Nomenclatural, taxonomic and biogeographic novelties in the Turkish *Crataegus* L. (Rosaceae-Maleae) taxa

Ali A. DÖNMEZ
Botany Department, Faculty of Science,
Hacettepe University, 06800 Beytepe-Ankara (Turkey)
donmez@hacettepe.edu.tr

Dönmez A. A. 2014. — Nomenclatural, taxonomic and biogeographic novelties in the Turkish *Crataegus* L. (Rosaceae-Maleae) taxa. *Adansonia*, sér. 3, 36 (2): 245-253. http://dx.doi.org/10.5252/a2014n2a7

ABSTRACT
Crataegus davisii Browicz is a later homonym of *C. davisii* Sarg., and the species has been renamed as *Crataegus petrodavisii* Dönmez, nom. nov., following its acceptance as a valid species. *Crataegus* × *yosgatica* K.I.Christ. is reduced to a synonym of *C. meyeri* Pojark., and an emended description of the species is given here. *Crataegus pseudoazarolus* Popov, *C. pseudoheterophylla* Pojark. subsp. *turcomanica* (Pojark.) K.I.Christ. and *Crataegus* × *lavallei* Hérincq ex Lavallée are new records for the Turkish flora. New descriptions of the taxa concerned are provided.

KEY WORDS
Maleae,
Rosaceae,
Pyreae,
Turkey,
new synonym.

RÉSUMÉ
Nouveautés nomenclaturales, taxonomiques et biogéographiques sur les Crataegus *L. (Rosaceae-Maleae) turques.*
Crataegus davisii Browicz est un homonyme postérieur de *C. davisii* Sarg. Les auteurs, considérant qu'il s'agit d'une bonne espèce, proposent le nom *Crataegus petrodavisii* Dönmez, nom. nov. *Crataegus* × *yosgatica* K.I.Christ. est placé en synonymie de *C. meyeri* Pojark., et une description augmentée est fournie. *Crataegus pseudoazarolus* Popov, *C. pseudoheterophylla* Pojark. subsp. *turcomanica* (Pojark.) K.I.Christ. et *Crataegus* × *lavallei* Hérincq ex Lavallée sont pour la première fois cités de Turquie. Des nouvelles descriptions des taxons concernés sont fournies.

MOTS CLÉS
Maleae,
Rosaceae,
Pyreae,
Turquie,
synonyme nouveau.

INTRODUCTION

Crataegus L. is widely distributed in the northern hemisphere and is represented by over 150 species in the New World and 60 species in the Old World (Pojarkova 1939; Meikle 1966; Riedl 1969; Browicz 1972; Phipps *et al.* 1990; Christensen 1992; Khatamsaz 1992; Gu & Spongberg 2003). In spite of a well-established morphological circumscription of the genus, *Mespilus* L. is included in *Crataegus*, based on molecular and the other data (Lo *et al.* 2007; Talent *et al.* 2008). Phylogenetic studies based on both chloroplast and nuclear DNA sequences by Campbell *et al.* (2007), Lo *et al.* (2009), Li *et al.* (2012), and Lo & Donoghue (2012) have made the intergeneric relationships among the genera of Maleae (incorrectly: Pyreae) tribe more clear.

The studies on polyploidy and reproductive biology of various genera belonging to the Maleae tribe enlighten the evolutionary relationships and make a contribution to the solution of various taxonomic problems (Evans & Campbell 2002; Dickinson *et al.* 2007). On the other hand, morphological characters have been also used in phylogenetic analysis (Phipps *et al.* 1991), numerical taxonomic (Christensen 1994) and classical taxonomic studies (Christensen 1992; Shahbaz & Sadeq 2006*;* Christensen & Zielinsky 2008; Sharifnia *et al.* 2011).

Since the publication of a comprehensive revision of the Old World *Crataegus* taxa by Christensen (1992), further studies on the genus have shown the richness of the taxa in south-west Asia (Dönmez 2004, 2005, 2007; Dönmez & Oybak-Dönmez 2005; Shahbaz & Sadeq 2006*;* Sharifnia *et al.* 2011). These studies have also illuminated other aspects of the genus; such as pollen morphology (Dönmez & Işık 2004; Oybak-Dönmez 2008), phytochemistry (Sözer *et al.* 2006, Özyürek *et al.* 2012), nomenclature (Dönmez 2007; Christensen & Zielinsky 2008), biogeography (Dönmez 2004), and have used numerical taxonomy (Dönmez 2010).

MATERIAL AND METHODS

To explore the ecology and phenology of the specimens of *Crataegus* taxa, many field trips have been carried out throughout Turkey and neighbouring countries. Specimens in the herbaria ANK, B, BM, C, E, G, K, L, LE, MO, MW, TARI, TUH, and W were also examined. (the examined type specimens examined are annoted with "!" after the herbarium acronym).

RESULTS

Family Rosaceae Juss.
Genus *Crataegus* L.

Crataegus petrodavisii Dönmez, nom. nov.

