonia mystax*, *Jasminum auriculatum*, *Kedrostis foetidissima*, *Momordica charantia*, *Mucuna pruriens*, *Plecospermum spinosum*, *Pyrenacantha volubilis*, *Vallaris solanacea*, *Wattakaka volubilis*.

Bulbous/tuberous/orchids

*Curculigo orchioides*, *Theriophonum fischeri*.

### **Additional species of the Plains Forest**

The plains forest referred to here is synonymous with the reserve forests that occur on the inland plains, which have always had a degree of human interference and a history of management and extraction. As a consequence they can not be studied as a climax forest type, but rather they represent various stages of the ecological cycle that would be present in the natural forest away from the influences of humanity. They are secondary regrowth forests. The species number in these forest types is often higher as they contain a wider variety of habitats and cover larger areas.

## ***Common***

### Trees

Acacia leucophloea, Bauhinia racemosa, Buchanania axillaris, Chloroxylon swietenia, Dalbergia lanceolaria, Dichrostachys cinerea, Diospyros melanoxylon, Ehretia pubescens, Garcinia spicata, Vitex altissima, Ziziphus xylopyra.

### Shrubs

Cadaba fruticosa, Dendrophtoe falcata, Euphorbia antiquorum, Salacia chinensis, Senna auriculata, Stenosiphonium russellianum.

### Climbers and stragglers

Cansjera rheedii, Derris scandens, Hugonia mystax, Jasminum auriculatum, Mimosa intsia, Pterolobium hexapetalum.

## ***Occasional***

### Trees

Acacia chundra, Acacia horrida, Alangium salviifolium, Albizia odoratissima, Anogeissus latifolia, Butea monosperma, Cassine glauca, Cordia myxa, Diospyros chloroxylon, Dolichandrone falcata, Euphorbia nivulia, Ficus benghalensis, Gyrocarpus americanus, Phyllanthus polyphyllus, Pterocarpus marsupium, Semecarpus anacardium, Spondias pinnata, Streblus asper, Strychnos nux-vomica, Terminalia chebula, Terminalia paniculata, Walsura trifoliolata.

### Shrubs

Antidesma ghesaembilla, Azima tetracantha, Breynia retusa, Breynia vitis-idaea, Capparis divaricata, Carissa salicina, Casearia elliptica, Clausena dentata, Cleistanthus collinus, Dimorphocalyx glabellus, Dodonaea viscosa var. angustifolia, Erythroxylum monogynum, Gardenia gummifera, Grewia hirsuta, Jasminum cuspidatum, Ochna obtusata, Ormocarpum sennoides, Phyllanthus reticulatus, Pleurostyliia opposita, Polyalthia cerasoides, Polyalthia korinti, Psilanthus wightianus, Suregada angustifolia, Tricalysia sphaerocarpa.

### Climbers and stragglers

Basella alba, Calycopteris floribunda, Capparis sepiaria, Coccinia grandis, Cucumis melo, Cryptostegia grandiflora, Derris scandens, Diplocyclos palmatus, Kedrostis foetidissima, Merremia hederacea, Olax scandens, Opilia amentacea, Plecospermum spinosum, Pyrenacantha volubilis, Secamone emetica, Strychnos colubrina, Toddalia asiatica.

### Bulbous/tuberous/orchids

Caralluma adscendens, Caralluma lasiantha, Curculigo orchioides, Eulophia epidendrea, Habenaria roxburghii, Scilla hyacinthina, Theriophonum fischeri, Theriophonum minutum, Urginea indica, Vanda spathulata, Vanda tessellata.

### **Additional species of the Hillocks**

The hillocks present a diverse habitat as soil conditions and moisture availability vary greatly within the habitat; thus the variation in species composition is high. The difference between the summit of the hillocks and the apron around their base is great. In fact the forest at the bottom of the hillocks is much akin to the plains forest type. It is most noticeable that when one moves from the flat land to the slopes of the hillock certain characteristic species appear, most noticeably *Barleria longiflora*.

#### **Common**

##### **Trees**

*Bauhinia racemosa*, *Cordia monoica*, *Diospyros chloroxylon*, *Ehretia pubescens*, *Ficus mollis*, *Gyrocarpus americanus*, *Pterospermum xylocarpum*, *Vitex altissima*, *Wrightia tinctoria*.

##### **Shrubs**

*Barleria longiflora*, *Cadaba fruticosa*, *Euphorbia antiquorum*, *Ormocarpum senoides*, *Psilanthus wightianus*, *Senna auriculata*, *Stenosiphonium russellianum*.

##### **Climbers and stragglers**

*Cissus pallida*, *Grewia flavescens*, *Hugonia mystax*, *Pterolobium hexapetalum*.

##### **Bulbous/tuberous/orchids**

*Chlorophytum tuberosum*, *Curculigo orchioides*, *Iphigenia indica*, *Scilla hyacinthina*.

#### **Occasional**

The occasional species of the hillocks are interesting in that they are found more commonly as one moves inland to the hillocks around the Gingee area. They are species of a different forest type that have somehow managed to survive and propagate far outside the boundaries of the normal range.

##### **Trees**

*Butea monosperma*, *Dichrostachys cinerea*, *Ficus arnottiana*, *Firmiana colorata*, *Givotia rottleriformis*, *Sterculia urens*, *Stereospermum personatum*, *Ziziphus xylopyra*.

##### **Shrubs**

*Barleria prionitis*, *Cassia montana*, *Cleistanthus collinus*, *Dodonaea viscosa* var. *angustifolia*, *Gardenia latifolia*, *Grewia hirsuta*, *Helicteres isora*, *Phyllanthus reticulatus*, *Premna corymbosa*, *Premna tomentosa*.

##### **Climbers and stragglers**

*Ctenolepis garcinii*, *Dioscorea pentaphylla*, *Dioscorea tomentosa*, *Grewia orbiculata*, *Ipomoea staphylyna*, *Mimosa intsia*, *Momordica charantia*, *Mukia maderaspatana*, *Olax scandens*, *Rhynchosia courtallensis*, *Secamone emetica*.

##### **Bulbous/tuberous/orchids**

*Caralluma adscendens*, *Theriophonum fischeri*.

### **Additional species of the Coastal Groves**

Of the additional species associated with this forest site type some species are associated with the freer draining sand, such as *Eugenia bracteata*, and *Capparis rotundifolia*. Others are associated with the under lying clay that can be termed halomorphic, such as *Salvadora persica*, *Premna serratifolia*, and *Clerodendrum inerme*, whereas a species such as *Syzygium caryophyllatum* is associated with an abundant supply of close ground water. Due to this variation and the desire to avoid too many site types, the concept of common and occasional was abandoned in this site type.

##### **Trees**

*Aglaia elaeagnoidea*, *Calophyllum inophyllum*, *Ficus tsjakela*, *Garcinia spicata*, *Hibiscus tiliaceus*, *Salvadora persica*, *Syzygium caryophyllatum*.

##### **Shrubs**

Catharanthus roseus, Clerodendrum inerme, Dendrothoe falcata, Eugenia bracteata, Pleurostylia opposita, Premna serratifolia, Salacia chinensis.

