Supplementary section

Supplementary Table S1

Species studied: Taxonomy, leaf habit, and ecological roles in Central Western Ghats seasonally dry Tropical forest

Species Name	Ecological significance
Terminalia bellirica (Gaertn.) Roxb. (Combretaceae)	Mid-successional deciduous canopy tree in dry deciduous forests; forms upper canopy layers, supports frugivore dispersal, and facilitates understorey regeneration in disturbed sites.powo.science.
Terminalia catappa L. (Combretaceae)	Early-successional deciduous pioneer on coastal dry edges; low to mid-canopy, stabilizes sandy soils, enhances bird-mediated seed dispersal.
Pterocarpus marsupium Roxb. (Fabaceae)	Mid-successional deciduous on moist slopes; tall emergent canopy, nitrogen-fixing roots promote soil fertility for late-successional species.
Terminalia arjuna (Roxb. ex DC.) Wight & Arn. (Combretaceae)	Mid-successional riparian deciduous; mid-canopy along streams, reduces erosion, provides shade microhabitats for aquatic and terrestrial biodiversity.
Terminalia anogeissiana Gere & Boatwr. (Combretaceae)	Early-mid successional deciduous in dry tropics; canopy emergent, creates gaps for pioneer recruitment post-disturbance.
Mitragyna parvifolia (Roxb.) Korth. (Rubiaceae)	Early-successional deciduous understorey along rocky streams; low canopy, supports shade-tolerant herbs and streambank stability.
Bauhinia purpurea L. (Fabaceae)	Pioneer deciduous in open disturbed areas; small canopy tree, rapid colonization improves soil nitrogen for forest succession.
Tectona grandis L.f. (Lamiaceae)	Mid-successional deciduous dominant in teak forests; tall open canopy facilitates light-demanding regeneration, abandoned stands enable native succession.
Dalbergia lanceolaria L.f. (Fabaceae)	Mid-successional deciduous in selectively logged forests; mid-canopy, slow growing with sparse regeneration, contributes to structural diversity.
Lannea coromandelica (Houtt.) Merr. (Anacardiaceae)	Pioneer deciduous in dry deciduous; light canopy attracts frugivores, promotes gap-phase dynamics post-fire.
Terminalia paniculata DC. (Combretaceae)	Early mid successional deciduous pioneer on hilltops; upper canopy dominant, stabilizes slopes during monsoon runoff.
Careya arborea Roxb. (Lecythidaceae)	Early successional deciduous on dry hilltops; scattered canopy, fire-resistant bark enables post-fire pioneer role.
Ficus religiosa L. (Moraceae)	Late-successional keystone deciduous; expansive canopy hosts epiphytes, year-round figs sustain diverse frugivores in dry forests.
Schleichera oleosa (Lour.) Oken (Sapindaceae)	Mid-successional deciduous in dry forests; dense canopy provides shade tolerance for undergrowth, fire-adapted regeneration.
Santalum album L. (Santalaceae)	Late-successional hemi-parasitic semi-evergreen; low-mid canopy, root parasitism on hosts maintains nutrient cycling in dry woodlands.

