

Terrestrial Orchid Diversity in Sharavati River Valley of Shimoga District Karnataka (India)

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Abstract

Sharavati is a river which originates and flows entirely within the state of Karnataka in India. Sharavati river valley is the one of the most beautiful valley in the Western Ghats. Extensive field surveys during 2018-2020, revealed the occurrence of 25 species of orchids under 13 genera in river basin region in Shimoga district. Habenaria with 9 species is the largest genus in the river basin region, followed by Nervilia with 3 species; Malaxis, Peristylus are 2 species each and the remaining genera by a single species each. The habit, distribution, phenology and population status of terrestrial orchid species is presented in this paper. Efforts have also been initiated for their conservation at Sharavati river valley region in Shimoga district Karnataka.

Keywords: Sharavati river valley, *Habenaria* sp, Shimoga, Western Ghats

Introduction

The Orchidaceae is one of the largest and widespread families of flowering plants, with highly evolved and specialized plant character. The Orchidaceae have about 25,000-35,000 currently accepted species, distributed in about 600-800 genera (Arditti, 1977; Dressler, 1981). Eastern Himalaya and Western Ghats are the richest Orchid habitats in India. Recent researches shows about 1300 species distributed in 151 genera in India (Medhi et.al.2012). According (Rao, 1998) more than 46% of the known species of orchids are endemic to Western Ghats. In Karnataka Orchidaceae family represented by about 203 species and 59 genera (Krishnaswamy et.al.,2004a). Although its flowers present a relatively uniform structure, the organization of vegetative parts are notably variable among species (Dressler, 1993), such features allow the family to thrive in different environments, and increase the number of its different grow forms (Pabst and Dungs,1975). Cooke (1901-1908), Gamble (1915-1936) and Hooker (1872-1897) have also mentioned several orchids in Karnataka. Prashant, (2016) observed 15terrestrial orchids in Shimoga district. Orchids are mainly categorized into two types terrestrial and epiphytic forms, terrestrial orchid grow on

the ground and all orchids associated with an endophytic symbiotic fungus mainly in their roots. The terrestrial forms include those inhabit the floor of the forest growing under the shade. During the evolutionary process, the orchids have become adapted to distinct environments, so they can be classified into epiphytes, terrestrial, saprophytes or lithophytes (Black, 1973). The altitudinal variations and climatic changes shown the great diversity in the habit, which resulted in luxuriant and varied floristic composition.

Sharavati is a river which originates and flows entirely within the state of Karnataka in India. Sharavati river valley is the most beautiful valley in the Western Ghats. This valley is rich in biodiversity and is nestled in the central Western Ghats of Shimoga district. The total length of the river is around 128 km, river basin falls into two district of Karnataka namely Uttara Kannada and Shimoga. The hills all around the Sharavati river basin is covered with evergreen forests, semi evergreen forest, deciduous forest and grasslands. This place has attracted many scientists and naturalist to study the various flora endemic to this place. There are many species of plants which are endemic in this region. In the present work an attempt has been made to collect wild terrestrial orchid from various region of river valley from Shimogga district.

Materials and Methods

Study Area

Shimogga district is a part of Malnad region of Karnataka and is also known as the 'Gateway to Malnad'. There are seven talukas they are Soraba, Sagara, Hosanagara, Shimogga, Shikaripura, Thirthahalli and Bhadravathi. District situated between the latitudes 130 27' and 140 39' N and between the longitudes 74⁰ 38' and 76⁰ 04' at a mean altitude of 640 meters above sea level. Peak Kodachadri hill is at an altitude of 1343 meters above sea level is the highest point in the district. The annual rainfall in Shimogga district varies from 611.7mm. to 7337.9mm. The present study has been carried out in upper catchment area (Sharavati River) spread over Sagar, Hosanagara, and part of Theertahalli taluks of Shimogga district in Karnataka. Shimogga district is rich in diversity of flora and fauna. The District covers evergreen, semi-evergreen, deciduous, scrub forest, and grasslands.