### **Climbers and stragglers**

Aristolochia bracteata, Calamus rotang, Capparis rotundifolia, Derris ovalifolia, Derris scandens, Pyrenacantha volubilis.

### **Gingee Species**

Most of the TDEF species occur all the way inland to Gingee and the surrounding hillocks. However there is a group of species that are found on the Gingee hills that have not been recorded on the smaller hillocks closer to the coast. They are listed here as possible other species that in the past may have occurred on the coastal hillocks, but due to human pressure have become locally extinct there.

#### **Trees**

Atalantia racemosa, Celtis philippensis, Cochlospermum religiosum, Commiphora caudata, Dalbergia latifolia, Deccania pubescens var. pubescens, Diospyros affinis, Drypetes porteri, Erythrina suberosa, Ficus albipila, Ficus microcarpa, Garuga pinnata, Grewia tiliifolia, Hildegardia populifolia, Hymenodictyon orixense, Sterculia foetida.

#### **Shrubs**

Barleria nitida, Bauhinia tomentosa, Euphorbia tortilis, Gardenia resinifera, Hibiscus purpureus, Kleinia grandiflora, Mallotus stenanthus, Mussaenda tomentosa, Ochna lanceolata, Phyllanthus pinnatus, Polyalthia coffeoides, Pouzolzia auriculata, Stenosiphonium parviflorum, Taxillus bracteatus, Taxillus heyneanus, Ximenia americana.

#### **Climbers and stragglers**

Argyreia osyrensis, Cayratia carnosa, Jasminum azoricum var. azoricum, Loeseneriella obtusifolia, Mallotus repandus, Pisonia aculeata, Trichosanthes cucumerina.

Bulbous/tuberous/orchids

Caralluma umbellata, Crinum latifolium, Cymbidium aloifolium.

### **Riverine**

Within the region no real areas of riparian vegetation remain, however with the occurrence of species in areas of perennial moisture, and with field observations from other areas, it is felt that these species would constitute this ecological type within the TDEF

#### **Trees**

Barringtonia acutangula, Mitragyna parvifolia, Pongamia pinnata, Streblus asper, Strychnos nux-vomica, Syzygium cumini, Terminalia arjuna, Vitex leucoxydon.

#### **Climber**

Mucuna gigantea.

### **Tank bunds**

These species are commonly associated with the tanks and *eyries* in the TDEF area.

#### **Trees**

Acacia nilotica ssp. indica, Alangium salviifolium, Barringtonia acutangula, Butea monosperma, Cassia fistula, Ficus religiosa, Madhuca indica, Mitragyna parvifolia, Pamburus missionis, Ficus benghalensis, Streblus asper, Strychnos nux-vomica, Syzygium cumini, Tamarindus indica.

#### **Palms**

Borassus flabellifer, Phoenix pusilla.

Stragglers and climbers

Ipomoea fistulosa, Pachygone ovata, Tiliacora acuminata.

## **Wayside**

The roadsides and field sides of the area contain many species that may either be part of remnant forest, or species that have been identified as useful or they will be opportunistic species that move along areas of disturbance. This list is not exhaustive, only the most important or unusual have been included. This category also includes naturalized exotics.

### **Trees**

*Aegle marmelos*, *Alangium salviifolium*, *Albizia lebeck*, *Anacardium occidentale*, *Azadirachta indica*, *Bombax ceiba*, *Bridelia retusa*, *Butea monosperma*, *Careya arborea*, *Cassine glauca*, *Casuarina equisetifolia*, *Commiphora berryi*, *Cordia myxa*, *Delonix elata*, *Ficus amplissima*, *Ficus benghalensis*, *Ficus religiosa*, *Ficus tinctoria*, *Hardwickia binata*, *Heterophragma adenophyllum*, *Lannea coromandelica*, *Limonia acidissima*, *Madhuca indica*, *Mimusops elengi*, *Morinda pubescens* var. *pubescens*, *Phyllanthus emblica*, *Pithecellobium dulce*, *Polyalthia longifolia* var. *pendula*, *Polyalthia longifolia*, *Pongamia pinnata*, *Prosopis juliflora*, *Santalum album*, *Senna siamea*, *Strychnos nux-vomica*, *Syzygium cumini*, *Tamarindus indica*, *Terminalia bellirica*, *Thespesia populnea*, *Ziziphus mauritiana*.

### **Shrubs**

*Annona squamosa*, *Calotropis gigantea*, *Casearia elliptica*, *Cereus pterogonus*, *Euphorbia tirucalli*, *Ficus hispida*, *Jatropha glandulifera*, *Jatropha gossypifolia*, *Jatropha tanjorensis*, *Justicia adhatoda*, *Lantana camara* var. *aculeata*, *Lantana camara* var. *splendens*, *Mallotus philippensis*, *Mallotus rhamnifolius*, *Ochna obtusata*, *Opuntia monacantha*, *Pandanus fascicularis*, *Phyllanthus reticulatus*, *Rauvolfia tetraphylla*, *Senna occidentalis*, *Thevetia peruviana*, *Vitex negundo*.

### **Palms**

*Borassus flabellifer*, *Phoenix pusilla*, *Phoenix sylvestris*.

### **Climbers and stragglers**

*Argyrea cymosa*, *Caesalpinia bonduc*, *Cardiospermum halicacabum* var. *luridum*, *Cardiospermum halicacabum* var. *microcarpum*, *Cissampelos pareira*, *Clitoria ternatea*, *Galactia tenuiflora*, *Leptadenia reticulata*, *Mallotus repandus*, *Mukia maderaspatana*, *Pentatropis capensis*, *Pergularia daemia*, *Teramnus labialis*, *Tinospora cordifolia*, *Tragia involucrata*, *Tragia plukenetii*, *Wattakaka volubilis*.

## **Discussion**

The results presented are not supposed to be those attained by a rigorous scientific method that can be utilized for comparison between other forest types within India and other tropical areas. They are intended as an addition to the knowledge about the TDEF as a forest type that is enigmatic due to its scarcity. These notes are more than anything offered as an aid for conservation, helping to identify which species are needed to be replanted in the degenerated areas of forest, and also in new areas for afforestation.

## **Limitations of the Methodology**

Information is very limited for the climax forest on the differing soil types. Due to the fact that very few groves and no reserve forests are found on the better soils, (the alluvial clays utilized for rice growing), we can have little idea of the species composition of these areas. The little information we can glean comes from the wayside trees and shrubs found in the area and also the occasional groves left, but they are of such small number that corroborative evidence is totally lacking.

Within the area it is uncertain which species have been introduced, either in sacred groves traditionally for minor forest products, or by the forest department in previous eras for enrichment planting. Information still needs to be gathered on these issues. Some species under question include *Anogeissus latifolia*, *Buchania axillaris*, *Gardenia gummifera*, *Maduca indica*, *Terminalia bellerica*, and *Terminalia paniculata*.

Extinction of high value timber trees. Some species may have been present, but wiped out due to over exploitation and their low tolerance to interference, for example *Dalbergia latifolia*, *Pterocarpus marsupium*, and *Terminalia paniculata*.

