

CHAPTER 4

Orchid diversity on *Shorea robusta* C. F. Gaertn.: a conservation aspect

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Abstract

Host plants are a key factor for the conservation of epiphytic orchids. Addressing the host plant-orchid interaction is essential work for ecological restoration. In light of this, researchers have attempted to document the epiphytic orchids that grow on the trunk of *Shorea robusta* in Chhattisgarh, Odisha, and Jharkhand. In all three of the above states, *S. robusta* is a key tree species. The results showed that *S. robusta* hosts about 29 epiphytic orchids from 17 genera. Results show the importance of *S. robusta* and other host tree species in the conservation of epiphytic orchids in India.

Keywords: Sal tree, host plant, epiphytic orchids, conservation

Introduction

Orchid species provide numerous ecological services essential for maintaining healthy ecosystems. They are also the source of medicinal agents (Kumar and Kumar, 2020; Kumar et al., 2021; Chakraborty et al., 2022; Kumar, 2022; Mety et al., 2022; Kumar, 2023). They exhibit a high degree of diversity among flowering plants. Researchers are continuously adding new species in the science of orchids (Kumar et al., 2018; Devi et al., 2018; Devi et al., 2019a; 2019b; Devi et al., 2020). As pollination specialists, orchids attract and support diverse pollinators, including

bees, wasps, moths, and bats, facilitating gene flow and seed set in other plant species (Brzosko et al., 2021). Epiphytic orchids create complex microhabitats, sheltering insects, amphibians, and reptiles, while their roots stabilize tree bark and prevent erosion (Pecoraro et al., 2021). Some orchids form mycorrhizal relationships with fungi, enhancing soil fertility and facilitating nutrient cycling. Additionally, orchids contribute to pest control, with certain species attracting beneficial insects that prey on harmful pests (Leng et al., 2024). They also play a crucial role in seed dispersal. Furthermore, orchids aid in climate regulation by storing carbon in their roots, stems, and leaves (Karremans et al., 2023). By maintaining ecosystem balance, supporting biodiversity, and providing habitat for other organisms, orchids underscore the intricate interconnectedness of ecosystems and emphasize the importance of conserving these ecologically valuable plants (Swain et al., 2019). Epiphytic orchids play a crucial role in tropical ecosystems, providing numerous ecological, economic, and cultural benefits. As habitat creators, they support complex communities of insects, amphibians, and reptiles, while their unique relationship with pollinators and seed dispersers facilitates gene flow and species diversity (Kumar et al., 2022a). Economically, they drive the multi-billion-dollar horticulture industry and provide medicinal properties. Culturally, they hold spiritual significance and inspire artistic expression. Furthermore, epiphytic orchids serve as indicator species, highlighting ecosystem health and informing conservation efforts (Phillips et al., 2020). With many species threatened or endangered, protecting epiphytic orchid habitats preserves entire ecosystems, underscoring the importance of conserving these ecologically valuable plants. Their intricate adaptations and symbiotic relationships make epiphytic orchids a fascinating and vital component of tropical biodiversity (Kumar et al., 2022b). Epiphytic orchids, comprising diverse species, thrive on other plants, known as host plants or phorophytes, without deriving nutrients from them. These fascinating relationships involve intricate adaptations, allowing orchids to exploit microclimates and acquire essential resources. Host plants provide structural support, create conducive microenvironments, and influence orchid diversity, distribution, and ecology (Kumar et al., 2022c). This article delves into the world of host plants, exploring their characteristics, roles, and interactions with epiphytic orchids, highlighting the complex interplay between these symbiotic partners (Li et

al., 2021). Understanding the host trees of orchid species is crucial for effective conservation, sustainable management, and ecological research. Host trees provide essential resources such as structural support, microclimate regulation, and nutrient availability, influencing orchid distribution, diversity, and abundance (Besi et al., 2023). Knowing the specific host tree preferences of orchid species informs habitat preservation and restoration efforts, enabling targeted protection of critical ecosystems (Kumar and Thorat, 2018; Sharma et al., 2024b). Additionally, identifying host trees helps predict orchid population dynamics, pollination patterns, and seed dispersal mechanisms, shedding light on complex ecological interactions. Furthermore, recognizing host tree-orchid relationships facilitates sustainable orchid harvesting and cultivation practices, reducing overexploitation and habitat destruction. By understanding these symbiotic relationships, researchers, conservationists, and horticulturists can develop informed strategies to protect and preserve orchid diversity, ensuring the long-term health of ecosystems and the persistence of these iconic plants (Sharma et al., 2024a). Researchers have documented the epiphytic orchids growing on the trunk of *Shorea robusta* in Chhattisgarh, Jharkhand, and Odisha states, recognizing the significance of host trees for these orchids. *Shorea robusta* is a key species in the forest areas of these three states. Therefore, this study serves as a baseline for developing a conservation plan for epiphytic orchids, specifically targeting the Sal (*Shorea robusta*) forest.

