

A New Subspecies of *Dianthus pseudarmeria* (Caryophyllaceae) from Türkiye

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Abstract: The samples collected from the Pınarhisar district (Kırklareli, Türkiye) were introduced as a new subspecies for the scientific world. *Dianthus pseudarmeria* subsp. *glabripetalus* grows in oak forest clearings with an altitude of about 250-350 meters. The new subspecies are similar in terms of many vegetative and generative characters with *D. pseudarmeria* (subsp. *pseudarmeria*). However, the new subspecies differs from *D. pseudarmeria* (subsp. *pseudarmeria*) by the fact that scales of the epicalyx are striped-lanceolate or reverse-lanceolate and the petal limb is glabrous. Conclusively, description of the subspecies, seed morphology, descriptive and explain photos, distribution, general ecological preferences are given. In addition, a suitable category of threats to the conservation of the subspecies is proposed in light of the available data.

Keywords: Kırklareli, *Dentati*, *Dianthus*, *glabripetalus*, new taxon, Türkiye.

Dianthus pseudarmeria (Caryophyllaceae) Türünün Türkiye'den Yeni Bir Alttürü

Öz: Pınarhisar (Kırklareli, Türkiye) ilçesinden toplanan örnekler, bilim dünyası için yeni bir alttür olarak tanıtıldı. *Dianthus pseudarmeria* subsp. *glabripetalus* olarak adlandırılan alttür, yaklaşık olarak 250-350 metre rakımlı meşe ormanı açıklıklarında yetişir. Yeni alttür birçok vejetatif ve generatif karakterler bakımından *D. pseudarmeria* (subsp. *pseudarmeria*) ile benzerlik gösterir. Ancak epikaliks pullarının şeritsi-mızraklı veya tersmızraklı ve petal limbinin tüysüz olması ile ondan farklıdır. Alttürün betimlemesi, tohum morfolojisi, tanıttıcı ve açıklayıcı fotoğrafları, yayılışı, genel ekolojik tercihleri verilmiştir. Ayrıca, mevcut veriler ışığında alttürün korunması için uygun bir tehdit kategorisi önerilmiştir.

Anahtar kelimeler: Kırklareli, *Dentati*, *Dianthus*, *glabripetalus*, yeni takson, Türkiye.

1. Introduction

The genus *Dianthus* L. includes about 300 species, the majority of which grow in the temperate climatic zone of Eurasia (Madhani et al., 2018). According to the revision in the work "Flora of Turkey and the East Aegean Islands (Flora of Turkey)", genus *Dianthus* has 81 taxa in Türkiye (Reeve, 1967). As a result of the intensive studies conducted in recent years, there have been significant changes in the systematics and number of *Dianthus* taxa in Türkiye. In these studies, a large number of new taxa have been identified and new *Dianthus* records have been given for the flora of Türkiye. At the same time, it was decided that some taxa were synonymized or were found in Türkiye and lectotyping for some taxa. As a result of all these studies, *Dianthus* taxa has increased to 94 along with this new taxa described in Türkiye (Davis et al., 1988; Gemici & Leblebici, 1995; Güner, 2000; Özhatay & Kültür, 2006; Vural, 2008; Yılmaz et al., 2011; İlçim et al., 2013; Hamzaoğlu et al., 2014, 2015a, 2015b, 2015c, 2017, 2018, 2020, 2021; Hamzaoğlu & Koç, 2015, 2018, 2019a, 2019b, 2019c, 2020, 2021; Deniz et al., 2016; Oskay, 2018; Hamzaoğlu, 2020a, 2020b, 2021; Koç, 2020).

According to "Flora of Turkey and the East Aegean Islands", *Dianthus* evaluated five groups in Türkiye (Reeve, 1967). "*Dentati* Boiss." is the group with the largest number of taxa among them. The fact that the calyx is not verruculose, the height of the leaf scabbard is less than 3

times its width, the petal limb is not fimbriate, and the barbulate are distinctive characters for this group (Reeve, 1967). However, the fact that the petal limb is "barbulate" or "ebarbulate" is a relatively "unreliable" character for group separation. The distinction between *Dianthus membranaceus* Borbás and *D. dobrogensis* Prodán supports this situation. Perhaps, for this reason, in some floras, the genus *Dianthus* was considered as a whole and divided into a group (section, subcins, etc.) (Tutin & Walters, 1993; Strid, 1997).

A similar situation is observed in the examples of Pınarhisar (Kırklareli, Türkiye) that constitutes the material of this article. According to the characters mentioned in the work Flora of Turkey, *Dianthus pseudarmeria* is a species included in the group "*Dentati*". Examples of Pınarhisar is similar to *D. pseudarmeria* in terms of many characters but the petal limbi is ebarbulate. Since differences in the species level could not be determined, the Pınarhisar specimens was decided to be evaluated as "subspecies", the description of the new subspecies, seed morphology, introductory and explanatory photos, distribution, general ecological preferences are given. Furthermore, a convenient threat category for the conservation of the species is proposed in the light of the available data.