Crataegus davisii Browicz in *Notes from the Royal Botanic Garden Edinburgh* 31 (2): 323 (1972); non *Crataegus davisii* Sarg. in *Annual report Missouri Botanical Garden* 22: 77 (1911). — Typus: **Turkey.** Hakkari, from Yüksekova to Şemdinli, 45 km, 1750 m, 15.V.1966, *Davis 45168* (holo-, E!; iso-, K!, ISTO!).

Chromosome number. — Unknown.

Phenology. — Flowering in May to June, mature fruit in September to October.

Distribution. — SE Turkey and Iran, probably north Iraq: in hedges, on mountain slopes with deciduous forest, usually of *Quercus*; 1500-1800 m.

Specimens examined. — **Turkey.** Hakkari, 6 km from Şemdinli to Yüksekova, in *Quercus* scrub, 37°20'224"N, 044°32'862"E, 1765 m, 2.X.2001, *A.A.Dönmez 10318*, *A.A.Dönmez 10325*; 2.5 km from Şemdinli to Şapatan Pass, 1520 m, 29.V.2002, *A.A.Dönmez 10789*, *10793*, *10797* with *B. Mutlu*.

Description

Tree or shrubs up to 7 m tall. Rarely thorny, thorns up to 40 mm long, with short twigs. Young shoots glabrous or villose, rarely sparsely villose, deciduous in fruit. Buds 1.5-2.5 mm long × 1.5-2.5 mm in diameter. Leaves glabrous or sparsely villose, dull or bright green, subcoriaceous, widely cuneate at base, rarely truncate, lobes obtuse, rarely acute, sometimes finely serrate at margin. Middle leaves of flowering shoots 35-55 (-80) × 35-60 (-90) mm, lobes 2-3 pairs, basal lobe at lower half of lamina, sinuses extending more than half the width of lamina, basal pair 0.5-1 times as long as wide, each lobe with 4-8 teeth in the upper

half; petioles 20-25 mm; stipules 5-7 × (2-) 3-5 mm, entire or irregularly serrate with 2-5 teeth, ± uppermost lamina divided into 10-20 × 5-8 mm oblong-lanceolate segments. Middle leaves of short shoots 30-60 × 40-70 mm, lobes 2-3 pairs, basal sinuses in lower half, sinuses extends to half or more of the lamina, basal pair 1-1.5 times as long as wide, each lobe with 6-10 teeth in the upper ⅔; petiole 18-30 mm, stipules 2-3 × 0.1-0.2 mm, entire. Middle leaves of long shoots 40-60 (-80) × 40-65 (-80) mm, lobes 2-3 pairs, basal sinuses at lower half of the lamina, extending nearly to mid-vein, 1.5-2 times as long as wide, 8-12 teeth at upper half; petiole 25-35 mm; stipules 8-12 × 2-7 mm with 5-10 teeth. Inflorescence 25-35 × 35-60 mm, densely corymbose with (10-) 20-35 flowers, villose, sparsely villose in fruit; pedicel 7-12 mm, bracts 3-5 × 0.3-0.5 mm, deciduous, linear or lanceolate, entire or with 1-4 teeth. Flowers 14-17 mm in diameter; hypanthium 3-3.5 × 2-3 mm; sepals 1.5-2 × 1.5-2 mm, oblong or widely triangular, margin entire, obtuse at apex; petals 6-7 × 6-7 mm; stamens 20-26, anthers pink; styles (2-) 3-5, sparsely hairy at base. Fruit 8-12 mm long × 9-13 mm wide, ± globose, dark purple or blackish, pruinose, glabrous; flesh dark reddish, juicy; sepals erect or patent, with a short neck at base; pyrenes (2-)3-5, 4-7 × 3-5 mm, slightly sulcate dorsally.

Remarks

Differences between *Crataegus pentagyna* Waldst. & Kit and *C. petrodavisii* nom. nov. are as follows and are summarized in Table 1. The leaves of *C. petrodavisii* nom. nov. are larger than those of *C. pentagyna* and are glabrous at mature stage. The fruit of *C. petrodavisii* nom. nov. is bigger than that of *C. pentagyna* Waldst. & Kit, and it is glabrous. Pyrenes are mostly are 2-4 (-5) for *C. petrodavisii* nom. nov. whereas they are 4-5 for *C. pentagyna*. *Crataegus petrodavisii* nom. nov. occurs mostly in forest areas under dry climatic conditions in Iran and Turkey. However, *C. pentagyna* occurs in more humid deciduous forest and openings. *Crataegus petrodavisii* nom. nov. is confined to SE Turkey, the ranges of Zagros Mountain and western Iran, it is an Irano Turanian element. However, native range of *C. pentagyna* is central and southern Europe, Crimea, Caucasia and northern Iran, and it is an Euro-Siberian element (Table 1). Thus, an evaluation of many collections made by the present author, particularly those with flowers or mature fruits, demonstrate that *C. petrodavisii* nom. nov. is taxonomically distinct from *C. pentagyna*.

Crataegus meyeri Pojark.

Komarov, *Flora of the U.S.S.R.* 9: 500, fig. XXIX. 3 (1939). — Typus: former U.S.S.R. Armenia: in vicinitate urbis Jerevan, in faucibus fl. Gjarni-czai, prope monasterium Gehart, 11.X.1936, *Pojarkova* 792 (holo-, LE!; photo, HUB!).

