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CORRESPONDENCE

Pyrus demetrii (Rosaceae), a new record for Turkey, with observations on micromorphology of leaves

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Abstract

The Caucasian species, *Pyrus demetrii* Kuth. has been reported from Turkey for the first time. The species was collected by the authors from both Georgia and Turkey. Leaf epidermis characters were studied by scanning electron microscopy to evaluate cuticle ornamentation, waxes and other relevant features of micromorphology.

Keywords: *Pyrus demetrii*, new record, epidermis micromorphology, Georgia, Turkey

Introduction

Rosaceae is widespread over the world but has diversified predominantly in the Northern Hemisphere; it includes approximately 3000 species in 100 genera (Kalkman 2004). *Pyrus* L. is the genus of woody trees with number of species vary from 41 to 73 (Robertson *et al.* 1991; Browicz 1993). For a long time it was treated under the subfamily Maloideae C. Weber (synonym of Malaceae Small), however according to further phylogenetic investigations it was nested under the subfamily Spiraeoideae C. Agardh, supertribe Pyrodae C.S. Campbell, R.C. Evans, D.R. Morgan & T.A. Dickinson, tribe Pyreae Baill. subtribe Pyrinae Dumort. (Campbell *et al.* 2007; Potter *et al.* 2007). Nevertheless, later nomenclatural changes resulted in priority of Maloideae over Spiraeoideae and Malinae Reveal over Pyrinae. Since, it was proposed to consider *Pyrus* under subfamily Maloideae, tribe Maleae Small, subtribe Malinae (Reveal 2012a; 2012b).

Pears are native only for Europe, Asia and some mountainous regions in North Africa (Browicz 1993), and Caucasus is one of remarkable diversity centers for this genus (Rubtsov 1944). Turkey is an important region linking Europe and Cauacasus, and several new taxa of *Pyrus* have been recently recorded for the

country (Uğurlu Aydın & Dönmez 2015). In this paper, *P. demetrii* Kuth. is reported as new species for the Turkish flora previously known from the Caucasian region.

According to Stace (1965), cuticular ornamentation can be used as important source of knowledge for taxonomic research. Despite the importance for taxonomy, only few studies (Ganeva 2009; Ganeva & Uzunova 2010; Zamani *et al.* 2015) are focused on epidermal structure of Malaceae and its taxonomic implementation. Therefore, data on leaf epidermal structure are presented here to evaluate the taxonomic relevance of micromorphological characters.

Material and methods

The type specimen and the other specimens of *P. demetrii* were examined at TBI (Herbarium of Georgian Academy of Science, Tbilisi, Georgia) and LE (V.L. Komarov Botanical Institute, Saint Petersburg, Russia). All herbarium acronyms are indicated in text according to Thiers (2017). Additional specimens of *P. demetrii* were collected by authors from Sagaredzho, Georgia, during field trips in 2012. For SEM studies, leaves of taxa were washed with 70% alcohol and coated with a gold-palladium mixture. SEM photographs were taken with a Zeiss EVO 50 EP electron microscope.

Results and discussion

Pyrus demetrii Kuth., *Zametki Sist. Geogr. Rast.* **13**: 25. 1947. (Fig. 1)
= *Pyrus georgica* Kuth. var. *glabra* Kuth., *Zametki Sist. Geogr. Rast.* **8**: 16. 1939.

Lectotype: **GEORGIA**. Gare-Kakhethia. 25.10.1938, *S. Kuthatheladze* s.n. TBI 1025828!, (Fig. 1 A). **Isolectotype**: LE! (lectotype selected by Uğurlu Aydın & Dönmez (2016) in Kew Bull. 71 (3): 37).

