



Carex brevispicula (Cyperaceae), a new species from Korea

Gi Heum Nam[†], Hyun-Do Jang[†], Byoung-Yoon Lee and Gyu Young Chung^{1*}

Plant Resources Division, National Institute of Biological Resources, Incheon 22689, Korea

¹*Division of Horticulture and Medicinal Plant, Andong National University, Andong 36729, Korea*

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ABSTRACT: A new species, *Carex brevispicula* G. H. Nam & G. Y. Chung (Cyperaceae), was found in Korea. *Carex brevispicula* is similar to the related species *C. chungii* Z. P. Wang and *C. genkaiensis* Ohwi in that its achenes are constricted in the middle part. However, *C. brevispicula* is distinguished from *C. chungii* as the plants, staminate, and pistillate spikes are shorter and its pistillate scales are pale green; *C. brevispicula* is distinguished from *C. genkaiensis* by its awned staminate and pistillate scales. The scientific name of this new species was based on the fact that its inflorescence is shorter than that of *C. chungii*. The corresponding Korean name, “Jom-mok-po-sa-cho,” means that the plants of this species are smaller than the “Mok-po-sa-cho” types (*C. genkaiensis*). We hereby provide a description of *C. brevispicula*, with corresponding illustrations and photographs, a distribution map, and a key of related taxa.

Keywords: *Carex brevispicula*, new species, Cyperaceae, section *Mitratae*, Korea

The genus *Carex* L. is the largest genus of monocots and comprises more than 2,000 species (Global Carex Group, 2015; Govaerts, 2020). These species are broadly distributed throughout the polar and temperate regions, and are sporadically found in some tropical regions (Egorova, 1999; Dai et al., 2010; Govaerts, 2020). Notably, morphological characters such as spike number, sex type, stigma number, achene shape, and appendage presence are known to be useful in the classification of *Carex* into subgenera and sections (Ball, 1990; Reznicek, 1990; Goetghebeur, 1998). Section *Mitratae* Kük. is characterized by the presence of a staminate terminal spike, 1–4 lateral spikes that are often pistillate, 2–3 stigmas, and trigonous achenes with appendages at the apex (Kükenthal, 1909; Akiyama, 1932; Ohwi, 1936; Koyama, 1961; Egorova, 1999; Oh, 2006). It is morphologically distinguished from the related sect. *Rhomboidales* by a smaller perigynium size (<5 mm long) and the presence of discoid-annulate or cylindrical appendages at the apex of the achene (Katsuyama, 2015). With 45–60 recognized species, the sect. *Mitratae* is broadly distributed across Asia and Europe, with a few species expanding to Australia, North Africa, and North America

(Egorova, 1999; Tang et al., 2010). Twenty-five species of the sect. *Mitratae*, including *Carex breviculmis* R. Br., *C. genkaiensis* Ohwi, *C. polyschoena* H. Lév. & Vaniot, and *C. sabynensis* Less. ex Kunth, are currently recognized to be vegetated in the Korean Peninsula (Nam, 2017).

Recently, Jang et al. (2012) reported a new distribution of a sect. *Mitratae* member in Korea, *C. kamagariensis* K. Okamoto, that was distinguished from related species by its pistillate scales with long awns and constricted achenes. However, Jin (2017) considered *C. kamagariensis* as a synonym of *C. chungii* Z. P. Wang based on a morphological study. While reviewing the *Carex* sect. *Mitratae* collected in Korea, we found that the taxon from Korea commonly recognized as *C. kamagariensis* could be classified into two species, *C. chungii* and a new species. We discovered that *C. chungii* grows in the southern provinces of Korea and Japan, as well as in northern China (Nam et al., 2014; Jin, 2017), and is characterized by longer plants (28–58 cm), staminate spikes (14–28 mm), and pistillate spikes (14–32 mm) with brown pistillate scales. In contrast, the new species thrives throughout South Korea, except in Jeju Island. Its height is 6–33 cm,

[†]These authors contributed equally to this work.