Crataegus monogyna var. *hirsutior* Boiss. *Flora Orientalis* 2. 664 (1872). — Typus: *Kotschy 189* (holo-, G; iso-, BM!, FI, REG, UPS, W!).

Crataegus ambigua var. *hohenackeri* Schneid., *Illustriertes Handbuch der Laubholzkunde* 1: 785 (1906). — Typus: *Hohenacker s.n.* (lecto-, W!; isolecto-, W!; selected by Christensen 1992).

Crataegus eriantha Pojark., in Komarov, *Flora of the U.S.S.R.* 9: 500 (1939). — Typus: *Kolenati* 1399 (holo-, LE!; iso-, LE; photo, HUB!).

Crataegus taurica Pojark., in Komarov, *Flora of the U.S.S.R.* 9: 501 (1939). — Typus: *Wullf & Dzevanovsky s.n.* (holo-, LE!; photo, HUB!).

Crataegus ucrainica Pojark., in Komarov, *Flora of the U.S.S.R.* 9: 502.1939. — Typus: *Rogovicz s.n.* (holo-, LE; iso-, LE!; photo, HUB!).

Crataegus persica Pojark., *Botanicheskie Materialy Gerbariya Botanicheskogo Instituti Imeni V. L. Komarova Akademii Nauk SSSR* 12: 190, fig. 3 (1960). — Typus: *Alexeenko* 836 (holo-, LE!; photo, HUB!).

Crataegus stankovii Kossych, *Botanicheskie materialy Gerbariya Glavnogo Botanicheskogo Sada SSSR* 57: 78 (1965). — Typus: *Kossych s.n.* (holo-, YALT).

Crataegus × *yosgatica* K.I.Christ. *in* K.I.Christ. *in* Christensen, Revision of *Crataegus* Sect. *Crataegus* and Nothosect. *Crataeguineae* (Rosaceae-Maloideae) in the Old World, *Systematic Botany Monographs* 35: 121, 122, fig. 71 (1992) syn. nov. — Typus: **Turkey.** [Yozgat] Yosgat: *c.* 27 km W of Akdağmadeni, along Sivas-Yozgat rd., 1350 m, 13.VI.1975. *Browicz & Zielinski 574* (holo-, KOR; iso-, KOR). — Paratypus: **Turkey.** Tunceli: [Pülümür]Pülüinür, du pont au village Yesilköy, *Yildirimli 3293* (G!; HUB!)

Chromosome number. — 2n (4x)= 68; 2n (3x)= 51.

Phenology. — Flowering in May to June, mature fruit in September to October.

Distribution. — Ukraine, Turkey, Georgia, Armenia, Azerbaijan and Iran, northern Iraq: dry areas, forest openings and in deciduous forest with mainly *Quercus*; 1200-2800 m.

Specimens examined. — **Turkey.** Sivas, 10 km from Suşehri to Şerefiye, around Değirmentaş village, 40°11'63"N, 37°57'910"E, 1350 m, 6.X.2001, *A.A.Dönmez 10354*. — Yozgat, from Akdağmadeni to 27 km, 39°48'389"N, 36°01'237"E, 1224 m, 25.VI. 2001, *A.A.Dönmez 9298*. — Sivas, 27 km from Akdağmadeni to Sivas, *Quercus cerris-Pinus sylvestris* forest, 39°48'604"N, 36°04'136"E, 1330 m, 28.IX.2001, *A.A.Dönmez 10178*; 27 km from Yıldızeli to Akdağmadeni, *Quercus* scrub, 39°48'604"N, 36°04'136"E, 1330 m, 27.VI.2002, *A.A.Dönmez 10926*; 27 km from Yıldızeli to Akdağmadeni, *Quercus* scrub, 39°48'604"N, 36°04'136"E, 1330 m, 30.IX.2002, *A.A.Dönmez 11160*. — Erzincan, Buğdaylı village, between Kızlarkalesi and Zirve, 39°47'238"N, 39°35'450"E, 2178 m, 39°47'383"N, 39°35'930"E, 2350 m, 25.VI.2001, *A.A.Dönmez 9387*. — Tunceli, 18 km from Erzincan-Erzurum road to Pülümür, around Pülümür Pass, 39°30'746"N, 39°52'594"E, 1790 m, 29.IX.2001, *A.A.Dönmez 10195* & *10196*; Pülümür, Gökçekonak village road junction, among *Quercus* scrub, 39°23'995"N, 39°50'087"E, 1252 m, 27.IX.2002, *A.A.Dönmez 11132*; Pülümür, 1 km from Kırmızıköprü to Tunceli, *Quercus* scrub, 39°23'109"N, 39°49'075"E, 1236 m, 1.VI.2002, *A.A.Dönmez 10867* & *10870*.

