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Host tree association and canopy microhabitat characteristics of epiphytic orchids in Kanger Valley National Park, Chhattisgarh, India

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ABSTRACT

Kanger Valley National Park (KVNP) in the Bastar region of Chhattisgarh, India, represents an ecologically diverse forest landscape supporting rich wild orchid flora. This study evaluated the floristic diversity, growth habits, host tree associations, and microhabitat characteristics of orchids in KVNP. Field surveys documented 19 orchid species belonging to 12 genera. Epiphytic orchids dominated the assemblage (17 species, 89.5%), while terrestrial orchids accounted for 2 species (10.5%). Sympodial growth habit was exhibited by 11 species (57.9%), and monopodial growth by 8 species (42.1%). *Dendrobium* was the most species-rich genus (5 species), followed by *Aerides* (3 species) and *Vanda* (2 species). The epiphytic orchids were recorded on 13 host tree species spanning 11 plant families. *Mangifera indica* supported the highest orchid species richness (9 species), followed by *Ficus religiosa* (6 species), *Terminalia* spp. (6 species), *Syzygium cumini* (5 species), and *Diospyros melanoxylon* (5 species). At the host family level, Moraceae, Anacardiaceae, and Combretaceae supported the highest number of associated orchid taxa (10 species each). Most epiphytic species occurred in moist deciduous and semi-evergreen forest patches, demonstrating a strong association with hosts possessing rough, longitudinally fissured, or flaky bark and dense canopy cover. These findings highlight the ecological interdependence between epiphytic orchids and mature forest structure, emphasizing the need to conserve mature phorophytes to maintain orchid diversity in tropical forest ecosystems.

Keywords: Orchidaceae, Epiphytes, Phorophyte association, Canopy structure, Bark texture, Kanger Valley National Park, Bastar

1. Introduction

The family Orchidaceae represents one of the largest and most species-rich lineages of flowering plants, comprising over 28,000 species distributed globally across diverse terrestrial and canopy microhabitats (Chase *et al.*, 2015; Zotz, 2016) [1, 2]. Tropical forest ecosystems serve as primary centers of orchid diversity and speciation, hosting an immense variety of epiphytic forms that inhabit forest canopies (Dressler, 1993; Zotz, 2016) [3, 2]. Unlike parasitic flora, epiphytic orchids utilize host trees—termed phorophytes—primarily as physical substrates for mechanical support without directly extracting water or metabolic nutrients from the host vascular tissue (Benzing, 1990) [4]. Moisture and essential inorganic nutrients are acquired from precipitation, atmospheric moisture, canopy drip, organic debris accumulation, and symbiotic associations with mycorrhizal fungi (Benzing, 1990; Zotz, 2016) [4, 2].

Consequently, the establishment, spatial distribution, and long-term survival of epiphytic orchids depend heavily on phorophyte structural traits and canopy microclimates (Johansson, 1974; Callaway *et al.*, 2002) [6, 5]. Bark physical properties, such as roughness, porosity, fissuring, and peeling rates, govern seed retention, germination success, root anchorage, and moisture conservation Callaway *et al.*, 2002 [5]; Adhikari *et al.*, 2020 [7]. Furthermore, canopy density directly modulates light availability, temperature fluctuations, and relative humidity gradients within the canopy strata (Benzing, 1990) [4]. Although many epiphytic orchids exhibit broad host ranges, host bias is frequently observed due to structural variations among phorophyte species (Wagner *et al.*, 2015) [8]. Recent studies across tropical and subtropical forests emphasize that phorophyte size, bark characteristics, and canopy cover play crucial roles in shaping epiphytic assemblages (Seshadri *et al.*, 2021; Timsina *et al.*, 2024) [9, 10].

