



An Account of Epiphytic Orchids of Nainital in Relation to Their Host Specificity

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ABSTRACT: Orchids are highly evolved and specialized group of flowering plants belonging to family Orchidaceae. It is the second largest family of the flowering plants in the world with more than 24,000 species of perennials that includes terrestrial, saprophytic, lithophytic and epiphytic species. The present work is based on the systematic epiphytic orchids observations based on habit, habitat, colour of flower, flowering period and detailed morphological features. Twenty-two epiphytic orchid species belonging to fifteen genera were recorded from Nainital area. The genera represented were *Dendrobium* (four species), *Aerides*, *Bulbophyllum*, *Eria* and *Oberonia* (two species each) while rests were represented by single species each. The host species such as *Quercus leucotrichophora* (6), *Sapium insigne* (5), *Syzygium operculatum*, *Bombax ceiba* and *Pyrus pashia* (4) supported maximum number of epiphytic orchids followed by the species *Syzygium cumini* and *Toona ciliata* (3). Four host species reported with single orchid species. Due to high anthropogenic pressure and changing environmental conditions resulted in vulnerability of these species. Therefore, regular monitoring of the species, mass scale propagation and creating awareness among the local inhabitants are suggested.

Keywords: Orchidaceae; saprophytic; epiphytic; monitoring and propagation.

INTRODUCTION: Orchids comprise unique assemblage of highly advanced monocotyledonous plants. Orchids are the most diverse group of flowering plants; estimated number of species ranges from 17,000 to 35,000 (Dressler, 1981). About 73 percent of the orchid species are epiphytes (Atwood, 1986), and contribute significantly to the epiphytic plant communities in the tropical forests. The Indian Himalayan Region (IHR) supports about 8,000 flowering plants and family Orchidaceae is one of the species rich families of angiosperms (Samant, 2002; Singh and Hajra, 1996). In India, 9% of flora (1300 species and 140 genera) is composed of orchids and is present predominantly in temperate Himalaya (Yonzon et al., 2010). These are terrestrial, epiphytic and saprophytic in nature and are cultivated for beautiful flowers and widely known for their economic importance but less for their medicinal value. The diversity of orchids decreases from North East to North West Himalaya (Chowdhery and Agarwal, 2013; Deva and Naithani, 1986; Samant et al., 1995 Samant, 2002). Uttarakhand with about 237 species ranks fifth among the Indian states in terms of orchid richness. State is blessed with different and unique species of orchids (Pangtey et al.,

1991). The distribution of the orchids within state, however, is extremely patchy, they are mainly concentrated along the riverine areas and pockets of moist forests (Jalal, 2005). The changing environmental conditions, land use patterns, over grazing, fodder purposes, over-exploitation and expanding urbanization have resulted in shrinkage and degradation of natural habitats causing threat to floristic diversity, including orchids. In view of the importance of orchids in various ways the present study has been conducted in and around of Nainital area of Uttarakhand with a view to: i) Identify and document the epiphytic orchids; ii) Identify their host species and distribution; and iii) Suggest conservation & management options.

MATERIALS AND METHODS:

Study Area: Present study is carried out in Nainital and its surrounding areas. Nainital catchments lies between 29° 19'-29° 28' N latitudes and 79° 22'-79° 38' E longitudes in the Kumaun Himalaya (Figure 1). The entire area is hilly with an altitudinal range up to 2200m asl. The study area experiences between subtropical to temperate climate on high elevation. Rain-fall begins earlier in the month of June and continues

up to the end of September. Nainital records heavy rainfall in these months mainly because of the local rain. Predominantly occurred plant species composed of temperate genera, such as - *Quercus leucotrichophora*, *Quercus semicarpifolia*, *Rhododendron arboreum*, *Acer oblongum*, *Cedrus deodara* Roxb., but in catchments of lower lakes at 1200-1400m altitudes tropical and subtropical plants such as species of *Bauhinia variegata*, *Butea* Roxb. and *Pinus roxburghii* Roxb. Forests are also reported. These species are also seen running down as low as 1100 m in elevation in moist ravines and form more or less distinct altitudinal zones.

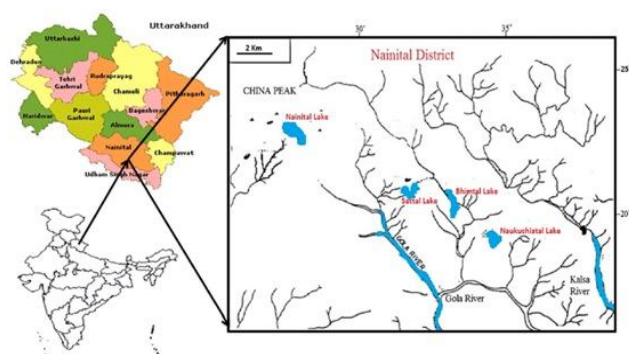


Figure 1: Map of the study area.