Description

Tree or shrubs up to 10 m tall. Rarely thorny, thorns up to 90 mm long, with short twigs. Young shoots glabrous to villose. Buds 1.4-3.7 mm long × 2.1-3 mm in diameter. Leaves long villose, dull or bright green, cuneate or attenuate at base, lobes acute, finely serrate at margin. Middle leaves of flowering shoots 18-35 (-50) × 16-30 (-45) mm, lobes 1-2(-3) pairs, basal sinuses at lower half of lamina and extending nearly midvein, basal pair 2-3 (-4) times as long as wide, each lobe with (2-) 5-10 (-15) teeth in the upper ⅓ to ¼; petiole (3-) 6-10 (-21) mm; stipules 4-7 (-15) × 1.5-4 mm, entire or irregularly (1-) 5-10 (-20) serrate glandular or eglandular teeth. Middle leaves of short shoots 20-40 (-55) × (15-) 20-40 (-50) mm, lobes 1-3 pairs, basal sinuses at lower half, sinuses extends to midvein, basal pair 1-2 times as long as wide, each lobe with 3-10 (-15) teeth in the upper ⅓-¼; petiole (5-) 15-25 (-35) mm, stipules 1-2 × 0.3-0.6 mm, glandular serrate. Middle leaves of long shoots 25-40 (-60) × 25-40 (-65) mm, lobes 2-3 (-4) pairs, basal sinuses at lower half of the lamina, extending to nearly midvein, 2-2.5 times as long as wide, 6-12 (-20) teeth at upper ⅓-¼; petiole 10-20 mm; stipules 5-10 (-25) × 2-4 (-15) mm with 8-20 (-45) glandular or eglandular irregular teeth. Inflorescence 20-40 × 30-50 mm, lax corymbose with 8-15 (-20) flowers, villose, densely villose; pedicel (2-) 4-7 (-10) mm, bracts 1.8-3 (-10) × 0.2-0.9 mm, deciduous, linear, entire or with (1-) 4-12 glandular teeth. Flowers 10-16 mm in diameter; hypanthium 3-5 × 3-5 mm; sepals (1.4-) 2-3 (-5.5) × 1.5-2 mm, triangular to linear, margin entire or glandular, acute or acuminate at apex; petals (4-) 5-6 (-9) × 5-6 (-7) mm; stamens 18 (-20), anthers pink; styles (1-) 2-3 (-4), hairy at base. Fruit (7-) 9-12 mm long × (6-) 7-10 (-15) mm ± globose to short oblong ± angular at base, dark shiny red, mostly hairy, flesh orange, juicy, sepals recurved on fruit; pyrenes (1-) 2-3 (-4), (5-) 7-9 × 4-6 mm, slightly sulcate dorsally and laterally.

Remark

The description of the species was based on the collections of Browicz and Zielinski (deposited at KOR herbarium in Poland) and Yıldırımlı (G and HUB herbaria). Both of the paratypes have been examined by the present author. Christensen & Zielinski (2008) mentioned new material from Tavşanlı, Kütahya which appeared to be an unusual location for this species. The present author therefore undertook extensive field research throughout Turkey and in many localities in Iran, which resulted in the reduction above of this species hybrid to synonymy with *C. meyeri* Pojark.

Crataegus pseudoazarolus Popov

Trudy po Prikladnoi Botanike 22: 442, fig. 101 (1929). (*Crataegus azarolus* var. *pontica* × *Crataegus pentagyna*). — Typus: *Kalinskiy s.n.*, Kopet-Dagh, Aidere, *Popov s.n.* (holo-, LE!).

Crataegus nikitinii Essenova, *Novitates Systematicae Plantarum non Vascularium* 13: 160, fig. [1] (1976). — Typus: *Essenova s.n.* (holo-, ASH; iso-, LE!).

Crataegus ×*androssovii* Essenova & Kerimova, *Novitates Systematicae Plantarum non Vascularium* 14: 122, fig. 1,

2 (1977). — Typus: *Essenova & Kerimova 15* (holo-, ASH; iso-, LE!).

Crataegus cinovskisii Kassumova, *Botanicheskii Zhurnal* (Moscow & Leningrad) 70: 266 (1985). — Typus: *Kassumova s.n.* (holo-, BAK).

CHROMOSOME NUMBER. — 2n (4x) = 68.

PHENOLOGY. — Flowering in May, mature fruit in August to October.

DISTRIBUTION. — Nakhichevan and Kopet-Dagh in Turkmenistan: on mountain slopes, in scrub with *Cerasus*, *Cotoneaster*, *Rhamnus*, *Quercus* in vineyards and roadsides; 500-1600 m.

SPECIMENS EXAMINED. — **Turkey.** Şırnak, Günyüzü village, *c.* 1700 m, 29.V.2002, *A.A.Dönmez 10759 – B. Mutlu* (flowering material); Beytüşşebap, below Başaran village, road side, 1146 m, 37°28'328"N, 38°08'488"E, 27.IX.2002, *A.A.Dönmez 11140* (fruiting material).