Kanger Valley National Park (KVNP), situated in the Bastar region of Chhattisgarh, is a biodiversity hotspot characterized by a transition zone between *Shorea robusta* (Sal) and *Tectona grandis* (Teak) forests (Kotia *et al.*, 2013; Jalal and Jayanthi, 2018) [12, 11]. The park exhibits high environmental heterogeneity, encompassing tropical moist deciduous, tropical dry deciduous, semi-evergreen, and limestone riverine habitats. While floristic surveys have recorded orchid species within KVNP, detailed investigations examining host tree relationships, host family associations, and associated microhabitat parameters remain limited. Understanding

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these ecological associations is critical for orchid conservation, as habitat fragmentation and the selective removal of mature phorophytes pose significant threats to orchid populations (Swarts *et al.*, 2009) [13].

This study aimed to:

1. Document orchid species diversity and growth habits in KVN.
2. Identify and document associated host tree species and host families.
3. Evaluate orchid species richness across different phorophytes.
4. Characterize associated microhabitats, including forest types, bark texture, and canopy density.

2. Survey methodology and taxonomic identification

Field surveys were conducted across representative forest compartments and microhabitats within KVN during 2024–2025 and 2025–2026. A total of 19 orchid taxa were documented and assigned unique collection codes (CG-B-O1 to CG-B-O19). Plant growth habit (epiphytic vs. terrestrial) and growth pattern (monopodial vs. sympodial) were recorded for each species. Botanical identities were cross-referenced with standard regional floras and plant taxonomic databases (Kew Science, 2024) [14].

