Epiphytic Orchid species diversity of Mainpat, Surguja, Chhattisgarh, India

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Abstract:

The Mainpat lies between latitudes 22 ^{0} 81'9''N and longitudes 83 ^{0} 28'2"E, spreading in an area of 407 km^2, with an altitude range of 558.15 m to 1085 m above sea level. Extensive field surveys of Orchid surveys were conducted from January 2022–November 2022 in various parts of the Mainpat. In this study, 8 genera and 14 epiphytic orchid species were identified in the Mainpat. region of Surguja District, Chhattisgarh, India. The study represents the taxonomy-based study of epiphytic orchid species diversity and distribution throughout the region with botanical names, place of collection (occurrence), altitudinal range, associate host range, and flowering.

Keywords: Epiphytic orchid species, Diversity, Mainpat-Surguja district, Chhattisgarh, India.

Introduction:

Orchids are nature's most fascinating, gorgeous and extravagant group of flowering plants.Orchids belong to the family Orchidaceae and are considered to be the most highly evolved in floral specialization and diversified form among the monocotyledons.In India, Orchids form 9% of our flora and are the largest and most highly advanced botanical family of flowering plants.(Yonzone and Kamran, 2008,2011,).[31,32]

Orchids are widely distributed throughout the world from the tropics to high alpine and are not found in a few isolated islands and Antarctica. There are concentrated in three areas, notably tropical America, Indo-Malayan, and the Eastern Himalayas. About 73% of species are epiphytes and these make a significant contribution to the epiphytic plant communities in tropical forests. India's Orchids are found from sea level to the snow-covered alpine regions but prevailing climatic conditions vary in the numbers of orchids in a different areas. (Jalal J.S.2012)[12].Orchidaceae is almost globally distributed comprising around 30000 - 35000 species in approximately 750 - 800 genera present worldwide. In India, it is represented by 1263 taxa in 155 genera (Singh et al.,2019) of which 52 taxa under 21 genera are found distributed in Chhattisgarh. (Singh et al.2019)[33].
Mainpat Block is situated on the southern part of the Surguja district of Chhattisgarh and is bounded in the west by Lakhanpur and Ambikapur Blocks, in the east by Sitapur Block, in the north by Batauli Block and in the south by Raigarh district. The block area lies between latitudes 22^0 81'9''N and longitudes 83^{0}28'2"E .Mainpat flanked Surguja District. the altitude range from 558.15 m to 1085 MSL. The geographical extension of the study area is 407km^2 representing around 12.94 % of the district's geographical area. The vegetation of Mainpat a mixed deciduous type with a temperature between 25^0- 30^0 annual rainfall of 120 mm. Mainpat is called "Shimla of Chhattisgarh." The altitudinal variations of the district range from 500 at the Mainpat foothill area to 1087 m at the Mainpat plateau with a physiographic contrast between the plain and the mountainous regions Administrative map of the block is shown in Fig.1.

The region is considered to be rich in Orchid resources which is a part of one of the cool climatic regions of the Surguja,Chhattisgarh.The abundance of Orchid resources in this region was studied by Tiwari and Maheshwari almost 53years back (Tiwari and Maheshwari, 1963). Later other workers studied (Kotia etal., 2010, 2013 (KVNP, Baster); Tiwari A.P. 2015 (Matringa); Sharma et al., 2017,(Maheshpur, Udaipur). In the present investigation, a tabulated enumeration of Epiphytic Orchid Species of Mainpat,Surguja,Chhattisgarh of India is presented.

Materials and Methods

The intensive field survey works were carried out from January 2022 - November 2022. The Orchid specimens for the study were collected from extensive field studies in all parts of the Mainpat block. Collected specimens were made into standard mounted herbarium sheets following the procedure of (Jain and Rao, 1977)[2]. The authors have done photograph some Orchid species from the region. The relevant data from the field notebooks were then transferred to the labels of the herbarium sheets. Normally, 2-3 specimens of each species in the flowering or fruiting stage were collected and life form photographs were prepared. The specimens were identified and described with the help of Flora of British India (Hooker, 1872- 1897)[3] ; Orchids of Bombay (Santapau, H., & Kapadia, Z. 1966)[25]; Flora of Madhya Pradesh, (Singh N.P., Khanna K.K. Mudgal V. and Dixit R.D., 2001)[209]; Orchids of India (Bose and Bhattacharya, 1999)[1]; The Orchids of the Sikkim-Himalaya (King G and Pantling R, 1898)[16] ; Orchid Flora of Arunachal Pradesh. Dehra Dun: (Chowdhery HJ, 1984)[2] ; Floristic Diversity of Chhattisgarh (Angiosperms.), Khanna,K.K. et al.,(2005) [15];Websites of The Plant List (www.theplantlist.org.) were consulted for updating species names. Finally, all the Voucher specimens were deposited in the Herbarium of the Department of Botany Guru Ghasidas Vishwavidyalaya (A Central University) Bilaspur Chhattisgarh. All the species were arranged systematically as per their altitude and GPS coordination-wise distribution in the area with botanical names, habitats and local distribution.Nomenclature has been checked with the Orchids Flora of Bombay.

Result

During recent field studies in the Mainpat,Surguja, there are 8 Genera with 14 Epiphytic Orchid Species diversity and distribution recorded from the regions. of them, a maximum of 5 species of *Dendrobium, 2 Vanda,2 Aerides, 2 Rhynchostylis,Pelatantherainsectifera*, *Acampe praemorsa, Luisia zeylanica Oberonia falcorneri,* are represented by single species (Table 1). There are 5 Dendrobium species like - *Dendrobium herbaceum, D. crepidatum, D. formosum, D.transparens, Dendrobium macrostachyum*, which are found in the Tiger point, Jaljali, fish point, Mehta point, and Apple garden, Barima of Mainpat. Dendrobium found the highest number of species diversity and wide distribution and some of the epiphytic species like *Oberonia falconeri*, *Pelatantheria insectifera, Acampe praemorsa, Aerides odorata*, *Aerides multiflora, Rhynchostylis retusa*, *Vanda tessellata,vanda testacea*. *Rhynchostylis retusa* (white flowers) is rarely found in habitat throughout the Mainpat Surguja, and Chhattisgarh.

Enumeration of species: The enumeration is alphabetically arranged, followed by artificial key, botanical name, short botanical description, flowering month, host plant species, status, occurrence Mainpat hill, Surguja district and photographs are provided here (Plate 1).

