

Crepis purpurea Subsp. *gulderenae* (Asteraceae: Cichorieae), A New Subspecies from Türkiye

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ABSTRACT

Crepis purpurea subsp. *gulderenae* is described and illustrated as a new subspecies belonging to tribe Cichorieae of family Asteraceae. It is morphologically similar to the typical *C. purpurea* from Crimea (Ukraine) but differs in leaf and bract size, peduncle and involucre hair types, inner involucre bract size, bracteole shape and size as well as length of corolla, stamen, anther, filament, stigma, ovary size, and width of sterile achene. *Crepis purpurea* subsp. *gulderenae* is distributed in the marly and gypsiferous soils around the Aysantı pass in the Ayaş district in the northwest of Ankara province, Türkiye. This region is an important plant biodiversity hotspot, where many newly discovered endemic species reside. Previously *Crepis purpurea* subsp. *gulderenae* was known as *C. purpurea* in Türkiye, and its taxonomy was updated based on field surveys data and macro- and micromorphological studies. Two DNA regions were examined: nuclear ribosomal internal transcribed spacers (nrITS) which was identical for typical and new subspecies of *C. purpurea* and chloroplast region *atpB-rbcL* which was also very similar. A comprehensive description, distribution map, habitat and ecological preferences, IUCN category, and diagnostic key for *Crepis purpurea* subsp. *gulderenae* are presented.

Keywords: *atpB-rbcL*, Crepidinae, Endemic, Micromorphology, nrITS

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1 Introduction

Crepis Linnaeus [1] was first mentioned in *Species Plantarum* with a total of 13 species, and *C. biennis* Linnaeus as the type species. The genus is thought to have first appeared in the Altai/Tien Shan region of Central Asia [2], and the center of diversity for the genus is the circum-Mediterranean region [3]. In the study by Hoffmann [4], considering the work of Cassini [5] and Bentham and Hooker [6], 170 species were identified within the genus. In comprehensive studies by Babcock [2,7], 196 *Crepis* species, classified into 27 sections, were listed. Later, 93 *Crepis*

taxa were identified within 20 sections in Europe [8], 44 taxa within 13 sections in Iran [9], 56 species in Ukraine [10] including 11 species from Crimea [11], and 52 species within 15 sections in Russia [12]. However, in Russia, some *Crepis* species were classified within the genus *Lagoseris* M. Bieb. [12]. According to the most recent data, *Crepis* includes more than 200 species, which are distributed throughout Africa and the southern hemisphere [13]. In addition, molecular phylogenetic studies based on internal transcribed spacer (ITS) and maturase K (*matK*) sequences have shown that *Crepis* is polyphyletic and can be divided into three well-supported clades [3].

In Türkiye, *Crepis* is represented by 41 species classified into 17 sections [14]. Nine of the known taxa are endemic, resulting in an endemism rate of 24.4%. *Crepis* taxa of Türkiye are distributed in diverse habitats within the areas from sea level to 2500 m a.s.l [15]. In this study, the new subspecies is classified within the sect. *Lagoseris* (M. Bieb.) Benth. based on Babcock studies [2,7]. However, recent molecular evidence based of some nuclear ITS and plastid *matK* sequences have suggested that sect. *Lagoseris* may be a separate genus [3,16,17].

Crepis purpurea (Willd.) M. Bieb. was first published as *Hieracium purpureum* Willdenow in 1803 [18], as *C. purpurea* in 1808, as *Lagoseris taurica* M. Bieb. in 1819 [19], and finally as *Lagoseris purpurea* (Willdenow) Boissier in 1875 [20]. The name *Crepis purpurea* is now accepted as valid, and the type species was described from Crimea [21]. The species was included in the *Flora of Turkey and East Aegean Islands* by Lamond [15] based on specimens collected by Yıldırım Akman (Akman-3068) from the Aysantı pass of the Ayaş district in Ankara province.

The specimens collected by the authors of the present study during field work carried out around the Aysantı pass in Ankara province between 2020 and 2022 were compared morphologically with *C. purpurea* specimens from Crimea collected by Yuliya Krasylenko on cretaceous slopes of Mt. Kubaluch, Bilohirsk (Qarasuvbazar) Rajon in Crimea (Ukraine) in 2017, and many differences were identified, supported by micromorphological studies (Figure 1).

According to the findings of this study, *C. purpurea* population from Türkiye belong to distinct subspecies. All available *Crepis* specimens from Türkiye are similar to typical *C. purpurea* but differ in numerous characteristics, and therefore, are described as a new subspecies: *Crepis purpurea* subsp. *gulderenae*. Since it replaced *C. purpurea*, the number of *Crepis* taxa (41) in Türkiye remains unchanged, though the number of endemic taxa was increased to 10.

2 Method

2.1 Sampling and Morphological Methods

Plants were collected during fieldwork in Ukraine (Crimea) in 2017 and in Türkiye during 2020 and 2022. Specimens are deposited in the ANK, GAZI, and HUB herbaria (acronyms according to Thiers [22], Figure 1). The identification of the specimens was based on the relevant literature [8,9,12,15,23]. Moreover, specimens in virtual herbaria B, LY, P, PI, US, W, and WAG (see appendix 2, specimens examined, acronyms according to Thiers [22]) were examined in detail. Morphological and morphometric measurements (at least 100 measurements for each character) were conducted on both live specimens during field studies and dry specimens due to the very limited distribution of the species and the small number of individuals. Morphological characters were digitalized using a stereo trinocular microscope with an integrated camera system (BAB-DMC310, USB2.0 5v) and BAB Bs200Pro software (BAB Image Analyzing Systems, Ankara, Türkiye). The preliminary threat assessment of the new subspecies was based on IUCN [24] criteria.

