Orchid diversity in three districts [Kiphire, Tuensang and Zunheboto] of Nagaland, India

Chitta Ranjan Deb¹ and Hutuka Y. Jakha

Department of Botany, Nagaland University, Lumami 798627, Nagaland, India

¹Communicating author, e-mail: debchitta@rediffmail.com and debchitta@gmail.com

[Received 13.11.2019; Revised 10.12.2019; Accepted 11.12.2019; Published 31.12.2019]

Abstract

Orchids in India are mostly confined to North-Eastern region and Western Ghats. Nagaland, a state of NE India is a hilly state with varied agro-climatic condition supports large number of orchids in different habitats. This study was an attempt for inventory of wild orchid resources of Kiphire, Tuensang and Zunheboto districts of Nagaland. Outcome of the study is the checklist of orchids diversity based on only primary data from the present study. A total of 180 species from 58 genera are collected, studied, plants are being maintained in the Orchidarium in the Department of Botany, Nagaland University. Of the, 180 species, 30 are epiphytic, 15 terrestrial, 11 are of dual habitat (terrestrial/epiphytic) and 2 are saprophytes.

Key words: Nagaland districts, Kiphire, Tuensang, Zunheboto, Orchid diversity

INTRODUCTION

Orchidaceae are one of the largest families of flowering plants accounting ~7% of the total flowering plants. Orchids are known for their beautiful flowers of different sizes, fascinating shapes and beautiful colors which have outnumbered other families of flowering plants by evolving higher levels of specialization in its vegetative and reproductive traits. World estimate of orchid species has been usually assessed between 17,000 and 35,000 (Dressler 1993). Some of the conservative estimates on this family, however, suggest 19,128 species in 800 genera (Atwood 1986); 18,000 species in 750 genera (Haywood 1993); 18,500 species in 778 genera (Mabberley 1998) and 20,000 species by Lawler & Rao (2002). Recent estimates suggests approximately 26,567 species are distributed worldwide (WCSP 2017). Unfortunately, orchids have become victims of their own beauty and utility and their natural populations have been detrimentally affected by unscrupulous collections for commercial and scientific purposes. In 1975, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), suggested a complete ban on the export of wild orchid plants to avoid overutilization. Orchids have been used in different systems of local medicine since the *Vedic* period (Deb *et al.* 2009). Besides this, orchids also find their use as an important ornamental crop in floriculture industry due to their beautiful foliage (Deb & Imchen 2011).

The first account on the work of 'Orchidaceae of Nagaland' was Clarke's (1889) collection wherein reported 22 species under 18 genera followed by Hooker (1890) recorded 49 species under 24 genera. Recent works on the Orchidaceae of Nagaland includes Chankija *et al.* (1992) recorded 360 species under 85 genera, Deorani & Naithani (1995) reported 238 species, Hynniewta *et al.* (2000) recorded 241 species of 63 genera, Deb & Imchen (2008) recorded 396 species of 92 genera. Post 2008 studies added several species to the

orchid flora of Nagaland viz., *Dendrobium tuensangense* (Odyuo *et al.* 2017); *Arachnis labrosa* var. *zhaoi* (Jakha *et al.* 2015a), *Coelogyne calcicola* (Odyuo *et al.* 2016a), *Panisea panchassensis* (Odyuo *et al.* 2016b), *Dendrobium regium* (Deb *et al.* 2015), *Polystachya concreta* (Deb *et al.* 2016), *Esmeralda clarkei* (Deb *et al.* 2014), *Dendrobium tamenglongense* (Jakha *et al.* 2014a), *Arachnis senapatiana* (Jakha *et al.* 2014b), *Pendulorchis himalaica* (Jakha *et al.* 2015b), *Goodyera fumata*; *Phalaenopsis manii*; *Vanilla parishii* (Jamir *et al.* 2015), *Phalaenopsis braceana* (Imchen *et al.* 2015), *Crepidium calophyllum*; *Eriodes barbata*; *Erythrones blumei* (Jakha & Dey 2017), *Cymbidium bicolor* (Deb *et al.* 2017) etc. Present study was undertaken to survey and documentation of orchid resources of three districts of Nagaland viz., Kiphire, Tuensang and Zunheboto.

MATERIALS AND METHODS

Study Area

The three districts namely Kiphire, Tuensang and Zunheboto are predominantly mountainous, altitudinal variations ranging from approximately 300 m in the lower regions of the Zunheboto side of Doyang River to 3840 m Mt. Saramati, in Pungro sub-division of Kiphire district and diverse species of orchids are predominant across these altitudinal ranges.

Kiphire district: Kiphire district is surrounded by Tuensang district in the North, Phek district in the South, Zunheboto in the West and Myanmar in the East occupying ~1255 sq km. The district headquarters Kiphire is located at an elevation of 896.42 m MSL. The climate is usually humid and hot during summer and cold during winter with temperature range between 2.7° C during winter and a high of 37° C during summer. Monsoon period starts from June up to September with 876 mm average rain fall.

Tuensang district: Tuensang district is located in the eastern part of Nagaland and surrounded by Mon and Longleng districts in the North, Mokokchung in the North-West, Zunheboto in the South-West, Kiphire in the South, and Myanmar in the East. The district has an area of ~1,728 sq km. The climate of the district ranges from sub-tropical to temperate.

Zunheboto district: Zunheboto district is bordered on the North by Mokokchung district, Kohima district and Wokha district on the West, Phek district in the South, and Tuensang district and Kiphire district in the East. The district has an area of about 1,255 sq km.

Extensive field survey was carried out at various village forest areas of Kiphire, Tuensang and Zunheboto districts (Table 1) during 2013 – 2017 in different seasons of the year to gather comprehensive information on the diversity of orchid species. Since the forest is mostly owned by the community, due permission from the village 'Gaonbura/Chairman' were obtained to enter forest areas of respective village. The specimens have been collected with GPS data and field photographs.

Method of collection and herbarium preparation

Random collection in village forest areas were carried out referring the forest cover map of the three districts viz., Kiphire, Tuensang and Zunheboto. Efforts were made to visit the more dense forest areas which were relatively undisturbed. Photographs of plants in flowering were taken along with GPS coordinates. The specimens collected from the field are accorded with proper field numbers and then pressed, dried and made into herbarium sheets as per standard method (Jain & Rao 1977). Fragile parts of plants such as flowers were also preserved and pickled in formaldehyde for later dissection. All herbarium sheets have been deposited in the herbarium of Department of Botany, Nagaland University, Lumami.

