



New species of *Euonymus* (Celastraceae): *E. baekdusanensis* M. Kim

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화살나무속(노박덩굴과)의 신종: 백두산회나무 (*Euonymus baekdusanensis* M. Kim)

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ABSTRACT: A new species, *Euonymus baekdusanensis* M. Kim (Celastraceae), has been named and described from Mt. Baekdu of the Korean peninsula. *Euonymus baekdusanensis* shares several characteristics (4-merous flowers, 4-angled capsule, warted branches and twigs, etc.) with its related species *E. verrucosus* Scopoli. It is, however, distinct from *E. verrucosus* which have small oblong leaves (6-7 cm), short petioles (1-2 mm), and small capsules (6-8 mm) by having large elliptical leaves (11-13 cm), long petioles (6-8 mm), and large capsules (12-15 mm).

Keywords: *Euonymus baekdusanensis*, Celastraceae, Mt. Baekdu

적 요: 백두산에서 화살나무속의 신종인 백두산회나무(*Euonymus baekdusanensis* M. Kim)를 새로이 발견하여 기재하였다. 백두산회나무는 4수성 꽃구조를 가지고 4개로 각이 진 삭과를 가지며 사마귀 같은 혹이 가지와 소지에 있어 회목나무(*E. verrucosus* Scopoli)와 유사하다. 그러나 백두산회나무는 커다란 장타원형의 잎(11-13 cm)을 가지고 엽병이 뚜렷하며(6-8 mm) 과실이 대형(12-15 mm)인 반면에, 회목나무는 작은 도란형의 잎(6-7 cm)을 가지고 엽병이 거의 없으며(1-2 mm) 과실이 소형(6-8 mm)인 점에서 두 종이 뚜렷하게 차이가 난다.

주요어: 백두산회나무, 노박덩굴과, 백두산

The genus *Euonymus* L. (Celastraceae) consists of approximately 130 species and is distributed from Asia through Europe to North America (Ma and Funston, 2008).

The genus *Euonymus* is characterized by shrubs, opposite leaves, cyme inflorescence, 4- or 5-merous flowers, and dehiscent capsules (Kim, 2007). Ten taxa of *Euonymus* are reported from Korea (Lee, 1980; Kim, 2007). Almost all taxa have a popular occurrence in Korea.

Baekdusan (Mt. Baekdu) is an active volcanic and highest

mountain (2,744 m) on the Korean peninsula and in Manchuria (Lee, 1991; Lee et al., 2013). Mt. Baekdu contains about 1,500 species of vascular plants, of which 11 angiosperms are endemic (Kim, 2004).

In 2011, the authors first discovered *Euonymus baekdusanensis* M. Kim on Mt. Baekdu. It forms a small population of twenty individuals at 1,800 m altitude in the Geumgang Grand Canyon area of Mt. Baekdu. The species shares several characteristics with its related taxa *E. verrucosus* Scopoli, but it can be distinguished based on large elliptical leaves, long petioles, large capsules, etc.

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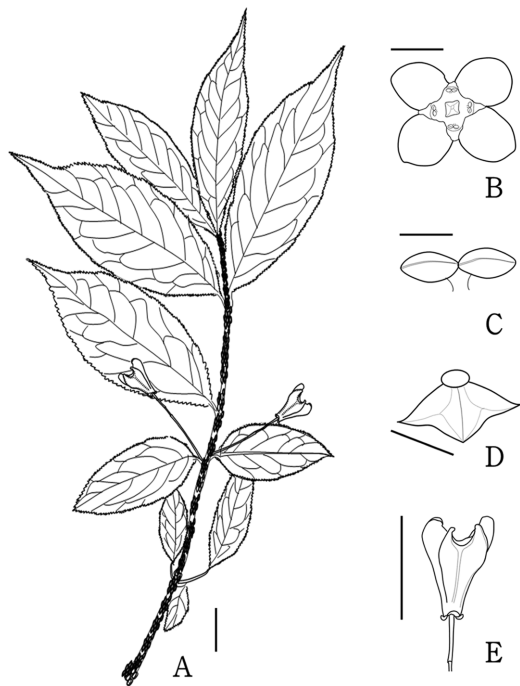


Fig. 1. *Euonymus baekdusanensis* M. Kim. A. Branches with leaves and fruits; B. Flower; C. Stamen; D. Pistil; E. Fruit. Scale bars 1 cm in A and E; 2 mm in B and D; 0.2 mm in C.

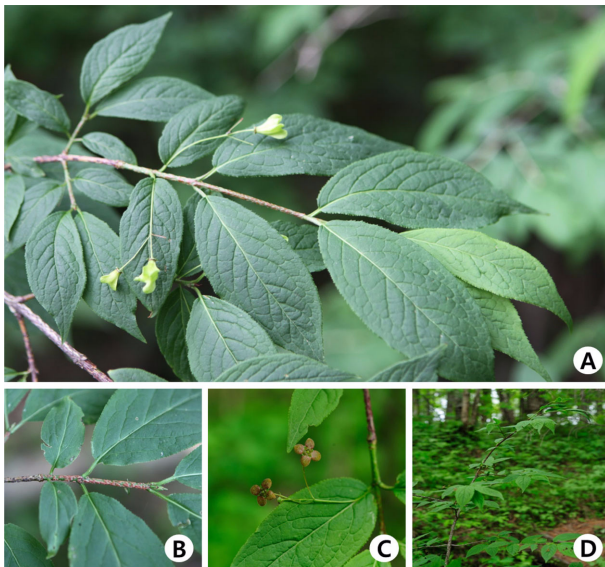


Fig. 2. Photographs of *Euonymus baekdusanensis* M. Kim at the natural habitat in Mt. Baekdu. A. Branches with leaves and fruits; B. Twig; C. Flower; D. Habitat.

