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Orchid diversity of Mesaki reserve forest, Assam, India

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ABSTRACT

This paper contains the survey of diversity and distribution of orchids with their host plants in Mesaki Reserve Forest, Tinsukia District of Assam of North East India. A total of 44 species with 24 genera have been recorded from this reserve forest. Out of them 38 number of species are epiphytic and 6 are terrestrial. The major dominant genus found in this reserve forest is *Dendrobium* with 8 numbers of species. The value of Shannon diversity index is (H2=1.716); which means the diversity of orchids of the forest is rich. In this reserve forest this is the first attempt to study on diversity and distribution of different orchids.

Key words: *Orchid diversity and distribution, Mesaki reserve forest, Tinsukia district, Assam.*

Introduction

The family Orchidaceae forms one of world's largest Monocotyledonous flowering plants of Angiosperms. As they have diverse shapes, forms and colours, they are considered to be the most highly evolved in floral specialization. In India, the family is represented by 1200sp. 170 genera (Sathish Kumar and Monilal, 1994). North east India is known to be an Orchid hotspot with nearly 72% of the total orchids found in India which are reported from this region (Barua, 2001). Assam is the second largest state of North east India and a rich store house of diverse forms of Orchids. According to Hegde (2000); Rao (1995) the total number of Orchid species may be around 193 under 71 genera out of which 27 are endemics, 26 are endangered and threatened, while 7 are near extinct. According to Gogoi (2018) it is estimated that there are 396 specific and 10 intraspecific taxa belonging 101 genera of orchids in Assam, out of 121 species under 48 genera are terrestrial or saprophytic and 275 species under 53 genera are epiphytic or lithophytic.

Several works were carried out to study diversity of Orchids in Tinsukia district, Assam. This paper deals with the diversity and distribution of orchids with their host plants in Mesaki Reserve Forest of Tinsukia District ,Assam, North East India. It is amazing to see the rich diversity of Orchids in such a small area.

Study Area

The Mesaki reserve forest is one of the smallest reserve forest of Tinsukia district, Assam. Geographically it is located between 95.61031° E and 27.71625° N, covering total area about 1366.80 hectares. The climate is moist, summer being hot and winters dry with annual temperature between 21-22.5°C. The annual rainfall is approximately 2400-2800 mm. Soil is of alluvial type. The vegetation of the reserve forest is a semi deciduous.

Materials and Methods

The study was conducted during 2017-2018 covering all the seasons in all parts of Mesaki reserve for-

est. For studying distribution of orchids, line transect method was used. The measuring tape was spread across the selected area and species richness of species was recorded. The specimens were collected in the flowering and fruiting stages and processed into herbarium specimens following Jain and Rao (1977). Identification were done using standard orchid manuals and Herbarium of the Department of Life Sciences, Dibrugarh University following Chowdhery (1998); Deorani and Naithani (1995); Deva and Naithini (1968); Hedge D. (1890); Pangtey *et al.*, (1991); Pradhan (2004); Pradhan (1976); Pradhan (1979); Seidenfaden (1973) and Seidenfaden (1962). The Herbarium specimens are deposited in the Herbarium, Department of Life Sciences, Dibrugarh University.

For determining frequency (*F*) of species, following formula was used (Trivedy *et al.*, 1987).

$$F = \frac{\text{Total number of hits made on the species}}{\text{Total number of hits made}} \times 100$$

After determining the percentage of frequency of each species they are then distributed among Raunkiaer's five frequency class formula *ie;* A>B>C=D<E, depending upon their value and percentage of each of five frequency. Classes found out used for preparing frequency diagram which can be expressed in form of pie chart.

For determining species richness and diversity Shannon-Wiener and Simpson's index was used.

Sipmson's index

$D2 = 1/\Sigma(pi)^2$

Shannon-Wiener index

$H' = \Sigma(pi \ln pi)$

Where, *pi* is the proportion of individuals that species *i* contribute to the total. The evenness was expressed by

$J = H'/H'_{max}$

Where, H'_{max} is the maximum value of diversity for the number of present species.