Live specimen and identification

Live specimens were brought and maintained in the Orchidarium of Department of Botany, Nagaland University for further observation of flowering and other characteristics. Identification of plants was done referring the regional and national flora and also with the help of relevant taxonomic revisions, monographs etc. Later, the identities of the species were confirmed by consulting the herbaria of Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM) and Central National Herbarium, Botanical survey of India, Howrah (CAL).

RESULTS AND DISCUSSION

The present floristic study documents a total of 180 species under 58 genera (Table 2). The genera *Dendrobium*, *Bulbophyllum* and *Coelogyne* are having 29, 17 and 15 species respectively and other genera are represented by lesser number of species (Table 3). Out of the 58 genera, 30 genera were strictly epiphytic, while 15 genera were terrestrial and 11 genera belonging to the mixed type i.e. either terrestrial or epiphytic. *Epipogium* and *Eulophia* species were found to be saprophytic and was represented by 1 species each, namely *Epipogium roseum* and *Eulophia zollengeri*. The species viz. *Polystachya concreta*, *Esmeralda clarkei*, *Dendrobium tamenglongense*, *Arachnis senapatiana*, *Phalaenopsis braceana*, *Cymbidium bicolor*, *Erythroides blumei*, *Eriodes barbata*, *Crepidium calophyllum*, *Pendulorchis himalaica* for the state, and *Arachnis labrosa* var. *zhaoi* and *Thrixspermum laurisilvaticum* for the country are already newly reported by the present authors (Deb *et al.* 2014, 2015, 2016, 2017). Reports of *Dendrobium tuensangense* N. Odyuo & C. Deori, a new species from Tuensang district in 2016 and *Panisea panchaseensis* Subedi also from Tuensang district a new record for the country by Odyuo *et al.* in 2016 have not been included in the list since the authors have not come across the specimens.

From the field studies it is observed that the species of the genera *Bulbophyllum*, *Coelogyne*, *Cymbidium*, *Dendrobium*, *Eria*, *Goodyera*, *Papilionanthe*, *Pinalia*, *Thrixspermum*, *Vanda* are growing in wide altitudinal range, while species of the genera *Epigénium*, *Phalaenopsis*, *Panisea*, *Pleione*, *Renanthera*, *Vandopsis*, are found to occur only at above 2000 m altitude.

In the study areas different types of vegetation observed and different vegetation supported the growth of different orchid species as follows:

Tropical vegetation: Among the three districts, only a small patch on the Zunheboto side of Doyang River could be classified under this type of vegetation and is a home to a wide variety of orchid species of both epiphytic and terrestrial. Epiphytic species viz. *Acampe papillosa*, *Aerides odorata*, *Bulbophyllum caryanum*, *Cleisostoma paniculatum*, *C. williamsonii*, *Coelogyne fimbriata*, *C. ovalis*, *Cymbidium aloifolium*, *C. iridiodes*, *Dendrobium aphyllum*, *D. chrysotoxum*, *Luisia trichorrhiza*, *Papilionanthe teres*, *Pinalia amica*, *Polystachya concreta*, *Vanda testaceae* and terrestrial orchids viz. *Calanthe triplicata*, *Crepidium acuminatum*, *C. calophyllum*, *Dienia ophrydis*, *Phaius tankervilleae*, *Tainia latifolia* are predominant.

Sub-Tropical vegetation: Majority of the orchid species were found to occur in this vegetation type viz., *Acampe ochracea*, *A. rigida*, *Aerides multiflora*, *A. odorata*, *Agrostophyllum callosum*, *Arachnis labrosa*, *A. labrosa* var. *zhaoi*, *Bulbophyllum affine*, *B. caryanum*, *B. cariniflorum*, *B. crassipes*, *B. cylindraceum*, *B. leopardinum*, *B. pteroglossum*, *B. rotschildianum*, *Cleisocentron pallens*, *Cleisostoma parishii*,

Table 1. G.P.S. points of the areas and localities of the three districts visited during field survey

Sl. No	Area	District	Position with approx. altitude	Localities visited (villages)
1.	Pungro	Kiphire	25°50'07.1" N & 94°51'25.2"E, 1343 m	Chomi, Iponger, khongkha, Moya, Mimi, Fakim
2.	Khongsa (Saramati)	Kiphire	25°45'13" N & 94°59'24.5"E, 2705m	Khong, Penkim, Salomi, Thanamer, Sangtsung
3.	Longmatra	Kiphire	25°50'08" N & 94°51'25.6"E, 1343m	Ngoromi, Sangphure, Sangtsoze, Tethuze
4.	Seyochung	Kiphire	25°53'175" N & 094°38'327" E, 2041m	Lukhami, Yangzitong, Yingphire, Thsinger
5.	Sitimi	Kiphire	25°47'18.6" N & 94°44'44.7"E, 1282m	Honito, Kiyeze, Thazuvi, Nikiye, Nitoi, Shishimi, Xuvish
6.	Amahotor	Kiphire	25°56'621" N & 094° & 44'659" E, 1976m	Hutanger, hurong, kisetong, Purur
7.	Longkhim	Tuensang	26°12 '24.3"N & 94°39'09.7"E, 1585m	Angangba, Chimonger, Mangakhi, New Sangsamong, Sangsamong
8.	Sotokur	Tuensang	26°12 '11.1"N & 94°44'44.3"E, 2200 m	Helipong, Sipongsang, Kuthur
9.	Chare	Tuensang	26°16'20.7"N & 94°36'04.3"E, 959m	Alisophur, Chare village, Thronger, Tsadang (Old and New), Kiding
10.	Chingmei	Tuensang	26°14'00.4"N & 94°56'39.2"E, 1438 m	Chendang saddle village, Waoshu, Chingmei village, Yimpang
11.	Noklak	Tuensang	26°15'26.8"N & 95°06'59.3"E, 1969m	Dan village, Pangsha (Old and New), Wansoi, Nokyan, Noklak
12.	Shamator	Tuensang	26°06'07.6"N & 94°50'23.1"E, 2153m	Meliankiur, Shiponger, Waphur, Yakor
13.	Satoi	Zunheboto	25°49 '10.3"N & 94°35' 42.3 E, 2324m	Hokiye, Khuvuxu, Satoi village, Tsutoho
14.	Ghathashi	Zunheboto	25°39 '25.3"N & 94°21'35.3 E, 432 m; 25°53 '18.3" N & 94°22'44.0" E. 886m	Mukalimi, Chishilimi, Chisholimi, Khughutomi, Kilomi
15.	Atoizu	Zunheboto	26°06 '31.6" N & 94°30'56.4" E.1806m	Naghuto (Old and New), Atoizu village, Litsami, Emlomi
16.	Pughoboto	Zunheboto	25°51' 12.0"N & 94°19' 19.4"E, 835m	Mishilimi, Lazami, Natsumi, Ghokimi, Tsaphimi
17.	V.K. Area village	Zunheboto	26°06 '47.7" N & 94°23'24.8" E. 401m	Mukhami, Izhet
18.	Akuluto	Zunheboto	26°12 '11.4" N & 94°29'21.0"E.971m	Lumami, Alaphumi, Sema settsu, Sutemi, Zaphumi, Lumithsami
19.	Saptiqa	Zunheboto	25°58 '40" N & 94°24'22.2"E. 901m	Ustomi,
20.	Zunheboto sadar	Zunheboto	26°05 '27.3" N & 94°32'46.9"E. 1936m	Asukhomi, Sukhalu, Lochomi
21.	Aghunato	Zunheboto	25°57'9.1"N & 94°36'12.7"E, 1314m	Aquba (Old and New), Lukhuyi, Thokihi
22.	Satakha	Zunheboto	25°57 '58.9" N & 94°24'25.5"E, .920m	Nunumi, Zhekiye, Khukiyi, Sukhai, Shoipu

