

Impatiens jenjittikuliae (Balsaminaceae), a new species from Thailand

Saroj Ruchisansakun¹, Piyakaset Suksathan²

1 Department of Plant Science, Faculty of Science, Mahidol University, Bangkok, Thailand **2** Queen Sirikit Botanic Garden, The Botanical Garden Organization, Chiang Mai, Thailand

Corresponding author: Saroj Ruchisansakun (s.ruchisansakun@gmail.com)

Academic editor: Y. Mutafchiev | Received 2 February 2019 | Accepted 13 May 2019 | Published 21 June 2019

Citation: Ruchisansakun S, Suksathan P (2019) *Impatiens jenjittikuliae* (Balsaminaceae), a new species from Thailand. PhytoKeys 124: 139–147. <https://doi.org/10.3897/phytokeys.124.33607>

Abstract

Impatiens jenjittikuliae Ruchis. & Suksathan, a new species from a limestone area in Thasongyang District, Tak Province, Northern Thailand, is described and illustrated. This endemic new species is distinguished from the most similar, *I. lacei* Hook.f. through having pilose lateral sepals vs glabrous, and by the absence of long hairs along the lamina margin. Its pollen and seed morphology, stem anatomy, and pollination ecology are also observed. Furthermore, its conservation status as Critically Endangered is also assessed.

Keywords

Uniflorae, lithophytic, endemic, critically endangered

Introduction

Balsaminaceae consists of *Hydrocera* Blume ex Wight & Arnott (1834: 140) with only a single species, *H. triflora* (L.) Wight & Arnott (1834: 140), and *Impatiens* L. (1753: 937), comprising over 1,000 species (Ruchisansakun et al. 2018). In Southeast Asia, many new *Impatiens* species were recently described (Souvannakhoumane and Suksathan 2015; Ruchisansakun et al. 2017; Ruchisansakun et al. 2018; Suksathan and Triboun 2009).

In Thailand, sixty-one native *Impatiens* species have been enumerated in previous works (Shimizu 1970, 1977, 1991, 2000; Shimizu and Suksathan 2004; Suksathan

and Triboun 2009; Ruchisansakun et al. 2014). In 2017, the first author cited here noticed an unnamed *Impatiens* from Tak Province via Weerayuth Laohajinda's Facebook and later on traveled to examine the plant in 2018. After a detailed study, it turned out to be a species new to science. It is therefore described here.

Material and methods

Fieldwork was conducted in October 2018. The plants were prepared for making herbarium specimens. Each part of the flower was separately glued on the hard paper and dried separately. All parts were measured and described in line with terminology in Ruchisansakun et al. (2018). For a palynological study, mature pollen grains were collected, air-dried, and fixed to aluminum stubs, then sputter-coated with gold. Micrographs were taken with a Field Emission Scanning Electron Microscope (FE-SEM) (Hitachi SU8010). The pollen grains and seeds were measured by ImageJ and described according to the terminology of pollen grains and seeds (Janssens et al. 2012). For an anatomical study, the fresh stem was dissected at the base and stained by diluted Safranin-O for 20 sec, and observed under a light microscope.

Result

Taxonomy

Impatiens jenjittikuliae Ruchis. & Suksathan, sp. nov.

urn:lsid:ipni.org:names:77198714-1

Figs 1–5

Diagnosis. *Impatiens jenjittikuliae* is most similar to *I. lacei* Hook.f. It differs from *I. lacei* by its densely pilose lateral sepal (versus glabrous) and by having no long hairs along its lamina margin (versus distinct long hairs especially along the lower-half of leaf margin).

