

## Taxonomic and nomenclatural contributions to *Pyrus* L. (Rosaceae) from Turkey

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**Abstract:** This paper presents a taxonomic contribution to the genus *Pyrus* L. *P. georgica* and *P. pseudosyrriaca* are reported from Turkey for the first time. The status of *P. pseudosyrriaca* is discussed and it is treated as a new variety of *Pyrus syriaca*. Notes on the chorology, morphological descriptions, figures, and taxonomy are provided. Moreover, *P. serikensis* and *P. boissieriana* are reduced to synonyms of *P. cordata*. An endemic subspecies, *P. elaeagrifolia* subsp. *kotschyana*, is compared with the related species *P. elaeagrifolia* and it is reassessed at the species level based on morphology and distribution. With these changes, *Pyrus* is represented by 18 taxa belonging to 12 species in Turkey.

**Key words:** Nomenclature, *Pyrus*, Rosaceae, taxonomy, Turkey

### 1. Introduction

*Pyrus* L. belongs to the subtribe Pyrinae of Rosaceae (Potter et al., 2007). The genus, including both pears and apples, was first described by Linnaeus (1753), and the first comprehensive study of the genus was published by Decaisne (1871–1872), with 23 species arranged in six groups. After that, Koehne (1890) described two sections, *Pashia* Koehne and *Achras* Koehne. Fedorov (1954) accepted Koehne's infrageneric classification and he added two new sections, namely *Xeropyrenia* Fed. and *Argyromalon* Fed. These two new sections comprised several microspecies and hybrid species from the Caucasus. The new sections are treated as a subsection by Tuz (1972) and Browicz (1972), who included them in *Flora of Turkey*. Challice and Westwood (1973) also proposed further relationships for intrageneric taxa based on chemical and morphological characters.

More than 80 species are recognized within the genus *Pyrus* (Browicz, 1993) and 73 of them are abundant in Eurasia (Robertson et al., 1991). In the Irano-Turanian and Mediterranean floristic regions *Pyrus* is represented by 12 species in *Flora Iranica* (Khatamsaz, 1992), four species in *Flora Italia* (Terpo, 1982), two species in *Flora of Syria, Palestine and Sinai* (Post, 1980), and 11 species including three endemic in *Flora of Turkey* (Browicz, 1972; Davis et al., 1988; Zielinski, 2000; Kurtto, 2009). In Europe 13 species are reported for the genus (Chater and Webb, 1968). Based on extensive fieldwork throughout Turkey, it is inferred that the taxonomy of the genus is more complex than that given in *Flora of Turkey*, suggesting that the

species number and status would be different than those known from the literature mentioned above.

*Pyrus* originated in the Tertiary era or even more ancient times, and diversification of pears is centered in western Eurasia and eastern Asia, mainly China. In these regions, there are two distinct groups of species, western and eastern (Rubtsov, 1944). The western species are found in Europe, northern Africa, Turkey, Iran, Iraq, Syria, Central Asia, Russia, and Afghanistan, whereas the eastern species are found predominantly in Eastern Asia. Based on our extensive field collections in Turkey and adjacent countries, the diversity center of *Pyrus* sect. *Pyrus* (Sect. *Achras*) appears to be mostly in Turkey.

The aim of the present study was to clarify and improve the taxonomy of *Pyrus*. As a result of fieldwork in Turkey and adjacent countries, two species have been found as new records for Turkey, namely *Pyrus georgica* Kuthath. and *P. pseudosyrriaca* Gladkova.

Following further studies on the specimens and herbarium materials, we concluded that *P. pseudosyrriaca* would be assigned to *P. syriaca* Boiss. as a variety. Consequently, *P. syriaca* Boiss. var. *pseudosyrriaca* (Gladkova) Uğurlu & Dönmez is proposed here as a new combination and status.

*P. elaeagrifolia* Pall. subsp. *kotschyana* (Boiss.) Browicz is a subspecies published in *Flora of Turkey* by Browicz (1972). Based on our collections and herbarium studies, the original rank of this taxon has been reassessed here as *P. kotschyana* Boiss. ex Decne.

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In this study, the taxonomic position of *P. boissieriana* Buhse known from Iran and Azerbaijan, *P. cordata* Desv. known from Europe, and the endemic taxon *P. serikensis* Güner & Duman known from Turkey are re-assessed, considering morphology, distribution, and nomenclature. All populations of these taxa are re-assigned as two subspecies of *P. cordata* Desv., namely *P. cordata* subsp. *cordata* and *P. cordata* subsp. *boissieriana* (Buhse) Uğurlu & Dönmez, whereas *P. serikensis* is reduced to a synonym of *P. cordata* subsp. *boissieriana*. Detailed morphologic descriptions and figures from specimens along with a taxonomic discussion are given herein.