Surveys, Samplings, Identification and Data Analysis: Extensive field survey was conducted during 2014 in Nainital and surrounding areas. Rapid sampling was done along the topographical gradients i.e., altitude, habitat and aspect for the survey of orchids. For epiphytic orchids in each locality, altitude, host species and their bark types were recorded. In each host species the numbers of epiphytic orchid species were counted. Host species were identified using standard flora and by comparing with herbarium specimens. For identification of orchid species, several referral works including (Anonymous, 1883; Deva and H. B. Naithani, 1986; Duthie, 1906; Jalal 2005; King and Pantling, 1898; Kumar and Manilal, 1994; Misra 2007; Pangtey and Samant, 1991; Pangtey et al., 1991; Polunin and Stainton, 1984; Vij et al., 1983; were used. Threat categories of the species have been identified based on habitat preference, population size, distribution range and use values (Rana and Samant, 2010).

RESULTS AND DISCUSSION: Twenty-two epiphytic orchid species belonging to fifteen genera were recorded from Nainital area (Table 1). This diversity represents 40% of the orchids reported from Nainital area. The genera represented were *Dendrobium* (four species), *Aerides*, *Bulbophyllum*, *Eria* and *Oberonia* (two species), *Coelogyne*, *Gasrtorchilus*, *Kingidium*,

Luisia, *Ornithochilus*, *Pholidota*, *Rhynchostylis*, *Smithandia*, *Thunia* and *Vanda* one species each (Figure 2). The host species such as *Quercus leucotrichophora* (6), *Sapium insigne* (5), *Syzygium operculatum*, *Bombax ceiba* and *Pyrus pashia* (4) supported maximum number of epiphytic orchids followed by the species *Syzygium cumini* and *Toona ciliata* (3). However four host species reported with single orchid species. Species such as *Aerides multiflora*, *Aerides odorata*, *Rhynchostylis retusa*, *Dendrobium amoenum*, *Pholidata articulate* and *Smitihandia micrantha* have wide range of host species (Figure 3). However two species *Oberonia ensiformis* and *Oberonia pachyrachis* reported only in single host. *Pinus roxburghii* was also reported as host may be due to high humidity in this region. The species with maximum number of hosts are widely distributed and hence are less vulnerable to change in environment where as the species that have single hosts are the most vulnerable and locally rare orchid species in the study area. The major threats are destruction of riverine habitats, extraction of fodder and fuel from the host plant, attack of wild animals, misuse of the beautiful orchids just for ornamental purpose etc.

Table 1: List of epiphytic orchid species.

S.No.	Species	Habit
1	<i>Aerides multiflora</i> Roxb.	E&L
2	<i>Aerides odorata</i> Lour.	E&L
3	<i>Bulbophyllum cariniflorum</i> Rchb. f.	E
4	<i>Bulbophyllum polyrhizum</i> Lindl.	E
5	<i>Coelogyne cristata</i> Lindl.	E&L
6	<i>Dendrobium amoenum</i> Wall.ex Lindl.	E&L
7	<i>Dendrobium bicameratum</i> Lindl.	E
8	<i>Dendrobium crepidatum</i> Lindl.	E
9	<i>Dendrobium primulinum</i> Lindl.	E
10	<i>Eria lasiopetala</i> (Willd.) Ormerod	E&L
11	<i>Eria spicata</i> (D.Don) Hand.-Mazz.	E&L
12	<i>Gasrtorchilus calceolaris</i> (Buch.-Ham. ex Sm.) D.Don	E
13	<i>Kingidium taeniale</i> (Lindl.) Hunt	E
14	<i>Luisia tristis</i> (G.Forst.) Hook.f.	E&L
15	<i>Oberonia ensiformis</i> (J. E. Sm.) Lindl.	E
16	<i>Oberonia pachyrachis</i> Rchb.f. ex Hook.f.	E&L
17	<i>Ornithochilus difformis</i> (Wall.ex Lindl.) Schltr.	E
18	<i>Pholidata articulata</i> Lindl.	E&L
19	<i>Rhynchostylis retusa</i> (Lindl.) Blume	E&L
20	<i>Smitihandia micrantha</i> (Lindl.) Holtt.	E
21	<i>Thunia alba</i> (Lindl.) Reichb.	E&L
22	<i>Vanda cristata</i> Lindl.	E