DESCRIPTION

Small tree or shrubs up to 6 m tall. Twigs densely to sparsely lanate-tomentose or lanate; thorns up to 15 mm long, rare. Buds 2.0-3.0 mm long, 1.8-3.0 mm in diameter. Leaf blades more or less coriaceous, dark or bright green and more or less villose to appressed-pubescent above, more or less greyish green and more or less villose to appressed-pubescent throughout or only in vein axils beneath, cuneate or attenuate at base, lobes acute, margin coarsely crenate-serrate, basal pair of veins straight or divergent. Subterminal leaf blades of flowering shoots 3.2-4.5 cm long, 2.7-4.6 cm wide, lobes 2-3 pairs, basal pair 3.0-4.1 times as long as wide, extending 0.8-0.9 times the width of lamina to midrib, each lobe with 1-5 teeth in the distal ⅖-⅓, basal pairs of sinuses in the basal 3/10-⅕ of lamina; petioles 7-15 mm long, 0.2-0.5 times as long as lamina; stipules 5-10 mm long, entire or with 3-6 teeth. Subterminal leaf blades of short shoots 4.0-5.1 cm long, 3.2-4.9 cm wide, lobes 2-3 pairs, basal pairs 3.0-3.7 times as long as wide, extending 0.8-0.9 times the width of lamina to midrib, each lobe with 3-8 teeth in the distal 3/10-⅕, basal pairs of sinuses in the basal ⅖-⅕ of laminas; petiole 12-35 mm long, 0.3-0.7 times as long as lamina. Leaf blades of elongate shoots 3.7-5.0 cm long, 4.1-5.0 cm wide, lobes 2-3 pairs, basal pair 2.3-3.0 times as long as wide, extending *c.* 0.9 times the width of lamina to midrib, each lobe with 4-6 teeth in the distal ⅓-¼, basal pair of sinuses in the basal ⅕-1/10 of lamina; petioles 10-18 mm long, *c.* 0.4 times as long as lamina; stipules 8-14 mm long, entire or with 1-2 teeth. Inflorescence corymbose, 6-25 flowered, more or less lax, more or less lanate-tomentose or lanate; pedicels 2-17 mm long, more or less lanate-tomentose or lanate; bracts 2.1-2.6 mm long, 0.2-0.4 mm wide, 7.5-12.0 times as long as wide, caducous, margin with 0-2 teeth; sepals 1.2-2.1 mm long, 2.3-3.0 mm wide, broadly triangular, 0.5-0.8 times as long as wide, margin entire, apex obtuse or subacute; petals 4-5 mm long, *c.* 6 mm wide; stamens 15-20, anthers purple; styles 3-4 (-5). Fruit 7-18 mm long, 9-22 mm in diameter, 0.5-1.3 times as long as wide, depressed-globose or subglobose, orange to blackish red, more or less lanate-tomentose or lanate, crowned by the persistent, recurved or suberect sepals; pyrenes 3-4 (-5), dorsally sulcate, ventro-laterally more or less sulcate or smooth, hypostyle pilose.

REMARK

The species is the first record for the Turkish flora. It grows naturally in mountainous areas of Şırnak in eastern Turkey. The examined individuals have plenty of mature fruits. According to the IUCN (2001) criteria, the Turkish population of the species has no threat for extinction.

Crataegus pseudoheterophylla Pojark.

Komarov, *Flora of the U.S.S.R.* 9: 507, fig. XXX.5 (1939). — Typus: former U.S.S.R. Armenia: district Jerevan, prope monasterium Gehart, in faucibus fl. Gjarni-czai, 11.X.1936, *Pojarkova 793* (holo-, LE!; iso-, LE!; photos: E!, HUB!).

KEY TO THE SUBSPECIES OF *CRATAEGUS PSEUDOHETEROPHYLLA* POJARK.

1. Pedicel, hypanthium and fruit villose ..... subsp. *pseudoheterophylla* Pojark.
— Pedicel, hypanthium and fruit glabrous ..... subsp. *turcomanica* (Pojark.) K.I.Christ.

TABLE 1. — Comparison of *C. pentagyna* Waldst. & Kit and *C. petrodavisii* Dönmez, nom. nov. (syn. of *C. davisii*).

Character	*C. pentagyna*	*C. petrodavisii* nom. nov.
Leaf size (on short shoot)	25-40 × 25-40 mm	30-60 × 40-70 mm
Leaf base (on short shoot)	Almost truncate	Cuneate
Leaf indumentum (beneath)	Pubescent	Glabrous
Fruit surface	Hairy (rarely glabrous)	Glabrous
Fruit size (mm)	(6-)8-10 × (6-)8-10	9-13 × 9-13
Pyrenes	3-5	3-4(-5)
Phytogeographical region	Euro-Siberian	Irano-Turanian
Habitat	Humid, deciduous forest	Dry, deciduous forest

