

LISTS OF SPECIES

Angiosperms, Climbing plants in tropical forests of southern Eastern Ghats, Tamil Nadu, India

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Abstract

We provide a check list of angiosperm climbing plant species, along with their climbing modes, enumerated from a total of one hundred and fifty grids in tropical forests of southern Eastern Ghats, peninsular India. The Eastern Ghats constitute an important biodiversity area in India and have been studied earlier mainly for the floristics, and that too confined to a few prioritized sites. Lianas, the woody vines contribute substantially to the diversity and structure of most tropical forests. Yet, little is known about the importance of habitat specialization in maintaining tropical liana diversity. A total of 175 climbing plant species that belong to 100 genera and 40 families are included in this enumeration.

Introduction

Lianas, the woody vines are an important, but understudied growth-form, common to most forests throughout the world, particularly in the tropics (Schnitzer and Bongers 2002). The past few decades have brought increasing awareness of the importance of lianas to species diversity (Gentry and Dodson 1987; Schnitzer and Carson 2001; Burnham 2002). Lianas constitute ~ 25 % of the woody stem density and species diversity in tropical forests (Gentry 1991). They are often a large component of the canopy in tropical forests, often one-third or more of the entire leaf area, though only a small component of the basal area and biomass (Schnitzer and Bongers 2002). Recent studies on lianas have focused on the significant contribution of this life-form to the overall density and species diversity of tropical forests (Mascaro et al. 2004; Rice et al. 2004), mechanisms by which lianas alter the tropical forest diversity and regeneration (Schnitzer and Carson 2001), harming some shade tolerant species, while promoting some pioneer species (Schnitzer et al. 2000; Toledo-Aceves and Swaine 2007), and their significant contribution to carbon sequestration (Restom and Nepstad 2001; Schnitzer and Bongers 2002).

The mean abundance, diversity and taxonomic composition of lianas in lowland tropical moist and wet forests are similar among tropical regions, although liana abundance is higher in Africa

(Schnitzer and Bongers 2002). Liana density (≥ 1.6 cm diameter) decreased with increasing altitude, whereas richness was highest at intermediate elevations (Parthasarathy et al. 2004). Reports suggest that lianas are now increasing in tropical forests as a result of the recent climatological trend (Malhi and Wright 2004). The higher frequency of lianas is not only caused by declining rainfall (Swaine and Grace 2007) but also several other factors are known to favour them such as an increase in disturbance (Laurance et al. 2001; Ibarra-Manriquez and Martinez-Ramos 2002; Londre and Schnitzer 2006), or an especially high responsiveness to elevated CO₂ (Grandos and Korner 2002; Zotz et al. 2006). More recently (Schnitzer 2005) examined floristic data from 69 tropical forests worldwide and found a negative correlation between mean annual precipitation and liana abundance.

Materials and methods

The Eastern Ghats constitute an important biogeographic region, as one of the nine floristic zones in India and form a broken chain of mountains spreading along the states of Orissa, Karnataka, Andhra Pradesh and Tamil Nadu and lie between Mahanadhi and Vaigai rivers. The present study was carried out in southern-most Eastern Ghats which falls in Tamil Nadu (10° 93'–12° 18' N) (Figure 1) in six major hill complexes viz., Chitteris, Kolli hills, Pachaimalais,

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Shervarayans, Kalrayans and Sathyamangalam forests (Figures 2 and 3). These sites harbor five distinct forest types -tropical evergreen, semi-evergreen, mixed deciduous, dry deciduous and thorn forests.

The overall climate in the Eastern Ghats is dry and salubrious. The climatic conditions favour both the south-west and the north-east monsoons. The months of April to June are hottest, while

November to February is relatively cooler. The average summer temperature in the plains can reach up to 40 °C particularly in some of the semi-arid areas in interior Tamil Nadu, while the average minimum temperature normally stays around 18-20 °C and the relative humidity is quite high throughout the year 70-75 %. Much of the region's rainfall occurs between October and December and ranges from 635-1,905 mm a year (Areendran and Rao 2006).

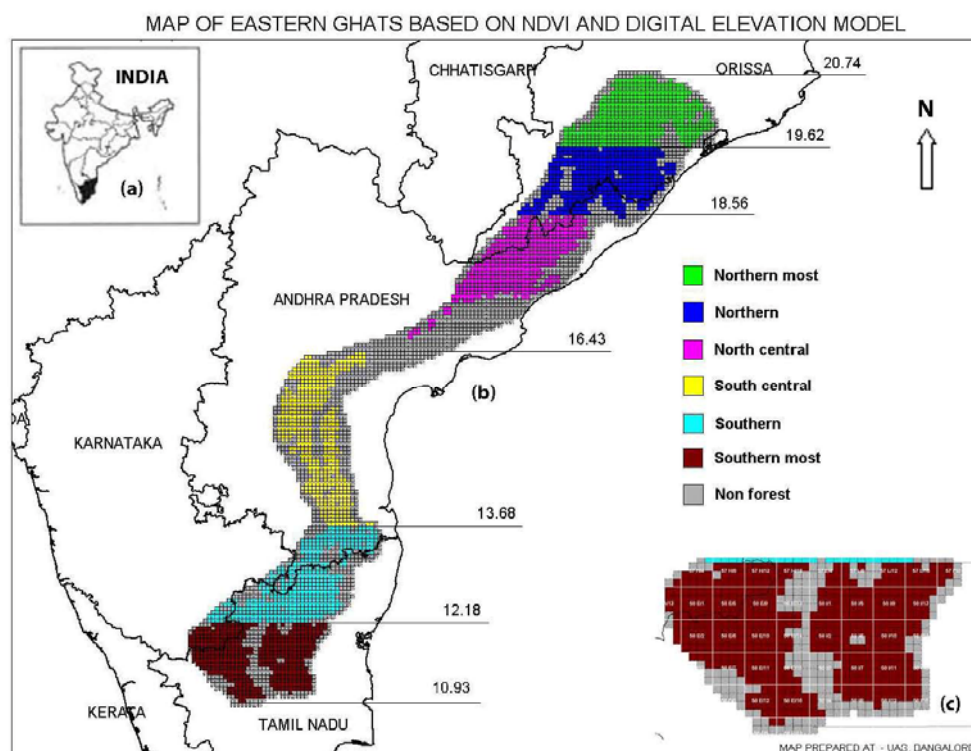


Figure 1. Map: (a) India, (b) Eastern Ghats stretch, (c) Southern Eastern Ghats.