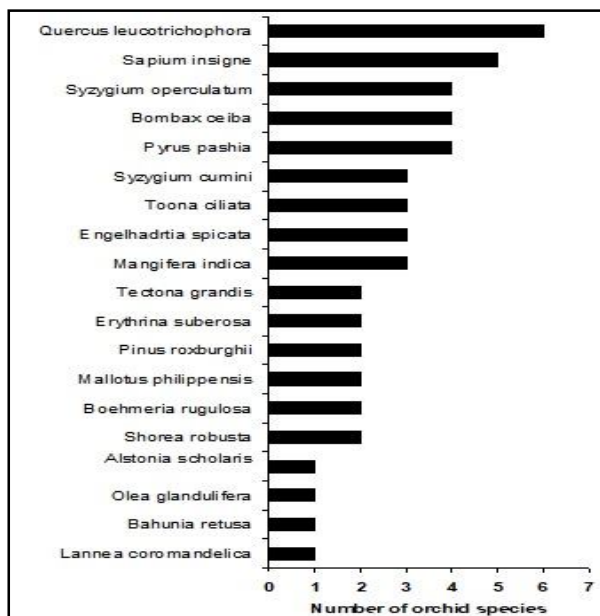


Figure 2: Host species of epiphytic orchids.

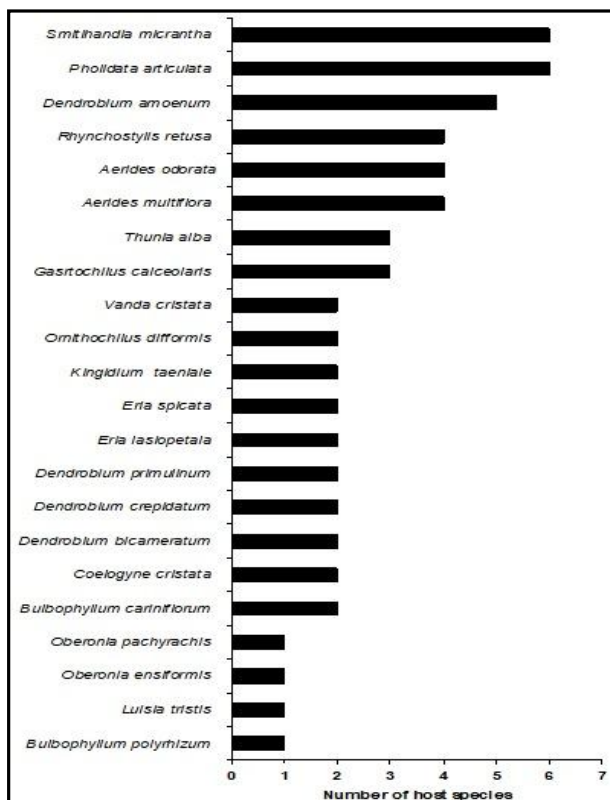


Figure 3: Epiphytic orchid species in relation to host species.

Himalayas are blessed with unique range of floristic diversity. Orchids of Utrakhnad specially the study area are at continuous threat due to high anthropogenic and climatic pressure. Extraction of plant for fodder and ornamental purposes, attack by the wild animals, and large scale exploitation of forests for

tourism related activities are main reasons which leads toward the phase of extinction of these unique species. Orchids are very sensitive to ecological changes. Proper and repetitive monitoring of study sites is required to suggest suitable management plans. Participation of local inhabitants is must to raise awareness among them about their conservation. Mass scale propagation of the orchids by in-situ and ex- situ conservation strategies is need of the hour.



Dendrobium amoenum



Aerides multiflora



Vanda cristata

CONCLUSION: The present study highlights the diversity and distribution of epiphytic orchids with correlation to their host species. High humidity and temperature favour the growth of diverse epiphytic orchids in the area. Continuing resource degradation in the mountains has led to a growing concern and a sense of urgency in the context of seeking strategies, which can ensure the sustainability management and conservation of forests. There is an urgent need to conduct a proper population monitoring program to

design orchid conservation plans. Establishment of orchid seed bank and germ plasm banks and conservation of seeds is the most effective means of genetic conservation (Gajendra et al., 2009). Orchid conservation areas can be developed for tourists and college students so that they can visit these areas during their educational trips and sense the urgency of their conservation.

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