

## Diversity of Orchids in Nagarahole Tiger Reserve, Kodagu – An updated checklist

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### ABSTRACT

*Orchidaceae* is the second largest family under the Kingdom Plantae with over 31,000 known species. Orchids found in diverse environment. Nagarahole Tiger Reserve, part of Nilgiri Biosphere reserve, extends from the foothills of Brahmagiri Wildlife Sanctuary, situated in Kodagu and Mysore district. The current study focused on documenting the orchids in Kodagu region of Nagarahole Tiger Reserve viz. Kahalla, Anechowkur and Nagarahole forest ranges. The study carried out a non-invasive opportunistic survey from August 2025 – April 2026 recording 26 species of orchids including 18 epiphytic and 8 terrestrial species. The highest number of species composition recorded in *Dendrobium Sw* and *Oberonia Lindl* with four species each and two species under *Eulophia R.Br*. Current survey documented 26 species including eight new species of orchids in Nagarahole Tiger Reserve, raising the count from 46 to 54 species. Further enumeration is required for complete documentation of Orchid flora in Nagarahole Tiger Reserve.

**Keywords:** Nagarahole Tiger Reserve; Orchidaceae; monocotyledons; epiphytic; terrestrial.

### Introduction

Orchids are Angiosperm, perennial, monocotyledonous, non-endospermous epiphytic, terrestrial or mycoheterotrophic plants belonging to family Orchidaceae. Orchids are widely distributed across tropics, subtropics and temperate regions of Earth. According to Plants of World online, orchids belongs to second largest family in plant kingdom with over 31,468 species trailing by family Asteraceae (34,557 species). While, India, one of 17 mega bio-diverse country, contribute 155 genera and 1,256 to 1,331 species, out of which 404 species are endemic to India [1][2] and about 390 species are reported in Peninsular India [3]. Among 404 endemic species, 130 species are endemic to Peninsular India and 123 species to Western Ghats [4]. Higher proportions of orchids are concentrated in North East India accounting over 800 species followed by 375 species in Western Ghats [5]. Among 28 states and 8 union territories, Arunachal Pradesh recorded for highest number of orchids with 624 species, followed by 557 in Sikkim and 352 in Meghalaya [3]. Karnataka comprises a great diversity of orchids. Karnataka hosts over 197 species and varieties of orchids [6]. The recent explorations in Koppa Taluk, Chikkamagaluru district recording 97 species of orchids belonging to 40 genera [7].

Sharavathi valley lion tailed macaque sanctuary; preferred habitat for the endangered Lion Tailed Macaque houses a great population of Orchids with 94 species [8] including 57 epiphytic, 34 terrestrial and 3 mycoheterotrophic species.

Kodagu, one of the smallest district in Karnataka, known for rich biodiversity and endemism has over 60 species of orchids [9][10]. The protected areas across India pose high degree of opportunities for documentation and behavioral studies of floral and faunal resources, contributing for understanding and management of biological diversity.

### Materials and Methodology

#### Study area:

Nagarahole Tiger Reserve formerly known as Rajiv Gandhi National Park, a part of Nilgiri Biosphere Reserve, situated between 11°51' - 12°26' N and 75°54' - 76°18' E. The name "Nagarahole" is derived from Kannada name "Nagara" meaning Snake and "hole" refers to river, a tributary of river Taraka that joins Kabini.

