A new variety of *Hosta* (Liliaceae): *Hosta clausa* var. *geumgangensis* M. Kim & H. Jo

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(Received 9 September 2016; Revised 19 September 2016; Accepted 23 September 2016)

비비추속(백합과)의 신변종: 금강비비추(*Hosta clausa* var. *geumgangensis* M. Kim & H. Jo)

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ABSTRACT: A new variety, *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo, was found in Geumgang River in Korea. This variety shares several characteristics (rhizomes with underground stolon, smooth scape and purple-colored anthers) with the related varieties *H. clausa* Nakai var. *clausa* and *H. clausa* var. *normalis* F. Maekawa. However, *H. clausa* var. *normalis* has open flowers, capsules with seeds, purple-spotted petioles, long pistils, and long narrow perianth tubes, whereas this new variety has open flowers, seedless capsules, green-colored petioles, short pistils, and short narrow perianth tubes. *Hosta clausa* Nakai var. *clausa* has closed flowers and seedless capsules.

Keywords: *Hosta clausa* var. *geumgangensis*, plantain lilies, Liliaceae, endemic taxa

적 요: 전북 진안군 금강변에서 비비추속의 신변종인 금강비비추(*Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo)를 새로이 발견하여 기재하였다. 금강비비추는 근경에 기는 줄기가 있고, 종주선이 화경에 없으며, 약은 자색이라는 점에서 비비추 *H. clausa* var. *normalis*나 참비비추 *H. clausa* var. *clausa*와 유사하다. 그러나 금강비비추는 개방화이고, 종자 결실을 하지 않으며, 엽병이 녹색이며, 암술과 수술의 길이가 비슷하고, 화피 협통부는 길이가 짧다. 반면에, 비비추는 개방화이고, 종자 결실을 하며, 엽병은 자색 반점이 있으며, 암술은 수술보다 길고, 화피 협통부는 길이가 길다. 또한 참비비추는 꽃의 화피가 전혀 열리지 않는 폐쇄화이고 종자를 맺지 못한다.

주요어: 금강비비추, 비비추류, 백합과, 고유분류군

Genus *Hosta* Tratt. (Liliaceae) consists of approximately 22 to 25 species (Jones, 1989). It is endemic genus in Eastern Asia (Maekawa, 1940).

Plants in this genus have the following characteristics: leafless scape, bisexual flower, perianth tube, and a capsule

(Chung, 2007). Seven species of *Hosta* are distributed in Korea, including *H. plantaginea* (Lam.) Asch. that has been introduced from China (Chung and Chung, 1988; Chung and Kim, 1991; Chung, 2007).

Hosta clausa Nakai is comprised of two varieties. *H. clausa*

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Table 1. Comparison of some morphological characters among *Hosta clausa* var. *geumgangensis*, *H. clausa* var. *normalis*, and *H. clausa* var. *clausa*. Ranges and means in parenthesis are provided for quantitative characters.

Characters	<i>H. clausa</i> var. <i>geumgangensis</i>	<i>H. clausa</i> var. <i>normalis</i>	<i>H. clausa</i> var. <i>clausa</i>
Leaf blade length (cm)	5.9 (12.6) 20.5	4.4 (13.2) 21.2	8.0 (11.5) 20.0
Leaf blade width (cm)	1.4 (3.4) 5.0	1.6 (4.5) 8.8	1.1 (1.8) 2.9
Petiole length (cm)	4.7 (11.6) 22.0	2.5 (18.0) 30.0	6.5 (13.0) 24.0
Petiole abaxial color	Green	Purple-spotted green	Green
Inflorescence length (cm)	58 (74) 103	21 (50) 76	34 (61) 78
Flower number	14.0 (24.5) 45.0	5.0 (19.4) 35.0	11.0 (25.8) 58.0
Pedicel color	Purple	Whitish purple to purple	Purple
Pedicel length (mm)	5 (7) 10	4 (8) 14	6 (9) 14
Perianth length (cm)	2.8 (3.7) 3.9	3.8 (4.8) 5.8	3.3 (3.5) 3.8
Perianth width (cm)	2.0 (2.7) 3.5	3.0 (3.6) 4.1	0.80 (0.82) 0.92
Narrow tube length (cm)	1.0 (1.1) 1.2	1.6 (1.8) 2.2	1.3 (1.4) 1.5
Wide tube length (cm)	1.2 (1.3) 1.4	1.5 (1.8) 2.2	1.0 (1.2) 1.4
Perianth lobe	Open	Open	Closed
Perianth lobe length (cm)	1.4 (1.5) 1.7	1.3 (1.6) 1.8	0.9 (1.0) 1.1
Perianth lobe width (cm)	0.7 (0.8) 1.0	0.7 (1.0) 1.3	0.4 (0.5) 0.6
Pistil length (cm)	4.2 (4.5) 4.8	5.5 (6.3) 7.6	3.3 (3.5) 3.8
Stamen length (cm)	4.0 (4.2) 4.5	4.3 (5.3) 6.3	.
Distance between pistil and stamen (cm)	0.1 (0.3) 0.5	0.5 (0.9) 1.6	.
Capsule	Seedless	With seeds	Seedless
Distribution	Southern Korea	Northern and central Korea	Central Korea

var. *clausa* has closed flowers and seedless capsule and *H. clausa* var. *normalis* F. Maekawa has open flowers and a capsule with seeds (Nakai, 1930; Maekawa, 1937, 1940; Schmid, 1991; Jo, 2016). *H. clausa* var. *ensata* (F. Maekawa) W. G. Schmid is a synonym for *H. clausa* var. *normalis* (Jo, 2016).

