A Newly Recorded Genus of Brassicaceae from China–Diptychocarpus (Postprint)

Authors: Yang Zongzong, Huang Yahui, Zhao Xiaolin, Zhang Yunling

Date: 2024-02-07T00:00:00+00:00

Abstract

Wuqia County is located in the western part of the Xinjiang Uygur Autonomous Region and is characterized by a distinctive flora. Based on field investigations in this region, together with herbarium specimen studies and literature verification, we report a newly recorded genus of Brassicaceae from western Xinjiang, China –Didymophysa Boiss. The genus Didymophysa comprises three species. This paper provides morphological descriptions of the genus and diagnostic characters for species differentiation. Didymophysa fedtschenkoana Regel is recorded for the first time in China, with detailed morphological descriptions and habitat photographs provided for its populations in Xinjiang, China. Finally, the biogeographical significance of the discovery of this newly recorded genus and species is discussed, along with recommendations for conservation efforts concerning plant diversity, uniqueness, and protection in the western Xinjiang plateau region.

Full Text

Didymophysa Boiss., a Newly Recorded Genus of Brassicaceae from Xinjiang, China

YANG Zong-Zong[1], HUANG Ya-Hui[2], ZHAO Xiao-Lin[3], ZHANG Yun-Ling[3]*

[1] Xinjiang Ziranli Information Technology Co., Ltd., Urumqi 830011, China
[2] Urumqi Shaibak District Public School Nature Conservation Science Popularization Center, Urumqi 830011, China
[3] General Grassland Station of Xinjiang, Urumqi 830049, China

Received: 2023-12-22

Funding: This work was supported by the Xinjiang Uygur Autonomous Region Innovation Environment (Talent, Base) Construction Special Project–Resource Sharing Platform Construction Project (PT2033), Xinjiang Uygur Au-

tonomous Region Forestry Development Subsidy Fund (XJLYKJ-2023-17), Xinjiang Uygur Autonomous Region Natural Science Foundation General Project (2022D01A104), and the Autonomous Region Forest and Grass Germplasm Resource Bank (Nursery) Construction Project (2023).

Corresponding Author: ZHANG Yun-Ling, Senior Animal Husbandry Engineer, specializing in grass germplasm resource conservation and utilization; Email: itylx@163.com

---

Abstract

Wuqia County, located in western Xinjiang, possesses a distinctive flora. Based on field investigations in this region, supplemented by herbarium studies and literature review, we report *Didymophysa* Boiss. as a newly recorded genus of Brassicaceae from western Xinjiang, China. The genus *Didymophysa* comprises three species. This paper provides a morphological description of the genus and diagnostic features for species identification. *Didymophysa fedtschenkoana* Regel is recorded for the first time in China, and we present a detailed morphological description along with habitat photographs of this species from Xinjiang. Finally, we discuss the biogeographical significance of this discovery and offer recommendations for plant diversity conservation in the fragile plateau regions of western Xinjiang.

Keywords: *Didymophysa fedtschenkoana*, Brassicaceae, newly recorded genus, Xinjiang, China

---

Introduction

Xinjiang, situated in the heart of the Eurasian continent, harbors a rich diversity of Brassicaceae species. Vertically, these plants are primarily distributed in the subalpine meadows and forest meadows of the Altai and Tianshan Mountains, the alpine cold deserts and desert steppes of the Kunlun Mountains, and the alpine meadows of the Pamir Plateau (Wang et al., 2006; Editorial Committee of Flora of Xinjiang, 1995).

