Impatiens cardamomensis (Balsaminaceae), a new species from Cambodia

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ABSTRACT: *Impatiens cardamomensis* S. H. Cho, C. K. Lim & H. Won, a new species of the family Balsaminaceae from the Cardamom Mountain Range in southwestern Cambodia, is described and illustrated. The species is similar to *I. noei* from Thailand in that it possesses solitary flowers, fusiform capsules, and compressed seeds, but is readily distinguished by its ovate to widely ovate leaves, shorter petioles, widely elliptic dorsal petals and smaller seeds.

Keywords: Cardamom Mountain range, new species, *Impatiens*, Cambodia

The genus *Impatiens* L. (Balsaminaceae) consist of about 1,000 species mainly distributed in tropical Africa (esp. Madagascar), the E. Himalayas, S. India and Sri Lanka, and S.E. Asia and is absent from Australia and S. America (Fischer, 2004; The Angiosperm Phylogeny Group, 2009). This genus includes fleshy herbs with more or less translucent stems to sub-shrubs. It is distinguished from most closed monotypic genus (*Hydrocera* Blume) by lateral petals united in pairs and explosive capsule (Chen et al., 2007; The Angiosperm Phylogeny Group, 2009).

The first comprehensive study of *Impatiens* in Indochina, at the beginning of the 20th century, began with Hooker (1911), who in *Flore Generale de l'Indo-Chine* described 25 species. In Indochina, now there are around 120 species of *Impatiens* (Tardieu, 1944; Grey-Wilson, 1971; Ho, 1999; Shimizu, 2000; Shimizu and Suksathan, 2004; Santisuk et al., 2006; Newman et al., 2007; Newman, 2008; Suksathan and Triboun, 2009; Ruchisansakun et al., 2014; Souvannakhommane and Suksathan, 2015; Vietnam Plant Data Center, 2019; Pham et al., 2019; Ruchisansakun and Suksathan, 2019).

Research on Cambodian *Impatiens* was initiated by Hooker

(1908), who reported *Impatiens zygosepala*. Hooker (1909a, 1909b) described *I. cardiophylla*, *I. notoptera*, *I. relaxata*, and *I. vagans* in *Notulae systematicae* and described *I. diffusa* in *Bulletin of Miscellaneous Information*, respectively. Hooker (1911) recognized six native species of *Impatiens* in Cambodia. Recently, *Impatiens bokorensis* was described as a new endemic species from Phnum Bokor National Park in southwestern Cambodia (Cho et al., 2017). Currently, Cambodian *Impatiens* consist of eight species (Cho et al., 2016, 2017). Except for *I. balsamina* and *I. cardiophylla*, most species in Cambodia have been considered endemic species, with *I. bokorensis*, *I. diffusa*, *I. notoptera*, *I. relaxata*, *I. vagans*, and *I. zygosepala* restricted to a local area with only a very small number of specimens.

During the recent floristic survey, one species of *Impatiens* was collected at Knong Krapeur Mt. in the Cardamom Mountain Range of Cambodia that does not appear to be similar to previously described species (Figs. 1, 2). It is most similar to *Impatiens noei* Craib from Thailand (Craib, 1926), but a comparison with the type specimens and descriptions revealed that it differs from *I. noei* and is therefore described here as a new species.

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Taxonomic Treatment

Impatiens cardamomensis S. H. Cho, C. K. Lim & H. Won, sp. nov. (Figs. 1, 2). —TYPE: Cambodia. Kampong Speu Province, Knong Krapeur Mt., sandstone area in forest margin, 11°41'43.4"N, 103°47'31.4"E, a.s.l. 950 m, 11 Nov 2015, *Hyosig*

Won, Changkun Lim, Seong-Hyun Cho, Phourin Chhang Won et al. 13209 (holotype, KB; isotypes DGU, HHU, KB).

Diagnosis: *Impatiens cardamomensis* is most similar to the Thailand endemic species *I. noei* Craib in habit but is readily distinguished from the latter by the ovate to widely ovate

Fig. 1. *Impatiens cardamomensis* S. H. Cho, C. K. Lim & H. Won. **A.** Habit. **B.** Leaf. **C.** Strigose-ciliate at leaf base. **D.** Developing flower bud. **E–G.** Mature flower. **H, I.** Developing androecium and gynoecium. **J.** Immature fruit. **K, L.** Mature fruit and seeds. **M.** Seeds. Won et al. 13113, 13209. Illustration by Kyung Soo Eo.