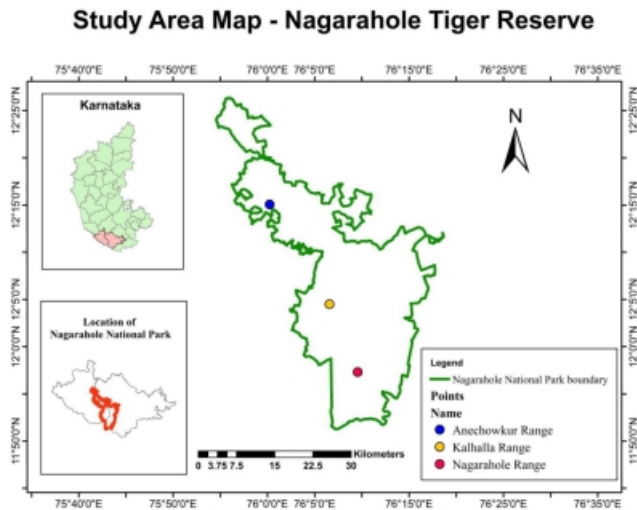


Fig 1: Map depicting sampling ranges in Nagarahole Tiger Reserve

Nagarahole National Park first established as Wildlife Sanctuary in 1955. In 1988, the government upgraded to National Park under the Wildlife (protection) Act 1972 further, in 1999, declared it as Nagarahole Tiger Reserve. It is located in Mysore and Kodagu district spanning 843.96 sq. km. Park comprises of eight ranges namely Kahalla, Anechowkur and Nagarahole (Kodagu) and Antarasanthe, DB Kuppe, Metikuppe, Hunsur wildlife range and Veeranahosalli. Figure 1 depicts the sampling location in Nagarahole Tiger reserve concentrated to Kodagu region with an area of 357.36 sq. km (Kahalla -111.19 sq km, Anechowkur -142.17 sq. km and Nagarahole - 104 sq. km (Source – Karnataka Forest Department)). The park bordered by Wayanad Wildlife Sanctuary in southwest, foothills of Brahmagiri Wildlife Sanctuary in west, and Kabini Reservoir in the southeast, further connecting Bandipur Tiger Reserve [11]. Elevation profile ranges from 701 masl in Kabiniriver bed to 959 m asl at Masalbetta. Major River Kabini, Lakshmana Theertha, and Taraka drains national park along with numerous perennial and seasonal streams. Park experiences tropical climatic conditions with temperatures ranging between 14 to 33°C. Major proportion of rainfall occurs during the Southwest monsoon with the average annual rainfall ranging from 1270 mm in the east to 1778 mm in the west [12]. Major forest types in Nagarahole Tiger reserve include moist deciduous, dry deciduous, scrub, semi evergreen vegetation, and Hadlus – the marshy areas occur in low-lying patches, with grassy cover and scattered tree cover (Fig 2).



Fig 2: A. Teak Plantation, B. Hadlu in Karmad section, C. Lakshmana Theertha river, D. Road connecting between Nagarahole and Nanachi

Data collection: Preliminary studies on orchids conducted in three ranges of Nagarahole Tiger Reserve viz. Kahalla, Anechowkur and Nagarahole of Coorg district. Studies were conducted from August 2025 to April 2026 via opportunistic surveys for documentation of orchids along safari road, D-line and transact lines. Whenever orchids were encountered during field surveys, they were identified to the species level and photographed. Intensive and repeated surveys were employed in the areas with a high degree of orchid diversity. Those orchids that were not able to be identified during non-flowering season (s), reexamined for confirmation once they had flowered with the help of literature and orchid experts.

## Results

Opportunistic survey carried out in three ranges of Nagarahole Tiger Reserve viz. Kahalla, Anechowkur and Nagarahole resulted in documentation of 26 species (Table 1 and figure 3) of Orchids including 18 epiphytic and 8 terrestrial species. The highest number of species recorded in Kahalla (22) range followed by Nagarahole (18) and Anechowkur (12). Variation in abundance of orchids among three ranges is related to intensity of exploration. Among 26 species, eight species form a first time record in Nagarahole Tiger reserve – *Chiloschista glandulosa* Blatt. & McCann, *Cottonia peduncularis* (Lindl.) Rchb.f, *Dendrobium crispum* Dalzell, *Eulophia nuda* Lindl, *Liparis deflexa* Hook.f., *Oberonia proudlockii* King & Pantl, *Odisha cleistantha* S.Misra and *Zeuxine gracilis* (Breda) Blume. Kalkere (Kahalla range, Murkal section) and Hunsekatte (Nagarahole range, Nagarahole section) harbored higher proportion of orchids. The grasslands in Kalkere and surrounding areas harbor higher proportion of both epiphytic and terrestrial orchids. Highest number of species composition recorded in *Dendrobium* Sw. and *Oberonia* Lindl. with four species each and two species under *Eulophia* R.Br and other 16 genera contributed with one species each.