Enumeration of angiosperm climbing plants was carried in a total of 150 grids in forests of southern Eastern Ghats. The entire stretch of southern Eastern Ghats (10°93'-12°18' N) was divided into 6.25 km × 6.25km grids and within each grid a 0.5 ha transect (5m × 1km) was established. Each transect was subdivided into fifty 5m × 20m units. All lianas - 1.5 cm dbh (5gbh, girth at breast height) were enumerated in the whole transect, and those of herbaceous vines of <1.5 cm dbh only in the beginning and end of the transect. Voucher specimens were collected

and identified using regional floras (Hooker 1872-1885; Gamble and Fischer 1921-1935; Matthew 1991), confirmed with the collections lodged in Department of Ecology and Environmental Sciences (DEES), Pondicherry University and Botanical Survey of India, Coimbatore (MH) and deposited in the herbarium of DEES.

Results and Discussion

A total of 175 angiosperm climbing plants in 100 genera and 40 families were recorded from the total of 150 grids of southern Eastern Ghats

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forests. Jongkind and Hawthorne (2005) reported 746 species of climbers in Upper Guinean forests and the total number of climbing plants species that are found in Puerto Rico and the Virgin Islands amounts to 386 (Acevedo-Rodriguez 2005). The most speciose families in our sites include Asclepiadaceae (18 species), Convolvulaceae and Papilionaceae (13 species each), Apocynaceae (12 species), Vitaceae (11 species) and Menispermaceae (9 species) etc. The most abundant liana species include the thorny stragglers *Pterolobium hexapetalum* (Caesalpiniaceae), *Lantana camara* (Verbenaceae), *Ziziphus oenopia* (Rhamnaceae), and the twiners *Jasminum angustifolium* (Oleaceae), *Gymnema sylvestre*, *Secamone emetica* (Asclepiadaceae) and *Aganosma cymosa* var. *cymosa* (Apocynaceae). The rare taxa include *Aganosma cymosa* var. *elegans*, *A. cymosa* var. *lanceolata*, *Ellertonia rheedii* (Apocynaceae), *Argyreia sericea* (Convolvulaceae), *Butea parviflora* (Papilionaceae), *Caesalpinia cucullata* (Caesalpiniaceae), *Capparis shevaroyensis*, *C. sepiaria* var. *retusella* (Capparaceae), *Cissus gigantea* (Vitaceae), *Cocculus pendulus* (Menispermaceae), *Dalbergia congesta* (Papilionaceae), *Rubus niveus* (Rosaceae), *Salacia oblonga* (Celastraceae) and *Ventilago goughii* (Rhamnaceae), all of which occurred in any one of the 150 study transects. Even though *Ola*

scandens (Olacaceae), *Chilocarpus atrovirens* (Apocynaceae), *Artabotrys zeylanicus* (Annonaceae) and *Calamus gamblei* (Arecaceae) were reported as most abundant species in the Western Ghats and *Strychnos minor* (Loganiaceae) in the tropical dry evergreen forests on the Coromandel Coast of India (Parthasarathy et al. 2004) these species did not occur in our sites. Pictures of selected liana species are featured in Figures 3-13. Plant binomial, family and voucher number of the 175 liana species are listed in Table 1. The enumerated climbing plants were classified into woody vines, the lianas (145 species) and herbaceous vines (30 species). Six climbing modes of lianas were recognized: stem twiners (46 %) followed by stragglers-armed (22 %), stragglers-unarmed (17 %), tendril climbers (13 %), root climbers (1 %) and hook climber (0.5 %). Only one climbing mode, the grapnel-like climber (rattans) which was reported from Indian Western Ghats sites (Muthuramkumar and Parthasarathy 2000; Padaki and Parthasarathy 2000), did not occur in our study transects. Presently, many forest sites of southern Eastern Ghats are subjected to various anthropogenic pressures and the data of plant diversity, such as this on lianas will be useful in highlighting the importance of these forests in species conservation and forest management.

Table 1. Angiosperm climbing plants enumerated from 150 grids in tropical forests of southern Eastern Ghats, Tamil Nadu, peninsular India with their binomial, family, category, climbing mode and voucher number. WV: Woody vines; HV: Herbaceous vines; ST: Stem twiners; Str-A: Stragglers-armed; Str-UA: Stragglers-unarmed; TC: Tendril climbers; RC: Root climbers; and HC-1: Hook climber.

Species / Family	Category	Climbing mode	Voucher No.
Annonaceae			
<i>Desmos viridiflora</i> (Bedd.) Safford	WV	Str-UA	6056
<i>Uvaria narum</i> (Dunal) Wall. ex Wight & Arn.	WV	Str-UA	6324
Apocynaceae			
<i>Aganosma cymosa</i> (Roxb.) G. Don var. <i>cymosa</i>	WV	ST	6037
<i>Aganosma cymosa</i> (Roxb.) G. Don var. <i>elegans</i> Hook. f.	WV	ST	6454
<i>Aganosma cymosa</i> (Roxb.) G. Don var. <i>lanceolata</i> Hook. f.	WV	ST	6262
<i>Anodendron paniculatum</i> A. DC.	WV	ST	6176
<i>Carissa carandas</i> L.	WV	Str-A	6020
<i>Carissa gangetica</i> Stapf	WV	Str-A	6271
<i>Carissa paucinervia</i> A. DC.	WV	Str-A	6273
<i>Carissa salicina</i> Lam.	WV	Str-A	6263
<i>Carissa spinarum</i> L.	WV	Str-A	6076

