

Checklist of Trees of Chhattisgarh, India

Research Article

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Chhattisgarh is felicitous with the undefiled and ample set of forest resources in the country covering 59,772 km sq, which is 44.21% of its geographical area. Primarily, Tropical Moist Deciduous and Tropical Dry Deciduous forests are common in the state. The Dominant tree species in Tropical Moist Deciduous Forest is Sal (*Shorea robusta*) whereas Teak (*Tectona grandis*) is the dominant tree species in Tropical Dry Deciduous forests. However, *Terminalia tomentosa*, *Pterocarpus marsupium* are common trees species in both forest types. In this study, total 323 tree species belonging to 59 families were documented. Of them, family Fabaceae is represented by maximum species, followed by Rubiaceae, Moraceae, etc. In context to IUCN database, 05 spp. are Endangered, 08 spp. are Vulnerable, 03 spp. are under Near Threatened, 213 spp. are under Least Concern and 12 spp. are Data Deficient

Keyword: Angiosperm families, Biodiversity, Tree, IUCN, Flora, Conservation.

Introduction

Trees are unit of vegetation which helps in study of physiognomy and vegetation of the area. It is an important database useful in understanding of biodiversity, climate and climate change pattern of any area. Further, trees species of any area are major component of forest and essential to both development and management of environment. Checklist is a comprehensive catalogue that provides basic information about targeted parameters in one frame. It allows tracking tree populations, identifying conservation priorities, forest restoration and informing sustainable forest management practices.

The state of Chhattisgarh is located in central-eastern India, spans an area of 135,194 km²

and lies in between 21.15° N to 21.25° N latitude and 81.36° E to 81.60° E longitude (Fig. 1).

The state shares its borders with Uttar Pradesh, Jharkhand, Odisha, Telangana, Andhra Pradesh, and Maharashtra. It has a rich hydrological network, with major rivers including Mahanadi, Indravati, Shivnath, Hasdeo, and Mand. The state has significant forest cover, with 59,772 km² of forests, accounting for 44.21% of its total geographical area. The climate of Chhattisgarh is characterized by three distinct seasons: summer (March to June), monsoon (July to September), and winter (October to February). The state has been experiencing significant climatic changes, including a steady decline in annual rainfall over the past five decades due to global warming.

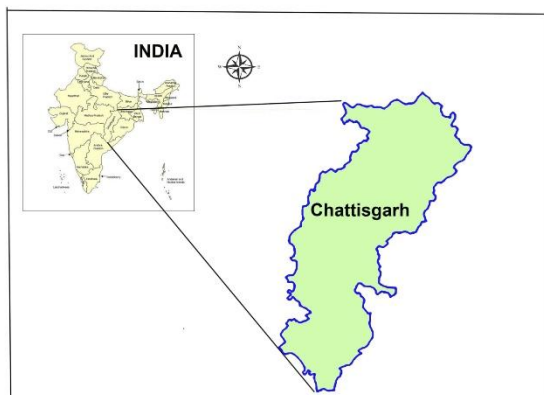


Fig 1: Map of Chhattisgarh

The average annual temperature ranges between 20°C to 23°C, while the mean annual precipitation is approximately 1,292 mm. These climatic variations influence the phenology and distribution patterns of tree species, affecting their reproductive cycles, seed dispersal, and overall survival. Chhattisgarh's forests are classified into two primary types: tropical moist deciduous forests in the eastern region and tropical dry deciduous forests in the northern and central regions. Tropical moist deciduous forests are composed of *Shorea robusta*, *Terminalia tomentosa*, *Pterocarpus marsupium*, *Anogeissus latifolia*, *Madhuca indica*, *Embelica officinalis*, *Buchanania lanzan*, *Diospyros melanoxylon*, *Terminalia chebula*, *Diospyros melanoxylon*, *Terminalia chebula*, *Kydia calycina*, *Ougeinia oojeinensis*, *Bridelia retusa*, *Bauhinia divaricata*, *Dendrocalamus strictus*, *Indigofera pulchella*, *Phoenix acaulis*, *Woodfordia fruticosa*, *Grewia* spp., *Embelia arborea*, *Themeda quadrivalvis*, *Imperata cylindrica*, *Bauhinia vahlii*, *Butea superba*, *Smilax zeylanica*, etc. Tropical dry deciduous forests have *Tectona grandis*, *Anogeissus latifolia*, *Diospyros tomentosa*, *Hardwickia binate*, *Pterocarpus marsupium*, *Dalbergia latifolia*, *Cassia fistula*, *Butea monosperma*, *Adina cordifolia*, *Mitragyna parviflora*, *Wrightia tinctoria*, *Dendrocalamus strictus*, *Nyctanthus arbor-tristis*, *Woodfordia*

fruticosa, *Helicteres sora*, *Grewia hirsute*, *Indigofera pulchella*, *Adhatoda vasica*, *Holarrhena antidysentrica*, *Cassia tora*, *Euphorbia* spp., *Xanthium strumarium*, *Apluda mutica*, *Aristida* spp., *Chloris inflata*, *Heteropogon contortus*, *Themeda quadrivalvis*, *Abrus precatorius*, *Acacia caesia*, *Ziziphus oenopia*, *Viscum* spp., *Vanda* spp., *Cuscuta reflexa*, etc. (Champion and Seth, 1968). However, the review of literature indicates that comprehensive document on trees of Chhattisgarh is not published so far. Therefore, in present investigation, an effort has been made for documentation of the tree species of Chhattisgarh was documented along with habit, phenology, native range and IUCN status. The aim of the study was to document the tree diversity of the state for conservation of forest, policy making, management of forest. Further, it will be useful for researchers who are pursuing their research in areas on biodiversity, forestry, agroforestry, horticulture, plant breeding, etc.

Materials and Methods

The present investigation was based on the information collected from authentic literatures and secondary data was compiled during 2024–2025. Both online and offline literatures were consulted and data regarding habits, phenology, and native range were collected and analyzed. The botanical names of the tree species have been updated according to the POWO (Plants of the World Online; <https://powo.science.kew.org>). Angiosperm phylogeny Group IV classification was followed while preparation of the checklist of the trees of Chhattisgarh (Byng et al., 2016).

