Bioscience Discovery, 13(1):01-04, Jan. - 2022

Open Access, Peer Reviewed, Referred Research Journal

Print & Online available on https://jbsd.in
ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)

Research Article

Anoectochilus formosanus Hayata (Orchidaceae) a new record for flora of Vietnam

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Article Info

Received: 10-10-2021,
Revised: 16-12-2021,
Accepted: 20-12-2021

Keywords: *Anoectochilus*, Biodiversity conservation, Orchid, Jewel, Vietnam

Abstract

Anoectochilus formosanus Hayata (Orchidaceae), has been only reported to occur in Japan, Taiwan and Hong Kong, is now reported for the first time in Vietnam. A morphological description, pictures, notes on habitat, distribution, and conservation status of this species in Vietnam are provided.

INTRODUCTION

Vietnam is ranked as the 16th richest country in natural resources (MONRE, 2011; World Conservation Monitoring Centre, 1992) with high diversity and endemism of species, ecosystem and genetic resources. The genus, *Anoectochilus* (Orchidaceae), consists of approximately 40 -50 species distributed throughout China, Japan, Southeast Asia, Australia, Papua New Guinea, New Caledonia and Hawaii (Nguyen Trong Quyen *et al*., 2020; Pham Xuan Binh Minh, 2019). It is known as a jewel orchid, which are grown primarily for its beautiful foliage and medicinal properties as it is used for hypertension, lung and liver disease in many countries, especially in China and Taiwan (Ket et al., 2004). There are 16 species that belong to the *Anoectochilus* genus that are recorded to occur in Vietnam (Nguyen Tien Ban, 2005; Nguyen Trong Quyen et al., 2020). *Anoectochilus formosanus* Hayata has been recorded to only occur in Taiwan, Japan and Hong Kong (Kumar & Gale, 2020). In Vietnam, there are several studies on this species, such as in vitro regeneration (Huyen & Hoang, 2017), and chemical constituents (Nguyen *et al.*, 2018). However, all materials from the lab do not have any records on this species to occur in Vietnam. Ket et al. (2004) recorded the species in Lamdong Province, Vietnam. However, there is no information about the location, and no voucher specimens and or pictures exist of this species in this area. Additionally, it is not listed in any recent enumerations of the orchid flora of Vietnam (Averyanov L.V. & A.L., 2003; Govaerts R. *et al*., 2021; Kumar & Gale, 2020). Under the project number NVQG-2016/07, funded by the Ministry of Science and technology Vietnam, we found this species in Nam Dong conservation area, Thanh Hoa province. After thorough identification and consultation with orchid experts, *Anoectochilus formosanus* Hayata is officially confirmed as a new record for the flora of Vietnam.

***Anoectochilus formosanus* Hayata,** Icon. Pl. Formosan. 4: 101. 1914

Vernacular name: Lan gấm

Plants erect, up to 22 cm tall. Rhizomes creeping, terete, 0.3–0.4 cm diameter, with thick hairy roots. Leaves 2–5, clustered at the base of the plant; petioles 1.5–2.4 × 0.7–0.9 cm, bright reddish - brown, sheathing at base; leaves ovate, 2.5–5 × 2– 3.3 cm,

acute at apex, margins pale white, reddish-green, dark green with silver-white. Peduncles erect, slender, up to 3-noded, hairy, pale reddish-brown, up to 16 cm long, bearing 2–3 sterile bracts; bracts ovate,1–1.5 × 0.7–0.9 mm. Floral rachis 3–5.5 cm long, bearing up to 7 laxly arranged flowers; floral bracts ovate, 1–1.3 × 0.6–0.7 mm, acuminate at apex, hairy on the lower surface, glabrous ventrally, reddish-brown. Flowers bisexual, sepals and petals greenish-brown to greenish-red, labellum white flushed yellow on the outer surface of the mesochile and along the flanges. Pedicel and ovary 10–15 × 3–5 mm, covered with glandular hairs; sepal broadly elliptic, 5,5–6.3 × 4.0–4.5 mm, tapering at both ends, acuminate at apex, forming a hood with the petals above the column, hairy with glandular hairs on lower surface, glabrous ventrally; lateral sepals obliquely ovate, 7.3–7.8 × 3.8–4.2 mm, acute, hairy with glandular hairs on lower surface; petals obliquely ovate, 5–7 × 3–3.3 mm, acuminate, hooked at the apex, apical margins slightly revolute, glabrous; labellum spreading and projecting downwards, adnate to the base of the column, 16– 18 × 10–13 mm including the spur, 3-partite; hypochile flabellate when flattened, 2.5–3 × 1.5–2 mm, lateral margins rolled upwards, terminating in a pair of short; mesochile canaliculate, margins raised, flanged on either side, each flange somewhat fleshy and divided into up to 8 teeth, each tooth 0.2–5.5 mm long; epichile 2-lobed, lobes narrowly elliptic, 7–9 × 2.5–3 mm, obtuse; spur conical, 2.4–3 × 2.2–2.6 mm, pointing backwards, conspicuously longitudinally channeled along the external surface, with one oblong callus attached to the inner wall, callus up to 2 mm long. Column ovoid, 2–3 × c. 2 mm. Pollinarium c. 3.3 × 2 mm; lobes obovate, 2–2.5 mm long; caudicle into two elliptic lobes, c. 2.5 mm long; viscidium longitudinally 2-lobed, 1–1.4 mm long. Anther-cap 2-lobed; lobes obovate, yellow, lobes held together by a semi-circular disc at the top; base cordate. .