Description. Tree up to 8 m, crown globose, stem bark grey; young branches glabrous, spiny. Leaves (3–) 4–6 × 1.5–2 cm, lanceolate to oblanceolate, acute and mucronate at apex, cuneate at base, margin serrate or slightly serrate, ± undulate, bilaterally tomentose in both side at flowering stage, finally sparsely pubescent below, glabrous above, with ciliate margins. Petioles 1.5–2 cm long, glabrous, ± thick. Stipules 9–10 × 2 mm, linear-lanceolate, deciduous. Corymb of 4–10 flowers. Bracts (5–) 8–10 × 0.5–1 mm, subulate, pubescent, brownish, orange. Pedicels 0.5 (–1) cm long, ± thick. Hypanthium concave, cupuliform, densely tomentose outside, glabrous inside. Sepals 3–5 × 1–2 mm, triangular, acute, reflexed, tomentose outside, whitish pubescent inside, persistent in fruiting stage. Petals 10–12 × 6–8 mm, white, from oblong-ovate to broadly ovate, apex rounded or rarely emarginate, with short claw. Stamens in two rows, 15–20 (–25), unequal, anthers pink before opening. Styles 3–5, minutely pubescent at base. Fruits 1.2–1.5 × 1.5–2 cm, yellow, greenish-yellow, globose, flattened globose or globose-pyriform, with lenticels, slightly juicy. Seeds 3–6 × 2–4 mm, ovate, apex acute, pale brown or dark brown.

Flowering and fruiting. From April – May till August – September.

Distribution. Middle part of Turkey, Georgia, Armenia.

Ecology. Grows on dry open hills, seldom on forest edges and in shrubs of lower mountain belts at altitudes of 800–1300 m a.s.l. Mostly individually, rarely – in groups.

Specimens examined. **TURKEY**: Sivas, 3.3 km from Sincan to Zara, steppe, among deciduous scrub, 39°29′31″ N, 037°55′07″ E, 1275 m a.s.l., 2.10.2012, *AAD 19237* (HUB!) (Fig. 1 B).

Additional specimens examined. **GEORGIA**: Sagaredzho, Gare-Kakhetia, Khasmi village, Davidgazejii, 41°45′22″ N, 045°13′06″ E, 845 m a.s.l., 9.8.2012, *ZUG 373 – A.A. Dönmez & N. Lachashrili* (HUB!) (Fig. 1 C). **ARMENIA**: Daralaghez, 6.9.1936, *Pojarkova* (LE!); Vayots Dzor distr., 21.9.2007, *Tamamyan K., Fayvush G.* s.n. (ERE!).

P. demetrii was collected by both authors from the type locality in Sagaredzho Georgia (Fig. 1 C) where it is widespread on steppe slopes and in open forest areas. It is also widely distributed in similar habitat conditions in the inner part of Turkey, so it is not a surprise to find specimens of *P. demetrii* there. The new record is morphologically related to *P. georgica*, which is also known from Georgia. Both these species

Fig. 1. *Pyrus demetrii*: **A** – lectotype; **B** – fruits of *AAD 19237*; **C** – leaves of *ZUG 373*.

are similar in leaf morphology, but *P. demetrii* differs from *P. georgica* in having glabrous leaves and much shorter pedicels. The newly recorded species is also well differentiated among Turkish taxa of *Pyrus* by its glabrous serrate leaves and shorter pedicels.

The cuticle of the upper epidermis generally represents reticulate ornamentation under SEM. It has weak stria covered with epicuticular waxes. The lower epidermis is smooth with granular dispersed waxes. Fine parallel striations are observed radially to the stomata (Fig. 2). The stomata are densenly distributed only in lower epidermis. Stomata are generally absent on the upper surface of leaf in most of *Pyrus* species including *P. demetrii* (Fig. 2 A), and they are known only for few representatives of the genus (Zamani *et al.* 2015).

Regarding micromorphological features, leaves of *P. demetrii* have some common characters with taxa of the related genera such as *Malus* Mill. and *Cydonia* Mill. The stomata are navicular in shape and have thicker stomatal rims for all mentioned genera (Ganeva 2009; Ganeva & Uzunova 2010). However, species of *Malus* and *Cydonia* are distinct in having dense and thicker stria on epidermal surface.

Granular waxes are often observed in most *Pyrus* taxa (Zamani *et al.* 2015), while reticulated waxes were observed only in subject of this study. Epicuticular waxes show great micromorphological diversity and are mostly correlated with ecological factors (Stace 1965).