2. Material and Methods

Samples of the new subspecies were collected in June from

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the Poyralı village exit, Pınarhisar District, Kırklareli Province, Türkiye (Thrace, Türkiye). The relevant literature and the samples found in the E, G, LINN, and MEL virtual herbaria were used for diagnosis and evaluation of the specimens (Borza, 1938; Reeve, 1967; Tutin & Walters, 1993). A Leica EZ4 stereo microscope was used to examine the samples, a Nikon Coolpix S9500 camera was used to take photos of the subspecies, and a ruler with accuracy of 0.5 mm in the metric dimensions was used for the description of the subspecies. The seed surface description was based on the 20 seeds examined and the pictures were taken with with a LEO 440 scanning electron microscope (SEM).

3. Results

Dianthus pseudarmeria M.Bieb. subsp. *glabripetalus* Hamzaoğlu & Koç, subsp. nova

Type: Türkiye. A1 Kırklareli: Pınarhisar, between Poyralı and İslambeyli villages, Poyralı village exit, 310 m a.s.l., *Quercus* sp. forest clearings, 27.6.2012, Hamzaoğlu 6375, Aksoy & Koç (holo. GAZI!; iso. GAZI!, ANK!, HUB!, Ankara Yıldırım Beyazıt University - AYBU!).

Diagnosis. *Dianthus pseudarmeria* subsp. *glabripetalus* is similar to *D. pseudarmeria* (subsp. *pseudarmeria*) in terms of its general habit. However, it mainly differs from *D. pseudarmeria* because it has petal limb ebarbulate (not barbulate) and epicalyx scales linear-lanceolate or oblanceolate (not ovate).

Description. Annual or biennial, pruinose, few-stemmed herbs. Stems erect, 13–45 cm tall, simple or few-branched above, scabrous-pubescent, 5–11-noded, nodes usually purplish. Sterile shoot leaves linear, flattened, rachis pubescent, the rest glabrous, with ciliate and scabrous margins, apex acuminate, as long as or longer than cauline leaves. Cauline leaves similar to sterile shoot leaves; lower persistent after anthesis; middle linear, 25–65 × 1–3 mm, separated to stem, longer than internodes, 1–3-veined, apex acute or acute-obtuse, sheaths up to 2 times as long as wide; upper purplish at base, nodes swollen. Inflorescence usually capitata, rarely branched, (6-)10-20(-35)-flowered, peduncles glabrous; pedicels 0–1.5 mm, glabrous, greenish. Epicalyx scales 4; outer herbaceous-cartilaginous, straw-colored below, greenish above, indistinctly 1–3-veined at apex, glabrous, ± as long as calyx, apex separated from calyx, linear-lanceolate, 8–11 × 1.8–2.6 mm, with narrowly scarious (0.2–0.3 mm) margins, apex acute to obtuse except arista, arista 2/5–2/3 as long as scale; inner herbaceous-cartilaginous, greenish, indistinctly 3–5-veined at apex, glabrous, ± as long as calyx, apex separated from calyx, oblanceolate, 9–12 × 2.4–3 mm, with scarious (0.3–0.5 mm) margins, apex acute-obtuse to obtuse-truncate except arista, arista 1/2–2/3 as long as scale. Calyx cylindrical-lanceolate, 9–13 × 2–2.6 mm, veinless below, indistinctly 35–40-veined above, glabrous, greenish; teeth narrowly triangular, 3–4 × 0.8–1.2 mm, 3–5-veined, with sparsely ciliate and narrowly scarious margins, apex acuminate. Petals 11–15 mm long; limb narrowly elliptic-cuneate to rhombic, 3–4 × 2–3 mm, c. 1/4 as long as petal, c. 2/3 exerted from calyx, unspotted, ebarbulate, pinkish, 3–7-toothed from middle to apex, teeth broadly triangular, up to 1/5 as long as limb; claw 8–11 × 1.2–1.4 mm, collar c. 1/3 as wide as claw. Capsule shorter than calyx (Fig. 1 and 2).



Figure 1. *Dianthus pseudarmeria* subsp. *glabripetalus*. A: Habit of holotype specimen (Hamzaoğlu 6375, Aksoy & Koç); B: Inflorescence; C: Flower; D: Petal; E: Capsule.



Figure 2. The natural view of the *Dianthus pseudarmeria* subsp. *glabripetalus* inflorescence.

