Contribution to Taxonomic Knowledge of *Crepis dioritica* (Asteraceae): A Threatened Endemic Species in Türkiye

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Abstract

**Aim of study:** Crepis dioritica Schott & Kotschy ex Boiss. (=*Crepis albiflora* Babcock) is a threatened endemic species in Türkiye. The aim of this study is to contribute taxonomic knowledge of this species, and to reassess of its IUCN Red List category.

**Area of study:** Bolkar Mountains (Niğde) and Irano-Turanian region.

**Material and methods:** The comprehensive floristic studies in type locality of *C. dioritica* in Bolkar Mountains were carried out. Besides, the specimens previously collected from the type locality and Irano-Turanian region of the species were examined in detail.

**Main results:** The typification of the name *Crepis dioritica* erroneously cited as holotype was corrected to lectotype herein. Besides, the IUCN category of the species was reassessed as VU (vulnerable), and its distribution pattern was given in detail for the first time.

**Highlights:** The data obtained from this study can be used for nomenclature and taxonomy of *C. dioritica*.

**Keywords:** Crepis dioritica, Lectotype, Distribution, Conservation Status

Introduction

The genus *Crepis* L. in the tribe Cichorieae of the family Asteraceae encompasses a range of species (ca. 200) with taxonomic complexity, distributed mainly in the Northern Hemisphere and Africa (Bremer, 1994; Enke, 2009). Its origin is thought to be in the Altai/Tien Shan region in Central Asia (Babcock, 1947a). The genus is represented by 41 taxa in Türkiye, of which 9 are endemic (Yıldırım, 2021).

Within the genus *Crepis*, the name *Crepis dioritica* Schott & Kotschy ex Boissier was described by Boissier (1875) in his *Flora Orientalis* on the basis of two collections, viz., *Kotschy 123* and *Balansa s.n.* from Cilician Taurus (Bolkar Mountains) in Türkiye. No holotype was indicated in the protologue. Therefore, a lectotype designation is required according to Art. 9.3 of the *International Code of Nomenclature for algae, fungi, and plants* (Turland et al.,...
2018, hereafter ICN), and besides, the term “holo(type)”, used by Lamond (1975), should be corrected to “lectotype” (Art. 9.10 of the ICN). This correction is possible as before 2001 it was not necessary to use the phrase “here designated” or an equivalent when lectotypifying names (Art. 7.11 of the ICN).

Crepis dioritica is an endemic species in the Turkish flora (Lamond, 1975). Aforementioned above, its type locality is the Bolkar Mountains, where is probably the richest massif in endemics, though the alpine flora here contains numerous species of Irano-Turanian stock (Davis, 1971). However, due to the anthropogenic pressures such as over-grazing and mining activity in the type locality, fragmentation and erosion are present within the habitat of C. dioritica. On the other hand, the conservation status of the species was assessed by Ekim et al. (2000) as LR(lc). The typification of the name Crepis dioritica is corrected from holotype to lectotype herein, and discussed with field notes in the type locality of the species. Additionally, description and distribution pattern of C. dioritica are presented, and its conservation status is revised.


Description: Dwarf±scapigerous perennial herb with short woody fibrous rhizome. Scapes erect, 1-2(-3-4)-capitulate with fine glandular and eglandular hairs. Leaves all caudical, ±oblanceolate, irregularly lobed to deeply pinnatifid with dentate lobes, apex acute, long or short petiolate, the petiolate scarious, alate, densely pubescent with short

Figure 1. Crepis dioritica growing in Bolkar Mountains; (a) Flowering plant, (b) Flowering and fruiting plant, (c) Habitat (limestone)
glandular and long eglandular hairs. Involucre campanulate, pilose with glandular or eglandular hairs, outer bracts lanceolate, acute, inner bracts lanceolate, acute with scarious margins. Receptacle grabrous. Ligules white. Style branches yellow. Achenes, unbeaked, pale greenish-brown (immature dark brown), fusiform. Pappus white or yellowish, soft, 2-seriate, tenacious, ±included in or partly exserted from involucre.

Flowering and fruiting: From June to August.

Distribution: The species is distributed in alpine regions of central, south and east Anatolia, such as Bolkar Mountains in Niğde, Tayran Mountain in Erzincan, Karababa Mountain in Sivas and İspiriz Mountain in Van. Crepis dioritica differs from all other species of the genus Crepis with in the distinctive white flowers. Hence, there is an apparent morphological isolation with respect to other species of Crepis. The chorotypes of C. dioritica are East Mediterranean (EM), Central Anatolian (CA) and Armeno-Iranian provinces (ARI).

Therefore, this species is tri-regional distribution in Türkiye. The majority with 80% of its locations is found in Central Anatolian and Armeno-Iranian provinces that indicate Irano-Turanian (IT) element. It is known that the chorotype distribution of plants reflects the climate conditions (Kolahi & Atri, 2014). Besides, Babcock (1947a) noticed that alpine endemics of Crepis were formerly more widely distributed and have become restricted to their present locations presumably through radical changes in the environment. It is concluded that C. dioritica might relatively old species (i.e. relic species) and adapted to mesophytic environments.