Key to the Epiphytic orchids Genera.

1a. plants epiphtytic :
  2a. leaves equitant ,ensiform …….***Oberonia.***
  2b. leaves otherwise:
3a. leaves more than 2:
  4a. labellum not spurred:
5a. flowers with a mentum ; column with a distinct foot:
  6a. pollinia 4; caudicle absent …… ***Dendrobium .***

5b. flowers without a mentum; column with a very short, indistinct foot or without foot:
3b. leaves terete, fleshy …… ***Luisia.***
4b. labellum spurred.
5c. column with a distinct foot:
2c. leaves flat; bid lobe of lebellum entire, lateral lobes not forming a tube round the column.……***..Aerides.***
5d. column with an indistinct foot or without foot:
5e. spur longitudinally septate ……. ***Pelatantheria***
7a. spur not septate :
7b. spur distant from the base of labellum ……. ***Rhynchostylis***
7c. spur at the base of labellum :
5e. flowers more than 2 cm across:
2c. leaves coriaceous ; flowers lateral ; pollinia 2 or 4 …. ***Vanda .***
2d. flowers up to 2 cm across:
8a. Plants more than 10 cm high:
8b. stem stout ; mid lobe of labellum not lobulate ; pollinia 2 or unequally 2- partite .. ***Acampe.***

Enumeration of Epiphytic orchids species:

1.ACAMPE Lindley

Keys of species

1. stems more than 20 cm long; mid lobe of labellum ovate- oblong or oblong.……***A. praemorsa.***

1.Acampe praemorsa (Roxb.) Blatt. & McCann.: J. Bombay Nat. Hist. Soc. 35: 495, 1932:

Plants Epiphytic. Stem woody, sheathed, 21-30×0.5-1.5 cm, and produce buds produce in flowering time, erect, Leaves alternate, 1.8-20×0.9-3.1cm, distichous, narrowly oblongand unequally bilobed at the apex with a small fine tip. Inflorescence condenses, short, branched.1.8-2.7×0.3-0.4 cm, Flowers clustered, not fully opening, 1×1 cm, 8 in number very fragrant; yellowish–green in colour, bract-0.2×0.2 cm brownish persistence, sepals 1.0×0.5cm and petals 0.8×0.3 cm, fleshy, succulent, creamy yellow with brown transverse linings or/and spots labellum 0.7×0.1cm across. peduncle 0.6×0.1 cm, Capsule subsessile, longitudinally ribbed.cigar shape 2×0.6cm .

Distribution: India (Andhra Pradesh, Odisha ,Goa, Gujarat, Maharastra, Karnataka, Kerala, Tamil Nadu, Daman & Diu, Dadara & Nagar Haveli, Chhattisgarh, Madhya Pradesh , Rajasthan), Nepal, Sri lanka, Myanmar.

Phenology: flowering period and fruiting session occur from September – November.
Flowering*:* September-October
Fruiting*:* October -November and takes almost one year to mature.
Ecological notes*:* species in open patches of *Shorea robusta, Schleichera oleosa, Terminalia chebula.,* and along the road sides. Distribution in Sal mixed forest. New report on these areas Mainpat hill, Surguja.

2. *AERIDES* Lour.

1. lateral lobes of labellum smaller the mid lobe:
a. Sepal obovate–orbicular; spur hook like, curved…..***1.A. odorata.***
b. sepals oblong ; spur conical straight ….. **2.*A. multiflora*.**

2.Aerides odorata Lour.,Fl. Cochinch. 2: 525, 1790 :

Epiphytic, 25-50 cm high, semi-pendulous. Stem stout, upper portion leafy and lower slightly woody. Leaves alternate, distichous, spreading, thick, 10-20cm long, oblong, flat, wavy, keeled, unequally

bilobed at the apex. Inflorescence raceme, extra-axillary, 10-30 cm long, Flowers white with purple blotches and spots. Spur large, funnel-shaped, curved upwards, tip greenish or yellowish or reddish. capsule ovoid shortly stalked.

Distribution: India (Assam, Manipur, Meghalaya, Mizzoram, Nagaland, Arunachal Pradesh Tripura, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Odisha ,Goa, Gujarat, Maharastra, Karnataka, Kerala, Tamil Nadu, Chhattisgarh, Madhya Pradesh , Andaman & Nicobar Islands), Bangladesh ,Bhutan, Nepal, Myanmar.

Phenology: flowering period and fruiting session occur from June- December.
Flowering: June – July.
Fruiting: August onwards and takes almost one year to mature.
Ecological notes*:* Common in dense Sal forest, can be seen in the Mainpat range and commonly associate with the same hosts - *Shorearobusta, Schleichera oleosa, Mangifera indica,* and *Diospyros melanoxylon*. Distribution in Mainapt hill area, Surguja. district, Mainpat hill, ±550 -1050 m.

3. Aerides multiflora Roxb.: Pl. Coromandel 3: 68; 1820 :

Epiphytic, semi-pendulous. Stem 10-25 cm long, with deep brown leaf base. Leaves narrowly oblong, conduplicate, 10-15cm long, deeply channelled, obliquely bifid at the apex, frequently flushed with a reddish tint, especially during the non-flowering condition. Inflorescence axillary, 10-40 cm long, raceme. Flowers pinkish-white or purple with darker blotches, Capsule stalked, ovoid.
Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh Tripura, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Himachal Pradesh Odisha, Rajasthan, Chhattisgarh, Madhya Pradesh, Andaman & Nicobar Islands), Bangladesh ,Bhutan, Nepal, Myanmar, Thailand, Indo-china.

Phenology: flowering period and fruiting session occur from June- December.
Flowering*:* June – July
Fruiting: August onwards and takes almost one year to mature.
Ecological notes*:* Common in dense Sal mixed forest and easy to locate in the Udaipur range and commonly associate with host plant *Shorearobusta, Schleicheraoleosa, Maduca latifolia, Mangifera indica, Diospyros melanoxylon, Miliusa tomentosa*.
Distribution was recorded in the main part of hill way in Mainpat, Surguja.