## **The current and future value of these forests to humanity**

At present when we consider this forest type in all its forms there are over 1000 plant species occurring within it. Of these 500 are herbaceous and grasses, the others are woody to a greater or lesser extent. Over half of these species have a medicinal use, and others have cultural or religious uses. Consequently conserving the forest in all its diversity will maintain this resource base for those that can or need to utilize it.

The forest, with its dense and evergreen characteristic, is an excellent conservator of soil, and when intact acts as an effective sponge for the monsoon rains that are characteristic of the area. In watershed management the forest is very effective, particularly due to its evergreen nature, maintaining a constant ground cover that breaks up the rain's impact. Also the nature of the leaves allows a persistent mulch layer to develop in the pristine forest.

The economic value of the forest is little investigated, and although the potential for timber extraction is limited, the development of sustainable harvesting of MFP's is a possibility for the members of society at a low subsistence level.

## **Other Auroville Resources on TDEF**

Auroville Botanical Garden:

[http://www.auroville.org/environment/botanical\\_garden/introduction.htm](http://www.auroville.org/environment/botanical_garden/introduction.htm)

Shakti Herbarium at Auroville:

[http://www.auroville.org/environment/env\\_shakti.htm](http://www.auroville.org/environment/env_shakti.htm)

Article in "Auroville Today" on TDEF (April 2002):

[http://www.auroville.org/journals&media/avtoday/april\\_2002/tdef%20project.htm](http://www.auroville.org/journals&media/avtoday/april_2002/tdef%20project.htm)

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- Salim Ali 1996 The book of Indian Birds BNHS, OUP

## Appendix 1: The mammals of the TDEF

<b>Family</b>	<b>Scientific name</b>	<b>Author</b>	<b>Common name</b>
Bovidae	<i>Antilope cervicapra</i>	Linnaeus	Black buck
Canidae	<i>Canis aureus</i>	Linnaeus	Jackal
Canidae	<i>Vulpes bengalensis</i>	Shaw	Indian fox
Ceropithecidae	<i>Macaca radiata</i>	Geoffroy	Bonnet macaque
Ceropithecidae	<i>Presbytis entellus</i>	Dufresne	Common langur
Cervidae	<i>Axis axis</i>	Erxleben	Chital
Cervidae	<i>Muntiacus muntjak</i>	Zimmermann	Barking deer
Chiroptera	<i>Cynopterus sphinx</i>	Vahl	Short nosed fruit bat
Chiroptera	<i>Kerivoula picta</i>	Pallas	Painted bat
Chiroptera	<i>Megaderma lyra</i>	Geoffroy	Indian false vampire bat
Chiroptera	<i>Pipistrellus coromandra</i>	Gray	Indian pipistrelle
Chiroptera	<i>Pteropus giganteus</i>	Brunnich	Indian flying fox
Erinaceidae	<i>Paraechinus micropus</i>	Blyth	Pale hedgehog
Felidae	<i>Felis chaus</i>	Guldenstaedt	Jungle cat
Herpestidae	<i>Herpestes edwardsi</i>	Geoffroy	Common mongoose
Herpestidae	<i>Herpestes smithi</i>	Gray	Ruddy mongoose
Leporidae	<i>Lepus nigricollis nigricollis</i>	F.Cuvier	Blacknaped hare
Lorisidae	<i>Loris tardigradus</i>	Linnaeus	Slender loris
Muridae	<i>Bandicota benghlensis</i>	Gray & Hardwicke	Indian mole rat
Muridae	<i>Bandicota indica</i>	Bechstein	Bandicoot
Muridae	<i>Golunda ellioti</i>	Gray	Indian bush rat
Muridae	<i>Mus booduga</i>	Gray	Indian field mouse
Muridae	<i>Mus musculus</i>	Linnaeus	House mouse
Muridae	<i>Rattus rattus</i>	Linnaeus	Common house rat
Muridae	<i>Vandeleuria oleracea</i>	Bennett	Long tailed tree mouse
Mustelidae	<i>Mellivora capensis</i>	Schreber	Ratel
Pholidota	<i>Manis crassicaudata</i>	Gray	Pangolin
Rodentia	<i>Hystrix indica</i>	Kerr	Indian porcupine
Scuiridae	<i>Funambulus palmarum</i>	Linnaeus	Three striped palm squirrel
Scuiridae	<i>Ratufa indica</i>	Erxelben	Indian giant squirrel
Scuiridae	<i>Tatera indica</i>	Hardwicke	Indian gerbil
Soricidae	<i>Suncus murinus</i>	Linnaeus	Grey musk shrew
Suidae	<i>Sus scrofa</i>	Linnaeus	Wild boar
Ursidae	<i>Melursus ursinus</i>	Shaw	Sloth bear
Viverridae	<i>Paradoxurus hermaphroditus</i>	Pallas	Comman palm civet or Toddy cat
Viverridae	<i>Viverra zibetha</i>	Linnaeus	Large india civet



## Appendix 2: The reptiles of the TDEF

<b>Family</b>	<b>Scientific name</b>	<b>Author</b>	<b>Common name</b>
BOIDAE	<i>Eryx conicus</i>	Schneider	Common sand boa
BOIDAE	<i>Eryx johni</i>	Russell	Red sand boa
COLUBRIDAE	<i>Ahaetulla nasutus</i>	Lacepede	Vine snake
COLUBRIDAE	<i>Amphiesma stolata</i>	Linn	Striped keelback
COLUBRIDAE	<i>Atretium schistosum</i>	Daudin	Olive keelback watersnake
COLUBRIDAE	<i>Boiga trigonata</i>	Schneider	Common cat snake
COLUBRIDAE	<i>Dendrelaphis tristis</i>	Daudin	Bronzeback tree snake
COLUBRIDAE	<i>Elaphe helena</i>	Daudin	Trinklet snake
COLUBRIDAE	<i>Lycodon aulicus</i>	Linnaeus	Common wolf snake
COLUBRIDAE	<i>Lycodon striatus</i>	Shaw	Shaw's wolf snake
COLUBRIDAE	<i>Oligodon arnensis</i>	Shaw	Banded kukri
COLUBRIDAE	<i>Oligodon taeniolaotus</i>	Jerdon	Russell's kukri snake
COLUBRIDAE	<i>Ptyas mucosus</i>	Linn.	Rat snake
COLUBRIDAE	<i>Xenochropis piscator</i>	Schneider	Chequered keelback
ELAIDAE	<i>Bungarus caeruleus</i>	Schneider	Common krait
ELAPIDAE	<i>Naja naja</i>	Linn.	Indian cobra
TYPHLOPHIDAE	<i>Typhlina bramina</i>	Daudin	Blind snake
VIPERIDAE	<i>Echis carinatus</i>	Schneider	Saw scaled viper
VIPERIDAE	<i>Vipera russelli</i>	Shaw	Russell's viper
AGAMIDAE	<i>Calotes calotes</i>	Linn.	Southern green calotes
AGAMIDAE	<i>Calotes rouxi</i>	Dum. & Bibr.	Forest calotes
AGAMIDAE	<i>Calotes vericolor</i>	Daudin	Common garden lizard
CHAMAELONIDAE	<i>Chamaeleon zeylanicus</i>	Laurenti	Indian chameleon
GEKKONIDAE	<i>Hemidactylus frenatus</i>	Schlegel	Southern house gecko
GEKKONIDAE	<i>Hemidactylus maculatus</i>	Dum. & Bibr.	Rock gecko
SCINCIDAE	<i>Mabuya carinata</i>	Schneider	Common skink
SCINCIDAE	<i>Riopa punctata</i>	Gmelin	Snake skink
TESTUDINIDAE	<i>Geochelone elegans</i>	Schoepff	Starred tortoise
VARANIDAE	<i>Varanus bengalensis</i>	Scheider	Common indian monitor