The genus *Didymophysa* Boiss. was established in 1841 and originally comprised two species: *D. fedtschenkoana* Regel and *D. aucheri* Boiss. *Didymophysa fedtschenkoana* is distributed across Afghanistan, Pakistan, Kyrgyzstan, Tajikistan, and Uzbekistan, while *D. aucheri* occurs from eastern Turkey through the Caucasus to Iran (N. Bush, 1939). In 2018, Esmailbegi et al. conducted a phylogenetic study of the tribe Thlaspideae and found that the monotypic genus *Elburzia* Hedge was nested within *Didymophysa* with similar fruit morphology. Consequently, they synonymized *Elburzia* under *Didymophysa*, expanding the genus to three species (S. Esmailbegi et al., 2018). During botanical surveys in the border region of Wuqia County, Xinjiang, we discovered a Brassicaceae

species on alpine scree slopes with unusually inflated, bladder-like fruits that differed from all previously known Chinese Brassicaceae. Through comprehensive examination of collected specimens and consultation of relevant literature (N. Bush, 1939; IA. Al-Shehbaz, 2015), we confirmed this plant as representing a genus new to China—*Didymophysa*—with *D. fedtschenkoana* being a newly recorded species for the country. This discovery is formally reported herein.

Taxonomic Treatment

Didymophysa Boiss., Ann. Sci. Nat., Bot. Sér. 2, 16: 379. 1841. Type: *Didymophysa aucheri* Boiss.

Description: Perennial prostrate herbs with short branches, glabrous throughout. Leaves simple, glabrous, fleshy, obovate to spatulate, 3–5-lobed or entire, sessile, apex rounded. Racemes short, corymbose, ebracteate. Flowers small, white or purplish; pedicels short, spreading, not thickened in fruit; sepals oblique, erect, not saccate, margin membranous; petals white to purple, ca. 2× as long as sepals, spatulate, apex rounded; stamens 6, erect, tetradynamous; filaments wingless, not drooping, glabrous; anthers ovate; lateral nectar glands 4, median glands absent; ovary suborbicular, 2-loculed, with 2 ovules per locule; style distinct, ca. 1/2 as long as ovary, stigma capitate, 2-lobed. Silicles bladder-like, valves membranous to thinly papery, veinless, glabrous, dehiscent; false septum narrowly elliptic, translucent; seeds 2 or 1 per locule, elliptic, flattened, dark brown; seed coat smooth, not mucilaginous when wet; cotyledons accumbent. n = 8.

The genus currently comprises three species distributed in central and western Asia. *Didymophysa fedtschenkoana* has entire leaves or rarely toothed margins, while *D. aucheri* has 3–5-lobed leaves, providing clear distinction between the two. *Didymophysa fenestrata* can be distinguished from both by its slightly inflated fruits and broader valves.

Didymophysa fedtschenkoana Regel, Newly Recorded from China

Didymophysa fedtschenkoana Regel, Descr. Pl. Nov. Rar. Fedtsch. 8. 1882. Type: [Kyrgyzstan], Dzhiptyk Pass, Fedtschenko s.n. (holotype: LE, n.v.).

Description: Perennial herb forming loose tufts, glabrous throughout, prostrate with ascending branches. Stems 7–20(–25) cm long, decumbent at base. Leaves alternate, fleshy, veins inconspicuous, glabrous, glaucous; petiole 1–6(–8) mm; blade 4–10 mm long, 2–5 mm wide, margin entire, apex rounded or obtuse, rarely with 1–3 teeth at apex. Raceme 10–30-flowered, dense, slightly elongating or not in fruit; pedicels slender, filiform, glabrous, up to 8 mm long in anthesis, spreading or deflexed. Flowers ca. 3 mm in diameter, white; sepals 1–

1.5 mm long, 1 mm wide, purplish-tinged; petals white, ca. 2.5 mm long, 1 mm wide, obovate; stamens 1.4–1.7 mm long; ovary elliptic to orbicular, flattened, style short; stigma capitate. Silicles paired, extremely inflated and bladder-like, deeply notched at base and apex, usually faintly purplish-tinged, valves subglobose, 7–10 mm long, 9–12 mm wide; replum 2–3 mm long, ca. 1 mm wide; style 1 mm long. Seeds 1–2 per locule, elliptic, flattened, black, ca. 1.7 mm long, 0.8 mm wide. Flowering June–July; fruiting July–August.