3.*Dendrobium* Sw. ,

key to species :

Stems greenish, brownish, branch or unbranch; more than 1 m long: leaves ovoate-oblong;linear-lanceolate: Inflorescence terminal raceme or both terminal and lateral racemes: flowers creamy-white, yellowish-white,pinkish –white, pinkish red:

A). leaves ovate-oblong, Inflorescence terminal, flower white with yellow patch. Labellum bilobed, glabrous, fruit greenish in colour……. **2.*D .formosum***

B). leaves linear- lanceolate : Inflorescence distinctly lateral, never terminal: labellum otherwise: Petals greenish white; mentum not spurred…. **3. *D. herbaceum*.**

C). leaves linear- lanceolate : Inflorescence distinctly lateral, never terminal: labellum otherwise:petals laceolate, yellowish; labellum panduriform; capsules ca 2 cm long……**4.. *D. macrostachyum*.**

D). Stems slender; greenish or Dark brownish in colour; leaves charataceous or membranous; bracts ca 2 mm long; petals pinkish white ,light pink of pink- red; sepals oblong or oblong -lanceolate; Petals broadly ovate; labellum longer than broad; yellow patch …… **1.*D. crepidatum*.**

E. Stems slender; Dark brownish in colour; leaves charataceous or membranous: petals pinkish white ,light pink of pink- red;Bract ca 6 mm long; sepals linear- lanceolate, labellum purple patch, ……. **5.*D. transparens.***

4. Dendrobium crepidatum Lindl. & Paxton.: Dendrobium crepidatum Griff. Not. Pl. Asiat. 3: 319, 1851; Paxt. Fl. Gard. 1: 63, f. 45, 1853.

Plants Eptipytic. Pseudobulbs are short, pendulous, greenish, covered with thin scarious sheaths of fallen leaves, up to 30 cm long. Leaves oblong-lanceolate, acute, entire, many-nerved. Flower white tinged with lilac, lebellum with yellow blotch, waxy, in pairs, from the nodes of the apical part of pseudobulbs.capsule obovate.
Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh , Sikkim, West Bengal, Uttarakhand, Odisha, Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu, Bihar, Jharkhand, Chhattisgarh), Bangladesh ,Bhutan, Nepal, Myanmar, Thailand, Indo-China, China.
Phenology: Flowering period and fruiting session occurs from Feb. - Jun.
Flowering: Feb. - Apr.
Fruiting: May-June.
Ecological note: Many abundant plants were recorded in Sal forests, growing on host trees of *Mangifera indica* and *Shorearobusta, Terminalia bellarica.* Distribution Inthe forest area and much abundant distribution is Mainpat hill at elevation range from 550 m to 1085 m.

5. *Dendrobium formosum* Roxb. ex Lindl. Pl. Asiat. Rar. 1: 24, 1830: Dendrobium formosum Roxb. Hort. Bengal. 63, 1832:

Plant epiphytic: Stems thick and pointed upwards, inflated at the base, covered by leaf sheath, narrowed towards Tip Leaves sessile, oblong, opposite on both sides of the pseudobulb, Inflorescence at the tip of stem 3 to 4 flowered; Flowers odorous, 5- 9 cm in size, white, yellowish-orange spot present on the lip, fruit stalked, ovoid. green in colour.
Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh Tripura, Sikkim, West Bengal, Odisha,Jharlkhand, Chhattisgarh, Madhya Pradesh, Andaman & Nicobar Islands), Bangladesh ,Bhutan, Nepal, Myanmar, Sri Lanka, Philippines, Thailand, Indo-china.
Phenology: Flowering period and fruiting session occurs from June -August.
Flowering*:* June – July
Fruiting: August onwards and takes almost one year to mature.
Ecological notes*:* Common in dense Sal mixed forest and easy to locate in the Mainpatrange and commonly associate with host plant *Shorearobusta, Schleicheraoleosa, Maduca latifolia, Mangifera indica, Diospyros melanoxylon, Miliusa tomentosa*. Distributionin Mainpat hill,Surguja Chhattisgarh at elevation range from 680 to 1058 m.

6.Dendrobium herbaceum Lindl. Edwards's Bot. Reg. 26: Misc. 69, 1840:

Plant epiphytic; stem caespitose, erect, branched, elongated, fusiform, slightly swollen, yellowish or dark brown to black, ridged and furrowed. Leaves alternate, distichous, sessile, linear-lanceolate. Inflorescence condensed racemes. Flowers 10 x 8mm, greenish-white, inodorous. Capsule clavate fusiform, strongly ribbed, tapering at the base into a long pedicel.
Distribution: India (Mizoram, West Bengal,Andhra Pradesh, Odisha, Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu, Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh), Endemic.

Phenology: The flowering period and fruiting session occur from Feb. – Oct.
Flowering: Feb. - Mar.
Fruitig: Apr. - Oct.

Ecological notes: A common species of the Sal mixed forest, the plant was recorded at top of the hill. The various host of the species in the region was *Shorea robusta, Terminalia bellarica,* Distribution in Mainpat hill at elevation range from 580m to 1085m.

7.*Dendrobium macrostachyum* Lindl.Gen. Sp. Orchid. Pl. 78,1830:

Plant epiphytic, stem thick, slinder 7-50 cm long, purplish brown with longitudinal streaks, leaves sessile, coriaceous, opposite,oblong–lanceolate inflorescence solitary or cyme, 3 flowered in each node, flowers odorous 2-9×0.3-2.5 cm in size, pale green, creamy yellow. Hairy lips fruit stalked, spindle brownish in colour.
Distribution: India (Arunachal Pradesh, West Bengal, Uttarakhand, Himachal Pradesh Odisha, Goa, Karnataka, Maharashtra, Jharkhand, Chhattisgarh), Bangladesh, Nepal, Sri Lanka, Indonesia, Thailand, Indo-china.

Phenology: flowering period and fruiting session occur from June- December.
Fruiting: June – July
Fruiting: July – December
Ecological note: plants associate with *Shorea robusta*, *Diospyros melanoxylon, Ficus cordata* .distribution in Mainpat hill at elevation range from 550-1085 m.

8.Dendrobium transparens Wall ex. Lindl.: Wall.Numer. List n. 2008, 1828; Dendrobium transparens Wall. ex Lindl. Gen. Sp. Orchid. Pl. 79, 1830 :

Plant epiphytic stem stout, up 35-55 cm. Leaves linear-lanceolate, apex oblique and acute. Peduncles arise from the older leafless pseudobulbs. Flowers two to three, fragrant, white, tinged purplish or rose towards the tip. Fruit stalked, ovoid. Brownish in colour.
Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh Tripura, Sikkim, West Bengal, Uttarakhand, Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh), Bangladesh ,Bhutan, Nepal, Myanmar, Indo-china.