2.2 Micromorphology

The mature specimens prepared for micromorphological examinations were first mounted individually on aluminum plates with double-sided adhesive tape. Then, they were placed into an Electron Microscopy Sciences device (Merck, Darmstadt, Germany) and sputter coated with gold palladium in a vacuum-free environment. After the coating process, the samples were examined in detail under an FEI Inspect F50 scanning electron microscope (FEI, Thermo

Fisher Scientific, Waltham, MA, USA) and digital images of characteristic features such as peduncle and hair types, fertile and sterile achenes and their pappus structures, pollen grains, stigma and style structure and leaf abaxial surface of both subspecies were obtained.

2.3 Genetic Analysis

Total genomic DNA from silica-dried leaf material was isolated using the NucleoSpin Plant II kit (MachereyNagel, Düren, Germany) following the manufacturer's instructions. The 5.8S rDNA and flanking internal transcribed spacers (ITS1 and ITS2 regions) were amplified using P16b (5'- CCAYTGAACCTTATCATTKAGAGGA-3') and P25 (5'-GGGTAGTCCCGCCTGACCTG- 3') primers [25,26]. The *atpB-rbcL* intergenic region was amplified using F: 5'-GAAGTAGTAGGATTGATTCTC-3' and R: 5'- CAACACTTGCTTTAGTCTCTG-3' primers [27]. Amplification of ITS and *atpB-rbcL* was performed according to the protocols of Enke & Gemeinholzer [3] and Xu *et al.* [27]. PCR products were sequenced using an ABI 3500XL automated sequencer (Applied Biosystems, Foster City, CA, USA). In this study, we present the ITS sequence of *Crepis purpurea* subsp. *gulderenae* and the *atpB-rbcL* sequences of both subspecies for the first time. The newly generated sequences were deposited in GenBank. Voucher information and GenBank Accession numbers (ITS/ *atpB-rbcL*) are provided in Appendix.

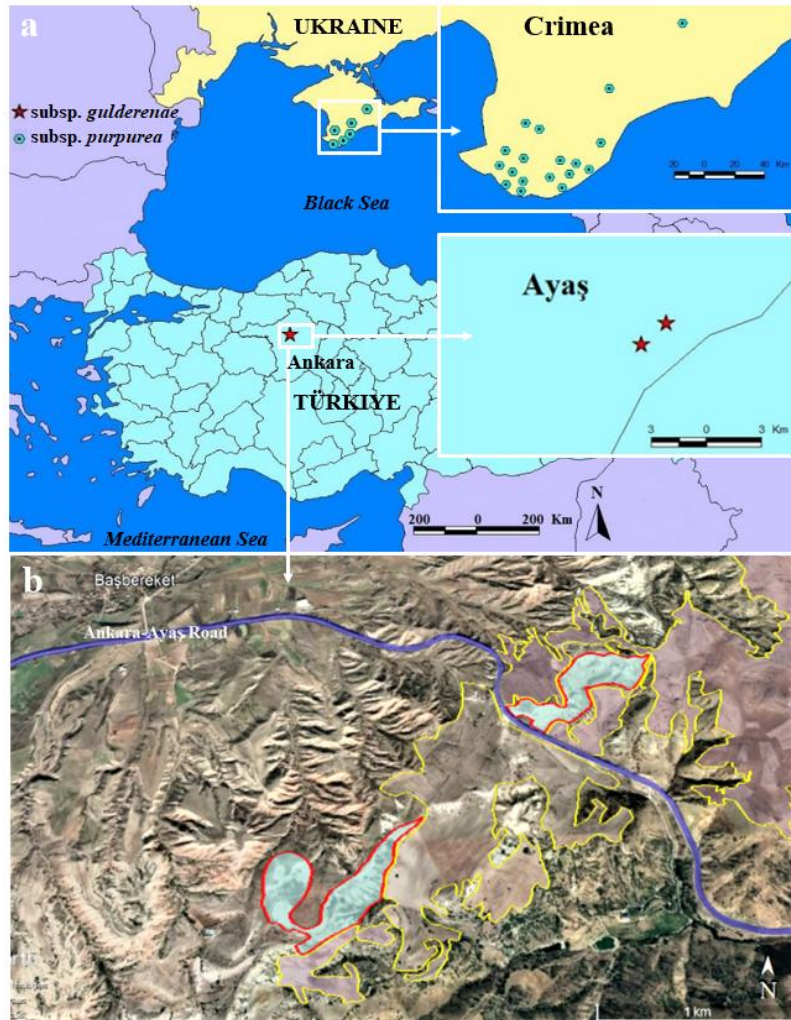


Figure 1: Distribution map of *Crepis purpurea* subsp. *gulderenae* and *C. purpurea* subsp. *purpurea*, a. Distribution range, b. Satellite image of the type locality of subsp. *gulderenae* in Türkiye (— type locality and distribution area boundary, — farmlands and borders, — Ankara-Ayaş Road)

3 Results and Discussion

Crepis purpurea (Willd.) M. Bieb. **subsp. gulderenae** Yaprak & Başköse **subsp. nova** (Figure 2 and 3)

Type: TÜRKİYE. Ankara province, Ayaş district, Ankara-Ayaş Road, Aysantı pass, gypsaceous soils and slopes, 1210 m a.s.l, 10 July 2021, 40.078711° N–032.418406°E, İ. Başköse & A.E. Yaprak 2021-1140 (holotype and isotype, ANK!).