## 2. Materials and methods

This study was mainly based on fresh materials collected from their natural geographical distribution in Turkey, Lebanon, Turkish Republic of Northern Cyprus, and Georgia between 2006 and 2013. These materials represent both flowering and fruiting phases. In addition, collections of the herbaria TBI, LE, HUJ, KNYA, ISTE, ISTO, and HUB were examined.

## 3. Results

### 3.1. *Pyrus georgica* Kuth.

*Pyrus georgica* Kuthath. in Zametki Sist. Geogr. Rast. 8: 13. 1939; Not. Syst. (Tbilisi): 8: 13 1939

Type: Georgia. Borshomi, p.p. Likani, 5. X. 1937. 11. V. 1938, *Sch. Kuthatheladze* s.n. (TBI!) Figure 1.

Tree, rarely shrub up to 3–9 m, stem diameter (15–) 25–30 (–60) cm, crown globose to irregular, stem bark gray; branches grayish or brown, spiny. Leaves (3–) 6 (–10) × 1.5 (–3) cm, widely elliptic-lanceolate, narrowly acute at apex, margin often entire or rarely serrate, undulate, gray tomentose on both sides at flowering time, finally pubescent; petioles 1.5–3 (–4.5) cm; stipules deciduous, linear-lanceolate. Inflorescence corymbose, 4–10-flowered. Flowers 20–30 mm in diameter; pedicels 1–2 (–3.5) cm, densely pubescent. Sepals 5, triangular, acute, reflexed, gray-tomentose at outside, (3–) 5 × 1 (–2) mm, persistent at fruit. Petals 5, white, (12–) 14 × (7–) 10 mm, apex rounded or rarely emarginate, from oblong-ovate to widely ovate, with short claw. Stamens in two rows, 15–20 (–25), unequal, anthers pink in young flowers. Pistils 3–5, base minutely pubescent; receptacle concave, cupuliform, densely tomentose at outside. Bracts subulate (5–) 10 × (0.5–) 1 mm, pubescence yellowish orange. Fruit single or in pairs, green, greenish-yellow, brownish, globose, flattened globose, cylindrical globose or rarely globose-pyriform (1.5–) 2 × 2.5 (–3.5) cm diam., slightly juicy; pedicel length 1–2 (–4) cm in fruit, ± thick. Seeds ovate, 6–7 × 4–5 mm, apex acute, flat at one side, convex at other side, pale brown or dark brown.

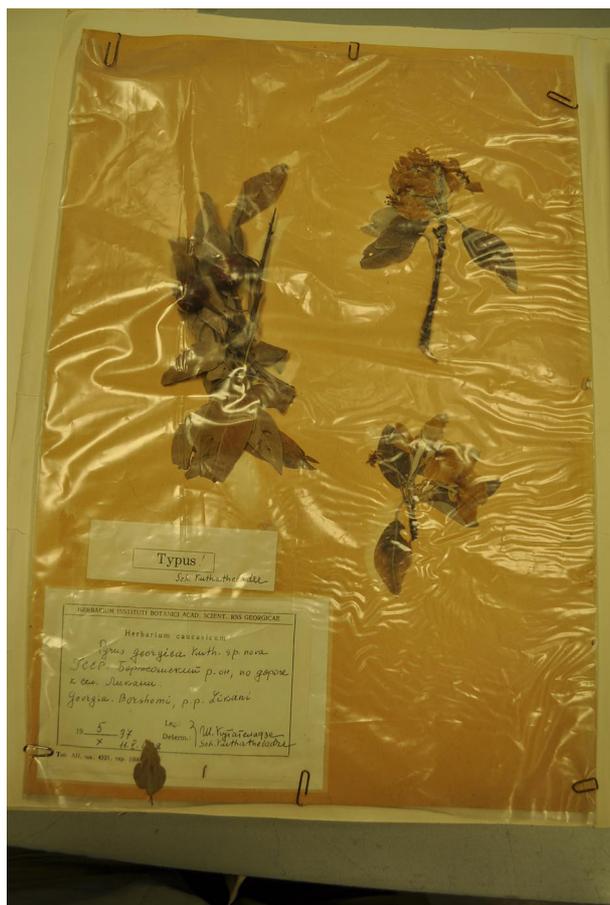


Figure 1. Type specimen of *Pyrus georgica*.

Distribution: Turkey (Figures 2a and 2b; see Appendix (on the journal's website)), Georgia (Figures 2c and 2d; see Appendix), Azerbaijan and Armenia.

