

Checklist of the tree flora of the Balaghat Ranges, Maharashtra, India

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ABSTRACT: A detailed inventory of all indigenous and exotic species of trees from the Balaghat Ranges of Maharashtra, India is provided. About 228 tree taxa belonging to 44 families and 132 genera have been recorded from the study region, of which 174 are indigenous and 53 are exotic. The families Fabaceae, Malvaceae, Bignoniaceae, Rubiaceae and Moraceae are dominant in the arborescent flora. *Acacia* Mill. is the largest genus with 19 tree taxa. Vegetation type and the months of flowering and fruiting are given for each tree taxon. Trees of Balaghat Ranges have many potential uses like sources of food, fodder, timber, fuel wood, dye, essential oils, medicines etc. However, forests of Balaghat Ranges have been declining due to anthropogenic activities and tourism. Hence, the present study was undertaken to generate baseline data, which will prove helpful for the conservation and protection the forest of Balaghat Ranges.

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INTRODUCTION

The terrain of Balaghat Ranges supports unique tropical dry deciduous forest and open scrub vegetation with vast grasslands. Pockets of dry deciduous forest in Balaghat Ranges not only provide habitats to an enormous number of amphibians, birds, insects, mammals and spiders but it is also the only site of their residence in the drought prone region of Maharashtra. The forests of Balaghat Ranges perform many ecological functions in Maharashtra such as ground-water-recharge; downstream-flood-control, precipitation and nutrient recharge, and indirectly affect socio-economic development of the region. The vegetation of Balaghat is quite varied and interesting. The area is also rich in a number of economically important plant species. According to Champion and Seth (1968), the vegetation in the region can be divided into tropical mixed dry deciduous forests, open scrub jungles and grasslands. The grasslands of Balaghat Ranges are unique and popularly known as Indian savannas; they provide habitat to more than 100 bird species, which include the critically endangered Great Indian Bustard. Thorny scrub jungles play a vital role in dry land ecosystems by providing sheltering places to wildlife.

The dry climate of Balaghat Ranges is not favorable for the luxuriant growth of plants like that of the Himalaya and Western Ghats of India. While this fact may have accounted for the paucity of botanical documentation of the region, some sporadic efforts towards exploration of plant resources of Balaghat Ranges have been made over the last hundred years by botanists such as Khan (1953), Jain (1961), Jagtap (1965, 1966), Bhagvat (1968), Naik (1969; 1979; 1998) and Mahabale (1987). A comprehensive and reliable floristic survey of Balaghat region does not exist. Hence, the present study was undertaken to produce an up-to-date account of the trees of Balaghat, which can better enable conservation and protection of these tree species.

MATERIALS AND METHODS

Study site

Balaghat Ranges are located from 18°47'40.26" to 18°32'29.28" N and from 75°20'26.90" to 76°48'56.18" E latitude, mainly spread over Ahmednagar, Beed, Latur, Osmanabad and Solapur districts of the Maharashtra State of India, in the basins of river Manjra and its tributaries Terna, Bori, Tiru and Manyad (Figure 1). Balaghat occupies an area about 18111km². The terrain of Balaghat shows hills and hillocks of varying heights (463–822 m). It supports different types of vegetation such as tropical dry deciduous forests, open scrub jungles and vast grasslands. The weather in general is dry and moderately extreme. The average temperature ranges from 27.7°C to 42°C and the relative humidity is extremely low (35–50%) during major parts of the year, while it is highest (75%) in the monsoon season (June to October). The average rainfall is about 729 mm mainly from June to October.

Data collection

Initially, a list of tree species of the Balaghat Ranges was prepared by referring to all available literature. Following this, intensive and extensive field visits were undertaken to different localities of the Balaghat Ranges for plant collection. During field exploration, information on vegetation type, habitat, phenology, coordinates and present status were gathered. Three good specimens were collected and prepared as voucher specimens as per standard herbarium techniques (Rao and Sharma 1990), and deposited in the herbarium of Walchand College, Solapur (Maharashtra). Field identifications were confirmed with the help of available literature such as Cooke (1958), Pascal and Ramesh (1987), Nayar *et al.* (1990), Sharma and Balakrishnan (1993), Sharma *et al.* (1993), Lakshminarasimhan (1996), Almeida (1996; 1998; 2001a; 2001b; 2003a; 2003b; 2009), Naik (1998), Singh *et al.* (2000), Singh and Karthikeyan (2000, 2001),

Binojkumar and Balakrishnan (2010), Bhat (2011) and Gaikwad *et al.* (2012, 2014). Doubtful and interesting identifications were confirmed by their direct comparison with authentically identified specimens deposited in various herbaria such as Herbarium of Botanical survey of India, Pune (BSI); Blatter Herbarium, St. Xavier College, Mumbai (BLAT) and BAMU Herbarium, Aurangabad (BAMUA). Author citation and binomial nomenclature of collected species were verified with International Plant Name Index (IPNI). All the families in the present work have been arranged according to APG III (2009) system of classification with adjustment to their present delimitations. The genera, species and infraspecific taxa are arranged alphabetically.

RESULTS

During the present work, 228 species of angiosperm trees have been recorded from Balaghat Ranges of Maharashtra, of which 174 are indigenous and occur in wild, while 53 are exotic and are either cultivated or naturalized in the region. Out of 228 tree taxa of Balaghat Ranges, 218 species (including 23 infraspecific taxa) are dicotyledonous belonging to 123 genera and 42 families, and 10 species are monocotyledonous belonging to 9 genera and 2 families (Table 1). The families like Fabaceae, Malvaceae, Bignoniaceae, Rubiaceae and Moraceae are dominant and possess the highest number of species.

DISCUSSION

This paper reports 228 species of angiosperm trees (including infraspecific taxa) from Balaghat Ranges of Maharashtra, India. Fabaceae is the largest family with 63 tree taxa, followed by Malvaceae (12), Bignoniaceae (12), Rubiaceae (12), Moraceae (11), Apocynaceae (10), Rutaceae (10), Arecaceae (9), Myrtaceae (8) and Combretaceae (7). *Acacia* Mill. is the largest genus having 19 tree taxa. *Hardwickia binata* Roxb., a monotypic tree genera and *Acacia campbellii* Arn. are endemic to Peninsular India (Ahmedullah and Nayar 1986; Nayar 1996; Irwin and Narasimhan 2011). Out of 228 tree taxa 174 are indigenous and occur in wild, while 53 tree taxa are exotic, and are either cultivated or naturalized in the study region. Important plant species are featured in Figures 2–6.

Dry deciduous forests are confined to Apsinga, Chumb, Hadongri, Kapildhar, Ramling, Sautada, Ukkadgaon, Wadwal-Janwad Bet in the study region. In addition to these, there are small pockets of dry deciduous forest formed in places throughout the valleys all over the region. The dominant tree taxa in the dry deciduous forest are *Anogeissus latifolia* (Roxb. ex DC.) Wall., *Butea monosperma* (Lam.) Taub. var. *monosperma*., *Boswellia serrata* Roxb. ex Colebr., *Bridelia airy-shawii* P. T. Li, *Buchanania cochinchinensis* Almeida, *Cordia macleodii* (Griff.) Hook. f., *Diospyros exculpta* Buch.-Ham., *Diospyros melanoxyton* Roxb., *Gardenia resinifera* Roth, *Grewia tiliifolia* Vahl., *Lagerstroemia parviflora* Roxb., *Lannea coromandelica* (Houtt.) Merr., *Madhuca longifolia* (Koen.) Mac Bride., *Miliusa tomentosa* (Roxb.) Sinclair, *Terminalia alata* Heyne ex Roth, and *Terminalia arjuna* (Roxb.) Wt. & Arn. Other scattered forests are much disturbed and have dominant trees like *Casearia tomentosa* Roxb., *Cassia*