Senna siamea (Lam.) H.S.Irwin & Barneby (Fabaceae)	Invasive early-successional exotic; fast canopy closure in disturbed sites, alters soil nitrogen and suppresses natives.
Neolamarckia cadamba (Roxb.) Bosser (Rubiaceae)	Pioneer deciduous in moist gaps; rapid tall canopy growth stabilizes soil erosion on slopes.
Acacia auriculiformis A.Cunn. ex Benth. (Fabaceae)	Invasive pioneer in degraded areas; dense feathery canopy acidifies soil, hinders native succession.
Magnolia champaca (L.) Baill. ex Pierre (Magnoliaceae)	Mid-late successional semi-evergreen in ravines; aromatic canopy supports specialized pollinators and seed dispersers.
Bambusa vulgaris Schrad. ex J.C.Wendl. (Poaceae)	Early mid successional understorey bamboo; clumping forms dense lower canopy, enhances soil binding in moist-dry transitions.
Pongamia pinnata (L.) Pierre (Fabaceae)	Pioneer nitrogen-fixer deciduous; open canopy on dry edges promotes understorey herbs and insect diversity.
Syzygium cumini (L.) Skeels (Myrtaceae)	Mid-successional evergreen riverine; dense mid-canopy, fleshy fruits drive frugivore assemblages.
Swietenia macrophylla King (Meliaceae)	Mid-successional introduced deciduous; straight tall canopy in plantations facilitates light penetration for ground-layer recovery.
Artocarpus heterophyllus Lam. (Moraceae)	Mid-late successional evergreen on slopes; broad canopy reduces erosion, supports mycorrhizal networks.
Saraca asoca (Roxb.) Willd. (Fabaceae)	Mid-successional semi-evergreen: flowering canopy attracts pollinators, stabilizes fragmented forest edges.
Ficus benghalensis L. (Moraceae)	Late-successional keystone deciduous banyan; massive prop-root canopy creates island habitats for epiphytes and invertebrates.
Ficus microcarpa L.f. (Moraceae)	Mid-successional epiphytic evergreen: strangler habit alters host canopies, forms dense shade layers.

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Supplementary Table 2

Summary of mixed-effects model results for thermal tolerance parameters.

T_5 models

Fixed effects (Random effects)		R^2	*F*-value	df1, df2	*P*-value
Season	(1 | Species)	0.03	8.87	1, 242	0.003
Species	(1 | Replicates)	0.24	3.31	26, 243	<0.001
Habit	(1 | Species)	0.01	0.34	1, 25	0.954
Succession	(1 | Species)	0.03	1.86	2, 24	0.176
Canopy	(1 | Species)	0.001	0.12	2, 25	0.725
Species × Season	(1 | Replicates)	0.36	1.67	26, 215	0.03
		Season	9.55	1, 215	0.002
		Species	3.64	26, 215	<0.001

T_{50} models

Fixed effects (Random effects)		R^2	*F*-value	df1, df2	*P*-value
Season	(1 | Species)	0.02	8.48	1, 242	0.003
Species	(1 | Replicates)	0.43	8.04	26, 243	<0.001
Habit	(1 | Species)	0.07	4.80	1, 25	0.038
Succession	(1 | Species)	0.01	0.54	2, 24	0.548
Canopy	(1 | Species)	0.001	0.04	1, 25	0.84
Species × Season	(1 | Replicates)	0.49	1.28	26, 215	0.18
		Season	9.01	1, 215	0.003
		Species	8.21	26, 215	<0.001

DW models

Fixed effects (Random effects)		R^2	*F*-value	df1, df2	*P*-value
Season	(1 | Species)	0.009	2.93	1, 242	0.088
Species	(1 | Replicates)	0.21	2.84	26, 243	<0.001
Habit	(1 | Species)	0.04	5.94	1, 25	0.022
Succession	(1 | Species)	0.03	2.3	2, 24	0.121
Canopy	(1 | Species)	0.001	0.05	1, 25	0.82
Species × Season	(1 | Replicates)	0.32	1.64	26, 216	0.03
		Season	3.13	1, 216	0.077
		Species	3.06	26, 216	<0.001

Supplementary Figure S1

Post-wet and wet period plasticity in PSII thermal tolerance (T_5 and T_{50}) of co-occurring tree species across successional categories. Boxplots depict T_5 (left panel, A) and T_{50} (right panel, B) thresholds for leaf heat tolerance, pooling all deciduous and evergreen species measured in each sampling period. T_5 indicates the temperature at 5% decline in F_v/F_m, while T_{50} indicates 50% decline. Differences between wet (blue) and post-wet (red) periods are shown for each time window, with asterisks indicating significant shifts in PSII thermal tolerance.