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Species / Family	Category	Climbing mode	Voucher No.
<i>Ellertonia rheedii</i> Wight	WV	ST	6038
<i>Ichnocarpus frutescens</i> (L.) R. Br.	HV	ST	6067
<i>Ichnocarpus ovatifolius</i> A. DC.	WV	ST	6041
Araceae			
<i>Rhaphidophora laciniata</i> (Burm.f.) Merr.	WV	RC	6178
Aristolochiaceae			
<i>Aristolochia indica</i> L.	HV	ST	6432
<i>Aristolochia tagala</i> Cham.	WV	ST	6168
Asclepiadaceae			
<i>Cosmostigma racemosum</i> (Roxb.) Wight	WV	ST	6025
<i>Cryptolepis buchanani</i> Roemer & Schultes	WV	ST	6018
<i>Cynanchum callialatum</i> Buch.-Ham. ex Wight & Arn.	WV	ST	6241
<i>Decalepis hamiltonii</i> Wight & Arn.	WV	ST	6060
<i>Gymnema hirsutum</i> Wight & Arn.	WV	ST	6321
<i>Gymnema montanum</i> (Roxb.) Hook. f. var. <i>beddomei</i> Hook. f.	HV	ST	6334
<i>Gymnema sylvestre</i> (Retz.) R.Br.ex Roemer & Schultes	WV	ST	6006
<i>Gymnema tingens</i> (Roxb.) Wight & Arn.	WV	ST	6246
<i>Hemidesmus indicus</i> (L.) R. Br. var. <i>indicus</i>	HV	ST	6083
<i>Hemidesmus indicus</i> (L.) R. Br. var. <i>pubescens</i> (Wight & Arn.) Hook. f.	HV	ST	6428
<i>Marsdenia brunoniana</i> Wt. & Arn.	WV	ST	6244
<i>Marsdenia tenacissima</i> (Roxb.) Moon	WV	ST	6030
<i>Pergularia daemia</i> (Forssk.) Chiov.	HV	ST	6224
<i>Sarcostemma acidum</i> (Roxb.) Voigt	WV	Str-UA	6147
<i>Secamone emetica</i> (Roxb.) R. Br. ex Schultes	WV	ST	6010
<i>Tylophora capparidifolia</i> Wight & Arn.	WV	ST	6087
<i>Tylophora indica</i> (Burm.f) Merr.	HV	ST	6128
<i>Wattakaka volubilis</i> (L.f.) T. Cooke	WV	ST	6043
Basellaceae			
<i>Basella alba</i> L.	HV	ST	6234
Caesalpiniaceae			
<i>Caesalpinia crista</i> L.	WV	Str-A	6027
<i>Caesalpinia cucullata</i> Roxb.	WV	Str-A	6259
<i>Pterolobium hexapetalum</i> (Roth) Sant. & Wagh	WV	Str-A	6012
Capparaceae			
<i>Capparis brevispina</i> DC.	WV	Str-A	6110
<i>Capparis divaricata</i> Lam.	WV	Str-A	6138
<i>Capparis sepiaria</i> L. var. <i>sepiaria</i>	WV	Str-A	6057
<i>Capparis sepiaria</i> L. var. <i>retusella</i> Thwaites	WV	Str-A	6204
<i>Capparis shevaroyensis</i> Sun.-Ragh.	WV	Str-A	6321
<i>Capparis zeylanica</i> L.	WV	Str-A	6059
<i>Maerua oblongifolia</i> (Forsk.) A.Rich.	WV	Str-UA	6050
Celastraceae			
<i>Celastrus paniculatus</i> Willd.	WV	Str-UA	6014
<i>Loeseneriella obtusifolia</i> (Roxb.) A.C. Smith	WV	Str-UA	6137
<i>Maytenus heyneana</i> (Roth) Raju & Babu	WV	Str-A	6195
<i>Maytenus royleanus</i> (Wallich ex M. Lawson) M.A. Rau	WV	Str-A	6013
<i>Reissantia indica</i> (Willd.) Halle	WV	Str-UA	6286
<i>Salacia chinensis</i> L.	WV	Str-UA	6106

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Species / Family	Category	Climbing mode	Voucher No.
<i>Salacia oblonga</i> Wall. ex Wight & Arn.	WV	Str-UA	6273
Combretaceae			
<i>Combretum acuminatum</i> Lam.	WV	TC	6055
<i>Combretum albidum</i> G. Don	WV	ST	6024
Convolvulaceae			
<i>Argyreia cuneata</i> (Willd.) Ker-Gawl.	WV	ST	6328
<i>Argyreia elliptica</i> (Roth) Choisy	WV	ST	6015
<i>Argyreia involucrata</i> Clarke	WV	ST	6321
<i>Argyreia kleiniana</i> (Roem. & Schultes) Raizada	WV	ST	6319
<i>Argyreia pilosa</i> Arn.	WV	ST	6032
<i>Argyreia sericea</i> Dalz.	WV	ST	6149
<i>Ipomoea asarifolia</i> (Desr.) Roem. & Schultes	HV	ST	6034
<i>Ipomoea companulata</i> L.	WV	ST	6474
<i>Ipomoea eriocarpa</i> R. Br.	WV	ST	6257
<i>Ipomoea quamoclit</i> L.	HV	ST	6332
<i>Ipomoea staphylina</i> Roem & Schultes	WV	ST	6149
<i>Merremia vitifolia</i> (Burm. f.) Hall. f.	HV	ST	6276
<i>Rivea hypocrateriformis</i> (Desr.) Choisy	WV	ST	6274
Cucurbitaceae			
<i>Coccinia grandis</i> (L.) J. Voigt	WV	TC	6146
<i>Gymnopetalum cochinchinense</i> Kurz	WV	TC	6323
<i>Kedrostis courtallensis</i> (Arn.) Jeffrey	WV	TC	6264
<i>Trichosanthes anaimalaiensis</i> Bedd.	WV	TC	6343
Dioscoreaceae			
<i>Dioscorea oppositifolia</i> L.	HV	ST	6064
<i>Dioscorea pentaphylla</i> L.	HV	ST	6068
<i>Dioscorea tomentosa</i> J. Koenig ex Sprengel	HV	ST	6066
Elaeagnaceae			
<i>Elaeagnus indica</i> Servettaz	WV	Str-UA	6209
Euphorbiaceae			
<i>Phyllanthus reticulatus</i> Poir.	WV	Str-UA	6426
<i>Tragia involucrata</i> L.	WV	ST	6047
<i>Tragia plukenetii</i> R. Smith	HV	ST	6262
Gnetaceae			
<i>Gnetum ula</i> Brongn.	WV	ST	6188
Liliaceae			
<i>Asparagus racemosus</i> Willd.	HV	Str-A	6222
Linaceae			
<i>Hugonia mystax</i> L.	WV	HC	6031
Malpighiaceae			
<i>Hiptage benghalensis</i> (L.) Kurz	WV	Str-UA	6074
Menispermaceae			
<i>Anamirta cocculus</i> (L.) Wight & Arn.	WV	ST	6253
<i>Cissampelos pareira</i> L. var. <i>hirsuta</i> (DC.) Forman	HV	ST	6069
<i>Cocculus hirsutus</i> (L.) Diels	WV	ST	6135
<i>Cocculus pendulus</i> (Forst.) Diels	WV	ST	6452
<i>Cyclea peltata</i> (Lam.) Hook.f. & Thoms.	HV	ST	6318
<i>Diploclisia glaucescens</i> (Blume) Diels	WV	ST	6188
<i>Pachygone ovata</i> (Poir.) Miers ex Hook.	WV	ST	6035