Methodology

Between 2009 and 2024, during various floristic and academic survey works in Jamtara of Jharkhand state, Baster of Chhattisgarh state, and Sundargarh & Mayurbhanj of Odisha state, India, the authors observed epiphytic orchids on *Shorea robusta* and made notes in the field. Photographs were taken and identified by the authors and presented in the result section (Kumar et al., 2021; Kumar et al., 2022b; Mishra et al., 2023).

Results and discussion

Table 1 shows 29 orchids belonging to the 17 genera. The enumerated genera are *Acampe*, *Aerides*, *Bulbophyllum*, *Chiloschista*, *Cymbidium*, *Dendrobium*,

Gastrochilus, *Liparis*, *Luisia*, *Oberonia*, *Papilionanthe*, *Pelatantheria*, *Rhynchostylis*, *Smitinandia* and *Vanda* (Table 1). It was noticed that most common orchids on *Shorea robusta* are *Vanda tessellata*, *Vanda Testacea*, *Bulbophyllum crassipes*, *Cymbidium aloifolium*, *Dendrobium herbaceum*, *Luisia zeylanica*, *Pelatantheria insectifera* and *Rhynchostylis retusa*. Out of 29, twenty-eight orchids are observed on *Shorea robusta* in Odisha, seven orchids in Chhattisgarh and six orchids in Jharkhand (Table 1).

Table 1: Orchid diversity on *Shorea robusta* in India

Botanical name	Common name	Observation site(s)	State(s)
<i>Acampe carinata</i>	Small warty acampe	Jamtara	Jharkhand
<i>Acampe ochracea</i>	Yellow acampe	Mayurbhanj	Odisha
<i>Acampe praemorsa</i>	Brittle orchid	Sundargarh	Odisha
<i>Acampe rigida</i>	Stiff acampe	Mayurbhanj	Odisha
<i>Aerides multiflora</i>	Many Flowered Fox Brush Orchid	Mayurbhanj	Odisha (Figure 3)
<i>Aerides odorata</i>	Hooked blossom orchid	Sundargarh	Odisha (Figure 1)
<i>Bulbophyllum careyanum</i>	Carey's bulbophyllum	Mayurbhanj	Odisha
<i>Bulbophyllum crassipes</i>	Thick-spurred bulbophyllum	Mayurbhanj	Odisha
<i>Chiloschista parishii</i>	Parish's chiloschista	Mayurbhanj	Odisha
<i>Cymbidium aloifolium</i>	Aloe-leafed cymbidium	Mayurbhanj, Bastar	Odisha; Chhattisgarh
<i>Cymbidium bicolor</i>	Two-colored cymbidium	Mayurbhanj	Odisha
<i>Dendrobium aphyllum</i>	Hooded orchid	Mayurbhanj	Odisha
<i>Dendrobium crepidatum</i>	Shoe-lipped dendrobium	Mayurbhanj	Odisha