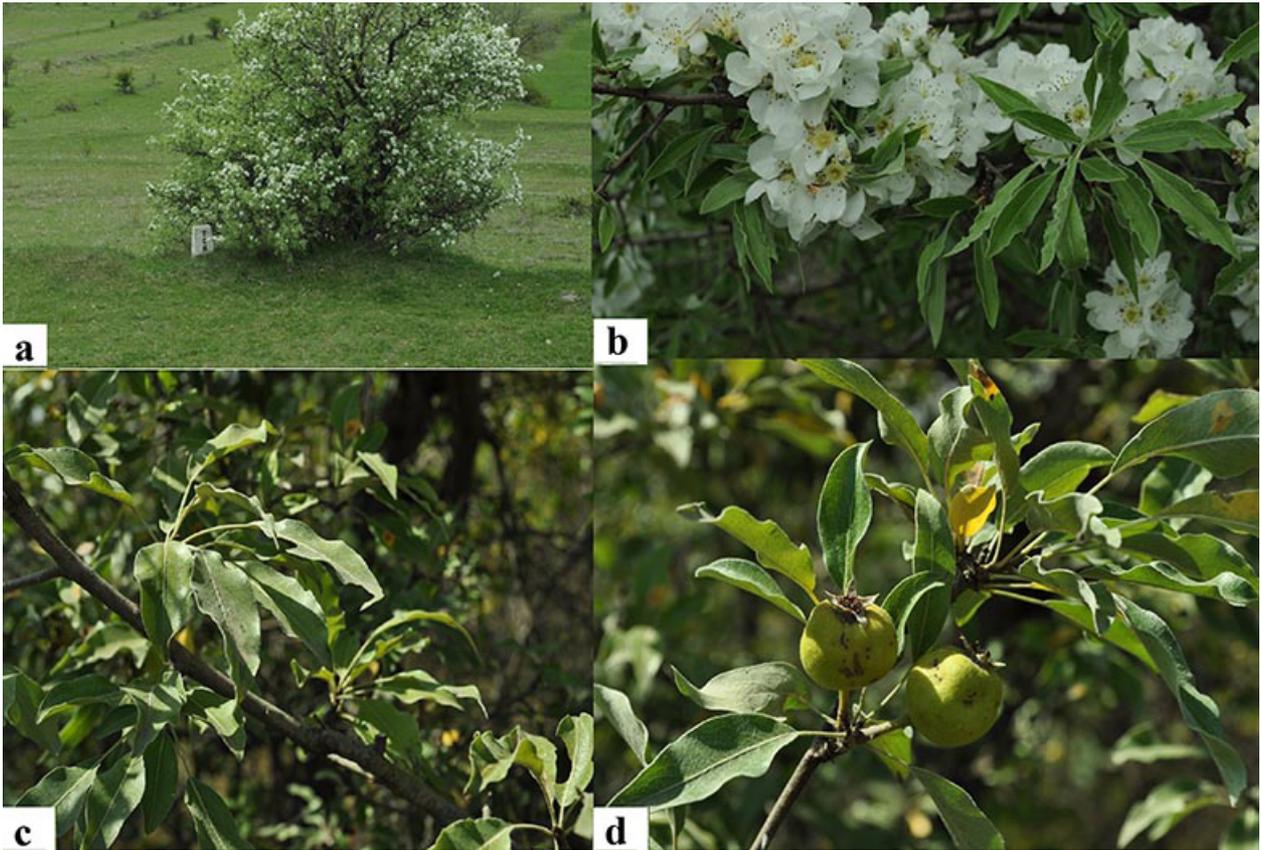
Ecology: Dry, open hills, rarely on forest edges, in scrubs of lower mountain belts and among agricultural areas at altitudes of 800–1500 m; mostly solitary or in groups. Flowering in April–May, fruiting in August–October.

### 3.2. *Pyrus syriaca* Boiss.

*Pyrus syriaca* Boiss. in Diagn. Pl. Orient. ser. 1, 10: 1. 1849

Type: Syria in sylvatica regionis montis Cassii (Akra Mountain) supra Cassab, Boissier (G foto!).

Tree up to 10 m; branches glabrous, short thick spiny; young branchlets sparsely pubescent, soon glabrous, lustrous reddish-brown, with lenticels. Leaves 3–9 × 2–4 cm, lustrous green, with a prominent network of veins, narrowly to broadly lanceolate, sometimes oblong-ovoid, cuneate, sometimes narrowly cuneate or cordate at base, apex gradually acute, rarely close to obtuse, margin minutely crenate or crenate-serrate, tomentose on both sides at flower, finally glabrous above, sparsely tomentose or glabrous at mature; petiole with short pubescence, soon glabrous, 3–5 cm long; stipules deciduous, linear-



**Figure 2.** a- General view of habit and habitat of *P. georgica*, b- flowers and leaves from Turkey- AAD 18499, c- short shoot leaves, d- fruit from Georgia- ZUG 391.

lanceolate. Inflorescence corymbose, 5–15-flowered. Flowers 20–35 mm in diameter; pedicels 1.5–5 cm, sparsely pubescent or glabrous. Sepals 5, triangular-oblong, acute, densely tomentose on both side, (3–) 6 × 1 (–2) cm, margin glandular, mostly persistent, rarely deciduous in fruit. Petals 5, white, 10–14 × 8–12 mm, apex rounded or emarginate, with hairy claw at base. Stamens in two distinct or inconspicuous rows, 15–20 (–30), anthers pink in young flowers. Pistil 2–5 (–7), base ± glabrous or tomentose, receptacle cupuliform, tomentose outside. Bracts deciduous, subulate (6–) 9 mm, pubescent, brownish. Fruit 2–5, dark brown to brown or yellow, mostly pyriform to subpyriform, rarely globose, 2.5–4 × 2.5–5 cm; pedicel thick, 2–6 mm wide, thickening toward base, 1.5–3 (–5) cm long. Seeds ovate, 6–9 × 4–6 mm, apex acute, flat at one side, convex at other side, dark brown or blackish.