Phenology: The flowering period and fruiting sessionoccur from April - Aug.
Flowering: April- June
Fruiting: July – Aug.
Ecological note: Plants associated with *Shorearobusta*and *Diospyros melanoxylon* Distributionin MainpatMainpat hill at elevation range from 680 to 1035 m.

5. *Luisia* Gaud.

Key of species :
leaves slender, stout, 4-5 mm in thickness; labellum Lobed; Flowers up to 6 mm across…. ***L. zeylanica.***
9. ***Luisia zeylanica*** Lindl. Fol. Orchid. Luisa 3, 1853:

Epiphytic, stem thick, 15-30 cm long, stout, leaves up to 15 cm,terete, tapering conspicuously from base to apex, inflorescence less than 5 cm long, few-flowered. Flower about 2 cm across, foul-smelling.dull dirty purple. sepal and petal equaling or longer than dorsal sepals,lip equaling or rather exceeding sepals, chocolate–brown in colour, convex, oblong,rotundate at the base, lip obovate – oblong, grooved, capsule 3.5×1cm oblong ribbed.

Distribution: India (Meghalaya, Nagaland, Arunachal Pradesh, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Himachal Pradesh Odisha, Jharkhand, Maharashtra, Goa, Kerala, Karnataka, Tamil Nadu, Bihar, Chhattisgarh, Madhya Pradesh), Bangladesh ,Bhutan, Nepal, Myanmar, Sri Lanka.
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Phenology: flowering period and fruiting session occur in March-May.
Flowering: February – March
Fruiting: May– June onwards and take almost one year to mature.
Ecological notes*:* Reported as common in open Sal mixed forest areas where plants grow in high numbers. Distributed in Mainpat hill. Surguja.

05.*Oberonia* lindl.
Key of the species .
1. leaves up to 7 cm long; petals yellow ; labellum oblong,with small lateral lobes….. O. falconeri..

10.Oberonia falconeri Hook. f. Hooker's Icon. Pl. 18: , ad pl. 1780, 1888:

Epiphytic. Leaves 2-9cm long, thick, slightly curved, broadly ensiform, acute, or acuminate. Inflorescence 7-8 cm terminal, equal to or longer than the leaves, laxly many-flowered, peduncle was strongly grooved. Flowers greenish-yellow, short peduncle small, spiral. Capsule 0.2×0.1 cm ovate, ribbed.
Distribution: India (Assam, Meghalaya, Arunachal Pradesh, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Odisha, Karnataka, Maharastra, Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh), Bangladesh , Nepal, China, Malaysia, Thailand, Indo-china.

Phenology: flowering period and fruiting session occur from September – October.
Flowering: September – October
Fruiting*:* October to the whole year.
Ecological notes: Common in Sal forest, Sal mixed forest, dense canopy cover; distributed in both forest ranges Mainpat hill area, Surguja.

06.*Pelatantheria* Lindl.
Key to species:
Stem branched, up to 60 cm, leaves oblong, unequally bilobed and color change in winter to summer season, flower greenish pink, labellum conical, lobed pink in color…….. ***P. insectifera.***

11. Pelatantheria insectifera (Reichb. f.) Ridl. J. Linn. Soc., Bot. 32: 373, 1896:

Epiphytic, up to 60 cm in length. Roots thin, vermiform, may arise from anywhere on the internode. Leaves many, 3.5×2 cm, alternate, shallow channelled, oblong, unequally bilobed at the apex. Inflorescence raceme, 2×0.5cm subsessile, shorter than the leaves, usually 3 to 5-flowered, decurved, and appearing from an old place on the stem. Flower small, attractive well spread. Bract minute, deciduous. Capsule oblong clavate, stout, four-angled; pedicel short and stout.
Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh Tripura, Sikkim, Uttarakhand,Odisha, Jharkhand, Chhattisgarh,), Bangladeshs, Nepal, Myanmar, Thailand, Indo-china, Malaysia.
Phenology: flowering period and fruiting session occur from June- October.
Flowering: June-July
Fruiting: July-October
Ecological notes*:* Plant is common, some plants were seen in the dense Sal forest of theMainpat hill road area. These species are not recorded in previous Arthur in the Surguja region of Chhattisgarh. A new report in these areas.

07. ***Rhynchostylis*** Blume

Key to species
1a. Flowers white or reddish- purple ; puple blotched ; capsules less than 2.5 cm long.....……..**1.** ***Rhynchostylis retusa***
1b. Flowers creamy whitish ; capsules less than 2.5 cm long.…….……**2.** ***Rhynchostylis retusa*** (white flower)

12.1.Rhynchostylis retusa (L.) Blume, Bijdr. Fl. Ned. Ind. (7): 286,1825:

Epiphytic, pendulous. Stem 10-20 cm long, woody, covered with persistent sheathing bases of fallen leaves. Leaves are dense, 15-25 cm long, linear, and deeply channelled. Inflorescence raceme, longer than the leaves, axillary, drooping, densely many flowered. Flowers fragrant, white or pink with purple or pink markings, dense. Capsules obovoid, winged.

Distribution: India (Assam, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh Tripura, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Himachal Pradesh , Jammu & Kashmir, Odisha, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Tamil Nadu, Jharkhand, Chhattisgarh, Madhya Pradesh, Haryana, Andaman & Nicobar Islands), Bangladesh ,Bhutan, Nepal, Myanmar, Thailand, Indo-china.Sri Lanka, China, Indonesia, Malaysia, Philippines.
Phenology: flowering period and fruiting session occur from May- October.
Flowering*:* May – June.
Fruiting*:* July – October
Ecological notes*:* Plant is common, some plants were seen in the dense Sal forest of the Mainpat hill road area. These species are not recorded in previous Arthur in the Surguja region of Chhattisgarh. The new report is these areas. Found in moist areas with a good amount of sunlight. Mainpat hill is a distribution location.

12.2.Rhynchostylis retusa (L) Blume.:(white flower).
Rhynchostylis retusa fo. albiflora (I.Barua & Bora) Christenson J. Orchidées 12: 344, 2005

Epiphytic, pendulous. Stem 10-20 cm long, woody, covered with persistent sheathing bases of fallen leaves. Leaves are dense, 30-55 cm long, linear, and deeply channelled. Inflorescence raceme, longer than the leaves, axillary, drooping, densely many flowered. Flowers are fragrant, pure white and dense. Capsules obovoid, winged.
Phenology: flowering period and fruiting session occur from May- October.
Flowering*:* May – June.
Fruiting*:* July – October
Ecological notes*:* Found in moist areas with a good amount of sunlight. Mainpat hill is a distribution location. New report of these areas.

