Impatiens fugongensis (Balsaminaceae), a new species from Yunnan, China

Yi-Yan CONG, Ke-Ming LIU*, Xiu-Zhen CAI, and Shu-Zhen TIAN

Department of Botany, College of Life Science, Hunan Normal University, Changsha, 410081, Hunan, P. R. China

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ABSTRACT. A new species of Impatiens L., I. fugongensis K. M. Liu et Y. Y. Cong, sp. nov., is described and illustrated. The species is restricted to the wet evergreen broad-leaved montane forests of Gaoligong Mountain in Northwestern Yunnan, China. Diagnostic morphological characters and seedcoat micromorphological characters that distinguish the new species from the related species, I. xanthina Comber and I. monticola Hook. f., are discussed.

Keywords: Balsaminaceae; China; Impatiens; Impatiens fugongensis; Micromorphology; New species; Seedcoat; Yunnan.

INTRODUCTION

The genus Impatiens L. (Balsaminaceae), including about 900 species worldwide (Yuan et al., 2004), mainly occurs in mountains of tropical and subtropical regions from India to southeastern Asia. Most of the species have very restricted distributions (Fischer and Rahelivololona, 2002). About 240 species have been reported from China (Chen, 2001; Jin and Ding, 2002; Huang et al., 2003), and most of them occur in southwestern China.

Since 1999 we have studied the taxonomy and pollination ecology of Impatiens (Liu, 1999; Tian et al., 2004). During a recent scientific survey of Gaoligong Mountain National Nature Reserve, northwestern Yunnan, an apparently new species of Impatiens was discovered by the authors. After carefully studying the morphology and seedcoat micromorphology of the species and the related species, and consulting the literature (Xiong and Luo, 1988; Chen, 2001; Huang, 2006), we concluded that these plants represent a new species.

MATERIALS AND METHODS

Seeds used for observations were collected in the field during the autumns of 2005 and 2006. Voucher specimens were deposited in the Herbarium of Hunan Normal University (HNNU; Table 1). For scanning electron microscopy, dried mature seeds were mounted on stubs, using double-sided adhesive tape, and coated with about 2 nm of gold with a JFC-1600 sputter coater. Coated seeds were then examined and photographed with the JEOL JSM-6360LV scanning electron microscope.

*Corresponding author: E-mail: lkming8@yahoo.com.cn; Tel: 86-731-887-2864.
Figure 1. Illustration of *Impatiens fugongensis* K. M. Liu & Y. Y. Cong (drawn by Li-Han Liu from the holotype). A, Habit; B, Basal portion of abaxial leaf surface; C, Flower, lateral view; D, Flower, anterior view; E, Lateral sepals; F, Dorsal petal; G, Lateral united petals; H, Lower sepal; I, Gynoecium; J, Androecium; K, Transverse section of fruit; L, Fruit; M, Seeds.
**Table 1. Source of materials.**

<table>
<thead>
<tr>
<th>Species</th>
<th>Locality</th>
<th>Voucher</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Impatiens fugongensis</em> K. M. Liu et Y. Y. Cong</td>
<td>Yunnan, China</td>
<td>K. M. Liu &amp; Y. Y. Cong 791378 (HNNU)</td>
</tr>
<tr>
<td><em>Impatiens xanthina</em> Comber</td>
<td>Yunnan, China</td>
<td>K. M. Liu &amp; Y. Y. Cong 791366 (HNNU)</td>
</tr>
<tr>
<td><em>Impatiens monticola</em> Hook. f.</td>
<td>Sichuan, China</td>
<td>K. M. Liu &amp; Y. Y. Cong 791448 (HNNU)</td>
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</tbody>
</table>

cornute, depth of lower sepal from pedicel to base of spur 18-21 mm, sparsely pubescent outside, mouth ca. 4.5 mm wide, anterior acute, base gradually narrowed into an incurved spur 15-18 mm. Dorsal petal galeiform, orbicular, 5.8-6 × 4-4.2 mm, base broadly cuneate, apex obtuse-rounded, abaxial midvein slightly thickened, sparsely white hairy. Lateral united petals sessile, 12-14 mm long, 2-lobed, upper lobes narrowly elliptic, ca. 2 mm wide, apex obtuse-acute; lower lobes dolabroform-triangular, 8-10 × 5-7 mm, apically retuse, abaxial auricle absent. Stamens 5, ca. 2 mm long, filaments linear, free for about 1/2 their length; anthers ovoid, joined into a ring surrounding the ovary apex, apex obtuse. Ovary superior, 5-carpellate, placentation axile, fusiform, ca. 3 mm long, erect, style 1. Capsule green, broadly fusiform, 5-angled, ca. 10 × ca. 4 mm, apex acute, rostellate, 5-valved, fleshy; seeds elliptic, 1.5-1.9 × 0.7-1.1 mm, yellow-brown.

Paratype. **CHINA.** Northwestern Yunnan Province: Fugong County, Gaoligong Mountain, alt. 2,200 m, on the damp cliff, 13 Oct 2006, Liu Ke-Ming & Cong Yi-Yan 791412 (HNNU).