Results and Discussion

In the present study, 323 tree species belonging to 59 families and 204 genera were documented. It is observed that Fabaceae is the most dominant family, comprising 60 tree species, followed by Rubiaceae (22 spp.), Moraceae 20 spp,

Malvaceae 17 spp, Phyllanthaceae 16 spp, and Rutaceae 15 spp. Among genera, *Ficus* has maximum representation with 14 species, followed by *Terminalia* (08 spp.), *Albizia* (07 spp.), *Wendlandia* (06), etc. The phenology of the trees has been categorized into four seasonal quarters: maximum flowering and fruiting (193 species) were takes place in the first quarter (January to March), followed by second quarter (April to June) with 172 species, third quarter (July – September) with 122 spp. and fourth quarter (October – December) with 99 species (Fig. 2)

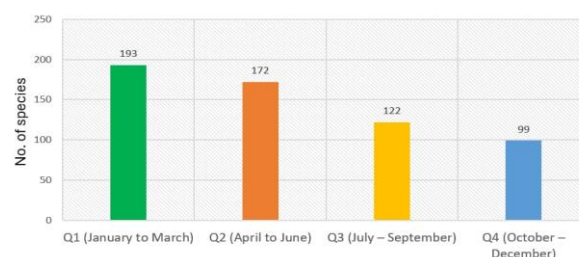


Fig. 2: Flowering and fruiting time line in each quarter

(Table-1). The phenological observations are valuable for research on climate change, reproductive biology, plant breeding and sustainable tree management.

Table-1: List of trees of Chhattisgarh, India

S. No	New name	Family	Habit	Fl & Fr	IUCN
1	<i>Anacardium occidentale</i> L.	Anacardiaceae	Small Trees	Sep. - Jun.	LC
2	<i>Buchanania axillaris</i> (Desr.) Ramamoorthy	Anacardiaceae	Trees	Dec. - Jan.	LC
3	<i>Buchanania lanzan</i> Spreng.	Anacardiaceae	Trees	Jan. - Jun.	LC
4	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Trees	Feb. - Jun.	LC
5	<i>Mangifera indica</i> L.	Anacardiaceae	Trees	Feb. - Jul.	DD
6	<i>Spondias pinnata</i> (L.f.) Kurz	Anacardiaceae	Trees	Feb. - Oct.	LC
7	<i>Annona reticulata</i> L.	Annonaceae	Trees	Sep. - Mar.	LC
8	<i>Annona squamosa</i> L.	Annonaceae	Trees	Apr. - Nov.	LC
9	<i>Miliusa tomentosa</i> (Roxb.) Finet & Gagnep.	Annonaceae	Trees	May. - Jul.	LC
10	<i>Miliusa velutina</i> (DC.) Hook.f. & Thomson	Annonaceae	Trees	Mar. - Oct.	LC
11	<i>Mitrephora heyneana</i> (Hook.f. & Thomson) Thwaites	Annonaceae	Trees	Jan. - Mar.	LC
12	<i>Monoon longifolium</i> (Sonn.) B.Xue & R.M.K.Saunders	Annonaceae	Trees	Apr. - Aug.	LC
13	<i>Polyalthia suberosa</i> (Roxb.) Thwaites	Annonaceae	Shurbs or trees	May. - Dec.	LC
14	<i>Cascabela thevetia</i> (L.) Lippold	Apocynaceae	Shrubs or Small trees	Throughout the year.	LC
15	<i>Holarrhena pubescens</i> Wall. ex G.Don	Apocynaceae	Small Trees	Feb. - Jun	LC
16	<i>Plumeria rubra</i> L.	Apocynaceae	Small Trees	Nov. - Jun	LC

17	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult.	Apocynaceae	Shrubs or small trees	May. - Aug.	LC
18	<i>Wrightia tinctoria</i> subsp. <i>rothii</i> (G.Don) Ngan	Apocynaceae	Small Trees	May. - Jun.	LC
19	<i>Borassus flabellifer</i> L.	Arecaceae	Unbranched dioecious trees	Mar. - Aug.	LC
20	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	Robust trees	Dec. - Jun.	NA
21	<i>Chlorophytum kolhapurense</i> Sardesai, S.P.Gaikwad & S.R.Yadav	Asparagaceae	Spinescent trees	Mar.- Jul.	NA
22	<i>Jacaranda mimosifolia</i> D.Don	Bignoniaceae	Trees	Mar. - Jun	VU
23	<i>Kigelia africana</i> (Lam.) Benth.	Bignoniaceae	Trees	Mar.- Dec.	LC
24	<i>Millingtonia hortensis</i> L.f.	Bignoniaceae	Trees	Dec. - May.	LC
25	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Trees	Jun – Mar.	LC
26	<i>Radermachera xylocarpa</i> (Roxb.) Roxb. ex K. Schum.	Bignoniaceae	Tall trees	Apr. - Feb.	LC
27	<i>Spathodea campanulata</i> P. Beauv.	Bignoniaceae	Small Trees	Jul. - Dec.	LC
28	<i>Stereospermum chelonoides</i> (L.f.) DC.	Bignoniaceae	Trees	Apr. – Jan.	LC
29	<i>Tabebuia rosea</i> (Bertol.) DC.	Bignoniaceae	Trees	Dec. – Mar.	LC
30	<i>Bixa urucrana</i> L.	Bixaceae	Trees	Jul. - Nov.	NA
31	<i>Cochlospermum religiosum</i> (L.) Alston	Bixaceae	Small Trees	Feb. – Jun.	LC
32	<i>Cordia dichotoma</i> G.Forst.	Boraginaceae	Trees	May. - Jun	LC
33	<i>Cordia grandis</i> Roxb.	Boraginaceae	Trees	Feb. – Mar.	NA
34	<i>Cordia macleodii</i> (Griff.) Hook.f. & Thomson	Boraginaceae	Trees	Mar. - May.	LC
35	<i>Cordia monoica</i> Roxb.	Boraginaceae	Trees	Jul. - Oct.	LC
36	<i>Dolichandrone falcata</i> (Wall. ex DC.) Seem.	Boraginaceae	Small Trees	Mar. - Jun	LC
37	<i>Ehretia aspera</i> Willd.	Boraginaceae	Small Trees	Mar. - May.	DD
38	<i>Heterophragma quadriloculare</i> (Roxb.) K.Schum.	Boraginaceae	Small Trees	Jan. - Jun	LC
39	<i>Boswellia serrata</i> Roxb.	Burseraceae	Trees	Feb. - Apr.	NA
40	<i>Garuga pinnata</i> Roxb.	Burseraceae	Trees	Feb. - Jun.	LC
41	<i>Protium serratum</i> (Wall. ex Colebr.) Engl. Var. Beddomei	Burseraceae	Medium sized trees	Mar. - Jun.	NA
42	<i>Celtis tetrandra</i> Roxb.	Cannabaceae	Trees	Jan. - Feb.	LC
43	<i>Celtis timorensis</i> Span.	Cannabaceae	Trees	Mar. - May.	LC
44	<i>Trema orientale</i> (L.) Blume	Cannabaceae	Small Trees	Sep. - Oct.	LC
45	<i>Trema politoria</i> (Planch.) Blume	Cannabaceae	Small Trees	Apr. - Sep.	NA