DESCRIPTION

Tree or shrubs up to 6 m tall. Rarely thorny, thorns up to 50 mm long, with short twigs. Young shoots glabrous to villose. Buds 1.5-2 mm long × 1.3-2 mm in diameter. Leaves glabrous or pilose, slightly shiny at upper, greyish at below, widely cuneate at base, lobes obtuse or acute, finely serrate at margin, basal pair of vein widely divergent. Middle leaves of flowering shoots 15-30 (-45) × 15-25 (-40) mm, lobes 1-2 (-3) pairs, basal sinuses at lower half of lamina and extending nearly midvein, basal pair 1-2 times as long as wide, each lobe with (2-) 4-7 (-14) teeth in the upper half; petiole (4-) 8-12 (-23) mm; stipules 4-8 (-12) × 1-2 (-3) mm, deciduous, irregularly divided 2-5(-20) serrate, rarely 3-lobed. Middle leaves of short shoot (10-) 15-20 (-40) × 20-35 (-45) mm, lobes 1-2 (-3) pairs, basal sinuses at lower half, sinuses extends to midvein, basal pair 2-4 times as long as wide, each lobe with (4-)8-10(-14) teeth in the upper half; petiole 10-15 (-35) mm, stipules 1-3 × 0.1-0.2 mm, lanceolate, deciduous. Middle leaves of long shoots (25-) 30-35 (-50) × (25-) 30-40 (-60) mm, lobes 2-3 pairs, basal sinuses at lower half of the lamina, extending to nearly midvein, 2-3 times as long as wide, 10-15 teeth at upper half; petiole (6-) 10-15 (-30) mm; stipules 6-10 (-21) × 2-8 mm with 8-12 (-30) serrate or irregular teeth. Inflorescence (20-) 30-40 (-50) × 20-30 mm, lax corymbose with 10-20 flowers, glabrous or pilose; pedicel 3-6 (-10) mm, bracts (1-) 2-3 (-5.3) × 0.1-0.2 (-0.4) mm, deciduous, linear, entire or with 4-9 glandular teeth. Flowers 8-10 mm in diameter; hypanthium 2-3 (-4) × 2-3 (-4) mm; sepals 1.5-2 × 0.3-0.6 mm, triangular, margin entire, acuminate at apex; petals 5-7 × 5-7 mm; stamens 18, anthers violet; styles 1 (-2), glabrous at base. Fruit 7-10 mm long × 6-8 mm ± globose to short oblong, red or dark red, ± hairy, flesh orange, juicy, sepals recurved on fruit, rarely deciduous; pyrenes (1-)2, 4-7 × 4-5 mm, slightly 1-2-sulcate dorsally and laterally.

Crataegus pseudoheterophylla Pojark. subsp. *turcomanica* (Pojark.)

K.I.Christ. in Christensen, Revision of *Crataegus* sect. *Crataegus* and *Nothosect*. Crataeguineae (Rosaceae-Maloideae) in the Old World, *Systematic Botany Monographs* 35: 98 (1992). — *Crataegus turcomanica* Pojark. in Komarov, *Flora of the U.S.S.R.* 9: 507, fig. XXX.4 (1939). — Typus: former U.S.S.R. Turcomania: in montibus Kopet-dagh, in angustiis Czuli, 9.V.1911, *Seismuratov s.n.* (holo-, LE!; iso-, LE!; photo: HUB!).

CHROMOSOME NUMBER. — Unknown.

PHENOLOGY. — Flowering in April-May, mature fruit in August to October.

DISTRIBUTION. — Turkomania (Kopet-Dagh) in Turkmenistan. On mountain slopes, steppe and hedges, roadsides, in scrub with *Prunus, Pyrus, Paliurus* and *Quercus*; 500-1600 m.

SPECIMENS EXAMINED. — **Turkey.** Bolu, 10 km from Seben to Bolu, steppe, 1183 m, 18.V.2002, *A.A.Dönmez 10615* (HUB). — Ankara, Beypazarı, Karagöl, around the lake, 1430 m, 25.VIII.2001, *A.A.Dönmez 10018* (HUB); Nallıhan, 1 km from Adapazarı to Seben road junction, *Paliurus* scrub, steppe, 710 m, 24.VIII.2001, *A.A.Dönmez 10002*, *10003* (HUB).

REMARKS

Crataegus pseudoheterophylla Pojark. subsp. *turcomanica* (Pojark.) K.I.Christ. is a first record for

the Turkish flora. It grows naturally in mountainous areas of central Anatolia. The examined individuals have plenty of mature fruits. According to the IUCN (2001) criteria, the Turkish population of the species has no threat for extinction. The species is represented by two subspecies and hence an identification key is given here.

Crataegus* × *lavallei Hérincq ex Lavallée

Arboretum Segrezianum 21 (7). (*C. pubescens* forma *stipulacea* × *C. crus-galli*). — Typus: unknown.

DIAGNOSE. — Tree or shrubs up to 5-7 m tall. Thorny, thorns up to 40 mm long. Leaves 40-110 × 30-50 mm, oblong to narrowly elliptic, undivided, finely serrate at margin, glabrous or hairy alongside the veins. Inflorescence 25-35 × 30-50 mm, erect, corymbose with 20-40 flowers, villose; 4-8 mm. Flowers 15-20 mm in diameter; sepals 4-6 × 1-2 mm, lanceolate, margin entire finely serrate, erect on fruit; petals 5-8 × 5-7 mm; stamens 5-20, anthers pink; styles 2-3, hairy at base. Fruits (12-)16-19 mm long × 10-15 mm, ovate orange to reddish, glabrous, flesh orange; pyrenes 2-3, 7-10 × 5-6 mm, 2-sulcate dorsally.

SPECIMENS EXAMINED. — **Turkey.** Ankara, Kurtuluş Park, 700 m, 1.VI.2003, *A.A.Dönmez 11165*; 4.X.2003, *A.A.Dönmez 11768* (HUB).