Methodology

The present study was undertaken in Sharavati river basin Shimogga district during the year 2018-2020. Different types of available vegetation's are evergreen forest, deciduous forest, scrub forest, plantations areas, and grasslands. Frequent field visit has carried out in Sagara, Hosanagara, Theertahalli taluks of the district. Random field survey method is used for observing diversity offerrestrial orchidin river basin of Shimogga district. The plants were identified with the help of available manuals and floras (Gamble, 1935; Rao, 1998). Important aspects were recorded and photographs were taken during field surveys.

Results and Discussion

Extensive surveys were planned in river valley, to assess diversity of orchid, many field visits were carried covering the most areas of river basin region, during different seasons were accomplished. In the present paper, an attempt has been undertaken to access the diversity of Terrestrial Orchids in Sharavati river basin of Shimogga district. In the present investigation, some of the orchids were reported for the first time in Shimogga district.

A total of 25 species of ground orchids belonging to 13 genera were documented in Sharavati river basin region from different type of vegetation. Some species were recorded only in grasslands of valley region. *Habenaria* was the dominant ground orchid found in all type of vegetation.

The evergreen to semi-evergreen habitats have rich terrestrial orchid flora except in mountain tops, ground orchid observed in the evergreen forests are *Dienia ophrydis*, *Epipogium roseum*., *Habaneria grandifloriformis*, *H. crinifera*, *H. elwessi*, *H. heyneana*, *H. longicorniculata*, *H. marginata*, *H. multicaudata*, *H. ovalifolia*, *Nervilia infundibulifolia*, *Nervilia plicata*, *Peristylus plantaginia*, *Platanthera susannae*, *Satyrium nepalensis*, *Tropidia angulosa*, *Zeuxinelongilabris*. In deciduous, scrub, grasslands early monsoon shower brings the growth of the ground orchid i.e *Habaneria grandifloriformis* and *Habenaria heyneana*. In deciduous forest highest ground orchids are observed after the evergreen forest they are *Habaneria grandifloriformis*, *H.longicorniculata*, *Liparis nervosa*, *Malaxis versicolor*, *Nervilia infundibulifolia*, *Nervilia plicata*, *Peristylus plantaginia*, *Platanthera susannae*, *Tropidia angulosa*, *Zeuxine longilabris*. Grass lands at lower or higher elevations are habitats for numerous species they are *Habaneria grandifloriformis*, *H.longicorniculata*, *Peristylus plantaginia*, *Peristylus spiralis*. Grasslands, evergreen to semi-evergreen forests, deciduous forest shows highest species richness then compares with scrub forest and plantation areas. The evergreen to semi-evergreen, grasslands, deciduous forests are important habitats serving as niche for rich ground orchid diversity. Many of the terrestrial orchid species such as *Habaneria grandifloriformis*, *Habenaria heyneana*, *Peristylus spiralis*, *Satyrium nepalensis* which comes in large carpets in both grasslands and scrub forest. The present study documents 25 species of orchids with majority of them are endemic to Western Ghats.

The rain will play a major role in the growth and development of most of the terrestrial orchid species. Ground orchid species start to produce leafy shoots on the onset of the rainy season. Terrestrial forms absorb their nutrition directly from the soil through the roots. Plant tubers have a capacity to survive in the dry season and nourish the plant when it is necessary conditions and produce new shoots in the upcoming rainy season. It is observed that the maximum number of species sprout out new shoots in the month of April to August. Species like *Liparis* and *Malaxis* sprout their shoots in February to March. During the present studies, it is found that a warm to high temperature with sufficient rainfall and moisture favour the sprout of new shoots in most of the species.

Terrestrial species passes a major portion of their life cycle in the vegetative phase. The initiation of flower in June marks the beginning of the reproductive phase of the life cycle. After full blooming in August-September, growth of the flower-bearing offshoot ceases and pod matures in August-October month. Some species like *Nervilia* sheds their seeds in April - May and *H. grandifloriformis* produce seeds in April - August. The chief mode of propagation in most of the species develops from the rhizome during May-June. A strong seasonality exists with respect to vegetative and reproductive phenology in terrestrial forms.

There are some threats alters the phenology of orchid species. Change in rainfall, collection of flowers from the wild, destruction of habitats, road construction, landslides, forest fires are the major causes for the depletion of terrestrial orchid diversity. In the basin region orchid species such as *Platanthera susannae* have ornamental value. Species of *Nervilia*, *Malaxis*, have medicinal properties. Due to ecosystem values, it is necessary to conserve in their original habitat, for their survival.