46	<i>Crateva adansonii</i> DC.	Capparaceae	Small Trees	Apr. – Jun.	LC
47	<i>Carica papaya</i> L.	Caricaceae	Usually unbranched trees	Almost Throughout the year	DD
48	<i>Casuarina equisetifolia</i> L.	Casuarinaceae	Evergreen trees	Mar. - Jul.	LC
49	<i>Cassine albens</i> (Retz.) Kosterm.	Celastraceae	Trees	Mar. - Aug.	NA
50	<i>Maytenus bailadillana</i> (V.Naray. & Mooney) D.C.S.Raju & Babu	Celastraceae	Small Trees	Oct. - Feb.	NA
51	<i>Maytenus emarginata</i> (Willd.) Ding Hou	Celastraceae	Small Trees	Oct. - Apr.	NA
52	<i>Maytenus senegalensis</i> (Lam.) Exell	Celastraceae	Small Trees	Oct. - Mar.	NA
53	<i>Anogeissus latifolia</i> var. <i>parvifolia</i> C.B.Clarke	Combretaceae	Trees	Aug. – Mar.	NA
54	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	Trees with grey smooth bark	Apr. – Mar.	LC
55	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Trees	Mar. - Feb.	LC
56	<i>Terminalia catappa</i> L.	Combretaceae	Trees	Dec. - Sep.	LC
57	<i>Terminalia chebula</i> Retz.	Combretaceae	Trees	Mar. - Feb.	LC
58	<i>Terminalia coronata</i> var. <i>parvifolia</i> (C.B.Clarke) Chakrab. & Anand Kumar	Combretaceae	Trees	Feb. - Apr.	NA
59	<i>Terminalia elliptica</i> Willd.	Combretaceae	Trees	Apr. – Mar.	LC
60	<i>Terminalia gella</i> Dalzell	Combretaceae	Trees	Mar. - Nov.	NA
61	<i>Terminalia pendula</i> (Edgew.) Gere & Boatwr.	Combretaceae	Trees	Aug. - Apr.	LC
62	<i>Dillenia aurea</i> Sm.	Dilleniaceae	Trees	May.- Jan.	LC
63	<i>Dillenia indica</i> L.	Dilleniaceae	Trees	Jul. – Sept.	LC
64	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Trees	Mar. – May.	NA
65	<i>Shorea robusta</i> C.F.Gaertn.	Dipterocarpaceae	Trees	Mar. - Jun.	LC
66	<i>Diospyros lanceifolia</i> var. <i>saliciformis</i> Ng	Ebnaceae	Trees	Mar. – Jan.	NA
67	<i>Diospyros malabarica</i> (Desr.) Kostel.	Ebnaceae	Trees	Apr. - Dec.	NA
68	<i>Diospyros melanoxylon</i> Willd.	Ebnaceae	Small Trees	Mar. - Aug.	NA
69	<i>Diospyros montana</i> Roxb.	Ebnaceae	Small Trees	Jul. - Sep.	NA
70	<i>Diospyros sylvatica</i> Roxb.	Ebnaceae	Small Trees	Apr. – Mar.	NA

71	<i>Elaeocarpus dognyensis</i> Guillaumin	Elaeocarpaceae	Trees	Feb. - Sep.	LC
72	<i>Elaeocarpus lanceifolius</i> Roxb.	Elaeocarpaceae	Trees	Aug. - Jan.	NA
73	<i>Elaeocarpus varunua</i> Buch.-Ham.ex Mast.	Elaeocarpaceae	Trees	Apr. - Oct.	LC
74	<i>Alchornea mollis</i> (Benth.) Müll.Arg.	Euphorbiaceae	Small Trees	Apr. - Oct.	NA
75	<i>Alchornea tiliifolia</i> (Benth.) Müll.Arg.	Euphorbiaceae	Large shrubs or small trees	Apr. - Oct.	LC
76	<i>Croton persimilis</i> Müll.Arg.	Euphorbiaceae	Trees	Mar.– Jan.	LC
77	<i>Euphorbia neriifolia</i> L.	Euphorbiaceae	Sping shrubs or small trees	Nov. - Dec.	LC
78	<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	Shrubs or Small trees	Aug. - Sep.	LC
79	<i>Macaranga cuspidata</i> Boivin ex Baill.	Euphorbiaceae	Small Trees	Jan. – Mar.	LC
80	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Euphorbiaceae	Small Trees	Aug. - Dec.	LC
81	<i>Macaranga indica</i> Wight	Euphorbiaceae	Trees	Aug. - Dec.	LC
82	<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Euphorbiaceae	SmallTrees	Oct. - May.	LC
83	<i>Acacia auriculiformis</i> A.Cunn. ex Benth.	Fabaceae	Trees	Aug. - May.	LC
84	<i>Albizia amara</i> (Roxb.) Boivin	Fabaceae	Trees	Mar. - Sep.	LC
85	<i>Albizia chinensis</i> (Osbeck) Merr.	Fabaceae	Trees	Apr. - Sep.	LC
86	<i>Albizia lathamii</i> Hole	Fabaceae	Trees	Sep. – Mar.	NA
87	<i>Albizia lebbeck</i> (L.) Benth.	Fabaceae	Trees	Mar. - Oct.	LC
88	<i>Albizia odoratissima</i> var. <i>subhedarii</i> M.R. Almeida	Fabaceae	Trees	Apr. - Jun.	LC
89	<i>Albizia procera</i> (Roxb.) Benth.	Fabaceae	Trees	Aug. - May.	LC
90	<i>Albizia thompsonii</i> Brandis	Fabaceae	Trees	Mar. - Dec.	NT
91	<i>Bauhinia purpurea</i> L.	Fabaceae	Trees	Oct. – Mar.	LC
92	<i>Bauhinia racemosa</i> Lam.	Fabaceae	Trees	Apr. - Aug.	LC
93	<i>Bauhinia variegata</i> L.	Fabaceae	Trees	Sep. - Apr.	LC
94	<i>Butea monosperma</i> (Lam.) Kuntze	Fabaceae	Small Trees	Jan. - May.	LC
95	<i>Caesalpinia pulcherrima</i> (L.) Sw.	Fabaceae	Shrubs or Small Trees	Jul. - Apr.	LC
96	<i>Calliandra haematocephala</i> var. <i>haematocephala</i>	Fabaceae	Small Trees	Nov. – Mar.	LC
97	<i>Cassia fistula</i> L.	Fabaceae	Trees	Mar. - Feb.	LC
98	<i>Cassia grandis</i> L.f.	Fabaceae	Trees	Mar. - Jun.	LC

