



## A new distribution record of *Trichosanthes cucumeroides* (Ser.) Maxim. ex Franch. & Sav. (Cucurbitaceae) in Korea

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**ABSTRACT:** A new distribution of *Trichosanthes cucumeroides* (Ser.) Maxim. ex Franch. & Sav. is discovered in Korea. This species was collected from forest margins on Ando Island, Ando-ri, Nam-myeon, Yeosu-si, in Jeollanam-do. *T. cucumeroides* is clearly distinguished from other species of the genus by having three- or five-lobed leaf blades, linear-lanceolate and minute bracts with entire margins, and oblong to triangular-ovoid seeds. Here, we provide precise description, a taxonomic key to the Korean *Trichosanthes* species, illustrations, and photographs of its habitat. The Korean name for the species is established as ‘Bul-geun-ha-neul-ta-ri’ considering the reddish color of its fruit.

**Keywords:** *Trichosanthes*, *Trichosanthes cucumeroides*, Cucurbitaceae, unrecorded species

*Trichosanthes* L. (Cucurbitaceae) contains approximately 100 species which are distributed in southern to eastern Asia including India, Sri Lanka, China, Malesia, Philippines, Taiwan, Japan, and Australia (Rugaya and de Wilde, 1997, 1999; Cooper and de Boer, 2011; de Boer and Thulin, 2012). Within *Trichosanthes*, six groups had been recognized as sections on the basis of morphological characteristics; fruit, seed, leaves, bracts of staminate inflorescences, probracts of pistillate inflorescences (Rugayah and de Wilde, 1999; Cooper and de Boer, 2011). Recently, molecular data have suggested the infrageneric classification of the genus *Trichosanthes* with two subgenera [subgn. *Trichosanthes*, subgn. *Scotanthus* (Kurz) H. J. de Boer] 11 sections (sect. *Asterospermae* W. J. de Wilde & Duyfjes, sect. *Cucumeroides* (Gaertn.) Kitam., sect. *Edulis* Rugayah, sect. *Foliobracteola* C. Y. Cheng & C. H. Yueh, sect. *Gymnopetalum* (Arn.) H. J. de Boer, sect. *Involucraria* (Ser.) Wight, sect. *Pseudovariifera* H. J. de Boer, sect. *Villosae* (Yueh & L. Q. Huang) H. J. de Boer, sect. *Trichosanthes*, sect. *Tripodanthera* (M. Roem.) H. J. de Boer, and sect. *Truncata* C. Y. Cheng & C. H. Yueh (de Boer and Thulin, 2012; de Boer et al., 2012).

*Trichosanthes cucumeroides* (Ser.) Maxim. ex Franch. & Sav. belongs to subgn. *Trichosanthes* sect. *Cucumeroides*. The

sect. *Cucumeroides* comprises ca. 10 species that are mainly distributed in Australia, Southeast Asia, and China (Cooper and de Boer, 2011). Species in sect. *Cucumeroides* are distinct from the other sections by their ovaries with 3 locules together with inflorescences without probracts, white fruits becoming reddish when they are matured, and gray or brown turgid seeds with coarsely undulate margins (Rugayah and de Wilde, 1999; de Wilde and Duyfjes, 2004; Cooper and de Boer, 2011). *T. cucumeroides*, known as distributed in China, India, Japan, and Taiwan is distinct from the other species in sect. *Cucumeroides* with their 3- or 5-lobed leaf blades, linear-lanceolate and minute bracts with entire margins, and oblong to triangular-ovoid seeds (Huang et al., 2011).

In Korea, only two taxa in the genus *Trichosanthes* are reported; *T. kirilowii* Maxim. var. *kirilowii* and *T. kirilowii* var. *japonica* (Miq.) Kitam. (Kim and Choi, 2018), which are member of sect. *Foliobracteola* (de Boer and Thulin, 2012). *T. kirilowii* var. *kirilowii* is distributed in East Asia, and found southern part of Korea (Kim and Choi, 2018). On the other hand, *T. kirilowii* var. *japonica* is distributed in Korea and Japan, and found on southern islands area in Korea (Kim and Choi, 2018).

During the Plant Diversity Research on Jeollanam-do Province, an unrecorded species, *T. cucumeroides* was

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confirmed in the forest margins in Ando Island, Ando-ri, Nammyeon, Yeosu-si in Korea. Here, we present the specific description, illustrations, taxonomic key to Korean *Trichosanthes* species as well as the photographs of its habit.