3.1 Diagnosis

Crepis purpurea subsp. *gulderenae* is similar to *C. purpurea* (Willd.) M. Bieb. subsp. *purpurea* but differs in leaf size 2.5–7.5 cm [versus 2.5–8.5(–10) cm], peduncle hair types canescent-tomentose and many glandular hairy (versus only canescent-tomentose or partially glabrescent), inner involucral bract size [7.0–10.5 × 1.2–2.5 mm vs 7.5–13.5 mm x (0.7–)1.0–1.9 mm] involucral hair type (canescent-tomentose and short glandular hairy vs only canescent-tomentose), bract size (2.0–11.0 mm vs 1.5–6.0 mm) bract hairs (both side canescent-tomentose, near to base short glandular vs both side only canescent-tomentose), bracteole shape and size (absent vs triangular, 1–3 mm), corolla length (8.5–16.5 mm vs 10.0–15.5 mm), stamen length [4.0–5.5 mm vs (2.5–)3.0–4.1 mm], anther length (3.0–4.0 mm vs 2.5–3.0 mm), filament length [(0.8–) 1.0–1.5 mm vs 0.3–0.8 mm], stigma length [(0.8)1.0–1.5 mm vs 1.5–2.5 mm], ovary size (1.5–2.5 × 0.5–0.9 mm vs 1.2–1.75 x 0.2–0.5 mm), and sterile achene width (0.3–0.6 mm vs 0.1–0.5 mm).

3.2 Description

Plant rhizomatous and scapigerous perennial herb. *Flowering stem* 1–4, 15–30 cm long. *All leaves* basal numerous, 2.5–7.5 cm long (inc. petiole), oblanceolate to oblong-oblanceolate, deeply bipinnatisect, attenuate; lacinia irregularly sharp-toothed, acute and white-mucronate; canescent-tomentose. *Capitula* on slender peduncles and 1–5 per stem. *Peduncles* filiform, (1.0–) 1.5–6.0 cm long, cylindrical, both canescent-tomentose and with many stalked glandular hairy. *Bracts* present, triangular, lanceolate, 2.0–11.0 mm, both side canescent-tomentose, near to base stalked glandular hairy, margin entire, apex acute, persistence. *Bracteoles* absent. *Receptacle* with setiform paleae and paleae 6.0–9.0 mm long. *Involucre* 4–5 seriate, 9.0–13.0 × 4.0–6.0 mm, at flowering cylindrical, after than ovoid, canescent-tomentose and with stalked glandular hairs; *outer involucral bracts* 1.5–5.5 × 0.7–1.7 mm, ovate to ovate-lanceolate, acute; *inner involucral bracts*, 7.0–10.5 × 1.2–2.5 mm, lanceolate, acute, margin scarious. *Corolla* ligulate, ligula pink, 8.5–16.5 mm long, 2.0–3.0 mm wide. *Stamen* 4.0–5.5 mm; *anther* tube 3.0–4.0 mm long, yellow; *filaments* free, (0.8–) 1.0–1.5 mm long. *Stigma* 2, (0.8)1.0–1.5 mm, dark brown or slightly blackish echinate; *style* 5.5–9.0 mm long, cylindrical; *ovary* 1.5–2.5 × 0.5–0.9 mm. *Fertile and sterile* achenes present, unbeaked; *fertile achenes* 4.0–6.0 × 0.4–0.75 mm, dark brown, straight or curved; *sterile achenes* 4.0–6.0 × 0.3–0.6 mm, flat, yellowish, straight or rarely curved. *Pappus* white, 4.0–5.0 mm long, persistent, pilose.

3.3 Habitat and Ecology

Crepis purpurea subsp. *gulderenae* generally grows on stony, gravelly, and eroded slopes at 1200–1400 m a.s.l in marly, gypsum, and calcareous areas and rarely on plains. It is accompanied by *Campanula damboldtiana* Davis & Sorger [28], *Scutellaria yildirimlii* Çiçek & Yaprak [29], *Aethionema dumanii* Vural & Adıgüzel [30], *Ae. aytachii* Ertuğrul & Hamzaoğlu [31], *Ae. turcica* Duman & Aytaç [32], *Astragalus turcicus* Sümbül [33], *A. densifolius* Lamarck [34] subsp. *ayashensis* Aytaç & Ekim [35], and *Crepis vuralii* Yıldırım [14].

3.4 Conservation Status

The new subspecies is known from a single locality (with two different populations, fragmented and close to each other) in the Aysantı pass on the Ankara-Ayaş highway in the Ayaş district of Ankara province. The Aysantı pass and its surroundings are an important region hosting many endemic plants due to the rock and soil structure. As a result of field studies and observations made by the authors over the last 7 years, it is concluded that *Crepis purpurea*

subsp. *gulderenae* is distributed in a very limited area (approximately 0.50 km²) and the population consists of fewer than 200 mature individuals. In addition, there are settlements and many agricultural lands around the distribution area of the subspecies (Figure 1b), and livestock activities are also carried out in the region causing grazing pressure. For these reasons, the locus classicus of *Crepis purpurea* subsp. *gulderenae* and its surroundings are highly exposed to anthropogenic effects. Based on the available information, it is recommended that the new subspecies be categorized as Critically Endangered (CR) according to IUCN criterion B2ab(i-v) [24].

3.5 Etymology

The plant takes its scientific name from the name of the first author's mother.

3.6 Phenology

Flowering from mid-May to mid-June, fruiting from late June to July.