### Appendix 3: The Birds of the TDEF

(Note – The number refers to Salim Ali's reference number)

Ref	Family	Scientific name	Author	Common name
74	ACCIPITRIDAE	<i>Pernis ptilorhyncus</i>	Temminck	Honey Buzzard
77	ACCIPITRIDAE	<i>Accipiter badius</i>	Gmelin	Shikra
80	ACCIPITRIDAE	<i>Virgatus besra</i>	Temminck	Besra Sparrow-Hawk
108	ACCIPITRIDAE	<i>Spilornis cheela</i>	Latham	Crested Serpent Eagle
119	FALCONIDAE	<i>Falco tinnunculus</i>	Linnaeus	Kestrel
122	PHASIANIDAE	<i>Francolinus pondicerianus</i>	Gmelin	Grey Partridge
135	PHASIANIDAE	<i>Pavo cristatus</i>	Linnaeus	Common Peafowl
138	PHASIANIDAE	<i>Turnix suscitator</i>	Gmelin	Bustard Quail
163	CHARADRIIDAE	<i>Vanellus malabaricus</i>	Boddaert	Yellow-Wattled Lapwing
222	COLUMBIDAE	<i>Treron bicincta</i>	Jerdon	Orangebreasted Green Pigeon
233	COLUMBIDAE	<i>Streptopelia chinensis</i>	Scopoli	Spotted Dove
237	PSITTACIDAE	<i>Psittacula krameri</i>	Scopoli	Roseringed Parakeet
243	CUCULIDAE	<i>Clamator coromandus</i>	Linnaeus	Redwinged Crested Cuckoo
244	CUCULIDAE	<i>Clamator jacobinus</i>	Boddaert	Pied Crested Cuckoo
245	CUCULIDAE	<i>Cuculus varius</i>	Vahl	Common Hawk-Cuckoo
249	CUCULIDAE	<i>Cacomantis passerinus</i>	Vahl	Plaintive Cuckoo
251	CUCULIDAE	<i>Eudynamys scolopacea</i>	Linnaeus	Koel
255	CUCULIDAE	<i>Centropus sinensis</i>	Stephans	Coucal
257	STRIGIDAE	<i>Tyto alba</i>	Scopoli	Barn Owl
260	STRIGIDAE	<i>Otus bakkamoena</i>	Pennant	Collared Scops Owl
261	STRIGIDAE	<i>Bubo bubo</i>	Linnaeus	Indian Great Horned Owl
267	STRIGIDAE	<i>Athene brama</i>	Temminck	Spotted Owlet
274	CAPRIMULGIDAE	<i>Caprimulgus asiaticus</i>	Latham	Nightjar
278	APODIDAE	<i>Apus affinis</i>	J.E. Gray	House Swift
279	APODIDAE	<i>Cypsiurus parvus</i>	Lichtenstein	Palm Swift
284	ALCEDINIDAE	<i>Alcedo atthis</i>	Linnaeus	Common Kingfisher
289	ALCEDINIDAE	<i>Halcyon smyrnensis</i>	Linnaeus	Whitebreasted Kingfisher
294	MEROPIDAE	<i>Merops phillippinus</i>	Linnaeus	Bluetailed Bee-eater
295	MEROPIDAE	<i>Merops orientalis</i>	Latham	Green Bee-eater
298	CORACIIDAE	<i>Coracias benghalensis</i>	Linnaeus	Indian Roller
300	UPUPIDAE	<i>Upupa epops</i>	Linnaeus	Hoopoe
314	CAPITONIDAE	<i>Megalaima haemacephala</i>	Muller	Crimsonbreasted Barbet
320	PICIDAE	<i>Dinopium benghalensis</i>	Linnaeus	Lesser Goldenbacked Woodpecker
329	PITTIDAE	<i>Pitta brachyura</i>	Linnaeus	Indian Pitta
332	ALAUDIDAE	<i>Mirafra assamica</i>	Horsfield	Bush Lark
342	HIRUNDINIDAE	<i>Hirundo rustica</i>	Linnaeus	Swallow
346	HIRUNDINIDAE	<i>Hirundo daurica</i>	Linnaeus	Redrumped Swallow
351	LANIIDAE	<i>Lanius cristatus</i>	Linnaeus	Brown Shrike
352	ORIOOLIDAE	<i>Oriolus oriolus</i>	Linnaeus	Golden Oriole
356	DICRURIDAE	<i>Dicrurus adsimilis</i>	Bechstein	Black Drongo
357	DICRURIDAE	<i>Dicrurus leucophaeus</i>	Vieillot	Ashy Drongo
363	ARTAMIDAE	<i>Artamus fuscus</i>	Vieillot	Ashy Swallow-Shrike
366	STURNIDAE	<i>Sturnus pagodarum</i>	Gmelin	Brahminy Mynah
367	STURNIDAE	<i>Sturnus roseus</i>	Linnaeus	Rosy Pastor
370	STURNIDAE	<i>Acridotheres tristis</i>	Linnaeus	Common Mynah
377	CORVIDAE	<i>Dendrocitta vagabunda</i>	Latham	Tree Pie
380	CORVIDAE	<i>Corvus splendens</i>	Vieillot	House Crow
381	CORVIDAE	<i>Corvus macrorhynchus</i>	Wagler	Jungle Crow
385	CAMPEPHAGIDAE	<i>Tephrodornis pondicerianus</i>	Gmelin	Common Wood Shrike
387	CAMPEPHAGIDAE	<i>Coracina melanoptera</i>	Ruppell	Blackheaded Cuckoo-Shrike
391	CAMPEPHAGIDAE	<i>Pericrocotus cinnamomous</i>	Linnaeus	Small Minivet
393	IRENIDAE	<i>Aegithina tiphia</i>	Linnaeus	Common Iora
404	PYCNONOTIDAE	<i>Pycnonotus cafer</i>	Linnaeus	Redvented Bulbul
407	PYCNONOTIDAE	<i>Pycnonotus luteolus</i>	Lesson	Whitebrowed Bulbul
416	MUSCICAPIDAE	<i>Turdoides caudatus</i>	Dumont	Common Babbler
419	MUSCICAPIDAE	<i>Turdoides malcolmi</i>	Sykes	Large Grey Babbler
422	MUSCICAPIDAE	<i>Turdoides affinis</i>	Jerdon	Whiteheaded Babbler