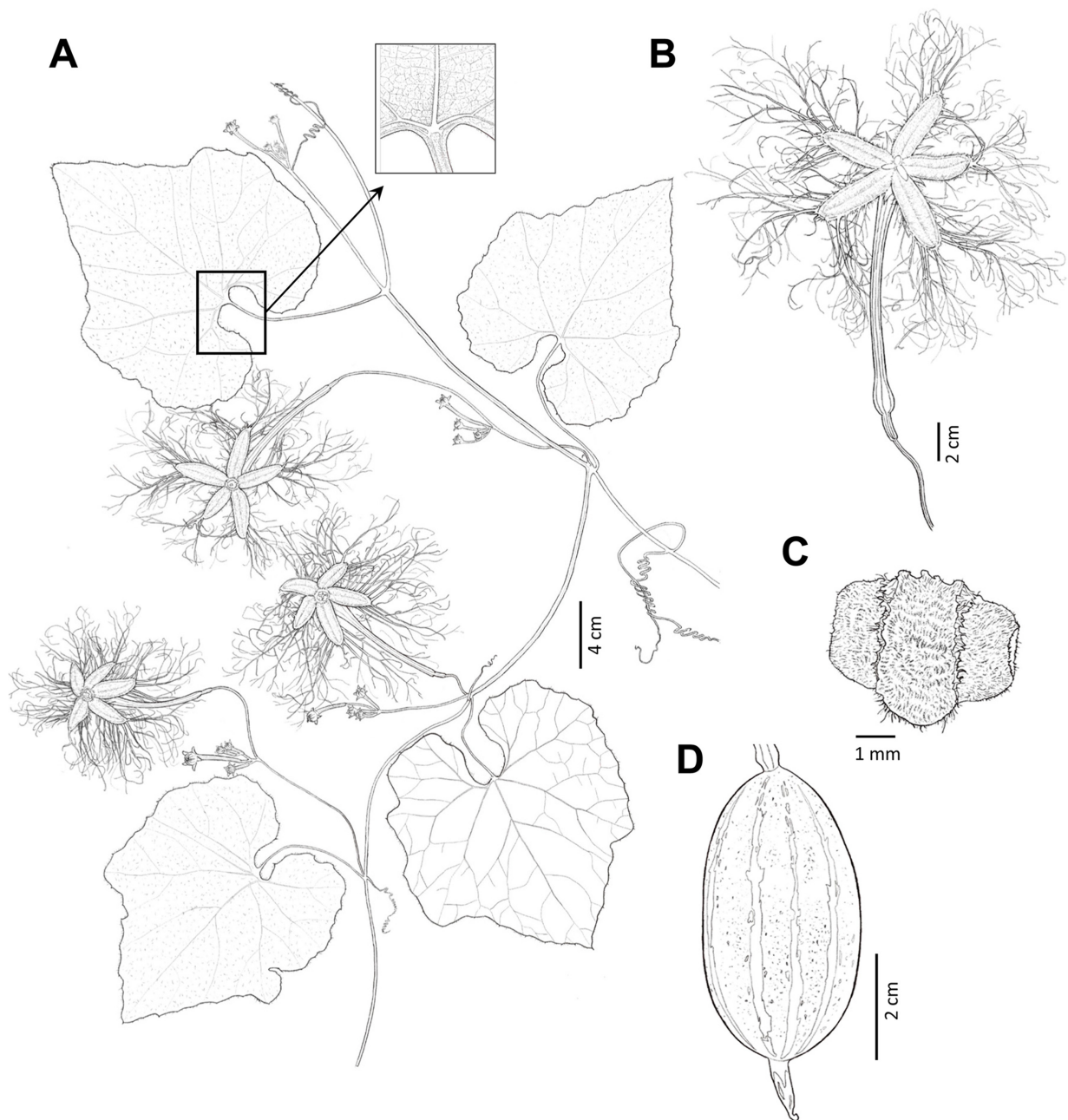
### Taxonomic Treatment

*Trichosanthes cucumeroides* (Ser.) Maxim. ex Franch. & Sav., Enum. Pl. Jap. 1: 172, 1873 (Figs. 1, 2). *Bryonia*

*cucumeroides* Ser. in DC., Prodr. 3: 308, 1828. *Trichosanthes ovigera* Blume subsp. *cucumeroides* (Ser.) C. Jeffrey, Mansfeld's Encycl. 3: 1528 (6: 2825), 2001.—TYPE: JAPAN. "Patria ignotus, Seringe manuscript", Wallich? (not seen).

