A NEW RECORD OF AN ENDANGERED AND ENDEMIC RARE REIN ORCHID Habenaria rariflora FROM GUJARAT, INDIA

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A new record of an endangered and endemic rare Rein Orchid 
Habenaria rariflora from Gujarat, India

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Abstract: Habenaria rariflora A.Rich., a species endemic to the southern and western parts of India, is reported for the first time from Gujarat State, western India. A detailed description and photographs are provided here for easy recognition in the field. Further, morphology, distribution, habitat, ecology, anatomy of leaf, rarity index, and conservation status of the species are provided.

Keywords: Anatomy, conservation, rarity Index, taxonomy.

So far, six species have been recorded from Gujarat, making it the largest terrestrial genus of the family for the state (Shah 1978; Anonymous 1996). During the orchid survey, a remarkable species of Habenaria was collected from Chinchali Village of Dang District. Various morphological characters of this species did not match with the previously documented species from Gujarat State (Suryanarayana 1968; Desai 1976; Shah 1978, 1983; Vora 1980; Raghavan et al. 1981; Reddy 1987; Bole & Pathak 1988; Anonymous 1996; Tadvi 2014). Hence, the systematic treatment of this taxon along with a detailed description, morphology, anatomy, photographs, ecological notes, rarity index, and conservation status has been provided here.

MATERIALS AND METHODS
Field survey and collection
In the course of ongoing taxonomic studies on the family Orchidaceae in Gujarat State, an interesting but unknown species of Habenaria was collected from Chinchali Village of the Dang District in September 2017. The district is located in the southeastern part of Gujarat and is part of the Western Ghats. It lies between 20.561–21.086N & 73.466–73.943E. The species was collected during the flowering stage and was photographed in its...
natural habitat as well as in the laboratory using various digital cameras (Nikon Coolpix P600, Nikon 5300). Details on habit, habitat, flowering, and fruiting period were recorded at the time of collection.

**Herbarium preparation and identification**

The species was studied for its gross morphological characters during the collection and critically examined under stereo zoom microscope for its detailed taxonomic identification. After a meticulous examination of its morphology and perusal of the relevant literature, the species was identified as *Habenaria rariflora* A. Rich. (Hooker 1890; Santapau & Kapadia 1964; Abraham & Vatsala 1981; Misra 2007). The description of vegetative and reproductive characters is based on live plants. All the representative parts for identification of orchids were collected and used for herbarium preparation. The prepared herbarium specimens were deposited at the Herbarium of The Maharaja Sayajirao University of Baroda (BARO) and Botanical Survey of India, Arid Zone Regional Centre, Jodhpur (BSJO).

**Anatomical study**

The matured and fresh young leaf samples of *H. rariflora* were fixed in FAA (Formaldehyde: acetic acid: ethanol 10: 5: 50, v/v/v) for preservation (Berlyn et al. 1976). The fixed samples were dehydrated with a graded series of TBA and processed for paraffin embedding (Johansen 1940; Ruzin 1999). Transverse sections of 15–20 µm thickness were taken using Leica rotary microtome (Leica RM 2035). The sections were stained with Safranin-Astra blue stain combination and mounted with DPX for permanent slide. The permanently mounted sectors on slides were observed and all the important features were photographed using a Leica DM1200 microscope coupled to an image capture system.

**Rarity status analysis**

Rarity index was calculated to assign a status to the species at the regional level (Jalal 2012). A statistical formula was developed considering five quantification parameters (Table 1). The rarity value of the species depends on all the five quantifiable parameters as mentioned in the below formula. The data were entered into an excel spreadsheet and summarized using descriptive statistics.

$$R = \frac{h^1 + s^1 + p^1 + p^2 + p^3}{5}$$

Where, $h^1$ = a number of habitats, $s^1$ = a number of sites in Gujarat, $p^1$ = distribution in India, $p^2$ = phytogeographical distribution within the Indian subcontinent, $p^3$ = phytogeographical distribution globally.

The scale of rarity index ranges from 1 to 5. Rarity ranking (Very Rare: 0.5–1; Sparse: 1.1–2; Occasional 2.1–3; Common: >3).

**RESULTS**

**Taxonomic treatment**


Lithophytic or terrestrial herb, 13.0–15.0 cm high with inflorescence. Tubers 1 or 2, small, ovoid or oblong. Leaves 3.0–5.0 × 1.1–1.8 cm, radical, oblong to lanceolate, broadly oblong, ovate to elliptic, or even ovate. Inflorescence 10–12 cm long, 1–4-flowered terminal racemes. Flowers 2.0–2.5 cm long, white,
pedicellate, bracteate. Bracts 1.9–2.2 × 0.7–0.8 cm, ovate to lanceolate, acute. Pedicel with ovary c 4.0 cm long. Sepals subequal, subacute; dorsal sepal c 1.0 × 0.6–7.0 cm, broadly ovate; lateral sepals c 1.1 × 0.6 cm, obliquely ovate, spreading, apical portions slightly decurved. Petals 2-partite; upper segment 0.8–1.0 × 0.4–0.6 cm, obliquely triangular–ovate; lower segment 1.0–1.3 cm long, filiform, acute. Lip c 1.5 cm long, tripartite from a little below middle; lateral segments scarcely 0.8–1.0 cm long, filiform or narrowly linear to subulate; mid segment 0.8–0.9 × c 0.2 cm, linear, subobtuse. Spur 4.5–4.6 cm long, curved, white. Column c 0.5 × 0.3 cm, oblong, rounded, greenish-white. Pollinia yellow, ovoid to oblong, caudicle slender. Capsules 2.0–3.0 cm long, strongly ribbed, beaked (Image 1).