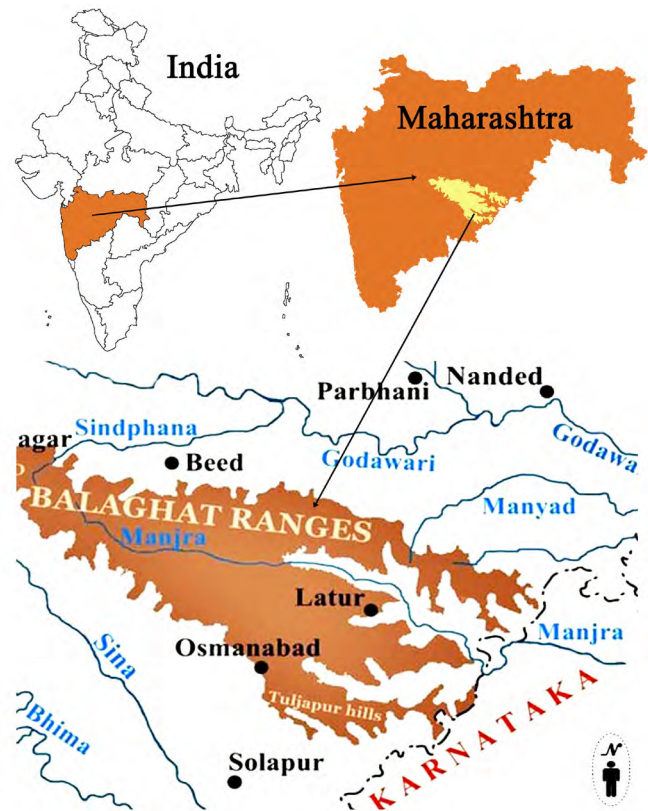


FIGURE 1. Location map of Balaghat Ranges of Maharashtra (India).

fistula L., *Desmodium oojeinensis* (Roxb.) Ohashi, *Diospyros chloroxyton* Roxb., *Erythrina suberosa* Roxb., *Flacourtia montana* Grah., *Holarrhena pubescens* (Buch.-Ham.) Wall. ex G. Don. *Morinda citrifolia* L., *Morinda tomentosa* Heyne ex Roth., *Prosopis cineraria* (L.) Druce, *Syzygium cumini* (L.) Skeels and *Wrightia tinctoria* R. Br. ssp. *tinctoria*. Trees like *Alangium salvifolium* (L.f.) Wangerin ssp. *salvifolium*., *Bombax ceiba* L., *Cochlospermum religiosum* (L.) Alston., *Mitragyna parvifolia* (Roxb.) Korth., *Pterocarpus marsupium* Roxb. var. *marsupium*, *Sterculia urens* Roxb., *Terminalia bellirica* (Gaertn.) Roxb. etc. are rare in occurrence. They are recorded from one or two sites in the study region.

On the well drained plateaus and isolated hills the open scrub vegetation has been developed which is represented by thorny trees. The dominant among these include *Acacia campbellii* Arn., *Acacia catechu* (Roxb. ex Rottl.) Willd., *Acacia chundra* (Roxb. ex Rottl.) Willd., *Acacia nilotica* (L.) Willd. ex Del., *Acacia leucophloea* (Roxb.) Willd., *Acacia senegal* (L.) Willd., *Azadirachta indica* A. Juss., *Balanites aegyptiaca* (L.) Del. *Bauhinia racemosa* Lamk., *Capparis decidua* (Forsk.) Edgew., *Dichrostachys cinerea* (L.) Wight & Arn. var. *indica* Brenen & Brummit., *Dolichandrone falcata* (Wall. ex DC.) Seem., *Santalum album* L., *Ziziphus caracutta* Roxb. and *Ziziphus rotundifolia* Lamk.

Trees of Balaghat have many potential uses like source of food, fodder, timber, fuel wood, dye and medicines. Important medicinal trees such as *Acacia catechu* (Roxb. ex Rottl.) Willd., *Azadirachta indica* A. Juss., *Cassia fistula* L., *Morinda citrifolia* L., *Madhuca longifolia* (Koen.) Mac Bride, *Pterocarpus marsupium* Roxb. var. *marsupium*, *Syzygium cumini* (L.) Skeels, *Terminalia arjuna* (Roxb.) Wt. & Arn., *Terminalia bellirica* (Gaertn.) Roxb., *Wrightia tinctoria* R. Br. ssp. *tinctoria* etc. are used in Ayurvedic formulations

and ethno-medicines. Essential oil is extracted from heartwood of a famous sandal wood tree *Santalum album* L., which is used in cosmetics, perfumes, medicines etc. *Dalbergia sissoo* Roxb. ex. DC and *Tectona grandis* L. f. are famous for their quality timber. *Acacias* are used as fuel wood by the local inhabitants.

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TABLE 1: Checklist of tree flora of the Balaghat Ranges of Maharashtra, India. CULT: cultivated; NAT: naturalized; SV: scrub vegetation; DD: dry deciduous.

BOTANICAL NAME	FLOWERING AND FRUITING	VEGETATION TYPE	FIELD NO.
Magnoliaceae			
<i>Michelia champaca</i> L.	April–November	CULT	KUG- 870; RDG- 859
Annonaceae			
<i>Annona reticulata</i> L.	June–October	CULT, NAT	KUG- 830; RDG- 097
<i>Annona squamosa</i> L.	May–December	CULT, NAT	KUG- 780; RDG- 098
<i>Miliusa tomentosa</i> (Roxb.) Sinclair	February–June	DD	KUG- 424; RDG- 534
<i>Polyalthia longifolia</i> (Sonner.) Thw.	March–July	CULT	KUG- 16; RDG- 052
Pandanaceae			
<i>Pandanus odoratissimus</i> L. f.	March–December	SV	KUG- 793; RDG- 195
Areaceae			
<i>Areca catechu</i> L.	Throughout year	CULT	KUG- 831; RDG- 116
<i>Bismarckia nobilis</i> Hildebrandt & H. Wendl.	February–August	CULT	KUG- 897
<i>Borassus flabellifer</i> L.	March–August	CULT	KUG- 833; RDG- 933
<i>Caryota urens</i> L.	Throughout year	CULT	KUG- 876; RDG- 893
<i>Cocos nucifera</i> L.	Throughout year	CULT	KUG- 877; RDG- 900
<i>Dypsis decaryi</i> (Jum.) Beentje & J. Dransf.	January–June	CULT	KUG- 896
<i>Dypsis lutescens</i> (H. Wendl.) Beentje & J. Dransf.	December–June	CULT	KUG-898; RDG- 906
<i>Phoenix sylvestris</i> Roxb.	January–October	SV	KUG- 798; RDG- 928
<i>Roystonea regia</i> (Kunth) O. F. Cook	March–June	CULT	KUG- 837; RDG- 930

TABLE 1: Continued.