99	<i>Cassia siamea</i> Lam.	Fabaceae	Trees	Sep. - May.	LC
100	<i>Colvillea racemosa</i> Bojer	Fabaceae	Trees	Sep. - Dec.	LC
101	<i>Dalbergia paniculata</i> (Roxb.) Thoth.	Fabaceae	Tell Trees	Apr. – Jan.	NA
102	<i>Dalbergia lanceolaria</i> L.f.	Fabaceae	Tell Trees	Apr. – Jan.	LC
103	<i>Dalbergia latifolia</i> Roxb.	Fabaceae	Tell Trees	Apr. – Jan.	VU
104	<i>Dalbergia sissoo</i> Roxb.ex DC.	Fabaceae	Small Trees	Mar.- Jan.	LC
105	<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Fabaceae	Trees	Apr. - Aug.	LC
106	<i>Delonix elata</i> (L.) Gamble	Fabaceae	Trees	Dec. - Feb.	LC
107	<i>Desmanthus acuminatus</i> Benth.	Fabaceae	Small Trees	May. - Jul.	NA
108	<i>Erythrina suberosa</i> Roxb.	Fabaceae	Medium - sized Trees	Mar. - Apr.	LC
109	<i>Erythrina variegata</i> L.	Fabaceae	Prickly Trees	Mar. - Sep.	LC
110	<i>Erythrostemon coccineus</i> (G.P. Lewis & J.L.Contr.) Gagnon & G.P.Lewis	Fabaceae	Tall shrubs or Small Trees	Oct.-Jan.	EN
111	<i>Hardwickia binata</i> Roxb.	Fabaceae	Trees	Oct. - Apr.	LC
112	<i>Leucaena leucocephala</i> (Lam.) de Wit	Fabaceae	Trees	Aug. – Jan.	NA
113	<i>Lysiloma latisiliquum</i> (L.) Benth.	Fabaceae	Small Trees	Aug. - Feb.	LC
114	<i>Millettia peguensis</i> Ali	Fabaceae	Shrubs or Small Trees	Feb. – Mar.	DD
115	<i>Mimosa rubicaulis</i> subsp. <i>himalayana</i> (Gamble) H.Ohashi	Fabaceae	Scandent Shrubs or Small Trees	Aug. - Feb.	NA
116	<i>Neltuma juliflora</i> (Sw.) Raf.	Fabaceae	Small Trees	Feb. - Oct.	LC
117	<i>Ougeinia oojeinensis</i> (Roxb.) Hochr.	Fabaceae	Medium - sized Trees	Feb. - Jun.	LC
118	<i>Parkia biglandulosa</i> Wight & Arn.	Fabaceae	Trees	Jan. - Oct.	DD
119	<i>Parkinsonia aculeata</i> L.	Fabaceae	shrubs or Small Trees	Sep. - Apr.	LC
120	<i>Peltophorum pterocarpum</i> (DC.) Backer ex K.Heyne	Fabaceae	Trees	Aug. - May.	LC
121	<i>Phanera roxburghiana</i> (Voigt) Bandyop.	Fabaceae	Trees	Sep. - Feb.	NA
122	<i>Piliostigma malabaricum</i> (Roxb.) Benth.	Fabaceae	Trees	Sep. - Apr.	LC

