



Distribution of orchid species in Nepal: A comprehensive overview

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Abstract

Orchids are the most largest and diverse groups among angiosperms. Orchids are known to produce one of the most varied, fascinating, colorful and attractive flowers in the whole plant kingdom. Orchids are perennial or rarely annual, epiphytic, terrestrial or lithophytic herbs with root which have multi-layered spongy tissue. They are capable of absorbing and storing considerable quantity of moisture. Due to their beautiful flowers, long blooming period, orchids have become great favorites in the horticultural trade and for internal decoration. We discuss about the orchids distribution in Nepal and their importance in this paper.

1. Introduction

Orchids are the most largest and diverse groups among angiosperms. Orchids are known to produce one of the most varied, fascinating, colorful and attractive flowers in the whole plant kingdom. Orchids are perennial or rarely annual, epiphytic, terrestrial or lithophytic herbs with root which have multi-layered spongy tissue. They are capable of absorbing and storing considerable quantity of moisture. Due to their beautiful flowers, long blooming period, orchids have become great favorites in the horticultural trade and for internal decoration.

Orchids have been used in traditional medicine in an effort to treat many diseases and ailments. They have been used as a source of herbal remedies in China since 2800 BC. *Gastodia elata* is one of the three orchids listed in the earliest known Chinese *Materia Medica*. Theophrastus mentions orchids in his *Enquiry into Plants* (372–286 BC). In recent years, a number of studies have been published on anticancer activity of the chemical moscatilin, which is found in the stems of the orchid species *Dendrobium*. Some plants like *Dendrobium crumenatum*, *Eulophia campestris*, *Orchis latifolia*, *Vanda roxburghii* and *Vanda tessellata* have been documented for their medicinal value. Phytochemically some orchids have been reported to contain alkaloids, glycosides, flavonoids and stilbenoids. Ashtavarga (group of eight medicinal plants) is vital part of Ayurvedic formulations like Chyavanprasha and four plants viz, Riddhi, Vriddhi, Jivaka and Rishbhaka have been discussed as possible members of family Orchidaceae. In Nepal, local use the paste of the rhizome of the orchids for the healing of injured wounds.

Eria pokharensis is one of the two endemic orchids of Nepal which is known to be found at an altitude of 900-1000 m. The flowering time for this species varies from Chaitra to Ashar. It is an epiphyte erect with pseudo bulb covered with membranous leaf sheath and of yellowish white colour. Similarly *Panisea panchasenensis* is the other endemic orchid of Nepal with short creeping rhizome, imbricate scales on young shoots. The species is endemic to lower temperate forest in the Panchase area, Kaski. The flowering time varies from Kartik to Poush and confined to an altitude of 2200-2500 m. The common associate trees are *Quercus* spps, *rhododendron* spps.

The genus *Panisea* (Lindl.) Lindl. (Orchidaceae, Epidendroideae, Coelogyninae) consists of 10 species (Gravendeel *et al.*, 2005; Averyanov and Averyanova, 2006) ^[2]. These species are distributed

from the Indian subcontinent to south-east Asia. The genus is easily recognized by the pseudobulbs consisting of a single internode, convolute or duplicate leaves, terminal inflorescence often produced before growth of the pseudobulbs, resupinate flowers, lip with more or less sigmoidly curved base with completely absent or only small side lobes (this character is its main diagnostic feature within the Coelogyninae), a 'petaloid' apex of the column hooded over the anther, and entire stigma. In 2002, the first author came across an interesting specimen of *Panisea* which was collected from the Panchase forest in central Nepal. This species was found in the same habitat where *Panisea demissa* Lindl. Occurs as common species. The specimens looked very different in plant habit and flower morphology as compared with *P. demissa*. However, due to limited flowering material, it was impossible to properly investigate the taxonomic identity. In 2007, additional explorations were carried out in the same area and more flowering specimens were located. A study of herbarium specimens of similar species of *Panisea*, a detailed literature review and DNA sequencing were carried out to investigate whether the specimens from the Panchase forest represented an hitherto undescribed species, (A. Subedi, 2007) ^[2].

Recently Government of Nepal has completely banned the collection and transportation of orchids from natural forest area. Hence, it is growing concern that conservation steps need to be taken for the sustainability of orchids. For this 'orchid conservation action plan' need to be prepared. This type of plan preparation requires complete baseline information regarding status, distribution, habitats, and threats of orchids and the formal research proves to be very fruitful for this purpose.