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Species / Family	Category	Climbing mode	Voucher No.
<i>Stephania japonica</i> (Thunb.) Miers	HV	ST	6070
<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thoms.	WV	ST	6033
Mimosaceae			
<i>Acacia caesia</i> (L.) Willd.	WV	Str-A	6026
<i>Acacia canescens</i> Grah.	WV	Str-A	6272
<i>Acacia intsia</i> Willd. var. <i>intsia</i>	WV	Str-A	6229
<i>Acacia pennata</i> (L.) Willd.	WV	Str-A	6071
<i>Acacia sinuata</i> (Lour.) Merr.	WV	Str-A	6192
<i>Acacia torta</i> (Roxb.) Craib	WV	Str-A	6271
<i>Entada pursaetha</i> DC.	WV	Str-UA	6197
<i>Mimosa intsia</i> L.	WV	Str-A	6327
Moraceae			
<i>Plecosperrum spinosum</i> Trecul.	WV	Str-A	6017
Myrsinaceae			
<i>Embelia basaal</i> (Roem. ex Schultes) A. DC.	WV	Str-UA	6179
<i>Embelia ribes</i> Burm.f.	WV	Str-UA	6192
Nyctaginaceae			
<i>Pisonia aculeata</i> L.	WV	Str-A	6226
Oleaceae			
<i>Jasminum angustifolium</i> (L.) Willd.	WV	ST	6004
<i>Jasminum auriculatum</i> Vahl	WV	ST	6022
<i>Jasminum azoricum</i> L. var. <i>azoricum</i>	WV	ST	6195
<i>Jasminum cuspidatum</i> Rottl.	WV	ST	6009
<i>Jasminum malabaricum</i> Wight	WV	ST	6073
<i>Jasminum multiflorum</i> (Burm. f.) Andr.	WV	ST	6188
<i>Jasminum sessiliflorum</i> Vahl	WV	ST	6001
<i>Jasminum trichotomum</i> Heyne ex Roth	WV	ST	6437
Opiliaceae			
<i>Cansjera rheedii</i> J. Gmelin	WV	Str-A	6021
Papilionaceae			
<i>Abrus precatorius</i> L.	WV	ST	6079
<i>Butea parviflora</i> Roxb.	WV	Str-UA	6308
<i>Canavalia virosa</i> (Roxb.) Wight & Arn.	WV	ST	6228
<i>Dalbergia congesta</i> Graham ex Wight & Arn.	WV	ST	6029
<i>Dalbergia rubiginosa</i> Roxb.	WV	ST	6045
<i>Derris scandens</i> (Roxb.) Benth.	WV	ST	6042
<i>Dolichos trilobus</i> L.	HV	ST	6086
<i>Galactia villosa</i> Wight & Arn.	HV	ST	6126
<i>Mucuna atropurpurea</i> DC.	WV	ST	6236
<i>Mucuna monosperma</i> DC. ex Wight	WV	ST	6184
<i>Mucuna pruriens</i> (L.) DC.	WV	ST	6023
<i>Neonotonia wightii</i> (Wight & Arn.) Lackey	WV	ST	6165
<i>Pseudarthria viscida</i> (L.) Wight & Arn.	HV	ST	6039
Passifloraceae			
<i>Passiflora edulis</i> Sims	HV	TC	6267
<i>Passiflora foetida</i> L.	HV	TC	6421
<i>Passiflora subpeltata</i> Ortega	HV	TC	6077
Piperaceae			
<i>Piper nigrum</i> L.	WV	RC	6273
Ranunculaceae			
<i>Clematis gouriana</i> Roxb. ex DC.	WV	Str-UA	6124
<i>Naravelia zeylanica</i> (L.) DC.	WV	TC	6019
Rhamnaceae			