123	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Fabaceae	Small Trees	Jan. - Apr.	LC
124	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	Trees	Mar. - Feb.	LC
125	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tall Trees	Jul. – Mar.	NT
126	<i>Samanea saman</i> (Jacq.) Merr.	Fabaceae	Trees	Mar. - Apr.	LC
127	<i>Saraca asoca</i> (Roxb.) W.J.de Wilde	Fabaceae	Small Trees	Dec. - Jul.	VU
128	<i>Schizolobium parahyba</i> (Vell.) S.F.Blake	Fabaceae	Trees	May. - Aug.	LC
129	<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb.	Fabaceae	Trees	Jul. – Jan.	LC
130	<i>Senegalia donaldi</i> (Haines) Ragup., Seigler, Ebinger & Maslin	Fabaceae	Subscandent Trees	Aug. – Jan.	NA
131	<i>Senegalia ferruginea</i> (DC.) Pedley	Fabaceae	Small Trees	Sep. – Mar.	VU
132	<i>Senegalia lenticularis</i> (Buch.-Ham. ex Benth.) Ragup., Seigler, Ebinger & Maslin	Fabaceae	Trees	May. - Dec.	DD
133	<i>Senegalia polyacantha subsp. polyacantha</i>	Fabaceae	Trees	Apr. - Dec.	LC
134	<i>Senna alexandrina</i> Mill.	Fabaceae	Trees	Nov. - Jun.	LC
135	<i>Senna auriculata</i> (L.) Roxb.	Fabaceae	Tall shrubs or Small Trees	Jul. - Dec.	LC
136	<i>Senna spectabilis</i> (DC.) H.S. Irwin & Barneby	Fabaceae	Trees	Apr. - Aug.	LC
137	<i>Senna surattensis</i> (Burm.f.) H.S.Irwin & Barneby	Fabaceae	shrubs or Small Trees	Nov. - Feb.	LC
138	<i>Sesbania grandiflora</i> (L.) Poir.	Fabaceae	Trees	Sep. – Mar.	DD
139	<i>Sesbania sesban</i> (L.) Merr.	Fabaceae	Small Trees	Feb. - Dec.	LC
140	<i>Tamarindus indica</i> L.	Fabaceae	Tall trees	May. - Feb.	LC
141	<i>Vachellia nilotica subsp. adstringens</i> (Schumach.) Kyal.& Boatwr.	Fabaceae	Trees with up to 5 cm long stipular spines	Jul. - Apr.	LC
142	<i>Xylocarpus xylocarpa</i> (Roxb.) W.Theob.	Fabaceae	Trees	Apr.	LC
143	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Flacourtiaceae	Thorny Trees	Jul. - Dec.	NA
144	<i>Callicarpa tomentosa</i> (L.) L.	Lamiaceae	Small Trees	May. - Nov.	LC
145	<i>Gmelina arborea</i> Roxb. ex Sm.	Lamiaceae	Trees	Mar. - Jun.	LC
146	<i>Premna mollissima</i> Roth	Lamiaceae	Trees	Jan.- Apr.	LC
147	<i>Premna tomentosa</i> Willd.	Lamiaceae	shrubs or Small trees	Aug. - Oct.	LC
148	<i>Tectona grandis</i> L.f.	Lamiaceae	Trees	Aug. - Dec.	EN
149	<i>Vitex heterophylla</i> Roxb.	Lamiaceae	Trees	Mar. - Jul.	NA

150	<i>Vitex leucoxylon</i> L.f.	Lamiaceae	Shrubs or Small trees	Apr. - Jun	LC
151	<i>Vitex peduncularis</i> Wall. ex Schauer	Lamiaceae	Trees	Apr. - Jun	LC
152	<i>Cinnamomum tamala</i> (Buch. -Ham.) T.Nees & C.H.Eberm.	Lauraceae	Evergreen trees	Jul. - Oct.	LC
153	<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	Lauraceae	Trees	Jun - Nov.	LC
154	<i>Litsea monopetala</i> (Roxb.) Pers.	Lauraceae	Trees	Mar. - Jun	LC
155	<i>Neolitsea cassia</i> (L.) Kosterm.	Lauraceae	Trees	Jan. - Apr.	LC
156	<i>Persea macrantha</i> (Nees) Kosterm.	Lauraceae	Trees	Jan. – Mar.	NA
157	<i>Barringtonia acutangula</i> (L.) Gaertn.	Lecythidaceae	Small Trees	May. - Sep.	LC
158	<i>Careya arborea</i> Roxb.	Lecythidaceae	Small Trees	Mar. - Jul.	NA
159	<i>Strychnos nux-vomica</i> L.	Loganiaceae	Trees	Mar. – Jan.	LC
160	<i>Strychnos potatorum</i> L.f.	Loganiaceae	Small Trees	Apr. - Jul.	NA
161	<i>Punica granatum</i> L.	Lythraceae	Small Trees	Mar. – Jan.	LC
162	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae.	Small Trees	Apr. - Oct.	LC
163	<i>Lagerstroemia speciosa</i> subsp. <i>speciosa</i>	Lythraceae.	Trees	Jun – Jan.	LC
164	<i>Woodfordia fruticosa</i> (L.) Kurz	Lythraceae.	Shrub or Small Trees	Jan. - May.	LC
165	<i>Magnolia grandiflora</i> L.	Magnoliaceae	Trees	Apr. - May.	LC
166	<i>Bombax ceiba</i> L.	Malvaceae	Prickly trees	Mar. - Jun.	LC
167	<i>Ceiba pentandra</i> (L.) Gaertn.	Malvaceae	Trees	Feb. - May.	LC
168	<i>Dombeya</i> × <i>cayeuxii</i> André	Malvaceae	Small Trees	Feb. - Mar.	NA
169	<i>Eriolaena hookeriana</i> Wight & Arn.	Malvaceae	Small Trees	Apr. – Jan.	NA
170	<i>Eriolaena quinquelocularis</i> (Wight & Arn.) Drury	Malvaceae	Small Trees	Feb. - Dec.	NA
171	<i>Firmiana colorata</i> (Roxb.) R.Br.	Malvaceae	Trees	Feb. - May.	LC
172	<i>Grewia asiatica</i> L.	Malvaceae	Small Trees	Mar. - Aug.	LC
173	<i>Grewia flavescens</i> Juss.	Malvaceae	Small Trees	Jul. - Jan.	LC
174	<i>Grewia serrulata</i> DC.	Malvaceae	Small Trees	Jun.- Jan.	NA
175	<i>Grewia tiliifolia</i> Vahl	Malvaceae	Trees	May. - Jan.	LC