REMARKS

The species is cultivated in Turkey and naturalized specimens of the species have not been observed in the field. It is included in the list of alien *Crataegus* taxa alongside *C. crus-galli* L. and the more common *C. laevigata* (Poir.) DC.

DISCUSSION

Crataegus davisii Browicz was described from Turkey (Browicz 1972). The holotype is a young branch with flowers that had shed petals. The species was reduced to a synonym of *Crataegus pentagyna* Waldst. & Kit by Christensen (1992) based on morphological study of herbarium materials. However, no material with mature fruit was available at that time to Christensen. The south-eastern part of Turkey, including the type locality and the adjacent parts of Iran have since then been extensively botanised by the present author. Following detailed studies of newly collected material, it is concluded that the species is morphologically distinct from *C. pentagyna*. Also, due to being a later homonym of another species described from the North American *C. davisii* by Sargent (1911), *Crataegus davisii* Browicz must be renamed (McNeil *et al.* 2012). Accordingly, *Crataegus davisii* Browicz is here renamed *Crataegus petrodavisii* nom. nov., and the description of the species is emended here. The new epithet thus keeps the name of the collector Peter Hadland Davis, as previously used by Browicz.

Examination of the paratypes of *Crataegus* × *yosgatica* K.I.Christ. and comparison of the other materials with *C. meyeri* deposited at the abovementioned herbaria revealed that *C.* × *yosgatica* is not distinguishable from *C. meyeri* Pojark. The specimens of the holotype and paratype have been collected at flowering stage, and Christensen did not have an opportunity to collect more material of this species with mature fruits. Examination of the paratypes showed that the fruit is not developed enough, and leaf characters, especially indumentum, has a different appearance at times of year. Type specimens *C. meyeri* at LE were also examined. An emended description of the species is given here.

The genus *Crataegus* has 25 native species in Turkey, and three species are cultivated for ornamental purposes. This paper reports two native taxa, one of which is a species and the other a subspecies. In respect of the native *Crataegus* taxa, Turkey is an important diversity centre in western Asia.

Acknowledgements

The *Crataegus* materials mentioned in this paper have been collected during the project (TÜBİTAK-TBAG 1958 (100T125). The author expresses his thanks to TÜBİTAK and the curators of the herbaria mentioned above and to Nadia Talent for improving the English and helpful comments on this manuscript. At last, the author wants to thank Timothy A. Dickinson and James B. Phipps for their helpful comments on a previous version of the manuscript.

REFERENCES

Browicz K. 1972. — *Crataegus* L., *in* Davis P. H. (ed.), *Flora of Turkey and The East Aegean Islands*. Edinburgh, Edinburgh University Press, 4: 133-147.

Campbell C. S., Evans R. C., Morgan D. R., Dickinson T. A. & Arsenault M. P. 2007. — Phylogeny of subtribe Pyrinae (formerly the Maloideae, Rosaceae): Limited resolution of a complex evolutionary history. *Plant Systematic and Evolution* 266: 119-145.

Christensen K. I. 1992. — *Revision of Crataegus sect. Crataegus and Nothosect. Crataeguineae (Rosaceae: Maloideae) in the Old World*. Ann Arbor, Mich.: American Society of Plant Taxonomists (Systematic Botany Monographs; v. 35), 199 p.

Christensen K. I. 1994. — *Crataegus* (Rosaceae) in the Balkan Peninsula. *Annales Museum Goulandris* 9: 39-90.

Christensen K. I. & Zielinski J. 2008. — Notes on the genus *Crataegus* (Rosaceae-Maleae) in southern Europe, the Crimea and western Asia. *Nordic Journal of Botany* 26: 344-360.

Dickinson T. A., Lo E. Y. Y. & Talent N. 2007. — Polyploidy, reproductive biology, and Rosaceae: understanding evolution and making classifications. *Plant Systematic and Evolution* 266: 59-78.

Dönmez A. A. 2004. — The Genus *Crataegus* L. (Rosaceae) with Special Reference to Hybridisation and Biodiversity in Turkey, *Turkish Journal of Botany* 28: 29-37.

Dönmez A. A. 2005. — New Species of *Crataegus (Rosaceae)* from Turkey. *Botanical Journal of the Linnean Society* 148: 245-249.

Dönmez A. A. 2007. — Taxonomic notes on the genus *Crataegus* (Rosaceae) in Turkey, The Linnean Society of London, *Botanical Journal of the Linnean Society* 155: 231-240.

Dönmez A. A. 2010. — Phenetic Analysis of the *Crataegus* L. (*Rosaceae*) Taxa, XIII OPTIMA Congress, 21-27 Marc 2010, Antalya, Turkey.

Dönmez A. A. & Işık S. 2004. — Pollen Morphology of the Three Pomoid Genera × *Malosorbus* Browicz, *Mespilus* L., and *Eriolobus* (Ser.) Roemer (*Rosaceae*). *The Hacettepe Bulletin of Natural Sciences and Engineering* 33: 65-75.

Dönmez A. A. & Oybak-Dönmez E. 2004. — Türkiye *Crataegus* L. (Rosaceae) Cinsinin Taksonomisi TÜBİTAK-TBAG 1958 (100T125), Research project.