Identification key to *Crepis purpurea* subspecies

1. Peduncle and involucre hairs only canescent-tomentose; bracts 1.5–6.0 mm; bracteoles triangular, 1–3.....**subsp. *purpurea***
1. Peduncle and involucre hairs both canescent-tomentose and many stalked glandular hairy; bracts 2.0–11.0 mm; bracteoles absent.....**subsp. *gulderenae***



Figure 2: Morphological characteristic of *Crepis purpurea* subsp. *gulderenae*, a. Habitus, b. Flower, c. Capitula, d. Peduncle without bracteole, e-f. Peduncle with stalked glandular hairs, g. Inner involucre bracts, h. Middle involucre bracts, i. Outer involucre bracts, j. Ligulate corolla, k. Stamen and stigma, l-m. Fertile achene structure, n-o. Sterile (seedless) achene structure, p. Bract, q. Rosette leaves. Scale bars: (b-l, n, p) 1 mm, (m, o) 0.5 mm.

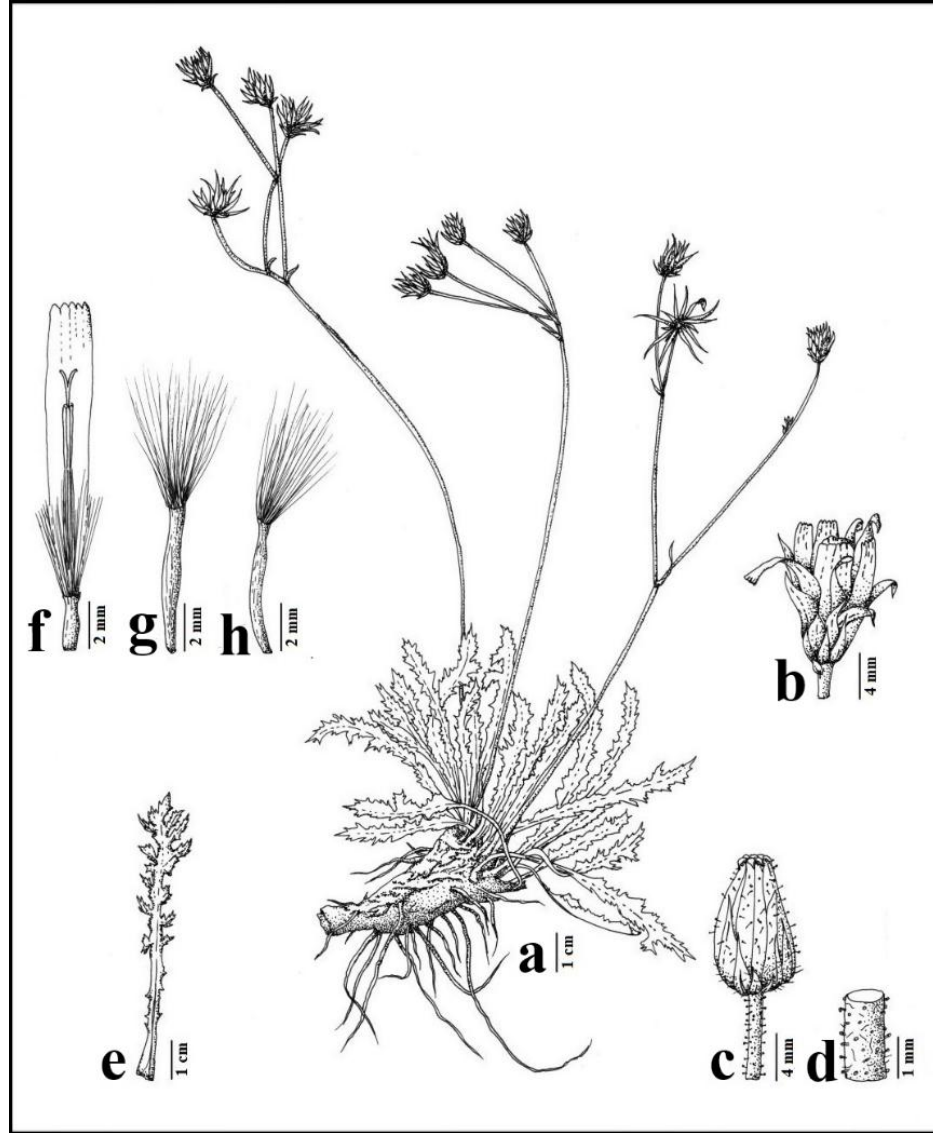


Figure 3: Graphical drawing of *Crepis purpurea* subsp. *gulderenae*, a. Habitus, b. Flowering capitula, c. Fruiting capitula and peduncle, d. Canescent-tomentose and stalked glandular hairy on peduncle, e. Rosette leaf, f. Ligulate corolla, g. Fertile achene and pappus, h. Sterile achene and pappus.

3.7 Morphological (Micro- and Macro) Characters

Crepis purpurea subsp. *gulderenae* is morphologically similar to subsp. *purpurea* in its stem length, leaf shape and hair type, bract shape, palea shape and size, involucre shape, fertile achene structure and color, and pappus hair type, as well as lifespan. However, it differs from subsp. *purpurea* in its leaf size, peduncle hair type, inner involucre bract size, involucre hair type, bract size, bract hair, bracteole shape and size, lengths of corolla, stamen, anther, filament, and stigma as well as ovary size, and sterile achene width (Table 1). It corroborates the data of other researchers [8,9,12] that the distinguishing characteristics listed here between these two subspecies are also directly distinguishing characteristics for many other taxa of the genus.