Seed morphology. Seeds elliptic, 1.5–2.2 × 1.0–1.3 mm, blackish, ungranular; ventral surface concave, with regular long rectangular-elliptic cells, tuberculate, with 7–9 teeth on each margin, teeth V-undulate, apparent; dorsal surface convex, with irregular polygonal or short rectangular-elliptic cells, tuberculate, with 1–3 teeth on each margin, teeth S-undulate, unapparent; apex beaked (Fig. 3).

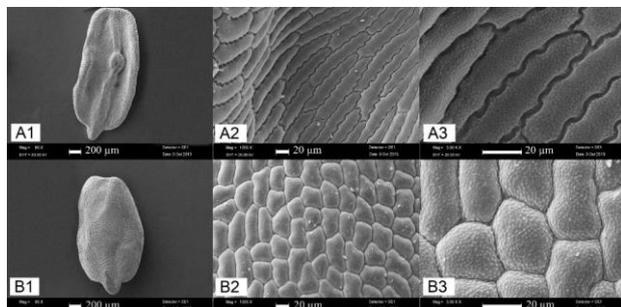


Figure 3. SEM photographs of the seed of *Dianthus pseudarmeria* subsp. *glabripetalus*. A1–A3: Ventral surface, B1–B3: Dorsal surface (scale bars. 1: 200 µm, 2 and 3: 20 µm).

Etymology. Because the petals are glabrous, the new subspecies has been given the name “*glabripetalus*”.

Vernacular name. “Pınarhisar Karanfili” in Turkish.

Distribution and habitat. This subspecies is currently only known from its type locality (Poyralı, Pınarhisar, Kırklareli) (Fig. 4). According to the observations made in and around the type locality, *Dianthus pseudarmeria* M.Bieb. subsp. *glabripetalus* prefers oak forest clearings of approximately 250–350 meters. In June and July, the subspecies blooms.



Figure 4. Distribution of *Dianthus pseudarmeria* subsp. *pseudarmeria* (△) and subsp. *glabripetalus* (●) (adapted from Google Earth Pro).

It is one of the woody species in the habitat of the subspecies which usually prefers low-sloping terrain. *Q. petraea* (Mattuschka) Liebl. subsp. *iberica* (Steven ex M.Bieb.) Krassiln., *Q. hartwissiana* Steven, *Q. frainetto* Ten, *Acer tataricum* L., *Euonymus latifolius* (L.) Mill. subsp. *latifolius*, *Ilex colchica* Poj., *Prunus spinosa* L. subsp. *dasyphylla* (Schur) Domin, *Rosa gallica* L., *Jasminum fruticans* L. and from herbaceous species *Spergularia marina* (L.) Besser, *Veronica pectinata* L. subsp. *pectinata*, *Bromus diandrus* Roth, *Phleum phleoides* (L.) Karsten, *Viola kitaibeliana* Roem. & Schultz, *Polygala anatolica* Boiss. & Heldr., *Minuartia anatolica* (Boiss.) Woron. var. *polymorpha* McNeill, *Stellaria holostea* L., *Petrorhagia prolifera* (L.) Ball. & Heywood, *Geranium sanguineum* L., *Anthyllis vulneraria* L.

subsp. *praepropera* (Kerner) Bornm., *Inula germanica* L., *Centaurea triumfettii* All., *Onosma thracicum* Velen., *Verbascum sinuatum* L. var. *sinuatum*, *Acinos suaveolens* (Sm.) G.Don, *Salvia verticillata* L. subsp. *verticillata*, *Euphorbia peplis* L., *Ornithogalum narbonense* L., *Iris sintenisii* Janca. widely observe.

Conservation status. According to observations made at the type locality “subsp. *glabripetalus*” prefers oak forest clearings. The area of about 300 km², located on the south-southwestern slopes of the Yıldız Mountains, is quite rich in the taxon's preferred habitat (oak clearing). The probability that the taxon will grow in different localities in this area is quite high. Although not intense, it was observed that grazing (especially cattle) is carried out at the type locality. However, data indicating that this grazing poses a threat to the taxon's extinction have not been obtained. The type locality of the taxon were counted about 400 individuals. For *Dianthus pseudarmeria* subsp. *glabripetalus*, it was found appropriate to recommend the “Vulnerable [VU: B1a+D1]” threat category due to the number of individuals counted in the type locality, habitat, and estimated distribution area width (IUCN Standards and Petitions Committee, 2022).