Type. THAILAND. Tak Province, Thasongyang District [17°30'1"N, 98°3'60"E], limestone area near waterfall in mixed deciduous forest at 540 m alt., 20 October 2018, S. Ruchisansakun 900 (holotype: QBG; isotypes: BK, BKF, Mahidol University Herbarium)

Description. Lithophytic, annual herb, up to 6–30 cm tall. Stem erect, up to 1.2 cm in diam., cylindrical, branched, green, densely pilose with short white hairs. Leaves spirally arranged. Petiole 3–7.5 cm long, ca. 2.5 mm in diam., pale green to green to pink, pilose; with 5–7 pairs of long hairs on petiole, up to 2 mm long, green, sometime with red tips. Lamina 9–20 × 3–7 cm, ovate to elliptic, apex acute, base cuneate, margin shallowly serrate, adaxial green, abaxial pale green, pilose on both sides; lateral veins 10–12 pairs. Inflorescence raceme, axillary, 8–12 florets; peduncle 7–10 mm

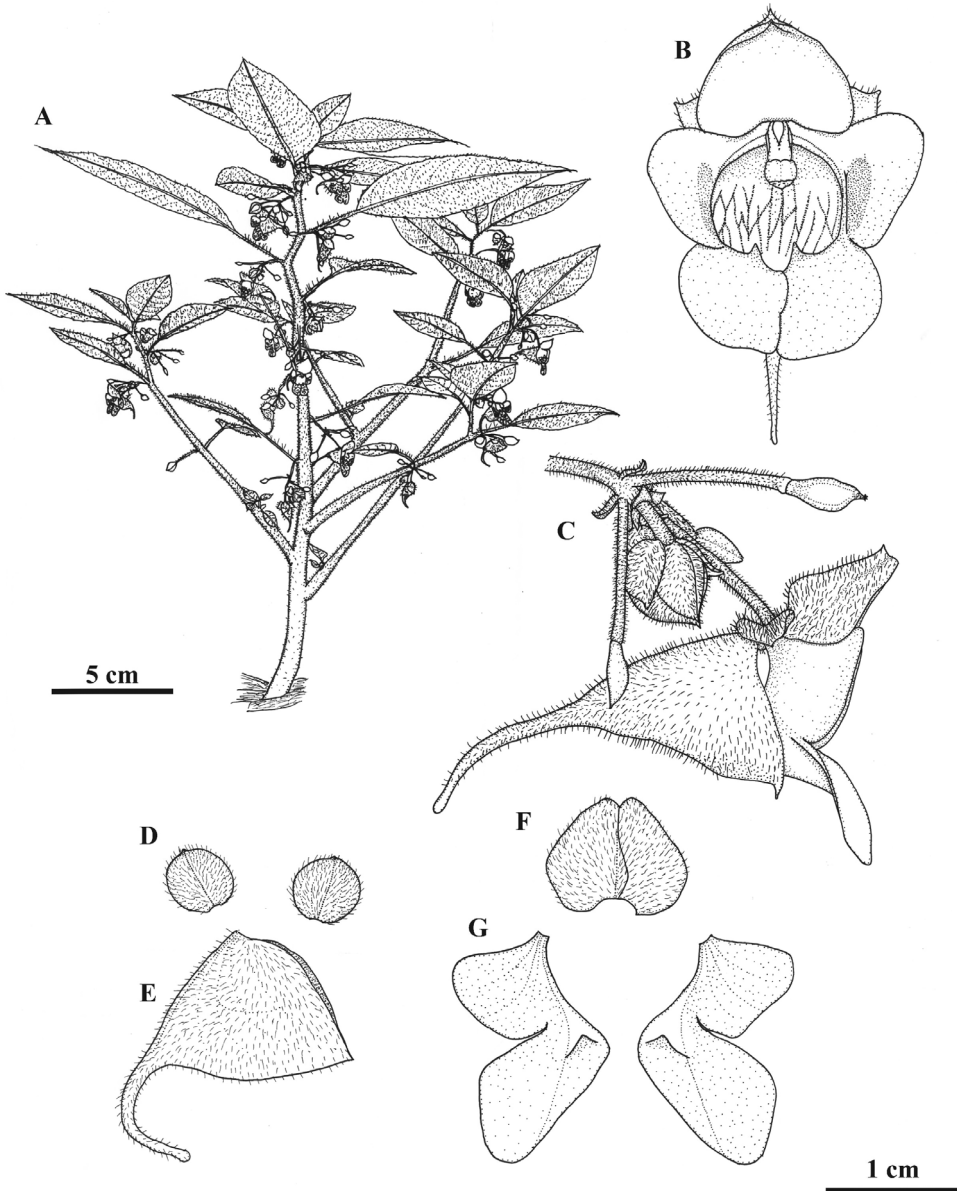


Figure 1. *Impatiens jenjittikuliae*. **A** Habit **B** Flower, front view **C** Inflorescence with flower in lateral view **D** Lateral sepals **E** Lower sepal **F** Dorsal petal **G** Lateral united petals. Drawn by Saroj Ruchisansakun.

long, 1.5–2 mm in diam., pale green, densely pilose; rachis 8–20 mm long, ca. 1.5 mm in diam., pale green, densely pilose, hairs shorter than those on peduncle. Flowers ca. 20 × ca. 15 mm, ca 3 mm deep, pinkish white with reddish purple lip. Bracts ca. 1 × 0.5 mm, linear to narrowly lanceolate, apex acute, base cuneate, green, caducous, abaxial densely pilose with white hairs. Pedicel 12–15 mm long, less than 1 mm in diam.,

