LINDBERGIA SINENSIS (MÜLL. HAL.) BROTH., AN INTERESTING MOSS, NEW TO INDIA

LINDBERGIA SINENSIS (MÜLL. HAL.) BROTH., НОВЫЙ ДЛЯ ИНДИИ ИНТЕРЕСНЫЙ МОХ

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Abstract

Lindbergia sinensis (Müll. Hal.) Broth., an epiphytic moss of family Leskeaceae has been identified during survey and investigation of mosses of Garhwal Hills, Uttarakhand, Western Himalaya. Earlier, this species was reported from China and Russia. This is the first report of Lindbergia sinensis from India which constitutes a new record for Indian Moss flora. The species is described and illustrated here with gametophytic as well as sporophytic details.

Резюме

Lindbergia sinensis (Müll. Hal.) Broth., эпифитный мох из семейства Leskeaceae найден в результате изучения флоры мхов хребта Гарвал в штате Уттаркханд в Индии, в Западных Гималаях. Этот вид был известен ранее из Китая и России. Данная находка Lindbergia sinensis является первой на территории Индии. Приводится описание и иллюстрации вида, включающие признаки спорофита и гаметофита.

KEYWORDS: Bryophytes, mosses, pleurocarps, Leskeaceae, Lindbergia sinensis, India, new record

INTRODUCTION

The genus Lindbergia Kindb. is widely distributed all over the world. Vohra (1983) reported 14 species in the tropical and warm temperate regions of the world. In recently updated list, the genus is represented by 18 legitimate species (Tropicos.org. Missouri Botanical Garden 05-II-2019). In India, three species of the genus i.e. Lindbergia duthiei (Broth.) Broth., Lindbergia koelzii Williams and Lindbergia longinervis Card. et Dix. are reported so far from Indian subcontinent (Gangulee, 1978-1980, Vohra, 1983, Tewari & Pant, 2002, Lal, 2005, Dandotiya et al., 2011, Alam, 2013, 2015). During the survey and study of bryophyte collection from Western Himalaya, the fertile plants of Lindbergia sinensis (Müll. Hal.) Broth. have been discovered. It is an Asiatic species reported from China and Russia so far (Tan et al., 1995, Cao et al., 2002, Huan et al., 2002, Ignatova et al., 2010). The present report of the taxon shows extended distribution of the species in the world. With this addition of the moss species, the genus Lindbergia is now represented by four species in India. All of them are from western Himalaya. Lindbergia duthiei is known from Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Tehri Garhwal & Kumaon). Lindbergia koelzii is known from Himachal Pradesh & Uttarakhand (Kumaon). Lindbergia longinervis is known from Uttarakhand (Kumaon) (Gangulee, 1978-1980; Vohra, 1983).

TAXONOMY


Fig. I: 1-29.

Type Locality: China.

Plants epiphytic, yellowish green to dark green, forming mats. Main stem creeping, irregularly branched, rhizoids present in bunches, 10–25 mm long and 0.83–1.16 mm wide with leaves. Branches 4–7 mm long. Stem 0.18–0.21 mm in diameter. Cross-section of the stem 10–14 cells across diameter, cortical cells small, thick walled in 2–3 rows, 3–8 × 7–12 μm, medullary cells large, thin walled, 15–20 × 15–31 μm, central strand indistinct. Leaves densely arranged, appressed to spreading, 0.66–0.75 mm long and 0.24–0.41 mm wide, ovate to lanceolate, somewhat concave to plane, acuminate, margin entire. Costa single, strong, reaching up to 2/3–3/4 of the leaf length, with 3–4 rows of thickened cells. Apical leaf cells rhomboidal, 23–35 × 5–12 μm, middle cells large, thin walled, 15–20 × 15–31 μm, basal leaf cells rectangular, 7–12 × 11–15 μm, basal leaf cells rectangular, 7–12 × 11–15 μm.
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Table 1. A comparison of *Lindbergia sinensis* and *L. duthiei*.

