

***EUONYMUS LEIOPHLOEUS* (CELASTRACEAE) - A NEW RECORD  
FOR THE FLORA OF TURKEY**

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*Keywords: Euonymus; Leaf anatomy; New record; Taxonomy; Turkey.*

*Euonymus* L. belongs to the subtribe Euonyminae Benth. & Hook., tribe Euomyneae DC., and subfamily Euonymoideae (DC.) Arn. of the family Celastraceae (Prokhanov, 1974). The genus includes deciduous and evergreen species from low growing shrubs, self-clinging climbers to tall shrubs and small trees. There are approximately 130-200 species of the genus distributed in tropical, subtropical and temperate regions of North and Central America, Europe, Asia and Australia (Blakelock, 1951).

During field work in Artvin province, some interesting specimens belonging to *Euonymus* were collected. The specimens were crosschecked with keys provided by Boissier (1879), Coode and Cullen (1967), and Prokhanov (1974). After critical study and consultation with relevant literature (Coode and Cullen, 1967; Güner *et al.*, 2000; Özhatay *et al.*, 2011; Eminağaoğlu *et al.*, 2012), the specimens have been identified as *Euonymus leiophloeus* Stev. and reported as a new record for the flora of Turkey. The identification was confirmed by comparison with a herbarium specimen housed at BATU in Georgia. Morphological analyses were carried out in living or herbarium specimens. Transverse section of leaf blade, midrib and peripheral sections of leaves were investigated (Algan, 1981). Stomatal lengths were measured and stomatal index was calculated (Meidner and Mansfield, 1968). Plant samples were deposited at the Herbarium of Artvin Çoruh University (ARTH), Artvin, Turkey.

The description, detailed leaf and stem anatomical properties and photographs of *Euonymus leiophloeus* Stev. are given below:

***Euonymus leiophloeus* Stev.** in Bull. Soc. Imp. Naturalistes Moscou 29(2): 122 (1856). *Euonymus leiophloeus* Stev. var. *armasicus* Gagnidze, Fl. Gruzii 8: 228 (1983); *Euonymus leiophloeus* Stev. var. *sempervirens* (Rupr. ex Boiss.) Gagnidze, Fl. Gruzii 8: 229 (1983); *Euonymus ketzhovellii* Gatsch., Soobshch. Acad. Nauk. Gruz. SSR 10: 232 (1949); *Euonymus armasica* Gatsch., Soobshch. Akad. Nauk. Gruz. SSR 10: 234 (1949); *Euonymus sempervirens* Rupr. ex Boiss., Fl. Orient. 2: 10 (1872); *Euonymus leiophloea* Stev., Bull. Soc. Imp. Naturalistes Moscow 29(2): 122 (1856); *Kalonymus leiophloea* Prokh., Bull. Soc. Imp. Naturalistes Moscow 29(2): 122 (1856). (Fig. 1).

Shrubs, up to 4 m tall. Twigs rounded, smooth, yellowish with black lenticels when young, greyish-brown at maturity. Buds ovoid-conical, 2-10 mm long. Leaves elliptic, obovate or oblong, 2.5-7.0 x 1.5-4.0 cm, rounded or even truncate at base, obtuse or rounded at apex, rarely short-mucronate, crenate-serrate, sometimes subentire above, scarious; petioles 3-5 mm long, not winged. Cymes 5-rayed, loose, many-flowered (up to 21). Flowers 4-merous, c. 5 mm in diam. Sepals 1.0-1.5 mm long. Petals 2.0-2.5 mm long, greenish-white. Stamens with subsessile anthers.

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Capsule flattened-disciform, 4-5 mm long, 4-lobed, lobes with erect linear wings, gradually acuminate or sometimes conversely tapering at base, wings 10-15 mm long. Seeds covered by the orange aril.

*Flowering period:* April to June. *Fruiting period:* August to September.



Fig. 1. *Euonymus leiophloeus*; a) Habit, B) Capsule

*Specimens examined:* **Turkey:** A8 Artvin, Şavşat, Ilıca village, in forest, 1533 m, 03.08.2011, Ö.Emin. 8750; A8 Artvin, Şavşat, Yeşilce Village, in forest, 1443 m, 04.08.2011, Ö.Emin. 8752; A8 Artvin, Şavşat, Eskikale village, in forest, 1885 m, 05.08.2011, Ö.Emin. 8754; A8 Artvin, Şavşat, Aşağıkoyunlu village, in forest, 1764 m, 13.08.2011, Ö.Emin. 8760; **Georgia:** Adjara, Dandalo Village, Shuakhevi, in forests, on the rocks, 1400 m, 18.08.1954, Davit Mandjavidze s.n., BATU!; Khelvachauri village, Kırmati Colchic forest, 1350 m, 18.07.2002, Nino Memiadze s.n., BATU!; Adjara Seaside, River Chaqvistskali, Chaqvistavi village, National park of Mtirala Colchic forest, 20 m, 22.08.2003, David Krazashvili s.n., BATU!.