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<i>Sageretia filiformis</i> (Schultes) Don	WV	Str-A	6007
<i>Scutia myrtina</i> (Burm.f.) Kurz	WV	Str-A	6008
<i>Ventilago goughii</i> Gamble	WV	ST	6325
<i>Ventilago maderaspatana</i> Gaertner	WV	ST	6003
<i>Ziziphus horrida</i> Roth	WV	Str-A	6028
<i>Ziziphus oenoplia</i> (L.) Miller	WV	Str-A	6005
<i>Ziziphus rugosa</i> Lam.	WV	Str-A	6228
Rosaceae			
<i>Rubus ellipticus</i> Smith	WV	Str-A	6214
<i>Rubus niveus</i> Thunb.	WV	Str-A	6329
Rubiaceae			
<i>Morinda umbellata</i> L.	WV	ST	6040
<i>Mussaenda hirsutissima</i> (Hook.f.) Hutch. ex Gamble	WV	ST	6224
<i>Pseudauda speciosa</i> (Bedd.) Tirveng.	WV	Str-UA	6178
<i>Rubia cordifolia</i> L.	HV	Str-UA	6156
Rutaceae			
<i>Paramignya beddomei</i> Tanaka	WV	Str-A	6142
<i>Toddalia asiatica</i> (L.) Lam.	WV	Str-A	6011
<i>Zanthoxylum ovalifolium</i> Wight	WV	Str-A	6176
<i>Zanthoxylum tetraspermum</i> Wight & Arn.	WV	Str-A	6185
Sapindaceae			
<i>Cardiospermum canescens</i> Wall.	HV	TC	6239
<i>Cardiospermum halicacabum</i> L. var. <i>luridum</i> (Blume) Adelb.	HV	TC	6094
Smilacaceae			
<i>Smilax zeylanica</i> L.	HV	TC	6157
Solanaceae			
<i>Solanum seaforthianum</i> Andr.	HV	ST	6159
Tiliaceae			
<i>Grewia flavescens</i> Juss.	WV	Str-UA	6075
<i>Grewia heterotricha</i> Mast.	WV	Str-UA	6269
<i>Grewia obtusa</i> Wall.	WV	Str-UA	6443
<i>Grewia oppositifolia</i> Buch-Ham.	WV	Str-UA	6148
<i>Grewia rhamnifolia</i> Heyne ex Roth	WV	Str-UA	6016
Verbenaceae			
<i>Lantana camara</i> L.	WV	Str-A	6124
<i>Premna coriacea</i> Clarke	WV	Str-UA	6176
<i>Premna corymbosa</i> (Burm.f.) Rottler & Willd.	WV	Str-UA	6002
<i>Premna flavescens</i> Ham.	WV	Str-UA	6234
<i>Premna villosa</i> Clark	WV	Str-UA	6204
<i>Premna wightiana</i> Schauer	WV	Str-UA	6324
Vitaceae			
<i>Ampelocissus araneosa</i> (Dalz. & Gibs.) Planch.	WV	TC	6327
<i>Ampelocissus arnottiana</i> Planch.	WV	TC	6109
<i>Ampelocissus tomentosa</i> (Heyne ex Roth) Planch.	WV	TC	6090
<i>Cayratia japonica</i> (Thunb.) Gagnep.	WV	TC	6172
<i>Cayratia pedata</i> (Lour.) A.L. Juss. ex Gagnep.	WV	TC	6146
<i>Cayratia roxburghii</i> (Wight & Arn.) Gagnep.	WV	TC	6166
<i>Cissus gigantea</i> (Bedd.) Planch.	WV	TC	6251
<i>Cissus glyptocarpa</i> (Thw.) Planch.	WV	TC	6174
<i>Cissus heyneana</i> (Wall. ex Lawson) Planch.	WV	TC	6149
<i>Cissus quadrangularis</i> L.	WV	TC	6128
<i>Cissus vitiginea</i> L.	WV	TC	6078

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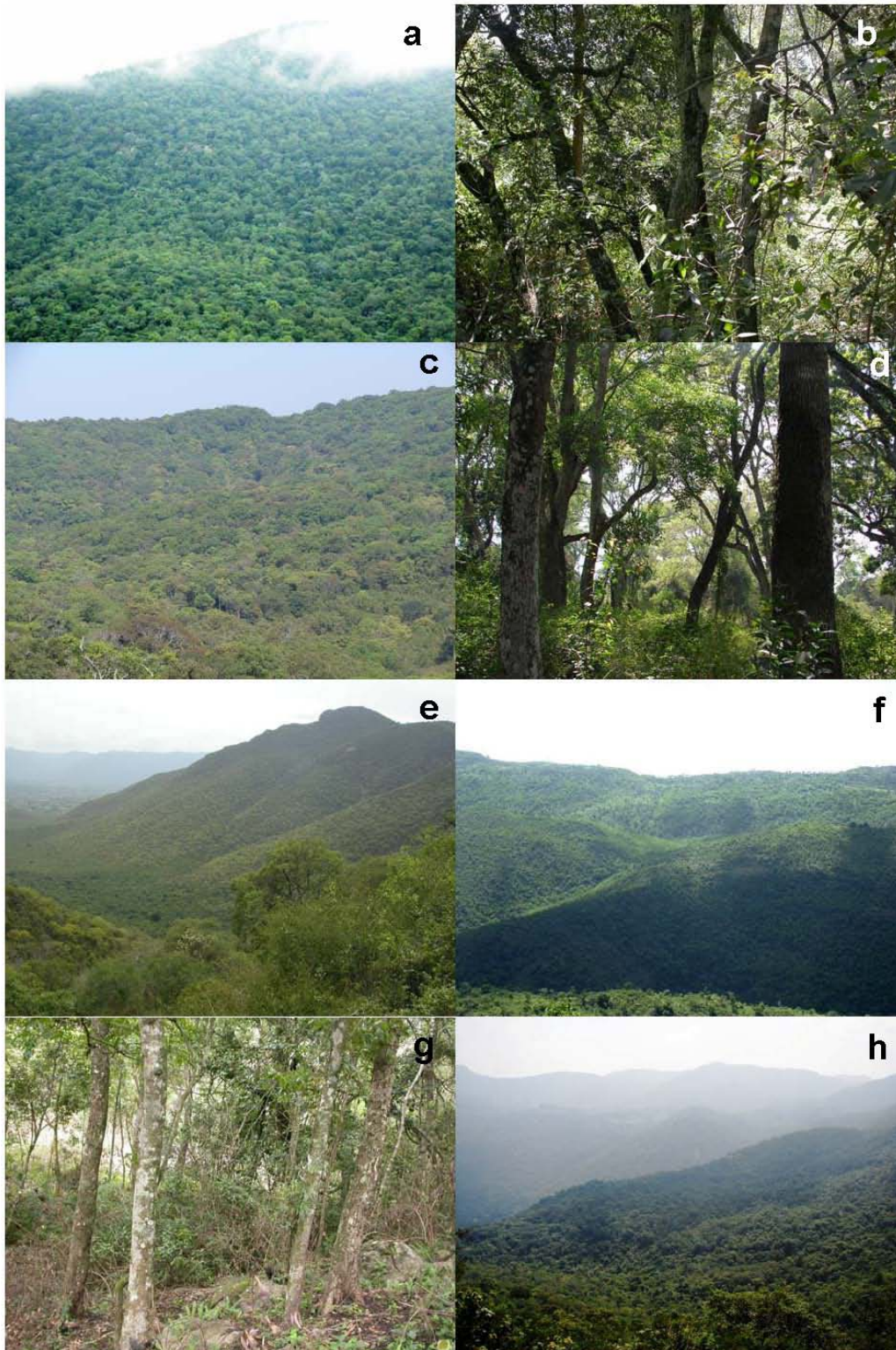