Table 1: Orchid diversity in Nagarahole Tiger Reserve (Kodagu district)

| Sl. no | Species name  | Range   |            |            | Habitat | Flowering season     |
|--------|---|---------|------------|------------|---------|----------------------|
|        |   | Kahalla | Anechowkur | Nagarahole |         |                      |
| 1      | <i>Acampe praemorsa</i> (Roxb.) Blatt. & McCann                       | +       | -          | +          | E.      | March - April        |
| 2      | <i>Aerides ringens</i> (Lindl.) C.E.C.Fisch                           | +       | +          | +          | E.      | February - May       |
| 3*     | <i>Chiloschista glandulosa</i> Blatt. & McCann                        | +       | -          | -          | E.      | January – February   |
| 4      | <i>Coelogyne imbricata</i> (Hook.) Rchb.f                             | +       | +          | +          | E.      | January - March      |
| 5*     | <i>Cotonia peduncularis</i> (Lindl.) Rchb.f                           | +       | +          | +          | E.      | March - May          |
| 6      | <i>Crepidium versicolor</i> (Lindl.) Sushil K.Singh, Agrawala & Jalal | +       | -          | -          | T.      | May - July           |
| 7      | <i>Cymbidium bicolor</i> Lindl  | +       | +          | +          | E.      | April - May          |
| 8*     | <i>Dendrobium crispum</i> Dalzell                                     | +       | +          | +          | E.      | November - January   |
| 9      | <i>Dendrobium herbaceum</i> Lindl                                     | +       | +          | +          | E.      | January - March      |
| 10     | <i>Dendrobium macrostachyum</i> Lindl                                 | +       | -          | -          | E.      | April -May           |
| 11     | <i>Dendrobium ovatum</i> (L.) Kraenzl.                                | +       | -          | +          | E.      | December - March     |
| 12*    | <i>Eulophia nuda</i> Lindl  | +       | -          | -          | T.      | March - May          |
| 13     | <i>Eulophia picta</i> (R.Br.) Ormerod                                 | +       | -          | +          | T.      | May - June           |
| 14     | <i>Habenaria marginata</i> Colebr                                     | +       | -          | +          | T.      | August - September   |
| 15*    | <i>Liparis deflexa</i> Hook.f.  | +       | -          | -          | T.      | July - August        |
| 16     | <i>Luisia zeylanica</i> Lindl   | +       | +          | +          | E.      | January - May        |
| 17     | <i>Oberonia brunoniana</i> Wight                                      | -       | +          | +          | E.      | October - December   |
| 18     | <i>Oberonia ensiformis</i> (Sm.) Lindl                                | -       | -          | -          | E.      | August - October     |
| 19     | <i>Oberonia mucronata</i> (D.Don) Ormerod & Seidenf                   | +       | +          | +          | E.      | September – November |
| 20*    | <i>Oberonia proudlockii</i> King & Pantl                              | +       | -          | -          | E.      | December – February  |
| 21*    | <i>Odisha cleistantha</i> S.Misra                                     | +       | -          | -          | T.      | September - October  |
| 22     | <i>Pecteilis gigantea</i> (Sm.) Raf                                   | -       | -          | +          | T.      | September - October  |
| 23     | <i>Polystachya concreta</i> (Jacq.) Garay & H.R.Sweet                 | +       | +          | +          | E.      | July - August        |
| 24     | <i>Rhynchostylis retusa</i> (L.) Blume                                | +       | +          | +          | E.      | June – September     |
| 25     | <i>Vanda testacea</i> (Lindl.) Rchb.f                                 | +       | +          | +          | E.      | March - April        |
| 26*    | <i>Zeuxine gracilis</i> (Breda) Blume                                 | -       | -          | +          | T.      | January - February   |