434 MUSCICAPIDAE	<i>Muscicapa latirostris</i>	Raffles	Brown Flycatcher
435 MUSCICAPIDAE	<i>Muscicapa muttui</i>	Layard	Brownbreasted Flycatcher
443 MUSCICAPIDAE	<i>Muscicapa rubeculoides</i>	Vigors	Bluethroated Flycatcher
450 MUSCICAPIDAE	<i>Terpsiphone paradisi</i>	Linnaeus	Paradise Flycatcher
459 MUSCICAPIDAE	<i>Orthotomus sutorius</i>	Pennant	Tailorbird
474 MUSCICAPIDAE	<i>Erithacus brunneus</i>	Hodgson	Blue Chat
475 MUSCICAPIDAE	<i>Copsycus saularis</i>	Linnaeus	Magpie Robin
485 MUSCICAPIDAE	<i>Saxicoloides fulicata</i>	Linnaeus	Indian Robin
490 MUSCICAPIDAE	<i>Zootera citrina citrina</i>	Latham	Orangeheaded Ground Thrush
491 MUSCICAPIDAE	<i>Zootera citrina cyanotus</i>	Jardine & Selby	Whitethroated Ground Thrush
502 MOTACILLIDAE	<i>Motacilla indica</i>	Gmelin	Forest Wagtail
507 MOTACILLIDAE	<i>Motacilla maderaspatensis</i>	Gmelin	Large Pied Wagtail
509 DICAETIDAE	<i>Dicaeum erythrorhynchos</i>	Latham	Tickell's Flowerpecker
513 NECTARINIIDAE	<i>Nectarinia zeylonica</i>	Linnaeus	Purplerumped Sunbird
515 NECTARINIIDAE	<i>Nectarinia lotenia</i>	Linnaeus	Loten's Sunbird
516 NECTARINIIDAE	<i>Nectarinia asiatica</i>	Latham	Purple Sunbird
520 ZOSTEROPIDAE	<i>Zosterops palpebrosa</i>	Temminck	White-eye
523 PLOCEIDAE	<i>Ploceus phillippinus</i>	Linnaeus	Baya Weaverbird
530 PLOCEIDAE	<i>Lonchura striata</i>	Linnaeus	Whitebacked Munia
533 PLOCEIDAE	<i>Lonchura malacca</i>	Linnaeus	Blackheaded Munia
534 FRINGILLINAE	<i>Carpodacus erythrinus</i>	Pallas	Rosefinch

## Appendix 4 Botanical names with Authors, by Family

<b>FAMILY</b>	<b>BOTANICAL NAMES</b>
ACANTHACEAE	Barleria longiflora L.f.
ACANTHACEAE	Barleria nitida Nees
ACANTHACEAE	Barleria noctiflora L.f.
ACANTHACEAE	Barleria prionitis L.
ACANTHACEAE	Ecbolium ligustrinum (Vahl) Vollesen
ACANTHACEAE	Justicia adhatoda L.
ACANTHACEAE	Stenosiphonium parviflorum T.Anderson
ACANTHACEAE	Stenosiphonium russellianum Nees
ALANGIACEAE	Alangium salviifolium (L.f.) Wangerin
AMARYLLIDACEAE	Crinum latifolium L.
ANACARDIACEAE	Anacardium occidentale L.
ANACARDIACEAE	Buchanania axillaris (Desr.) T.P.Ramamoorthy
ANACARDIACEAE	Lanea coromandelica (Houtt.) Merr.
ANACARDIACEAE	Semecarpus anacardium L.f.
ANACARDIACEAE	Spondias pinnata (L.f.) Kurz
ANNONACEAE	Annona squamosa L.
ANNONACEAE	Miliusa eriocarpa Dunn
ANNONACEAE	Polyalthia cerasoides (Roxb.) Beddome
ANNONACEAE	Polyalthia coffeoides (Hook.f. et Thomson) Benth. et Hook.f. ex Beddome
ANNONACEAE	Polyalthia korinti (Dunal) Thwaites
ANNONACEAE	Polyalthia longifolia (Sonn.) Thwaites
ANNONACEAE	Polyalthia longifolia (Sonn.) Thwaites var. pendula
ANNONACEAE	Polyalthia suberosa (Roxb.) Thwaites
ANTHERICACEAE	Chlorophytum tuberosum (Roxb.) Baker
APOCYNACEAE	Carissa salicina Lam.
APOCYNACEAE	Carissa spinarum L.
APOCYNACEAE	Catharanthus roseus (L.) G.Don
APOCYNACEAE	Ichnocarpus frutescens (L.) R.Br.
APOCYNACEAE	Rauvolfia tetraphylla L.
APOCYNACEAE	Thevetia peruviana (Pers.) Merr.
APOCYNACEAE	Vallaris solanacea (Roth) Kuntze
APOCYNACEAE	Wrightia tinctoria (Roxb.) R.Br.
ARACEAE	Theriophonum fischeri Sivadasan
ARACEAE	Theriophonum minutum (Willd.) Baillon
ARECACEAE	Borassus flabellifer L.
ARECACEAE	Calamus rotang L.
ARECACEAE	Phoenix pusilla Gaertner
ARECACEAE	Phoenix sylvestris (L.) Roxb.
ARISTOLOCHIACEAE	Aristolochia bracteata Retz.
ARISTOLOCHIACEAE	Aristolochia indica L.
ASCLEPIADACEAE	Calotropis gigantea (L.) R.Br.
ASCLEPIADACEAE	Caralluma adscendens (Roxb.) Haw.
ASCLEPIADACEAE	Caralluma attenuata Wight
ASCLEPIADACEAE	Caralluma lasiantha (Wight) N.E.Br.
ASCLEPIADACEAE	Caralluma umbellata Haw.
ASCLEPIADACEAE	Gymnema sylvestre (Retz.) R.Br. ex Roemer et Schultes
ASCLEPIADACEAE	Leptadenia reticulata (Retz.) Wight et Arn.
ASCLEPIADACEAE	Pentatropis capensis (L.f.) Bullock
ASCLEPIADACEAE	Pergularia daemia (Forsskal) Chiov.
ASCLEPIADACEAE	Sarcostemma intermedium Decne.
ASCLEPIADACEAE	Secamone emetica (Roxb.) R.Br. ex Schultes
ASCLEPIADACEAE	Tylophora indica (Burm.f.) Merr.
ASCLEPIADACEAE	Wattakaka volubilis (L.f.) Stapf
ASPARAGACEAE	Asparagus racemosus Willd.
ASTERACEAE	Kleinia grandiflora (DC.) N.Rani
BASELLACEAE	Basella alba L.
BIGNONIACEAE	Dolichandrone falcata (DC.) Seemann
BIGNONIACEAE	Heterophragma adenophyllum (Wallich ex G.Don) Seemann ex Benth. et Hook.f
BIGNONIACEAE	Stereospermum personatum (Hassk.) Chatterjee