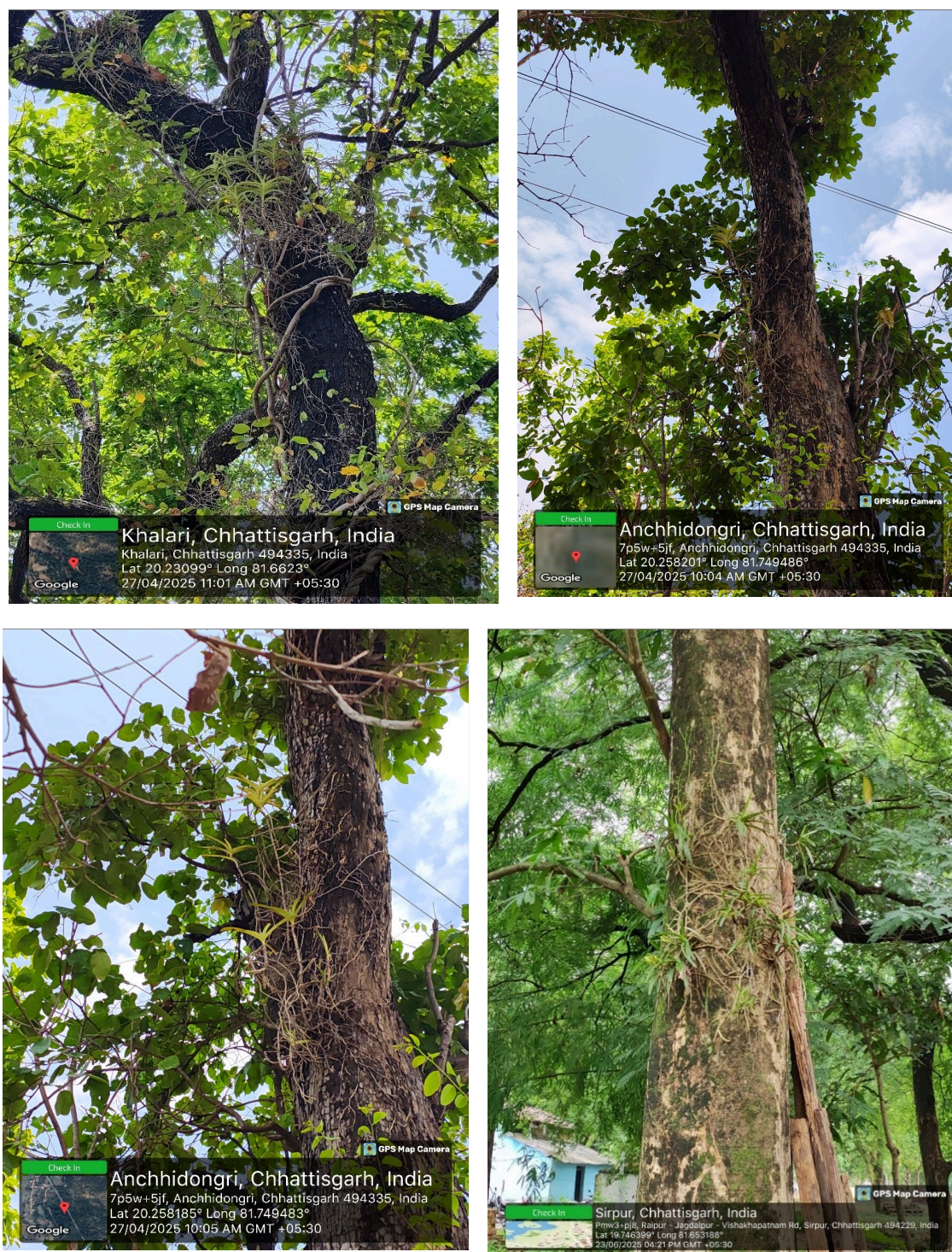


Figure 1. Epiphytic orchid (*Acampe praemorsa* / *Vanda* sp.) habit and root anchoring on deeply fissured phorophyte bark.



Figure 2. Microhabitat establishment of epiphytic orchids showing vegetative cluster anchoring (top) and flowering specimen *Rhynchostylis retusa* with pendulous inflorescences (bottom)



Figure 3. Canopy microhabitats and host tree structural traits supporting epiphytic orchid richness on mature phorophytes (including *Madhuca longifolia*)



Figure 4. Vertical distribution and host tree association of monopodial epiphytic orchids on a mature phorophyte trunk.

Table 1. Floristic Diversity, Growth Habit, and Documented Host Trees of Orchids in Kanger Valley National Park

S.no	Code	Species Name	Growth Habit	Growth Pattern	Associated Host Trees	Host Tree Families
1.	CG-B-01	<i>Acampe praemorsa</i>	Epiphytic	Monopodial	<i>Ficus religiosa</i> , <i>Mangifera indica</i> , <i>Shorea robusta</i> , <i>Schleichera oleosa</i> , <i>Tectona grandis</i> , <i>Diospyros melanoxylon</i> , <i>Haldina cordifolia</i>	Moraceae, Anacardiaceae, Dipterocarpaceae, Sapindaceae, Lamiaceae, Ebenaceae, Rubiaceae
2.	CG-B-02	<i>Aerides odorata</i>	Epiphytic	Monopodial	<i>Terminalia arjuna</i> , <i>Mangifera indica</i> , <i>Pterocarpus marsupium</i>	Combretaceae, Anacardiaceae, Fabaceae