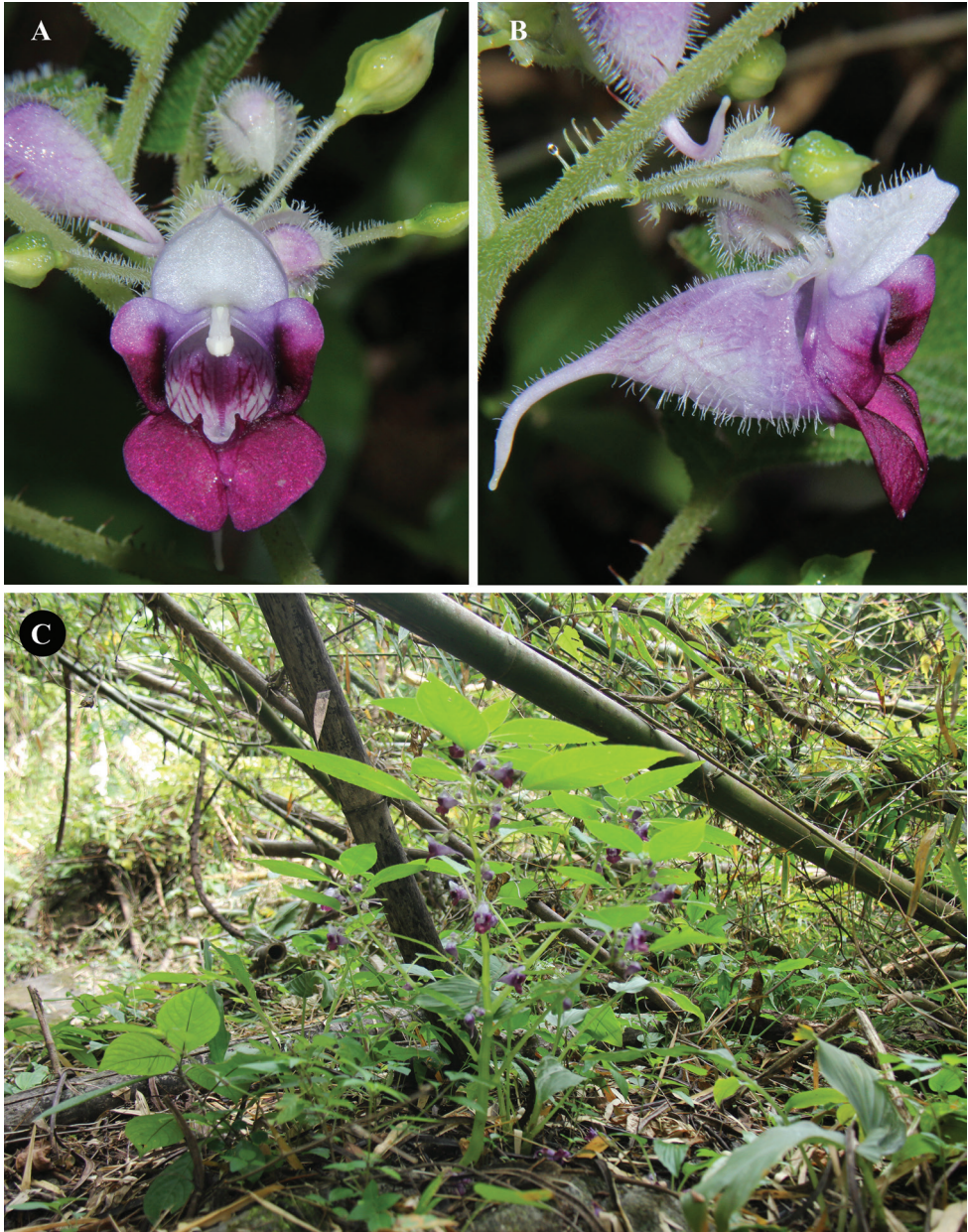


Figure 2. *Impatiens jenjittikuliae* **A** flower, front view **B** flower, lateral view **C** habit *in situ*. Photographs by Saroj Ruchisansakun.

pink, densely pilose with white hairs. Lateral sepals 2, 5–6 × 6–7 mm, free, broadly ovate, the apex mucronate, the base truncate, pale pink, abaxially densely pilose with white hairs. Lower sepal 11–13 × 8–10 mm, ca. 14–17 mm deep, broadly navicular to subsaccate, apex acuminate and mucronate, white with green tip, densely pilose to