BOTANICAL NAME	FLOWERING AND FRUITING	VEGETATION TYPE	FIELD NO.
Proteaceae			
<i>Grevillea robusta</i> A. cunn. ex R. Br.	March–July	CULT	KUG- 608; RDG- 854
Zygophyllaceae			
<i>Balanites aegyptiaca</i> (L.) Del.	February–May	SV	KUG- 852; RDG- 878
Fabaceae			
<i>Acacia auriculiformis</i> Cunn. ex. Bth.	August–June	CULT	KUG- 604; RDG- 874
<i>Acacia campbellii</i> Arn.	January–May	SV	KUG- 327; RDG- 426
<i>Acacia catechu</i> (Roxb. ex Rottl.) Willd.	June–October	SV	KUG- 218; RDG- 352
<i>Acacia chundra</i> (Roxb. ex Rottl.) Willd.	August–November	SV	KUG- 76; RDG- 201
<i>Acacia concurrens</i> Pedley.	November–February	CULT	KUG- 380; RDG- 499
<i>Acacia eburnea</i> (L. f.) Willd.	December–May	SV	KUG- 462; RDG- 555
<i>Acacia farnesiana</i> (L.) Willd.	November–January	SV	KUG- 296; RDG- 433
<i>Acacia horrida</i> (L.) Willd.	June–March	SV	KUG- 507; RDG- 638
<i>Acacia leucophloea</i> (Roxb.) Willd.	September–February	SV	KUG- 240; RDG- 712
<i>Acacia longifolia</i> Willd.	August–November	CULT	KUG- 895; RDG- 879
<i>Acacia mangium</i> Willd.	June–July	CULT	KUG- 443; RDG- 882
<i>Acacia nilotica</i> (L.) Willd. ex Del. ssp. <i>astringens</i> (Schum. & Thonn.) Roberty	August–December	SV	KUG- 887; RDG- 894
<i>Acacia nilotica</i> (L.) Willd. ex Del. ssp. <i>cupressiformis</i> (Stew.) Ali & Faruqui	August–February	SV	KUG- 888; RDG- 172
<i>Acacia nilotica</i> (L.) Willd. ex Del. ssp. <i>indica</i> (Bth) Brenan.	Throughout year	SV	KUG- 219; RDG- 414
<i>Acacia nilotica</i> (L.) Willd. ex Del. ssp. <i>subulata</i> (Vatke) Brenan	July–December	SV	KUG- 266; RDG- 741
<i>Acacia planifrons</i> Wight & Aren.	August–March	SV	KUG- 120; RDG- 488
<i>Acacia polyacantha</i> Willd.	August–December	SV	KUG- 625; RDG- 875
<i>Acacia senegal</i> (L.) Willd.	November–March	SV	KUG- 368; RDG- 491
<i>Acacia tomentosa</i> Willd .	July–May	SV	KUG- 461; RDG- 591
<i>Adenanthera pavonina</i> L.	March–May	CULT	KUG- 396; RDG- 235
<i>Albizia lebbek</i> (L.) Willd. var. <i>lebbek</i> Baker	April–August	NAT	KUG- 27; RDG- 236
<i>Albizia odoratissima</i> (L. f.) Benth.	November–May	NAT	KUG- 859; RDG- 890
<i>Albizia procera</i> (Roxb.) Benth.	August–April	SV, CULT	KUG- 860; RDG- 902
<i>Bauhinia purpurea</i> L.	September–December	CULT	KUG- 370; RDG- 492
<i>Bauhinia racemosa</i> Lamk.	March–July	DD, SV	KUG- 844; RDG- 056
<i>Bauhinia tomentosa</i> L. forma <i>concolor</i> Baker ex de Wit	August–October	DD	KUG- 746; RDG- 744
<i>Bauhinia variegata</i> L.	November–January	CULT	KUG- 757; RDG- 088
<i>Butea monosperma</i> (Lam.) Taub. var. <i>monosperma</i>	March–June	DD	KUG- 478; RDG- 046
<i>Caesalpinia coriaria</i> (Jacq.) Willd.	September –December	CULT	KUG- 591; RDG- 895
<i>Cassia fistula</i> L.	March–May	CULT, NAT	KUG- 521; RDG- 884
<i>Cassia javanica</i> L.	May–July	CULT	KUG- 508; RDG- 598
<i>Cassia renigera</i> Wall. ex Benth.	April–June	CULT	KUG- 819; RDG- 897
<i>Cassia roxburghii</i> DC.	September–January	CULT	KUG- 535; RDG- 133
<i>Colvillea racemosa</i> Boj. ex Hook.	October–January	CULT	KUG- 704
<i>Dalbergia lanceolaria</i> L.	March–May	DD	KUG- 510; RDG- 615
ssp. <i>paniculata</i> (Roxb.) Thoth.			
<i>Dalbergia latifolia</i> Roxb.	August–October	DD	KUG- 520; RDG- 129
<i>Dalbergia melanoxylon</i> Guill. & Perr.	April–June	CULT	KUG- 244; RDG- 375
<i>Dalbergia sissoo</i> Roxb. ex. DC	March–December	CULT	KUG- 08; RDG- 648
<i>Delonix elata</i> (L.) Gamble	June–September	CULT	KUG- 879; RDG- 904
<i>Delonix regia</i> (Boj. ex Hook.) Raf.	April–August	CULT	KUG- 880; RDG- 911
<i>Desmodium oojainensis</i> (Roxb.) Ohashi	February–June	DD	KUG- 864; RDG- 682
<i>Dichrostachys cinerea</i> (L.) Wight & Arn. var. <i>indica</i> Brenen & Brummit.	October–January	SV	KUG- 538; RDG- 657
<i>Erythrina suberosa</i> Roxb.	March–May	DD	KUG- 834; RDG- 043
<i>Erythrina variegata</i> L.	February–May	NAT	KUG- 741; RDG- 923
<i>Gliricidia sepium</i> (Jacq.) Kunth ex Walp.	February–June	CULT	KUG- 728; RDG- 550
<i>Hardwickia binata</i> Roxb.	August–November	DD, CULT	KUG- 803; RDG- 905
<i>Lysiloma latisiliquum</i> (L.) Benth.	August–October	NAT	KUG- 86; RDG- 912
<i>Parkia biglandulosa</i> Wt. & Arn.	January–May	CULT	KUG- 472; RDG- 931
<i>Parkinsonia aculeata</i> L.	November–June	NAT	KUG- 127; RDG- 888
<i>Peltophorum pterocarpum</i> (DC.) Baker ex Heyne	September–March	CULT	KUG- 857; RDG- 861
<i>Pithecellobium dulce</i> (Roxb.) Benth.	January–June	CULT	KUG- 742; RDG- 863
<i>Pongamia pinnata</i> (L.) Pierre.	March–August	DD, CULT	KUG- 05; RDG- 576
<i>Prosopis cineraria</i> (L.) Druce	November–April	SV	KUG- 873; RDG- 939
<i>Prosopis juliflora</i> (Sw.) DC.	August–May	NAT	KUG- 275; RDG- 917
<i>Pterocarpus marsupium</i> Roxb. var. <i>marsupium</i>	November–March	DD	KUG- 453; RDG- 016
<i>Samanea saman</i> (Jacq.) Merr.	March–May	NAT	KUG- 851; RDG- 829
<i>Senna pallida</i> (Vahl) Irwin & Barneby	July–November	CULT	KUG- 773; RDG- 626
<i>Senna siamea</i> (Lam.) Irwin & Barneby	May–November	CULT	KUG- 820; RDG- 903

TABLE 1: Continued.