C. williamsonii, *Coelogyne cristata*, *C. fimbriata*, *C. ovalis*, *C. prolifera*, *C. schultesii*, *C. Suaveolens*, *Cryptochilus luteus*, *C. sanguineus*, *Cymbidium aloifolium*, *C. bicolor*, *C. iridiodes*, *D. aphyllum*, *D. chrysanthum*, *D. chrysotoxum*, *D. densiflorum*, *D. formosum*, *D. jenkinsii*, *D. moschatum*, *D. ochreatum*, *D. spatella*, *D. transparens*, *Epigeneium amplum*, *Eria spicata*, *Gastrochilus calceolaris*, *G. inconspicua*, *Liparis bootanensis*, *L. distans*, *L. viridiflora*, *Luisia trichorrhiza*, *Oberonia pachyrachis*, *Papilionanth vandarum*, *Phalanaeopsis difformis*, *Pholidota articulate*, *Pinalia acervata*, *P. paniculata*, *P. pannea*, *Pleione maculata*, *Polystachya concreta*, *Vanda ampullaceaum*, *V. bicolor*, *V. coerulea*, *V. testaceae* and terrestrial orchids such as *Acanthephippium striatum*, *Anthogonium gracile*, *Arundina graminifolia*, *Calanthe biloba*, *C. mannii*, *Calanthe puberula*, *C. triplicata*,

Table 2. List of orchid species documented from the three districts viz. Kiphire, Tuensang and Zunheboto. [Total: 180 species belonging to 58 Genera]

Name of Genera		Name of Species	Flowering Season
<i>Acampe</i>	1	<i>Acampe praemorsa</i> (Roxb.) Blatt. & McCann	Dec – Jan
	2	<i>Acampe ochracea</i> (Lindl.) Hochr.	Jan – Feb
	3	<i>Acampe rigida</i> (Buch.-Ham. ex Sm.) P.F.Hunt	Aug – Oct
<i>Acanthephippium</i>	4	<i>Acanthephippium striatum</i> Lindl.	May - Jun
<i>Aerides</i>	5	<i>Aerides multiflora</i> Roxb.	Apr– May
	6	<i>Aerides odorata</i> Lour.	May – Jun
<i>Agrostophyllum</i>	7	<i>Agrostophyllum callosum</i> Rchb.f.	Jun – Jul
<i>Anthogonium</i>	8	<i>Anthogonium gracile</i> Lindl.	Aug – Sep
<i>Arachnis</i>	9	<i>Arachnis labrosa</i> (Lindl. ex Paxt) Rchb. f.	Aug – Sep
	10	<i>Arachnis labrosa</i> var Zhaoi	Aug – Sep
	11	<i>Arachnis senapatiana</i> (Phukan & A.A.Mao) Kocyan & Schuit.	May – Jun
<i>Arundina</i>	12	<i>Arundina graminifolia</i> (D. Don) Hochr.	Jun – Aug
<i>Bulbophyllum</i>	13	<i>Bulbophyllum affine</i> Lindl.	May – Jun
	14	<i>Bulbophyllum candidum</i> Hook.f.	Aug – Sep
	15	<i>Bulbophyllum caryanum</i> (Hook.) Spreng	June – Jul
	16	<i>Bulbophyllum cariniflorum</i> Rchb.f.	Mar – Apr
	17	<i>Bulbophyllum crassipes</i> Hook.f.	Sep– Nov
	18	<i>Bulbophyllum cylindraceum</i> Lindl.	Sep – Oct
	19	<i>Bulbophyllum elatum</i> (Hook.f.) J.J.Sm.	May – Jun
	20	<i>Bulbophyllum. helenae</i> (Kuntze.) J.J.Sm.	May – Jun
	21	<i>Bulbophyllum leopardinum</i> (Wall.) Lindl.	Jun – Jul
	22	<i>Bulbophyllum odorotissimum</i> (Sm.) Lindl.	May – Jun
	23	<i>Bulbophyllum pteroglossum</i> Schltr.	Oct – Nov
	24	<i>Bulbophyllum reptans</i> Lindl.	Oct – Nov
	25	<i>Bulbophyllum retusiusculum</i> Rchb.	Aug - Sep
	26	<i>Bulbophyllum rotschildianum</i> (O'Brien) J.J. Sm.	Sep – Oct
	27	<i>Bulbophyllum sunipia</i> J.J.Verm., Schuit. & de Vogel	May – Jun
	28	<i>Bulbophyllum umbellatum</i> Lindl.,	Apr – Jun
	29	<i>Bulbophyllum viridiflorum</i> (Hook.f.) Schltr.	Oct – Nov
<i>Bulleyia</i>	30	<i>Bulleyia yunnanensis</i> Schltr.	Jun – Jul
<i>Calanthe</i>	31	<i>Calanthe alismifolia</i> Lindl.	Jun – Jul
	32	<i>Calanthe biloba</i> Lindl.	Nov – Dec