A new taxon of *Hosta* from Geumgang River, Jinan-eup, Jinan-gun, Jeonbuk Province, Korea was discovered. The new variety shares several characters with its related variety, *H. clausa* var. *normalis* F. Maekawa. However, it can be distinguished from its related species by having seedless capsule (versus a capsule with seeds), green-colored petioles (versus green with purple spot), short pistils (versus long pistils), and short narrow part of perianth tube (versus long narrow part of perianth tube) (Table 1, Appendix 1). We named this new taxon as *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo.

Taxonomic Treatment

1. *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo, var. nov. (Figs. 1–3).

TYPE: KOREA. Jeonbuk Province: Jinan-gun, Jinan-eup, along Geumgang River, 24 Aug 2015, *H. Jo* JF82402 (holotype, JNU; isotypes, JNU, KH, KB).

Korean name: Geum-gang-bi-bi-chu 금강비비추.

Diagnosis: *Hosta clausa* Nakai var. *geumgangensis* can be distinguished from its related taxa by having seedless capsule (versus a capsule with seeds), green-colored petioles (versus green with purple spot), short pistils (versus long pistils), and short narrow part of perianth tube (versus long narrow part of perianth tube) (Fig. 4).

Herbs perennial, glabrous. Rhizome stout, usually with underground stolon. Leaves 7–11, basal; petiole green, 4.7–22.0 cm long, winged at least in distal part; blades 5.9–20.5 cm × 1.4–5.0 cm, oblong to narrow elliptical, glabrous, apex acute, veins 3–6 pairs. Inflorescence spike-like raceme, elongate, 58–103 cm × 2.5–6.0 mm, 14–45-flowered; scape smooth; bracts pale yellow or green at flowering, ovate to broad ovate or elliptical, 6–9 mm × 4–6 mm, membranous; pedicel purple, 5–10 mm long. Flowers opening during the day, odorless; perianth purple, bell-shaped, 2.8–3.9 cm × 2.0–

Fig. 1. A–J. Photographs of *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo at type locality. **A.** Habit. **B.** Inflorescence. **C.** Perianth. **D.** Pistil & Stamen. **E.** Perianth (outer side). **F.** Perianth (inner side). **G.** Anther color. **H.** Leaf. **I.** Bract. **J.** Scape.

Fig. 2. *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo. **A.** Adult plant with flowers. **B.** Flower. **C.** Pistil. **D.** Stamen. **E.** Perianth (inner side). **F.** Bract. **G.** Anther.

Fig. 3. Holotype of *Hosta clausa* Nakai var. *geumgangensis* M. Kim & H. Jo.

Fig. 4. Photographs of morphological comparisons among *Hosta clausa* varieties in Korea. **A, D, G, J.** *H. clausa* var. *geumgangensis*. **B, E, H, K.** *H. clausa* var. *normalis*. **C, F, I, L.** *H. clausa* var. *clausa*. **A–C.** Inflorescence. **D–F.** Perianth. **G–I.** Pistil and stamen. **J–L.** Petiole abaxial color.

3.5 cm; narrow parts of the perianth grooved, 1.0–1.2 cm long; wide parts of the perianth 1.2–1.4 cm long; lobes 6,

1.4–1.7 cm × 0.7–1.0 cm, opened. Stamens 6, equal, 4.0–4.5 cm long, slightly exerted; filament white; anther purple,

3.4–4.1 mm × 1.6–1.8 mm. Pistil 4.2–4.8 cm long, style whitish purple; distance between pistil and stamen 0.1–0.5 cm. Capsule seedless.

Flowering: Early Aug to mid Sep.

Distribution: Southern Korea (Jinan-gun, Jeollabuk-do).

Etymology: The infraspecific epithet was derived from its type locality (Geumgang River, Jinan-eup, Jinan-gun, Jeonbuk Province, Korea).

Habitat: Large population of *Hosta clausa* var. *geumgangensis* is found at sandy soil area of Geumgang river. This new variety grows at river edges dominated by *Phragmites communis* and *Phragmites japonica*. This species also grows with other herbaceous species dominated by *Lythrum anceps*, *Oenothera biennis*, *Acer tataricum* subsp. *ginnala*, and *Humulus japonicus*.