Distribution: Syria, Lebanon, Iraq, southern Iran, Turkey (in particular southern part), southern Transcaucasia, western Jordan.

Ecology: Dry slopes, forest remnants, field edges.

1. Leaves up to 3.5 cm long; petiole up to 3.5 cm ..... var. *microphylla*
1. Leaves longer than (3–)3.5 cm long; petiole longer than (3–)3.5 cm
2. Leaves 3–7 cm long; pedicel 3–5 cm ..... var. *syriaca*
2. Leaves 6–9 cm long; pedicel 1.5–3 cm..... var. *pseudosyriaca*

### 3.2.1. *Pyrus syriaca* var. *syriaca*

Distribution: Syria, Lebanon, Iraq, southern Iran, Turkey (in particular southern part), southern Transcaucasia, western Jordan.

Ecology: Dry slopes, forest remnants, field edges at altitudes of 700–1400 m. Flowering in April–May, fruiting in June–September.

3.2.2. *Pyrus syriaca* var. *microphylla* Zohary ex Browicz  
*Pyrus syriaca* var. *microphylla* Zohary ex Browicz, Notes R.B.G. Edinburgh 31(2): 322.1972.

Holotype: Turkey, Konya, environment of Beyşehir, fields, 17.8.1959, M. & D. Zohary 2173 (HUJ!).

Distribution: Turkey. Endemic

Ecology: Dry slopes, forest remnants, solitary at altitudes of 500–900 m. Flowering in April–May, fruiting in August–October

**3.2.3. *Pyrus syriaca* var. *pseudosyriaca*** (Gladkova) Uğurlu & Dönmez

*Pyrus syriaca* var. *pseudosyriaca* (Gladkova) Uğurlu & Dönmez **comb. et stat. nov.**

Basionym: *Pyrus pseudosyriaca* Gladkova in Novosti Sist. Vyssh. Rast. 26: 107.1989.

Holotype: Armenia, Azizbekov, Dzhermuk. 25. 09. 1985, N 8, Gladkova & Flatova (LE!) Figure 3a.

Distribution: Southwest of Turkey (Figures 3b and 3c; see Appendix), Armenia.

Ecology: Dry slopes open forest formation at altitudes of 1400–1800 m. Flowering in April–May, fruiting in August–October

**3.3. *Pyrus kotschyana*** Boiss. ex Decne.

*Pyrus kotschyana* Boiss. ex Decne., Jard. Fruit. Mus. 1: t. 18 (1859).

Basionym: *Pyrus kotschyana* Boiss. ex Decne., Jard. Fruit. Mus. 1: t. 18 (1859).

= *Pyrus elaeagrifolia* Pallas subsp. *kotschyana* (Boiss.) Browicz in Flora of Turkey and the East Aegean Islands, 4: 160-168 (1972).

= *Pyrus elaeagrifolia* Pallas var. *kotschyana* (Boiss.) Boiss. in Fl. Or. 2: 654 (1872).

Holotype: Turkey. Musch (Muş) ad radices australis Bimboell (Bingöl) montis ad Gungum (Gümgüm) in districtu Wardo (Varto). Arbor frequens ad Pgum Koweg, 1500 m, 16. 8. 1859, *Kotschy* 533 (LE!) Figures 4a and 4b.

Tree 6 to 12 m; branches densely white pubescent, unarmed, rarely spiny. Leaves (3–) 5 × 1.5 (–2.5) cm, elliptic or narrowly obovate, cuneate or subcuneate at base, mostly obtuse or subacute at apex, margin entire, slightly undulate, mostly mucronate, densely white pubescent on both sides, sometimes less pubescent above when mature, petiole with white pubescence, 1.5–4 cm long; stipules deciduous, linear-lanceolate. Inflorescence 8–15-flowered, corymbose. Flowers 15–30 mm in diameter; pedicels 1–3.5 cm, densely pubescent. Sepals 5, triangular-oblong, acute, densely tomentose on both sides. Petals 5, white, 6 (–12) × 5 (–8) mm, from oblong-ovate to ovate, with short claw. Stamens in two rows, 15–20 (–25), anthers pink in



Figure 3. a- Type specimen of *Pyrus syriaca* var. *pseudosyriaca*, b- fruit- AAD 18797, c- leaves- AAD 18798.