*Author for correspondence: gychung@andong.ac.kr

and the lengths of the staminate and pistillate spikes are 8–17 mm and 6–14 mm, respectively, which is smaller than those of *C. chungii*; furthermore, the new species has pale green pistillate scales (Nam, 2017).

In this study, we describe and illustrate a new species of *Carex* from the sect. *Mitratae* that was identified in Korea, *C. brevispicula* G. H. Nam & G. Y. Chung. The taxonomic key and table with related taxa are provided for comparison of the

main morphological characteristics and the micro-characteristics, as observed by scanning electron microscopy (SEM).

Taxonomic Treatment

Carex brevispicula G. H. Nam & G. Y. Chung, sp. nov. (Figs. 1–3).—**TYPE:** KOREA. Jeollabuk-do: Jinan-gun, Jwapo-ri,

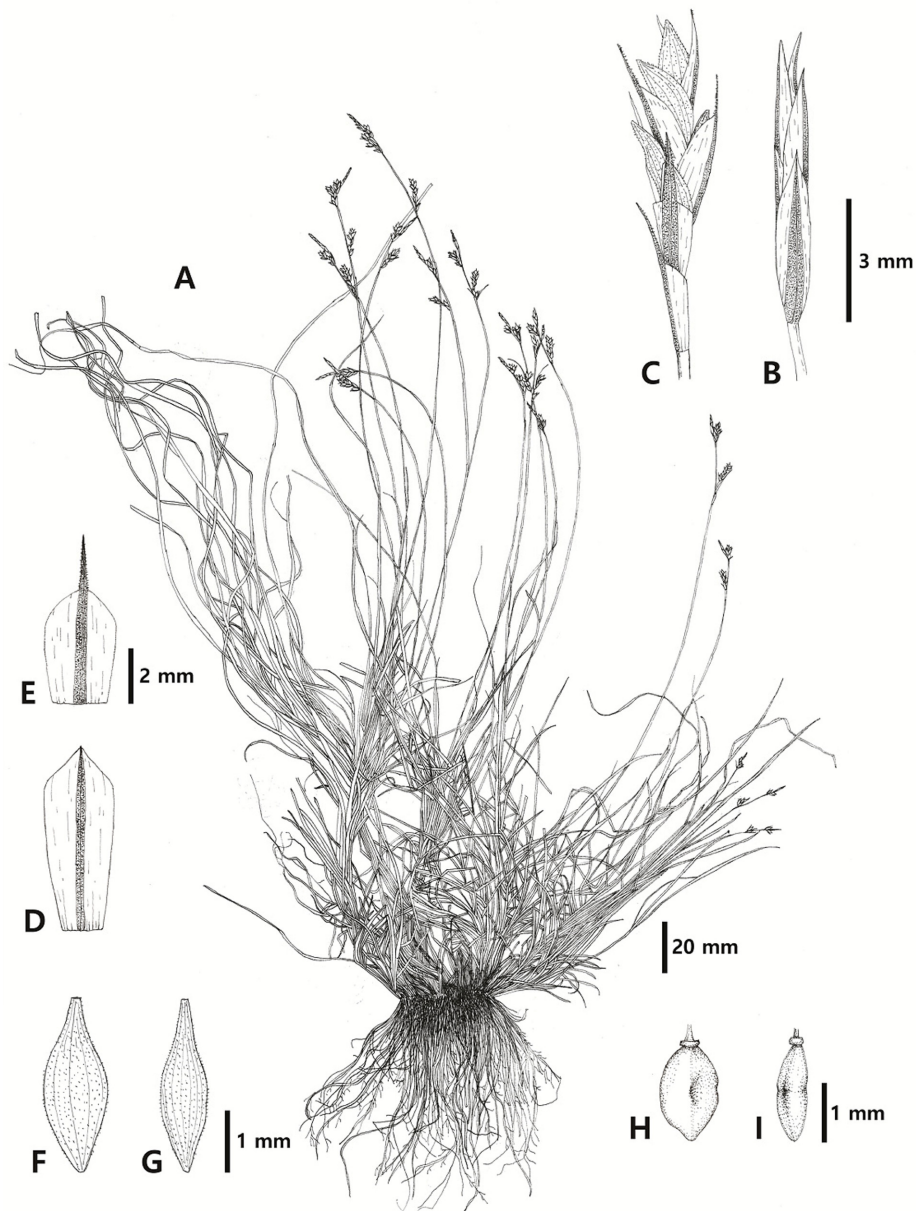


Fig. 1. Illustrations of *Carex brevispicula*. **A.** Habit. **B.** Terminal spike (staminate). **C.** Lateral spike (pistillate). **D.** Staminate scale. **E.** Pistillate scale. **F, G.** Perigynium (**F**, abaxial view; **G**, side view). **H, I.** Achene (**H**, abaxial view; **I**, side view).