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3.	CG-B-O3	<i>Aerides maculosa</i>	Epiphytic	Monopodial	<i>Mangifera indica</i> , <i>Syzygium cumini</i> , <i>Madhuca longifolia</i> , <i>Terminalia elliptica</i> , <i>Anogeissus latifolia</i>	Anacardiaceae, Myrtaceae, Sapotaceae, Combretaceae
4.	CG-B-O4	<i>Aerides multiflora</i>	Epiphytic	Monopodial	<i>Mangifera indica</i> , <i>Syzygium cumini</i> , <i>Shorea robusta</i> , <i>Schleichera oleosa</i> , <i>Diospyros melanoxylon</i>	Anacardiaceae, Myrtaceae, Dipterocarpaceae, Sapindaceae, Ebenaceae
5.	CG-B-O5	<i>Cymbidium aloifolium</i>	Epiphytic	Sympodial	<i>Ficus religiosa</i> , <i>Mangifera indica</i> , <i>Shorea robusta</i> , <i>Phyllanthus emblica</i>	Moraceae, Anacardiaceae, Dipterocarpaceae, Phyllanthaceae
6.	CG-B-O6	<i>Dendrobium aphyllum</i>	Epiphytic	Sympodial	<i>Ficus benghalensis</i> , <i>Terminalia elliptica</i> , <i>Shorea robusta</i> , <i>Terminalia chebula</i>	Moraceae, Combretaceae, Dipterocarpaceae
7.	CG-B-O7	<i>Dendrobium moschatum</i>	Epiphytic	Sympodial	<i>Shorea robusta</i> , <i>Terminalia bellirica</i>	Dipterocarpaceae, Combretaceae
8.	CG-B-O8	<i>Dendrobium transparens</i>	Epiphytic	Sympodial	<i>Terminalia tomentosa</i> , <i>Syzygium cumini</i> , <i>Schleichera oleosa</i> , <i>Diospyros melanoxylon</i>	Combretaceae, Myrtaceae, Sapindaceae, Ebenaceae
9.	CG-B-O9	<i>Dendrobium nobile</i>	Epiphytic	Sympodial	<i>Ficus benghalensis</i> , <i>Lagerstroemia parviflora</i> , <i>Bombax ceiba</i> , <i>Buchanania lanzan</i>	Moraceae, Lythraceae, Malvaceae, Anacardiaceae
10.	CG-B-O10	<i>Dendrobium herbaceum</i>	Epiphytic	Sympodial	<i>Ficus</i> spp., <i>Terminalia</i> spp., <i>Pongamia pinnata</i>	Moraceae, Combretaceae, Fabaceae
11.	CG-B-O11	<i>Geodorum densiflorum</i>	Terrestrial	Sympodial	None (Terrestrial / Forest Floor)	N/A
12.	CG-B-O12	<i>Luisia trichorhiza</i>	Epiphytic	Monopodial	<i>Azadirachta indica</i> , <i>Shorea robusta</i>	Meliaceae, Dipterocarpaceae
13.	CG-B-O13	<i>Oberonia falconeri</i>	Epiphytic	Sympodial	<i>Ficus</i> spp., <i>Syzygium</i> spp., <i>Mangifera indica</i> , <i>Madhuca longifolia</i> , <i>Shorea robusta</i>	Moraceae, Myrtaceae, Anacardiaceae, Sapotaceae, Dipterocarpaceae
14.	CG-B-O14	<i>Pelatantheria insectifera</i>	Epiphytic	Monopodial	<i>Mangifera indica</i> , <i>Ficus religiosa</i> , <i>Diospyros melanoxylon</i>	Anacardiaceae, Moraceae, Ebenaceae
15.	CG-B-O15	<i>Peristylus goodyeroides</i>	Terrestrial	Sympodial	None (Terrestrial / Forest Floor)	N/A
16.	CG-B-O16	<i>Pholidota imbricata</i>	Epiphytic	Sympodial	<i>Ficus</i> spp., <i>Terminalia</i> spp.	Moraceae, Combretaceae
17.	CG-B-O17	<i>Rhynchostylis retusa</i>	Epiphytic	Monopodial	<i>Mangifera indica</i> , <i>Syzygium cumini</i> , <i>Ficus religiosa</i> , <i>Diospyros melanoxylon</i>	Anacardiaceae, Myrtaceae, Moraceae, Ebenaceae
18.	CG-B-O18	<i>Vanda testacea</i>	Epiphytic	Monopodial	<i>Diospyros melanoxylon</i> , <i>Madhuca longifolia</i> , <i>Mangifera indica</i> , <i>Azadirachta indica</i>	Ebenaceae, Sapotaceae, Anacardiaceae, Meliaceae
19.	CG-B-O19	<i>Vanda tessellata</i>	Epiphytic	Monopodial	<i>Schleichera oleosa</i> , <i>Azadirachta indica</i> , <i>Acacia nilotica</i> , <i>Diospyros melanoxylon</i> , <i>Terminalia bellirica</i> , <i>Terminalia chebul</i>	Sapindaceae, Meliaceae, Fabaceae, Ebenaceae, Combretaceae



Figure 5. Branch-level microhabitat characteristics, canopy position, and root attachment patterns of epiphytic orchids.