Name of Genera		Name of Species	Flowering Season
<i>Calanthe</i> (contd.)	33	<i>Calanthe brevicornu</i> Lindl.	May – Jun
	34	<i>Calanthe mannii</i> Hook.f.	Apr – May
	35	<i>Calanthe puberula</i> Lindl.	May – Jun
	36	<i>Calanthe triplicate</i> (Willem.) Ames.	Jul – Oct
<i>Chiloschista</i>	37	<i>Chiloschista parishii</i> Seidenf.	Apr – May
<i>Cleisocentron</i>	38	<i>Cleisocentron pallens</i> (Cathcart ex Lindl.) N. Pearce & P.J.Cribb	Sep – Oct
<i>Cleisostoma</i>	39	<i>Cleisostoma paniculatum</i> (Ker Gawler) Garay.	Jul – Aug
	40	<i>Cleisostoma parishii</i> (Hook.f.) Garay	Sep
	41	<i>Cleisostoma williamsonii</i> (Reichb.f.) Garay	Jun – Jul
<i>Coelogyne</i>	42	<i>Coelogyne barbata</i> Lindl. ex Griff.	Oct – Dec
	43	<i>Coelogyne calcicola</i> Kerr.	May – Jun
	44	<i>Coelogyne corymbosa</i> Lindl.	Mar – Apr
	45	<i>Coelogyne cristata</i> Lindl.	Mar – May
	46	<i>Coelogyne fimbriata</i> Lindl.	Oct – Dec
	47	<i>Coelogyne flaccida</i> Lindl.	Mar
	48	<i>Coelogyne griffithii</i> Hook.f.	Mar – May
	49	<i>Coelogyne nitida</i> (Wall. ex D. Don) Lindl.	June-July
	50	<i>Coelogyne occultata</i> Hook.f.	Jun – Jul
	51	<i>Coelogyne ovalis</i> Lindl.	Sept – Oct
	52	<i>Coelogyne prolifera</i> Lindl.	May – Jun
	53	<i>Coelogyne punctulata</i> Lindl.	Mar – Apr
	54	<i>Coelogyne schultesii</i> S.K.Gen & S.Das	Mar
	55	<i>Coelogyne stricta</i> (D. Don) Schltr.	Apr – May
	56	<i>Coelogyne. suaveolens</i> Hook.f.	May – Jun
<i>Cremastra</i>	57	<i>Cremastra appendiculata</i> (D.Don) Makino	May – Jun
<i>Crepidium</i>	58	<i>Crepidium acuminatum</i> (D.Don) Szlach.	Jun – Jul
	59	<i>Crepidium calophyllum</i> (Rechb.f.) Szlach.	Jun – Jul
	60	<i>Crepidium khasianum</i> (Hook.f.) Szlach.	Jun – Jul
<i>Cryptochilus</i>	61	<i>Cryptochilus luteus</i> Lindl.	May – Jun
	62	<i>Cryptochilus sanguineus</i> Wall.	Jun – Jul
<i>Cymbidium</i>	63	<i>Cymbidium aloifolium</i> (L.) Sw.	Apr – May
	64	<i>Cymbidium bicolor</i> Lindl.	Mar – Apr
	65	<i>Cymbidium cochleare</i> Lindl.	Nov – Dec
	66	<i>Cymbidium devonianum</i> Paxton	Apr – May
	67	<i>Cymbidium elegans</i> Lindl.	Nov – Dec
	68	<i>Cymbidium erythraeum</i> Lindl.	Nov – Dec
	69	<i>Cymbidium iridiodes</i> D. Don	Oct – Jan
	70	<i>Cymbidium mastersii</i> Griff. ex Lindl.	Oct – Nov
	71	<i>Cymbidium tigrinum</i> Par. ex Hook	Apr – May
<i>Dendrobium</i>	72	<i>Dendrobium aphyllum</i> (Roxb.) Fischer	Apr – May
	73	<i>Dendrobium chrysanthum</i> Wall. exLindl.	Sep – Oct
	74	<i>Dendrobium chrysotoxum</i> Lindl.	Apr - May
	75	<i>Dendrobium crepidatum</i> Lindl. & Paxt	Apr – May
	76	<i>Dendrobium densiflorum</i> (Lindl.) Wall.	Apr – May
	77	<i>Dendrobium denudans</i> D.Don	Nov - Dec
	78	<i>Dendrobium devonianum</i> Paxt.	May – Jun
	79	<i>Dendrobium falconeri</i> Hook.f.	Apr – May
	80	<i>Dendrobium fimbriatum</i> var. <i>oculatum</i> Hook.f.	Apr– May