BOTANICAL NAME	FLOWERING AND FRUITING	VEGETATION TYPE	FIELD NO.
<i>Senna sulfurea</i> (DC. ex Collad.) Irwin & Barneby	September–June	CULT	KUG- 673; RDG- 746
<i>Senna surattensis</i> (Burm.f.) Irwin & Barneby	September–May	CULT	KUG- 353; RDG-
<i>Sesbania grandiflora</i> (L.) Poir.	September–April	CULT	KUG- 367; RDG- 805
<i>Sesbania sesban</i> (L.) Merr. subsp. <i>sesban</i> var. <i>sesban</i> Gillett	January–March	CULT, NAT	KUG- 407; RDG- 911
<i>Tamarindus indica</i> L.	November–April	CULT, NAT	KUG- 06; RDG- 593
Rhamnaceae			
<i>Ziziphus caracutta</i> Roxb.	May–September	DD, SV	KUG- 593; RDG- 148
<i>Ziziphus mauritiana</i> Lamk.	September–January	SV, CULT	KUG- 90; RDG- 927
<i>Ziziphus rotundifolia</i> Lamk.	September–January	SV	KUG- 546; RDG- 670
<i>Ziziphus xylopyra</i> (Retz.) Willd.	March–June	SV	KUG- 545; RDG- 667
Ulmaceae			
<i>Holoptelea integrifolia</i> (Roxb.) Planch.	March–May	DD, CULT	KUG- 468; RDG- 590
Moraceae			
<i>Artocarpus heterophyllus</i> Lam.	March–April	CULT	KUG- 451; RDG- 055
<i>Ficus amplissima</i> J. E. Sm.	April–October	CULT	KUG- 446; RDG- 085
<i>Ficus benghalensis</i> L.	April–June	CULT, NAT	KUG- 341; RDG- 918
<i>Ficus benjamina</i> L.	Not seen	CULT	KUG- 474; RDG- 480
<i>Ficus carica</i> L.	March–May	CULT	KUG- 301; RDG- 434
<i>Ficus ealstica</i> Roxb. ex Horn.	Not seen	CULT	KUG- 494; RDG- 632
<i>Ficus krishnae</i> C. DC.	Not seen	CULT	KUG- 881; RDG- 932
<i>Ficus microcarpa</i> L. f.	March–June	CULT	KUG- 882; RDG- 938
<i>Ficus racemosa</i> L.	February–June	SV	KUG- 782; RDG- 811
<i>Ficus religiosa</i> L.	April–August	CULT, NAT	KUG- 783; RDG- 910
<i>Morus alba</i> L.	January–March	CULT	KUG- 447; RDG- 087
Casuarinaceae			
<i>Casuarina equisetifolia</i> J. & G. Forst.	January–May	CULT	KUG- 399; RDG- 781
Celastraceae			
<i>Cassine albens</i> (Retz.) Kosterm.	February–July	DD	KUG- 221; RDG- 251
<i>Cassine paniculata</i> (Wight & Arn.) Lobreau-Collen	March–August	CULT	KUG- 555
Oxalidaceae			
<i>Averrhoa carambola</i> L.	May–September	CULT	KUG- 832
Euphorbiaceae			
<i>Bridelia airy-shawii</i> P.T.Li	September–December	DD	KUG- 426; RDG- 537
<i>Drypetes roxburghii</i> (Wall.) Hurus	March–June	CULT	KUG- 459; RDG- 065
<i>Embllica officinalis</i> Gaertn.	October–March	CULT	KUG- 318; RDG- 049
<i>Euphorbia tirucalli</i> L.	March–April	SV	KUG- 866; RDG- 926
<i>Phyllanthus acidus</i> (L.) K. Skeels	October–March	CULT	KUG- 822; RDG- 818
Salicaceae			
<i>Casearia tomentosa</i> Roxb.	January–May	DD	KUG- 490; RDG- 106
<i>Flacourtia montana</i> Grah.	March–May	DD	KUG- 421; RDG- 524
Combretaceae			
<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall.	September–December	DD	KUG- 639; RDG- 266
<i>Terminalia alata</i> Heyne ex Roth	April–November	DD	KUG- 826; RDG- 379
<i>Terminalia arjuna</i> (Roxb.) Wt. & Arn.	April–August	DD	KUG- 265; RDG- 166
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	May–September	DD	KUG- 479; RDG- 094
<i>Terminalia catappa</i> L.	April–October	CULT	KUG- 747; RDG- 834
<i>Terminalia crenulata</i> Roth.	April–September	DD	KUG- 727; RDG- 554
<i>Terminalia elliptica</i> Willd.	April–November	DD	KUG- 529; RDG- 544
Lythraceae			
<i>Lagerstroemia parviflora</i> Roxb.	June–September	DD	KUG- 464; RDG- 532
<i>Lagerstroemia reginae</i> Roxb.	August–October	CULT	KUG- 543; RDG- 658
Myrtaceae			
<i>Callistemon citrinus</i> (Curtis) Skeels	October–February	CULT	KUG- 583; RDG- 679
<i>Eucalyptus globulus</i> Labill.	February–May	CULT	KUG- 883; RDG- 937
<i>Eucalyptus maculata</i> Hook.	March–April	CULT	KUG- 884; RDG- 907
<i>Eucalyptus rudis</i> Endl.	April–May	CULT	KUG- 395; RDG- 527
<i>Eucalyptus terreticornis</i> Sm.	March–June	CULT	KUG- 805; RDG- 915
<i>Psidium guajava</i> L.	April–February	CULT	KUG- 829; RDG- 587
<i>Syzygium cumini</i> (L.) Skeels	March–July	DD	KUG- 456; RDG- 101
<i>Syzygium samarangense</i> (Bl.) Merr. & Perry	March–May	CULT	KUG- 823
Burseraceae			
<i>Boswellia serrata</i> Roxb. ex Colebr.	February–June	DD	KUG- 511; RDG- 468
Anacardiaceae			
<i>Anacardium occidentale</i> L.	January–May	CULT	KUG- 847; RDG- 060
<i>Buchanania cochinchinensis</i> Almeida	February–May	DD	KUG- 428; RDG- 538
<i>Lannea coromandelica</i> (Houtt.) Merr.	February–April	DD	KUG- 423; RDG- 533