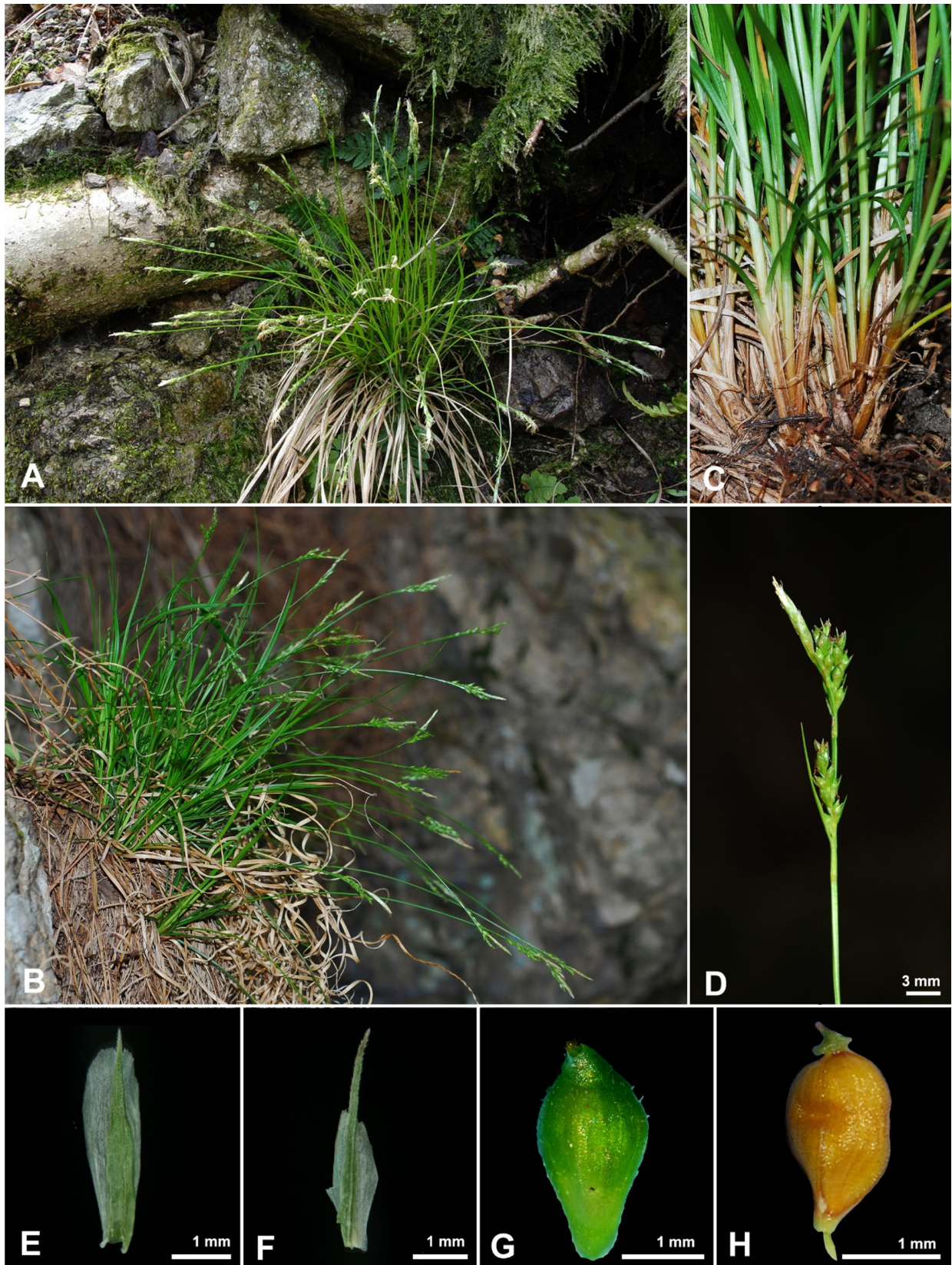


Fig. 2. Photographs of *Carex brevispicula*. **A, B.** Habit (**A**, flower; **B**, fruit). **C.** Basal structure. **D.** Inflorescence. **E.** Staminate scale. **F.** Pistillate scale. **G.** Perigynium. **H.** Achene.



Fig. 3. Holotype of *Carex brevispicula*.

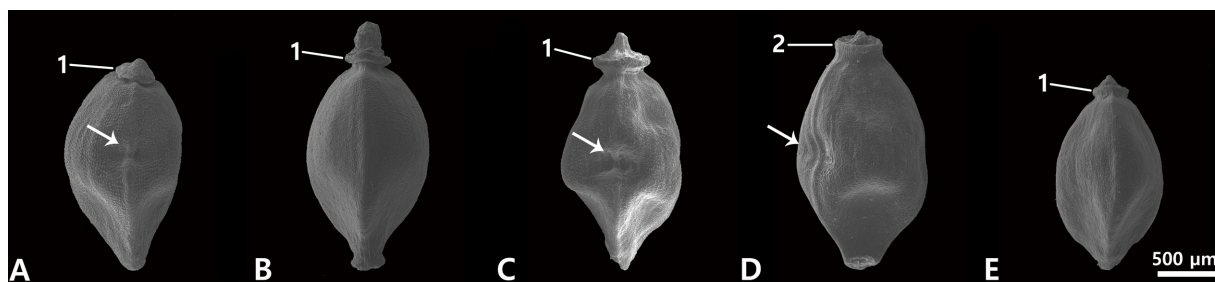


Fig. 4. Scanning electron microscopy photographs of achene shapes. **A.** *Carex brevispicula*. **B.** *Carex breviculmis*. **C.** *Carex chungii*. **D.** *Carex genkaiensis*. **E.** *Carex mitrata* var. *aristata*. The arrows indicate constriction in the middle part of the achene. 1, shortly cylindrical at achene apices; 2, annulated at achene apices.

Table 1. Comparison of the morphological characters of *Carex brevispicula* and related taxa.