Specimen Examined: China: Xinjiang, Kizilsu Kyrgyz Autonomous Prefecture, Wuqia County, 39°39' 28.10" E, 73°58' 33.77" N, alt. 4,233 m, 22 July 2022, Y. H. Huang 520 (BNU).

Discussion and Conservation Implications

According to the latest statistics on wild vascular plants in Xinjiang, the region harbors 4,109 species (including infraspecific taxa) belonging to 800 genera and 113 families, among which Brassicaceae is represented by 215 species in 76 genera (Chen et al., 2023). The flora includes numerous oligotypic genera. *Didymophysa fedtschenkoana* is currently known from Afghanistan, Pakistan, Kyrgyzstan, Tajikistan, Uzbekistan, and now Wuqia County in western Xinjiang, China. The discovery of *Didymophysa* enriches our understanding of alpine Brassicaceae diversity in China and provides valuable material for floristic studies.

Didymophysa fedtschenkoana in Wuqia County grows on high-altitude scree slopes at approximately 4,233 m elevation. Associated species include *Corydalis fedtschenkoana* Regel, *Alajja anomala* (Juz.) Ikonn, *Delphinium lacostei* Danguy, and *Thermopsis alpina* (Pall.) Ledeb. Wuqia County lies in western Xinjiang, at the northern edge of the Pamir Plateau, the western terminus of the Tarim Basin, and the junction of the southern Tianshan and Kunlun mountain ranges, bordering Kyrgyzstan to the northwest. This region possesses a unique flora with many unusual plant species. Botanical surveys in this area remain insufficient, necessitating further intensive research and specimen collection. We recommend establishing conservation mechanisms for fragile alpine scree habitats, which harbor specialized plant communities, and conducting thorough population assessments for rare species to ensure their protection.

[Figure 1: see original paper]

Figure 1. *Didymophysa fedtschenkoana*. A. Habitat; B. Leaf; C. Inflorescences; D. Fruit.

Acknowledgments

We thank Professor LIU Quan-Ru from Beijing Normal University and Dr. LIU Bing from the Institute of Botany, Chinese Academy of Sciences, for their valuable assistance in manuscript preparation and literature consultation.

References

Al-Shehbaz IA, 2015. *Flora of Pan-Himalaya* [M]. Beijing: Science Press, 30: 555-557.

Bush N, 1939. *Flora of the USSR* [M]. Moscow & Leningrad: Academy of Sciences of the USSR, 8: 574-575.

Chen HM, Li WJ, Qiu J, et al., 2023. A checklist of wild vascular plants in Xinjiang, China [J]. *Biodiversity Science*, 31(9): 1-7. [Chen Huimei, Li Wenjun, Qiu Juan, et al., 2023. Checklist of wild vascular plants in Xinjiang [J]. Biodiversity, 31(9): 1-7.]

Editorial Committee of Flora of Xinjiang, 1995. *Flora of Xinjiang* [M]. Urumqi: Xinjiang Science and Technology Publishing House, 2(2): 38-229. [Xinjiang Flora Editorial Committee, 1995. Flora of Xinjiang [M]. Urumqi: Xinjiang Science, Technology and Health Publishing House, 2(2): 38-229.]

Esmailbegi S. et al., 2018. Phylogeny and systematics of the tribe Thlaspideae (Brassicaceae) and the recognition of two new genera [J]. *Taxon*, 67(2): 324-340.

Wang Y, Zhou GL, Meng HM, 2006. Analysis on Geographical Elements of Brassicaceae Area of Xinjiang [J]. *Journal of Xinjiang Agricultural University*, 29(4): 5-9. [Wang Yong, Zhou Guiling, Meng Hongmei, 2006. Analysis of geographical elements of Brassicaceae flora in Xinjiang [J]. Journal of Xinjiang Agricultural University, 29(4): 5-9.]

Note: Figure translations are in progress. See original paper for figures.