Table 1: Morphological differences between *Crepis purpurea* subsp. *gulderenae* and *C. purpurea* subsp. *purpurea*

Character	<i>Crepis purpurea</i> subsp. <i>gulderenae</i>	<i>Crepis purpurea</i> subsp. <i>purpurea</i>
Leaf size (including petiole)	2.5–7.5 cm	2.5–8.5(–10) cm
Peduncle hair type	both canescent-tomentose and with many stalked glandular hairy	only canescent-tomentose or glabrescent
Inner involucrel bract size	7.0–10.5 × 1.2–2.5 mm	7.5–13.5 × (0.7–)1.0–1.9 mm
Involucrel hair type	canescent-tomentose and stalked glandular hairy	only canescent-tomentose
Bract size	2.0–11.0 mm	1.5–6.0 mm
Bract hair	both side canescent-tomentose, near to base stalked glandular hairy	both surfaces only canescent-tomentose
Bracteole shape and size	absent	triangular, 1–3 mm
Corolla length	8.5–16.5 mm	10.0–15.5 mm
Stamen length	4.0–5.5 mm	(2.5–)3.0–4.1 mm
Anther length	3.0–4.0 mm	2.5–3.0 mm
Filament length	(0.8–) 1.0–1.5 mm	0.3–0.8 mm
Stigma length	(0.8)1.0–1.5 mm	1.5–2.5 mm
Ovary size	1.5–2.5 × 0.5–0.9 mm	1.2–1.75 × 0.2–0.5 mm
Sterile achene width	0.3–0.6 mm	0.1–0.5 mm

As a result of macro- and micromorphological examinations, several important findings were obtained. First, the trichomes types on the peduncle, involucre, and involucre bracts of the new subspecies are different from those of *Crepis purpurea* subsp. *purpurea*. Thus, in subsp. *gulderenae* these structures are covered with both canescent-tomentose and densely stalked glandular hairs (Figure 2c-i and Figure 4a-d), whereas in subsp. *purpurea* – with glabrescent or canescent-tomentose hairs (Figure 5a-e and Figure 6a-d). Second, both subspecies have bracts at the base of the peduncles bearing the capitula in the inflorescence structure (except for the involucre bracts), which are morphologically similar but differ in size and hair structure (Figure 2p and Figure 6f). Next, the inflorescence of the new subspecies lacks bracteoles on the peduncles (Figure 2d-f and Figure 4a), whereas subsp. *purpurea* has one bracteole (Figure 5g-i and Figure 6c,d) on the peduncles close to the capitula, triangular in shape, 1–3 mm, covered with canescent-tomentose hairs.

Furthermore, the new subspecies is longer than subsp. *purpurea* in terms of stamen, anther, and filament length but shorter in stigma length and larger in ovary size. Finally, achene morphology is one of the important distinguishing characters among species and Aksu-Kalmuk *et al.* [36] performed detailed SEM analysis of the achene structures of 26 *Crepis* species (including the new subspecies as *C. purpurea*) distributed in Türkiye. They determined that fertile achenes were brown, outer cell wall ornamentation was smooth, and epidermal cell structure outline was indistinct with acute tips, but no information was given about sterile achenes.

In the present study, SEM analysis of the achenes of both subsp. *purpurea* (Ukraine) and subsp. *gulderenae* was performed. It was found that both subspecies had two types of achenes, fertile and sterile, and the fertile achenes were morphologically similar to each other, as also reported by Aksu-Kalmuk *et al.* [36] (Figure 4 and Figure 5f). However, the width and surface characteristics of the sterile achene differ between these subspecies (Figure 2 and 5n,o; Figure 4 and 6h-j). The micromorphology of the lower leaf surface differs between the subspecies (Figure 4s and Figure 6s); stomata were found on both surfaces of the leaves and were amphistomatic, mesomorphic with respect to epidermal pavement cells, and anomocytic with respect to cells surrounding the stomata (Figure 4t and Figure 6t).