Korean name: Baek-du-san-hoe-na-mu 백두산회나무

Deciduous shrubs, 2-3 m tall; branches and twig warts. Petiole 6-8 mm long, pubescent; leaf blade elliptic, 11-13 × 3-

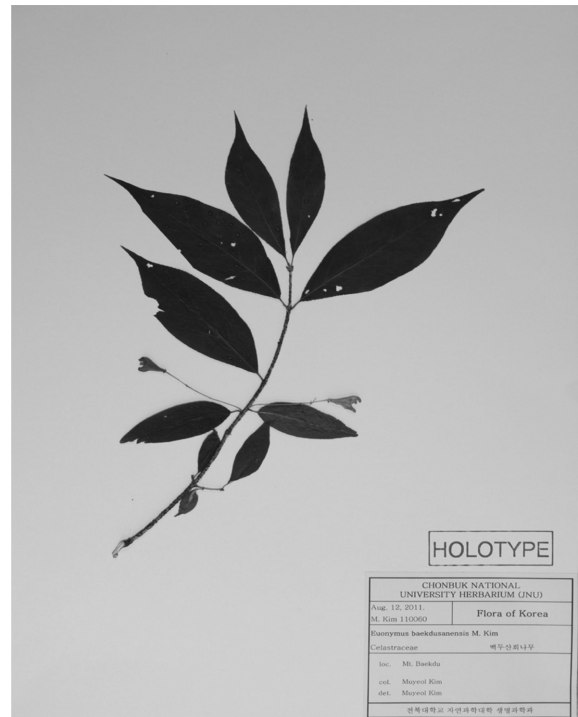


Fig. 3. Holotype of *Euonymus baekdusanensis* M. Kim.

4 cm, pubescent on veins of abaxial surface, base cuneate, margin crenulate, apex acuminate; lateral veins 7-8 pairs. Inflorescence cyme; peduncle 3-4 cm, glabrous; pedicel 15-15 mm, glabrous. Flowers 4-merous. Sepals 4, semi-rounded, green, 1 × 1 mm. Petals 4, rounded, purple, 2 × 2 mm. Stamens 4, anther 2-celled. Pistil 1, ovary tetragonal, style absent, stigma globose. Capsule 4-angled. Seeds ovoid, covered by orange aril. Flowering June.

Holotype: Mt. Baekdu. August 12, 2011. *M. Kim 110060*. Herbarium of Chonbuk National University (JNU).

Isotype: Mt. Baekdu. August 12, 2011. *M. Kim 110060* (3 sheets, JNU).

Paratype: Mt. Baekdu. June 12, 2012. *M. Kim 120305* (5 sheets, JNU).

Distribution: Mt. Baekdu

Etymology: The specific epithet is derived from Mt. Baekdu where this new species is located.

Habitats: The natural habitat of *Euonymus baekdusanensis* M. Kim was found in the woodlands of the Keungang Grand Canyon area on Mt. Baekdu. This species occurs under trees in forests dominated by *Larix olgensis*, *Picea jezoensis*, *Acer ukurunduense* and *Sorbus pohuashanensis*. The species also occurs with principal shrub and herbaceous species dominated by *Euonymus verrucosus*, *Lonicera caerulea*, *Rosa davurica*, and *Maianthemum bifolium*.

Table 1. Comparison of morphological characters between *Euonymus baekdusanensis* M. Kim and *E. verrucosus* Scopoli.

Characters	<i>E. baekdusanensis</i>	<i>E. verrucosus</i>
Plant height	2-3 m	2-3 m
Altitude	1,800 m	900-1,800 m
Twig internode	3-4 cm	2-4 cm
Leaf petiole	6-8 mm	1-2 mm
Leaf shape	elliptic	oblong
Leaf blade length	11-13 cm	6-7 cm
Leaf blade width	3-4 cm	3-4 cm
Leaf margin	crenulate	crenulate
Leaf apex	acuminate	acute
Peduncle	3-4 cm	1.5-2.0 cm
Pedicele	15-25 mm	2-3 mm
Petal color	purple	purple
Fruit length	12-15 mm	6-8 mm

Key to *Euonymus baekdusanensis* and its related taxa.

1. Winter bud large; stamens sessile, anther 1-celled; capsule winged
 2. Flowers 4-merous *E. macropterus* 나래회나무
 2. Flowers 5-merous
 3. Capsule nearly without wing... *E. oxyphyllus* 참회나무
 3. Capsule with long wings *E. sachalinensis* 회나무
1. Winter bud small; stamens filamentous, anther 2-celled; capsule without wings
 4. Capsule 4-lobed *E. alatus* 화살나무
 4. Capsule unlobed
 5. Capsule smooth and rounded ... *E. japonicus* 사철나무
 5. Capsule rugose and angled
 6. Branches and twigs warts
 7. Petiole 1-2 mm, blade 6-7 cm and oblong; fruit 6-8 mm *E. verrucosus* 회목나무
 7. Petiole 6-8 mm, blade 11-13 cm and elliptic; fruit 12-15 mm *E. baekdusanensis* 백두산회나무
 6. Branches and twigs smooth
 - *E. hamiltonianus* 참빗살나무

By applying the IUCN Red List criteria (IUCN, 2011), *Euonymus baekdusanensis* M. Kim will be evaluated as the category of Endangered (EN) species, because of its small population of twenty individuals found in Mt. Baekdu.

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