Table 2. Microhabitat Characteristics and Relative Abundance of Orchids in Kanger Valley National Park

S.no	Code	Species Name	Forest Type in KVNP	Host Bark Texture	Canopy Density Class
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1.	CG-B-O1	<i>Acampe praemorsa</i>	Moist Deciduous	Rough	Dense
2.	CG-B-O2	<i>Aerides odorata</i>	Moist Deciduous	Rough	Moderate–Dense
3.	CG-B-O3	<i>Aerides maculosa</i>	Moist Deciduous	Rough	Dense
4.	CG-B-O4	<i>Aerides multiflora</i>	Moist Deciduous	Rough	Dense
5.	CG-B-O5	<i>Cymbidium aloifolium</i>	Semi-evergreen	Rough	Dense
6.	CG-B-O6	<i>Dendrobium aphyllum</i>	Moist Deciduous	Rough	Moderate
7.	CG-B-O7	<i>Dendrobium moschatum</i>	Moist Deciduous	Rough	Moderate
8.	CG-B-O8	<i>Dendrobium transparens</i>	Moist Deciduous	Rough	Moderate–Dense
9.	CG-B-O9	<i>Dendrobium nobile</i>	Semi-evergreen	Rough	Moderate
10.	CG-B-O10	<i>Dendrobium herbaceum</i>	Semi-evergreen	Rough	Moderate
11.	CG-B-O11	<i>Geodorum densiflorum</i>	Moist Deciduous	N/A (Forest Floor)	Moderate
12.	CG-B-O12	<i>Luisia trichorhiza</i>	Dry Deciduous	Rough	Open–Moderate
13.	CG-B-O13	<i>Oberonia falconeri</i>	Semi-evergreen	Rough	Dense
14.	CG-B-O14	<i>Pelatantheria insectifera</i>	Limestone Forest	Rough	Dense
15.	CG-B-O15	<i>Peristylus goodyeroides</i>	Moist Deciduous	N/A (Forest Floor)	Moderate
16.	CG-B-O16	<i>Pholidota imbricata</i>	Semi-evergreen	Rough	Moderate
17.	CG-B-O17	<i>Rhynchostylis retusa</i>	Moist Deciduous	Rough	Dense
18.	CG-B-O18	<i>Vanda testacea</i>	Dry Deciduous	Rough	Open–Moderate
19.	CG-B-O19	<i>Vanda tessellata</i>	Dry Deciduous	Rough	Open–Moderate

Table 3. Phorophyte Species Characteristics and Supported Epiphytic Orchid Richness

S.no	Botanical Name	Common Name	Family	Bark Morphology	Canopy Density Class	Leaf Habit	Associated Orchid Species Count
1.	<i>Mangifera indica</i>	Mango	Anacardiaceae	Rough, deeply fissured	Dense	Evergreen	9
2.	<i>Ficus religiosa</i>	Peepal	Moraceae	Rough, cracked	Dense	Deciduous	6
3.	<i>Terminalia spp.</i>	Saja / Arjun / Bahera	Combretaceae	Longitudinally fissured	Moderate	Deciduous	6
4.	<i>Syzygium cumini</i>	Jamun	Myrtaceae	Rough to flaky	Dense	Evergreen	5
5.	<i>Diospyros melanoxylon</i>	Tendu	Ebenaceae	Rough, checkered/fissured	Moderate	Deciduous	5
6.	<i>Shorea robusta</i>	Sal	Dipterocarpaceae	Thick, deeply fissured	Dense	Semi-deciduous	5
7.	<i>Schleichera oleosa</i>	Kusum	Sapindaceae	Rough, fissured	Moderate	Deciduous	4
8.	<i>Madhuca longifolia</i>	Mahua	Sapotaceae	Rough, cracked	Moderate	Evergreen	3
9.	<i>Azadirachta indica</i>	Neem	Meliaceae	Moderately rough	Open	Deciduous	3
10.	<i>Ficus benghalensis</i>	Banyan	Moraceae	Rough, spongy	Dense	Evergreen	2

