

Minuartia hamzaoglu (Caryophyllaceae), a new species from Turkey

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Abstract: *Minuartia hamzaoglu* M.Koç & Aksoy (Caryophyllaceae) is described as a new species of sect. *Minuartia* in Turkey. The specimens were collected from Mount Erciyes (Kayseri). The new species is related to *Minuartia erythrosepala* (Boiss.) Hand.-Mazz. var. *erythrosepala*. *M. hamzaoglu* is an endemic species which has a distribution in Central Anatolia. The differences between the species are discussed. Description, distribution, illustration, and conservation status of the new species are given. Seed structures were examined by scanning electron microscopy.

Key words: Alsinoideae, *Minuartia*, taxonomy, Turkey

1. Introduction

The genus *Minuartia* L. is located in subfam. Alsinoideae (DC.) Fenzl in the family Caryophyllaceae. It comprises approximately 120 species that mostly occur in the northern hemisphere, with some species native to Brazil and Chile (Bittrich, 1993). *Minuartia* includes 7 sections and 74 taxa in the flora of Turkey (McNeill, 1967; Davis et al., 1988; Tan & Vural, 2000). In Turkey it is always possible to describe a new species (Göktürk, 2012; Hamzaoglu, 2012; Mutlu & Karakuş, 2012). As a result of recent studies, 2 taxa [*M. dianthifolia* (Boiss.) Hand.-Mazz. subsp. *cataonica* McNeill and *M. dianthifolia* (Boiss.) Hand.-Mazz. subsp. *kurdica* McNeill] were determined as synonyms in this genus. In addition, 2 species [*M. elmalia* (Aytaç) Aytaç, Parolly & Ö.Eren and *M. turcica* M.Koç], 1 variety (*Minuartia dianthifolia* var. *longipetala* Parolly & Ö.Eren), and 1 hybrid (*Minuartia* × *antalyensis* Parolly & Ö.Eren) have been added to this genus (Aytaç & Duman, 2004; Eren et al., 2004; Parolly & Eren, 2006; Koç et al., 2011). As a result, the total taxa number of this genus has been increased to 76 in Turkey (McNeill, 1967; Davis et al., 1988; Özhatay et al., 2009; Özhatay et al., 2011).

The authors collected *Minuartia* specimens from Mount Erciyes (Kayseri), supported by Bozok University, to revise Turkey's sect. *Minuartia* taxa (Caryophyllaceae). These specimens were compared with related species or photographs in the herbaria of JE, G, ANK, GAZI, ISTE, HUB, ISTE, EGE, Bozok University Herb., and Erciyes University Herb. and with records in the literature

(McNeill, 1963; Rechinger, 1964; Zohary, 1966; McNeill, 1967; Halliday, 1976; Davis et al., 1988; Rechinger, 1988; Shishkin, 1995; Kamari, 1997; Bojňanský & Fargašová, 2007). The studies showed that these specimens are representatives of a species new to science.

2. Results

2.1. Taxonomic treatment

Minuartia hamzaoglu M.Koç & Aksoy sp. nov. (Figures 1–3)

Sect. *Minuartia*

Type: Turkey, B5 Kayseri: Mount Erciyes, over ski slopes, to the summit, 2835 m, alpine, 38°31'50"N, 35°29'16"E, 04.09.2011, *Hamzaoglu* 6276, *M.Koç & Aksoy* (holotype: ANK, isotypes: Bozok Univ. Herb., Erciyes Univ. Herb., ANK, GAZI, HUB).

Diagnoses: *Minuartia hamzaoglu* is related to *Minuartia erythrosepala*. It mainly differs from *Minuartia erythrosepala* because it has loosely caespitose (not densely caespitose) leaf axillary fascicles closed at flowering-time, tetrastichous (not axillary fascicles opened at flowering-time, flaccid); seeds lateral and dorsal surfaces tuberculate (not lateral surfaces papillate towards dorsal and dorsal surfaces papillate); periclinal cell upper smooth (not upper papillate).

