

Impatiens malipoensis S. H. Huang, a new record for the flora of Vietnam

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(Received: 02 January 2024; Revised: 29 March 2024; Accepted: 03 June 2024)

Abstract. *Impatiens malipoensis* S. H. Huang, a narrowly distributed species previously recorded only from Southern China, is newly found in the limestone mountains of Northeast Vietnam. Its morphological description, colour illustration, ecological and phenological characteristics, and taxonomic notes are provided in this paper.

Keywords: Balsaminaceae, Ha Giang province, limestone mountains, plant taxonomy

1 Introduction

Impatiens L. (Balsaminaceae) comprises 1120 accepted species native to the Old World, North and Central America [1]. Southeast Asia is considered the original region of *Impatiens* [2]. So far, 359 species of this genus have been reported from China [3], but only 48 species have been recorded in Vietnam [4–7] and 36 in Laos [8]. It is likely that the number of *Impatiens* in Vietnam will rapidly increase when more field surveys and taxonomic work are carried out.

When investigating specimens of *Impatiens* collected during 2018–2022 from Northern Vietnam, we found some unusual plants with morphological characteristics of racemose inflorescence with several large white flowers. They also have 4 lateral sepals (outer 2 oblique ovate, inner 2 linear or subulate), an infundibular lower sepal with a short incurved spur, lateral united petals 2-lobed (basal lobe ovate-oblong, distal lobe oblong), a fusiform 4-carpellate ovary,

and a clavate 4-valved capsule. After a close scrutiny of relevant literature [8–10] and examination of photographed *Impatiens* specimens available from herbarium websites (<https://data.kew.org>; <https://www.cvh.ac.cn>; <https://science.mnhn.fr>; <https://www.gbif.org>) from neighboring countries, we confirmed that the plant specimens belong to *Impatiens malipoensis* S. H. Huang [11], a species previously reported as endemic to Yunnan and Guangxi, China [3, 12, 13]. This species has not yet been recorded for the flora of Vietnam [4–7, 14–19]; therefore, it is worth providing a morphological description, colour illustration, data on its distribution, ecology, and phenology based on Vietnamese material, as well as relevant taxonomic notes.

2 Materials and methods

The morphology of our samples was compared with that of relative species in Vietnam and neighbouring countries based on their protologue

and relative [9, 10, 13–15], as well as their herbarium specimen from the traditional herbaria (HN, E, P, K, SING, PE and VNM) and high-resolution images of specimen digitized on Chinese Virtual Herbarium (<http://www.cvh.org.cn/>), Jstor Global Plant (<https://plants.jstor.org/>), and Muséum National d'Histoire Naturelle (<https://science.mnhn.fr/>).

3 Results and discussion

Impatiens malipoensis S. H. Huang, Acta Bot. Yunnan. 25(3):269, fig. 6(8–15), 2003; Huang S. H. et al., Acta Bot. Yunnan. 26(5):573, 2004; Yu S. X., Balsaminaceae of China:77, 2012 (Fig. 1).

Type: China, Yunnan: Malipo, Yunling gongshe (Yunling village), elevation 1,400 m, in forest, 24 January 1964, *Wu Quan-An 9883* (Holotype: KUN).

Description: Terrestrial herb, 40–80 cm tall, entirely glabrous. Stem terete, (3)5–8(10) mm in diameter, single or branched, basally (proximally) prostrate or procumbent, ascending and erect apically, purple-red at base and gradually turning from purplish-green to pale green upward, basal nodes swollen at both ends, apical parts of stem with two longitudinally narrow ridges. Roots adventitious, several at each old node, purplish brown to reddish, and fibrous. Leaves simple, alternate, aggregated at stem apex, petiolate; petiole semi-cylindrical, (1.5)2–4(4.5) cm long, adaxially somewhat grooved; leaf blade elliptic, narrowly ovate, or broadly lanceolate, (7)9–14(16) cm long, (2.5)3–5(5.5) cm wide, adaxially green, abaxially pale green or grayish green; venation anastomosing, brochidodromous, mid-vein conspicuously sunken above and raised below, with 5–7(9) pairs of lateral veins slightly depressed adaxially and almost flat abaxially; base broadly cuneate to obtuse; apex acuminate to attenuate; margin crenate, teeth with a mucro. Inflorescences racemose, usually 3–6 per a branch,