08. ***VANDA*** W. Jones ex R. Br.
Key to species
1a. Flowers yellow; labellum without ridges; spur vermiform at tip; capsules more than 3 cm long.....……..**1.** ***V. testacea.***
1b. Flowers greenish-blue; labellum with ridges; spur not vermiform at tip; capsules up to 3 cm long.…….……**2.** ***V. tessellata***

13 .Vanda testacea (Lindl.) Reichb. f.:Gard. Chron., n.s. 8: 166, 1877**:**

Epiphytic. Stem thick, 10-20 cm. Leaves leathery, 7-10 x 1- 1.3 cm. Inflorescence raceme, axillary, erect, as long as the leaves or longer. Flowers yellow, long-pedicelled, 1.5 cm across. Sepal 1.5×0.5 cm, oblong curved, yellow, petal 1.5×0.5 spur small labellum .creamy white Capsule 3.5×1.5 cm oblong ribbed.

Distribution: India (Assam, Manipur, Mizoram, Nagaland, Arunachal Pradesh, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Himachal Pradesh, Odisha,Goa, Karnataka, Kerala, Maharastra, Tamil Nadu, Jharkhand, Rajasthan, Chhattisgarh, Madhya Pradesh, Uttar Pradesh), Nepal, Myanmar, Sri Lanka.

Phenology: flowering period and fruiting session occur from April- June.

Flowering: April – May

Fruiting: June onwards and takes almost one year to mature.

Ecological notes*:* Reported as common in open Sal mixed forest areas where plants grow in high numbers. Distributed in Mainpat hill. Surguja.

14.Vanda tessellata **(Roxb.)** Hook. *ex* G. Don, Hort. Brit. 372, 1850.:

Epiphytic. Stem 40-60×1.5 cm. woody, Leaves several, distichous, linear, keeled, auriculate at the base, unequally bilobed at the apex, 10-20 x 1-3 cm. inflorescence 20-26 cm,3 to 10-flowered axillary raceme, longer than the leaves, zig-zag. Flowers yellowish-green, with a blue tinge, scented, 3.5-5×1.6cm across. Sepal 2.5×1.2 cm, oblong, wavy dark brownish colour with the net like patches, petal 3×2 cm sepal-like in colour and patches, spur 0.8×0.4 cm across, capsule 10×2 cm oblong, ribbed.

Distribution: India (Assam, Nagaland,Tripura, Arunachal Pradesh, Andhra Pradesh, Sikkim, West Bengal, Uttarakhand, Odisha,Goa,Gujarat, Karnataka, Kerala, Maharastra, Rajasthan,Tamil Nadu, Chhattisgarh, Madhya Pradesh, Jharkhand, Dadara & Nagar Haveli, Bihar,Uttar Pradesh), Bangladesh ,Nepal, Myanmar, Sri Lanka .

Phenology: flowering period and fruiting session occur from march- December.

Flowering: March-May and November-December.

Fruiting: June onwards and takes almost one year to mature and other species are from January onwards and take almost one year to mature.

Ecological notes: One of the most common orchids of the study area with a large number of host trees and found growing in almost all forest types. Mainpat hill area is the main spot of occurrence.

Discussion

The region is considered to be rich in Orchid resources which is a part of one of the cool climatic regions of the Surguja,Chhattisgarh.The abundance of Orchid resources in this region was studied by Tiwari and Maheshwari almost 53 years back (Tiwari and Maheshwari, 1963). Later other workers studied (Kotia et al., 2010, 2013 (KVNP,Baster), Tiwari A.P. 2015 (Matringa,Surguja) ; Sharma et al., 2017 (Maheshpur,Udaipur Surguja). other than no Exploration work of the field of Epiphytic orchid species diversity in Surguja . the present study of the Mainpat area of Surguja district reported 14 species belonging to 8 genera of Epiphytic Orchid flora in Chhattisgarh, and some species are new reported of the study area found Rhynchostylis retusa (creamy white flower) species.

Conclusion

Man-made multifarious activities are the major threat in the region. Besides this, forest fire, mining, and Deforestation also cause great harm to the species of human activities. The Orchid resources of Mainpat, Surguja, and Chhattisgarh are some species soon going to be threatened. Thus it is very important to take up conservation measures need to workout suitable conservation strategies and also to protect their survival in natural habitats.

Acknowledgment

I extend my sincere gratitude to Dr. Devdendra Kumar Patel my Supervisor and Head, Department of Botany, G.G.V. (A Central University) Bilaspur, Chhattisgarh for constant supervision and valuable suggestions during the present studies. I am also thankful to the authorities of G.G.V. Bilaspur, Chhattisgarh for facilities and to Mr. Dileshwar Tigga, Mr. Tuleshwar Rajwade and Mr. Kaushik Singh Parmar and the Forest Department to help me with the field visit of Mainpat block, Surguja, Chhattisgarh.