Description: Loosely caespitose perennial herb. Stem erect or ascending, 1.5–5 cm, glandular hairy, loosely branched, base 0.6–1 mm diameter. Leaves linear-setaceous, 3–6 × 0.4–1.2 mm, smooth, glandular hairy,

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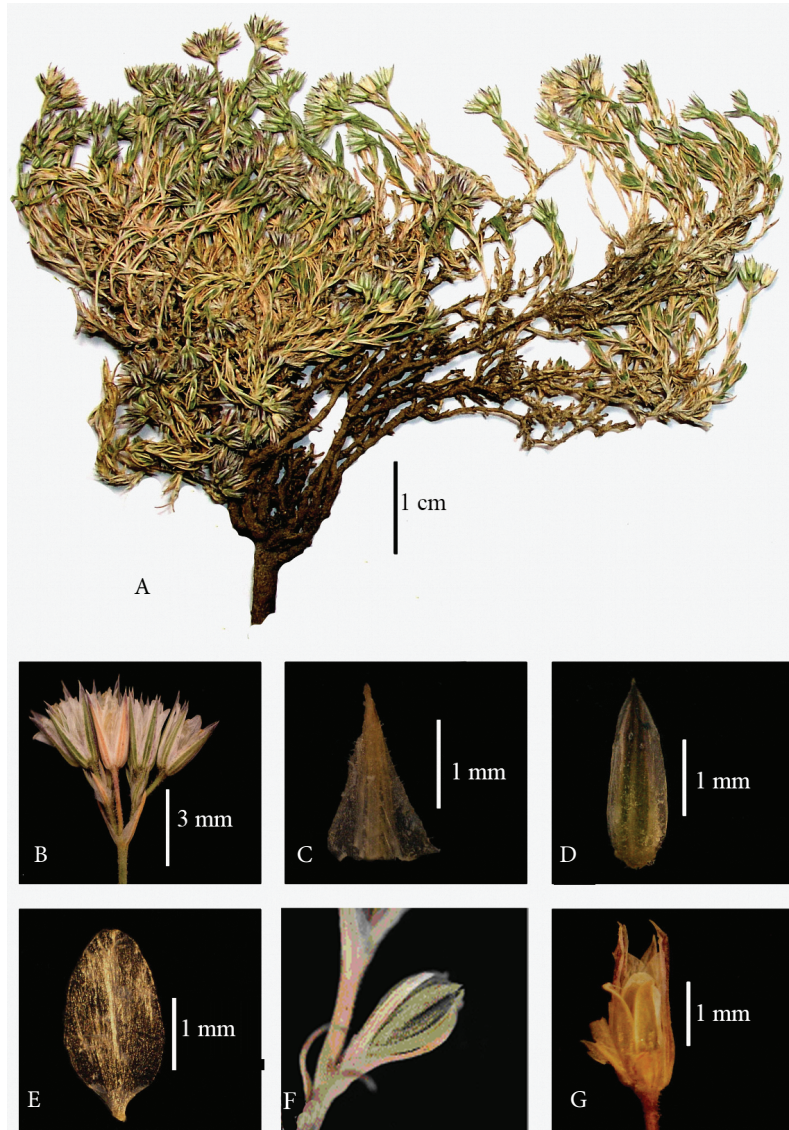


Figure 1. *Minuartia hamzaoglui*. A- habit, B- cyme, C- bract, D- sepal, E- petal, F- leaf axillary fascicles, G- capsule.

