

## A new species of *Zabelia* (Linnaeaceae) from Korea

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A new species, *Zabelia densipila* M.-P. Hong, Y.-C. Kim & B.Y. Lee (Linnaeaceae) is described from Gangwon-do, Korea and illustrated. The new taxon resembles *Z. biflora* (Turcz.) Makino, but it can be distinguished by its different flowering seasons, ovaries with densely long-pilose hairs, and sequence differences in nuclear ribosomal DNA and chloroplast DNA coding regions.

Keywords: Limestone, Linnaeaceae, *Zabelia densipila*

*Zabelia* (Rehder) Makino, endemic to eastern Asia, is a genus of the family Linnaeaceae. The genus is distinguished from closely related genus, *Abelia* R. Br., by its stems with six longitudinal fissures, thickened twigs on nodes, basic chromosome number,  $x=9$ , and pollen surface structure (Hisauichi and Hara, 1954; Fukuoka, 1968; Kim *et al.*, 2001). The genus of *Zabelia* includes five to six species vegetating in warm temperate regions of eastern Asia (Hisauichi and Hara, 1954; Tang and Li, 1994), of which two *Z. biflora* (Turcz.) Makino and *Z. tyaihyonii* (T.H. Chung ex Nakai) Hisauti & H. Hara were treated to be indigenous to Korea (Kim, 2007). During an expedition to the Donggang reserve of Gangwon-do in April 2009, we found a population of *Zabelia* that resembled *Z. biflora*. After a careful morphological and molecular studies, and examination of many specimens, it became clear that these plants represented a new species of *Zabelia*. A taxonomic description, illustration and other relevant detailed morphological features of this new species are presented below.

*Zabelia densipila* M.-P. Hong, Y.-C. Kim & B.Y. Lee sp. nov. TYPE: Korea. Gangwon-do: Youngwol-gun, 37° 14'N, 128° 32'E, alt. 235 m. 18 Apr. 2009. M.-P. Hong and Y.-C. Kim 2K9-00181 (holotype, KB; isotype, KB). Figure 1. Korean local name, Gin-Teol-Daeng-Gang-Na-Moo. Paratypes. KOREA. Gangwon-do: on slopes of limestone forest areas near Donggang riverside, 20 Sep. 2009 (in fruit), Y.C. Kim VP-KOBG-2K9-0195, 0196 (KB).

Deciduous shrubs, 120-220 cm tall. Stems erect, branched from base. Young branches grayish, densely pilose hairy; old branches pale gray, glabrous. Leaves opposite, ovate to elliptical, 1.8-3.7 × 0.8-1.6 cm; margins toothed,

restricted to the upper 1/2, rarely entire, apex acuminate to acute, base cuneate; abaxial surface densely long-pilose hairy, adaxial surface shorter-pilose hairy, petioles 3.0-4.0 mm long, covered with the same hairs as abaxial surface of the leaf. Inflorescence terminal, peduncle sessile, rarely up to 1.5 mm long; pedicel 1.0 mm long. Flowers paired, more or less actinomorphic. Calyx lobes 4, persistent, oblanceolate, 7-8 × 1.8-2.0 mm. Corolla infundibuliform, tube 9.5-10.0 mm long, 2.9-3.0 mm in diameter, outer surface pilose hairy, corolla lobes 4, 3.0 × 2.5 mm; stamens 4, didynamous, inserted at the middle of corolla; styles 6.5-7.0 mm long, glabrous, not exerted, positioned around the same height of the longer stamens. Fruits capsule, cylindrical, 1.2-1.5 mm long, straight or slightly curved, seeds fusiform. Flowering in late April to early May, and fruiting during September.

**Distribution and habitat.** *Zabelia densipila* grows on slopes of limestone forest areas at an altitude 200-600 m. About 60 individuals of *Z. densipila* are vegetated continuously. It is known only from the type locality in Gangwon-do, Korea.

### DISCUSSION

*Zabelia densipila* resembles *Z. biflora* in the presence of straight or slightly curved forms of fruits, but can be distinguished from the latter by the characters such as spread long pilose hairs on new branches, veins of abaxial leaf surface, petioles, and ovaries (Fig. 1). Furthermore, flowering of *Z. densipila* were recognized two-three weeks earlier than those of *Z. biflora* even though they habitat at the neighboring areas (Fig. 2). *Z. densipila*



**Fig. 1.** *Zabelia densipila* M.-P. Hong, Y.-C. Kim & B.Y. Lee. A. Habit. B. Inflorescence. C. Fruit. Drawn from the holotype and isotype M.-P. Hong and Y.-C. Kim 2K9-00181 (KB).

is also clearly distinguished from the species *Z. biflora*, in sequences of nuclear ribosomal DNA and chloroplast DNA matK, rbcL regions and chromosome numbers (Lee *et al.*, in prep.). For example, the chromosome number of *Z. densipila* is  $2n=4x=36$ , one of *Z. biflora* is  $2n=12x=108$  (Kim *et al.*, in prep.). These two closely related taxa were clearly distinguished from the Korean endemic species, *Z. tyaihyonii*, by the presence of paired inflo-

rescence, four-lobed calyx, and cylindrical capsules.

#### Key to the species of *Zabelia* in Korea

1. Inflorescence cymes, calyx lobes 5, corolla lobes 5 ..... *Z. tyaihyonii*
1. Inflorescence pairs of flowers, calyx lobes 4, corolla lobes 4
  2. Densely pilose on new branches, calyx abaxial, and



**Fig. 2.** Comparison of flowering seasons between *Zabelia biflora* and *Z. densipila*. The left pictures represent *Z. biflora* (pictures taken at Yeongwol, in May 15, 2009) and the right ones are *Z. densipila* (pictures taken at Yeongwol, in April 18, 2009). Leaf colors at flowering seasons are different from each other; leaves of *Z. biflora* show all green and *Z. densipila* reveals leaves with edges brown to red. Ovaries of *Z. biflora* are almost glabrous while ones of *Z. densipila* are pilose. Pictures were taken by the second author of the paper, Mr. Young-Chul Kim.

- ovary ..... *Z. densipila*
- 2. Glabrous to scattered pilose, rarely densely retrorse  
on new branches, calyx abaxial, and ovary .....  
..... *Z. biflora*

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