Figure 4. a- and b- Type of *Pyrus kotschyana*, c- fruit and leaves- ZUG 158.

young flowers. Pistils 2–5, tomentose at base, receptacle cupuliform, tomentose outside. Bracts subulate (4–) 7 mm, pubescent, brownish. Fruit 2–5, yellow to dark brown, globose to subglobose, 1.2–2 × 1.5–2.5 cm; pedicel 0.8–2 cm long. Seeds ovate, 5–8 × 3–5 mm, apex acute, flat at one side, convex at other side, brown or dark brown.

Distribution: Turkey. Endemic (Figure 4c; see Appendix).

Ecology: Limestone slopes, forest and open forest formation at altitudes of 900–1900 m. Flowering in April–May, fruiting late August–October

### 3.4. *Pyrus cordata* Desv.

*Pyrus cordata* Desv. in Observ. Pl. Angers 152. 1818.

Shrub or small tree up to 10 m (Figure 5a), with patent to irregular crown; branches spiny; branchlets sparsely pubescent, purplish. Leaves lustrous green, (2.5–) 4 (–6) × (2–) 3 (–5) cm, very variable in shape, ovate-lanceolate to ovate, orbicular, cordate, rounded to subcordate at base, cuspidate to acuminate, obtuse, mucronulate or emarginate at apex, serrate, crenate or crenate-dentate, tomentose on both sides at time of flowering sparsely tomentose, glabrous when mature; petiole slender, stiff or flexible, 2–5 cm; stipules



Figure 5. a- General view of *Pyrus cordata* subsp. *cordata*, b- fruit and leaves- ZUG 337.

deciduous, linear-lanceolate. Inflorescence corymbose, 5–15-flowered. Flowers 15–25 mm in diameter; pedicels 1–3 cm, sparsely pubescent. Sepals 5, triangular-oblong, acute, densely tomentose outside, 1.5–3 mm long, mostly deciduous at fruit. Petals 5, white, 8–14 × 5–11 mm, apex rounded or emarginate, with short claw at base. Stamens in two rows, outer ring longer than inner one, 15–20 (–25), anthers pink in early flower. Pistil 2–5, base ± glabrous; receptacle cupuliform, ± glabrous outside. Bracts subulate (4–) 7 mm, pubescent, brownish. Fruit 1–5, shiny, dark red to brown, globose to subpyriform, densely covered with lenticels (Figure 5b); pedicel (0.5) 1.5–4 (5) cm long. Seeds ovate, 4–7 × 3–5 mm, apex acute, flat at one side, convex at other side, pale brown to dark brown or black.

1. Fruit 1.5–2 cm in diameter; pedicel 1.2–2.5 cm long ..... subsp. *cordata*

1. Fruit 0.8–1.2 (–1.5) cm in diameter; pedicel 0.8–1.5 cm long ..... subsp. *boissieriana*

**3.4.1. *Pyrus cordata* subsp. *cordata***

Distribution: Germany, England, France, Hungary, Portugal, Spain, Turkey (Figure 5; see Appendix).

Ecology: Open forest formation of oaks, scrub-lands at altitudes of 100–1200 m.

**3.5. *Pyrus cordata* subsp. *boissieriana* (Buhse) Uğurlu & Dönmez**

*Pyrus cordata* subsp. *boissieriana* (Buhse) Uğurlu & Dönmez **comb. et stat. nov.**

Basionym: *Pyrus boissieriana* Buhse in Nouv. Mem. Soc. Imp. Naturalistes Moscúe 12: 87. 1860.

= *Pyrus boissieriana* subsp. *crenulata* Browicz in Notes Roy. Bot. Gard. Edinburgh 31(2): 322. 1972. = *Pyrus serikensis* Güner & Duman in Karaca Arbor. Mag. 2(4): 166 (1994), **syn. nov.** Type: Turkey, Antalya, 17 km south of Serik, c. fr., 16. 8. 1959. *M & D. Zohary* 3092 HJ!) Figure 6a.

Holotype: Iran, in Elburs Mountain, Radkan. Buhse 19. 09. 1848 (LE 1046-a!, G) Figure 6b.

Distribution: Turkey (Figures 7a and 7b; see Appendix), Azerbaijan, and Iran.

Ecology: Dry, open area, rarely on forest edges at altitudes of 5–1250 m, mostly solitary.



**Figure 6.** a- Type specimen of *P. boissieriana* subsp. *crenulata* (*M. & D. Zohary* 3092), b- type specimen of *Pyrus cordata* subsp. *boissieriana* (LE 1046-a).