BOMBACACEAE	<i>Bombax ceiba</i> L.
BORAGINACEAE	<i>Carmona retusa</i> (Vahl) Masam.
BORAGINACEAE	<i>Cordia monoica</i> Roxb.
BORAGINACEAE	<i>Cordia myxa</i> L.
BORAGINACEAE	<i>Ehretia pubescens</i> Benth.
BURSERACEAE	<i>Commiphora berryi</i> (Arn.) Engl.
BURSERACEAE	<i>Commiphora caudata</i> (Wight et Arn.) Engl.
BURSERACEAE	<i>Garuga pinnata</i> Roxb.
CACTACEAE	<i>Cereus pterogonus</i> Lemaire
CACTACEAE	<i>Opuntia dillenii</i> (Ker Gawler) Haw.
CACTACEAE	<i>Opuntia monacantha</i> (Willd.) Haw.
CAESALPINIACEAE	<i>Bauhinia racemosa</i> Lam.
CAESALPINIACEAE	<i>Bauhinia tomentosa</i> L.
CAESALPINIACEAE	<i>Caesalpinia bonduc</i> (L.) Roxb.
CAESALPINIACEAE	<i>Cassia fistula</i> L.
CAESALPINIACEAE	<i>Cassia montana</i> Heyne ex Roth
CAESALPINIACEAE	<i>Delonix elata</i> (L.) Gamble
CAESALPINIACEAE	<i>Hardwickia binata</i> Roxb.
CAESALPINIACEAE	<i>Pterolobium hexapetalum</i> (Roth) Santapau et Wagh
CAESALPINIACEAE	<i>Senna auriculata</i> (L.) Robx.
CAESALPINIACEAE	<i>Senna occidentalis</i> Roxb.
CAESALPINIACEAE	<i>Senna siamea</i> (Lam.) Irwin et Barneby
CAESALPINIACEAE	<i>Tamarindus indica</i> L.
CAPPARACEAE	<i>Cadaba fruticosa</i> (L.) Druce
CAPPARACEAE	<i>Cadaba trifoliata</i> (Roxb.) Wight et Arn.
CAPPARACEAE	<i>Capparis brevispina</i> DC.
CAPPARACEAE	<i>Capparis divaricata</i> Lam.
CAPPARACEAE	<i>Capparis rotundifolia</i> Rottl.
CAPPARACEAE	<i>Capparis sepiaria</i> L.
CAPPARACEAE	<i>Capparis zeylanica</i> L.
CAPPARACEAE	<i>Crateva magna</i> (Lour.) DC.
CAPPARACEAE	<i>Maerua oblongifolia</i> (Forsskal) A.Rich.
CASUARINACEAE	<i>Casuarina equisetifolia</i> Forster et Forster f.
CELASTRACEAE	<i>Cassine glauca</i> (Rottb.) Kuntze
CELASTRACEAE	<i>Loeseneriella obtusifolia</i> (Roxb.) A.C.Smith
CELASTRACEAE	<i>Maytenus emarginata</i> (Willd.) Ding Hou
CELASTRACEAE	<i>Pleurostyliopsis opposita</i> (Wallich) Alston
CELASTRACEAE	<i>Reissantia indica</i> (Willd.) N.Hallé
CELASTRACEAE	<i>Salacia chinensis</i> L.
CLUSIACEAE	<i>Calophyllum inophyllum</i> L.
CLUSIACEAE	<i>Garcinia spicata</i> (Wight et Arn.) Hook.f.
COCHLOSPERMACEAE	<i>Cochlospermum religiosum</i> (L.) Alston
COLCHICACEAE	<i>Iphigenia indica</i> (L.) A.Gray e
COLICACEAE	<i>Gloriosa superba</i> L.
COMBRETACEAE	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wallich ex Guill. et Pers.
COMBRETACEAE	<i>Calycopteris floribunda</i> (Roxb.) Poir.
COMBRETACEAE	<i>Combretum ovalifolium</i> Roxb.
COMBRETACEAE	<i>Terminalia arjuna</i> (DC.) Wight et Arn.
COMBRETACEAE	<i>Terminalia bellirica</i> (Gaertner) Roxb.
COMBRETACEAE	<i>Terminalia chebula</i> Retz.
COMBRETACEAE	<i>Terminalia paniculata</i> Roth
CONVOLVULACEAE	<i>Argyreia cymosa</i> Sweet
CONVOLVULACEAE	<i>Argyreia osyrensis</i> (Roth) Choisy
CONVOLVULACEAE	<i>Ipomoea fistulosa</i> C.Martius ex Choisy
CONVOLVULACEAE	<i>Ipomoea sepiaria</i> J.Koenig ex Roxb.
CONVOLVULACEAE	<i>Ipomoea staphylina</i> Roemer et Schultes
CONVOLVULACEAE	<i>Merremia hederacea</i> (Burm.f.) Hallier f.
CONVOLVULACEAE	<i>Rivea hypocrateriformis</i> (Desr.) Choisy
CUCURBITACEAE	<i>Coccinia grandis</i> (L.) J.Voigt
CUCURBITACEAE	<i>Ctenolepis garcinii</i> (Burm.f.) C.B.Clarke
CUCURBITACEAE	<i>Cucumis melo</i> L.
CUCURBITACEAE	<i>Diplocyclos palmatus</i> (L.) C.Jeffrey
CUCURBITACEAE	<i>Kedrostis foetidissima</i> (Jacq.) Cogn.