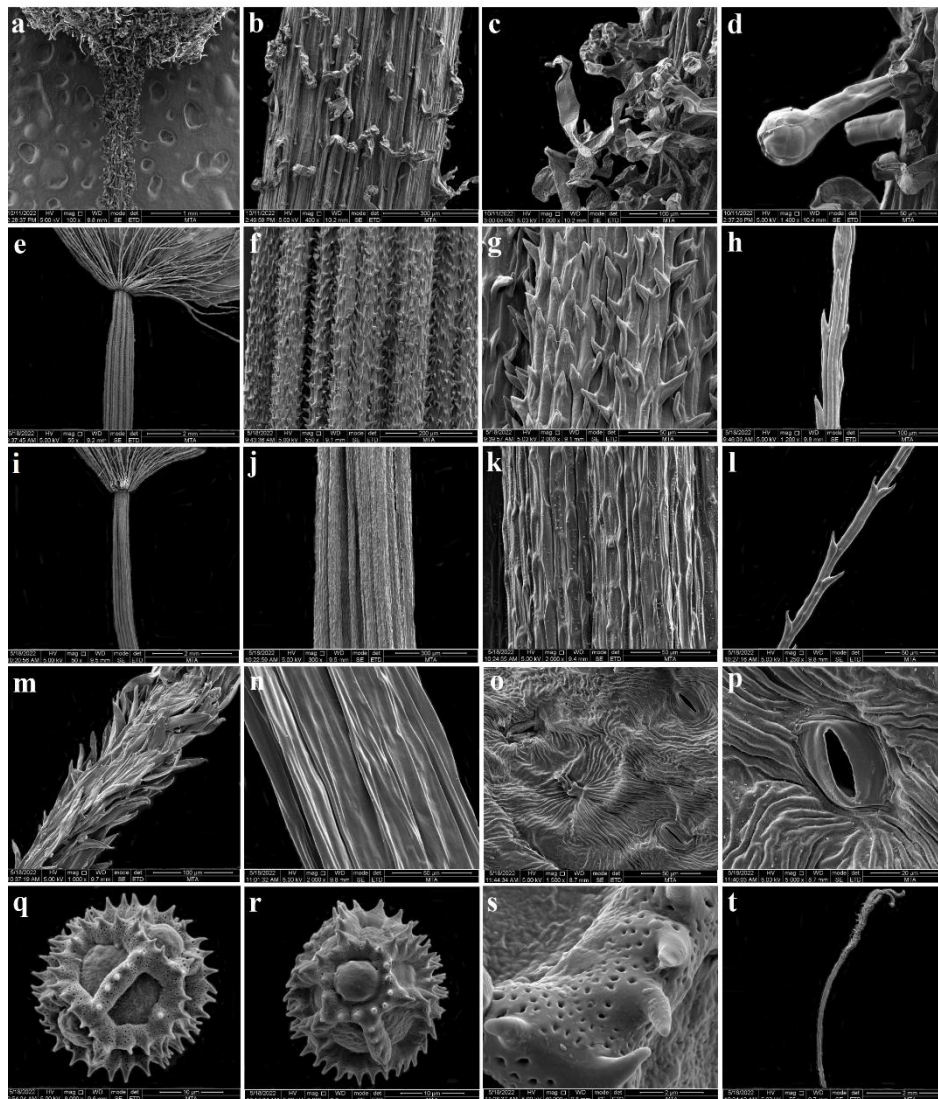


Figure 4. Scanning electron microscopy images of some micromorphological characteristics of *Crepis purpurea* subsp. *gulderenae*, a. Peduncle, b. Peduncle surface, c. Canescent-tomentose hairy on peduncle, d. Stalked glandular hairy on peduncle, e. Fertile achene, f-g. Fertile achene surface, h. Fertile achene pappus, i. Sterile achene, j-k. Sterile achene surface, l. Sterile achene pappus, m. Stigma surface, m. Style surface, o. Leaf abaxial surface with trichomes and closed stomata, p. Open stoma and leaf epidermis, q. Pollen grain (equatorial view), r. Pollen grain (polar view), s. Pollen grain exine surface ornamentation, t. Stigma and style structure. Scale bars: (a) 1 mm, (b, j) 300 µm, (c, h, m) 100 µm, (d, g, k, l, n, o) 50 µm, (e, i, t) 2 mm, (f) 200 µm, (p) 20 µm, (q, r) 10 µm, (s) 2 µm

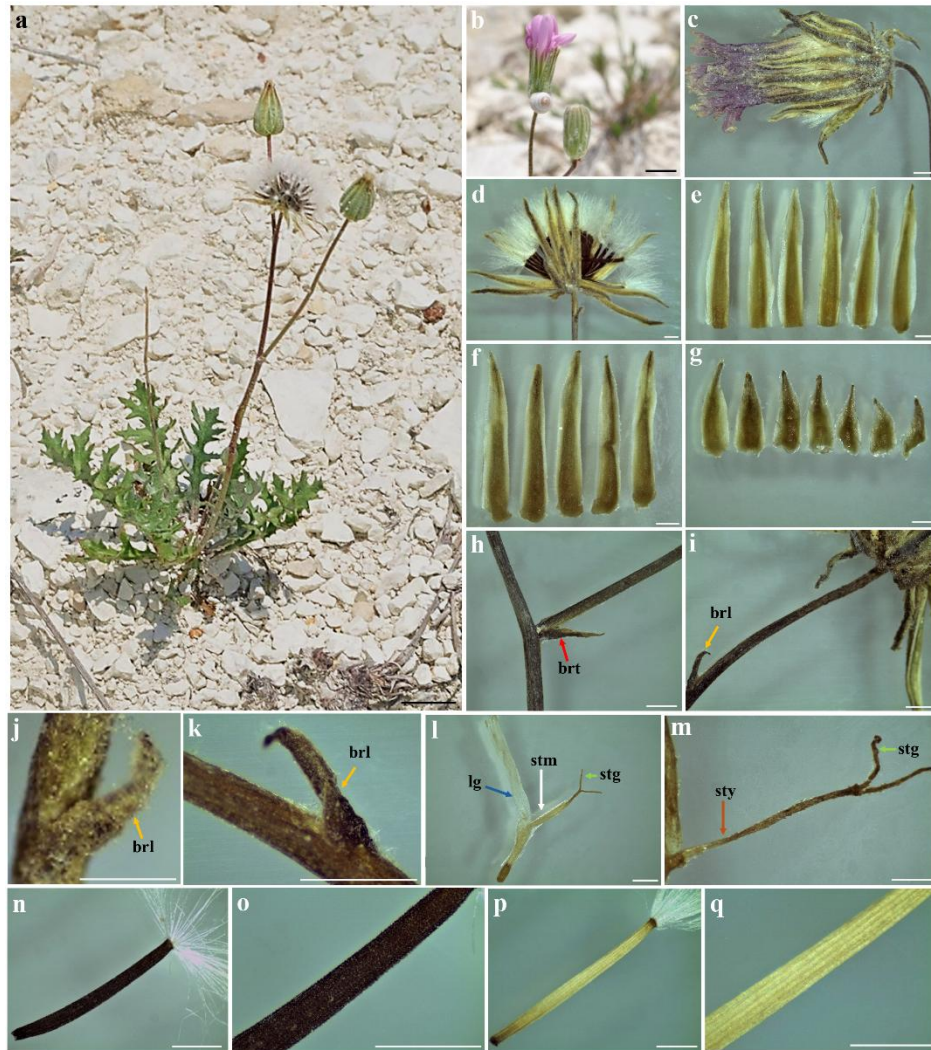


Figure 5. Morphological characteristics of *Crepis purpurea* subsp. *gulderenae*, a. Habitus, b-c. Flowering capitula, d. Fruitlet, e. Inner phyllary, f. Middle phyllary, g. Outer phyllary, h. Bract (red arrow, brt), i-j-k. Bracteoles on peduncle (yellow arrow, brl), l. Ligulate corolla (blue arrow, lg) and stamen (white arrow, stm), m. Stigma (green arrow, stg) and style (orange arrow, sty), n-o. Fertile achene structure, p. sterile (seedless) achene structure. Scale bars: (b-i, l-m, p, q) 1 mm, (j, k, o, r) 0.5 mm