In lower leaf epidermis *P. demetrii* has roughly striate cuticle ornamentation around the stomata. Zamani *et al.* (2015) observed this feature in xerophytic *Pyrus* species growing in dry areas. *P. demetrii* also prefers such kind of dry conditions both in Turkey and Georgia. As a result, *P. demetrii* has enough features to be distinctive from the most related genera, and, in the same time, it shows similar features

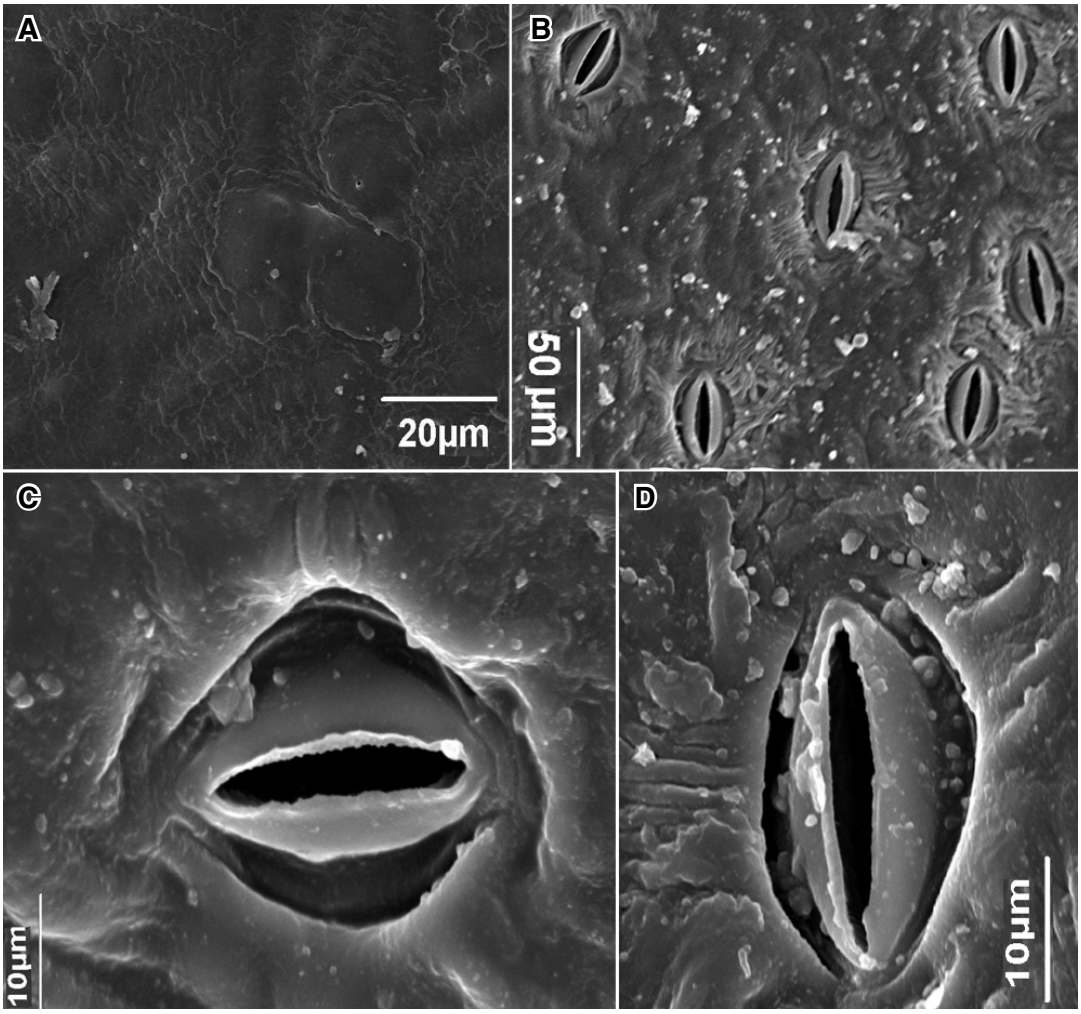

Fig. 2. Leaf micromorphology of *Pyrus demetrii* (**A–C** – **ZUG 373**; **D** – *Tamamyan K., Fayvush G.* s.n.): **A** – upper epidermis; **B** – lower epidermis showing stomata; **C–D** – stomata.

with xerophytic taxa of the genus. It seems that micromorphological characters support intergeneric classification of *Pyrus*. On the other side, these characters show variations and often reflect ecological conditions rather than taxonomical relationships among *Pyrus* species.

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