<i>Dendrobium herbaceum</i>	Grassy dendrobium	Mayurbhanj	Odisha
<i>Dendrobium moschatum</i>	Musky-smelling dendrobium	Mayurbhanj	Odisha
<i>Dendrobium transparens</i>	Translucent dendrobium	Mayurbhanj	Odisha
<i>Gastrochilus inconspicuous</i>	Tiny belly-lip orchid	Mayurbhanj	Odisha
<i>Liparis resupinata</i>	Resupinate liparis	Mayurbhanj	Odisha
<i>Luisia filiformis</i>	Thread-shaped luisia	Sundargarh	Odisha
<i>Luisia trichorrhiza</i>	Hairy root orchid	Sundargarh	Odisha
<i>Luisia zeylanica</i>	Cylindrical-leaf luisia	Sundargarh, Bastar	Odisha; Chhattisgarh
<i>Oberonia ensiformis</i>	Sword-leaf oberonia	Sundargarh, Jamtara	Odisha; Jharkhand
<i>Oberonia falconeri</i>	Limey oberonia	Sundargarh, Bastar	Odisha; Chhattisgarh
<i>Papilionanthe teres</i>	Parrot flower	Sundargarh	Odisha
<i>Pelatantheria insectifera</i>	Insect-bearing pelatanthera	Sundargarh, Bastar	Odisha; Chhattisgarh
<i>Rhynchostylis retusa</i>	Foxtail orchid	Sundargarh, Jamtara	Odisha; Jharkhand (Figure 2)
<i>Smitinandia micrantha</i>	Small flowered smitinandia	Sundargarh, Jamtara, Bastar	Odisha; Jharkhand; Chhattisgarh
<i>Vanda tessellata</i>	Checkered vanda	Sundargarh, Jamtara, Bastar	Odisha; Jharkhand; Chhattisgarh
<i>Vanda testacea</i>	Small flowered vanda	Sundargarh; Jamtara, Bastar	Odisha; Jharkhand; Chhattisgarh

Few researchers have documented the host trees of epiphytic orchids. Wangdi, (2016) recorded 33 host plants for *Cymbidium* species. Angel et al., (2019) reported 202 colonies of *Lophiaris cosymbephorum*, 25 of *Oncidium sphacelatum* and eight

of *Catasetum integerrimum*, distributed on 11 species of phorophytes. Kumar and Kumar, (2021) reported a good population of *Luisia zeylanica* on *Shorea robusta*. Martinez et al. (2022) recorded 63 host trees of epiphytic orchids in Mexico.



Figure 1: *Aerides odorata* on *Shorea robusta*

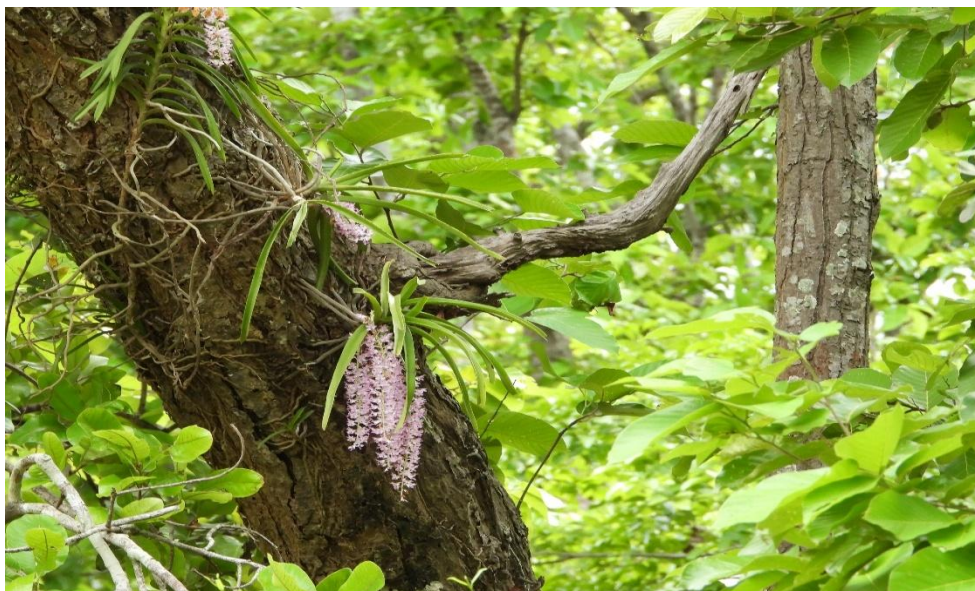


Figure 2: *Rhynchostylis retusa* on *Shorea robusta*



Figure 3: *Aerides multiflora* on *Shorea robusta*

Conclusion

In conclusion, the diversity of 29 orchid species from 17 genera recorded on *Shorea robusta* in India underscores the significance of this tree species as a habitat for epiphytic orchids. The geographical distribution of these orchids across Odisha, Jharkhand, and Chhattisgarh highlights the importance of regional conservation efforts. This study emphasizes the need for habitat preservation, sustainable forest management, and ex-situ conservation programs to protect these ecologically valuable plants. Furthermore, it highlights the potential for future research on orchid-host tree relationships, pollination, and seed dispersal mechanisms, ultimately informing effective conservation strategies for these iconic plants and the ecosystems they inhabit.

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