Table 4. Orchid Species Richness Across Host Tree Families

S.NO	Host Family	Documented Host Species Count	Associated Orchid Species Count	Representative Host Species
1.	Moraceae	3	10	<i>Ficus religiosa</i> , <i>F. benghalensis</i> , <i>Ficus spp.</i>
2.	Anacardiaceae	2	10	<i>Mangifera indica</i> , <i>Buchanania lanzan</i>
3.	Combretaceae	5	10	<i>Terminalia arjuna</i> , <i>T. elliptica</i> , <i>T. bellirica</i> , <i>T. chebula</i> , <i>Anogeissus latifolia</i>
4.	Dipterocarpaceae	1	8	<i>Shorea robusta</i>
5.	Sapindaceae	1	6	<i>Schleichera oleosa</i>
6.	Myrtaceae	2	6	<i>Syzygium cumini</i> , <i>Syzygium spp.</i>
7.	Ebenaceae	1	6	<i>Diospyros melanoxylon</i>
8.	Sapotaceae	1	4	<i>Madhuca longifolia</i>

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9.	Fabaceae	3	3	<i>Pterocarpus marsupium</i> , <i>Pongamia pinnata</i> , <i>Acacia nilotica</i>
10.	Meliaceae	1	3	<i>Azadirachta indica</i>
11.	Lamiaceae	1	1	<i>Tectona grandis</i>
12.	Rubiaceae	1	1	<i>Haldina cordifolia</i>
13.	Phyllanthaceae	1	1	<i>Phyllanthus emblica</i>
14.	Lythraceae	1	1	<i>Lagerstroemia parviflora</i>

Table 5. Genus-wise Distribution and Growth Characteristics of Orchids

S.NO	Genus	Species Count	Habit Group	Growth Architecture	Representative Taxa
1.	Dendrobium	5	Epiphytic	Sympodial	<i>D. aphyllum</i> , <i>D. moschatum</i> , <i>D. transparens</i> , <i>D. nobile</i> , <i>D. herbaceum</i>
2.	Aerides	3	Epiphytic	Monopodial	<i>A. odorata</i> , <i>A. maculosa</i> , <i>A. multiflora</i>
3.	Vanda	2	Epiphytic	Monopodial	<i>V. testacea</i> , <i>V. tessellata</i>
4.	Acampe	1	Epiphytic	Monopodial	<i>A. praemorsa</i>
5.	Cymbidium	1	Epiphytic	Sympodial	<i>C. aloifolium</i>
6.	Geodorum	1	Terrestrial	Sympodial	<i>G. densiflorum</i>
7.	Luisia	1	Epiphytic	Monopodial	<i>L. trichorhiza</i>
8.	Oberonia	1	Epiphytic	Sympodial	<i>O. falconeri</i>
9.	Pelatantheria	1	Epiphytic	Monopodial	<i>P. insectifera</i>
10.	Peristylus	1	Terrestrial	Sympodial	<i>P. goodyeroides</i>
11.	Pholidota	1	Epiphytic	Sympodial	<i>P. imbricata</i>
12.	Rhynchostylis	1	Epiphytic	Monopodial	<i>R. retusa</i>

3. Results

Floristic Composition and Growth Habits

A total of 19 orchid species belonging to 12 genera were recorded from KVNP. Epiphytic orchids predominated, accounting for 17 species (89.5%), whereas terrestrial orchids were represented by only 2 species (10.5%: *Geodorum densiflorum* and *Peristylus goodyeroides*). Analysis of growth architectures indicated that sympodial growth habit was present in 11 species (57.9%), while 8 species (42.1%) exhibited a monopodial growth habit.

Orchid Guild Composition in KVNP:

Epiphytic (89.5%, $n = 17$) Sympodial (11 species total, 57.9%)

Terrestrial (10.5%, $n = 2$) Monopodial (8 species total, 42.1%)

Dendrobium was the most diverse genus with 5 species (*D. aphyllum*, *D. moschatum*, *D. transparens*, *D. nobile*, *D. herbaceum*), followed by *Aerides* (3 species: *A. odorata*, *A. maculosa*, *A. multiflora*), and *Vanda* (2 species: *V. testacea*, *V. tessellata*). The remaining 9 genera (*Acampe*, *Cymbidium*, *Geodorum*, *Luisia*, *Oberonia*, *Pelatantheria*, *Peristylus*, *Pholidota*, and *Rhynchostylis*) were represented by 1 species each.