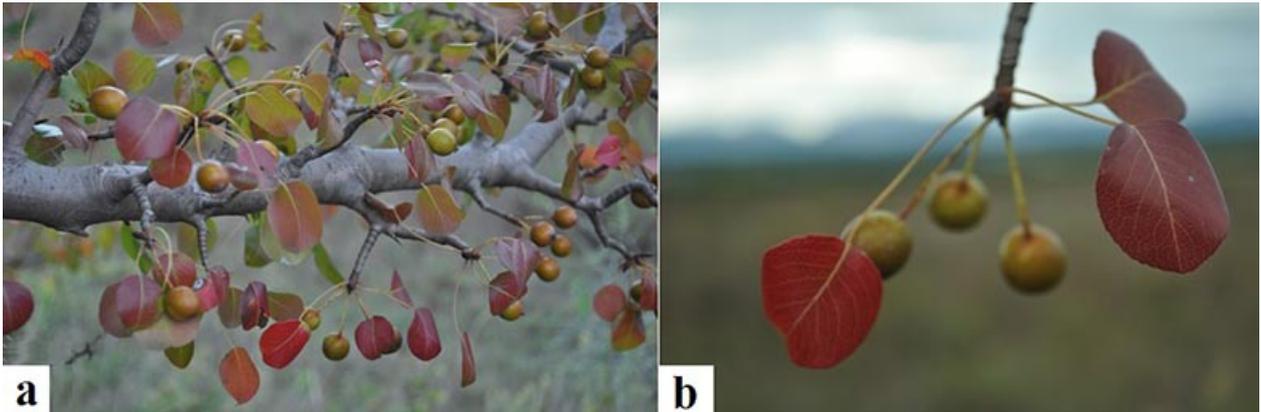


Figure 7. a- and b- Fruit and leaves of *Pyrus cordata* subsp. *boissieriana*- ZUG 483.

#### 4. Discussion

*Pyrus georgica* was first described from Georgia and it is similar to *P. elaeagrifolia* Pallas known from Turkey. Although both taxa are similar in leaf morphology, *P. georgica* has short pedicels. *Pyrus elaeagrifolia* is characterized by long and distinct pedicels. Beside this, leaf apex and margin are useful characters for *P. georgica* in distinguishing it from *P. elaeagrifolia*. Undulate margins can be seen clearly in all leaves of *P. georgica*. However, *P. elaeagrifolia* only has undulate leaves in young shoots, and its apex is variable within individuals (Table 1).

*P. pseudosyrriaca* was described by Gladkova (1989) from Armenia and distinguished from *P. syriaca*, which is widely distributed in Turkey. Among the Turkish *Pyrus* species, *P. syriaca* is the only taxon with a pedicel that is robust and clearly thickening towards the base of fruit (Figure 3). Comparison of specimens showed that *P. pseudosyrriaca* differs from *P. syriaca* only by pedicel length, which is smaller; leaf length, which is longer; and fruit shape, which is globose to subglobose in *P. pseudosyrriaca* according to the original description (Gladkova, 1989). In fact, fruit shape is the most important character between them, which is typically pyriform, but rarely globose to subglobose in *P. syriaca*. Although *P. pseudosyrriaca* is globose to subglobose, this variation can be also seen in *P. syriaca*. Beside this, leaf, pedicel, and petiole length variations have been used to create a new variety (*P. syriaca* var. *microphylla*) by

Browicz (1972) and by us here. These differences are not sufficient to keep the two taxa as separate species. It is clear that *P. pseudosyrriaca* should be regarded as a variety of *P. syriaca*. With respect to distribution pattern, these two species have a sympatric distribution in Turkey. Based on the few morphological differences among the species and nearly sympatric distribution, *P. pseudosyrriaca* is assigned as a new variety of *P. syriaca* and reported as a new record for the Turkish flora.

*Pyrus kotschyana* was first described by Boissier (1859) from eastern Turkey; subsequently it was re-evaluated as a subspecies of *P. elaeagrifolia* by Browicz (1972). This endemic subspecies is predominantly distributed in eastern and inner parts of Turkey with small populations (see Appendix). According to Browicz (1972), it differs from *P. elaeagrifolia* subsp. *elaeagrifolia* by unarmed stems, and densely white-pubescent leaves that are broadest in the lower half of the lamina. However, detailed examination shows that *P. kotschyana* has spines, sometimes rarely. The presence of spines is included in the description of *P. kotschyana* here. In addition, the taxon is quite distinct from *P. elaeagrifolia*, with elliptic leaf shape, densely white pubescent leaves, and shorter pedicel and fruit length (Figure 4; Table 2). Furthermore, distribution patterns of these two taxa are similar. They are found in the same area, even in the same stand. The opportunity to study the type material and relevant specimens from herbaria and field

Table 1. Diagnostic characters of *P. georgica* and *P. elaeagrifolia*.

	<i>P. georgica</i>	<i>P. elaeagrifolia</i>
Leaf apex	Acute	Obtuse or acute
Leaf indumentum	Pubescent or tomentose	Pubescent on both sides
Leaf margin	Undulate; entire at upper half	Flat; crenate at upper half
Fruit pedicel	2–3(–4) cm	3–5 cm

**Table 2.** Diagnostic characters of *P. kotschyana* and *P. elaeagrifolia*.

	<i>P. kotschyana</i>	<i>P. elaeagrifolia</i>
Leaf shape	Elliptic or narrowly obovate	Narrowly elliptic or ovate-oblong
Leaf indumentum	Densely white pubescent on both sides	Pubescent on both sides
Fruit	1.5–2.5 cm in diameter	2–3.5 cm in diameter
Fruit pedicel	0.8–2 cm	3–5 cm

works enabled us to conclude that these two taxa should be treated as different species. Therefore we raised it back to species level.