Results

The study resulted in 44 species of orchids with 24 genera. Total 7 host plants are commonly found in

Table 1. List of Epiphytic Orchids with host plants, percentage frequency and frequency class:

Sl. No.	Species name	Status in Assam	Host plant	(%) Frequency	Frequency class
1.	*Acampe ochracea*	common	*Lagerstomia indica, Bischofia javanica*	8	A
2.	*Acampe rigida*	common	*Lagerstomia indica, Bischofia javanica*	20	A
3.	*Aerides multiflora*	common	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	64	D
4.	*Aerides roseum*	common	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	28	B
5.	*Bulbophylum careyanum (Hook.) Spreng*	Common	*Dipterocarpus macrocarpus, Bischofia javanica*	40	B
6.	*Bulbophylum roxbughii* (Lindl.) Rchb.f.	Common	*Dipterocarpus macrocarpus, Bischofia javanica*	88	E
7.	*Bulbophylum spathulum (Rolfe ex Cooper) Seidenf*	Common	*Dipterocarpus macrocarpus, Bischofia javanica*	28	B
8.	*Callostylis rigida Bl.*	Common	*Dipterocarpus macrocarpus, Lagerstomia indica*	16	A
9.	*Cleisostoma appendicualtum* (Lindl.) Benth. & Hook.f. ex Jackson	Common	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	80	E
10.	*Cleisostoma linearilobulatum* (Scidenf. & Smitind.)	Common	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	32	B
11.	*Cleisostoma Subulatum Bl.*	Common	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	28	B
12.	*Cleisostoma tenuifolium* (L.) Garay	Rare	*Lagerstomia indica, Bischofia javanica, Bombax ceiba, Premna benghalensis*	12	A
13.	*Cymbidium aloifolium* (L.) Sw.	Common	*Found in any boundary side tree of the forest*	40	B

Table 1. *Continued ...*

Sl. No.	Species name	Status in Assam	Host plant	(%) Frequency	Frequency class
14.	*Dendrobium acinaciforme* Roxb.	Common	*Lagerstomia indica, Bischofia javanica*	52	C
15.	*Dendrobium aduncum* Wall. ex Lindl.	Common	*Lagerstomia indica, Bischofia javanica*	48	C
16.	*Dendrobium aphyllum*	Common	*Lagerstomia indica, Bischofia javanica*	16	A
17.	*Dendrobium cumulatum* Lindl.	Rare	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	12	A
18.	*Dendrobium fimbriatum* Hook.	Common	*Lagerstomia indica, Bischofia javanica, Dipterocarpus macrocarpus, Premna benghalensis*	60	C
19.	*Dendrobium lituiflorum* Lindl.	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	66	D
20.	*Dendrobium moschatum* (Buch.-Ham) Sw.	Common	*Lagerstomia indica, Bischofia javanica, Dipterocarpus macrocarpus, Premna benghalensis*	96	E
21.	*Dendrobium terminale* Parish & Rchb.f.	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	44	C
22.	*Eria lasiopetala*	Common	*Bischofia javanica, Premna benghalensis*	36	B
23.	*Gastroceilus obliquus* (Lindl.) Kuntze	Common	*Found in any boundary side tree of the forest*	64	D
24.	*Gastrochillus inconspicous*	Common	*Found in any boundary side tree of the forest*	88	E
25.	*Luisia trichorrhiza (Hook.) Bl.*	Rare	*Vatica lanceifolia*	12	A
26.	*Oberonia mucornata*	Common	*Vatica lanceifolia, Dillenia indica*	4	A
27.	*Papilionanthe teres (Roxb.)* Schltr.	Common	*Vatica lanceifolia, Dillenia indica*	4	A
28.	*Pennilabium struthio Carr.*	Common	*Dillenia indica,Vatica lanceifolia*	12	A
29.	*Phalaenopsis deliciosa Rcbh.f.*	Common	*Dipterocarpus macrocarpus*	72	D
30.	*Phalaenopsis lobbii (Rcbh.f.) H.R. Sweet.*	Common	*Lagerstomia indica, Bischofia javanica*	16	A
31.	*Phalaenopsis mannii Rchb.f.*	Rare	*Dipterocarpus macrocarpus, Dillenia indica*	20	A
32.	*Pholidota articulata Lindl.*	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	76	D
33.	*Pholidota imbricata Hook.*	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	68	D
34.	*Pinalia amica* (Rcbh.f.) Kuntze	Common	*Dillenia indica*	28	B
35.	*Podochilus cultratus* Lindl.	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	60	C
36.	*Pomatocalpa undulatum* (Lindl.) Tang & Wang	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	36	B
37.	*Rhynchostylis retusa (L.) Bl.*	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	24	B
38.	*Robiquetia spatulata* (Bl.) J.J. Sm.	Common	*Lagerstomia indica, Bischofia javanica, Premna benghalensis*	92	E