3-nerved at the base, greenish; apex acute to acuminate; margin membranous at the base and ciliate; leaf sheath membranous, 0.1–0.2 mm, glandular hairy; leaf axillary fascicles closed at flowering time, tetrastichous. Bracts ovate-lanceolate, 2–3 × 1–1.6 mm, glandular hairy, obscurely 3-nerved, middle nerved white; apex acute; margin membranaceous and ciliate, ciliate 0.1–0.2 mm. Pedicels 2–5 mm, erect, densely glandular hairy. Inflorescence headed, lax clusters, glandular hairy, generally reddish or rarely greenish; flowers pedicellate, per cyme 3–8-flowered. Sepals ovate or ovate-lanceolate, 2–4 × 1–1.5 mm, obscurely 1 middle and occasionally 2 lateral nerved, glandular hairy;

apex acute; margin membranous and glabrous, membrane 0.1–0.2 mm wide. Petals ovate, 2–3.5 × 1–1.8 mm, 2/3 or as long as sepals, white; apex widely acute; cuneate at the base. Stamens 10; filaments 1–4 mm; staminal glands at the base of outer filaments, definite, 5-numerous, bipartite, white to orange. Styles 1–2 mm. Capsule ovoid, 1.5–3.5 × 0.8–1.5 mm, 3–6-seeded, 2/3 as long as sepals. *Fl.* 7–9.

2.2. Seed micromorphology

Seeds reniform; 1–1.4 × 0.8–1 mm; brownish; lateral and dorsal surfaces tuberculate; cells oblong-elliptic, irregular; anticlinal cell walls uncertain V-undulate; periclinal cell walls convex, wrinkled, upper smooth.