\*New report to Nagarahole Tiger Reserve; E. - Epiphytic; T. - Terrestrial

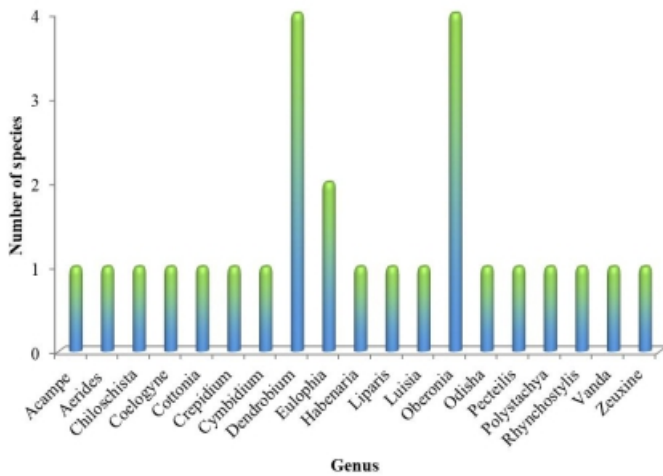


Fig 3: Diversity of Orchids in Nagarahole Tiger Reserve, Kodagu

**Discussion**

Karnataka is home for over 197 species of orchids [1] with majority of them found in South Western Ghats of Karnataka. The most recent exploration in Bhadra Tiger Reserve [13] resulted in documentation of over 125 species. The floral survey of orchids in Kali Tiger Reserve of Uttar Kannada in district revealed 91 species including 50 epiphytes, 36 terrestrial, 3 mycoheterotrophs and 2 species with shared habitats [14]. Tiger reserves are great biological treasure. The new species *Zeuxine seetharamii* Betageri & Kotresha, was reported at Anshi National Park, in Kali [15].

Tiger reserves are great biological treasure. Family Orchidaceae thrives in myriad of habitats from tropical to temperate climate. An orchid survey at Biligiri Rangaswamy Temple Tiger Reserve's undulating terrain and diverse vegetation [16] resulted in recording of 95 species of orchids in of Biligiri Rangaswamy Temple Tiger Reserve, with a rediscovery of *Vanilla walkerae* after 110 years and the first report of *Habenaria sahyadrica* in Karnataka. About 25 terrestrial orchid species belonging to 13 genera were reported in Sharavati River Valley of Shivamogga district [17]. Over two decade old studies [9][10] documented over 60 species of orchids in Kodagu district. The botanical hotspot Pushpagiri Wildlife Sanctuary in Kodagu district harbors more than 69 species [18]. The Nagarahole Tiger Reserve shares the boundary with Nilgiri Biosphere reserve, the first biosphere reserve established in India, which is home for over 240 species of orchids [19] under 72 genera. A floristic study in Nagarahole Tiger Reserve [20] documented 1337 species of flowering plants under 754 genera including 46 species of orchids in entire Tiger reserve. According to this study, Orchidaceae stands as fifth most dominant family with 13 endemic species. Current study, in contrast to previous one, concentrated only to Kodagu region viz. Kahalla, Anechowkur and Nagarahole ranges documented 26 species of orchids including eight new species raising the count to 54 species. All 26 species are flowers and variation (if observed) is represented in figures 4, 5 and 6.