BOTANICAL NAME	FLOWERING AND FRUITING	VEGETATION TYPE	FIELD NO.
<i>Mangifera indica</i> L.	January–June	CULT, NAT	KUG- 445; RDG- 563
<i>Semecarpus anacardium</i> L.f.	September–January	DD	KUG- 787; RDG- 180
Sapindaceae			
<i>Filicum decipiens</i> (Wt. & Arn.) Thw.	February–May	CULT	KUG- 867
<i>Sapindus emarginatus</i> Vahl	October–February	CULT, NAT	KUG- 348; RDG- 595
<i>Sapindus trifoliatus</i> L.	October–February	CULT, NAT	KUG- 759; RDG- 898
Rutaceae			
<i>Aegle marmelos</i> (L.) Corr.	March–June	DD, CULT	KUG- 858; RDG- 876
<i>Citrus aurantifolia</i> (Christm. & Panz.) Swingle	Throughout year	CULT	KUG- 789; RDG- 889
<i>Citrus limon</i> (L.) Burm. f.	April–September	CULT	KUG- 863; RDG- 899
<i>Citrus maxima</i> (Burm.) Merr.	May–October	CULT	KUG- 845; RDG- 938
<i>Citrus medica</i> L.	May–October	CULT	KUG- 839; RDG- 901
<i>Citrus reticulata</i> Blanco	January–May	CULT	KUG- 836; RDG- 946
<i>Citrus sinensis</i> (L.) Osb.	Throughout year	CULT	KUG- 855; RDG- 944
<i>Limonia acidissima</i> L.	March–September	DD, SV	KUG- 788; RDG- 074
<i>Murraya koenigii</i> (L.) Spreng.	February–June	CULT	KUG- 415; RDG- 076
<i>Murraya paniculata</i> (L.) Jack.	June–October	CULT	KUG- 856; RDG- 922
Simaroubaceae			
<i>Ailanthus excelsa</i> Roxb.	February–May	CULT, NAT	KUG- 626; RDG- 701
Meliaceae			
<i>Azadirachta indica</i> A. Juss.	January–May	SV	KUG- 20; RDG- 096
<i>Chloroxylon swietenia</i> DC.	March–May	DD	KUG- 828; RDG- 610
<i>Melia azadirach</i> L.	July–September	CULT, NAT	KUG- 272; RDG- 417
<i>Melia dubia</i> Cav.	April–July	CULT, NAT	KUG- 885; RDG- 914
<i>Soymida febrifuga</i> (Roxb.) A. Juss.	March–May	DD	KUG- 838; RDG- 969
<i>Swietenia macrophylla</i> King	April–June	CULT	KUG- 835
<i>Swietenia mahogany</i> (L.) Jacq.	April–June	CULT	KUG- 874; RDG- s.n.
Muntingiaceae			
<i>Muntingia calabura</i> L.	Throughout year	CULT	KUG- 493; RDG- 145
Malvaceae			
<i>Adansonia digitata</i> L.	May–July	CULT	KUG- 598; RDG- 925
<i>Bombax ceiba</i> L.	March–June	CULT, DD	KUG- 554; RDG- 886
<i>Ceiba pentandra</i> (L.) Gaertn.	January–March	CULT	KUG- 480; RDG- 668
<i>Grewia asiatica</i> L.	April–June	DD	KUG- 500; RDG- 966
<i>Grewia helicterifolia</i> Wall. ex G. Don	September–November	DD	KUG- 706; RDG- 747
<i>Grewia tiliifolia</i> Vahl. var. <i>leptopetala</i> Cook	May–September	DD, SV	KUG- 531; RDG- 132
<i>Grewia tiliifolia</i> Vahl. var. <i>tiliifolia</i>	May–September	DD, SV	KUG- 467; RDG- 181
<i>Guazuma ulmifolia</i> Lamk.	March–August	CULT	KUG- 590; RDG- 881
<i>Pterospermum acerifolium</i> Willd.	March–April	CULT	KUG- 442; RDG- 063
<i>Sterculia foetida</i> L.	March–November	CULT	KUG- 841; RDG- 941
<i>Sterculia urens</i> Roxb.	March–May	DD	KUG- 649; RDG- 571
<i>Thespesia populnea</i> (L.) Soland ex Corr.	September–January	CULT, NAT	KUG- 827; RDG- 942
Bixaceae			
<i>Cochlospermum religiosum</i> (L.) Alston.	February–May	DD	KUG- 449; RDG- 374
Moringaceae			
<i>Moringa oelifera</i> Lamk.	Throughout year	CUT, NAT	KUG- 806; RDG- 659
Caricaceae			
<i>Carica papaya</i> L.	Throughout year	CULT	KUG- 346; RDG- 896
Salvadoraceae			
<i>Salvadora persica</i> L.	January–April	SV	KUG- 321; RDG- 041
Capparaceae			
<i>Capparis decidua</i> (Forsk.) Edgew.	March–November	SV	KUG- 419; RDG- 072
<i>Capparis divaricata</i> Lamk.	January–June	SV	KUG- 01; RDG- 883
<i>Capparis grandiflora</i> Wall. ex Hook. f. & Thoms.	February–September	SV	KUG- 862; RDG- 892
<i>Capparis grandis</i> L. f.	April–September	SV	KUG- 532; RDG- 798
<i>Crateva adansonii</i> ssp. <i>odora</i> (Buch.-Ham.) Jacobs	March–June	CULT	KUG- 745; RDG- 936
Santalaceae			
<i>Santalum album</i> L.	March–October	SV	KUG- 118; RDG- 179
Alangiaceae			
<i>Alangium salvifolium</i> (L.f.) Wangerin ssp. <i>salvifolium</i>	March–June	SV	KUG- 754; RDG- 807
Lecythidaceae			
<i>Couropita guianensis</i> Abul.	Throughout year	CULT	KUG- 768; RDG- 852
Sapotaceae			
<i>Madhuca longifolia</i> (Koen.) Mac Bride var. <i>latifolia</i> (Roxb.) Chev.	February–May	DD	KUG- 868; RDG- 062
<i>Madhuca longifolia</i> (Koen.) Mac Bride var. <i>longifolia</i>	January–April	DD	KUG- 869; RDG- 093
<i>Manilkara hexandra</i> (Roxb.) Dub.	September–November	CULT	KUG- 850; RDG- 858
<i>Manilkara zapota</i> (L.) van Royen.	Throughout year	CULT	KUG- 476; RDG- 583

TABLE 1: Continued.

BOTANICAL NAME	FLOWERING AND FRUITING	VEGETATION TYPE	FIELD NO.
<i>Mimusops elengi</i> L.	January–July	CULT	KUG- 23; RDG- 075
Ebenaceae			
<i>Diospyros chloroxylon</i> Roxb.	July–December	DD	KUG- 71; RDG- 138
<i>Diospyros exculpta</i> Buch.-Ham.	March–September	DD	KUG- 469; RDG- 139
<i>Diospyros melanoxyton</i> Roxb.	March–December	DD	KUG- 843; RDG- 061
<i>Diospyros peregrina</i> (Gaertn.) Guerke	March–May	CULT	KUG- 756
Rubiaceae			
<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	July–September	DD	KUG- 516; RDG- 568
<i>Cerisoides turgida</i> (Roxb.) Tirvengadum	April–June	DD	KUG- 454; RDG- 887
<i>Gardenia jasminoides</i> Ellis. var. <i>plana</i> (Voight) Almeida	June–September	CULT	KUG- 519; RDG- 912
<i>Gardenia latifolia</i> Soland.	April–September	DD	KUG- 846; RDG- 130
<i>Gardenia resinifera</i> Roth	March–November	DD	KUG- 223; RDG- 279
<i>Ixora brachiata</i> Roxb.	November–February	DD	KUG- 420; RDG- 573
<i>Ixora pavetta</i> Andrews	December–April	DD	KUG- 848; RDG- 592
<i>Mitragyna parvifolia</i> (Roxb.) Korth.	April–August	DD	KUG- 715; RDG- 724
<i>Morinda citrifolia</i> L.	April–August	DD, SV	KUG- 09; RDG- 794
<i>Morinda tomentosa</i> Heyne ex Roth.	April–August	DD, SV	KUG- 821; RDG- 871
<i>Mussaenda erythrophylla</i> Schum. & Thonn.	July–January	CULT	KUG- 586; RDG- 688
<i>Neolamarckia cadamba</i> (Roxb.) Boss.	November–February	CULT	KUG- 283; RDG- 334
Loganiaceae			
<i>Strychnos potatorum</i> L.	June–January	DD	KUG- 515; RDG- 623
Apocynaceae			
<i>Alstonia macrophylla</i> Wall ex G. Don	September–December	CULT	KUG- 861; RDG- 877
<i>Alstonia scholaris</i> (L.) R. Br.	February–July	CULT	KUG- 790; RDG- 880
<i>Cascabella thevetia</i> (L.) Lippold	June–October	CULT	KUG- 842; RDG- 845
<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G. Don.	March–July	DD	KUG- 32; RDG- 948
<i>Plumeria alba</i> L.	May–September	CULT, NAT	KUG- 871; RDG- 842
<i>Plumeria rubra</i> L.	March–September	CULT	KUG- 872; RDG- 864
<i>Tabernaemontana citrifolia</i> L.	Throughout year	CULT	KUG- 280; RDG- 421
<i>Tabernaemontana divaricata</i> (L.) R. Br.	Throughout year	CULT	KUG- 524
<i>Wrightia arborea</i> (Dennst.) Mabb.	April–June	DD	KUG- <i>s.n.</i>
<i>Wrightia tinctoria</i> R. Br. ssp. <i>tinctoria</i> .	March–June	DD	KUG- 886; RDG- 205
Boraginaceae			
<i>Cordia dichotoma</i> Forst. f.	January–June	DD, SV	KUG- 358; RDG- 100
<i>Cordia macleodii</i> (Griff.) Hook. f.	March–June	DD	KUG- 875; RDG- 873
<i>Cordia sebestena</i> L.	January–March	CULT	KUG- 740; RDG- 832
<i>Cordia sinensis</i> Lamk.	March–June	DD, SV	KUG- 769; RDG- 827
Oleaceae			
<i>Nyctanthes arbor-tristis</i> L.	June–December	CULT, NAT	KUG- 134; RDG- 194
Bignoniaceae			
<i>Crescentia cujete</i> L.	March–July	CULT	KUG- 758; RDG- 835
<i>Dolichandrone falcata</i> (Wall. ex DC.) Seem.	March–June	SV	KUG- 267; RDG- 276
<i>Jacaranda acutifolia</i> Humb. & Bonpl.	March–October	CULT	KUG- 840; RDG- 909
<i>Kigelia africana</i> (Lam.) Bth.	May–August	CULT	KUG- 814; RDG- 920
<i>Markhamia lutea</i> (Benth) K. Schum.	December–April	CULT	KUG- 765; RDG- 824
<i>Millingtonia hortensis</i> L. f.	September–December	CULT	KUG- 628; RDG- 913
<i>Spathodea campanulata</i> P. Beauv.	September–February	CULT	KUG- 729; RDG- 199
<i>Tabebuia aurea</i> (S. Manso) Benth. & Hook. f.	March–April	CULT	KUG- 824; RDG- 844
<i>Tabebuia pallida</i> (Lindl.) Miers	March–May	CULT	KUG- 470; RDG- 661
<i>Tabebuia rosea</i> (Bertol.) Dc.	February–May	CULT	KUG- 750; RDG- 836
<i>Tecoma stans</i> (L.) H.B.K.	September–February	CULT, NAT	KUG- 228; RDG- 662
<i>Tecomella undulata</i> (Sm.) Seem.	February–March	CULT, NAT	KUG- 825; RDG- 241
Verbenaceae			
<i>Gmelina arborea</i> Roxb.	March–May	DD, CULT	KUG- 492; RDG- 943
<i>Tectona grandis</i> L. f.	June–December	DD, CULT	KUG- 581; RDG- 102
Araliaceae			
<i>Schefflera actinophylla</i> Harms.	July–August	CULT	KUG- 808; RDG- 924