Conservation Measures

Traditional faiths are treasure house of the plant. Orchids are most wondrous creature of nature were found in almost all types of habitats in Sharavati river valley of Shivamogga district. 1) Conservation strategies such as cryopreservation, in situ, ex situ conservation, Orchidarium maintenance and community efforts assume great importance to save the orchid wealth of the river valley region. 2) More efforts are required to be taken for preparation of national inventory

of orchids, inventories from protected area, identification of rare and threatened orchid taxa to formulate effective conservation strategies. 3) Mass propagation by using conventional as well as tissue culture techniques would be an important strategy. In addition to this local communities and general public should be educated about the need for preservation and conservation of orchids.

Conclusion

Sharavati river basin falls in one of the megacentres of endemism harbouring diverse kinds of flora and fauna which are adapted to various kinds of habitats (Rao, 2005). Orchidaceae being one of the largest families of flowering plants. In the present research carried in Sharavati river basin of Shimoga district total 25 terrestrial orchid species were observed belongs to 13 genera. Phenology of the all ground orchids were studied. In the present studied species, all species produces new shoots during the onset of monsoon, produces new shoots and flowers, fruits at different time period to different species.

Rapid changes in the habitat and microhabitat conditions owing to recent developmental projects have caused depletion of ground orchids in this valley. Many species have either become rare or endangered and restricted to a few specialized habitats. The major threats are destruction of riverine habitats, grazing, fire and excessive demand for fuelwood and timber. For saving this advanced beautiful group of plants, it is necessary to identify suitable conservation measure and needs high priority for their conservation.

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Table 1 Diversity and Phenology of Terrestrial Orchids in Sharavati River Valley Region

Sl. no	Genus	Species
1.	<i>Dienia ophrydis (J.Konig)Seidenf</i>	May- September
2.	<i>Epipogium roseum.</i>	December-March
3.	<i>Geodorum densiflorum (Lam.)Schltr</i>	April- September
4.	<i>Habenaria grandifloriformis Blatt.&McCann</i>	April- August
5.	<i>Habenariaplantaginea</i>	June-September
6.	<i>Habenaria crinifera Lindl</i>	April-October
7.	<i>Habenaria elwessi Hook.f.</i>	April-october
8.	<i>Habenaria heyneana Lindl.</i>	April-october
9.	<i>Habenaria longicorniculata J.Graham</i>	June-october
10.	<i>Habenaria marginata Colebr</i>	June-september
11.	<i>Habenaria multicaudata Sedgw</i>	June-september
12.	<i>Habenaria ovalifolia Wight</i>	June-september
13.	<i>Liparis nervosa (Thumb.)Lindl</i>	April-august
14.	<i>Malaxisrheedii</i>	June- October
15.	<i>Malaxis versicolor (Lindl.)</i>	April-october
16.	<i>Nervilia infundibulifolia Blatt.&McCann</i>	March-September
17.	<i>Nervilia plicata (Andrews)Schltr</i>	March-september
18.	<i>Nervilia praniana (King & Prantl)Seid &Smit.</i>	March-november
19.	<i>Odisha cleistantha S .Misra</i>	July-december
20.	<i>Peristylus plantagina (Lindl.)</i>	June-october
21.	<i>Peristylus spiralis A.Rich ,</i>	June-october
22.	<i>Platantherasusannae</i>	May-august
23.	<i>Satyrium nepalensis D.Don</i>	June-october
24.	<i>Tropidia angulosa</i>	June-September
25.	<i>Zeuxine longilabris</i>	August-December