Name of Genera	Name of Species		Flowering Season
<i>Dendrobium</i> (contd.)	81	<i>Dendrobium formosum</i> Roxb. ex Lindl.	Jun – Jul
	82	<i>Dendrobium gibsonii</i> Lindl.	Jun – Jul
	83	<i>Dendrobium heterocarpum</i> Wall. ex Lindl.	Mar – Apr
	84	<i>Dendrobium jenkinsii</i> Wall. ex Lindl.	Mar – Apr
	85	<i>Dendrobium lituiflorum</i> Lindl.	Mar – Apr
	86	<i>Dendrobium longicornu</i> Lindl.	Oct – Nov
	87	<i>Dendrobium moschatum</i> Griff.	Jun – Jul
	88	<i>Dendrobium nobile</i> Lindl.	Apr – May
	89	<i>Dendrobium ochreatum</i> Wall. ex Lindl.	Apr – May
	90	<i>Dendrobium parishii</i> Rchb.f.	Apr – May
	91	<i>Dendrobium polyanthum</i> Wall. ex Lindl.	Mar – Apr
	92	<i>Dendrobium porphyrochilum</i> Lindl.	May – Jun
	93	<i>Dendrobium sociale</i> J.J.Sm.	Mar – Apr
	94	<i>Dendrobium spatella</i> Rchb.f.	Jun – Aug
	95	<i>Dendrobium tamenlongse</i> R. Kishor; Y.N. Devi; H.B. Sharma; J. Tongbram & S.P. Vij	Jul – Aug
	96	<i>Dendrobium thyrsiflorum</i> Rchb. f.	Sep – Oct
	97	<i>Dendrobium transparens</i> Wall. ex Lindl.	Apr – May
	98	<i>Dendrobium wardianum</i> Warner.	May – Jun
	99	<i>Dendrobium wattii</i> Rchb. f.	Dec – Jan
	100	<i>Dendrobium williamsonii</i> Day & Rchb.f.	Apr – May
<i>Dienia</i>	101	<i>Dienia ophrydis</i> (J.König) Seidenf.	Jul – Aug
<i>Epigeneium</i>	102	<i>Epigeneium amplum</i> (Lindl.) Summer.	Oct – Nov
	103	<i>Epigeneium fuscescens</i> (Griff.) Summer.	Sep – Oct
	104	<i>Epigeneium rotundatum</i> (Lindl.) Summer.	Mar – Apr
<i>Epipogium</i>	105	<i>Epipogium roseum</i> (D.Don) Lindl.	May – Jun
<i>Eria</i>	106	<i>Eria coronaria</i> (Lindl.) Rchb.f.	May – Jun
	107	<i>Eria spicata</i> (D.Don) Hand.-Mazz.	Jul – Aug
	108	<i>Eria vittata</i> Lindl.	Feb – Mar
<i>Eriodes</i>	109	<i>Eriodes barbata</i> (Lindl.) Rolfe	Oct – Nov
<i>Erythrodes</i>	110	<i>Erythrodes blumei</i> (Lindl.) Schltr.	Mar – Apr
<i>Esmeralda</i>	111	<i>Esmeralda Clarkei</i> Rchb.f.	Dec – Feb
<i>Eulophia</i>	112	<i>Eulophia zollengeri</i> (Rchb.f.) J.J. Smith	May – Jun
<i>Galeola</i>	113	<i>Galeola lindleyana</i> (Hook.f. & Thomson) Rchb.f.	May – Jun
<i>Gastrochilus</i>	114	<i>Gastrochilus calceolaris</i> (Buch.-Ham. ex Sm.) D. Don	Mar – Apr
	115	<i>Gastrochilus distichus</i> (Lindl.) Kuntze	May – Aug
	116	<i>Gastrochilus inconspicuus</i> (Wall. ex Hook.f.) Kuntze	Jun – Jul
	117	<i>Gastrochilus pseudodistichus</i> (King & Pantl.) Schltr.	Aug – Oct
<i>Goodyera</i>	118	<i>Goodyera schlechtendaliana</i> Rchb.f.	Aug – Sep
	119	<i>Goodyera viridiflora</i> (Blume.) Lindl. ex Dietrich.	Sep
<i>Habenaria</i>	120	<i>Habenaria arietina</i> Hook.f.	Aug – Sep
	121	<i>Habenaria dentata</i> (Sw.) Schltr.	Sep – Oct
<i>Hygrochilus</i>	122	<i>Hygrochilus parishii</i> (Veitch. & Reichb.f.) Pfitzer	May – Jun
<i>Liparis</i>	123	<i>Liparis bistriata</i> E.C. Parish & Rchb.f.	Jun – Jul
	124	<i>Liparis bootanensis</i> Griff.	Aug – Sep
	125	<i>Liparis distans</i> C.B. Clarke	Oct – Nov
	126	<i>Liparis elliptica</i> Wight.	Nov – Dec
	127	<i>Liparis nervosa</i> (Thunb.) Lindl.	Jun – Jul
	128	<i>Liparis resupinata</i> Ridl.	Oct – Nov
	129	<i>Liparis viridiflora</i> (Blume) Lindl.	Oct – Nov

Name of Genera		Name of Species	Flowering Season
<i>Luisia</i>	130	<i>Luisia trichorrhiza</i> (Hook.) Blume	Apr– May
<i>Oberonia</i>	131	<i>Oberonia acaulis</i> Griff.	Oct
	132	<i>Oberonia mucronata</i> (D.Don) Ormerod & Seidenf.	Jun – Jul
	133	<i>Oberonia obcordata</i> Lindl.	Aug –Sep
	134	<i>Oberonia pachyrachis</i> Rchb.f. ex Hook.f.	Aug – Sep
<i>Otochilus</i>	135	<i>Otochilus albus</i> Lindl.	May – Jul
	136	<i>Otochilus fuscus</i> Lindl.	Nov – Dec
	137	<i>Otochilus lancilabius</i> Seidenf.	Mar – Apr
<i>Panisea</i>	138	<i>Panisea tricallosa</i> Rolfe.	Nov – Dec
<i>Paphiopedilum</i>	139	<i>Paphiopedilum hirsutissimum</i> (Lindl.) Stein.	Apr – May
	140	<i>Paphiopedilum villosum</i> var. <i>boxallii</i> (Rchb.f.) Pfitzer	Jan – Mar
<i>Papilionanthe</i>	141	<i>Papilionanthe teres</i> (Roxb.) Schltr.	Feb – Mar
	142	<i>Papilionanthe vandarum</i> (Rchb.f.) Garay	Feb – Mar
<i>Pecteilis</i>	143	<i>Pecteilis susannae</i> (L.) Raf.	Aug – Sep
<i>Pendulorchis</i>	144	<i>Pendulorchis himalaica</i> (Deb, Sengupta & Malick) Z.J. Liu, Ke Wei Liu & X.J. Xiao.	Nov – Dec
<i>Phaius</i>	145	<i>Phaius flavus</i> (Blume) Lindl.	Mar – Apr
	146	<i>Phaius tankervilleae</i> (Banks ex L'Her.) Blume	Apr – Jun
<i>Phalaenopsis</i>	147	<i>Phalaenopsis braceana</i> (Hook.f.) Christenson	Apr – May
	148	<i>Phalaenopsis difformis</i> (Wall. ex Lindl.) Kocyan & Schuit.	Jun – Jul
	149	<i>Phalaenopsis taenialis</i> (Lindl.) E.A. Christ. & Pradhan	May – Jun
	150	<i>Phalaenopsis yingjiangensis</i> (Z.H.Tsi) Kocyan & Schuit.	Jul – Aug
<i>Pholidota</i>	151	<i>Pholidota articulata</i> Lindl.	Jun
	152	<i>Pholidota convallariae</i> (E.C. Parish & Rchb.f) Hook.f.	May – Jun
	153	<i>Pholidota pygmaea</i> H.J. Chowdhery & G.D. Pal	Nov – Dec
<i>Pinalia</i>	154	<i>Pinalia acervata</i> (Lindl.) Kuntze	Jul – Aug
	155	<i>Pinalia amica</i> (Rchb.f.) Kuntze	Mar – Apr
	156	<i>Pinalia excavata</i> (Lindl.) Kuntze	Jun – Jul
	157	<i>Pinalia graminifolia</i> (Lindl.) Kuntze	Jun – Jul
	158	<i>Pinalia paniculata</i> (Lindl.) Kuntze	Mar – Apr
	159	<i>Pinalia pannea</i> (Lindl.) Kuntze	May – Jul
<i>Pleione</i>	160	<i>Pleione humilis</i> (Sm.) D. Don	Mar – Apr
	161	<i>Pleione maculata</i> (Lindl.) Lindl.	Nov – Dec
	162	<i>Pleione praecox</i> (Lindl.) D. Don	Sep – Nov
<i>Polystachya</i>	163	<i>Polystachya concreta</i> (Jacq.) Garay & Sweet	Jun – Jul
<i>Renanthera</i>	164	<i>Renanthera imschottiana</i> Rolfe.	May – Jun
<i>Rhynchostylis</i>	165	<i>Rhynchostylis retusa</i> Blume	May – Jun
<i>Schoenorchis</i>	166	<i>Schoenorchis gemmate</i> (Lindl.) J.J. Sm.	May – Jun
<i>Smitinandia</i>	167	<i>Smitinandia micrantha</i> (Lindl.) Holttum	Jun – Jul
<i>Spathoglottis</i>	168	<i>Spathoglottis pubescens</i> Lindl.	Jun – Jul
<i>Tainia</i>	169	<i>Tainia latifolia</i> Benth. ex Hook.	Mar – Apr
	170	<i>Tainia minor</i> Hook.f.	Apr– May
<i>Thrixspermum</i>	171	<i>Thrixspermum laurisilvaticum</i> (Fukuy.) Garay	May – Jun
<i>Thunia</i>	172	<i>Thunia alba</i> (Lindl.) Rchb. f.	Jun – Aug
<i>Uncifera</i>	173	<i>Uncifera obtusifolia</i> Lindl.	Aug – Sep
<i>Vanda</i>	174	<i>Vanda alpina</i> (Lindl.) Lindl.	Jun – Aug
	175	<i>Vanda ampullaceum</i> (Roxb.) L.M.Gardiner	Mar - Apr
	176	<i>Vanda bicolor</i> Griff.	Jan – Feb
	177	<i>Vanda coerulea</i> Griff. ex Lindl.	Sep – Oct
	178	<i>Vanda pumila</i> Hook.f.	Mar–Apr
	179	<i>Vanda testacea</i> (Lindl.) Rchb.f.	May – Jun
<i>Vandopsis</i>	180	<i>Vandopsis undulata</i> (Lindl.) J.J.Sm.	Mar–Apr