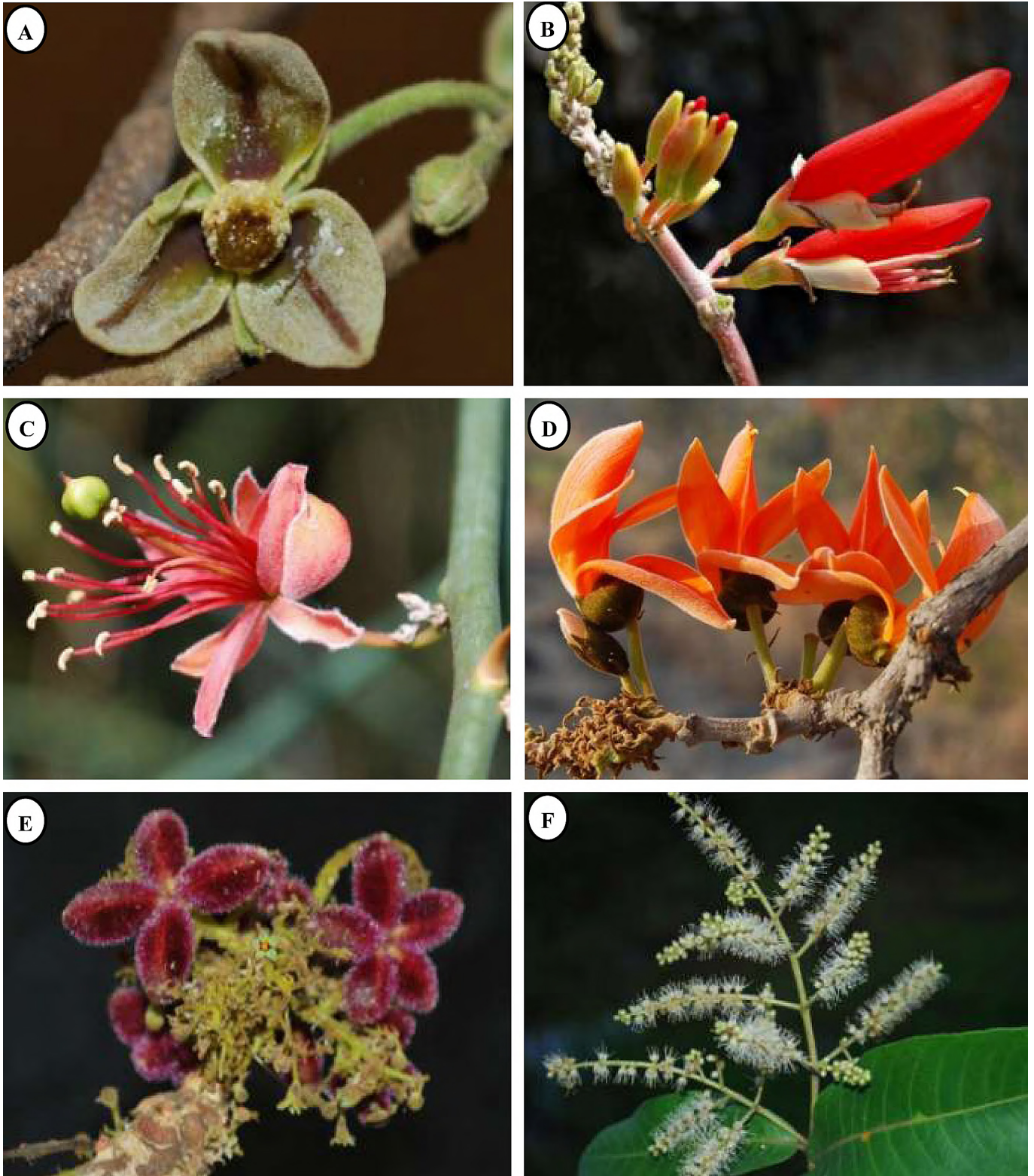


FIGURE 2. A) *Miliusa tomentosa* (Roxb.) Sinclair (Annonaceae); B) *Erythrina suberosa* Roxb. (Fabaceae); C) *Capparis decidua* (Forsk.) Edgew. (Capparaceae); D) *Butea monosperma* (Lamk.) Taub. (Fabaceae); E) *Sterculia urens* Roxb. (Malvaceae); F) *Terminalia arjuna* (Roxb.) Wight. & Arn. (Combretaceae).