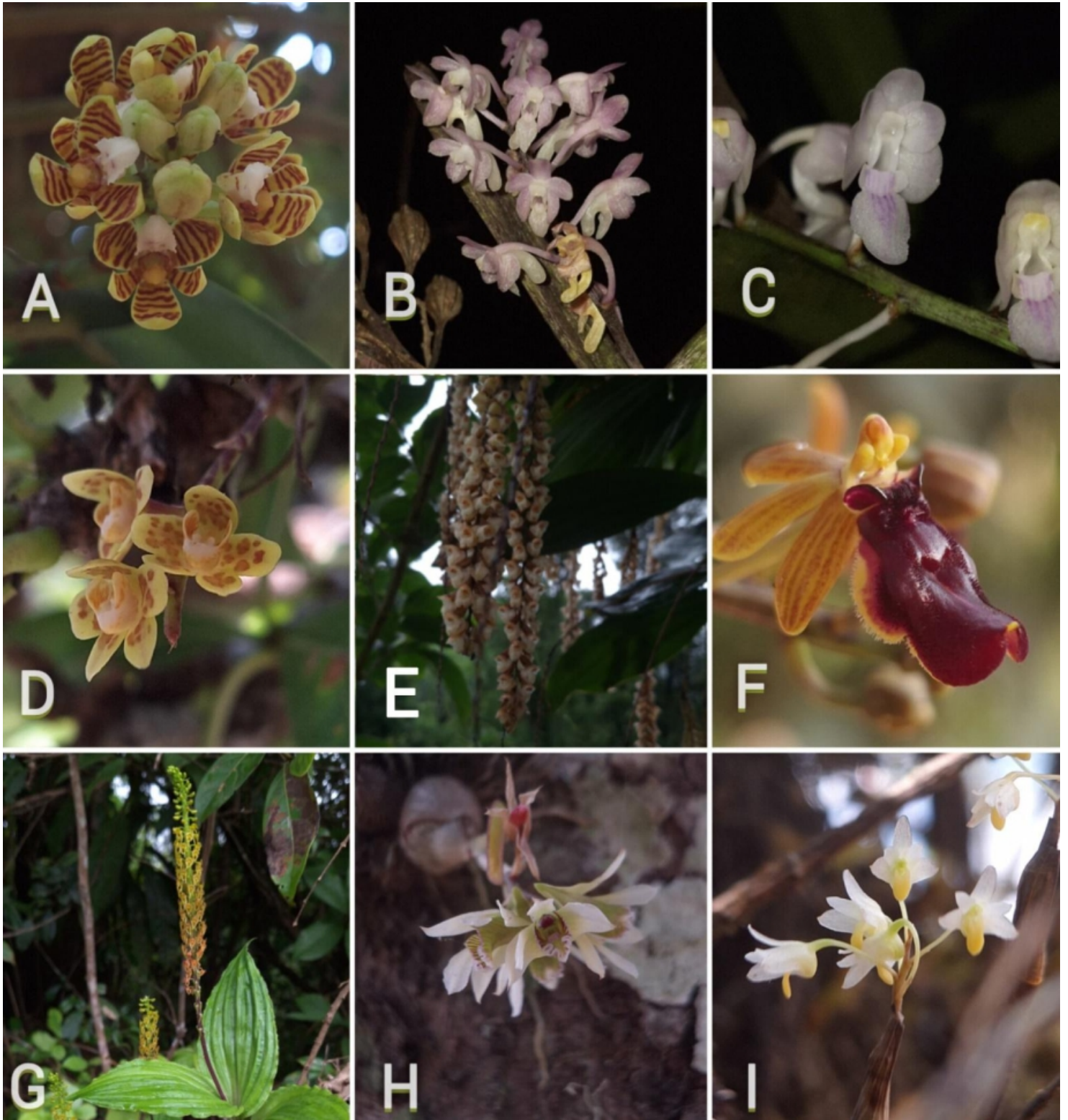


Fig 4: Orchids of Nagarahole Tiger Reserve: A. *Acampe praemorsa*, B & C. *Aerides ringens*, D. *Chiloschista glandulosa*, E. *Coelogyne imbricate*, F. *Cottonia peduncularis*, G. *Crepidium versicolor*, H. *Dendrobium crispum*, I. *Dendrobium herbaceum*



Fig 5: Orchids of Nagarahole Tiger Reserve: J. *Cymbidium bicolor*, K. *Dendrobium ovatum*, L. *Dendrobium macrostachyum*, M, N & O. *Eulophianuda*, P. *Eulophia picta*, Q. *Liparis deflexa*, R. *Habenaria marginata*



Fig 6: Orchids of Nagarahole Tiger Reserve: S, T & U. *Luisia zeylanica*, V. *Oberonia brunoniana*, W. *Oberonia ensiformis* (Image courtesy: Sachin Nimbalker), X. *Oberonia mucronata*, Y. *Oberonia proudlockii*, Z. *Odisha cleistantha*, A'. *Pecteilis gigantea*



Fig 7: Orchids of Nagarahole Tiger Reserve: B'. *Polystachya concreta*, C'. *Rhynchostylis retusa*, D'. *Vanda testacea*, E'. *Zeuxine gracilis*

### Conclusion

The Nagarahole Tiger Reserve hosts significant amount floral and faunal resources. The current study carried out in three ranges of Nagarahole Tiger Reserve in Kodagu (Kahalla, Anechowkur and Nagarahole) district yielded 26 species of orchids with 18 epiphytic and 8 terrestrials. Among 26 species, current study yielded an addition of eight species to the existing flora of Nagarahole Tiger Reserve raising the total to 52 from earlier 46. New addition to the flora of Nagarahole Tiger Reserve indicates more explorations are required in future for documentation.

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**Conflict of interest:** The authors have no conflict between each other.

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