Figure 2. a) Overview of Chitteri hills; b) Inner stand view of Chitteri hills; c) Overview of Kolli hills; d) Inner stand view of Kolli hills; e) Overview of Pachaimalais; f) Overview of Shervarayans g) Inner stand view of Shervarayans; h) Overview of Kalrayans.

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Figure 3. a) Inner stand view of Kalrayans; b) Overview of Sathyamangalam forests; c) Stand view of Sathyamangalam forests; d) *Abrus precatorius* (Papilionaceae); e) *Acacia caesia* (Mimosaceae); f) *Acacia intsia* var. *intsia* (Mimosaceae); g) *Acacia pennata* (Mimosaceae); h) *Acacia simuata* (Mimosaceae).

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Figure 4. a) *Acacia torta* (Mimosaceae); b) *Aganosma cymosa* (Apocynaceae); c) *Argyreia cuneata* (Convolvulaceae); d) *Argyreia kleiniana* (Convolvulaceae); e) *Argyreia pilosa* (Convolvulaceae); f) *Argyreia involucrata* (Convolvulaceae); g) *Aristolochia indica* (Aristolochiaceae); h) *Aristolochia tagala* (Aristolochiaceae); i) *Caesalpinia crista* (Caesalpinaceae).

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Figure 5. a) *Canavalia virosa* (Papilionaceae); b) *Cansjera rheedii* (Opiliaceae); c) *Capparis shevaroyensis* (Capparaceae); d) *Capparis divaricata* (Capparaceae); e) *Capparis sepiaria* (Capparaceae); f) *Capparis zeylanica* (Capparaceae); g) *Cardiospermum halicacabum* var. *luridum* (Sapindaceae); h) *Carissa carandas* (Apocynaceae)

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Figure 6. a) *Carissa paucinervia* (Apocynaceae); b) *Carissa salicina* (Apocynaceae); c) *Carissa spinarum* (Apocynaceae); d) *Cayratia pedata* (Vitaceae); e) *Cissus heyneana* (Vitaceae); f) *Cissus quadrangularis* (Vitaceae); g) *Cissus vitiginea* (Vitaceae); h) *Clematis gouriana* (Ranunculaceae); g) *Coccinia grandis* (Cucurbitaceae).

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Figure 7. a) *Cocculus hirsutus* (Menispermaceae); b) *Combretum albidum* (Combretaceae); c) *Cosmostigma racemosum* (Asclepiadaceae); d) *Decalepis hamiltonii* (Asclepiadaceae); e) *Derris scandens* (Papilionaceae); f) *Diploclisia glaucescens* (Menispermaceae); g) *Embelia basal* (Myrsinaceae); h) *Entada pursaetha* (Mimosaceae); i) *Gnetum ula* (Gnetaceae).

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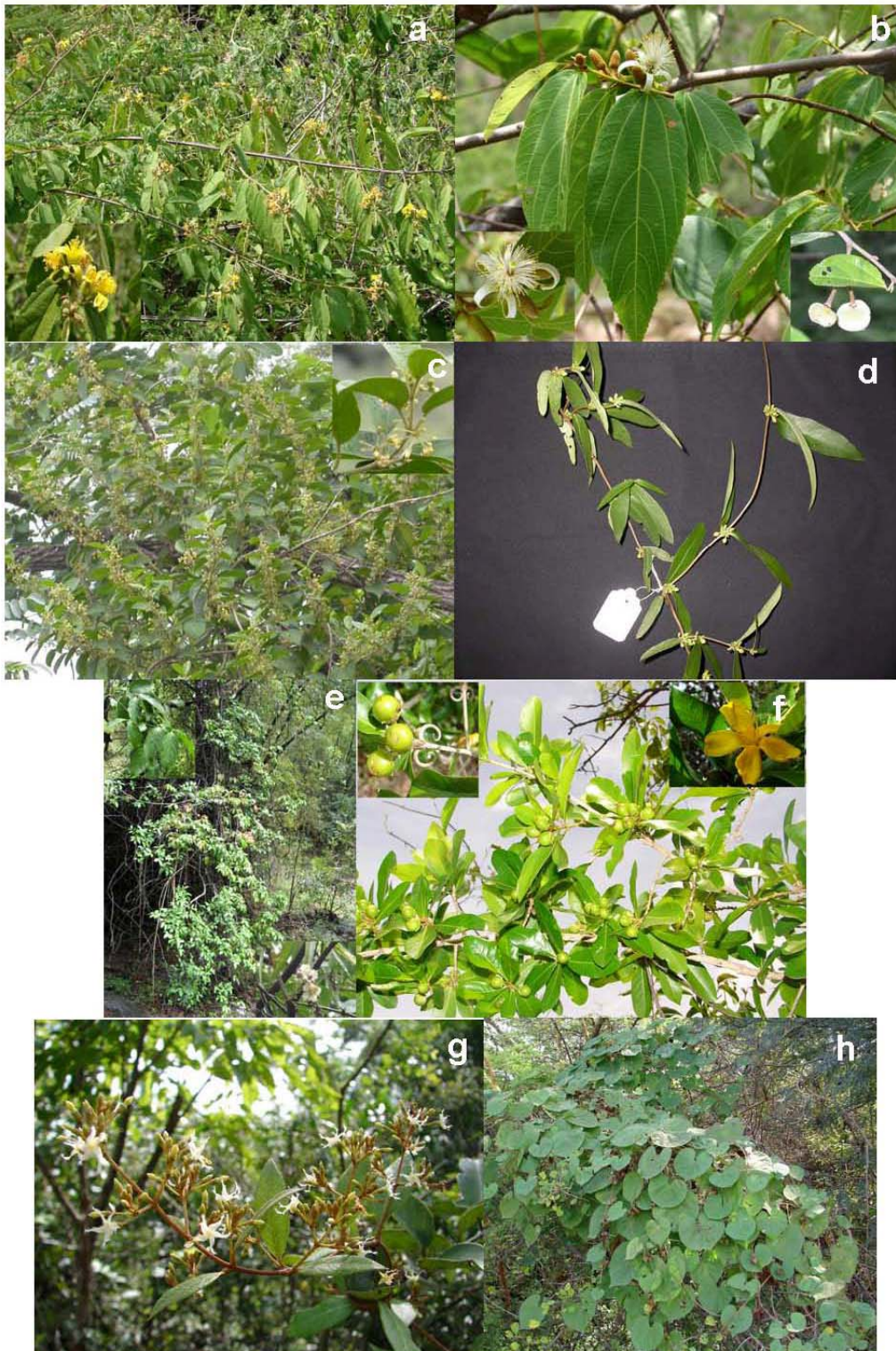