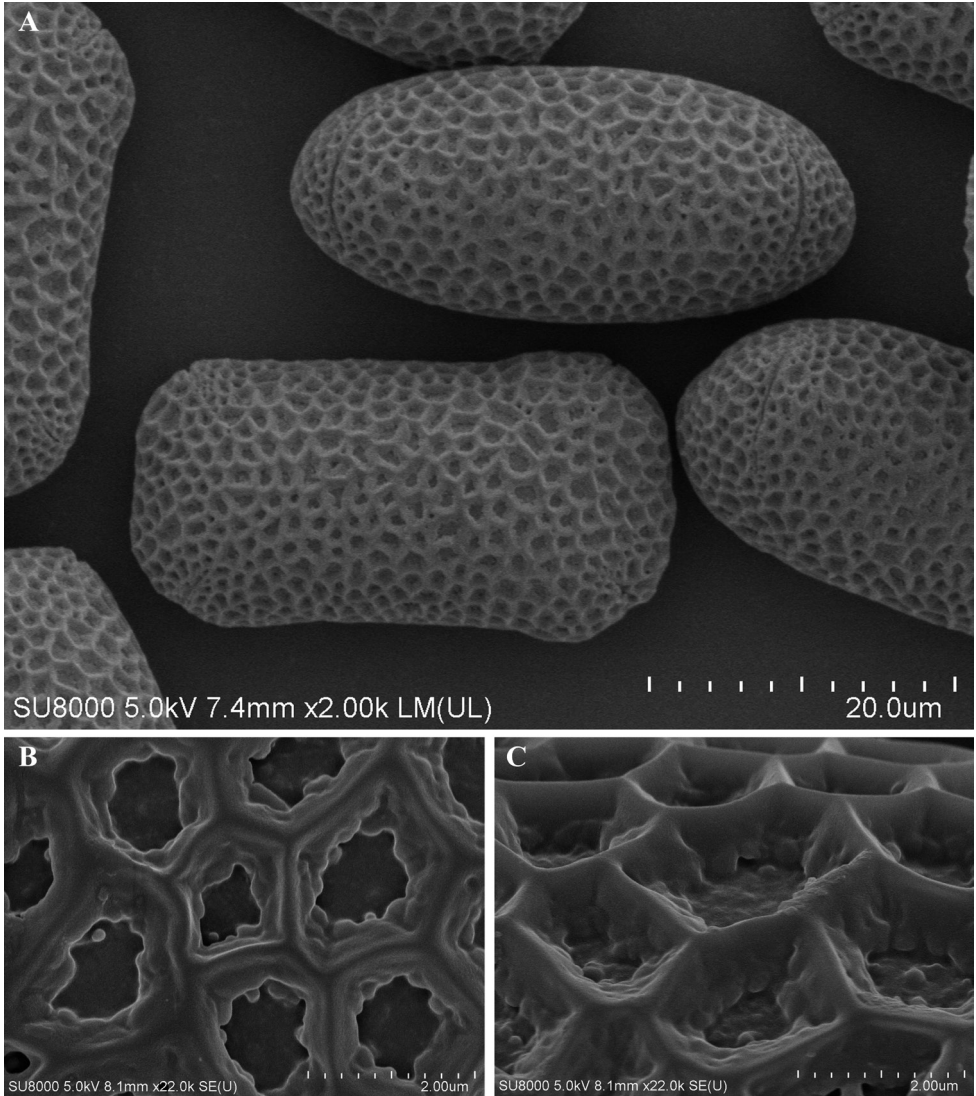


Figure 3. Pollen of *Impatiens jenjittikuliae* (FE SEM) **A** entire pollens **B, C** sexine ornamentation.

strigose outside with long white hairs, distal part gradually constricted into a curved spur, 14–15 mm long, white to pale pink. Dorsal petal 11–12 × 14–15 mm, broadly ovate to obcordate, cucullate, apex emarginate and mucronate, base cordate, white to pale pink, densely pilose with white hairs, abaxial midvein with a white crescent-shaped crest, 1–1.5 mm high. Lateral united petals 20–24 mm long, free: the upper petals 9–10 × 10–11 mm, broadly oblong, apex truncate, base cuneate, upper outer part white to pale pink, lower inner part dark purple; the lower petals 17–19 × 8–10 mm, oblong, apex truncate, pink to reddish-purple; with a pink auricle at the base, ca 1 mm high. Stamens 5; filaments 4–5 mm long, white; anthers white. Ovary ca 4 mm