2. Facts about orchids

Orchids represent one of the largest, successful and diverse groups of flowering plants which belong to family Orchidaceae, in the plant group the Monocotyledon. The orchid family is regarded as one of the largest, most diverse and distinctive families in the flowering plant kingdom with estimates of about 20,000 to 35,000 species in the world. They are found in wide array of ecological conditions, except in marine environments and habitats with extreme cold throughout the year. (Acharya *et al.*, 2010) ^[3]. The plants are terrestrial, epiphytic, lithophytic and saprophytic in habitat. In Nepal, nearly 388 orchid's species within 99 genera are reported. Environmental conditions associated with altitude exert a large influence on orchid species composition and their distribution. Regarding the number of orchids found in Nepal, different authors mentioned different figures. For example, in Annotated Checklist of the Flowering Plants of Nepal mentioned 89 genera and 323 species in Beautiful Orchids of Nepal mentioned 97 genera and 363 species. in Orchids of Nepal: A Checklist mentioned 100 genera and 377 species in The Orchids of Nepal mentioned the number to be 102 genus and 388 species. This shows more recent the publication, higher the number of orchids. However, some authors mentioned synonyms in their publication. KP Acharya have compiled total number of orchids found in Nepal with the help of many literature. The total number of orchids found in Nepal is 492 (this includes 454 species, 30 varieties, 6 subspecies and 2 forma). These species fall within 104 genus.

3. Problem Statement and Justification

Orchids are the threatened species which are listed in the Appendix II of CITES. Habitat destruction and poaching are the great threats to the sustainability of orchids. Habitat degradation and destruction can lead to the extinction of any species from an area (Prasai *et al.*, 2021) ^[18].

Poaching of orchids is done heavily due to its high ornamental and medicinal value and it is done by those who have link to the foreigners. They are mostly poached to the Tibet and India. The main causes of these threats are lack of awareness among the local/community people. If the scientific evidence for the medicinal properties of the orchids could be explored then motivating the people towards the cultivation of orchids in the ex-situ and conserving it in-situ will help for the sustainability of orchids. It will also help to reduce the import of medicines from the foreign countries and hence save the national currency.

Orchids are well known not only for their ornamental value, but also for their uses in herbal medicine. The use of orchids as medicine has a very long history and the Chinese were the first to use them as herbal medicine. The presence of phytochemicals such as alkaloids, flavonoids, glycosides have made orchids valuable as medicine.

For any natural resource management it is very important for the managers to be fully equipped with the total information about the resource present in its site. In case of threatened species the information should be available on the present existing stock as well as the threats to it and its habitat preference too. This information cannot be obtained until formal research is carried out. To implement the policy regarding the conservation of threatened species it is very necessary to know the total information of the resource.

4. Present status of knowledge

NTFP includes forest products other than timber, fuelwood and fodder. Some 80% of the populations of the developing countries depend on NTFPs for their primary health care, nutritional needs and income generation (FAO, 2000). This is particularly true to a country like Nepal where alternative economic opportunities are limited. Edward (1996) ^[6] categorizes NTFPs in Nepal into three major groups; those used for subsistence, those used for industries inside the country, and those that are exported. According to MPFS, Nepal (HMG/N, 1988), income from the forestry sector amounts for 15% of the GDP. Likewise NTFP can contribute around 5% of the GDP of Nepal (Malla *et al.*, 1995) ^[15]. Conservation and sustainable utilization of these NTFP could be thought of as a means of poverty alleviation (Tenth Five Year Plan, 2003-2007).

Orchids are found in almost all kinds of habitats from tropical and subtropical forests to alpine meadows. Nepal with its unique geographical position and climate offers excellent growing conditions for orchids. As a result about 388 species of orchids under 99 genera have been reported from this country. All Nepalese orchids are considered beautiful and most of them especially epiphytic ones have very attractive flowers.

The wild orchids having high horticultural values especially in the cross national sectors are posing a continuous threat to wild populations in the forests. As a result, the wild habitat is perceived to be depleting because of habitat destruction. Protected areas can play a major role in protection of

biodiversity because within these areas there is a restriction of collection of these species. In the case of medicinal orchid species, there is negative correlation between number of protected areas and number of medicinal orchid species. Maximum numbers of protected areas are found at about 3000 to 3500 msl. But, diversity of maximum number of medicinal orchids is found below this elevational range. This shows that our conservation efforts are less focused towards orchids (Acharya KP and Rokaya MB, 2010.)^[3]. Protected areas are located at higher elevations where diversity of plants is less (Hunter and Yunzon, 1993)^[10]. Along with this, there is no complete checklist of orchids distributed in each protected areas.

5. Conclusion

The investigation of the *Panisea* specimens from Panchase Forest revealed distinct differences from *Panisea demissa*, highlighting a potentially new species. However, the limited availability of flowering material initially hampered accurate taxonomic identification. Further research, including additional fieldwork and DNA analysis, confirmed the unique characteristics of these specimens. As the Government of Nepal has enacted a ban on orchid collection and transportation from natural areas, it underscores the urgent need for an 'orchid conservation action plan'. This plan should be based on comprehensive baseline data about the orchids' status, distribution, habitats, and threats, to ensure effective conservation and sustainable management.

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