solitary at a leaf axil, 3–7(9) flowered. Peduncles cylindrical, straight, horizontal or slightly ascending, (3)4–7(8) cm long, 1.5–2 mm in diameter, greenish, smooth and glossy; pedicels slender, (1.5)1.8–2.5(2.8) cm long, bearing one bract at base; bracts caducous, ovate, or narrowly ovate, concave, (7)8–12(13) mm long, (5)6–8(9) mm wide, green, inconspicuously veined, acuminate to caudate at apex. Flowers white, (3.5)3.8–4.8(5) cm long. Lateral sepals 4; the outer 2 ovate, oblique, concave, 7–9 mm long, 3–5 mm wide, pale green to light greenish, inconspicuously 3–5 veins, abaxially longitudinal ribbed, apex acuminate or mucronate; the inner 2 linear or subulate, strongly recurved or revolute, 11–13 mm long, ca. 2 mm wide, white, unicostate, apex attenuate to acuminate. Lower sepal obliquely tubular or infundibular, 2.8–3.5 cm long excluding spur, 1.5–2.0 cm wide at mouth, white, anterior part attenuate to mucronate, distal part abruptly constricted into a strongly incurved spur ca. 7–10 mm long, 1.3–1.8 mm wide, pale orange. Dorsal petal widely ovate or suborbicular, (1.4–2.1)×(1–1.5) cm, recurved, white, adaxially shallowly conduplicate in the middle and marginally recurved, abaxial surface carinate with a small greenish crest-like appendage ca. 1–1.5 mm high at the upper half; base truncate; apex acute to shortly acuminate; margin almost entire or slightly repand. Lateral united petal 2-lobed, 2.3–2.8 cm long; upper petal (basal lobe) overlapped on lower petal, ovate-oblong or nearly rhombic, 1.2–1.4 cm long, 0.6–0.8 cm wide, apex obtuse or obliquely rounded, margin shallowly undulate, adaxially white and tinged with a small yellowish blotch, abaxially white; lower petal (distal lobe) oblong, 2–2.5 cm long, 0.6–0.9 cm wide, apex truncate or obliquely rounded, white, basally speckled with yellow blotches and dark orange patches or small purple spots; auricle incurved, yellow. Stamens 5, adnate around ovary; filaments stout, white to dull yellowish,

3.5–5 mm long, flatten, apically with a spatulate appendage joined into a ring surrounding the ovary apex; anthers connivent, ovoid, ca. 1.5×1 mm, light yellowish. Ovary superior, fusiform, 4–4.5 mm long, 1.5–1.8 mm in diameter greenish, glabrous, acute, 4-carpellate, with one ovule per locule, placentation axil. Immature capsule clavate, straight, 14–18 mm long, green, apically white, acuminate, 4-valved.

Vernacular name: Bón nước malipo (Vietnamese language)