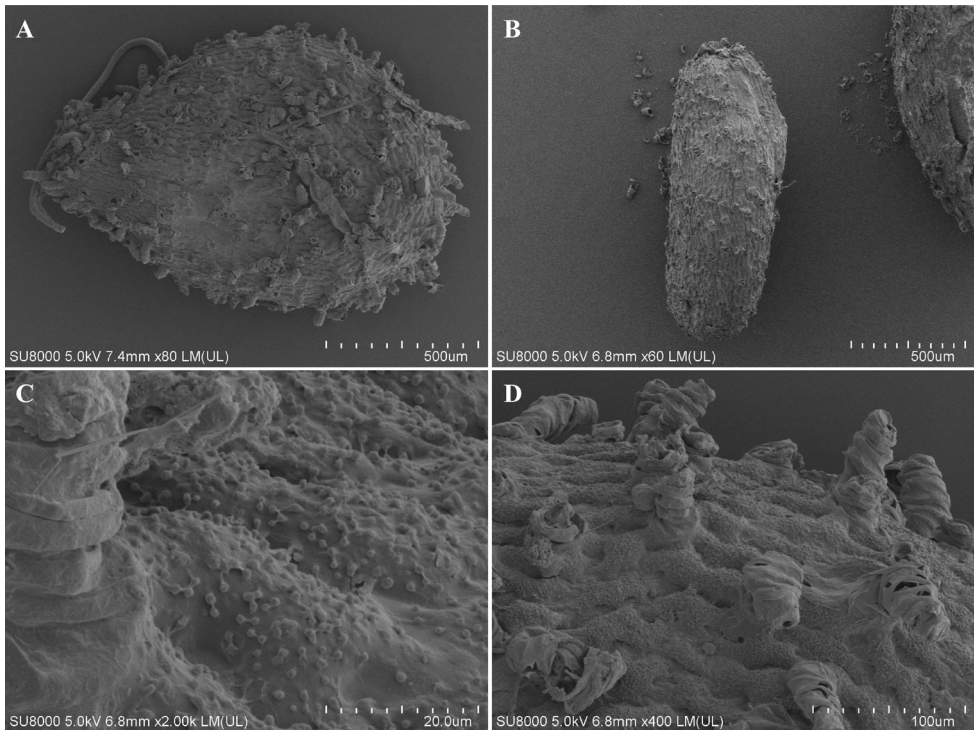


Figure 4. Seed of *Impatiens jenjittikuliae* (FE SEM). **A, B** Entire seeds **C** Inflated cells with granulate walls **D** Thick finger-like cells.

long, 1.5–2 mm in diam., short fusiform, 5-carpellate, green, glabrous. Fruits, short fusiform capsule, 11–12 mm long, 6–8 mm in diam., subglobose, 5-lobed, green, glabrous. Seeds ca. 20 per fruit, ca. 1.34 mm long, ovoid, brown.

Pollen morphology: Pollen grains 4-colpate (Fig. 3A). Equatorial view oblong, ca $35 \times 18\text{--}19 \mu\text{m}$ (length/width = 1.89); Polar view nearly elliptic, ca. $17 \mu\text{m}$ thick, colpi four, linear, ca $9\text{--}10 \mu\text{m}$ (Fig. 3A); surface entirely covered with numerous irregular lumens, $1.2\text{--}2 \mu\text{m}$ diam, lumens deep, sparsely granulate (Fig. 3B); muri slightly straight, joint of muri slightly corniculate (Fig. 3C).

Seed morphology: Brown ovoid, ca $1.34 \times 0.93 \text{ mm}$, ca $0.51 \mu\text{m}$ thick (length/width = 1.44) (Fig. 4). Seed coat a composite of two types, thick finger-like cells, and inflated cells with granulate walls (Figs. 4C, D).

Stem anatomy: Stem herbaceous, without lignification (Figs 5A–C). Only angular collenchyma for stem-strengthen were found (Fig. 5D).

Phenology. Flowering from Oct. to Nov.; fruiting Oct. from Nov.

Distribution. The new species is only known from the type locality in Tak Province, Thailand.