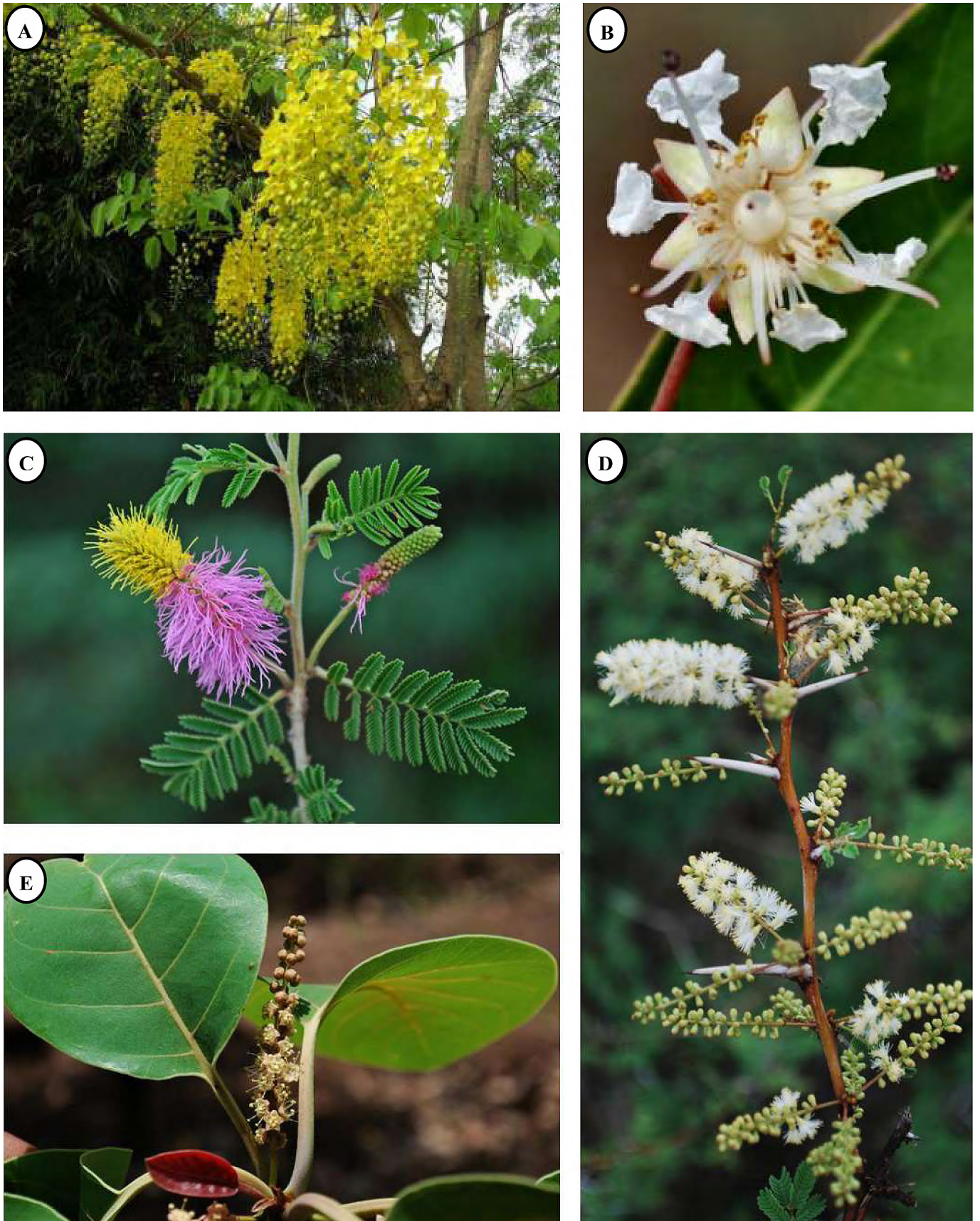


FIGURE 3. A) *Cassia fistula* L. (Fabaceae); B) *Lagerstroemia parviflora* Roxb. (Lythraceae); C) *Dichrostachys cinerea* (L.) Wight & Arn. (Fabaceae); D) *Acacia horrida* (L.) Willd. (Fabaceae); E) *Terminalia bellirica* (Gaertn.) Roxb. (Combretaceae).

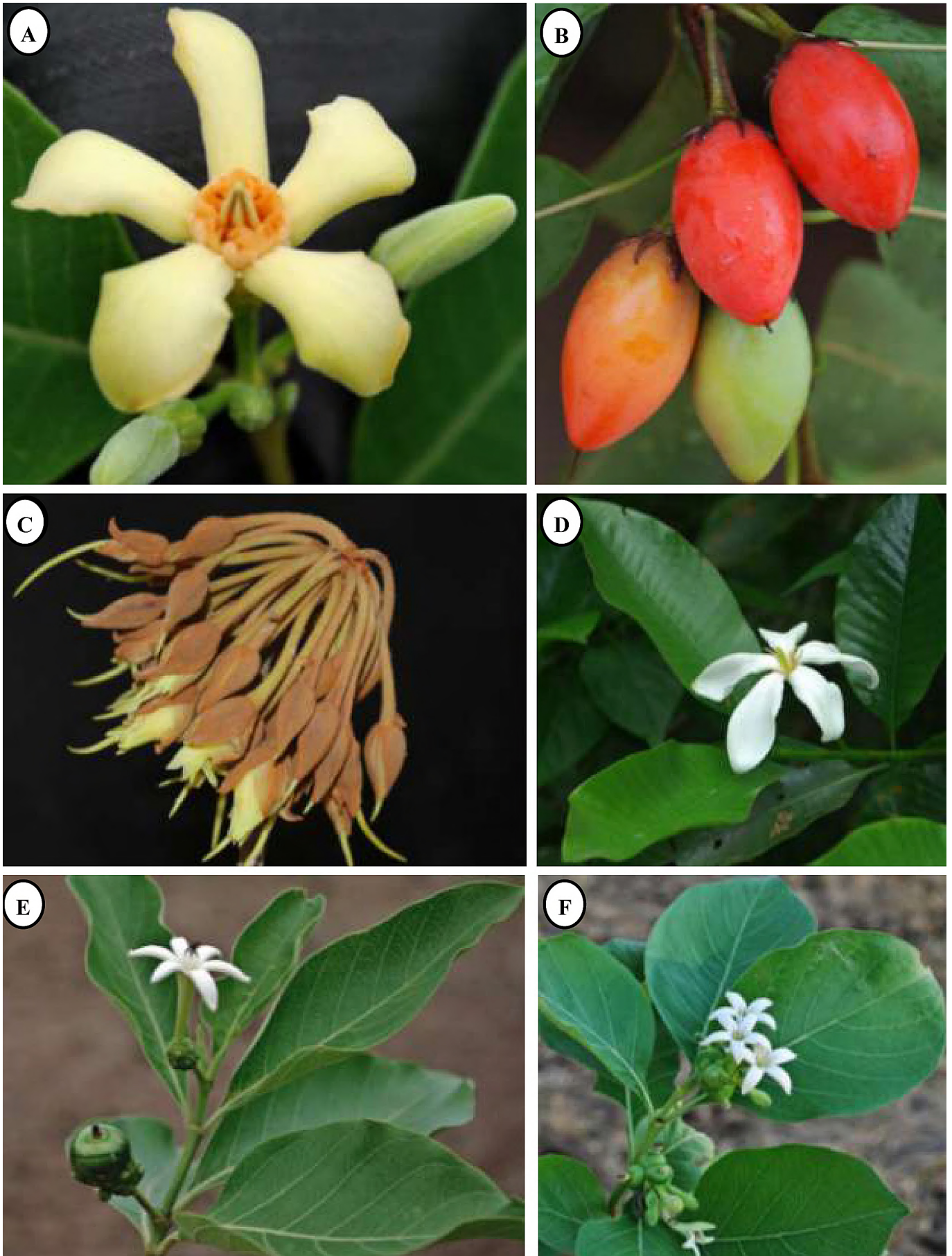


FIGURE 4. A) *Wrightia arborea* (Dennst.) Mabb. (Apocynaceae); B) *Mimusops elengi* L. (Sapotaceae); C) *Madhuca longifolia* (Koen.) Mac Bride (Sapotaceae); D) *Gardenia resinifera* Roth. (Rubiaceae); E) *Morinda tomentosa* Heyne ex Roth. (Rubiaceae); F) *Morinda citrifolia* L. (Rubiaceae).