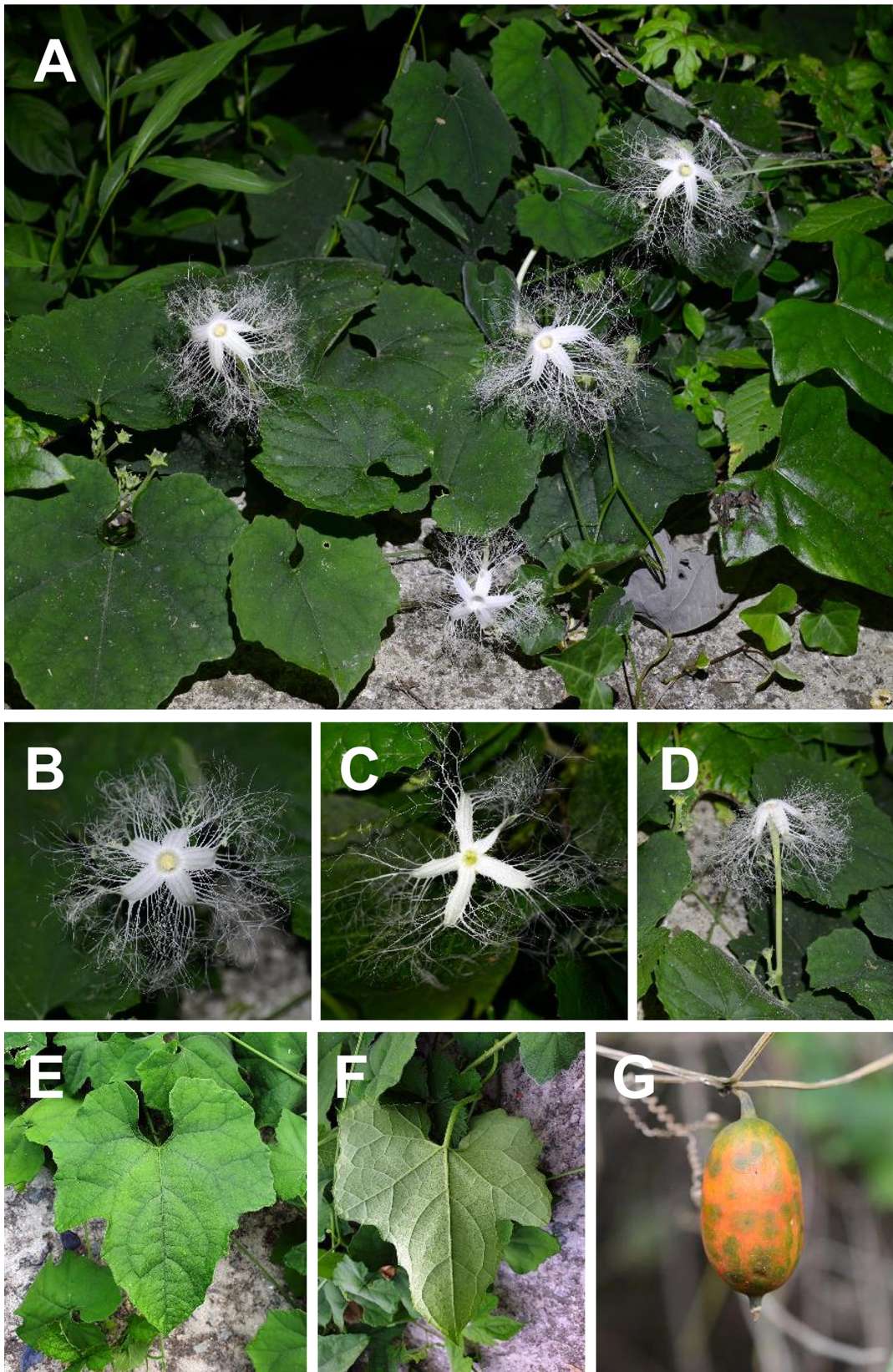
**Korean name:** Bul-geun-ha-neul-ta-ri (붉은하늘타리).