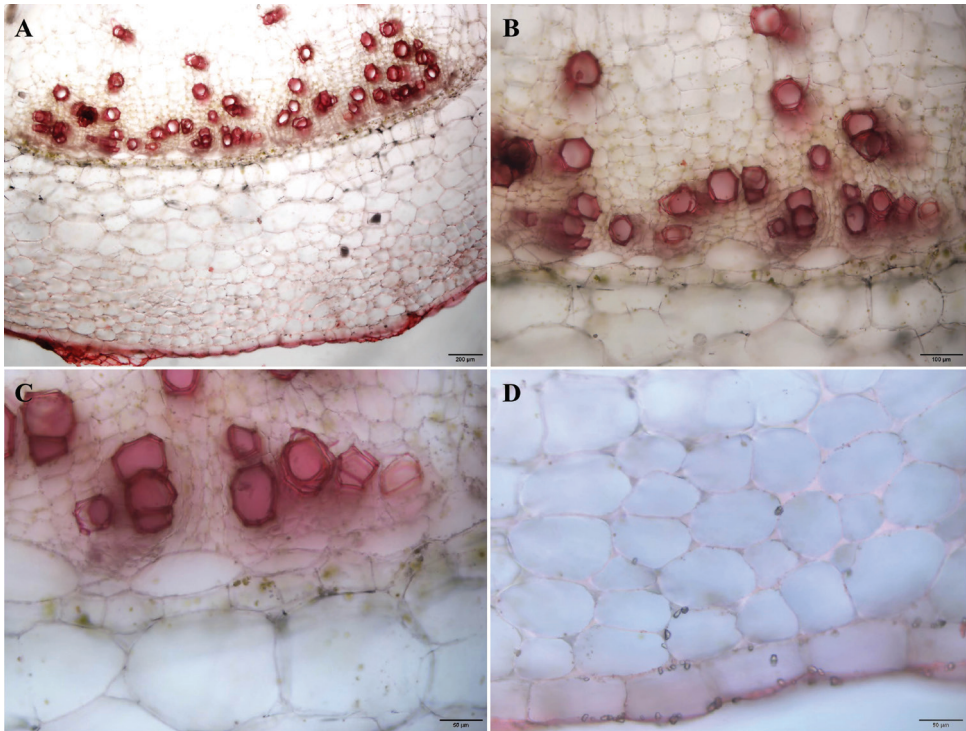


Figure 5. Stem of *Impatiens jenjittikuliae*, transverse sections.



Figure 6. Floral visitation by bee in the locality of *Impatiens jenjittikuliae*.

Ecology. *Impatiens jenjittikuliae* grows on limestone close to waterfall in a mixed deciduous forest, 520–600 m elevation (pers. obs.).

Proposed IUCN conservation assessment. Critically Endangered B1ab (i, ii, iii) + 2ab (i, ii, iii). This species is only known from the type locality; the extent of occurrence is estimated to be less than 5 km, where it occurs as a small population (IUCN 2012).

Etymology. The new species is named in honor of Dr. Thaya Jenjittikul who encouraged the first author to step in and study this lovely plant family.

Pollination ecology. The author observed five visitations by bees from the family Apidae (identified by an entomologist, Pornpimon Tangtorwongsakul) during the expeditions. The size of bee body fit well with the floral entrance (Fig. 6). Moreover, the floral structure of this new species is similar to other bee-pollinated species, e.g. *I. psittacina* (Ruchisansakun et al. 2016). Hence, we concluded that it is a bee-pollinated species.

Discussion

Impatiens jenjittikuliae is similar to *I. lacei* and the other species closely related to *I. pulchra* Hook.f (= *I. mengtszeana* Hook.f. in Ruchisansakun et al. 2015) in its raceme inflorescence, shape of flower, and short fusiform capsule. The short fusiform capsule and the 4-colpate pollen grains of the new species support its placement in the subgenus *Impatiens* (Yu et al. 2015). In addition, *I. jenjittikuliae* has seeds coated with inflated cells with granulate walls similar to those described in species, such as *I. napoensis* Y. L. Chen, within the sect. *Uniflorae* (Janssens et al. 2012; Yu et al. 2015).

The cross sections of the stem of *I. jenjittikuliae* have shown that the new species is herbaceous, similar to the morphologically similar species in the sect. *Uniflorae*, *I. pulchra*, which also show in Lens et al. (2012) as *I. mengtszeana* Hook.f. (Lens et al. 2012; Ruchisansakun et al. 2015; Yu et al. 2015).

Acknowledgements

We would like to thank Frederic Lens, Larissa Chacon-Doria, Pantamith Ratanakrjang, Pornpimon Tangtorwongsakul, and Weerayuth Laohajinda, for their help with different parts of this work.