Table 3. Orchid genera represented by number of species and its habitat

Sl. No.	Name of Orchid Genera	Number of species	Type/ Habitat
1	<i>Acampe</i> Lindl.	3	Epiphytic
2	<i>Acanthephippium</i> Blume.	1	Terrestrial
3	<i>Aerides</i> Lour.	2	Epiphytic
4	<i>Agrostophyllum</i> Blume.	1	Epiphytic
5	<i>Anthogonium</i> Wall. ex Lindl	1	Terrestrial
6	<i>Arachnis</i> Blume.	3	Epiphytic
7	<i>Arundina</i> Blume	1	Terrestrial
8	<i>Bulbophyllum</i> Thou.	17	Epiphytic
9	<i>Bulleyia</i> Schltr.	1	Epiphytic/ Lithophytic
10	<i>Calanthe</i> R.Br.	6	Terrestrial
11	<i>Chiloschista</i> Lindl.	1	Epiphytic
12	<i>Cleisocentron</i> Bruhl	1	Epiphytic
13	<i>Cleisostoma</i> Blume	3	Epiphytic
14	<i>Coelogyne</i> Lindl.	15	Epiphytic/ Lithophytic
15	<i>Cremastra</i> Lindl.	1	Terrestrial
16	<i>Crepidium</i> Blume	3	Terrestrial
17	<i>Cryptochilus</i> Wall.	2	Epiphytic/ Lithophytic
18	<i>Cymbidium</i> Sw.	9	Epiphytic/ Lithophytic
19	<i>Dendrobium</i> Sw.	29	Epiphytic
20	<i>Dienia</i> Lindl.	1	Terrestrial
21	<i>Epigenium</i> Gagnep.	3	Epiphytic/ Lithophytic
22	<i>Epipogium</i> J.G. Gmelin ex Borkhausen	1	Saprophyte
23	<i>Eria</i> Lindl.	3	Epiphytic/ Lithophytic
24	<i>Eriodes</i> Rolfe	1	Epiphytic/ Lithophytic
25	<i>Erythrodes</i> Blume	1	Terrestrial
26	<i>Esmeralda</i> Rchb.f.	1	Epiphytic
27	<i>Eulophia</i> R.Br. ex Lindl.	1	Saprophyte
28	<i>Galeola</i> Lour.	1	Terrestrial
29	<i>Gastrochilus</i> D.Don	4	Epiphytic
30	<i>Goodyera</i> R.Br.	2	Terrestrial
31	<i>Habenaria</i> Willd.	2	Terrestrial
32	<i>Hygrochilus</i> Pfitzer	1	Epiphytic
33	<i>Liparis</i> Rich.	7	Epiphytic/ Lithophytic
34	<i>Luisia</i> Gaud.	1	Epiphytic
35	<i>Oberonia</i> Lindl.	4	Epiphytic
36	<i>Otochilus</i> Lindl.	3	Epiphytic
37	<i>Panisea</i> Lindl.	1	Epiphytic
38	<i>Paphiopedilum</i> Pfitzer	2	Epiphytic/ Lithophytic
39	<i>Papilionanthe</i> Schltr.	2	Epiphytic
40	<i>Pecteilis</i> Rafin.	1	Terrestrial
41	<i>Pendulorchis</i> Z.J. Liu, Ke Wei Liu & G.Q. Zhang	1	Epiphytic
42	<i>Phaius</i> Lour.	2	Terrestrial
43	<i>Phalaenopsis</i> Blume	4	Epiphytic
44	<i>Pholidota</i> Lindl. ex Hook.	3	Epiphytic
45	<i>Pinalia</i> Lindl.	6	Epiphytic
46	<i>Pleione</i> D.Don	3	Epiphytic/ Lithophytic
47	<i>Polystachya</i> Hook.	1	Epiphytic
48	<i>Renanthera</i> Lour.	1	Epiphytic
49	<i>Rhynchostylis</i> Blume	1	Epiphytic
50	<i>Schoenorchis</i> Blume	1	Epiphytic