Flowering: *Anoectochilus formosanus* Hayata flowers from August to Octorber.

Habitat: *Anoectochilus formosanus* Hayata grows in moist evergreen forests in Nam Dong conservation area at 900- 1,200 m above sea level. The dominant tree species in the area is *Pinus kwangtungensis, Acer sp. (Sapindaceae), Lithocarpus spp. Castanopsis spp. (Fagaceae) and Machilus spp (Lauraceae)*

Distribution: *Anoectochilus formosanus* Hayata is found in Nam Dong conservation area, Thanh Hoa province, Vietnam (X 487.695; Y 2.245.861 and X 487.514; Y 2.247.609). This species is also recorded in Hong Kong, Japan, and Taiwan according to Kumar P. & S.W. Gale. 2020.

Specimens examined: Quyen ND 258 (VNF)

Conservation status: *Anoectochilus formosanus* Hayata was originally described from Taiwan (Chen X. et al., 2009; Hemsley, 1912) and subsequently found in the southern Ryukyu Islands of Japan (Garay L.A. & Sweet H.R., 1974; Iwatsuki K. et al., 2016; Kumar & Gale, 2020). More recently, it has been discovered on Okinawa Island and in Hong Kong, and in continental East Asia (Kumar & Gale, 2020). This species was found only in a small area at Nam Dong conservation area, Thanh Hoa province, Vietnam. The number of populations is small and under threat from high demand from the market in Vietnam. Therefore, we consider the species to be Endangered (EN) following IUCN guidelines (IUCN, 2019), the Red Book Vietnam 2007, IA category in Decree No. 84/2021/ND-CP amending and supplementing a number of articles of the Government's Decree No. 06/2019/ND-CP on the management of endangered, precious and rare forest plants and animals and implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora of Vietnamese goverment.

Acknowledgements

The authors are grateful to the Vietnamese goverment for financial support this study (Project number NVQG-2016/07). We are thankful to Andre Schuiteman – Kew Garden, United Kingdom; Leonid V. Averyanov - LE, Russia, and Pankaj Kumar - Kadoorie Farm and Botanic Garden, Hong Kong for fruitful discussion on the taxonomy and pre-identification of *Anoectochilus spp.* and *Anoectochilus formosanus* Hayata in Vietnam. Authors also would like to thanks Ms. Army Byrne, The Morton Arboretum, USA for her checking English of manuscript.

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Fig. 01: Flower of *Anoectochilus formosanus* Hayata collected in Nam Dong conservation area, Thanh Hoa province (Source: Nguyen Trong Quyen)

Fig. 02: Whole plant of *Anoectochilus formosanus* Hayata Nam Dong conservation area, Thanh Hoa province (Source: Nguyen Trong Quyen)

Fig. 03 & 04: *Anoectochilus formosanus* Hayata in Nam Dong conservation area, Thanh Hoa province (Source: Nguyen Trong Quyen)

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How to cite this article

Nguyen Trong Quyen, Do Quang Tung, Bui Van Thang, Mai Hai Chau, Hoang Van Sam, 2022. *Anoectochilus formosanus* Hayata (Orchidaceae) a new record for flora of Vietnam. *Bioscience Discovery*, **13**(1):01-04.

Google Scholar citation: https://scholar.google.co.in/citations?user=vPzEyC8AAAAJ&hl=en