Character	<i>C. brevispicula</i>	<i>C. breviculmis</i>	<i>C. chungii</i>	<i>C. genkaiensis</i>	<i>C. mitrata</i> var. <i>aristata</i>
Plant height (cm)	6.6 (20.3) 33.0	22.0 (36.5) 57.0	28.0 (41.9) 57.6	31.4 (44.1) 71.5	11.8 (22.6) 39.0
Inflorescence length (cm)	1.9 (3.3) 5.6	2.2 (3.3) 4.7	5.8 (9.5) 14.6	7.0 (14.4) 26.7	1.5 (2.4) 4.3
Terminal spike length (mm)	8.0 (11.0) 16.9	6.8 (9.2) 11.9	14.6 (20.4) 27.9	10.9 (16.3) 21.7	3.4 (6.5) 8.3
Lateral spike length (mm)	5.9 (10.6) 14.4	7.1 (13.8) 18.2	14 (24.3) 32.4	18.5 (26.6) 33.6	9.1 (13.5) 16.2
Lateral spike erectness	Erect	Erect	Erect	Pendent	Erect
Pistillate scale length (mm)	1.8 (2.1) 2.5	2.2 (2.9) 3.9	1.6 (2.2) 2.8	2.2 (2.7) 3.1	1.3 (1.8) 2.5
Pistillate scale color	Pale green	Pale green	Pale brown	Pale green	Pale green
Pistillate scale awn length (mm)	0.5 (1.0) 1.7	0.8 (3.0) 7.0	2.1 (3.1) 5.1	0 (0.1) 0.7	0.9 (2.0) 3.2
Perigynium length (mm)	1.9 (2.0) 2.2	2.8 (3.1) 3.3	2.6 (2.9) 3.1	3.1 (3.6) 4.2	1.8 (1.9) 2.1
Perigynium surface	Smooth	Smooth	Papillate	Smooth	Smooth
Achene length (mm)	1.8 (2.0) 2.3	2.0 (2.1) 2.3	1.9 (2.1) 2.3	2.0 (2.4) 2.9	1.4 (1.6) 1.9
Achene shape	Obovate	Obovate	Fusiform	Fusiform	Elliptic
Achene feature	Slightly constricted at middle	Not contracted	Slightly constricted at middle	Constricted at middle	Not contracted
Achene apex	Annulated	Annulated	Annulated	Shortly cylindrical	Annulated

Pung-hyeol-laeng-cheon, 13 May 2011, *G. H. Nam Cerex201* (Holotype: KB, Barcode NIBRVP291950, Isotype: KB, Barcode NIBRVP619368, NIBRVP619369).

Korean name: Jom-mok-po-sa-cho (쭈목포사초).

Perennial herbs, 6.6–33.0 cm tall, caespitose. Culms 6.4–29.3 cm long. Basal sheaths 0.6–1.4 cm long, brown, veined, fibrillose. Leaves as long as culms, blades 6.7–29.7 cm × 0.8–2.3 mm, light green, soft. Bract sheaths 2.1–5.0 mm long; bracts 2–3, 5.0–28.0 × 0.1–0.5 mm, setaceous, shorter than spikes. Inflorescences with 3–4 spikes, densely racemiform, 1.9–5.6 cm long. Terminal peduncles 1.6–9.9 mm long; terminal spike 1, staminate, linear cylindrical, 8.0–16.9 × 0.9–1.7 mm. Staminate scales pale green, narrowly obovate, 3.3–

4.5 × 1.0–1.5 mm, round at apex or shortly awned. Lateral peduncles 0–2.4 mm long; lateral spikes 2–3, pistillate, erect, narrowly cylindrical, 5.9–14.4 × 1.8–2.4 mm. Pistillate scales pale green, elliptically ovate, 1.8–2.5 × 0.9–1.4 mm, long awned at apex, 0.5–1.7 mm long. Stigmas 3. Perigynia as long as pistillate scales, 1.9–2.2 × 0.9–1.4 mm, distinctly 5–6 veined, pubescent, beaks 0.5–1.7 mm, mouth notched. Achenes tightly enveloped by perigynia, obovoid, 1.8–2.3 × 0.8–1.0 mm, slightly constricted in the middle, discoid–annulate at apex.

Taxonomic note: The new species is similar to the related species *C. breviculmis* R. Br., *C. chungii* Z. P. Wang, *C. genkaiensis* Ohwi and *C. mitrata* var. *aristata* Ohwi. However, it has achenes that are constricted in the middle, distinguishing it from *C. breviculmis* and *C. mitrata* var. *aristata* (Fig. 4).