*Pyrus cordata* is well known from Western Europe, from Portugal to England, and has globose or subglobose fruit with a deciduous calyx (Figure 5), although some forms have variation in shape and a persistent calyx. These variations have been used for diagnostic characters of the sections of the genus by Koehne (1890). Browicz (1993) added peduncle width for distinguishing the sections *Pashia* and *Pyrus*. *Pyrus boissieriana* and *P. cordata* are very similar and have been treated as separate species in contrast to the treatment by Boissier (1872). *Pyrus boissieriana* belongs to the section *Pashia* and is distributed from Turkey to Iran (see Appendix) and Afghanistan (Maleev, 1939; Khatamsaz, 1992; Zamani et al., 2012). The Turkish population growing in Antalya (see Appendix) has been described as a new subspecies, *P. boissieriana* subsp. *crenulata*, by Browicz (1972) based on crenulate leaf margins. After a while, this population was published under a new name and status, *P. serikensis*, by Güner and Duman (1994), without examining the type specimen or any further specimens. It was stated that *P. serikensis* differs from the Iran populations by leaf length (up to 2.9 cm) and some characters of the flower by the authors. It is clear from the type specimen (Figure 6) and other examined specimens (Figure 7) that leaf length is up to 5 cm. The other important character, crenulate or serrulate leaf margin, is inconspicuous and some have crenate-serrate margins together. Aldasoro et al. (1996) showed that the width of fruit peduncle, petal size, leaf width, and petiole length are discriminative, particularly in distinguishing some *Pyrus* taxa, including *P. cordata*. They also evaluated *P. cordata* and *P. boissieriana* by carrying out a multivariate morphometric study and concluded that these are the same species. We agree with this assessment based on comparisons of the specimens collected for the first time from the European part of

Turkey and from Antalya and Iran. However, we observed that fruit length and pedicel thickness represent only minor differences between these populations. As a result, we decided that populations named *P. cordata* and *P. boissieriana* separately belong to one species. *P. cordata* was correctly described by Desvaux in 1818, whereas *P. boissieriana* was described by Buhse in 1860; therefore, *P. cordata* should be accepted as a correct name because of priority of publication (Art. 11–12, McNeill, 2012). Apart from morphological similarities, *P. cordata* is geographically isolated from the nearest localities of *P. boissieriana*. Considering this, the populations growing in southern Turkey, Azerbaijan, and Iran are placed in *P. cordata* as a subspecies based on some minor differences in morphology, but mainly distribution.

In conclusion, taxonomic and nomenclatural novelties of the economically important genus *Pyrus* are represented in this study. *Pyrus georgica* is reported for the first time from Turkey and morphologic characters are compared with those of the related species *P. elaeagrifolia*. The other new record for the flora of Turkey, *P. pseudosyriaca*, is discussed, emphasizing its affinity with *P. syriaca*. Based on morphology, this new record is reduced to a variety of *P. syriaca*. *P. elaeagrifolia* subsp. *kotschyana* is accepted as a species. Two new combinations are revealed: *P. cordata* subsp. *cordata* and *P. cordata* subsp. *boissieriana*.

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**Appendix****Specimens examined*****Pyrus georgica***

**Turkey:** Ardahan, Posof, 0.6 km from Eminbey village to Türközü, field margin. 41°33'430"N, 42°34'764"E, 1497 m, 31.05.2012, ZUG 305- A.A. Dönmez; 03. 6. 2013, A.A. Dönmez 18499 (Figures 2a and 2b). Posof, from Posof-Türközü road junction to Türközü 12.6 km, 41°34'578"N, 042°48'516"E, 1315 m, 31. 5. 2012, ZUG 307- A.A. Dönmez.

**Georgia:** Tbilisi, Sagarejo, Gaze Kakheti, Khasmi village, Davidgazeji, 41°44'825"N, 45°12'65"E, 844 m, 09.08.2012, ZUG 391- A.A. Dönmez- Niko Lachashrili (Figures 2c and 2d).

***Pyrus syriaca* var. *syriaca***

**Turkey:** Erzincan, Kemah, Çiğdemli village, 39°36'680"N, 038°44'361"E, 03.05.2013, 1334 m, A.A. Dönmez 18456; Antalya, Cevizli, Bademli village, 37°17'628"N, 031°43'369"E, 1225 m, 01.05.2013, ZUG 511- A.A. Dönmez; ZUG 515- A.A. Dönmez; Kahramanmaraş, Hamancık hill, 712 m, 37°40'648"N, 036°49'463"E, 27. 06. 2001, A.A. Dönmez 9454; Hakkari, 12 km from Yüksekova to Hakkari, 29.06.2009, A.A. Dönmez 15492.