References

- IUCN (2012) IUCN Red List Categories and Criteria: Version 3.1 (2nd edn). Gland and Cambridge, 32 pp.
- Janssens SB, Wilson SY, Yuan YM, Nagels A, Smets EF, Huysmans S (2012) A total evidence approach using palynological characters to infer the complex evolutionary history of the Asian *Impatiens* (Balsaminaceae). *Taxon* 61(2): 355–367. <https://doi.org/10.1002/tax.612007>

- Lens F, Eeckhout S, Zwartjes R, Smets EF, Janssens SB (2012) The multiple fuzzy origins of woodiness within Balsaminaceae using an integrated approach. Where do we draw the line? *Annals of Botany* 109(4): 783–799. <https://doi.org/10.1093/aob/mcr310>
- Linnaeus C (1753) *Species Plantarum* 2. Laurentius Salvius, Stockholm, 639 pp.
- Ruchisansakun S, Triboun P, Jenjittikul T (2014) A new species of *Impatiens* (Balsaminaceae) from Southwestern Thailand. *Phytotaxa* 174(4): 237–241. <https://doi.org/10.11646/phytotaxa.174.4.5>
- Ruchisansakun S, Van der Niet T, Janssens SB, Triboun P, Techaprasan J, Jenjittikul T, Suksathan P (2015) Phylogenetic analyses of molecular data and reconstruction of morphological character evolution in Asian *Impatiens* section *Semeiocardium* (Balsaminaceae). *Systematic Botany* 40(4): 1063–1074. <https://doi.org/10.1600/036364415X690102>
- Ruchisansakun S, Tangtorwongsakul P, Cozien R, Smets E, Van Der Niet T (2016) Floral specialization for different pollinators and divergent use of the same pollinator among co-occurring *Impatiens* species (Balsaminaceae) from Southeast Asia. *Botanical Journal of the Linnean Society* 181(4): 651–666. <https://doi.org/10.1111/boj.12427>
- Ruchisansakun S, Suksathsan P, Van der Niet T (2017) *Impatiens tanintharyiensis* (Balsaminaceae), a new species from southern Myanmar. *Phytotaxa* 296(2): 171–179. <https://doi.org/10.11646/phytotaxa.296.2.6>
- Ruchisansakun S, Suksathan P, van der Niet T, Smets EF, Saw-Lwin, Janssens SB (2018) Balsaminaceae of Myanmar. *Blumea* 63: 199–267. <https://doi.org/10.3767/blumea.2018.63.03.01>
- Shimizu T (1970) Contributions to the Flora of Southeast Asia II. *Impatiens* of Thailand and Malaya. *South Asian Studies* 8: 187–217.
- Shimizu T (1977) Some additional note on *Impatiens* (Balsaminaceae) of Thailand. *Acta Phytotaxonomica et Geobotanica* 23: 31–34.
- Shimizu T (1991) New species of the Thai *Impatiens* (1). *Shokubutsu Kenkyu Zasshi* 66: 166–171.
- Shimizu T (2000) New species of Thai *Impatiens* (Balsaminaceae) 2. *Bulletin of the National Science Museum, Series B (Botany)* 26: 35–42.
- Shimizu T, Suksathan P (2004) Three new species of the *Impatiens* (Balsaminaceae), part 3. *Bulletin of the National Science Museum, Series B (Botany)* 30: 165–171.
- Souvannakhoummane K, Suksathan P (2015) Two new species of *Impatiens* (Balsaminaceae) from north of Lao PDR. *Taiwania* 60(4): 175–180. <https://doi.org/10.6165/tai.2015.60.175>
- Suksathan P, Triboun P (2009) Ten new species of *Impatiens* (Balsaminaceae) from Thailand. *Gardens' Bulletin (Singapore)* 61: 159–184.
- Wight R, Arnott W (1834) *Prodromus Florae Peninsulae Indiae Orientalis* 1. Parbury, Allen & Co, London, 480 pp. <http://dx.doi.org/10.5962/bhl.title.252>
- Yu SX, Janssens SB, Zhu XY, Lidén M, Gao TG, Wang W (2015) Phylogeny of *Impatiens* (Balsaminaceae): Integrating molecular and morphological evidence into a new classification. *Cladistics* 32: 1–19. <https://doi.org/10.1111/cla.12119>