Sl. No.	Name of Orchid Genera	Number of species	Type/ Habitat
51	<i>Smitinandia</i> Holtt.	1	Epiphytic
52	<i>Spathoglottis</i> Blume	1	Terrestrial
53	<i>Taenia</i> Blume	2	Terrestrial
54	<i>Thrixspermum</i> Lour.	1	Epiphytic
55	<i>Thunia</i> Rchb.f.	1	Epiphytic
56	<i>Uncifera</i> Lindl.	1	Epiphytic
57	<i>Vanda</i> W.Jones ex R. Br.	6	Epiphytic
58	<i>Vandopsis</i> Pfitzer	1	Epiphytic/ Lithophytic

[Epiphytic: 30; Terrestrial: 15; Mixed (Terrestrial/Epiphytic): 11; Saprophyte: 2]

Crepidium acuminatum, *C. calophyllum*, *C. khasianum*, *Dienia ophrydis*, *Eriodes barbata*, *Erythroides blumei*, *Goodyera viridiflora*, *Habenaria arietina*, *Habenaria dentata*, *Pecteilis susannae*, *Phaius tankervilleae*, *Tainia latifolia*.

Temperate vegetation: During the present study it was observed that majority of the rare species were found in this vegetation type. Epiphytic orchid species viz., *Acampe rigida*, *A. multiflora*, *Agrostophyllum callosum*, *Arachnis senapatiana*, *Bulbophyllum affine*, *B. candidum*, *B. crassipes*, *B. cylindraceum*, *B. elatum*, *B. helenae*, *B. odorotissimum*, *B. reptans*, *B. retusiusculum*, *B. sunipia*, *B. umbellatum*, *B. viridiflorum*, *Bulleyia yunnanensis*, *Coelogyne barbata*, *C. calcicola*, *C. corymbosa*, *C. cristata*, *C. griffithii*, *C. nitida*, *C. occultata*, *C. stricta*, *Cryptochilus luteus*, *C. sanguineus*, *Cymbidium cochleare*, *C. devonianum*, *C. elegans*, *C. erythraeum*, *C. mastersii*, *C. tigrinum*, *Dendrobium aphyllum*, *D. chrysanthum*, *D. crepidatum*, *D. densiflorum*, *D. denudans*, *D. devonianum*, *D. ochreatum*, *D. falconeri*, *D. fimbriatum*, *D. heterocarpum*, *D. lituiflorum*, *D. longicornu*, *D. nobile*, *D. sociale*, *D. wardianum*, *D. wattii*, *D. williamsonii*, *Epigeneium fuscescens*, *E. rotundatum*, *Eria coronaria*, *E. spicata*, *Esmeralda clarkei*, *Gastrochilus calceolaris*, *G. distichus*, *G. pseudodistichus*, *Hygrochilus parishii*, *Liparis bistrata*, *L. resupinata*, *Oberonia acaulis*, *O. mucronata*, *O. obcordata*, *O. pachyrachis*, *Otochilus albus*, *O. fuscus*, *O. lancilabius*, *Panisea tricallosa*, *Paphiopedilum hirsutissimum*, *P. villosum* var. *boxallii*, *Papilionanthe vandarum*, *Pendulorchis himalaica*, *Phalaenopsis braceana*, *P. taenialis*, *P. yingjiangensis*, *Pholidota articulata*, *P. convallariae*, *Pinalia excavata*, *P. graminifolia*, *P. paniculata*, *P. pannea*, *Pleione humilis*, *P. praecox*, *Renanthera imschottiana*, *Schoenorchis gemmata*, *Thrixspermum laurisilvaticum*, *Thunia alba*, *Vanda alpina*, *V. pumila*, *Vandopsis undulate*. Terrestrial orchids are *Calanthe alismifolia*, *C. puberula*, *Cremastra appendiculata*, *Epipogium roseum*, *Eulophia zollengeri*, *Galeola lindleyana*, *Goodyera schlechtendaliaana*, *Phaius flavus*.

Sub Alpine/Alpine vegetation: This type of forest occurs only in high altitudinal area in Saramati range of Kiphire district and is predominated with *Rhododendron* species (Particularly *Rhododendron macabeum* and *Rhododendron arboreum*). Species of *Epigeneium*, *Pleione* and *Goodyera* are some rare species of the region.

The state has witnessed a large scale exploitation of orchid species in the past owing to their horticultural value, moreover the practice of logging, shifting cultivation and unplanned developmental activities which has resulted in decrease in plant biodiversity of the region including orchids as being vulnerable to changes in microclimate.

Rao *et al.* (2003) listed 105 species under 46 genera of the family Orchidaceae from India in different threat categories out of which 14 species are reported from these three districts and these are *Esmeralda clarkei* (*Arachnis clarkei*), *Bulbophyllum rotschialdianum*, *Bulleyia yunnanensis*, *Calanthe alismaefolia*, *Coelogyne barbata*, *Coelogyne cristata*, *Coelogyne flaccida*, *Coelogyne nitida*, *Coelogyne prolifera*, *Galeola lindleyana*, *Paphiopedilum hirsutissimum*, *Renanthera imschottiana*, *Vanda coerulea*, *Pholidota imbricate* (*Pholidota calceata*).

Further in this study it is found that wild population of threatened species like *Coelogyne barbata*, *Coelogyne cristata* and *Vanda coerulea* are being collected by the people to adorn their houses causing further declining the population. Wild flowering population of *Paphiopedilum villosum* var *boxallii* from Pangsha village bordering Myanmar in Tuensang district, report of *Arachnis labrosa* var. *zhaoi* and *Thrixspermum laurisilvaticum* as new records for India are some of the interesting findings.

It should be noted that all orchid species are included under Appendix B of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and subsequently all *Paphiopedilum* species (Lady's slippers) are listed under Appendix I of CITES, hence a collaborative effort from the government agency and researchers alike could thus go a long way in conservation of the remaining orchid species.

Indian orchids are mostly confined to North-Eastern region and Western Ghats. Unfortunately, in recent years excessive human interventions have led to the rapid decline of floral diversity and as orchids are being intolerant to slight changes in microclimates causing massive decline of its population. Hence, the need for conservation of orchids both *in-situ* and *ex-situ* is necessary for further sustainable utilization of this rich resource.

Acknowledgements

Authors are thankful to Department of Biotechnology, Ministry of Science & Technology, Govt. of India, New Delhi for financial support through a R&D project to Prof. C. R. Deb vide order No. DBT/NER/Agri/23/2013. Facilities used from the Institutional Biotech Hub, UGC-SAP (DRS-III) programmes are duly acknowledged.