**Lebanon:** Beirut, Arz Barouk, 08. 06. 2010, A.A. Dönmez 16997; Bekaa, Yammounek, 1393 m, 34°07'984"N, 36°02'690"E, 10. 06. 2010, A.A. Dönmez 17047.

**Turkish Republic of Northern Cyprus:** Girne, Kayalar village, 22.06.2011, A.A. Dönmez 17788 -Hüseyin Genç; Edremit, 35°19'849"N, 033°15'641"E, 20. 06. 2011, A.A. Dönmez 17763 -Demet Genç.

***Pyrus syriaca* var. *microphylla***

**Turkey:** Karaman, Ermenek, 36°41'142"N, 032°45'723"E, 874 m, 04. 07. 11, ZUG 102- A.A. Dönmez; ZUG 106- A.A. Dönmez; Konya, Bozkır, 37°12'602"N, 032°11'154"E, 1360 m, ZUG 159- A.A. Dönmez; Antalya, Beşkonak, 37°13'464"N, 031°08'174"E, 819 m, 26.09.2012, A.A. Dönmez 18209.

***Pyrus syriaca* var. *pseudosyriaca***

**Turkey:** Hakkari, 6 km from Şemdinli to Yüksekova, *Quercus* forest, 1765 m, 37°20'224"N, 044°32'862"E, 02.10.2001, A.A. Dönmez 10324; Şemdinli, Tekeli village, 04.10.2013, A.A. Dönmez 18755- K. Özgüşi; From Günyazı village to Şemdinli, 04.10.2013, A.A. Dönmez 18777- K. Özgüşi; 4.6 km from Şemdinli to Şapatan pass, 04. 10.2013, A.A. Dönmez 18797- K. Özgüşi (Figure 3b); A.A. Dönmez 18798- K. Özgüşi (Figure 3c).

***Pyrus kotschyana***

**Turkey:** Konya, Beyşehir, Derebucak road, 37°39'045"N, 031°40'895"E, 1130 m, 22. 09. 2011, ZUG 148- A.A. Dönmez; Bozkır, Bozkır-Akseki road junction, 37°12'602"N, 032°11'154"E, 1360 m, 23.09.2011, ZUG 158- A.A. Dönmez (Figure 4c); ZUG 160- A. A. Dönmez; ZUG 161- A.A. Dönmez; Beyşehir around, 17.08.1959, M. & D. Zohary (HUJ No 2171!); Kayseri, around Develi village, 1300 m, 25.08.1965, M. Awishai (HUJ No. 94!); Erzincan, Kemaliye, Kabataş village, 1912 m, 25.09.2006, S. Yüzbaşıoğlu 2849 (KNYA!); Muş, 8 km from Çaylar to Karlıova, 1850 m, D. 46140 (E foto!).

***Pyrus cordata* subsp. *cordata***

**Turkey:** Kırklareli, road from Kofcaz to Kırklareli, 41°56'325"N, 027°09'363"E, 407 m, 17.07.2012, ZUG 337- A.A. Dönmez (Figures 5a and 5b).

**Great Britain:** Thornbury, J.R. Briggs (K photo!); Gloucestershire, C.I. Sandwith & N.Y. Sandwith (K photo!); Truro, L.R. Fitzgerald & J. Akeroyd (K photo!).

***Pyrus cordata* subsp. *boissieriana***

**Turkey:** Antalya, Aksu, Abdurrahmanlar village, 4 m, 36°57'588"N, 030°55'723"E, 21. 04.2012, ZUG 198- A.A. Dönmez; ZUG 199- A.A. Dönmez; Serik, road junction of Kırılı-Gündoğdu, 15 m, 36°51'676"N, 031°16'692"E, ZUG 200- A.A. Dönmez; ZUG 201- A.A. Dönmez; Gündoğdu, around Bereket village, 18 m, 36°53'586"N, 031°13'145"E, 09.11.2012, ZUG 483- A.A. Dönmez (Figures 7a and 7b); Road junction of Gündoğdu, 21 m, 36°52'364"N, 031°15'761"E, ZUG 486; ZUG 487- A.A. Dönmez; A road from Manavgat river bridge to Serik, 3 m, 36°46'526"N, 031°20'602"E, 16. 3. 2013, ZUG 488- A.A. Dönmez; Highway to Beşkonak, 51 m, 36°55'333"N, 031°13'872"E, 26.09.2012, A.A. Dönmez 18206 - Z. Uğurlu; 17 km south of Serik, 16. 8. 1959, M. & D. Zohary 3092 (HUJ!) Figure 6a.

**Iran:** Mazenderan, road from Mazenderan to Karaj, 2100 m, 21.09.2005, AAD 12541- M. Atoi & E. Esreti; Tehran, road from Firuz Kut to Emirir, 2188 m, 35°50'619"N, 052°56'437"E, 05.09.2006, AAD 14059 - G. Zare & M. Suzani; Coastal Plain, 16. 8. 1960 Zohary & Zohary No 862 (HUJ!).