Phenology: August (flowering) and September–October (fruited).

Distribution: This endemic species is reported to occur in Andhra Pradesh, Goa, Gujarat (present report), Karnataka, Kerala, Maharashtra, and Tamil Nadu (Figure 1).

Habitat and Ecology: The habitat is dominated by tropical moist deciduous vegetation with an average rainfall of 2,000mm. The species was found growing on vertical rocks and old walls along with grasses up to an elevation of 1,000m.

Only a few individuals were located from the site.

Anatomical study
In the transverse section, the leaf shows a crescent shape with a minor abaxial groove in the middle section.
The cuticle is thin and smooth followed by epidermis, ground tissues and vasculature (Image 3a). The leaf shows a single-layered epidermis with thin-walled cells. The abaxial epidermal layer is interrupted by superficial stomata (hypostomatic) having a cuticular extension and sub-stomatal cavity (Image 3b). Adaxial cells are usually larger than abaxial ones occupying half the volume of leaf (Image 3a,c). The anticlinal walls of adaxial epidermis are undulating (Image 3c). The outer cell wall is thicker compared to other cell walls which are generally flat to slightly round. Hypodermis and fibre bundles are absent in this species. The mesophyll layer comprises homogenous, thin-walled parenchymatous cells. It is 4–6 cells wide with comparatively smaller intercellular spaces. Raphide bundles are absent. Starch grains are the most common cellular inclusion (Image 3c). Vascular bundles are conjoint, collateral and closed with a larger one in the midrib and smaller in the side vein region. They are arranged in a single series across the blade. The vascular sclerenchyma is absent (Image 3a, d).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Documentation</th>
<th>Scoring (Quantification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Number of habitats (h¹)</td>
<td>A number of habitats in which each orchid species found were recorded.</td>
<td>Three habitats depending on how many habitats, a particular orchid occurred in.</td>
</tr>
<tr>
<td>2 Number of sites (s¹)</td>
<td>A number of sites in which each orchid found were recorded.</td>
<td>“1” for single site; “2” for &lt; 5 sites; “3” for &lt; 10 sites; “4” for &lt; 15 sites and “5” for &gt; 15 sites.</td>
</tr>
<tr>
<td>4 Phytogeographical distribution (p³)</td>
<td>Indian subcontinent (Bangladesh, Bhutan, Nepal, Pakistan, Sri Lanka)</td>
<td>Depending on how many species are spread in a particular region.</td>
</tr>
<tr>
<td>5 Phytogeographical distribution (p³)</td>
<td>Europe, Sino-Japan, China, Indo-Malaya, Africa, Australia, and North &amp; South America</td>
<td>Depending on how many species are spread in a particular region.</td>
</tr>
</tbody>
</table>


Image 3. Photomicrographs of a sector of leaf blade of H. rariflora: a—transverse section | b—hypostomatic stomata showing cuticular projection and sub-stomatal cavity | c—starch grains and undulating anticlinal walls of adaxial epidermis | d—midvein vascular bundle. Scale bars = 100µm.
Identification Key to the Habenaria of Gujarat

1a. Petals divided ................................................................................................................................. 2
1b. Petals undivided ............................................................................................................................ 4
2a. Plants with inflorescence up to 45cm tall, leaves spreading all along the stem, flowers greenish white ........ H. gibsonii
2b. Plants with inflorescence up to 12–55 cm tall, leaves radical, flowers white .............................................. 3
3a. Leaf solitary or occasionally two, cordate, appressed to the ground ............................................................ H. grandifloriformis
3b. Leaves few, oblong-lanceolate, not appressed to the ground ................................................................ H. rariflora
4a. Flowers white ........................................................................................................................................ 5
4b. Flowers green or yellow .................................................................................................................. 6
5a. Plants reaching up to 80–120 cm height, leaves 1–5, radical, spur equal to the length of ovary .................... H. plantaginea
5b. Petals undivided ............................................................................................................................. 6
6a. Leaves radical, clustered at base of stem, with narrow pale yellow margins, flowers yellow, spur geniculate, clavate at apex ................................................................................................................................. H. marginata
6b. Leaves clustered about middle of the stem, not margined, spur linear, incurved .............................................. H. furcifera

Rarity status

As per the present study and rarity status analysis, the species is considered as very rare as the rarity index value is 0.8 and the species is located only from the single locality.

Conservation status

Habenaria rariflora is an endemic terrestrial orchid of peninsular India. Based on the current survey and literature study it is revealed that the species is reported from seven different states of India (Figure 1). In the present study, only a few individuals were located from Chinchali Village of Dangs District in Gujarat State. The particular site is prone to soil erosion due to agricultural invasion and grazing. The ex situ conservation for this species has been made at Waghari Botanical Garden, Dangs and Maharaja Sayajirao University of Baroda, Vadodara. The species has not been evaluated for its threat status till date.

REFERENCES

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