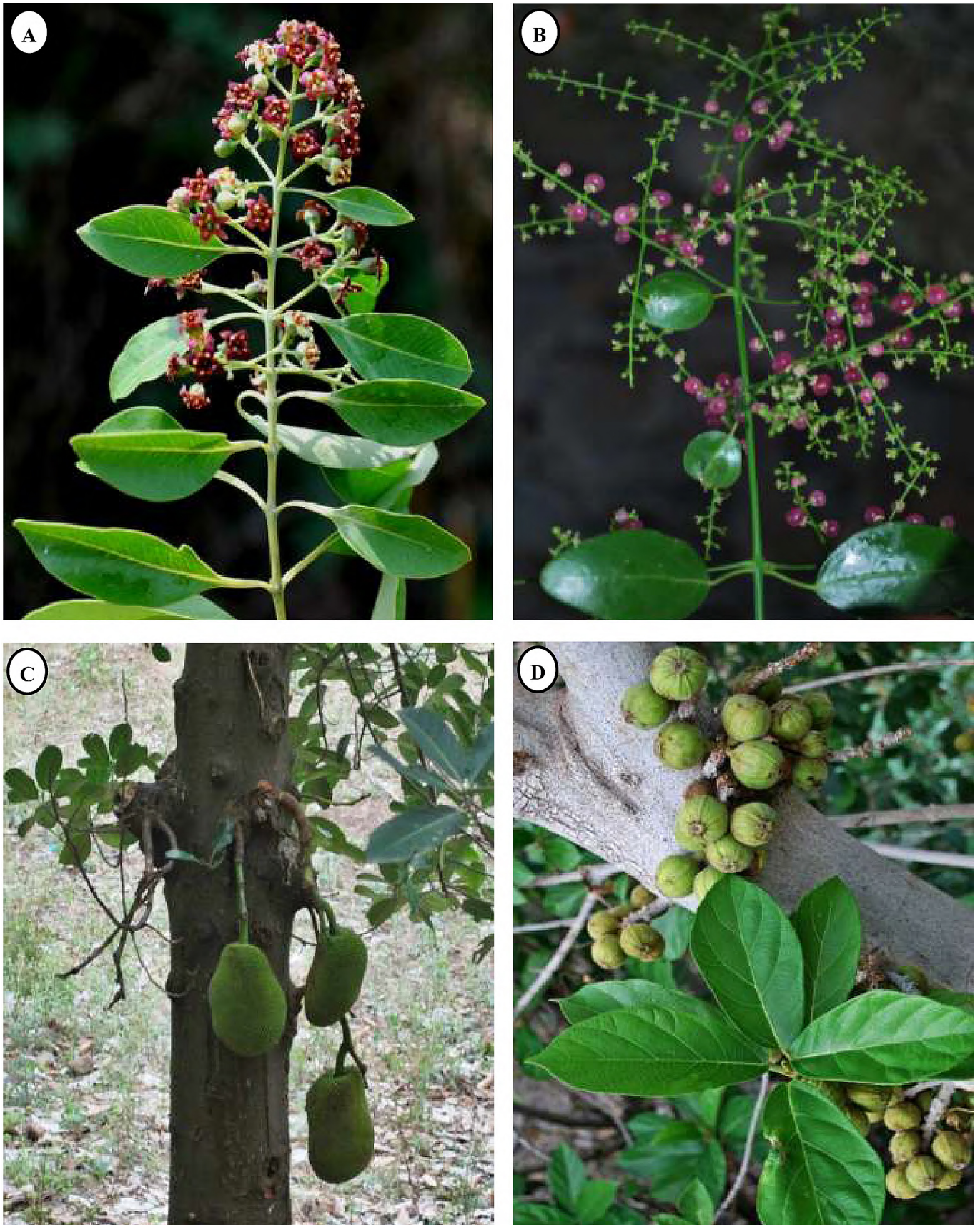


FIGURE 5. A) *Santalum album* L. (Santalaceae); B) *Salvadora persica* L. (Salvadoraceae); C) *Artocarpus heterophyllus* Lam.(Moraceae); D) *Ficus hispida* L. f. (Moraceae).

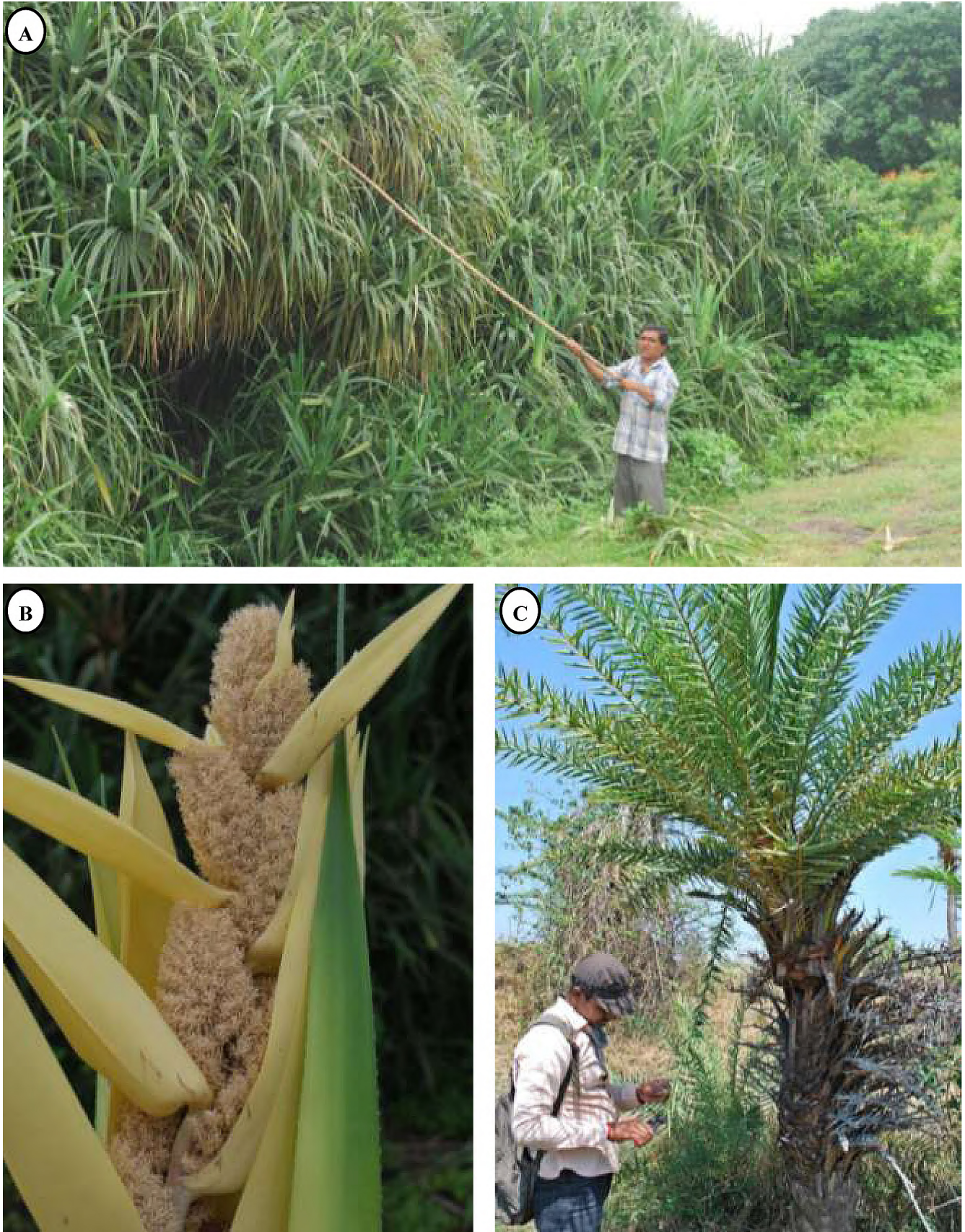


FIGURE 6. A) *Pandanus fascicularis* Lamk. (Pandanaceae); B) Inflorescence of *Pandanus fascicularis* Lamk. (Pandanaceae); C) *Phoenix sylvestris* (L.) Roxb. (Arecaceae).