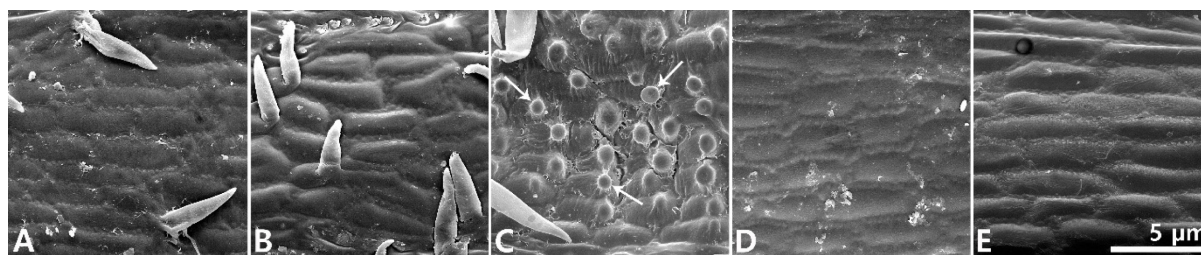


Fig. 5. Scanning electron microscopy photographs of perigynium epidermis. A. *Carex brevispicula*. B. *Carex breviculmis*. C. *Carex chungii*. D. *Carex genkaiensis*. E. *Carex mitrata* var. *aristata*. The arrows indicate the papilla.

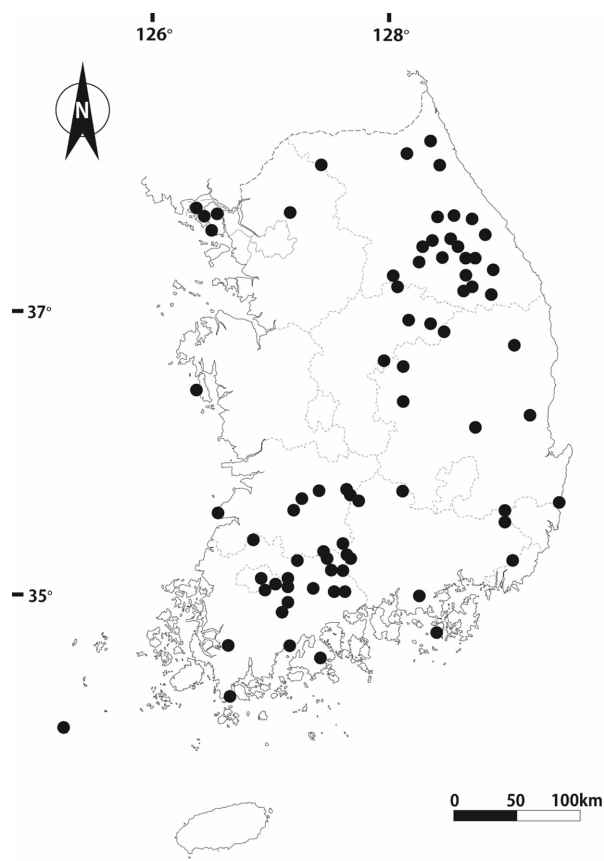


Fig. 6. Distribution of *Carex brevispicula* in South Korea. Vouchers refer to Nam (2017).

Furthermore, its pale green pistillate spikes with long awns discriminate it from *C. chungii* and *C. genkaiensis* (Table 1). In addition, among the above mentioned species, papillae on the perigynium surface were only observed in *C. chungii* (Fig. 5).

Distribution and habitat: *Carex brevispicula* is distributed throughout South Korea; Gangwon-do to the islands of the southern provinces, except in Jeju-do Island (Fig. 6). Notably, We could not examine the distribution of this species in North Korea. This species perennates on mountain slopes, under half-

shadow conditions, and mainly prefers the rocky environments.

Phenology: *C. brevispicula* flowers from March to April and fruits from May and June.

Etymology: The specific epithet “*brevispicula*” refers to the fact that the inflorescence of this species is shorter than that of *C. chungii* Z. P. Wang. For the corresponding Korean name, we used the existing name “Jom-mok-po-sa-cho” (Jang et al., 2012), because *C. kamagariensis*, reported by Jang et al. (2012) as an unrecorded species in Korea, is this newly identified species. The name means that the plants of this species are smaller than those of “Mok-po-sa-cho” (*C. genkaiensis* Ohwi). In addition, we suggest that the Korean name for *C. chungii* (accepted name of *C. kamagariensis*) be “Keun-chung-sa-cho,” in accordance with Nam et al. (2014).