Table 2. List of Terrestrial Orchids:

Sl. No.	Species Name	Status in Assam	Frequency (%)	Frequency class
1.	*Calanthe masuca (D.Don)Lindl.*	Common	4	A
2.	*Calanthe sylvitica(Thouars) Lindl.*	Common	12	A
3.	*Collabium chinense(Rolfe) Tang&Wang*	Common	12	A
4.	*Goodyera procera(Ker Gawl.)Hook.*	Common	12	A
5.	*Hetaeria affinis(Griff.)*	Common	4	A
6.	*Phaius tankervilleae(Banks ex l'Herit.)Bl.*	Common	20	A

the forest. Table 1 summarises the host plant and frequency of different epiphytic species. Table 2 contains frequency of terrestrial species. Table 3 summarises species diversity index (SDI) of orchid species. Figure 1 shows te comparision of Raunkiaer's frequency class. Out of 18 genera 38 species are epiphytic and 5 terrestrial genus of orchids with 6 species.

Table 4. Species Diversity Index

Sl. No.	Species name	No of individual	Total No. of individual	$P_i = \frac{n_i}{N}$	Pi log Pi	H′
1.	*Acampe ochracea*	2		0.022	-0.036	
2.	*Acampe rigida*	5		0.004	-0.009	
3.	*Aerides multiflora*	16		0.012	-0.023	
4.	*Aerides roseum*	7		0.039	-0.054	
5.	*Bulbophylum careyanum (Hook.) Spreng*	15		0.037	-0.052	
6.	*Bulbophylum roxbughii* (Lindl.) Rchb.f.	22		0.037	-0.052	
7.	*Bulbophylum spathulum* (Rolfe *ex* Cooper) Seidenf	13		0.054	-0.068	
8.	*Calanthe masuca (D.Don)Lindl.*	1		0.032	-0.047	
9.	*Calanthe sylvitica(Thouars) Lindl.*	3		0.002	-0.005	
10.	Callostylis rigida Bl.	4		0.007	-0.015	
11.	*Cleisostoma appendicualtum* (Lindl.) Benth. & Hook.f. *ex* Jackson	22		0.009	-0.018	
12.	*Cleisostoma linearilobulatum* (Scidenf. & Smitind.)	8		0.079	-0.087	
13.	*Cleisostoma Subulatum* Bl.	7		0.019	-0.032	
14.	*Cleisostoma tenuifolium* (L.) Garay	3		0.017	-0.030	
15.	*Collabium chinense(Rolfe) Tang&Wang*	8		0.007	-0.015	
16.	*Cymbidium aloifolium*(L.)Sw.	10		0.007	-0.015	
17.	*Dendrobium* acinaciforme Roxb.	12		0.024	-0.038	
18.	*Dendrobium aduncum* Wall. *ex* Lindl.	4		0.029	-0.044	
19.	*Dendrobium aphyllum*	18	404	0.039	-0.054	1.716
20.	*Dendrobium cumulatum* Lindl.	3		0.044	-0.059	
21.	*Dendrobium fimbriatum* Hook.	15		0.007	-0.015	
22.	*Dendrobium lituiflorum* Lindl.	14		0.037	-0.052	
23.	*Dendrobium moschatum*(Buch.-Ham) Sw.	24		0.034	-0.049	
24.	*Dendrobium terminale* Parish & Rchb.f.	11		0.059	-0.072	
25.	*Eria lasiopetala*	9		0.027	-0.042	
26.	*Gastroceilus obliquus* (Lindl.) Kuntze	9		0.022	-0.036	
27.	*Gastrochillus inconspicous*	6		0.059	-0.072	
28.	*Goodyera procera(Ker Gawl.)Hook.*	3		0.007	-0.015	
29.	*Hetaeria affinis(Griff.)*	1		0.002	-0.005	
30.	*Luisia trichorrhiza* (Hook.) Bl.	16		0.039	-0.054	
31.	*Oberonia mucornata*	23		0.056	-0.066	
32.	*Papilionanthe teres* (Roxb.) Schltr.	22		0.079	-0.087	
33.	*Pennilabium struthio* Carr.	18		0.007	-0.015	
34.	*Phaius tankervilleae(Banks ex l'Herit.)Bl.*	5		0.012	-0.023	
35.	*Phalaenopsis deliciosa* Rcbh.f.	1		0.002	-0.005	
36.	*Phalaenopsis lobbii* (Rcbh.f.) H.R. Sweet.	1		0.002	-0.005	
37.	*Phalaenopsis mannii* Rchb.f.	3		0.007	-0.015	
38.	*Pholidota articulata* Lindl.	19		0.047	-0.062	
39.	*Pholidota imbricata* Hook.	17		0.040	-0.055	
40.	*Pinalia amica* (Rcbh.f.) Kuntze	18		0.044	-0.059	
41.	*Podochilus cultratus* Lindl.	5		0.012	-0.023	
42.	*Pomatocalpa undulatum* (Lindl.) Tang & Wang	4		0.039	-0.054	
43.	*Rhynchostylis retusa* (L.) Bl.	15		0.037	-0.052	
44.	*Robiquetia spatulata* (Bl.) J.J. Sm.	7		0.017	-0.030	