176	<i>Helicteres isora</i> L.	Malvaceae	Shrubs or Small trees	Aug. - Jun.	LC
177	<i>Kydia calycina</i> Roxb.	Malvaceae	Trees	Aug. - Mar.	LC
178	<i>Pterospermum acerifolium</i> (L.) Willd.	Malvaceae	Trees	Sep. - May.	LC
179	<i>Pterospermum xylocarpum</i> (Gaertn.) Oken	Malvaceae	Trees	May. - Jul.	NA
180	<i>Sterculia urens</i> Roxb	Malvaceae	Trees	Dec. - Apr.	LC
181	<i>Sterculia villosa</i> Roxb. ex Sm.	Malvaceae	Trees	Jan. - Jun.	LC
182	<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	Malvaceae	Small Trees	Sep. - Aug.	LC
183	<i>Memecylon umbellatum</i> var. <i>umbellatum</i>	Melastomataceae	Small Trees	Dec. - Apr.	LC
184	<i>Aglaia tomentosa</i> subsp. <i>kabaensis</i>	Meliaceae	Small Trees	Oct. - Feb.	LC
185	<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Meliaceae	Trees	Jan.-Dec.	LC
186	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Trees	Apr. -Jun.	LC
187	<i>Heynea trijuga</i> Roxb.ex Sims	Meliaceae	Trees	Mar. - Dec.	LC
188	<i>Melia azedarach</i> L.	Meliaceae	Trees	Apr. - Dec.	LC
189	<i>Melia dubia</i> Cav.	Meliaceae	Trees	Mar.- Apr.	NA
190	<i>Soymdia febrifuga</i> (Roxb.) A.Juss.	Meliaceae	Trees	Feb. - Jun.	LC
191	<i>Toona ciliata</i> M.Roem.	Meliaceae	Trees	Mar. - Apr.	LC
192	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Trees	Nov. - Jun	NA
193	<i>Artocarpus lacucha</i> Buch.-Ham.	Moraceae	Trees	Mar. - Jul.	NA
194	<i>Broussonetia papyrifera</i> (L.) L'Hér. ex Vent.	Moraceae	Trees	May. - Jul.	LC
195	<i>Ficus amplissima</i> Sm.	Moraceae	Trees	Dec. - Feb.	LC
196	<i>Ficus arnottiana</i> (Miq.) Miq.	Moraceae	Trees	Feb. - Apr.	NA
197	<i>Ficus benghalensis</i> L.	Moraceae	Trees	Throughout the year	NA
198	<i>Ficus concinna</i> (Miq.) Miq.	Moraceae	Trees	Apr. - Jun.	LC
199	<i>Ficus hispida</i> Blanco	Moraceae	Small Trees	Jan. - Jun.	LC
200	<i>Ficus mollis</i> (Miq.) Miq.	Moraceae	Trees	Apr. - Jun.	LC
201	<i>Ficus nervosa</i> Roth	Moraceae	Trees	Feb. – Mar.	LC
202	<i>Ficus palmata</i> Forssk.	Moraceae	Small Trees	Jun. - Sep.	LC
203	<i>Ficus racemosa</i> L.	Moraceae	Trees	Feb. - Sep.	LC
204	<i>Ficus recurva</i> var. <i>recurva</i>	Moraceae	Evergreen trees	Mar. - Oct.	NA
205	<i>Ficus religiosa</i> Forssk.	Moraceae	Trees	Apr. - Sep.	LC

206	<i>Ficus rumphii</i> Blume	Moraceae	Trees	Mar. - Jul.	NA
207	<i>Ficus semicordata</i> Buch. -Ham. ex Sm.	Moraceae	Trees	Throughout the year	LC
208	<i>Ficus tinctoria</i> G.Forst.	Moraceae	Small Trees	Jul. - Dec.	NA
209	<i>Glinus lotoides</i> L.	Moraceae	Small Trees	Apr. – Jan.	LC
210	<i>Morus alba</i> L.	Moraceae	Small Trees	Jan. - May.	LC
211	<i>Streblus asper</i> Lour.	Moraceae	Small Trees	May. - Aug.	LC
212	<i>Moringa concanensis</i> Nimmo ex Dalzell & A.Gibson	Moringaceae	Trees	Nov. - Apr.	NA
213	<i>Moringa oleifera</i> Lam.	Moringaceae	Trees	Jan. - Jun.	LC
214	<i>Corymbia maculata</i> (Hook.) K.D.Hill&L.A.S.Johnson	Myrtaceae	Tall trees	Almost Throughout the year	LC
215	<i>Eucalyptus glaucina</i> (Blakely) L.A.S.Johnson	Myrtaceae	Tall trees	Almost Throughout the year	VU
216	<i>Eucalyptus tereticornis</i> subsp. <i>mediana</i> Brooker & Slee	Myrtaceae	Tall trees	Feb. - Jun	LC
217	<i>Melaleuca lophantha</i> (Vent.) ined.	Myrtaceae	Trees	Feb. - May.	NA
218	<i>Psidium guajava</i> L.	Myrtaceae	Small Trees	Almost Throughout the year	LC
219	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Trees	Feb. - Aug.	LC
220	<i>Syzygium jambos</i> (L.) Alston	Myrtaceae	Small Trees	Mar. - Jul.	LC
221	<i>Syzygium nervosum</i> DC.	Myrtaceae	Large trees	Mar. - Jul.	LC
222	<i>Syzygium salicifolium</i> J.Graham	Myrtaceae	Small Trees	Mar. - Aug.	LC
223	<i>Ochna gamblei</i> King ex Brandis	Ochnaceae	Small Trees	Mar. - Jun.	EN
224	<i>Ochna integerrima</i> (Lour.) Merr.	Ochnaceae	Shrubs or trees	Mar. - Apr.	LC
225	<i>Ochna obtusata</i> DC.	Ochnaceae	Shrubs or Small Trees	Apr. - Jun.	LC
226	<i>Chionanthus mala-elengi</i> (Dennst.) P.S.Green	Oleaceae	Trees	Feb. - Apr.	LC
227	<i>Chionanthus ramiflorus</i> Roxb.	Oleaceae	Trees	Feb. - Apr.	LC
228	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Small Trees	Sep. – Jan.	LC
229	<i>Olea paniculata</i> R.Br.	Oleaceae	Trees	Mar. - Feb.	LC