Conservation status: This species is widely distributed in South Korea. Therefore, no special conservation measures are required at present.

Additional specimens examined: KOREA. Gangwon-do: Jeongseon-gun, Hambaeksan Mt., 4 Jun 2013, *G. H. Nam* NGH13-196, KB (NIBRVP435122); Pyeongchang-gun, Woljeongsa, 2 Jun 2012, *J. H. Kim* *Carex-Kim130*, KB (NIBRVP362158). Gyeongsangbuk-do: Cheongsong-gun, Juwangsan Mt., Baengnyeonan, 22 Apr 2017, *H. D. Jang* 508, KSM. Gyeongsangnam-do: Hamyang-gun, Jirisan Mt., 6 Jun 2010, *G. H. Nam & J. H. Do* *Carex35*, KB (NIBRVP291986); Miryang-si, Gajisan Mt., 7 May 2011, *G. H. Nam* *Carex173*, KB (NIBRVP291922). Jeollanam-do: Boseong-gun, Cheonseongsan Mt., 24 Apr 2010, *J. H. Kim & Y. H. Cho* *Kim110769*, KB (NIBRVP353066); Gurye-gun, Jirisan Mt., Nogodan, 6 Jun 2006, *J. H. Kim* *KJH162*, KB (NIBRVP274808); *J. H. Kim* *KJH163*, KB (NIBRVP274809). Seoul: Buramsan Mt., 6 May 2014, *C. S. Lee* *Leecs1354*, KB (NIBRVP505672).

Key to *Carex brevispicula* and related taxa

1. Achene angles not contracted, achenes excavated at faces
2. Terminal spike pale brown; lateral spikes linear
..... *C. mitrata* var. *aristata*

2. Terminal spike pale green; lateral spikes short cylindrical *C. breviculmis*
1. Achene angles contracted in middle part
3. Pistillate scale apexes acute or shortly awned; achene apexes shortly cylindrical *C. genkaiensis*
3. Pistillate scale apexes long awned; achene apexes shortly annulated
4. Pistillate scales pale brown; perigynium surface papillate; plant 28–58 cm and lateral spikes 14–33 mm *C. chungii*
4. Pistillate scales pale green; perigynium surface smooth; plant less than 33 cm and lateral spikes less than 15 mm *C. brevispicula*

ORCID: Gi Heum NAM <https://orcid.org/0000-0002-3497-8870>; Hyun-Do JANG <https://orcid.org/0000-0001-7556-3682>; Byoung-Yoon LEE <https://orcid.org/0000-0002-4611-9707>; Gyu Young CHUNG <https://orcid.org/0000-0002-4891-1140>

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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좁목포사초, 한국에서 발견된 1신종

남기흠[†] · 장현도[†] · 이병윤 · 정규영^{1*}

국립생물자원관 식물자원과, ¹안동대학교 원예생약융합학부

적 요: 사초과의 좁목포사초(*Carex brevispicula* G. H. Nam & G. Y. Chung)가 한국에서 처음으로 발견되었다. 좁목포사초는 수과의 중앙부가 함몰되는 점에서 큰청사초(*C. chungii* Z. P. Wang) 및 목포사초(*C. genkaiensis* Ohwi)와 유사하다. 그러나 좁목포사초는 식물체, 웅화서와 자화서가 소형이고, 자인편이 연녹색인 특징으로 큰청사초와 구분되며, 자인편과 웅인편에 까락이 있다는 점에서 목포사초와 차이를 보인다. 새로운 국명은 목포사초보다 작다는 의미로 좁목포사초로 하였고, 주요형질에 대한 기재, 도해, 사진, 분포정보 및 근연분류군과의 차이점을 검색표로 제시하였다.

주요어: 좁목포사초, 신종, 사초과, 청사초질, 한국