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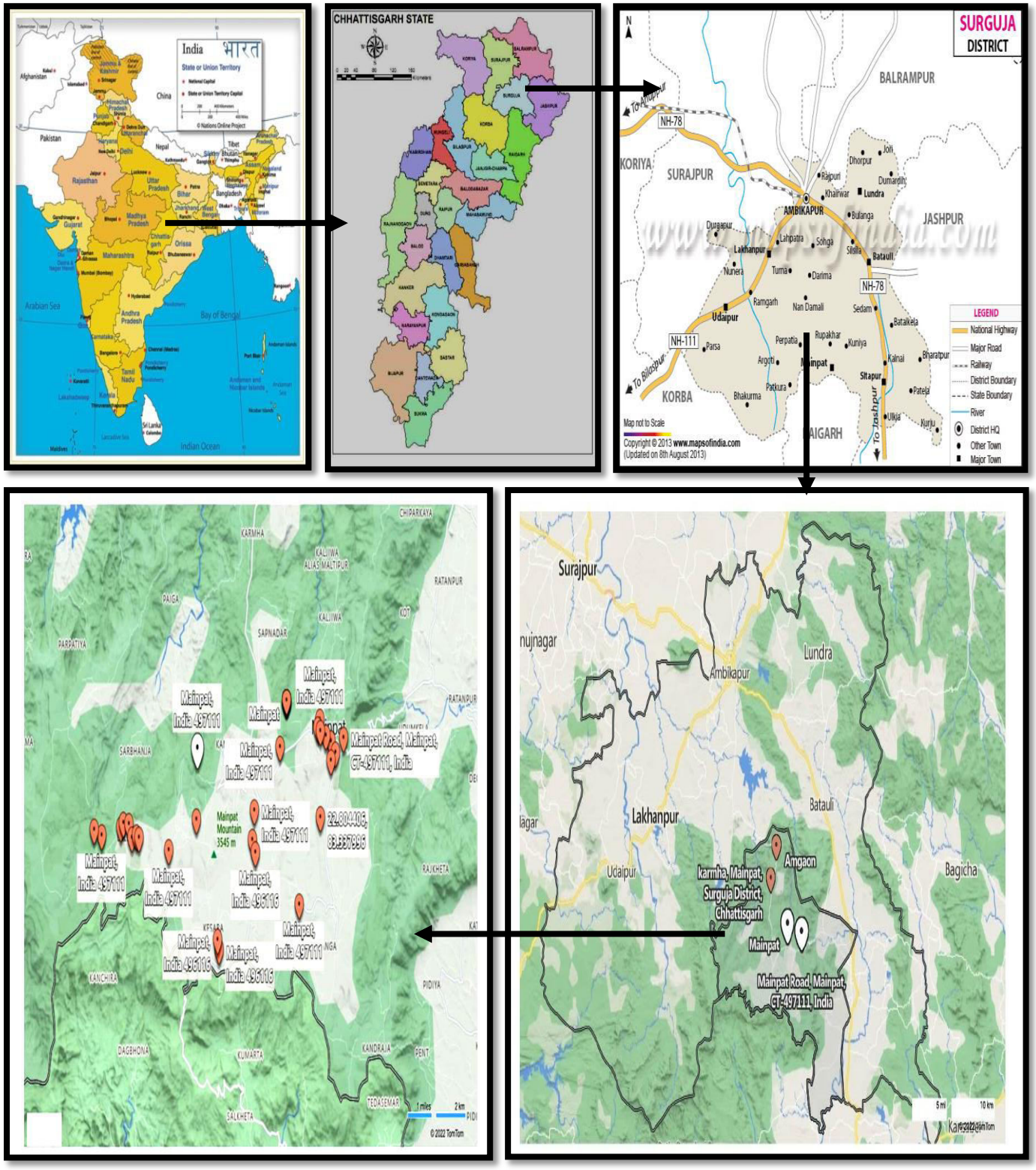
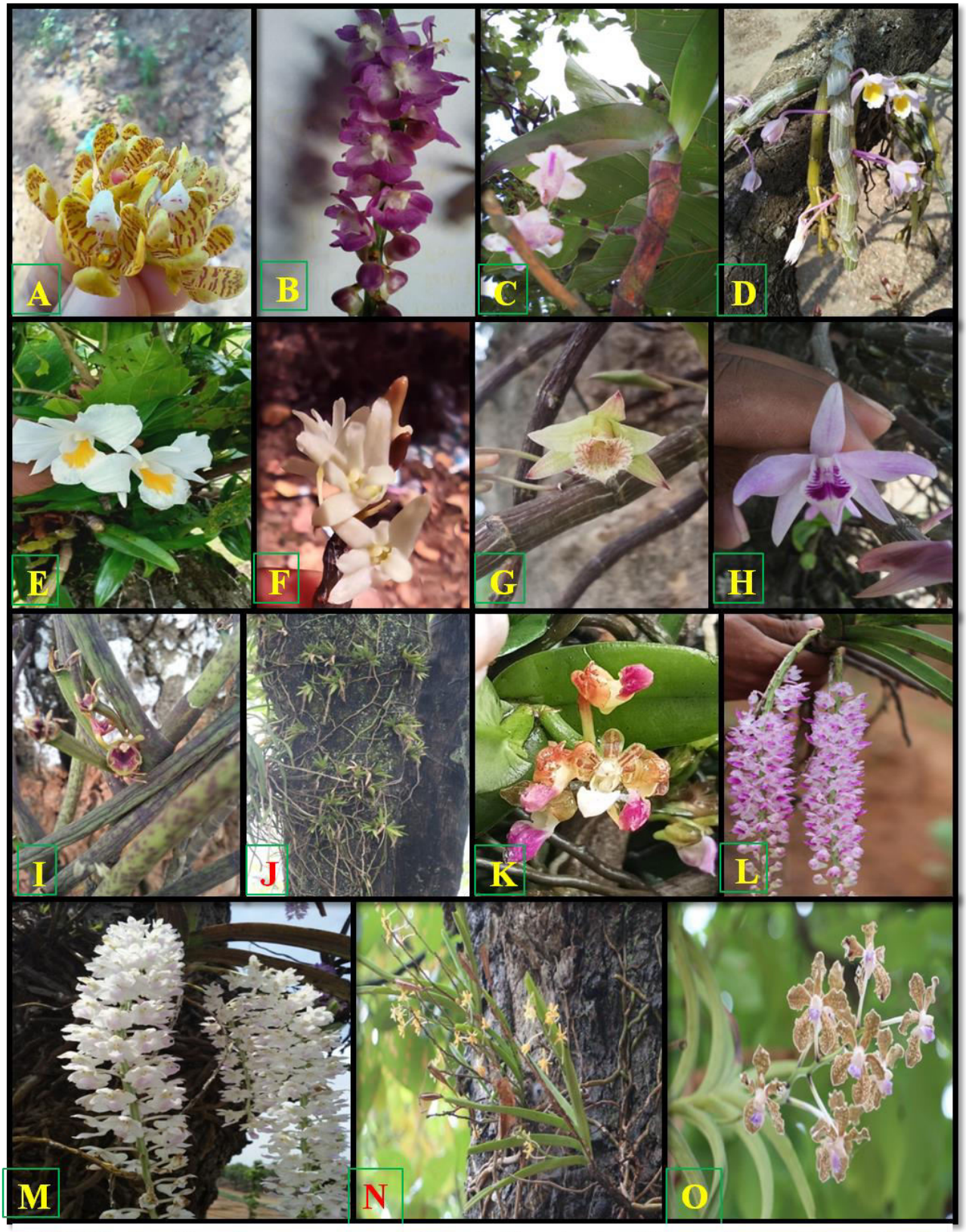


Figure 1: Location of Mainpat, Surguja District (study area) of Chhattisgarh, India.