Additional specimens examined (paratypes): Korea, Jeonbuk Province, Jinan-gun, Jinan-eup, along Geumgang River, 29 Aug 2015, *H. Jo*, JF82901–JF82903; 26 Jul 2016, *H. Jo*, JG72601–JG72605 (JNU); 2 Aug 2016, *H. Jo*, JG80201–JG80204 (JNU); 22 Aug 2016, *H. Jo*, JG82201 (JNU).

Key to *Hosta clausa* var. *geumgangensis* and its related taxa

1. Flower more than 10 cm long, fragrant, opening at night *H. plantaginea*
1. Flower less than 7 cm long, odorless, opening during the day.
 2. Scape ridged.
 3. Racemes congested, head-like *H. capitata*
 3. Racemes elongate, spike-like *H. minor*
 2. Scape smooth.
 4. Flower funnel-shape. Stamens 3 short and 3 long *H. yingeri*
 4. Flower bell-shape. Stamens 6 equal.
 5. Rhizome without underground stolon. Anthers yellow-color *H. jonesii*
 5. Rhizome with underground stolon. Anthers purple-color.
 6. Flowers closed *H. clausa* var. *clausa*
 6. Flowers opened.
 7. Petiole green with purple spot. Perianth 3.8–5.8 cm long; narrow parts of the perianth tube 1.6–2.2 cm long. Capsule with seeds *H. clausa* var. *normalis*
 7. Petiole green without purple spot. Perianth 2.8–3.9 cm long; narrow parts of the perianth tube 1.0–1.2 cm long. Capsule seedless *H. clausa* var. *geumgangensis*

Using the IUCN Red List Categories and Criteria (IUCN, 2011), *Hosta clausa* var. *geumgangensis* M. Kim & H. Jo is categorized as Endangered (EN) species because only one thousand to one thousand five hundreds organisms have been found at sandy soil area of Geumgang River, Korea.

Acknowledgments

We are deeply indebted to Hyun-Sook Choi for her kind help.

Literature Cited

- Chung, M. G. and J. W. Kim. 1991. The genus *Hosta* Tratt. (Liliaceae) in Korea. SIDA 14: 411–420.
- Chung, Y. C. and Y. H. Chung. 1988. A taxonomic study of the genus *Hosta* in Korea. Korean Journal of Plant Taxonomy 18: 161–172. (in Korean)
- Chung, Y. C. 2007. *Hosta*. In The Genera of Vascular Plants of Korea. Park, C. W. (ed.), Academy Publishing Co., Seoul. Pp. 1304–1306.
- IUCN. 2011. Guidelines for Using the IUCN Red List Categories and Criteria. Version 3.1. Retrieved Oct. 7, 2015, from <http://www.iucnredlist.org>.
- Jo, H. 2016. A taxonomic study of the genus *Hosta* in Korea. Ms thesis, Chonbuk National University, Jeonju. Pp. 46–48, 54–60. (in Korean)
- Jones, S. B. 1989. *Hosta yingeri* (Liliaceae/Funkiaceae): a new species from Korea. Annals of the Missouri Botanical Garden 76: 602–604.
- Maekawa, F. 1937. Divisiones et plantae novae generis Hostae. Journal of Japanese Botany 13: 898–905.
- Maekawa, F. 1940. The genus *Hosta*. Journal of the Faculty of Science, Imperial University of Tokyo, Section 3 Botany 5: 317–425.
- Nakai, T. 1930. Notulae ad Plantas Japoniae et Koreae 38. Botanical Magazine Tokyo 44: 27.
- Schmid, W. G. 1991. The genus *Hosta*: Giboshi Zoku. Timber Press, Portland, OR. Pp. 43–44.

Appendix 1. Examined specimens of *Hosta clausa* varieties in Korea.

Hosta clausa Nakai var. *normalis* F. Maekawa

KOREA. Gangwon-do: Cheolwon-gun, 23 Aug 2015, *H. Jo*, JF82301, JF82302, JF82303 (JNU); 29 Jul 2015, *M. Kim*, MKH07291, MKH07292 (JNU); Gangneung-si 28 Sep 2012, *K. S. Lee et al.*, 628 (KH); Goseong-gun, 22 Jul 1999, *Y. M. Lee*, S-2324 (KH); Jeongseon-gun, 24 Aug 2016, *H. Jo*, JG82407, JG82408, JG82409 (JNU); Hongcheon-gun, 6 Sep 2016, *H. Jo*, JG90601, JG90602, JG90603, JG90604, JG90605, JG90606, JG90607, JG90608 (JNU). **Gyeonggi-do:** Pocheon-si, 23 Aug 2015, *H. Jo*, JF82304, JF82305, JF82306, JF82307, JF82308, JF82309, JF82310 (JNU); Yeoncheon-gun, 23 Aug 2015, *H. Jo*, JF82311, JF82312 (JNU).

Hosta clausa Nakai var. *clausa*

KOREA. Chungcheongbuk-do: Goesan-gun, 23 Aug 2016, *H. Jo*, JG82302, JG82303, JG82304, JG82305, JG82306, JG82307, JG82308, JG82309, JG82310, JG82311, JG82312 (JNU).