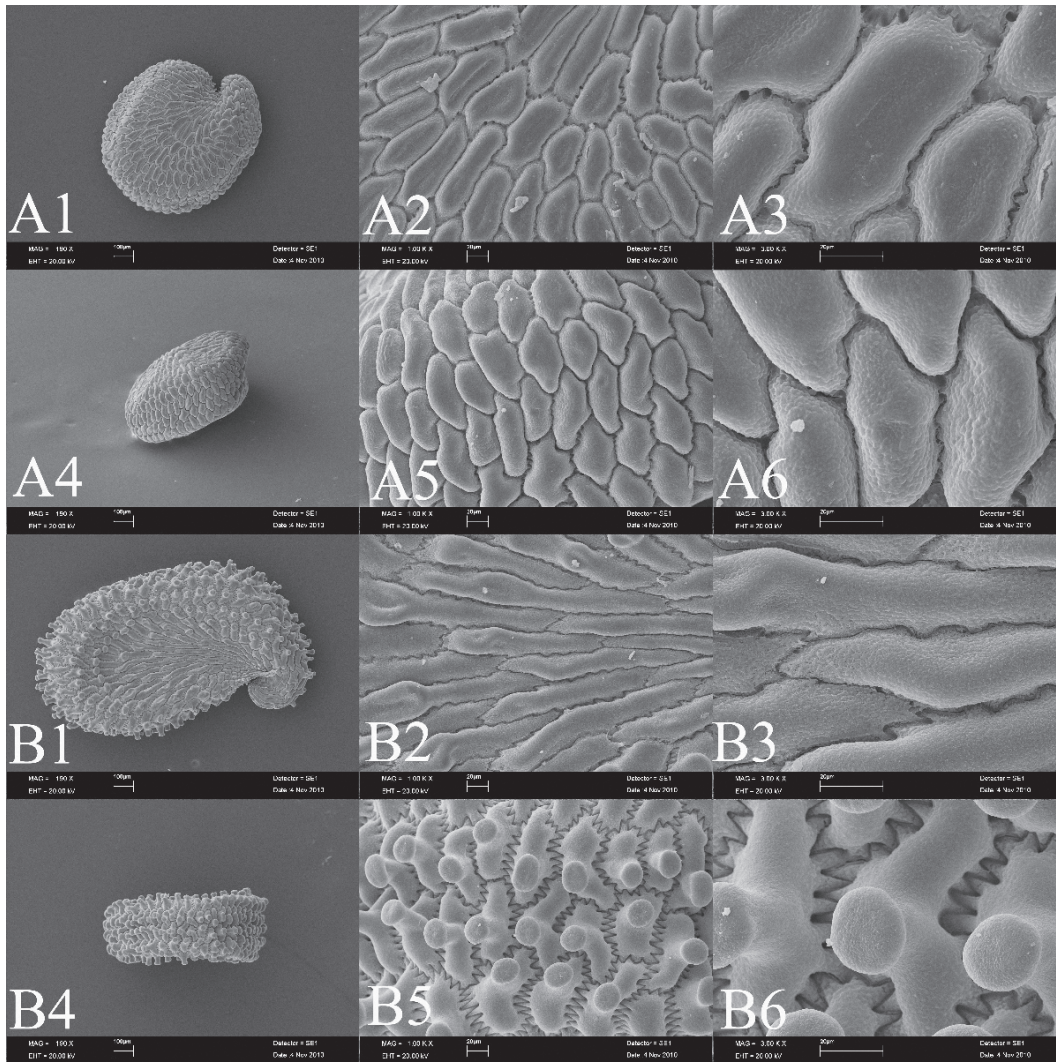


Figure 2. Scanning electron microscope photographs of the seed coat. A1–A6- *Minuartia hamzaoglu*; B1–B6- *M. erythrosepala* var. *erythrosepala*. Scale bars: 1 and 4 = 100 µm; 2, 3, 5, and 6 = 20 µm.

2.3. Specimens examined

Minuartia erythrosepala var. *erythrosepala*: Turkey. A2 Bursa: Uludağ, summit, 2400 m, 30.07.1968, *Quezel & Pamukçuoğlu s.n.* (HUB-02425); In regione alpina Anatoliae, Olympus, *Boissier s.n.* (G-Boiss, G00150380, photo!); A4 Karabük: Keltepe, c. 2000 m, 12.07.1984, *M.Demirörs* 1180 (ANK); Kastamonu, Küçük Ilgaz Dağı, Yurt hill, 2100 m, 30.06.1958, *Z.Markgraf & F.Markgraf* 10603 (ANK); Kastamonu: Saka Dağı, Yukarı village, c. 1300 m, 27.06.1980, *M.Demirörs* 178 (ANK); A5 Amasya: Akdağ, surrounding TV towers, 40°46'76"N, 35°55'63"E, 01.07.2009, *M.Koç* 521, *Hamzaoglu & Budak* (Bozok Univ. Herb.); Amasya: Suluova, Seyfe köyü, Ovacık yaylası, 40°50'12"N, 35°54'40"E, 19.06.2010, *Hamzaoglu* 5669, *M.Koç & Budak* (Bozok Univ. Herb.); B1 İzmir: Ödemiş, Bozdağ, 1830 m, 38°19'23"N, 28°07'13"E, 17.06.2009,

M.Koç 250, *Hamzaoglu & Budak* (Bozok Univ. Herb.); İzmir: Ödemiş, Bozdağ, c. 1750 m, 14.07.1993, *Ö.Seçmen s.n.* (EGE-19532); B2 Kütahya: Gediz, Şaphane, c. 1900–2100 m, 17.06.1993, *Y.Gemici & G.Görk s.n.* (EGE-21845); B3 Isparta: Şarkikaraağaç, Kızıldağ, Ulusazlıpınarı, 1000–1100 m, 25.06.1994, *B.Mutlu* 843 (GAZI); B6 Sivas: Zara, west of Bağlama village, 1760 m, 27.06.2010, *Hamzaoglu* 5813, *M.Koç & Budak* (Bozok Univ. Herb.); Kayseri: Yalak, around Işık mountain, 2700–2900 m, 21.07.1992, *Z.Aytaç* 5130 & *H.Duman* (GAZI); B7 Tunceli: Munzur Dağı, Ovacık, c. 2800 m, 17.07.1957, *P.H.Davis* 31287 & *Hedge*; Tunceli: Pülümür, 1600–2000 m, 17.06.1980, *Ş.Yıldırım* 3386a (HUB); B10 Iğdır: Aralık, Tazeköy village, 820 m, 19.07.2008, *E.Altundağ s.n.* (ISTE-85719); C2 Antalya: Ak Dağ, west slopes, 2000–2300 m, 08.07.1992, *Y.Gemici, G.Görk & N.Özel s.n.* (EGE-21974); Balıkesir: Edremit,