3.1 Host tree diversity and associations

Epiphytic orchids were documented on 13 distinct host tree species spanning 11 families. Among individual host species, *Mangifera indica* supported the highest orchid diversity (9 species). *Ficus religiosa* and *Terminalia* spp. (*T. arjuna*, *T. elliptica*, *T. bellirica*, *T. chebula*, *T. tomentosa*) each supported 6 orchid species. *Syzygium cumini* and *Diospyros melanoxylon* were each associated with 5 orchid species, while *Shorea robusta* and *Schleichera oleosa* supported 5 and 4 orchid species, respectively.

At the host family level, Moraceae (*Ficus religiosa*, *Ficus benghalensis*, *Ficus* spp.), Anacardiaceae (*Mangifera indica*, *Buchanania lanzan*), and Combretaceae (*Terminalia* spp., *Anogeissus latifolia*) were associated with the highest overall orchid richness (10 orchid species each). Dipterocarpaceae (*Shorea robusta*) supported 8 species, while

Myrtaceae (*Syzygium cumini*) and Ebenaceae (*Diospyros melanoxylon*) supported 6 species each.

3.2 Microhabitat and bark characteristics

Phorophytes characterized by rough, deeply fissured, or spongy bark (e.g., *Mangifera indica*, *Terminalia elliptica*, *Ficus benghalensis*, *Shorea robusta*) consistently hosted greater orchid species richness than hosts with smoother or flaking bark. Moist deciduous and semi-evergreen forest patches under dense-to-moderate canopy cover harbored the majority of epiphytic taxa (e.g., *Acampe praemorsa*, *Aerides* spp., *Cymbidium aloifolium*, *Dendrobium* spp.). In contrast, species such as *Luisia trichorhiza*, *Vanda testacea*, and *Vanda tessellata* were recorded in dry deciduous zones under open-to-moderate canopy cover.

4. Discussion

The strong dominance of epiphytic orchids (89.5%) in KVNP reflects the ecological suitability of the park's moist deciduous and semi-evergreen canopy microhabitats. Epiphytic preference for phorophytes such as *Mangifera indica*, *Ficus* species, and *Terminalia* species is closely related to bark morphology and microclimate (Callaway *et al.*, 2002; Zotz, 2016) [5, 2]. Rough, fissured, and porous bark provides physical micro-crevices that trap orchid seeds, retain organic humus, support mycorrhizal fungal colonization, and offer superior root anchorage (Benzing, 1990; Callaway *et al.*, 2002) [4, 5]. Furthermore, mature trees of *Mangifera indica* and *Ficus* species possess large canopy spreads that generate stable, high-humidity microclimates, buffering epiphytes against desiccation during seasonal dry periods. The high orchid richness associated with host families Moraceae, Anacardiaceae, and Combretaceae highlights their importance as structural foundation species in KVNP. *Shorea robusta* (Sal), despite being a dominant climax canopy tree in KVNP, supported fewer epiphytic species (8 species) compared to *Mangifera indica* (9 species). This may be attributed to the periodic bark shedding and resinous exudates of Sal, which can impede long-term epiphytic establishment relative to stable, non-exfoliating barks Johansson, 1974 [6]; Gowland *et al.*, 2021) [15].

Variations in canopy openness also explain observed distribution patterns. Members of *Dendrobium*, *Oberonia*, and *Pholidota* were primarily restricted to dense, humid semi-evergreen and moist deciduous canopies, reflecting low drought tolerance. Conversely, *Vanda* species and *Luisia trichorhiza* occurred under open-to-moderate canopy conditions in dry deciduous patches. These taxa possess thick, coriaceous leaves, reduced surface-area-to-volume ratios, and well-developed velamen root structures adapted to withstand higher irradiances and lower relative humidity (Benzing, 1990; Zotz, 2016) [4, 2].