CUCURBITACEAE	Momordica charantia L.
CUCURBITACEAE	Mukia maderaspatana (L.) M.Roemer
CUCURBITACEAE	Solena amplexicaulis (Lam.) Gandhi
CUCURBITACEAE	Trichosanthes cucumerina L.
DIOSCOREACEAE	Dioscorea oppositifolia L.
DIOSCOREACEAE	Dioscorea pentaphylla L.
DIOSCOREACEAE	Dioscorea tomentosa J.Koenig ex Sprengel
DRACAENACEAE	Sansevieria roxburghiana Schultes et Schultes f.
EBENACEAE	Diospyros affinis Thwaites
EBENACEAE	Diospyros chloroxylon Roxb.
EBENACEAE	Diospyros ebenum J.Koenig ex Retz.
EBENACEAE	Diospyros ferrea (Willd.) Bakh.
EBENACEAE	Diospyros melanoxylon Roxb.
EBENACEAE	Diospyros montana Roxb.
ERYTHROXYLACEAE	Erythroxylum monogynum Roxb.
EUPHORBIACEAE	Breynia retusa (Dennst.) Alston
EUPHORBIACEAE	Breynia vitis-idaea (Burm.f.)
EUPHORBIACEAE	Bridelia retusa (L.) Sprengel
EUPHORBIACEAE	Cleistanthus collinus (Roxb.) Benth. ex Hook.f.
EUPHORBIACEAE	Dimorphocalyx glabellus Thwaites
EUPHORBIACEAE	Drypetes porteri (Gamble) Pax et Hoffm.
EUPHORBIACEAE	Drypetes sepiaria (Wight et Arn.) Pax et Hoffm.
EUPHORBIACEAE	Euphorbia antiquorum L.
EUPHORBIACEAE	Euphorbia nivulia Buch.-Ham.
EUPHORBIACEAE	Euphorbia tirucalli L.
EUPHORBIACEAE	Euphorbia tortilis Rottler ex Ainslie
EUPHORBIACEAE	Givotia rottleriformis Griffith
EUPHORBIACEAE	Jatropha glandulifera Roxb.
EUPHORBIACEAE	Jatropha gossypifolia L.
EUPHORBIACEAE	Jatropha tanjorensis Ellis et Saroja
EUPHORBIACEAE	Mallotus philippensis (Lam.) Muell.Arg.
EUPHORBIACEAE	Mallotus repandus Muell.Arg.
EUPHORBIACEAE	Mallotus rhamnifolius Muell.Arg.
EUPHORBIACEAE	Mallotus stenanthus Muell.Arg.
EUPHORBIACEAE	Phyllanthus emblica L.
EUPHORBIACEAE	Phyllanthus pinnatus (Wight) Webster
EUPHORBIACEAE	Phyllanthus polyphyllus Willd.
EUPHORBIACEAE	Phyllanthus reticulatus Poirer
EUPHORBIACEAE	Sapium insigne (Royle) Trimen
EUPHORBIACEAE	Securinega leucopyrus (Willd.) Muell.Arg.
EUPHORBIACEAE	Suregada angustifolia (Muell.Arg.) Airy Shaw
EUPHORBIACEAE	Tragia involucrata L.
EUPHORBIACEAE	Tragia plukenetii R.-Sm.
FABACEAE	Abrus precatorius L.
FABACEAE	Butea monosperma (Lam.) Taubert
FABACEAE	Canavalia cathartica Thouars
FABACEAE	Clitoria ternatea L.
FABACEAE	Dalbergia lanceolaria L.f.
FABACEAE	Dalbergia latifolia Roxb.
FABACEAE	Derris ovalifolia (Wight et Arn.) Benth.
FABACEAE	Derris scandens (Roxb.) Benth.
FABACEAE	Erythrina suberosa Roxb.
FABACEAE	Galactia tenuiflora (Willd.) Wight et Arn.
FABACEAE	Mucuna gigantea DC.
FABACEAE	Mucuna pruriens (L.) DC.
FABACEAE	Ormocarpum sennoides (Willd.) DC.
FABACEAE	Pongamia pinnata (L.) Pierre
FABACEAE	Pterocarpus marsupium Roxb.
FABACEAE	Rhynchosia courtallensis Maesen
FABACEAE	Teramnus labialis (L.f.) Sprengel
FLACOURTIACEAE	Casearia elliptica Willd.
FLACOURTIACEAE	Flacourtia indica (Burm.f.) Merr.
FLINDERSIACEAE	Chloroxylon swietenia DC.

HERNANDIACEAE	Gyrocarpus americanus Jacq.
HYACINTHACEAE	Scilla hyacinthina (Roth) J.F.Macbr.
HYACINTHACEAE	Urginea indica (Roxb.) Kunth
HYPOXIDACEAE	Curculigo orchioides Gaertner
ICACINACEAE	Pyrenacantha volubilis Wight
LAURACEAE	Cassytha filiformis L.
LECYTHIDACEAE	Barringtonia acutangula (L.) Gaertner
LECYTHIDACEAE	Careya arborea Roxb.
LINACEAE	Hugonia mystax L.
LOGANIACEAE	Strychnos minor Dennst.
LOGANIACEAE	Strychnos nux-vomica L.
LOGANIACEAE	Strychnos potatorum L.f.
LORANTHACEAE	Dendrophthoe falcata (L.f.) Ettingsh.
LORANTHACEAE	Taxillus bracteatus (Wallich) Thiegem
LORANTHACEAE	Taxillus heyneanus (Schultes)
LORANTHACEAE	Viscum orientale Willd.
MALVACEAE	Hibiscus purpureus Forsskal
MALVACEAE	Hibiscus tiliaceus L.
MALVACEAE	Thespesia populnea (L.) Sol. ex Corr.Serr.
MELIACEAE	Aglaia elaeagnoidea (Adr.Juss.) Benth.
MELIACEAE	Azadirachta indica Adr.Juss.
MELIACEAE	Walsura trifoliolata (Adr.Juss.) Harms
MEMECYLACEAE	Memecylon umbellatum Burm.f.
MENISPERMACEAE	Cissampelos pareira L.
MENISPERMACEAE	Cocculus hirsutus (L.) Diels
MENISPERMACEAE	Pachygone ovata (Poiret) Hook.f. et Thomson
MENISPERMACEAE	Tiliacora acuminata (Lam.) Miers
MENISPERMACEAE	Tinospora cordifolia (Willd.) Hook.f. et Thomson
MIMOSACEAE	Acacia chundra (Rottler) Willd.
MIMOSACEAE	Acacia farnesiana (L.) Willd.
MIMOSACEAE	Acacia horrida (L.) Willd.
MIMOSACEAE	Acacia leucophloea (Roxb.) Willd.
MIMOSACEAE	Acacia nilotica (L.) Willd. ex Del. subsp. indica (Benth.) Brenan
MIMOSACEAE	Acacia torta (Roxb.) Craib
MIMOSACEAE	Albizia amara (Roxb.) Boivin
MIMOSACEAE	Albizia lebbeck (L.) Benth.
MIMOSACEAE	Albizia odoratissima (L.f.) Benth.
MIMOSACEAE	Dichrostachys cinerea (L.) Wight et Arn.
MIMOSACEAE	Mimosa intsia L.
MIMOSACEAE	Pithecellobium dulce (Roxb.) Benth.
MIMOSACEAE	Prosopis juliflora (Sw.) DC.
MORACEAE	Ficus albipila (Miq.) King
MORACEAE	Ficus amplissima Smith
MORACEAE	Ficus arnottiana (Miq.) Miq.
MORACEAE	Ficus benghalensis L.
MORACEAE	Ficus hispida L.f.
MORACEAE	Ficus microcarpa L.f.
MORACEAE	Ficus mollis Vahl
MORACEAE	Ficus religiosa L.
MORACEAE	Ficus tinctoria Forster f.
MORACEAE	Ficus tsjakela Rheede ex Burm.f.
MORACEAE	Plecosperrum spinosum Trécul
MORACEAE	Streblus asper Lour.
MYRTACEAE	Eugenia bracteata (Willd.) Roxb. ex DC.
MYRTACEAE	Syzygium caryophyllatum (L.) Alston
MYRTACEAE	Syzygium cumini (L.) Skeels
NYCTAGINACEAE	Pisonia aculeata L.
OCHNACEA	Ochna lanceolata Sprengel
OCHNACEAE	Ochna obtusata DC.
OLACACEAE	Olax scandens Roxb.
OLACACEAE	Ximenia americana L.
OLEACEAE	Chionanthus mala-elengi (Dennst.) P.S.Green
OLEACEAE	Jasminum angustifolium Vahl