4. Discussion

Dianthus pseudarmeria (subsp. *pseudarmeria*) is known from the Balkans, Romania, Crimea, Southern Russia, and the Caucasus (Figure 4). The taxon is a Euro-Siberian phytocotrophic region element that prefers plains in the northwest, north, and northeast of the Black Sea (Reeve, 1967; Tutin & Walters, 1993; Oprea & Sarbu, 2009). The spread of this species ends in Türkiye, which surrounds the Black Sea from the north almost like a crescent moon. The existence of the taxon in Türkiye is based on a publication by Davidoff in 1915 in the work “Flora of Turkey and the East Aegean Islands”. In the work, the taxon was stated to exist near Çerkezköy but specimens were not seen (Reeve, 1967). In the literature, it was determined that *Dianthus moesiacus* Vis & Pančić were grown around Çerkezköy district (Province Tekirdağ) (Hamzaoğlu & Koç, 2019a). Additionally, “It could not be determined that it was in the herbarium of the specimens examined by Davidoff in the work named “Spis. Bulg. Acad. Nauk. 12. 1915. Therefore, it is not clear which taxon the examined specimens are.

The Pınarhisar specimens introduced as a new subspecies are similar to *Dianthus pseudarmeria* except that the petal limb is ebarbulate, the epicalyx scales are linear-lanceolate or oblanceolate, and the calyx is glabrous (Tutin & Walters, 1993). As a result of the literature review and the examination of herbarium specimens, it was found that some specimens with glabrous calyx were also previously collected by Nyárády (Dobrogea, Romania) and it was determined that it was published as “subsp. *dobrogenis* Borza & Nyár.” (Borza, 1938). However, neither Flora Europaea nor this taxon name has been found on reliable taxonomy sites (Tutin & Walters, 1993; Euro+Med, 2022; IPNI, 2022; POWO, 2022; WFO, 2022). This situation of the “glabrous” of the calyx is considered as an “intra-species variation” for *Dianthus pseudarmeria*, and “subsp. *dobrogenis*” has been interpreted as not being taxonomically accepted. Therefore, the calyx “hairless” has not been used as a diagnostic character for “subsp. *glabripetalus*”. Since it is not considered taxonomically, on

the label "*Dianthus pseudarmeria* subsp. *dobrogensis*" examples of herbaria was evaluated as "*Dianthus pseudarmeria* (subsp. *pseudarmeria*)" (see "Specimens examined").

Key to subspecies of *Dianthus pseudarmeria*;

1. Petal limb barbate; epicalyx scales ovate subsp. *pseudarmeria*

1. Petal limb ebarbate; epicalyx scales linear-lanceolate or oblanceolate..... subsp. *glabripetalus*

Specimens examined. *Dianthus pseudarmeria* (subsp. *pseudarmeria*). BULGARIA. Pazardzhik: Tatar Pazardzhik, 31.7.1897, *V.Stříbrný s.n.* (P05169485, virtual image!); Dobruja: In Bulgariae orientalis districtu Dobrudscha, 5.7.1872, *Janka s.n.* (P04929211, virtual image!). ROMANIA. Dobrogea: Distr. Tulcea, in declivibus apricis calcareis graminosis montis Pricopcea (256 m), inter pagios Greci et Curna, 21.6.1926, *E.I.Nyárady s.n.* (MEL2497959 and P05076124, virtual images!), as subsp. *dobrogensis* Borza & Nyár., type specimens; Distr. Constanta, prope pag. Murfatlar, in declivibus apricis graminosive e reservatione botanica, 60 m, 17.6.1971, *I.Geregely & A.Fazacaş s.n.* (P05076124, virtual image!), as f. subsp. *dobrogensis* Borza & Nyár.). UKRAINE. Crimea: Tauria, *M.Bieberstein s.n.* (E00301804, photo of type specimen!); *ibid.*, 1817, *C.Steven s.n.* (G00214363, virtual image!); Abhänge des Elmeli in Karagatsch bei Sudak, 13.7.1896, *A.Callier 35* (P04929216 and P04929208, virtual images!); Donetsk: Regio silvatico-stepposa donetzia: provincia Donetsk, prope stationem viae ferreae Amwrossiivka, in cretaceis loco "Bilyj Jar", *G.Klepow & F.Gryn 54* (E00301803, virtual image!). RUSSIA. Pyatigorsk: In collibus aridis prope oppid. Paetigorsk (thermas Constantinomontanas) prov. ciscaucas, 7.1843, *R.F.Hohenacker s.n.* (P04929205, virtual image!); Tanais: 1819, *K.L.Goldbach s.n.* (G00214401, virtual image!). CAUCASIA: 1810, *M. Caucase* [Caucasus], *F.E.L.Fischer s.n.* (G00214362!, virtual image!); 1811, Mt. Caucasus, *D.Fischer s.n.* (LINN-HS813-4-1 and LINN-HS813-4-2, virtual images!). GEORGIA. Carthalia: Gori, 7.1881, *A.H.Brotherus & V.F.Brotherus s.n.* (P04929209, virtual image!).

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