Herbs perennial, dioecious, climbing. Roots fasciculate, thickened. Stem slender, ca. 1.5 mm in diam., branched, longitudinally grooved, sparsely to densely pubescent with



**Fig. 1.** Illustration of *Trichosanthes cucumeroides*. **A.** Habit (♂). **B.** Pistillate flower. **C.** Seed. **D.** Fruit.





**Fig. 2.** Photographs of *Trichosanthes cucumeroides* in their habitat. **A.** Habit. **B.** Staminate flower. **C.** Pistillate flower. **D.** Staminate flower (side view). **E.** Leaf (adaxial surface). **F.** Leaf (abaxial surface). **G.** Fruit.

white short simple hairs. Leaves alternate, simple, petiolate; petiole (2–)4–8.5(–10) cm long, longitudinally grooved, densely pubescent with simple hairs intermixed with short conical stiff hairs; blade ovate, broadly ovate to triangular-ovate, shallowly 3- or 5-lobed, (5–)10–16(–19) × (5–)11–16(–18) cm, apex obtuse or acuminate, base cordate, margins slightly undulate, ciliolate, abaxial surface pale green, densely pubescent with short simple hairs, adaxial surface green to dark green, sparsely to densely pubescent with short simple hairs, especially along midvein; central lobe triangular to triangular-ovate, (3.5–)6–6.5 × (2.7–)7.3–10 cm; tendrils lateral, simple or bifid, spirally twisted; stipule absent. Inflorescences axillary, racemes or flowers solitary, pedunculate. Staminate inflorescences racemes, 6–10-flowered; peduncle 4–10 cm long, sparsely pubescent with short simple hairs; bracts linear-lanceolate, entire, minute, 1–3 mm long, densely pubescent with white short simple hairs; pedicel 5–8 mm long, sparsely to moderately pubescent with short simple hairs. Pistillate inflorescences flowers solitary; pedicel 0.5–1 cm long. Flowers: calyx tube salver-shaped, 6–7.5 cm long, outer surface densely pubescent with short simple hairs, sometimes glabrate, 5-lobed; calyx lobes green, linear-lanceolate to narrowly triangular, 2.5–4 mm long, less than 1 mm wide, abaxial surface densely pubescent with short simple hairs, adaxial surface sparsely pubescent with short simple hairs; corolla white; corolla tube 6–7.5 cm long, 5-lobed; corolla lobes oblong or oblong-elliptic, 1–2 × 0.4–0.7 cm, apex and margins long fimbriate, 4- or 5-veined; veins green; fimbriae elongate. Staminate flowers: stamens 3, short; anthers blackish, 1.5–2.5 mm long. Pistillate flower: ovary inferior, narrowly oblong, pubescent; placentae 3; ovules many; stigmas 3. Fruit berry, orange, orange-red or red, ellipsoid to globose, 5–7 × 3–5.5 cm, fleshy, smooth, apex beaked; fruiting pedicel ca. 1 cm long, pubescent. Seeds brown or dark brown, many, oblong to triangular-ovoid, 3-loculed, 0.6–1.2 × 0.7–1.4 cm, with 2 longitudinal bands, 2 lateral locules empty, rugulose.

**Flowering:** Jul to Sep.

**Fruiting:** Sep to Nov.

**Distribution:** China, India, Japan, Taiwan, and Korea.

**Specimens examined:** KOREA. Jeollanam-do: Yeosu-si, Nam-myeon, Ando-ri, Ando Isl., 34°28'49.33"N 127°48'43.35"E, elev. 10 m, 13 Oct 2018, *Yang-Hoon Cho & Seok-Soon Kim WR-181013-001* (♀, 2 sheets [KB, NIBRVP0000772811]); same locality, 34°28'52.54"N 127°48'41.7"E, elev. 10 m, 5 Aug 2019, *Yang-Hoon Cho & Seok-Soon Kim JN19167* (♂, 2 sheets [KB, NIBRVP0000772029]); same locality, 34°28'52.54"N 127°48'41.7"E, alt. 10 m, 16 Oct 2019, *Yang-Hoon Cho & Seok-Soon Kim JN19253* (♀, [KB, NIBRVP0000772115]); same locality,

5 Aug 2019, *Jin-Seok Kim kjs19033* (♂, 3 sheets [KB, NIBRVP0000772807]), *kjs19034* (♀, 2 sheets [KB, NIBRVP0000772808]); same locality, 6 Oct 2019, *Jin-Seok Kim kjs19035* (♀, 2 sheets [KB, NIBRVP0000772809]).