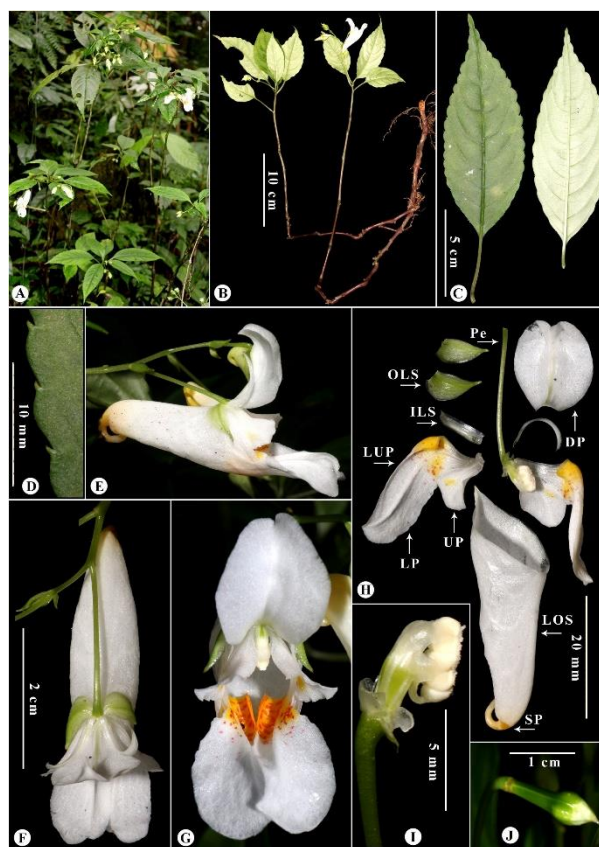


Fig. 1. Illustration of *Impatiens malipoensis* S. H. Huang
A: Plants in natural habitat; B: Habit (pressed specimen); C: Leaves, adaxial (left) and abaxial (right) surface; D: Portion of leaf margin; E–G: Flower, side, top and front view; H: Flower dissection (Pe: Pedicel, OLS: Outer lateral sepal, ILS: Inner lateral sepal, LOS: Lower sepal, SP: Spur, DP: Dorsal petal, LUP: Lateral united petal, UP: Upper petal, LP: Lower petal); I: Stamens; J: Immature capsule. (Photographed by K. S. Nguyen)

Ecology and phenology: *Impatiens malipoensis* usually grows in wet, humid, shady places on alluvial foothills of limestone mountains, under remnants of humid primary evergreen broad-leaved and mixed coniferous forests (with *Amentotaxus yunnanensis* H. L. Li, *Podocarpus* sp.) in Cao Ma Po and Ta Van Communes, at elevations 1150–1500 m. It is often associated with *Strobilanthes* sp., (Acanthaceae), *Ophiorrhiza* spp., *Psychotria* sp., *Spiradiclis* sp. (Rubiaceae), *Ophiopogon chingii* F. T. Wang & Tang, *O. dracaenoides* Hook., *Peliosanthes yunnanensis* F. T. Wang & Tang (Asparagaceae: Convallarioideae), *Begonia hemsleyana* Hook. f., *Begonia* spp. (Begoniaceae), *Lysionotus* sp., *Paraboea* sp., *Hemiboea* sp. (Gesneriaceae), *Bulbophyllum andersonii* J. J. Sm., *Cephalantheropsis obcordata* (Lindl.) Ormerod, *Liparis* spp., *Phaius* sp. (Orchidaceae), *Boehmeria* sp., *Elatostemma* sp., *Pilea* sp. (Urticaceae), *Zingiber cochleariforme* D. Fang, *Alpinia* sp., and *Hedychium* sp. (Zingiberaceae). *Impatiens malipoensis* flowers in October and November.

Examined materials: Vietnam, Ha Giang Prov., Quan Ba Distr., Cao Ma Po Com., Va Thang 1 Village, around point N23°05'52" E104°51'26", steep alluvial slopes and flattened mountain summits based on limestone at elevation 1,400–1,450 m, primary evergreen broad-leaved very humid forest, terrestrial herb 0.5–0.8 m tall in shady humid place, flowers white, spur yellow, common, 22 October 2018, L. Averyanov, K. S. Nguyen, T. Maisak, T. D. Truong, VR 1218 (HN!, LE01050405!, LE01050445!); *ibid.*, Then Van 1 Village, Binh Mountain, around point N23°05'40" E104°50'54", at elevation: 1,400–1,500 m., remnants of primary evergreen broad-leaved very humid forest, erect terrestrial herb to 70 cm tall, flowers white, inside tube with yellowish spot, occasional, 4 October 2019, L. Averyanov, K. S. Nguyen, T. Maisak, VR 1277 (HN!, LE01061211!, LE01066914!); *ibid.*, Va Thang 2 Village, on the trail to Tung Vai