<table>
<thead>
<tr>
<th>Russian Plants (Ignatova et al., 2010)</th>
<th>Indian Plants (LWU 22472/12)</th>
<th>L. duthiei (Vohra 1983)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitat</strong></td>
<td>Epiphytic</td>
<td>Epiphytic</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td>Dark green or brownish green</td>
<td>Yellowish green to dark green</td>
</tr>
<tr>
<td><strong>Stem</strong></td>
<td>1–3 cm long, Irregularly or almost pinnately branched; branches 2–5 mm long</td>
<td>10–25 mm long and 0.83–1.16 mm wide with leaves, irregularly branched; branches 4–7 mm long</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>Weakly concave to plain, ovate-lanceolate, acuminate, 0.9–1.3×0.4–0.7 mm, margin entire</td>
<td>Slightly concave to plain, ovate-lanceolate, acuminate, 0.66–0.75×0.24–0.41 mm, margin entire</td>
</tr>
<tr>
<td><strong>Costa</strong></td>
<td>Ending at 2/3–3/4 the leaf length</td>
<td>Reaching up to 2/3–3/4 the leaf length</td>
</tr>
<tr>
<td><strong>Leaf cells</strong></td>
<td>Smooth, sometimes with one very small, hardly visible simple papilla per cell on dorsal or both surfaces</td>
<td>Smooth, papillae not seen</td>
</tr>
<tr>
<td><strong>Seta</strong></td>
<td>Red, smooth, 5–7 mm long</td>
<td>Brown, erect, smooth, 4–7 mm long</td>
</tr>
<tr>
<td><strong>Capsule</strong></td>
<td>Ovate, symmetrical, 1.0–1.1 mm long, red brown, narrowed to the mouth</td>
<td>Ovate-elongated, 1.5–1.7 mm long and 0.68–0.76 mm wide, brown</td>
</tr>
<tr>
<td><strong>Operculum</strong></td>
<td>Conic with short obtuse beak</td>
<td>Brown, conical, 0.33–0.38 mm long and 0.48–0.55 mm wide, obtuse at apex.</td>
</tr>
<tr>
<td><strong>Peristome</strong></td>
<td>Double</td>
<td>Double</td>
</tr>
<tr>
<td><strong>Exostome</strong></td>
<td>220 μm long, whitish, finely papillose on outer surface, dorsal trabeculae moderately high</td>
<td>Exostome well developed, 196–235×39–47 μm in size, obtuse at apex, light yellow-brown and finely papillose except at base</td>
</tr>
<tr>
<td><strong>Endostome</strong></td>
<td>Endostome basal membrane 1/4 of exostome length, white, finely papillose, segments absent</td>
<td>Endostome hyaline, finely papillose, fragile, rudimentary</td>
</tr>
<tr>
<td><strong>Spores</strong></td>
<td>20–25 μm, reddish brown, finely papillose</td>
<td>19–24 μm, yellowish brown, finely papillose</td>
</tr>
</tbody>
</table>

**Habitat.** Plants grow epiphytically on tree bark.

**Distribution in the World.** China & Russia (Tan et al., 1995, Cao et al., 2002, Huan et al., 2002, Ignatova et al., 2010).

**Distribution in India.** Garhwal hill in Uttarkhand, Western Himalaya (new record for India).

**Specimen examined:** Western Himalaya, Uttarkhand, Garhwal hill, Chamoli, Khanoitnala, alt. ca. 1678 m, Lat. 30° 31’ 70N, Lon. 79° 31’ 70E, G. Asthana & party, 05-X-2012, 22472/12 (LWU).

**Discussion**

*Lindbergia sinensis* resembles *Lindbergia duthiei* in their overall morphology, especially in the presence of smooth leaf cells, but differs in having smaller, ovate to lanceolate leaves, while leaves are broadly ovate in *Lindbergia duthiei*. Central conducting strand is indistinct in *L. sinensis*, while well developed in *L. duthiei* (Fig. 1:5, Vohra, 1983 Fig. 18:n). Perichaetal leaves are...
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...small, with smooth and entire margin in L. sinensis (Fig. 1: 15-17), while they are large, with dentitions at the apical portion in L. duthiei (Vohra, 1983 Fig. 18: i). Besides, the spores are finely papillose (Fig. 1: 29) in the former species and smooth in the latter one (see Vohra, 1983 Fig.18: m).

Ignatova et al. (2010) have revised the genus Lindbergia in Russia and remarked, “Material of L. duthiei studied in H-BR does not show any substantial differences from L. sinensis, except for slightly larger plants. They quite likely belong to the same species, which is however better to proof genetically before their formal synonymization”. With this remark, they included L. duthiei in L. sinensis with (?) mark (Ignatova et al., 2010: p. 103,105). At present juncture L. duthiei is considered to be a valid species until unless it is formally synonymised with L. sinensis. However, the Indian population of Lindbergia collected from Uttarakhand has been critically investigated, compared and identified as L. sinensis (Table 1).

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Literature Cited