LITERATURE CITED

- Atwood, J.T. 1986. The size of orchidaceae and the systematic distribution of epiphytic orchids. *Selbyana* 9(1): 171 – 186.
- Chankija, S.; Kumar, Y. & Gurung, P.B. 1992. *Orchids of Nagaland*. Forest Department, Nagaland.
- Clarke, C.B. 1889. On the plants of Kohima and Muneypore. *J. Linn. Soc.* 25: 71 – 74.
- Deb, C.R. & Imchen, T. 2008. *Orchid Diversity of Nagaland*. Sci Chem Publishing House, Udaipur, Rajasthan, India.
- Deb, C.R. & Imchen, T. 2011. Orchids of horticultural importance from Nagaland, India. *Pleione* 5(1): 44 – 48.
- Deb, C.R.; Deb, M.S.; Jamir, N.S. & Imchen, T. 2009. Orchids in indigenous system of medicine in Nagaland, India. *Pleione* 3(2): 209 – 211.
- Deb, C.R.; Jamir, N.S.; Jakha, H.Y.; Kikon, Z.P. & Dey, S. 2014. *Esmeralda clarkei* Reichenbach f. (Orchidaceae): a new report for the flora of Nagaland, India. *Pleione* 8(1): 181 – 183.

- Deb, C.R.; Jakha, H.Y. & Dey, S. 2015. Report of *Dendrobium regium* Prain (Orchidaceae) from Nagaland, India – a new record for North-East India. *Pleione* 9(1): 258 – 260.
- Deb, C.R.; Jakha, H.Y. & Jamir, N.S. 2016. *Polystachya concreta* (Jacquin) Garay & H.R. Sweet (Orchidaceae): a new record for Nagaland, India. *Pleione* 10(1): 189 – 191.
- Deb, C.R.; Kamba, J.; Longchar, T.B. & Jakha, H.Y. 2017. *Cymbidium bicolor* Lindl. (orchidaceae): a new report for the orchid flora of Nagaland, India. *Pleione* 11(2): 498 – 500.
- Deorani, S.C. & Naithani, H.B. 1995. *Orchids of Nagaland*. Oriental Enterprises, Dehradun, India.
- Dressler, R.L. 1993. Phylogeny and classification of the orchid family. *Miss. Bot. Card. Cambridge University* 47: 25 – 67.
- Haywood, W.H. 1993. *Flowering Plants of the World*. B. T. Batsford Ltd., Oxford.
- Hooker, J.D. 1890. Orchidaceae. In: *The Flora of British India*. 5: 667 – 858.1888; 6:1 – 198. Ashford, Kent. London.
- Hynniewta, T.M.; Kataki, S.K & Wadhwa, B.M. 2000. *Orchids of Nagaland*. Botanical Survey of India, Calcutta.
- Imchen, T.;Jakha, H.Y. & Deb, C.R. 2015. *Phalaenopsis braceana* (Hooker f.) Christenson – a new distributional record for Nagaland, India. *Pleione* 9(1): 244 – 246.
- Jain, S.K. & Rao, R.R. 1977. *A Handbook of Field and Herbarium Methods*. Today and Tomorrow's Printers and Publishers, New Delhi.
- Jakha, H.Y. & Dey, S. 2017. Addition of *Crepidium calophyllum* (Rchb.f.) Szlach.,*Eriodes barbata* (Lindl.) Rolfe and *Erythrodes blumei* (Lindl.) Schltr. to the orchid flora of Nagaland, India. *Indian J. Fundam. Appl. Life Sci.* 7(2): 1 – 4.
- Jakha, H.Y.; Deb, C.R.; Dey, S. & Jamir, N.S. 2014a. *Arachnis senapatiana* (Phukan & A.A. Mao) Kocyan & Schuiteman (Orchidaceae): an addition to the flora of Nagaland, India. *Pleione* 8(2): 516 – 518.
- Jakha, H.Y.; Deb, C.R.; Dey, S.; Jamir, N.S. & Kikon, Z.P. 2014b. *Dendrobium tamenglongense* R. Kishor; Y.N. Devi; H.B. Sharma; J. Tongbram & S.P. Vij: Orchidaceae: an addition to the flora of Nagaland. *Pleione* 8(2): 526 – 528.
- Jakha, H.Y.; Deb, C.R.; Singh, S.K.; Verma D.; Dey, S. & Jamir, N.S. 2015a. *Pendulorchis* (Orchidaceae) - A new generic record for Nagaland, India. *Keanean J. Sci.* 4: 31–34.
- Jakha, H.Y.; Deb, C.R.; Dey, S. & Jamir, N.S. 2015b. *Arachnis labrosa* var. *zhaoi* (Orchidaceae): A new record for India. *Rheedea* 25(2): 120 – 122.
- Jamir, A.; Jamir, N.S. & Deb, C.R. 2015a. Three New Distributional Records of Orchid from Intangk National Park, Nagaland, India. *Int. J. Res. Studies Biosci.* 3(6): 7 – 9.
- Lawler, L.J. & Rao, A.N. 2002. Medicinal uses of orchids in some Asian countries. *J. Trop. Med. Pl.*3(1): 73 – 88.
- Mabberley, D.J. 1998. *The Plant Book* (2ndEdn.). Cambridge University Press, Cambridge. Madras.
- Odyuo, N.; Deori, C. & Daimary, R. 2016a. *Panisea panchaseensis* (Orchidaceae): an addition to the flora of India. *Richardiana* 16: 141 – 145.

- Odyuo, N.; Deori, C. & Daimary, R. 2016b. *Coelogyne calcicola* (Orchidaceae): an addition to the flora of India. *Richardiana* 16: 343–346.
- Odyuo, N.; Deori, C. & Daimary, R. 2017. *Dendrobium tuensangense*, a new species of Orchidaceae from Nagaland, Northeast India. *Phytotaxa* 311(2): 185–189.
- Rao., C.K.; Geetha., B.L. & Geetha., S. 2003. *Red List of Threatened Vascular Plant Species in India*. Compiled from the 1997 IUCN red list of threatened plants. *ENVIS, Botanical Survey of India* Ministry of environment & forests. Dehradun.
- WCSP. 2017. Kew Royal Botanic Gardens. World Checklist of Selected Plant Families. URL: <http://apps.kew.org/wcsp/home.do> (*Accessed*: May, 2017).