

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

Hüseyin INCEER 

Karadeniz Technical University, Faculty of Sciences, Department of Biology, 61080, Trabzon, TÜRKİYE
Corresponding Author: inceer@ktu.edu.tr

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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

Crepis dioritica (Asteraceae)'nın Taksonomik Bilgisine Katkıları: Türkiye'de Nesli Tehlike Altında Endemik Bir Tür

Öz

Çalışmanın amacı: *Crepis dioritica* Schott & Kotschy ex Boiss. (= *Crepis albiflora* Babcock) Türkiye'de nesli tehlike altında olan endemik bir türdür. Bu çalışmanın amacı bu türün taksonomik bilgisine katkıları sağlamak ve IUCN Kırmızı Liste kategorisini yeniden değerlendirmektir.

Çalışma alanı: Bolkar Dağları (Niğde) ve İran-Turan bölgesi.

Materyal ve yöntem: *Crepis dioritica*'nın Bolkar Dağlarındaki tip lokalitesinde kapsamlı floristik çalışmalar yapıldı. Bununla birlikte, türün daha önceden tip lokalitesinden ve İran-Turan bölgesinden toplanan örnekleri detaylı olarak incelendi.

Temel sonuçlar: *Crepis dioritica* isminin yanlışlıkla holotip olarak gösterilen tip örneği lektotip olarak burada düzeltilti. Bununla birlikte, türün IUCN kategorisi VU (duyarlı) olarak yeniden değerlendirildi ve yayılış modeli ilk kez detaylı olarak verildi.

Araştırma vurguları: Bu çalışmadan elde edilen veriler *C. dioritica*'nın adlandırmasında ve taksonomisinde kullanılabilir.

Anahtar Kelimeler: *Crepis dioritica*, Lektotip, Yayılış, Koruma Statüsü

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. Scan of the lectotype can be found in the Catalogue des Herbiers de Genève (CHG, 2023) website.

Material and Method

The herbarium collections at ANK, BM, G, GAZI, GOET, E, JE, HUB, K, M, MPU, MW, UC, P, S, W, WAG and WU (the acronym follows Thiers, 2023, continuously updated) were examined in detail. In addition, the comprehensive floristic studies were carried out in type locality of *C. dioritica* in Bolkar Mountains. Life form and phytochoria adopted by Raunkiaer (1934) and Takhtajan (1986) were followed, respectively. The threat category of *C. dioritica* was reassessed based on IUCN Red List Categories version 15 (IUCN, 2022).

Results and Discussion

Crepis dioritica Schott & Kotschy ex Boissier (1875: 842). (Figure 1a-b).

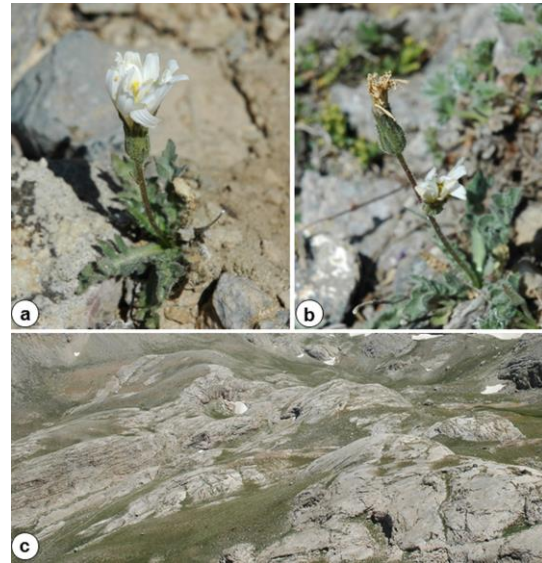


Figure 1. *Crepis dioritica* growing in Bolkar Mountains; (a) Flowering plant, (b) Flowering and fruiting plant, (c) Habitat (limestone)

Lectotype (indicated by Lamond 1975: 820 as “holo.”, corrected here): Türkiye. “In planitie dioritica ad fontes montis Gisyl Deppe alt. 3000 ped.”, 15 July 1853, *Kotschy 123* (G-BOIS [G00748076] image!); isolectotypes: K [K000808111] image!, GOET [GOET001417] image!, M [M0030848] image!, MPU [MPU014779] image!, MW [MW0595345] image!, P [P00691263, P00691264, P00691266, P00691267, P00691268] images!, S [S10-16554] image!, W [W0045851, W18890024068] images!, WAG [WAG0000557] image!, WU [WU0033217] image!. –Syntypus: Türkiye. “Region alpine du Taurus oriental au-dessus de Bulgarmaden”, 18 July 1855, *Balansa s.n.* (G-BOIS [G00748077] image!; isosyntypes: JE [JE00015020] image!, K [K000808110] image!, P [P00691262, P00691265] images!.

= *Crepis albiflora* Babcock (1941: 399).

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

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 exerted from involucre.

Flowering and fruiting: From June to August.

Distribution: The spesices 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 know 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; Aytac & 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(lc), 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 sheed of lectotype in G-BOIS (G00748076) bears a handwritten label with the field number 123 of *Kotschy* 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 verrified for typification. On the other hand, a few specimens of *Kotschy* 123 and *Balansa s.n.* mounted in same sheed 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 sheed 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

accordance with Boissier's description. However, the number 1028 is inconsistent with other field numbers of Balansa in his field trips at Bulgarmaden 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, Kazıkgeçmez mevki, 2,100-2,200 m, 28.vi.2009, *B. Özüdoğru* 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, Sarıbey 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 phytochoria indicate that Central Anatolian and Armeno-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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Ethics Committee Approval

N/A

Peer-review

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Author Contributions

Conceptualization: H. I.; Investigation H. I.; Material and Methodology: H. I.; Visualization: H. I.; Writing-Original Draft: H. I.; Writing-review & Editing: H. I.

Conflict of Interest

The author has no conflicts of interest to declare.

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