Figure 8. a) *Grewia flavescens* (Tiliaceae); b) *Grewia rhamnifolia* (Tiliaceae); c) *Gymnema sylvestre* (Asclepiadaceae); d) *Hemidesmus indicus* var. *indicus* (Asclepiadaceae); e) *Hiptage benghalensis* (Malpighiaceae); f) *Hugonia mystax* (Linaceae); g) *Ichnocarpus frutescens* (Apocynaceae); h) *Ipomoea asarifolia* (Convolvulaceae).

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Figure 9. a) *Ipomoea companulata* (Convolvulaceae); b) *Ipomoea staphylina* (Convolvulaceae); c) *Jasminum angustifolium* (Oleaceae); d) *Jasminum auriculatum* (Oleaceae); e) *Jasminum azoricum* var. *azoricum* (Oleaceae); f) *Jasminum malabaricum* (Oleaceae); g) *Jasminum sessiliflorum* (Oleaceae); h) *Lantana camara* (Verbenaceae).

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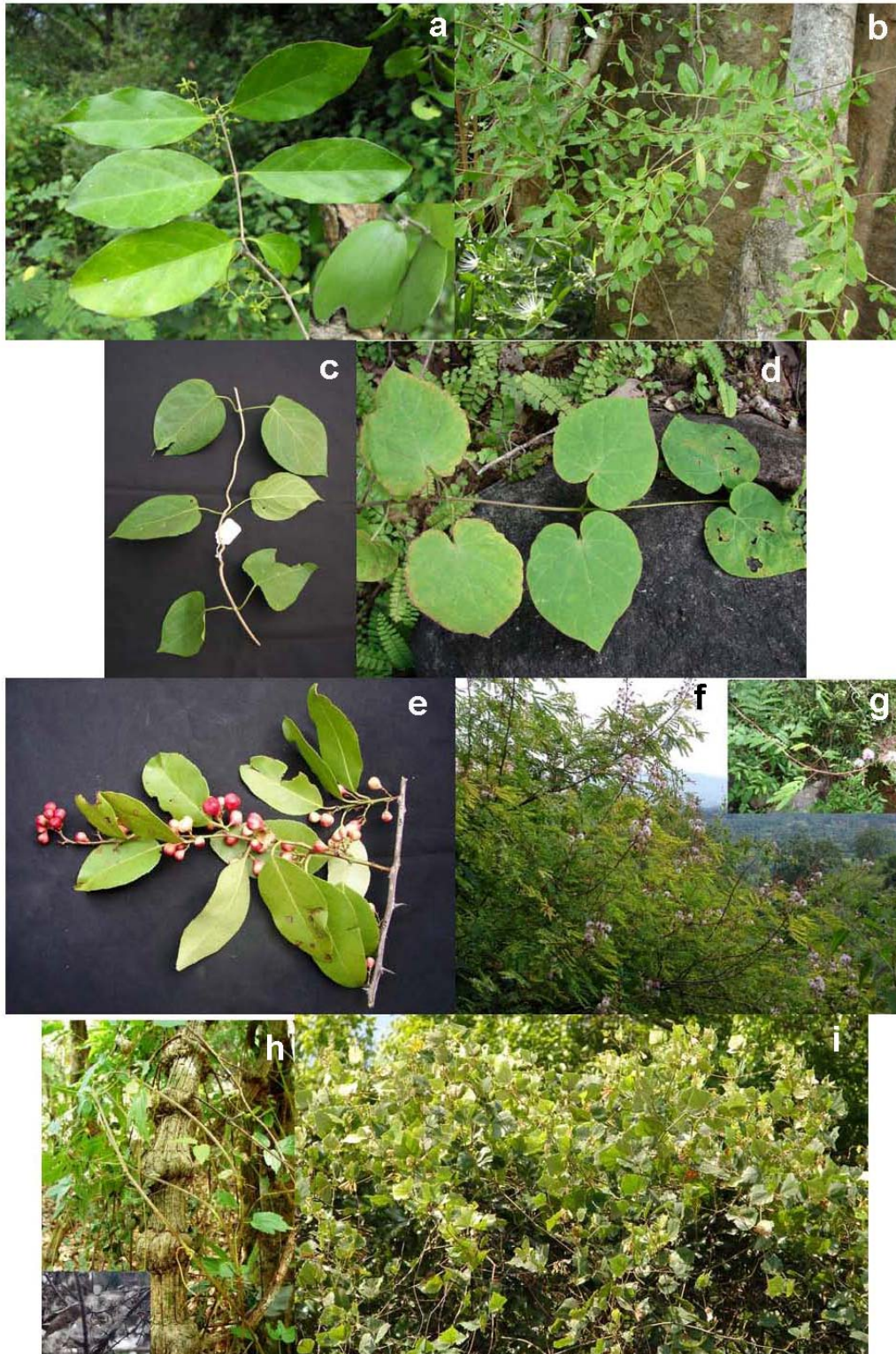


Figure 10. a) *Loeseneriella obtusifolia* (Celastraceae); b) *Maerua oblongifolia* (Capparaceae); c) *Marsdenia brunoniana* (Asclepiadaceae); d) *Marsdenia tenacissima* (Asclepiadaceae); e) *Maytenus heyneana* (Celastraceae); f) *Mimosa intsia* (Mimosaceae); g) *Naravelia zeylanica* (Ranunculaceae); h) *Neonotonia wightii* (Papilionaceae).