**Note:** *Trichosanthes cucumeroides* was known to be distributed in China, India, Japan, and Taiwan. From this study, the new natural distribution is discovered at forest edge in Ando Island, Ando-ri, Nam-myeon, Yeosu-si, Jeollanam-do, Korea. The population was composed of 20 individuals within 20 × 20 m<sup>2</sup> in size. The upper vegetation was made up of *Pinus thunbergii* Parl., *Celtis sinensis* Pers., *Broussonetia papyrifera* (L.) L'Her. ex Vent, *Camellia japonica* L., *Prunus spachiana* (Lavallée ex Ed. Otto) Kitam. f. *ascendens* (Makino) Kitam., *Picrasma quassioides* (D. Don) Benn., and *Mallotus japonicus* (L. f.) Müll. Arg., etc. The low vegetation was made up of *Dryopteris sacrosancta* Koidz., *Clematis apiifolia* DC., *Sinomenium acutum* (Thunb.) Rehder & E. H. Wilson, *Humulus japonicus* Siebold & Zucc., *Trichosanthes kirilowii* Maxim. var. *japonica* (Miq.) Kitam., *Rubus hirsutus* Thunb., *Pueraria lobata* (Willd.) Ohwi, *Orixa japonica* Thunb., *Hedera rhombea* (Miq.) Bean, *Phryma leptostachya* L. var. *oblongifolia* (Koidz.) Honda, *Ligustrum obtusifolium* Siebold & Zucc. *Melampyrum roseum* Maxim. *Artemisia indica* Willd., *Commelina communis* L., *Oplismenus undulatifolius* (Ard.) Roem. & Schult., and *Dioscorea quinqueloba* Thunb.

*Trichosanthes cucumeroides* (Ser.) Maxim. ex Franch. & Sav. was first recognized on the basis of its horizontally oblong seeds bearing longitudinal bands (de Candolle, 1828). It is most similar to *T. pilosa* Lour. in sect. *Cucumeroides* distributed in Southeast Asia including India, Indonesia, Nepal, Thailand, and Vietnam (Huang et al., 2011). However, *T. cucumeroides* is differ from *T. pilosa* in having linear-lanceolate (vs. lanceolate or oblanceolate) and much smaller (1–3 mm long vs. ca. 1.6 cm × 5–6 mm) bracts with entire margins (vs. dentate margins), and sparsely to densely pubescent adaxial surface of leaves (vs. glabrous or puberulent). Meanwhile, some authors have treated *T. cucumeroides* as synonym of *T. pilosa* (Cooper & de Boer, 2011).

In addition, *T. cucumeroides* is distinct from *T. kirilowii* var. *kirilowii* and var. *japonica*, which are distributed in Korea, by its minute, linear-lanceolate bracts with entire margins (vs. distinct, broadly ovate to obovate bracts with coarsely dentate margins), oblong (vs. obovate) corolla lobes with narrower in width (0.4–0.7 cm vs. about 1.8 cm), orange to red (vs. dull yellow to yellowish brown or orange) fruits when they are matured, and turgid, 3-loculed (vs. not turgid, 1-loculed) seeds.

## Key to Korean *Trichosanthes* taxa

1. Bracts minute, linear-lanceolate, 1–3 mm long, margins entire. Calyx lobes minute, 2.5–4 × ca. 1 mm. Corolla lobes oblong, 1–2 × 0.4–0.7 cm, margins long fimbriate to apex. Fruits orange to red. Seeds turgid, 3-loculed ..... *T. cucumeroides* 붉은하늘타리
1. Bracts distinct, broadly ovate to obovate, 15–30 mm long, margins coarsely dentate. Calyx lobes prominent, 8–15 mm long in staminate flowers, 35–40 mm long in pistillate flower. Corolla lobes obovate, ca. 2 × 1.8 cm, margins long fimbriate along upper half. Fruits dull yellow to yellowish brown or orange. Seeds not turgid, 1-loculed ..... *T. kirilowii*
  2. Leaves 3- or 5-(rarely 7-)lobed, lobes rhombic-ovate or oblong-ovate. Fruits orange. Seeds pale yellow to yellowish brown ..... var. *kirilowii* 하늘타리
  2. Leaves 3- or 5-lobed, lobes triangular or triangular-ovate. Fruits yellow. Seeds dark brown ..... var. *japonica* 노랑하늘타리

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## Conflict of Interest

The authors declare that there are no conflicts of interest.

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