Commune, around point N23°04'30" E104°51'09", elevation 1,300–1,370 m, remnants of primary evergreen broad-leaved and occasionally mixed coniferous (*Amentotaxus yunnanensis*, *Podocarpus* sp.) humid forest on limestone mountain, terrestrial perennial herb up to 50 cm, flower white, 22 October 2022, V. D. Nguyen, K. Nguyen, X. T. Trinh, V. N. Vu, F. M. Scott, H. Daniel, W. Mark, T. Marchlik, VN-US 24 (HN!, LE01123906!); Ta Van Commune, around point N23°02'20" E104°51'02", 1150–1290 m a.s.l., remnants of primary evergreen broad-leaved forest on steep slopes mixed with conifers on ridge and tops of limestone mountains, terrestrial herb about 40–60 cm, flower white, not common, 19 November 2019, K. S. Nguyen, D. V. Nguyen, F. M. Scott, Z. P. Jeffrey & P. Gregory, HG-QB 25 (HN!, LE01170617!). China, Yunnan: Malipo, Yunling gongshe (Yunling Village), moist evergreen broad-leaved forest on limestone, elevation 1,400 m, 26 October 1964, *leg. ign.* 9880 (KUN0428233!); Yunnan, elevation 1,260 m, 10 October 1964, *Wu Quan-An et al.* 9546 (KUN0428230!); *ibid.*, Xiajinchang, Huoshao liangzi, under forest, elevation 1,400 m, 6 July 2009, Yunnan Expedition Team, Jin X. H., Liu B., Liu B., Quan X., Su J. X., Zhong Y., YN-ET 939 (PE01879069!, PE01879070!); Yunnan, subtropical evergreen broad-leaved forest, elevation 1,223 m, 23 October 2015, Malipo Team 5326240518 (HITBC0027359!, HITBC0027360!); Guizhou: Anlong, Xianheping, evergreen broad-leaved forest, elevation 1,300–1,500 m, 12 October 1998, Wu S. G., Tateishshi Y., Sugawara T., Kawakubo N., Kato H., Chen W. Y. 100728 (KUN0429451!); *ibid.*, Anlong, Xianheping, elevation 1,430 m, 31 October 1981, Liu D. J. 87-126 (HGAS025453!); Guangxi, Napo, elevation 800 m, 25 October 2006, Wang Y., Wen F., *s.n.* (BGFC00059293!).

Distribution: Vietnam, Ha Giang Province, Quan Ba District, Cao Ma Po and Ta Van

Communes. China, Yunnan (Malipo), Guizhou (Anlong) and Guangxi (Napo).

Taxonomic notes: *Impatiens malipoensis* is most closely related to *I. apalophylla* Hook. f. [20] based on molecular data that show that they are a sister pair in the phylogenetic tree [21] and morphological similarity of habit, number and shape of lateral sepal, and clavate capsule, but the former strikingly differs from the latter by its elliptic, narrowly ovate, or broadly lanceolate (vs. oblong-ovate or oblong-oblancheolate) leaf blade with a smaller size of (7–16)×(2.5–5.5) (vs. (10–22)×(4–8) cm, fewer leaf lateral veins, 5–7, rarely 9 (vs. 9–10) pairs, white (vs. yellow) flower, obliquely tubular or infundibular (vs. saccate) lower sepal with short spur 0.7–1 (vs. 2–3) cm long, lateral united petal with ovate-oblong (vs. oblong) basal lobe, and oblong (vs. narrowly oblong) lower lobe [9, 11, 12]. *Impatiens malipoensis* also somewhat resembles to *I. chishuiensis* Y. X. Xiong [22] on habit, shape of leaf and lateral sepal, fusiform ovary and clavate capsule, but easily distinguished by its white (vs. pinkish) flower, obliquely tubular or infundibular (vs. broadly funnellform) lower sepal abruptly constricted into a strongly incurved spur ca. 7–10 mm long (vs. gradually narrowed into an incurved spur 15–18 mm long), and obtuse or obliquely rounded (vs. acute) basal lobe apex of lateral united petal.

Acknowledgement

We cordially thank the authorities of Ha Giang Province for providing facilities to our field surveys. This research is supported by the Ministry of Education and Science of the Russian Federation (contract number 075-15-2021-1056, to L.V. Averyanov).

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