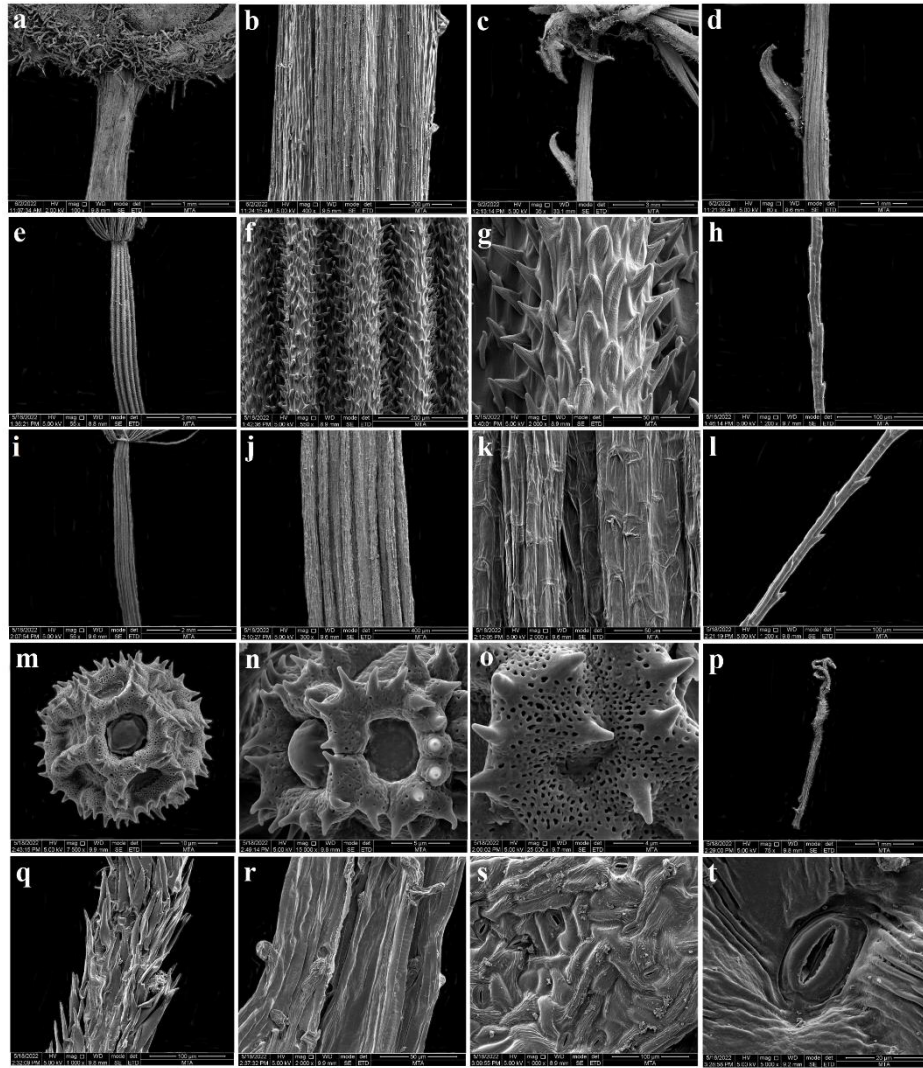


Figure 6. Scanning electron microscopy images of some micromorphological characteristics of *Crepis purpurea* subsp. *gulderenae*, a. Peduncle, b. Peduncle surface, c-d. Bracteole structure on peduncle, e. Fertile achene, f-g. Fertile achene surface, h. Fertile achene pappus, i. Sterile achene, j-k. Sterile achene surface, l. Sterile achene pappus, m. Pollen grain (polar view), n. pollen grain (equatorial view), o. Pollen grain exine surface ornamentation, p. Stigma and style structure, q. Stigma surface, r. Style surface, s. Leaf abaxial surface, t. Open stoma and leaf epidermis cells. Scale bars: (a, d, p) 1 mm, (b, f) 200 µm, (c) 3 mm, (e) 2 mm, (j) 400 µm, (k, r) 50 µm, (l, q, s) 100 µm, (m) 10 µm, (n) 5 µm, (o) 4 µm, (t) 20 µm.

3.8 Molecular Phylogenetic Analysis

The ITS sequences of the two subspecies were found to be identical while the *atpB-rbcL* intergenic region sequences differ by one indel of 10 bases in length. The sequences were deposited in GenBank and accession details are provided in Appendix 1.

It has been hypothesized that many of the Mediterranean floristic elements were established in southern Crimea during the warmer climatic conditions of the early and middle Holocene [37]. Floral similarities between Türkiye and Crimea were reported by Didukh *et al.* [38]. However, *C. purpurea* subsp. *purpurea* and the newly described *Crepis purpurea* subsp. *gulderenae* are both edaphic endemics and can only grow in very specific habitats, and so it is much more likely that long-distance dispersal (because both localities are on the migration routes of bird species such as *Coturnix coturnix* Linnaeus [39,40] and founder-event speciation occurred rather than this being a relict species from earlier geological time scales. In Crimea, the mass-scale seasonal migrations of quail (*Coturnix coturnix*) appeared in the Holocene [41].