*Distribution and Conservation Status:* In Turkey, *E. leiophloeus* is distributed in the province of Artvin (Şavşat) in north-east Anatolia. Georgia (West Transcaucasia, Guria Mountains) was previously the only known distribution area of the species (Prokhanov, 1974). *E. leiophloeus*, which was known as endemic to Georgia, lost this characteristic after the recent assessments. This species is rare in Turkey and Georgia. By considering its distribution area, LR conservation status is proposed (IUCN, 2013).

#### *Anatomical features:*

Shape of leaf midrib is more or less distinctly protrudes both on the upper and lower sides. There is a single-layered epidermis. In terms of size, upper epidermal cells ( $16.50 \pm 0.79$ ) are slightly taller than those of the abaxial ones ( $12.33 \pm 0.71$ ). One large vascular bundle and two accessory bundles can be seen in the midrib region. Lamina is bifacial (dorsiventral) and mesophyll composed of 6 layers of spongy parenchyma and two or sometimes three layers of palisade parenchyma (Fig. 2B). Lower surface has cyclocytic stomata with 4 or 6 neighbouring cells as a circle (Fig. 2B). Average of stomatal length and stomatal index is  $28.76 \pm 0.24 \mu\text{m}$  and  $04.28 \pm 0.51$ , respectively. Number of stomata per  $1 \text{ mm}^2$  is  $120.0 \pm 15$ .

*Notes:* *E. leiophloeus* resembles *E. latifolius* (L.) Mill. subsp. *cauconis* Coode & Cullen, morphologically, but it differs by erect linear wings (10 -15 mm long), smaller capsules (4-5 mm long) and flowers (4-merous). According to anatomically investigated samples, adaxial epidermal

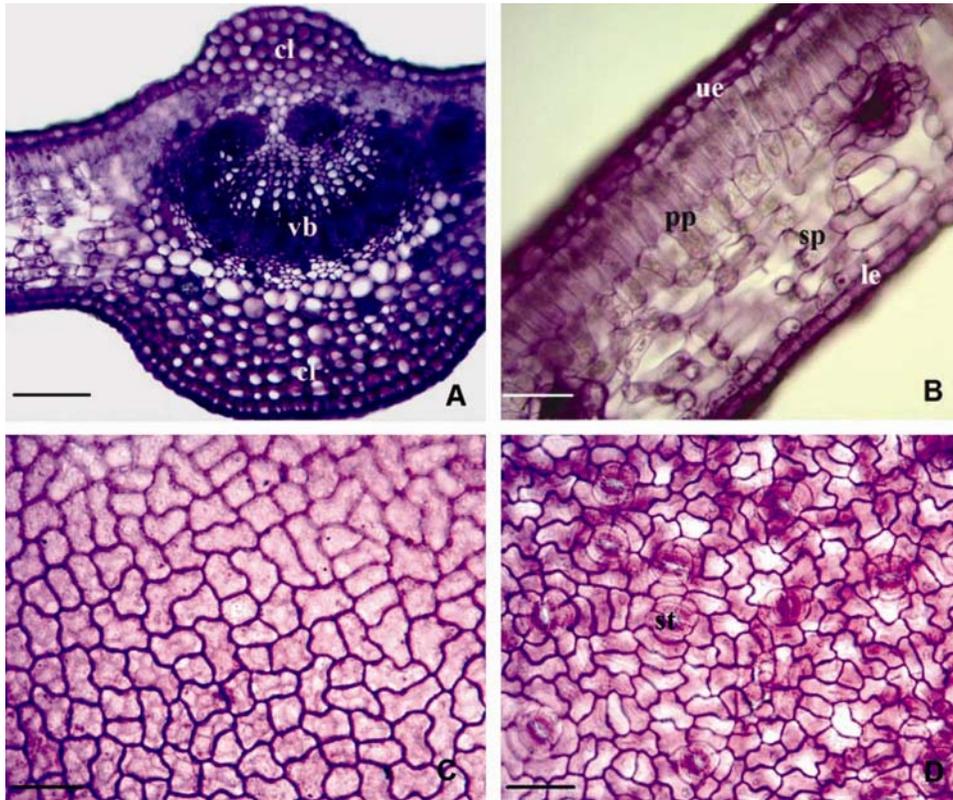


Fig. 2. Leaf anatomy in *Euonymus leiophloeus*; A: midrib, B: lamina, C: Adaxial surface, D: Abaxial surface. Scale bars: (A): 100  $\mu$ m, (B, C, D): 50  $\mu$ m.

cells are more or less larger than the abaxial ones in two *E. latifolius* populations, while it is almost equal in *E. leiophloeus* accessions. In addition, the shape of anticlinal cell walls in adaxial surface is irregular cells with undulate (repand) cell walls in *E. latifolius*, but more or less straight cell walls are present on the adaxial surfaces of *E. leiophloeus*.

#### Acknowledgements

The authors thank the Turkish Ministry of Forestry and Water Affairs and Doğa Koruma Merkezi (Nature Conservation Centre) for their financial support.

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(Manuscript received on 26 June 2013; revised on 27 October 2013)