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Figure 11. a) *Pachygone ovata* (Menispermaceae); b) *Piper nigrum* (Piperaceae); c) *Plecospermum spinosum* (Moraceae); d) *Premna villosa* (Verbenaceae); e) *Pseudaida speciosa* (Rubiaceae); f) *Pterolobium hexapetalum* (Caesalpiniaceae); g) *Rhapsidophora laciniata* (Araceae); h) *Rubus ellipticus* (Rosaceae); i) *Rubus niveus* (Rosaceae).

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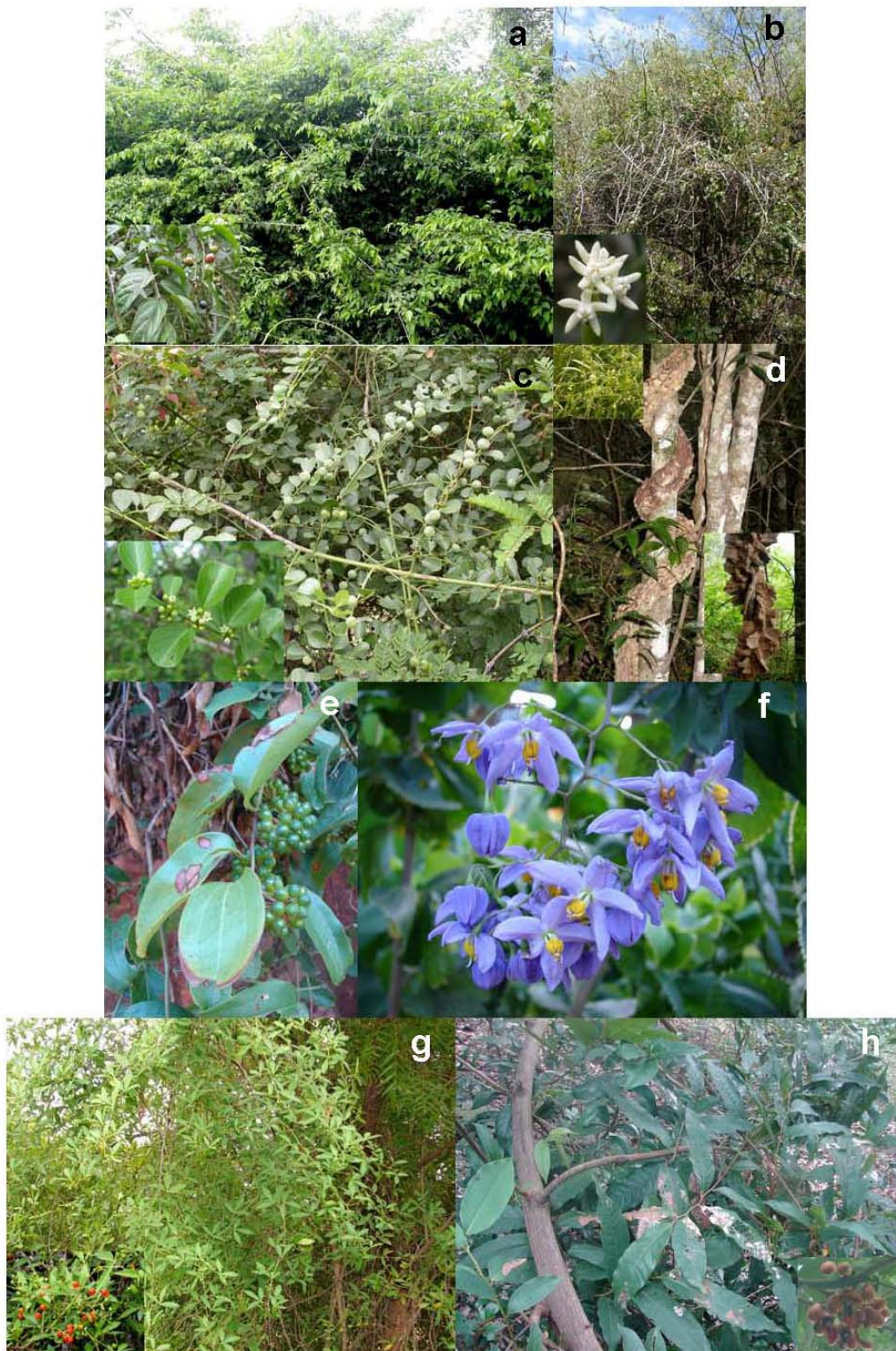


Figure 12. a) *Sageretia filiformis* (Rhamnaceae); b) *Sarcolemma acidum* (Asclepiadaceae); c) *Scutia myrtina* (Rhamnaceae); d) *Secamone emetica* (Asclepiadaceae); e) *Smilax zeylanica* (Smilacaceae); f) *Solanum seaforthianum* (Solanaceae); g) *Toddalia asiatica* (Rutaceae); h) *Uvaria narum* (Annonaceae).

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Figure 13. a) *Ventilago maderaspatana* (Rhamnaceae); b) *Wattakaka volubilis* (Asclepiadaceae); c) *Zanthoxylum ovalifolium* (Rutaceae); d) *Zanthoxylum tetraspermum* (Rutaceae); e) *Ziziphus oenoplia* (Rhamnaceae)

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