The morphological divergence between the two subspecies apparently exceeds the DNA sequence divergence. Thus, it is hypothesized that *Crepis purpurea* subsp. *gulderenae* probably diverged rapidly and recently via founder-event speciation.

Appendix 1.

***Crepis gulderenae*:** A.E. Yaprak 2020-126, ITS PP464880, *atpB-rbcL* PP726921.1

***Crepis purpurea*:** Y. Krasylenko 21.06.2017, ITS PP464877, *atpB-rbcL* PP726920.1

Appendix 2.

Specimens examined: *Crepis purpurea* subsp. *gulderenae*: TÜRKİYE. Ankara, Ayaş mountains, Aysanti pass, steppe, marly soils, ca. 1200 m a.s.l, 06 June 1975, Y. Akman-3068 (ANK!); Ayaş, Aysanti pass, Akkaya Hill, eroded slopes in marly areas, 1250-1400 m a.s.l, 27 June 1986, M. Vural-4166 (GAZI and HUB!); Ayaş-Aysanti pass (going to Ayaş, right side of the road), marly, stony white slopes, 02 July 2015, GA-1291 (!); Ayaş-Aysanti pass (going to Ayaş, right side of the road), marly, stony white slopes, 1196 m a.s.l, 11 July 2015, 40° 05' 23.5" N–032° 26' 06.4" E, GA-1302 (!); Ankara, Ayaş-Aysanti pass, marly, stony white slopes, 1196 m a.s.l, 06 July 2017, GA-1695 (!); Ankara, Ayaş, Aysanti Pass, gypsiferous slopes, 1200 m a.s.l, 30 June 2020, A.E. Yaprak 2020-126 (!); Ankara, Aysanti Pass, gypsiferous slopes, 1205 m a.s.l, 10 July 2021, 40.08028° N–032.42313°E, A.E. Yaprak 2021-1133 (!); Ankara, Ayaş, Aysanti Pass, 1.5 km south of the pass, gypsiferous soils, 1210 m a.s.l, 10 July 2021, N 40.078711° – E 032.418406°, A.E. Yaprak 2021-1140 (!). ***Crepis purpurea* subsp. *purpurea*:** UKRAINE. Tauria, in saxosis cretaceis prope ‘Karasubazar’, June 1896, A. Callier, (on sheet *Pterotheca purpurea*, LY/0375816, LY/0375818, LY/0375819, LY/0375821, P/03617285, US/1379550, photos!); June 1896, A. Callier-3577, (on sheet *Pterotheca purpurea*, LY/0375820, photo!); Ukraine, Crimée, Les rochers d'Outeh Koch près Yalta, 27 May 1900, D. Sireitschikoff, (on sheet *Pterotheca purpurea*, PI/037049, photo!); Ukraine, Crimea, Patentibus declivibus solariis, fer viam stangeicam, (prope Yaltam) 800 m a.s.l., 26 June 1910, I. Wankow 25?, (on sheet *Intybellia purpurea*, US/1310984, photo!); Ukraine, Crimea, Tauricae, Krym., June 1912, I. Wankow s.n., (on sheet *Pterotheca purpurea*, US/1171788, photo!); Ukraine, Crimea, Tauria, in viciniis opp. Sympheropol, infra opp. Antiquum ‘Neapolis’, in declivibus lapidosis ad vallem fl. Salgir, 13 June 1952, S. V. Juzepczuk, (on sheet *Laegoseris purpurea*, US/3557185, photo!); Ukraine, Crimea, Tauria, locality unclear s.n., (on sheet *Laegoseris taurica* and *H. purpureum*, B-W/14638, photo!); Aut Huyelu bei Karasubazar, 33b, (on sheet *Intybellia callicephala*, P/0383573, photo!); Tauria, (on sheet *Intybellia callicephala*, WAG/1265783, photo!); *Hieracium purpureum*, Willdenow, (on label *Laegoseris taurica*, B-W/14639, photo!); Ukraine, Autonomous Republic of Crimea, cretaceous slopes of North-Western edge of Mt. Kubaluch, foothill of the south-western slope of Mt. BurundukKaya in 1.2 km from Michurinskoye (=Qaburçaq) village, Bilohirsky (Qarasuvbazar) Rajon, 45°04'51.73"N–34°43'09.46"E (~ 270 m a.s.l.), 21. 06. 2017, Yuliya Krasylenko (!).

4 Conclusions

With this study, based on morphological data, the populations of *Crepis purpurea* found in Türkiye have been recognized as a new subspecies (subsp. *gulderenae*) due to their different morphological traits. However, based on findings from both field surveys and morphological studies, the existence of subsp. *purpurea* in Türkiye has not been confirmed. Consequently, the total number of taxa in the genus in Türkiye remains the same (41), but the number of endemic taxa has increased to 10.

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Author Contribution Statements

Project development: AEY, İB; Fieldwork/ /Editing: YK, İB, AEY, GA; Data analysis: İB, AEY; Laboratory work/ Literature search/Writing: İB, YK, ; Conceptualization: YK, AEY. All authors have read and approved the article.

Declaration of Competing Interests

The authors declare no conflict of interest.

Ethical Statement

This research did not involve human participants or animals. Therefore, no ethical approval was required.

Declaration of Generative Artificial Intelligence Use

No artificial intelligence-based tools or applications were used in the preparation of this study. The entire content of the study was produced by the author(s) in accordance with scientific research methods and academic ethical principles.

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