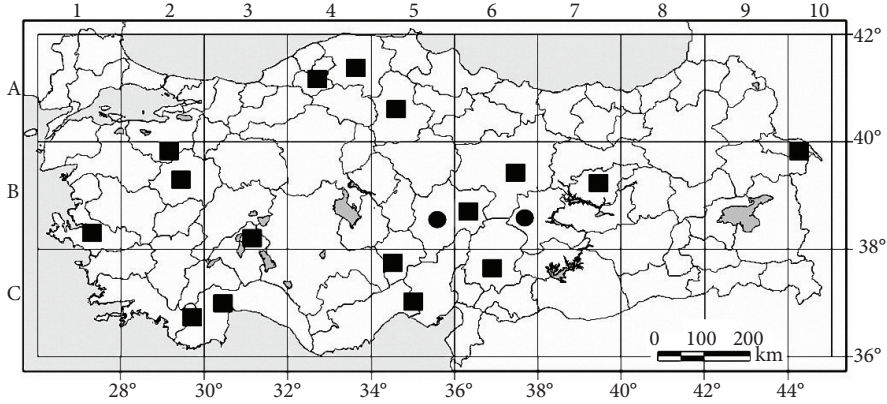


Figure 3. Distribution of *Minuartia hamzaoglu* (●) and *Minuartia erythrosepala* var. *erythrosepala* (■) in Turkey.

Kazdağı, Karataş hill, 1750 m, 30.06.2004, *Dirmenci & Satel* 2116 (HUB); C3 Antalya: Kemer, Feslikan plateau, Çalbalı Dağı, 36°49'37"N, 30°20'46"E, 18.06.2009, *M.Koç* 280, *Hamzaoğlu & Budak* (Bozok Univ. Herb.); Isparta: Dedegöl Dağı, c. 2100 m, 02.08.1949, *P.H.Davis* 16050 (ANK); Antalya: Tahtalı dağı, around the Kemer district, 2200–2300 m, *P.H.Davis* 14122 (ANK); C5 Niğde/Mersin: Bolkar mountain, west of the summit of Medetsiz, 3000–3500 m, 27.07.1984, *G.Görk, P.Hartving & A.Strid s.n.* (EGE-31078); Mersin: Aslanköy, Beşpınar, c. 2300 m, 13.07.1988, *Y.Gemici s.n.* (EGE-33791); Mons Berytdagh (Berit dağı) Cataoniae, *Hausknecht s.n.* (JE, JE00009371, photo!).

Minuartia erythrosepala (Boiss.) Hand.-Mazz. var. *cappadocica* (Boiss.) McNeill: Turkey. B5 Yozgat: Kadışehri, Gümüşsuyu village, Devenci mountain, 1880 m, 40°05'16"N, 35°54'43"E, 05.07.2009, *Hamzaoğlu* 5497, *M.Koç & Budak* (Bozok Univ. Herb.); Yozgat: Çayıralan, Akdağ, 1600–1750 m, 16.07.1980, *T.Ekim* 5420 (ANK); B6 Sivas: Yıldızeli to Çamlıbel, around the Çamlıbel TV towers, 1855 m, 11.07.2009, *M.Koç* 561, *Hamzaoğlu & Budak* (Bozok Univ. Herb.); Kahramanmaraş: Elbistan, Berit Dağı, Arpaçukuru position, 2250–2400 m, 24.07.1992, *Z.Aytaç* 5518 & *H.Duman* (GAZI); Kayseri, Sarız, Yalak (Yeşilkent town); 1650–2100 m, 04.08.1988, *Z.Aytaç* 2483 (GAZI); B7 Erzincan: Kemaliye, Erkek stream, 900 m, 18.05.1980, *Ş.Yıldırım* 2840 (HUB); C5 Niğde: Ulukışla, towards Karagöl, 2100 m, 37°25'41"N, 34°35'10"E, 21.06.2009, *M.Koç* 381, *Hamzaoğlu & Budak* (Bozok Univ. Herb.).