230	<i>Schrebera swietenoides</i> Roxb.	Oleaceae	Trees	Mar.- Dec.	LC
231	<i>Tetrapilus dioicus</i> (Roxb.) L.A.S.Johnson	Oleaceae	shrubs or Small trees	Jan. - Feb.	NA
232	<i>Averrhoa carambola</i> L.	Oxalidaceae	Trees	Mar. - Aug.	DD
233	<i>Eurya nitida</i> subsp. <i>anceps</i> (Blume) de Wit	Pentaphylacaceae	Small Trees	Most parts of the year	LC
234	<i>Antidesma acuminatum</i> Wight	Phyllanthaceae	Small Trees	May. - Aug.	NA
235	<i>Antidesma buniis</i> (L.) Spreng.	Phyllanthaceae	Small Trees	Apr. - Aug.	LC
236	<i>Antidesma ghaesembilla</i> Gaertn.	Phyllanthaceae	Small Trees	Jul. - Sep.	LC
237	<i>Antidesma menasu</i> (Tul.) Müll.Arg.	Phyllanthaceae	Small Trees	Sep. - Oct.	NA
238	<i>Bischofia javanica</i> Blume	Phyllanthaceae	Trees	Feb. - Apr.	LC
239	<i>Bridelia pubescens</i> Kurz	Phyllanthaceae	Trees	Apr. - Feb.	NA
240	<i>Bridelia retusa</i> (L.) A.Juss.	Phyllanthaceae	Trees	Jul. - Feb.	LC
241	<i>Bridelia squamosa</i> (Lam.) Gehrm.	Phyllanthaceae	Small Trees	Aug. – Jan.	NA
242	<i>Cleistanthus collinus</i> (Roxb.) Benth. ex Hook.f.	Phyllanthaceae	Small Trees	Jun - Nov.	VU
243	<i>Cleistanthus patulus</i> (Roxb.) Müll.Arg.	Phyllanthaceae	Small Trees	Feb. - May.	NA
244	<i>Glochidion assamicum</i> (Müll.Arg.) Hook.f.	Phyllanthaceae	Small Trees	Apr. - Dec.	NA
245	<i>Glochidion ellipticum</i> Wight	Phyllanthaceae	Shrubs or Small trees	Sep. – Jan.	LC
246	<i>Glochidion lanceolarium</i> (Roxb.) Voigt	Phyllanthaceae	Shrubs or Small trees	Jan - Oct.	NA
247	<i>Glochidion velutinum</i> Wight	Phyllanthaceae	Trees	Apr. - Jul.	NA
248	<i>Glochidion zeylanicum</i> (Gaertn.) A.Juss.	Phyllanthaceae	Trees	Mar - Jul.	LC
249	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Trees	Mar. - Dec.	LC
250	<i>Pittosporum napaulense</i> (DC.) Rehder & E.H.Wilson	Plttsoporaceae	Trees	Jul. - Oct.	LC
251	<i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A. DC.	Primulaceae	Shrubs or Small trees	Jul. – Jan.	NA
252	<i>Grevillea robusta</i> A.Cunn. ex R.Br.	Proteaceae	Trees	Mar. - Apr.	LC
253	<i>Rhamnus davurica</i> Pall.	Rhamnaceae	Small Trees	Mar. - Oct.	NA
254	<i>Rhamnus triquetra</i> (Wall.) Brandis	Rhamnaceae	Small Trees	Jul. - Dec.	LC
255	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Trees	Sep. - Jun.	LC
256	<i>Ziziphus xylopyrus</i> (Retz.) Willd.	Rhamnaceae	Strggling shrubs or Small Trees	Apr. - Jan.	LC
257	<i>Carallia brachiata</i> (Lour.) Merr	Rhizopharaceae	Trees	Jan. - May.	LC

258	<i>Prunus ceylanica</i> (Wight) Miq.	Rosaceae	Trees	May. - Dec.	EN
259	<i>Prunus persica</i> (L.) Batsch	Rosaceae	Small Trees	Jan. - Jun.	NA
260	<i>Prunus pygeoides</i> Koehne	Rosaceae	Trees	Nov.	NA
261	<i>Pyrus pashia</i> var. <i>pashia</i>	Rosaceae	Trees	Feb. - Dec.	LC
262	<i>Adina cordifolia</i> (Roxb.) Hook.f. & Benth.	Rubiaceae	Trees	Aug. - Jun	LC
263	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Rubiaceae	Small Trees	Mar. - Dec.	LC
264	<i>Ceriscoides turgida</i> (Roxb.) Tirveng.	Rubiaceae	Small armed trees	Mar. - Nov.	LC
265	<i>Coffea arabica</i> L.	Rubiaceae	Small Trees	Mar.- Dec.	EN
266	<i>Gardenia gummifera</i> L.f.	Rubiaceae	Small Trees	Mar. - Aug.	LC
267	<i>Gardenia resinifera</i> Roth	Rubiaceae	Small Trees	Mar. - Nov.	LC
268	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Rubiaceae	Trees	Jul. - Feb.	LC
269	<i>Ixora undulata</i> Roxb.ex Sm.	Rubiaceae	Small Trees	Feb. - May.	LC
270	<i>Meyna spinosa</i> Roxb.ex Link	Rubiaceae	Armed small trees	Jul. - Aug.	NA
271	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	Trees	Aug. – Jan.	LC
272	<i>Morinda pubescens</i> Sm.	Rubiaceae	Small Trees	May. - Sep.	NA
273	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Rubiaceae	Trees	May. - Dec.	NA
274	<i>Pavetta canescens</i> DC.	Rubiaceae	Small trees	Aug. – Jan.	NA
275	<i>Pavetta crassicaulis</i> Bremek.	Rubiaceae	Small Trees	Apr. - Nov.	LC
276	<i>Psydrax dicoccos</i> Gaertn.	Rubiaceae	Trees	Jan. - May.	LC
277	<i>Tamilnadia uliginosa</i> (Retz.) Tirveng. & Sastre	Rubiaceae	Armed trees	May. - Feb.	LC
278	<i>Wendlandia coriacea</i> (Wall.) DC.	Rubiaceae	Small Trees	Feb. - Apr.	NA
279	<i>Wendlandia thyrsoides</i> (Roth) Steud.	Rubiaceae	Shrubs or Small trees	Feb. - Apr.	LC
280	<i>Wendlandia tinctoria</i> (Roxb.) DC.	Rubiaceae	Small Trees	Jan. - May.	LC
281	<i>Wendlandia gamblei</i> Cowan	Rubiaceae	Trees	Mar.- May.	DD
282	<i>Wendlandia heyneana</i> Wall.ex Wight & Arn.	Rubiaceae	Small Trees	Feb. - May.	DD
283	<i>Wendlandia heynei</i> (Schult.) Santapau & Merchant	Rubiaceae	Trees	Mar. - Jul.	LC