Dönmez A. A. & Oybak-Dönmez E. 2005. — *Crataegus turcicus* (Rosaceae), a new species from NE Turkey with special reference to pollen morphology. *Annales Botanici Fennici* 42: 61-65.

Evans R. C. & Campbell C. S. 2002. — The origin of the apple subfamily (Rosaceae: Maloideae) is clarified by DNA sequence data from duplicated GBSSI genes. *American Journal of Botany* 89: 1478-1484.

Gu C. Z. & Spongberg S. A. 2003. — *Crataegus* L., in, *Flora of China* 9, 111-117.

IUCN Red List Categories: Version 3.1. 2001. — Prepared by the IUCN Species Survival Commission, IUCN, Gland, Switzerland and Cambridge, UK, 31s.

Khatamsaz M. 1991. — The genus *Crataegus* L. (Rosaceae). *Iranian Journal of Botany* 5 (1): 47-56.

Li Q. Y., Guo W., Liao W. B., Macklin J. A. & Li J. H. 2012. — Generic limits of Pyrinae: Insights from nuclear ribosomal DNA sequences. *Botanical Studies* 53: 151-164.

Lo E. Y. & Donoghue M. J. 2012. — Expanded phylogenetic and dating analyses of the apples and their relatives (Pyreae, Rosaceae). *Molecular Phylogenetic Evolution* 63 (2): 230-243

Lo E. Y., Stefanovic S. & Dickinson T. A. 2007. — Molecular reappraisal of relationships between *Crataegus* and *Mespilus* (Rosaceae, Pyreae) – Two genera or one? *Systematic Botany* 32: 596-616.

McNeill J., Barrie F. R., Buck W. R., Demoulin V., Greuter W., Hawksworth D. L., Herendeen P. S., Knapp S., Marhold K., Prado J., Prud'homme Van Reine W. F., Smith G. F., Wiersema J. H. & Turland N. J. 2012. — International Code of Botanical Nomenclature (Vienna Code). Koeltz Scientific Books, *Regnum Vegetabile* 154.

Meikle R. D. 1966. — *Crataegus* L. (Rosaceae), *in* Townsend C.C. & Guest E. (eds), *Flora of Iraq*. Ministry of Agriculture Republic of Iraq, Baghdad, 2: 115-118.

Oybak-Dönmez E. 2008. — Pollen morphology in Turkish *Crataegus* (Rosaceae). *Botanica Helvetica* 118: 59-70.

Özyürek M., Bener M., Güçlü M. K., Dönmez A. A., Süzgeç-Selçuk S., Pirildar S., Meriçli A. H. & Apak R. 2012. — Evaluation of Antioxidant Activity of *Crataegus* Species Collected from Different Regions of Turkey. *Records of Natural Products* 6 (3): 263-277.

Phipps J. B., Robertson K. R. & Rohrer J. R. 1990. — A checklist of the subfamily Maloideae (Rosaceae). *Canadian Journal of Botany* 68: 2209-2269.

Phipps J. B., Robertson K. R., Rohrer J. R. & Smith P. G. 1991. — Origins and Evolution of Subfam. Maloideae (Rosaceae). *Systematic Botany* 16 (2): 303-332.

Pojarkova A. I. 1939. — *Crataegus* L. (Rosaceae), *in* Komarov V. L. & Yuzepchuk S. V. (eds), *Flora USSR*. Botanicheskii Institut Akademii Nauk SSSR, Moscow, 9: 317-356.

Riedl H. 1969. — *Crataegus* L. (Rosaceae), *in* Rechinger K. H. (ed.), *Flora Iranica*. Akademische Druck und Verlagsanstalt, Graz 66: 49-65.

Robertson K. R., Phipps J. B. & Rohrer J. R. 1992. — Summary of leaves in the genera of Ma-

loideae (Rosaceae). *Annals of the Missouri Botanical Garden* 79: 81-94.
SARGENT C. S. 1911. — *Annual report Missouri Botanical Garden* 22: 77.
SHAHBAZ S. E. & SADEQ Z. A. 2006. — *Crataegus azarolus* var. *sharania* (Rosaceae), a new variety for the flora of Iraq. *Nordic Journal of Botany* 23: 713-717
SHARIFNIA F., CHRISTENSEN K. I., SEYEDIPOUR N., SALIMPOUR F. & MEHREGAN I. 2011. — *Crataegus grossidentata* sp. nov. (Rosaceae-Pyreae), a new hawthorn from northern Iran. *Nordic Journal of Botany* 29: 534-537.
SÖZER U., DÖNMEZ A. A. & MERIÇLI A. H. 2006. — Constituents from the leaves of *Crataegus davisii* Browicz. *Scientia pharmaceutica* 74: 203-208.
TALENT N., ECKENWALDER J. E., LO E. Y. Y., CHRISTENSEN K. I. & DICKINSON T. A. 2008. — (1847) Proposal to conserve the name *Crataegus* against *Mespilus* (Rosaceae). *Taxon* 57: 1007-1008.

Submitted on 19 September 2013;
accepted on 22 December 2013;
published on 26 December 2014.