Fig. 2. Photographs of *Impatiens cardamomensis* S. H. Cho, C. K. Lim & H. Won. **A.** Habit. **B, C.** Flower. **D.** Strigose-ciliate at leaf base. **E.** Capsule. Photos by Seong-Hyun Cho.

leaves, shorter petioles, widely elliptic dorsal petals and smaller seeds (Table 1).

Herbs, annual, terrestrial, hermaphroditic. Stems erect, 20–30 cm tall, branched, glabrous. Leaves simple, alternate, crowded on upper part of branch; petioles subsessile to 15 mm; leaf blade ovate to widely ovate, apex acute, mucronate, base

cuneate to attenuate, $1.0\text{--}4.0 \times 0.6\text{--}2.2$ cm, upper surface slightly pubescent, lower surface glabrous, secondary veins pinnate, 5 to 7 on each side of mid-vein, margin serrate, teeth mucronate, strigose-ciliate at base; strigose-ciliate, 5–7, $0.5\text{--}1.0$ mm long, purple. Flowers axillary, solitary, zygomorphic, minutely puberulous; pedicels slender, erect, brightly purplish

Table 1. Comparison of key features of *Impatiens cardamomensis* S. H. Cho, C. K. Lim & H. Won and *I. noei* Craib.

Taxonomic traits	<i>Impatiens cardamomensis</i>	<i>I. noei</i>
Stem hair	Glabrous	Glabrous or pilosulous on the upper part
Leaf shape	Ovate to widely ovate	Lanceolate to ovate-lanceolate
Petiole length (mm)	Subsessile to 15	Up to 30
Strigose-ciliate no.	5–7	2–3
Lateral sepal shape	Ovate	Lanceolate
Lateral sepal length (mm)	1.5	2
Dorsal petal shape	Widely elliptic	Orbicular-obovate
Dorsal petal length (mm)	ca. 7	5–6
Seed length (mm)	2.0	2.5

red, 1.5–2.0 cm long (up to 3.5 cm in fruiting time), glabrous, bracteate at base; bracts triangular, ca. 0.5 mm, mucronate; lateral sepals 2, ovate, 1.5 mm long, glabrous; lower sepal funnel-form, pink, ca. 4 mm long, ca. 3 mm deep; spur 20–22 mm long, slightly curved, glabrous; dorsal petal, widely elliptic, ca. 7 × 6.8 mm, apex mucronate; lateral united petals separate, bilobed, ca. 9 mm long; upper petals oblong, ca. 7.0 × 5.2–5.5 mm; lower petals, 6.7–6.8 × 2.7–2.8 mm; androecium ca. 2.7 × 2.1 mm; stamens 5, connate, surrounding gynoecium; filaments ca. 0.8 mm; ovary fusiform, minutely puberulous, ca. 2.0 × 1.2 mm; style glabrous, ca. 0.2 mm long; stigma 5. Fruit a capsule, fusiform, ca. 12 × 6.5 mm, pubescent, 26–39-seeded. Seeds obovoid, slightly compressed, 2.0 × 1.2–1.3 mm, pubescent.

Flowering: October to November.

Distribution: Knong Krapeur Mt. in the Cardamom Mountain Range of Cambodia (Kampong Speu Prov., Koh Kong Prov.)

Habitats: *Impatiens cardamomensis* grows on sandstone tables in evergreen forest margins at 900 m a.s.l.. Endemic to Cambodia, *I. cardamomensis* is at present known only in the type locality.

Additional specimens examined (paratype): Cambodia. Koh Kong Province: Knong Krapeur Mt., 11 Nov 2015, *Won et al.* 13113 (DGU, HHU, KB).

GenBank accession No. Won et al. 13113: MN699568, MN699569 (ITS).

Conservation status. *Impatiens cardamomensis* was collected in Knong Krapeur Mt. in the Cardamom Mountain Range of Cambodia. Until now, only two populations, consisting of ca. 300 individuals, has been discovered in the park area; therefore, it is preliminarily classified as data deficient (DD) according to the IUCN Red List criteria (IUCN, 2001).

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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