Habitat and life from: Crepis dioritica grows in dioritic plains, limestone rocks and screes (Figure 1c). The life form of this species is hemicryptophyte. It is known that hemicryptophytes are commonly present in the alpine regions, which are associated with colder climates and longer periods of coldness (Raunkiaer, 1934; Noroozi et al., 2008).

Conservation status: According to relevant literatures (Lamond, 1975; Aytaç & Duman, 2005; Saglam & Unal, 2007; Ozudogru et al., 2010; Paksoy, 2022) and herbarium records, C. dioritica is known from 10 locations with respect to the most plausible threats which are habitat destruction, over-grazing and mining activities. Hence, IUCN threat category for this species is VU: B1ab (ii,iii,iv)+2ab(ii,iii,iv) (previously assessed as LR(Ic), according to Ekim et al., 2000; IUCN, 2022). As a result, the extent of occurrence (EOO) and area of occupancy (AOO) are less than 20,000 km² and 2,000 km², respectively (criterion B1, B2). On the other hand, decline can be inferred due to fact that alpine habitats are at greater risk than lower altitudes for habitat loss as the climate warms (Inouye, 2020).

Notes: It is clear that Lamond’s accepted in G-BOIS (G00748076) as the holotype, which is correctable to lectotype under Art. 9.10 of the ICN (Turland et al., 2018). The sheet of lectotype in G-BOIS (G00748076) bears a handwritten label with the field number 123 of Kotschya as well as a label that carries the species name in Boissier’s handwriting. G00748076 is a 4-part specimen that unambiguously fits with the diagnostic morphological characters stated in the original description, which is verified for typification. On the other hand, a few specimens of Kotschya 123 and Balansa s.n. mounted in same sheet in K (K000808111, K000808110) and P (P00691262, P00691266) bear 3(-4)-capitula, whereas Boissier (1875) cited 1-2-capitulated specimens in the protologue.

When describing the species, Boissier (1875) cited Balansa’s collection without collection or field number in the protologue. With an exception, the label with handwriting (presumably Balansa’s) of the sheet in G-BOIS (G00748077) bears the number of 1028, but all other sheets carry the labels without collection or field number. On the other hand, the labels in all the sheeds bear the same the date of collection and locality. There is no doubt that all of them have come from the same collection of Balansa. Therefore, as those materials are in
In accordance with Boissier’s description. However, the number 1028 is inconsistent with other field numbers of Balansa in his field trips at Bulgharmaden in 1855.

Boissier (1875) gave an annotation “ligulae elongatae pallide flavae” in the protologue of *C. dioritica*. Likewise, Babcock (1947b) emphasized pale yellow ligules in the species. However, Lamond (1975) suspiciously noticed that the ligules were white with purplish tinge or “pale yellow?”. In addition, Lamond (1975) tentatively reduced *C. albiflora* with having white flowers to synonym of *C. dioritica* with an annotation that “further gatherings with detail of flower colour from Taurus region are needed”. According to our field observations in Bolkar Mountains, *C. dioritica* has two subpopulations (Inceer’s collections no. 1034 and 1035) in the type locality and it is characterized by pure white-flowers (ligules), and these white ligules become pale yellow at fruiting time (Figure 1b). On the other hand, white ligules can show a slight coloration as pale yellow after drying.

Boissier (1875) cited the elevation as “8000” (ca. 2,439 m) in the protologue, whereas it was given as “3000 ped” on the labels in all herbarium sheets of Kotschy 123, except for in herbarium sheet at MW that carries the elevation as “8000”’ with an handwriting (presumably Kotschy’s). This ambiguity was also noticed by Babcock (1947b) in the monograph of the genus *Crepis* as well as by Lamond (1975) in the *Flora of Turkey and the East Aegean Islands*. According to our field observations in the type locality of *C. dioritica*, it grows in a high elevation above 2,400 m a.s.l. that confirms the elevation cited in the protologue.

Additional specimens examined: Türkiye. B6 Sivas: Şarkışla, Karababa Dağı, Kazıkgence mez evkii, 2,100-2,200 m, 28.VI.2009, B. Özdöğru 2401 (HUB); B9 Van: Gevaş, Artos Dağı, 3,000 m, 15.VII.1954, Davis & Q. Polunin 22836 (E); Van: Başkale, İspiriz Dağı, 3,300 m, 31.VII.1954, Davis 23715, Q. Polunin (E); Van: Gevaş S.E. corner of Lake Van, Artos Dağı, 2,500-3,000 m, vi-vii.1968, Coll. E.M. Rix et al 745 (E); C5 Niğde: Between Kızıltepe and Karagöl, 2,600 m, 04.VII.2013, Inceer 1034 (KTUB); Niğde: Kızıltepe, Sarbey plateau, 2,620 m, 05.VII.2013, Inceer 1035 (KTUB).

Conclusions
The typification of the name *Crepis dioritica* cited as holotype in the *Flora of Turkey* is corrected to lectotype herein according to nomenclature rules of ICN. The results obtained from phytoscloria indicate that Central Anatolian and Armeano-Iranian provinces of the IT region play an important role in distribution of *C. dioritica*. The present assessment of conservation status of *C. dioritica* based on the current IUCN criteria shows that it is prone to extinction in the future unless in reducing the antropogenic pressures as well as conservation strategies are established as soon as possible.

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Conflict of Interest
The author has no conflicts of interest to declare.
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