PALATE 1 – (A) - *Acampe praemorsa* (B) - *Aerides odorata* , (C) - *Aerides multiflora, (D) - D. crepidatum,* (E) - *D. formosum,* (F)\- *Dendrobium herbaceum , (G) - Dendrobium macrostachyum* (H) - *D. transparens, (I) - Luisia zeylanica,* (J) - *Oberonia falconeri,* (K) - *Pelatantheria insectifera,* (L,M) - *Rhynchostylis retusa,* (N) - *Vanda testacea,* (O) - *Vanda tessellata* .

Table 1 : List of Epiphytic Orchid Species available in Mainpat, Surguja, and Chhattisgarh with their availability ,GPS Coordination, Altitudinal range and Month of Flowering

S.No.	Botanical name	Habitat	Locality Of Their Availability Within Mainpat,Surguja With (GPS -Coordination)	Altitudinal range (m)	Flowering time
1	*Acampepraemorsa*(Roxb.) Blatter& McCann.	Epiphyte	Amgaon (22^{0}53'19"N TO 83^{0}27'16"E) To Kamleshwarpur,(22^{0}81'54"N To 83^{0}28'32"E)	558.15M	September-November
2	*Aerides odorata* lour.	Epiphyte	Lurena, , Narmadapur,(Tigher Point), ,Jaljali , Mehtapoint ,Uranga, (22^{0}34'33.77496'' N-23^{0}8'26''N To 83^{0}10'21''E-83^{0}38'27''E)	558.15M-1057.85M	June – July
3	*Aeridesmultiflora* Roxb.	Epiphyte	Sapnadar , Amgaon ,Nagadand, Samania, Bisarpani, Kudaridih, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden (22^{0}0'23.38992''N-23^{0}8'26''N To 83^{0}4'4.25532''E-83^{0}38'27''E)	550M-1057.85M	June – July
4	*Dendrobium herbaceum*Lindl.	Epiphyte	Sapnadar , Amgaon ,Nagadand, Samania, Bisarpani, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden (22^{0}0'23.38992''N-23^{0}8'26''N To 83^{0}4'4.25532''E-83^{0}38'27''E)	558.15M-1057.85M	February – March
5	*Dendrobium macrostachyumLindl.*	Epiphyte	Sapnadar , Samania, Bisarpani, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden .(22^{0}0'23.38992''N-23^{0}8'26''N To 83^{0}4'4.25532''E-83^{0}38'27''E)	558.15M-1057.85M	June – July
6	*Dendrobium transparens*Lindl	Epiphyte	Sapnadar , Samania, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden (22^{0}0'23.38992''N-23^{0}8'26''N To 83^{0}4'4.25532''E-83^{0}38'27''E.)	558.15M-1057.85M	May-June

7	*Dendrobium crepidatum*Lindl. & Paxton.:	Epiphyte	Samania, Kudaridih, Lurena, Patharai, Kuniya, Bisarpani ,Jaljali , Laleya **(**$22^0$50'37''-$22^0$97'02.0326''N To $83^0$17'6'E- $83^0$38'27''E)	550M-1057.85M	March – April
8	*Dendrobium formosum*Roxb. ex Lindl.	Epiphyte	Lurena, Patharai , Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Fishpoint**(.22^{0}47'59.094''N-**$22^0$97'02.0326''N To $83^0$11'10.152''E - $83^0$38'27''E)	558.15M-1057.85M	May- July
9	*Luisiazeylanica*lindl.	Epiphyte	Nagadad ,Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint ,Uranga, ($22^0$47'59.094''N-$22^0$97'02.0326''N To $83^0$11'10.152''E - $83^0$38'27''E)	558.15M-1057.85M	February-March
10	*Oberoniafalconeri* Hook.f.	Epiphyte	Amgaon ($22^0$53'19"N To $83^0$27'16"E)	558.15M-	September – October
11	*Pelatantheriainsectifera* (Reichb.f.)Ridl.	Epiphyte	Amgaon ($22^0$53'19"N To $83^0$27'16"E)	558.15M-	July – August
12.1	*Rhynchostylis retusa (l.)(white flower)*	Epiphyte	Kuniya ($22^0$83'64"N- To $83^0$34'40"E)	1030 M	May- July
12.2	*Rhynchostylis retusa* (L.) Blume.	Epiphyte	Sapnadar , Amgaon ,Nagadand, Samania, Bisarpani, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point) ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden ($22^0$0'23.38992''N-$23^0$8'26''N $83^0$4'4.25532''E-$83^0$38'27''E).	558.15M-1057.85M	May- July
13	*Vandatestacea*(Lindl.) Reichb.f.	Epiphyte	Sapnadar , Amgaon ,Nagadand, Samania, Bisarpani, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden ($22^0$0'23.38992''N-$23^0$8'26''N To $83^0$4'4.25532''E-$83^0$38'27''E.)	550.15M-1057.85M	April – June
14	*Vanda tessellata*(Roxb.) Hook. ex G.Don.	Epiphyte	Sapnadar , Amgaon ,Nagadand, Samania, Bisarpani, Kudaridih, Lurena, Patharai, Rupakhar, Kamleshwarpur,Kuniya, Barima, Narmadapur,(Tigher Point), Lurena ,Jaljali , Laleya,Sarbhanja ,Fishpoint , Mehtapoint ,Uranga, Sunset Point ,Apple Garaden (Pts) . ($22^0$0'23.38992''N-$23^0$8'26''N To $83^0$4'4.25532''E-$83^0$38'27''E)	550 M-1057.85 M	All year blooming

TABLE 2. ASSOCIATE HOST RANGE OF EPIPHYTIC ORCHID SPECIES OF MAINPAT, SURGUJA, CHHATTISGARH.

