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A NEW RECORD OF *CYMBIDIUM GOERINGII* (RCHB.F.) RCHB.F. (ORCHIDACEAE) FOR THE FLORA OF HIMACHAL PRADESH, NORTHWESTERN HIMALAYAS, INDIA

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Abstract

Cymbidium goeringii (Rchb.f.) Rchb.f. is reported for the first time from Himachal Pradesh. It is a terrestrial herb; roots thick and fleshy. Pseudobulbs small, ovoid, enclosed in bladeless sheaths. Leaves 5-7, narrowly elliptic, linear, acute, margins serrate, 40-80 × 0.2-1.0 cm. Inflorescence erect, 1-flowered; peduncle slender. The detailed morphological description, distribution, species associates, ecology, and conservation status is provided.

Introduction

THE HIMALAYAS has attained a unique position owing to its large altitudinal range, steep gradient, diverse habitats, snow capped mountains, complex geological structure, and rich flora. The Indian Himalayan region (IHR) as a whole supports nearly 50% of the total flowering plants in India, of which 30% flora is endemic to the region. It is one of the mega diverse regions of India and supports about 8,500 flowering plants (Singh and Hajra, 1996). This region is one of the largest vaults of orchids. Orchidaceae is considered as the second largest family of flowering plants, with estimates of 705 genera (POWO, 2023) and 29,481 species (WFO, 2023) with more than 1,50,000 man-made hybrids (De and Pathak, 2020; Prakash and Pathak, 2020a). These plants rank amongst the most significant ornamental plants, known for the beauty, colour combinations, and shape of their flowers and have always been interesting to evolutionary biologists because of their remarkable floral forms and diversity in pollination systems (Prakash and Pathak, 2020b, 2022). Orchids are widely distributed in the tropical, sub-tropical, temperate, sub-alpine, and alpine regions in all continents except Antarctica, but reach their maximum diversity in the humid tropical regions. Orchidaceae covers the 6.8% of the flowering plants in India (Samant, 2002) along with over 1,256 species belonging to 155 genera (Singh *et al.*, 2019).

Earliest botanical exploration of orchids in the Himalaya was started by Thomas Hardwicke, the first European to collect plants during 1796. J.F. Royle in 1839 made extensive collection of plants from Kashmir to Himachal Pradesh and Garhwal. Systematic studies on the orchids in Himalayas have so far been carried out by a few workers while exploring the flora (Akhtar *et al.*, 2011; Chowdhery and Wadhwa, 1984; Deva and Naithani, 1986; Jaryal *et al.*, 2021; Pangtey *et al.*, 1991; Prakash and Pathak, 2019; Verma *et al.*, 2021; Vij *et al.*, 2013).

The genus *Cymbidium* is one of the most popular and widely cultivated genera, with about 86 accepted species ranging from terrestrial to epiphytic or lithophytic habit (POWO, 2023). The genus derives its name due to shape of its lip from Greek word, *kymbes* (boat shaped). Species of this genus are naturally distributed in Japan, China, Korea, India, Malaysia, Vietnam, Borneo, Nepal, Taiwan, Philippines, Thailand, New Guinea, Sri Lanka, Myanmar, and Australia (Bose *et al.*, 1999; Misra, 2007). In India, majority of the species are concentrated in Eastern Himalayas (David and Phillip, 2007) and represented by 25 species (Singh *et al.*, 2019), out of which 8 are reported from Himalayas (Samant, 2002, 2009). Only one species *i.e. Cymbidium macrorhizon* Lindl. has been reported from NorthWestern Himalayas (Jammu & Kashmir, Ladakh; Himachal Pradesh) and eight species *i.e. Cymbidium aloifolium* (L.) Sw., *C. bicolor* Lindl., *C. cyperifolium* Wall. ex Lindl., *C. eburneum* Lindl., *C. erythraeum* Lindl., *C. hookerinum* Rchb.f., *C. iridoides* D.Don, *C. macrorhizon* Lindl. were reported from Western Himalayas [Uttrakhand (Kumaun and Garhwal region)] (Jalal *et al.*, 2008; Pangtey *et al.*, 1991; Samant, 2002, 2009).

Cymbidium plants are sympodial and grow up to the height of 30-60 cm. Plants bear long, narrow flag-like foliage and produce racemes as high as 60 cm, with arching sprays, and coloured waxy flowers. Stems of the plant are short, rarely elongated, and have ovoid pseudo-bulbs. The scape is loosely sheathed, with flowers often large in a sub-erect or dropping raceme.

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Structural Diversity, Distribution Pattern and Regeneration of Forest communities in Shivalik Hills, Himachal Pradesh, North Western Himalaya