Minuartia hamzaoglu (paratype): Turkey. B6 Malatya: Hekimhan, between Kurşunlu-Ağılbaşı, 38°34'45"N, 37°49'18"E, 1630 m, 25.06.2010, *Hamzaoğlu* 5773, *M.Koç & Budak* (Bozok Univ. Herb.).

2.4. Conservation status

The species is currently known from 2 populations. Both locality populations in both are vulnerable to anthropogenic impact. Informal grazing and land-use changes could have a detrimental impact in the future. For this reason, we consider *Minuartia hamzaoglu* to be "Endangered (EN)", and we recommend that the World Conservation Union (IUCN) conservation status of "EN (B1)" be allocated to this species (IUCN, 2001).

2.5. Ecology

Minuartia hamzaoglu grows on noncalcareous brown, colluvial, brown, organic, alluvial, and hydromorphic alluvial soils, the most widespread of which is the noncalcareous brown soil and its habitat alpine with *Cerastium cerastioides* (L.) Britt., *Cerastium gnaphalodes* Fenzl, *Petrorrhagia alpina* (Habl.) P.W.Ball. & Heywood subsp. *alpina*, and *Dianthus zederbaueri* Vierh.

2.6. Etymology

The species is named in honour of the eminent Turkish botanist Prof Dr Ergin Hamzaoğlu (Department of Elementary Education, Gazi Faculty of Education, Gazi University, Ankara).

3. Discussion and conclusion

Minuartia hamzaoglu belongs to the sect. *Minuartia* because it has some morphological characters such as conical calyx, a hardened and truncate base, distinctive staminal glands, and capsule as long as calyx (McNeill, 1967; Halliday, 1976). Weak characters have often been used for the differentiation of many species in the section *Minuartia* because of a lack of taxonomic characters. For example, *Minuartia bulgarica* (Velen.) Graebn. and *M. hirsuta* (M.Bieb.) Hand.-Mazz. are distinguished from each other only by being densely or loosely tufted

(Halliday, 1976), *M. krascheninnikovii* Schischk. and *M. mutabilis* (Lapeyr.) Schinz & Thell. ex Bech. only by the number of flowers (Halliday, 1976), *M. taurica* (Steven) Graebn. and *M. juniperina* (L.) Maire & Petitm. only by leaf length (Halliday, 1976), *M. abchasica* Schischk. and *M. granuliflora* (Fenzl) Grossh. only by the length of calyx (Shishkin, 1995), and *M. athoa* (Griseb.) Kamari and *M. anatolica* (Boiss.) Woronow only by leaf axillary fascicles closed or open at flowering-time and seed surface characters (Kamari, 1997). The taxonomic difficulty that is seen in the genus has been met by identifying more distinctive characters in differentiation of close species of *M. hamzaoglu*. This species is related to *Minuartia erythrosepala* var. *erythrosepala* because of short stems,

glandular hairiness, sepal colours, and petal shape. *Minuartia hamzaoglu* differs from *Minuartia erythrosepala* by being loosely caespitose, leaf axillary fascicles closed at flowering-time, tetrastichous; seeds lateral and dorsal surfaces tuberculate; cells oblong-elliptic, anticlinal cell walls uncertain V-undulate, periclinal cell walls convex, wrinkled, upper smooth (Table).

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Table. Diagnostic characters of *Minuartia hamzaoglu* and *Minuartia erythrosepala*.

Characters	<i>Minuartia hamzaoglu</i>	<i>Minuartia erythrosepala</i>
Plants	loosely caespitose	densely caespitose
Leaf	axillary fascicles closed at flowering-time, tetrastichous	axillary fascicles opened at flowering-time, flaccid
Petals	ovate	ovate to rounded
Seeds' dorsal surface cells	oblong-elliptic	short oblong-elliptic
Seeds' ornamentation	lateral and dorsal surfaces tuberculate	lateral surfaces papillate towards dorsal and dorsal surfaces papillate
Seeds' periclinal cells	upper smooth	upper papillate

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