The two terrestrial species (*Geodorum densiflorum* and *Peristylus goodyeroides*) occupied forest floor microhabitats with rich organic leaf litter, demonstrating that orchid diversity in KVNP spans both canopy and terrestrial niches. Because epiphytic orchids rely directly on mature host trees, forest management in KVNP must prioritize the preservation of large, mature phorophytes (*Mangifera*, *Ficus*, *Terminalia*, *Syzygium*) to ensure the long-term conservation of wild orchid populations (Swarts and Dixon, 2009; Seshadri *et al.*, 2021) [13, 9].

Kanger Valley National Park (KVNP), situated in the Bastar region of Chhattisgarh, represents an ecologically important forest ecosystem characterized by diverse vegetation types and specialized habitats capable of supporting a rich orchid flora. Orchids exhibit remarkable ecological plasticity and occur in terrestrial as well as epiphytic forms. Epiphytic orchids utilize trees primarily as structural support and are influenced by host-tree characteristics, canopy structure, moisture availability and other microhabitat factors (Benzing, 1990; Dressler, 1993; Zotz, 2016) [4, 3, 2]. The present investigation was undertaken to document orchid diversity and assess the association of epiphytic orchids with their probable host trees and selected habitat characteristics in Kanger Valley National Park. A total of 19 orchid species were documented, comprising 17 epiphytic and two terrestrial species. The recorded epiphytic orchids included *Acampe praemorsa*, *Aerides odorata*, *Aerides maculosa*, *Aerides multiflora*, *Cymbidium aloifolium*, *Dendrobium aphyllum*, *D. moschatum*, *D. transparens*, *D. nobile*, *D. herbaceum*, *Luisia trichorhiza*, *Pelatantheria insectifera*, *Oberonia falconeri*, *Rhynchostylis retusa*, *Pholidota imbricata*, *Vanda testacea* and *Vanda tessellata*. The terrestrial orchids were *Geodorum densiflorum* and *Peristylus goodyeroides*. The epiphytic species showed associations with a diverse range of probable host trees, including *Mangifera indica*, *Ficus religiosa*, *Ficus* spp., *Syzygium cumini*, *Shorea robusta*, *Terminalia* spp., *Schleichera oleosa*, *Diospyros melanoxylon*, *Azadirachta indica* and *Madhuca longifolia*. Among the documented host trees, *Mangifera indica* was associated with the highest number of orchid species (9), followed by *Ficus religiosa* and *Terminalia* spp. (6 species each). At the host-family level, Moraceae and Anacardiaceae were associated with 10 orchid species each, followed by Combretaceae with eight species and Myrtaceae and Dipterocarpaceae with seven species each. Most epiphytic orchids were recorded in moist deciduous and semi-evergreen forest conditions and were associated predominantly with rough-barked host trees. Dense to moderate canopy conditions were associated with several orchid species, whereas *Luisia trichorhiza*, *Vanda testacea* and *Vanda tessellata* occurred under relatively open to moderate canopy conditions. The findings demonstrate that orchid occurrence in KVNP is associated with host-tree availability and forest structural characteristics. However, the present observations represent host association rather than statistically demonstrated host preference because quantitative data on total host availability were not available. Conservation of epiphytic orchids should therefore include protection of important host trees, mature forest structure, canopy heterogeneity and suitable microhabitats.

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6. Declaration of AI use

This manuscript was prepared through the combined contributions of all author(s), including contributions to the study design, data, content development, results, interpretation, and related scholarly work. The author(s) acknowledge the use of Grammarly and ChatGPT to assist with grammar checking, language refinement, reference formatting. These AI-assisted tools were not used as authors and did not replace the intellectual contributions or scholarly judgment of the author(s). All AI-assisted outputs, including content, references, and interpretations, were carefully reviewed, revised, verified, and approved by the author(s). The author(s) accept full responsibility for the accuracy, integrity, and final content of the manuscript.

7. Competing interests

Authors have declared that no competing interests exist

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