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ABSTRACT: Shivalik hills of the Himachal Pradesh are blessed with divine floral and faunal wealth. Forests of these hills provide life support not only to the people of Himachal Pradesh, but also to those in the plains. The present study has been conducted in the seven districts of Himachal Pradesh, to evaluate the diversity and distribution of vegetation in different forest types and their regeneration pattern. Surveys were conducted between 300-1500 m amsl in all districts of Shivalik in all the seasons of the years from 2015-2018. Standard ecological methods were followed for collection and processing of field data. Total 33 communities have been identified based on Importance Value Index and relative density. Out of 33 communities, 32 were tree communities while 01 community was of shrub. Maximum sites were represented by *Pinus roxburghii* (40 sites), followed by *Acacia catechu* (13 sites), *Eucalyptus tereticornis* (11 sites) and *Shorea robusta* (10 sites). From the identified tree communities, total tree density was ranged from 160-1015 Ind ha^{-1}; total basal area ranged from 0.54-105.17 m^2 ha^{-1}; total shrubs density from 570-2180 Ind ha^{-1}; total herbs density from 25.06-61.1 Ind m^{-2}; total saplings density from 140-1375 Ind ha^{-1} and total seedings density from 150-1035 Ind ha^{-1}. Species richness among all the identified communities ranged from 30-262. Species diversity ($H^{'}$) for trees ranged from 0.48-2.41, saplings, 0.98-3.36, seedlings, 0.06-2.31, shrubs, 1.26-3.65 and herbs, 2.14-3.43. Concentration of dominance for trees ranged from 0.10-0.80, saplings, 0.06-0.66, seedlings, 0.09-0.68, shrubs, 0.05-0.44 and herbs, 0.02-.015. Seven (07) communities were identified with highest regeneration of dominant species, 05 communities were identified under highest regeneration of co-dominant species, 07 communities were identified under poor regeneration of dominant and co-dominant species and rest 14 communities were identified under mixed forest communities with highest regeneration of one species. Of the total species, recorded 151 were found native to Indian Himalayan Region. Natural and anthropogenic activities, habitat degradation and biological invasion across Shivalik hills are major causes for the loss of floristic diversity. Continuing degradation of floristic diversity in the region has led to a demand of growing concern and a sense of urgency in the context of seeking strategies, which can ensure the sustainability management and conservation of forests.

Keywords: Shivalik, Invasive, Monitoring, Management, Species diversity.

INTRODUCTION

The Himalaya is one of the largest mountain system in India and believed to be only 40 million years old (Balokhra, 2015). The Indian Himalayan region occupy a special place in the mountain ecosystems of the world. These geodynamical young mountains are not only important from the standpoint of climate but also a provider of life, giving water to a large part of the Indian subcontinent, but they also harbour a rich variety of flora, fauna, human communities and cultural diversity. Himalayan region represents unique tropical, sub-tropical, temperate, sub-alpine, alpine and tundra vegetation. The Indian Himalayan Region (IHR) spreads over 2 Union territories (UTs) and 11 states namely Jammu and Kashmir and Laddakh Union territories and Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram and hilly regions of Assam and West Bengal states, and contributes about 16.2% of India's total geographical area. The IHR comprises of 1,748 medicinal plants (Samant *et al.*, 1998), 675 wild edibles (Samant and Dhar 1997), 155 plants of sacred belief (Samant and Pant 2003), 118 essential oil yielding

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Diversity, endemism, indigenous uses and threat status of medicinal plants in Shivalik Hills of Himachal Pradesh, North Western Himalaya, India

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ABSTRACT

Indian Himalayan Region is known globally since the Vedic time for its rich resources. Due to less accessibility to basic facilities, communities of the Himalaya are well adopted with forests for curing various ailments. The present study has been conducted in Shivalik Hills of Himachal Pradesh. A total of 330 medicinal plants belonging to 85 families and 263 genera were recorded. 40 species were native to the Himalayan Region and 27 species were native to the Himalayan Region and other biogeographical regions, together, 01 species was endemic, 23 species were near endemic. Leaves, roots and whole plants were utilized in majority of cases. The analysis revealed that maximum species were used for fever, skin diseases, cough, dysentery and stomach problems. *Acorus calamus, Berberis asiatica, Cheilocostus speciosus, Cinnamomum tamala, Gloriosa superba, Pittosporum eriocarpum, Rauvolfia serpentina, Terminalia chebula*, etc. were identified as threatened species. Due to habitat degradation, biological invasion, over-exploitation and changing environmental conditions, the populations of these medicinal plants are facing high pressures. Therefore, identification of Medicinal Plants Conservation Areas (MPCAs), frequent monitoring of habitats, extraction trend of medicinal plants, education, awareness and participation of the local inhabitants have been suggested.

INTRODUCTION

For centuries, India is known for its rich Vedic culture all over the world. From Vedic times to date, use of natural plants especially medicinal plants of forest origin holds great promise to strengthen the health of people who are dependent on them. Although in the race of modernization traditional practices of using medicinal plants are lagging. Around 65% of Indian population depends on traditional medicine system for curing various diseases (Timmermans, 2003). While at world level, mainly in developing countries, 75-80% of the population depends upon herbal medicines (Kamraj, 2000).

Globally, Indian Himalayan region is blessed and recognised with one of the oldest, richest and most diverse cultural traditions associated with the use of floristic diversity for day-to-day purposes. Indian Himalayan Region (IHR) extends from Jammu and Kashmir and Ladakh Union Territory in the North West to the Arunachal Pradesh in the East, and covers approximately 4,19,873 km^2 area (Rodger & Panwar, 1988). The majority of population in IHR lives in rural areas and are directly dependent on forest resources for their livelihood. Use of medicinal plants by ancient people like vaidhyas, and the handover of its uses from one generation to the next, gives us knowledge about plants surrounding us.

Forest areas of Himachal Pradesh are endowed with plants having useful medicinal properties, which are very well recognized by village people and even cure their ailments by such plants. Due to this, various pharmaceutical companies have extended their efforts to recognize and develop the worth of such plants, but still more efforts are required in this direction. Numerous plants with medicinal properties still exist whose potential is yet to be recognized and utilized for the benefit of mankind. Occurrence of 18,440 plant species in various habitats (Singh & Hajra, 1997), 1748 medicinal plants,

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