OLEACEAE	<i>Jasminum auriculatum</i> Vahl
OLEACEAE	<i>Jasminum azoricum</i> L. var. <i>azoricum</i>
OLEACEAE	<i>Jasminum cuspidatum</i> Rottler
OPILIACEAE	<i>Cansjera rheedii</i> J.Gmelin
OPILIACEAE	<i>Opilia amentacea</i> Roxb.
ORCHIDACEAE	<i>Cymbidium aloifolium</i> (L.) Sw.
ORCHIDACEAE	<i>Eulophia epidendraea</i> (J.Koenig) Schltr.
ORCHIDACEAE	<i>Habenaria roxburghii</i> (Pers.) R.Br.
ORCHIDACEAE	<i>Vanda spathulata</i> Sprengel
ORCHIDACEAE	<i>Vanda tessellata</i> (Roxb.) Hook. ex Don
PANDANACEAE	<i>Pandanus fascicularis</i> Lam.
PASSIFLORACEAE	<i>Adenia wightiana</i> (Wallich ex Wight et Arn.) Engl.
PASSIFLORACEAE	<i>Passiflora foetida</i> L.
PERIPLOCACEAE	<i>Cryptostegia grandiflora</i> R.Br.
PERIPLOCACEAE	<i>Hemidesmus indicus</i> (L.) R.Br.
RHAMNACEAE	<i>Scutia myrtina</i> (Burm.f.) Kurz
RHAMNACEAE	<i>Ventilago maderaspatana</i> Gaertner
RHAMNACEAE	<i>Ziziphus mauritiana</i> Lam.
RHAMNACEAE	<i>Ziziphus oenoplia</i> (L.) Miller
RHAMNACEAE	<i>Ziziphus xylopyra</i> (Retz.) Willd.
RUBIACEAE	<i>Benkara malabarica</i> (Lam.) Tirv.
RUBIACEAE	<i>Canthium parviflorum</i> Lam.
RUBIACEAE	<i>Deccania pubescens</i> (Roth) Tirv. var. <i>pubescens</i>
RUBIACEAE	<i>Gardenia gummifera</i> L.f.
RUBIACEAE	<i>Gardenia latifolia</i> Ait.
RUBIACEAE	<i>Gardenia resinifera</i> Roth
RUBIACEAE	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.
RUBIACEAE	<i>Ixora pavetta</i> Andrews
RUBIACEAE	<i>Mitragyna parvifolia</i> (Roxb.) Korth.
RUBIACEAE	<i>Morinda pubescens</i> J.E.Smith var. <i>pubescens</i>
RUBIACEAE	<i>Mussaenda tomentosa</i> Wight ex Wallich
RUBIACEAE	<i>Pavetta indica</i> L.
RUBIACEAE	<i>Psilanthus wightianus</i> (Wight et Arn.) J.Leroy
RUBIACEAE	<i>Psydrax dicoccos</i> Gaertner
RUBIACEAE	<i>Randia dumetorum</i> (Retz.) Poiret
RUBIACEAE	<i>Tarenna asiatica</i> (L.) Kuntze ex Schumann
RUBIACEAE	<i>Tricalysia sphaerocarpa</i> Gamble
RUTACEAE	<i>Aegle marmelos</i> (L.) Corr.Serr.
RUTACEAE	<i>Atalantia monophylla</i> (L.) Corr.Serr.
RUTACEAE	<i>Atalantia racemosa</i> Wight et Arn.
RUTACEAE	<i>Clausena dentata</i> (Willd.) Roemer
RUTACEAE	<i>Glycosmis mauritiana</i> (Lam.) Yuich Tanaka
RUTACEAE	<i>Limonia acidissima</i> L.
RUTACEAE	<i>Murraya paniculata</i> (L.) Jacq
RUTACEAE	<i>Pamburus missionis</i> (Wight) Swingle
RUTACEAE	<i>Pleiospermium alatum</i> (Wight et Arn.) Swingle
RUTACEAE	<i>Toddalia asiatica</i> (L.) Lam.
SALVADORACEAE	<i>Azima tetracantha</i> Lam.
SALVADORACEAE	<i>Salvadora persica</i> L.
SANTALACEAE	<i>Santalum album</i> L.
SAPINDACEAE	<i>Allophylus cobbe</i> (L.) Raeusch.
SAPINDACEAE	<i>Cardiospermum halicacabum</i> L. v. <i>luridum</i> (Blume) Adelb.
SAPINDACEAE	<i>Cardiospermum halicacabum</i> L. v. <i>microcarpum</i> (Kunth) Blume
SAPINDACEAE	<i>Dodonaea viscosa</i> Jacq. var. <i>angustifolia</i> (L.f.) Benth.
SAPINDACEAE	<i>Lepisanthes tetraphylla</i> (Vahl) Radlk.
SAPINDACEAE	<i>Sapindus emarginata</i> Vahl
SAPOTACEAE	<i>Madhuca indica</i> J.Gmelin
SAPOTACEAE	<i>Manilkara hexandra</i> (Roxb.) Dubard
SAPOTACEAE	<i>Mimusops elengi</i> L.
SOLANACEAE	<i>Solanum trilobatum</i> L.
STERCULIACEAE	<i>Firmiana colorata</i> (Roxb.) R.Br.
STERCULIACEAE	<i>Helicteres isora</i> L.
STERCULIACEAE	<i>Hildegardia populifolia</i> (Roxb.) Schott et Endl.



STERCULIACEAE	<i>Pterospermum canescens</i> Roxb.
STERCULIACEAE	<i>Pterospermum xylocarpum</i> (Gaertner) Santapau et Wagh
STERCULIACEAE	<i>Sterculia foetida</i> L.
STERCULIACEAE	<i>Sterculia urens</i> Roxb.
STILAGINACEAE	<i>Antidesma ghesaembilla</i> Gaertner
SYMPHOREMACEAE	<i>Symphorema involucratum</i> Roxb.
TILIACEAE	<i>Grewia carpinifolia</i> A.L.Juss.
TILIACEAE	<i>Grewia flavescens</i> A.L.Juss.
TILIACEAE	<i>Grewia hirsuta</i> Vahl
TILIACEAE	<i>Grewia orbiculata</i> Rottler
TILIACEAE	<i>Grewia tiliifolia</i> Vahl
ULMACEAE	<i>Celtis philippensis</i> Blanco
URTICACEAE	<i>Pouzolzia auriculata</i> Wight
VERBENACEAE	<i>Clerodendrum inerme</i> (L.) Gaertner
VERBENACEAE	<i>Clerodendrum phlomides</i> L.f.
VERBENACEAE	<i>Gmelina asiatica</i> L.
VERBENACEAE	<i>Lantana camara</i> L. var. <i>aculeata</i> (L.) Moldenke
VERBENACEAE	<i>Lantana camara</i> L. var. <i>splendens</i> L.
VERBENACEAE	<i>Premna alstoni</i> Moldenke
VERBENACEAE	<i>Premna corymbosa</i> (Burm.f.) Rottler et Willd.
VERBENACEAE	<i>Premna serratifolia</i> L.
VERBENACEAE	<i>Premna tomentosa</i> Willd.
VERBENACEAE	<i>Vitex altissima</i> L.f.
VERBENACEAE	<i>Vitex leucoxydon</i> L.f.
VERBENACEAE	<i>Vitex negundo</i> L.
VITACEAE	<i>Cayratia carnosa</i> (Wallich ex Wight et Arn.) Gagnepain
VITACEAE	<i>Cayratia pedata</i> (Lour.) A.L.Juss. ex Gagnepain
VITACEAE	<i>Cissus pallida</i> (Wight et Arn.) Planchon
VITACEAE	<i>Cissus quadrangularis</i> L.
VITACEAE	<i>Cissus repens</i> Lam.
VITACEAE	<i>Cissus vitiginea</i> L.