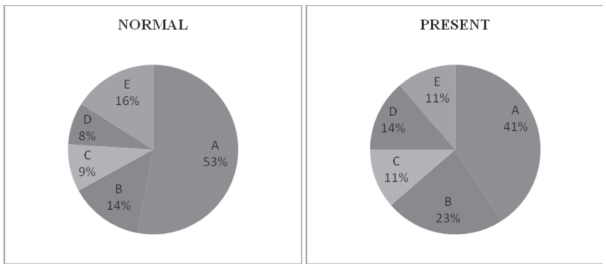

Fig. pie chart comparing the Raunkiaer's frequency class with Mesaki reserve forest

Discussion

Mesaki Reserve Forest is a house of diverse group of flora. Economically important timber yielding plants like *Dipterocarpus macrocarpus*, *Lagerstomia indica*, *Shorea robusta* are major component of the forest. The forest is rich in faunal diversity. It is a semi deciduous forest. The environmental and climatic conditions are exceptionally suitable for the growth and development of orchids and can be exploited to maintain a good gene pool of orchids here. The orchids of the forest are mainly epiphytic and some are terrestrial. Most of the orchids in the forest are heliophyte in nature. Dendrobium members viz; *D. aphyllum, D. acinaciforme, D. aduncum, D. cumulatum, D. fimbriatum, D. lituiflorum, D. moschatum* are dominant in the forest. It is followed by Bulbophyllum, Cleisostoma, Phalaenopsis. The common host plants are *Lagerstomia indica , Dipterocarpus macrocarpus, Bombax ceiba, Bischofia javanica, Premna benghalensis* . *Cymbidium* and *Papilionanthe* are two epiphytic species in the boundary side trees like *Dipiterocarpus macrocarpus* and *Bischofia javanica*. Members of *Rubiqueta* are found on *Dillenia indica* only. Shannon diversity index of the study area is (H2=1.716) high. It revealed that the diversity of orchids is rich in the study area.

Conclusion

From the present study it is found that in this forest a number of important orchids are present, although the diversity index is found high, but as the forest is situated in road side a lot of disturbances create destruction of forest. Hence, there is an urgent need for a detailed survey so as to assess the current conservation status of different species.

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