S.N.	Species	Habitat	Host/phorophytes
1	*Acampepraemorsa* (Roxb.)Blatter&McCann.	Epiphyte	*Shorea robusta, Soymida febrifuga, Diospyros melanoxylon, Haldina cordifolia*
2	*Aerides odorata* lour.	Epiphyte	*Syzygium cumini, Shorea robusta*
3	*Aerides multiflora* Roxb.	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica Madhuca longifolia, Terminalia elliptica*
4	*Dendrobium herbaceum* Lindl.	Epiphyte	*Shorea robusta, Mangifera indica, Diospyros melanoxylon, Terminelia bellarica Madhuca longifolia, Terminalia elliptica*
5	*Dendrobium macrostachyum Lindl*	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica Madhuca longifolia, Terminalia elliptica, Terminalia chebula, Ficus religiosa, Ficus benghalensis.*
6	*Dendrobium transparens* Lindl	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica Madhuca longifolia, Terminalia elliptica, Terminalia chebula, Ficus religiosa, Ficus benghalensis.*
7	*Dendrobium crepidatum* Lindl. & Paxton.:	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica, Madhuca longifolia, Terminalia elliptica*
8	*Dendrobium formosum* Roxb. ex Lindl.	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica, Terminalia elliptica, Shorea robusta*
9	*Luisia zeylanica*lindl.	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Terminalia bellarica , Terminalia elliptica*
10	*Oberonia falconeri* Hook.f.	Epiphyte	*Mangifera indica, Diospyros melanoxylon, Madhuca longifolia, Syzygium cumini, Shorea robusta*
11	*Pelatantheria insectifera* (Reichb.f.)Ridl.	Epiphyte	*Shorea robusta, Madhuca longifolia, Syzygium cumini,*
12.1	*Rhynchostylis retusa* (L.) Blume.	Epiphyte	*Ficus religeosa, Mangifera indica, Diospyros melanoxylon, Madhuca longifolia, Syzygium cumini, Shorea robusta*
12.2	*Rhynchostylis retusa* (white flowers)	Epiphyte	*Shorea robusta*
13	*Vandatestacea*(Lindl.) Reichb.f.	Epiphyte	*Diospyros melanoxylon, Ficus religeosa, Mangifera Indica, Diospyros melanoxylon, Madhuca longifolia, Syzygium cumini, Shorea robusta*
14	*Vanda tessellata*(Roxb.) Hook. ex G.Don.	Epiphyte	*Schleichera oleosa, Diospyros melanoxylon, Ficus religeos ,Mangifera Indica, Terminelia bellarica, Terminelia chebula, Madhuca longifolia, Syzygium cumini, Shorea robusta, Haldina cordifolia, Soymida febrifuga, Ficus cordata, Lannea coromandelica.*

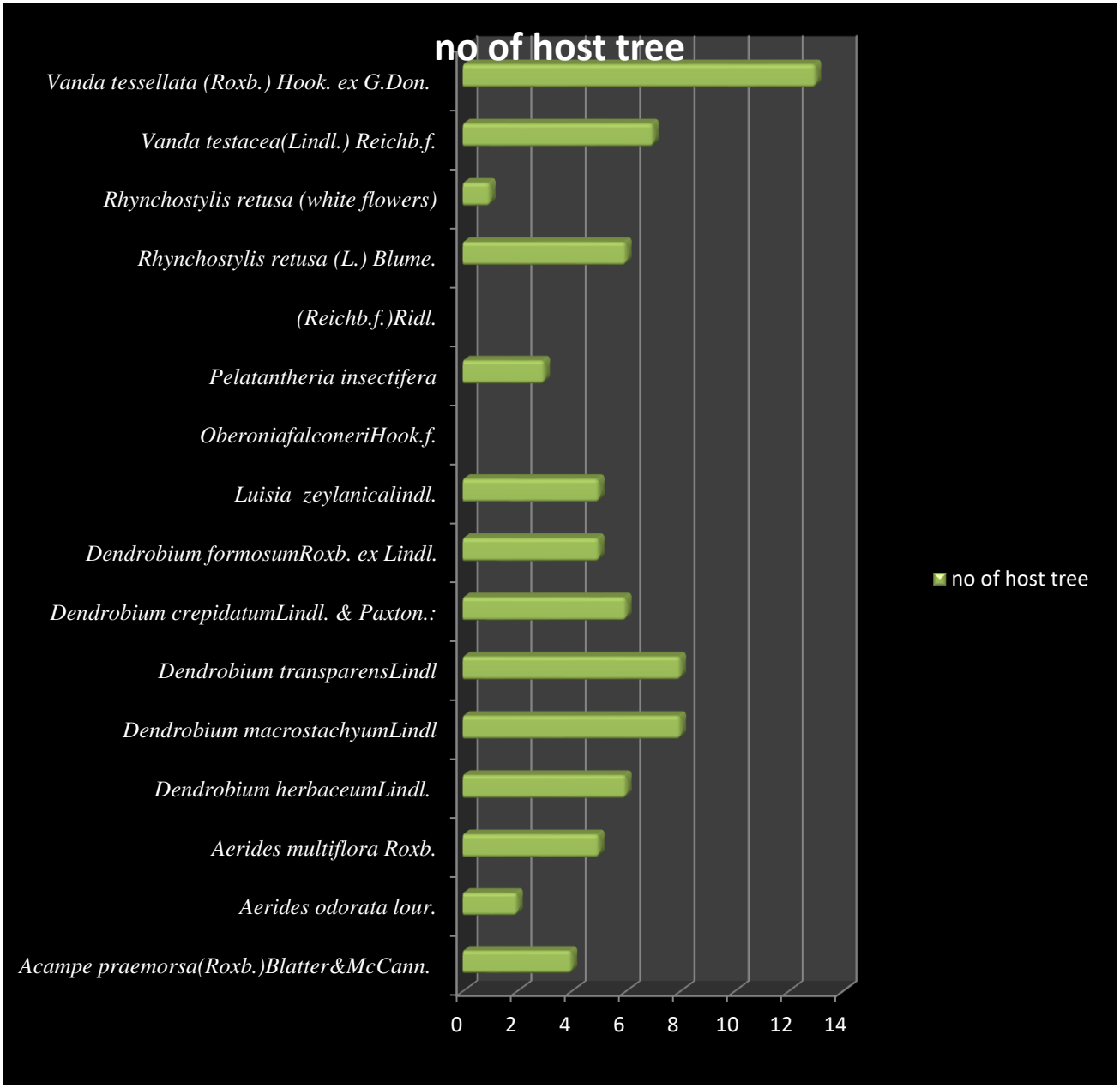


FIG:- GRAPHS SHOW NO. OF EPIPHYTIC ORCHIDS ASSOCIATE HOST TREE.