284	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Armed Trees	Apr. - Aug.	NT
285	<i>Atalantia monophylla</i> DC.	Rutaceae	Small Trees	Jul. - Feb.	LC
286	<i>Chloroxylon swietenia</i> DC.	Rutaceae	Small Trees	May. - Aug.	VU
287	<i>Citrus medica</i> L.	Rutaceae	Small Trees	Jan - Dec.	LC
288	<i>Citrus reticulata</i> Blanco	Rutaceae	Small Trees	Nov. - Mar.	NA
289	<i>Citrus</i> × <i>aurantiifolia</i> (Christm.) Swingle	Rutaceae	Small Trees	Throughout the year	NA
290	<i>Citrus</i> × <i>aurantium</i> L.	Rutaceae	Small Trees	Jul. - Mar.	NA
291	<i>Citrus</i> × <i>limon</i> (L.) Osbeck	Rutaceae	Small Trees	Apr. - May.	NA
292	<i>Citrus</i> × <i>sinensis</i> (L.) Osbeck	Rutaceae	Trees	Aug. - Dec.	NA
293	<i>Limonia acidissima</i> L.	Rutaceae	Trees	Feb. - Oct.	NA
294	<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Small Trees	Dec. - Jun.	LC
295	<i>Murraya paniculata</i> var. <i>omphalocarpa</i> (Hayata) Yu.Tanaka	Rutaceae	Shrub or Small Trees	Oct. - Apr.	NA
296	<i>Naringi crenulata</i> (Roxb.) Nicolson	Rutaceae	Small trees	Sep. - Dec.	LC
297	<i>Zanthoxylum armatum</i> var. <i>ferrugineum</i> (Rehder & E.H.Wilson) C.C.Huang	Rutaceae	Shrub or Small Trees	Apr. - Oct.	LC
298	<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	Rutaceae	Trees	Apr. - Oct.	LC
299	<i>Meliosma simplicifolia</i> (Roxb.) Walp.	Sabiaceae	Trees	Dec. - Jun.	NA
300	<i>Casearia graveolens</i> Dalzell	Salicaceae	Trees	May. - Jul.	NA
301	<i>Casearia tomentosa</i> Roxb.	Salicaceae	Trees	Mar. - May.	LC
302	<i>Flacourtia indica</i> (Burm.f.) Merr.	Salicaceae	Thorny Trees	Mar. - May.	LC
303	<i>Homalium napaulense</i> (DC.) Benth.	Salicaceae	Small Trees	May. - Jun.	NA
304	<i>Populus alba</i> L.	Salicaceae	Trees	Mar. - Jul.	LC
305	<i>Salix tetrasperma</i> Roxb.	Salicaceae	Small Trees	Oct. - Feb.	LC
306	<i>Xylosma longifolia</i> Clos	Salicaceae	Thorny Trees	Dec. - Mar.	LC
307	<i>Santalum album</i> L.	Santalaceae	Evergreen trees semi - parasitic trees	Aug. - Dec.	VU
308	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	Sapindaceae	Trees	Jan - May.	LC
309	<i>Litchi chinensis</i> Sonn.	Sapindaceae	Trees	Feb.-Jun.	NA
310	<i>Sapindus emarginatus</i> Vahl	Sapindaceae	Trees	Oct. - Jan.	NA



311	<i>Sapindus mukorossi</i> Gaertn.	Sapindaceae	Trees	May. - Feb.	LC
312	<i>Sapindus trifoliatu</i> s L.	Sapindaceae	Trees	Nov. - Apr.	DD
313	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Trees	Mar. - Aug.	LC
314	<i>Madhuca longifolia</i> (L.) J.F. Macbr.	Sapotaceae	Trees	Jan. - Jun	NA
315	<i>Mimusops elengi</i> Bojer	Sapotaceae	Trees	Jan. - Sep.	NA
316	<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	Trees	Jan - Mar.	DD
317	<i>Cestrum nocturnum</i> L.	Solanaceae	Small Trees	Jul. - Oct.	LC
318	<i>Symplocos acuminata</i> (Blume) Miq.	Symplocaceae	Small Trees	Sep. - Apr.	LC
319	<i>Symplocos macrophylla</i> subsp. <i>rosea</i> (Bedd.) Noot.	Symplocaceae	Small Trees	Sep. - May.	LC
320	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Ulmaceae	Trees	Jan. - Apr.	LC
321	<i>Oreocnide integrifolia</i> (Gaudich.) Miq.	Urticaceae	Small Trees	Mar. - Aug.	NA
322	<i>Duranta erecta</i> L.	Verbenaceae	Shrubs or Small trees	May. - Dec.	LC
323	<i>Balanites angolensis</i> (Welw.) Mildbr. & Schltr.	Zygophyllaceae	Armed Small Trees	Oct. - Aug.	LC

IUCN database (<https://www.iucnredlist.org/>) was used for evaluation of threat status of the species. It has been observed that five species are classified under Endangered category (*Tectona grandis*, *Coffea arabica*, *Erythrostemon coccineus*, *Prunus ceylanica*, *Ochna gamblei*), eight species are placed under Vulnerable (*Cleistanthus collinus*, *Dalbergia latifolia*, *Jacaranda mimosifolia*, *Santalum album*, *Saraca asoca*, *Chloroxylon swietenia*, *Senegalia ferruginea*), three species are Near Threatened (*Aegle marmelos*, *Albizia thompsonii*, *Pterocarpus marsupium*), 213 species fall under the Least Concern category and 12 species are classified as Data Deficient (Table-1).

Conclusions

The correlation between tree phenology, nativity, and climatic factors offers valuable

insights into species adaptation and resilience, particularly in the context of future climate change scenarios. Phenological shifts, such as alterations in flowering and fruiting timelines, hold considerable significance for tree breeders engaged in seed collection, propagation, and genetic enhancement initiatives. Furthermore, such data are invaluable to entomologists studying insect-plant interactions, as the developmental stages of tree species are closely linked with insect life cycles (Pautasso, 2009; Miller et al., 2023). In light of these considerations, the current study seeks to comprehensively document the tree species diversity of Chhattisgarh, placing particular emphasis on their phenological patterns and native distribution, with the aim of informing conservation strategies and promoting sustainable forest management practices. The results

underscore the imperative for targeted conservation approaches and effective land management strategies to safeguard the rich tree diversity of Chhattisgarh. The prevalence of

deciduous forests, coupled with the presence of rare and threatened species, further amplifies the relevance of this study in the broader context of biodiversity conservation.

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