**Phenology.** Flowering from August to October; fruiting from September to November. Flower visitors (insects of Hymenoptera) were seen in the field.

**Ecology.** On moist limestone rocks in wet evergreen broad-leaved montane forests, at 2,100-2,500 m elevation.

**Distribution.** Fugong County, Northwestern Yunnan Province, China; known only from the type locality.

**DISCUSSION**

*Impatiens fugongensis* K. M. Liu et Y. Y. Cong resembles *I. xanthina* Comber in having leaves crowded at the upper part of stem and branches, a galeiform standard, and a broadly fusiform capsule. However, it differs in having elliptic to suborbicular lamina with apex obtuse-acute or obtuse-rounded, lateral veins (5-7 pairs), caduceus bracts, a cornute lower sepal, outside hair, narrowly elliptic upper lobes of lateral united petals with no purple-tinged flecks at base, and dolabroform-triangular lower lobes. *I. fugongensis* K. M. Liu et Y. Y. Cong is also

**Table 2. Comparison between Impatiens fugongensis, I. monticola, and I. xanthina.**

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>Impatiens fugongensis</em></th>
<th><em>Impatiens monticola</em></th>
<th><em>Impatiens xanthina</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant height</td>
<td>5.5-9 cm</td>
<td>30-60 cm</td>
<td>6-20 cm</td>
</tr>
<tr>
<td>Lamina</td>
<td>Elliptic to suborbicular, 2.6-4 × 1.1-2.2 cm, apex obtuse-acute or obtuse-rounded, lateral veins 5-7 pairs</td>
<td>Ovate-elliptic or obovate, 3-13 × 3-4.5 cm, apex acuminate, lateral veins 5-7 pairs</td>
<td>Lanceolate, elliptic-lanceolate, or oblong-spatulate, 4.5-7 × 1.5-2 cm, apex acute or acuminate, lateral veins 7-9 pairs</td>
</tr>
<tr>
<td>Bracts</td>
<td>Caducous</td>
<td>Persistent</td>
<td>Persistent</td>
</tr>
<tr>
<td>Inflorescences</td>
<td>2-3-flowered in a raceme</td>
<td>2-flowered in a raceme</td>
<td>1-2-flowered in a raceme</td>
</tr>
<tr>
<td>Flower length</td>
<td>14-17 mm</td>
<td>ca. 35 mm</td>
<td>20-25 mm</td>
</tr>
<tr>
<td>Lateral sepals</td>
<td>Ovate-elliptic, 2.8-3.1 × 1.7-1.9 mm, abaxially long white hairy</td>
<td>Ovate or orbicular, 6-10 × 6-8 mm, glabrous</td>
<td>Triangular-ovate, ca. 9 mm, glabrous</td>
</tr>
<tr>
<td>Lower sepal</td>
<td>Cornute, sparsely pubescent, base gradually narrowed into an incurved spur 15-18 mm</td>
<td>Navicular, glabrous, base gradually narrowed into an incurved spur 23-36 mm</td>
<td>Narrowly infundibular, glabrous, base gradually narrowed into an involute spur 22-25 mm</td>
</tr>
<tr>
<td>Dorsal petal</td>
<td>5.8-6 mm long, not purple-tinged flecks at base</td>
<td>13-15 mm long, not purple-tinged flecks at base</td>
<td>6-17 mm long, purple-tinged flecks at base</td>
</tr>
<tr>
<td>Lateral united petals</td>
<td>12-14 mm long, upper lobes narrowly elliptic, not purple-tinged flecks at base; lower lobes dolabroform-triangular</td>
<td>20-25 mm long, upper lobes suborbicular, not purple-tinged flecks at base; lower lobes dolabroform</td>
<td>15-16 mm long, upper lobes orbicular, purple-tinged flecks at base; lower lobes dolabroform or ovate-dolabroform</td>
</tr>
</tbody>
</table>
similar to *I. monticola* Hook. f. by its lateral veins (5-7 pairs), 2-3 flowers in a raceme, dolabriform-triangular lower lobes of lateral united petals, and a broadly fusiform capsule, but differs in having stems 5.5-9 cm tall, elliptic to suborbicular lamina, caduceus bracts, hairy flowers 14-17 cm long, ovate-elliptic lateral sepals, cornute lower sepal, and narrowly elliptic upper lobes of lateral united petals. More detailed morphological comparisons of these three species are given in Table 2.

In addition, seedcoat micromorphological characters also differentiate *Impatiens fugongensis* from *I. xanthina* and *I. monticola*. In *I. fugongensis*, seeds are elliptic (Figure 2A), and some of the epidermal cells of the seedcoat protrude significantly to form squamalate projections that are oblong and have conspicuous pits (Figure 2B, C); while in *I. xanthina*, seeds are ovate (Figure 2D), and some of the epidermal cells of the seedcoat protrude significantly to form cristate protrusions which are spirally thickened (Figure 2E, F). Seedcoat of *I. monticola* is similar to that of *I. fugongensis*, but differs in having elliptic, squamalate projections with margins rolled inward (Figure 2G, H) and more pits on the squamalate, which are sometimes connected with each other by grooves (Figure 2I).

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LITERATURE CITED