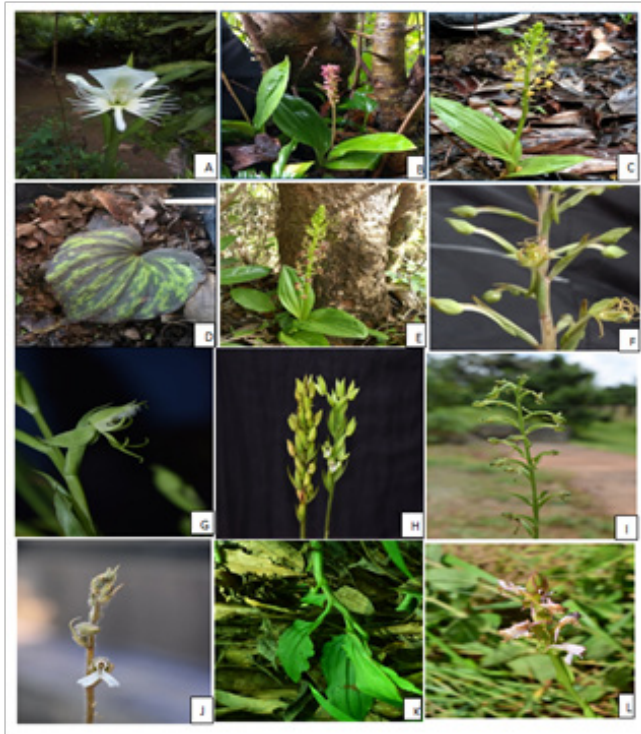
Table 2 Distribution of Terrestrial Orchids in Different Vegetation

Sl.No	Types of vegetation	Name of the orchid
1.	Evergreen	<i>Dienia ophrydis</i> , <i>Epipogium roseum.</i> , <i>Habenaria grandifloriformis</i> , <i>H.crinifera</i> , <i>H.elwessi</i> , <i>H.heyneana</i> , <i>H.longicorniculata</i> , <i>H.marginata</i> , <i>H.multicaudata</i> , <i>H.ovalifolia</i> , <i>Nervilia infundibulifolia</i> , <i>Nervilia plicata</i> , <i>Peristylus plantaginia</i> , <i>Platantherasusannae</i> , <i>Satyrium nepalensis</i> , <i>Tropidia angulosa</i> , <i>Zeuxinelongilabris</i> .
2.	Dry deciduous	<i>Habenaria grandifloriformis</i> , <i>H.longicorniculata</i> , <i>Liparis nervosa</i> , <i>Malaxis versicolor</i> , <i>Nervilia infundibulifolia</i> , <i>Nervilia plicata</i> , <i>Peristylus plantaginia</i> , <i>Platantherasusannae</i> , <i>Tropidia angulosa</i> , <i>Zeuxinelongilabris</i> . <i>Zeuxinelongilabris</i> .
3.	Scrubby	<i>Malaxis versicolor</i> , <i>Nervilia praniana</i> , <i>H.longicorniculata</i> , <i>Nervilia infundibulifolia</i> .
4.	Acacia plantation	<i>Nervilia praniana</i> , <i>Odisha cleistantha</i> .
5.	Grass lands	<i>Habenaria grandifloriformis</i> , <i>H.longicorniculata</i> , <i>Peristylus plantaginia</i> , <i>Peristylus spiralis</i> .

Figures 1



A. *Nervilia infundibulifolia* Blatt. & McCann B. *Malaxis versicolor* (Lindl.) C. *Peristylus plantaginia* (Lindl.). D. *Habenaria heyneana* Lindl. E. *Geodorum densiflorum* (Lam.)Schltr F. *Habenaria crinifera* Lindl. G. *Habenaria longicorniculata* J.Graham. H. *Habenaria marginata* Colebr. I. *Tropidia angulosa*. J. *Habenaria grandifloriformis* Blatt. & McCann K. *Nervilia praniana* (King & Prantl) Seid & Smit. L. *Peristylus spiralis* A.Rich



A. *Platanthera susannae* (L) B. *Dienia ophrydis* (J.Konig)Seidenf. C. *Liparis nervosa* (Thumb.) Lindl. D. *Nervilia plicata* (Andrews)Schltr. E. *Liparis odorata* (Wild.)Lindl. F. *Habenaria multicaudata* Sedgw. G. *Habenaria elwessi* Hook.f. H. *Odisha cleistantha* S . Misra, (*Habenaria peloriodes* non E.C.Parish & Rchb.F.) I. *Habenaria ovalifolia* Wight. J. *Zeuxine longilabris*. K. *Malaxis rheedii* L. *Satyrium nepalensis* D. Don