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Research article/Araştırma makalesi

A contribution of enigmatic species to *Smyrnium galaticum* from Turkey

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Abstract

Smyrnium galaticum Czeczott was identified in the Northern Anatolia for the first time (Turkey A4 Çankırı-Eldivan) by Czeczott. During the preparation of the Flora of Turkey P.F.Stevens considered this species to be imperfectly known. Therefore, it was not included in the keys. In the present study, the diagnostic morphologic characteristics are discussed and the taxonomic issues are addressed. In addition, the expanded description of the species, its ecology, conservation status, differences from *S. cordifolium*, as well as the photographs of mericarps are presented.

Keywords: *Smyrnium*, taxonomy**,** conservation status, Apiaceae, Turkey

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Türkiye'den bilmece gibi bir tür olan Smyrnium galaticum'a katkılar

Özet

Smyrnium galaticum Czeczott ilk olarak Kuzey Anadolu Çankırı-Eldivan çevresinden Czeczott tarafından toplandı. Türkiye florası hazırlanırken P.F. Stevens tarafından bu tür iyi bilinmeyen türler arasına kondu ve tür ayırım anahtarında yer almadı. Bu makalede türün morfolojik karakterleri tartışıldı. İlave olarak türün tanımı genişletildi, ekolojisi, koruma statusü, *S. cordifolium*'dan farkları ve merikarplarının fotoğrafları verildi.

Anahtar kelimeler: Smyrnium, taksonomi, koruma status, Apiaceae, Türkiye

1. Introduction

Smyrnium galaticum Czeczot **(Apiaceae)** samples were collecte**d** in 1925 for the first time by Czeczott during one of her botanical trips in Anatolia and these specimens were described by Czeczott as *S. galaticum* [Czeczott, 1932]. In 1939 it was published in Feddes Rep. Beih**.** by Czeczott [Czeczott, 1939]. During the preparation of the Flora of Turkey by P.F.Stevens, he presumed this species to be imperfectly known. Therefore, it was not included in the keys [Stevens, 1972]. This species was collected again by Baytop in type location *A.Baytop* & *T.Baytop* 35243 [Ajani et al., 2008]. Y.Ajani and colleagues ran analysis of nr DNA ITS sequence [Ajani et al., 2008]. However, this species was assumed to be problematic as a result of being an imperfectly known species in the Flora of Turkey and the East Aegean Islands. A comprehensive revision study on Turkish *Smyrnium* has been conducted by the authors of this paper since 2008, and a large number of new specimens have been collected from all over Turkey. Some interesting specimens were collected from A4 Çankırı-Eldivan vicinity by the authors in July 2008. These specimens appeared to have similar characteristics as *S. galaticum* at first glance as they had upper stem leaves opposite to each other. During subsequent visits, adequate flowering and fruiting materials were collected. Following an examination of the account of *Smyrnium* in the Flora of Turkey in detail, it was clear that the specimens were quite different from the other Turkish *Smyrnium* species [Stevens, 1972]. The study of the specific descriptions of *Smyrnium* given in Flora Europaea [Tutin, 1968],

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Flora Iranica [Rechinger, 1987], Flora U.S.S.R. [Shishkin, 1950] as well as the comparisons with specimens present in the herbaria ANK, GAZI, HUB, E, K and G showed that the specimens represented were indeed *S. galaticum* (Fig. 1). A map shows the distribution of both *S. galaticum* and a related species, *S. cordifolium* Boiss. (Fig. 2).

The results obtained in this study are given in the following order: the general description of the collected specimens**,** their distribution, habitat and ecology, their conservation status and the photographs of the mericarps, the IUCN Red list Category, and the discussion of the present findings.

2. Materials and methods

Samples belonging to *Smyrnium galaticum* were collected in 3 different localities. Each locality was visited at least twice during the flowering and the fruiting periods of the plant, and the population state of the species in these localities was determined. Mericarps representing the general fruit structure were selected from the samples bearing fruits. Suitable mericarps belonging to *S. galaticum* and to the closest species *S. cordifolium*; the photos of the surface of the mericarps were taken using a Nikon SMZ 745T microscope equipped with a Nikon DS-FI1 camera. Voucher specimens collected during the flowering and the fruiting periods are deposited in herbaria GAZI and DUOF.

3. Results

3.1. Plant description

Smyrnium galaticum Czeczott, Acta Soc. Bot. Poloniae 9: 38 (1932). (Turkish vernacular name: azmiryon), (Güner et al., 2012).

Type: Turkey A4 Çankırı supra oppidulum Arab, in declivi occidentali montis Eldivan Mount, in fruticetis humidis ad fontem Yaila-Chai, c. 1450 m, *Czeczott* 303 (G-photo!).

Perennial, glaucous, polycarpic herbs. Rootstock oblong, 3-5 cm diam.; fibrous collar absent. Stem 100-140 cm, terete, weakly sulcate, solid, glabrous, 2.5-3.5 cm diam. at the base. Basal leaves triangular-ovate in outline, 30-45 x 20-30 cm; petioles 5-10 cm long, glabrous; lamina 2-3 ternate-pinnate; ultimate segments ternate, ovate-eliptic to spathulate, 1.5-5 x 1-2 cm, crenate-dentate. Lower leaves alternate, semiamplexicaul; lamina 3-4 lobes, lobes ovate, 6-10 x 4-7 cm, crenate-dentate. Middle leaves reduced, petioles absent; lamina 3-4 leaflets. Upper leaves opposite, ovate with weakly cordate base, sometimes truncate base, margin entire, acute-acuminate. Inflorescence scattered, paniculate-corymbose, lateral branches long, central umbels 5-8 cm in fruiting time, ± equal, 8-12 rays, lateral umbels 2-4 cm, 7-10 rays, usually sterile; umbellules 10-16 flowered, fruiting pedicel 10-13(-14) mm. Bracts absent. Bracteoles usually 1-2 in flowering time, caducous in fruiting time, sometimes persistent. Sepals obsolete. Petals yellow, 1.5 mm, oblong, without claw at base, with solitary secretory duct, with acuminate apex, glabrous, deflexed. Mericarps 2-3 x 2.5 mm, dorsal ridges prominent; carpophore entire; stylopodium conical 0.5-0.7 mm; style 2-3 mm erect.
Flowering time: June-July.
Habitat: Stony rocky places, in open forest.

Figure 1. Assessment and general view of *Smyrnium galaticum.*

Specimens examined

S. galaticum Czeczott

-A4 Çankırı: Eldivan Mount, 1400 m, 17.07.2008, *M.Sağıroğlu* 2721 & *B.Şahin*; ibid., 10.08.2009, *M. Sağıroğlu* 2827; ibid., 26.06.2010, *M. Sağıroğlu* 3136 & *B. Şahin*; ibid., ca.1450 m, 18.07.1925, *Czeczott* 303 (WU,G-photo!); ibid., 18.07.1976, *A. Boytop* 35271 & *T. Boytop* (ANK Photo!); ibid., 19.07.1982, *F. Izgü* 10332 (ANK-Photo!); ibid., 26.08.1982, *H. Recep* 1333(ANK-Photo!).

-A4 Zonguldak: between Karabük and Keltepe, near the road, 12.07.1985, 1000 m, *M. Demirörs* 2033 (ANK-Photo !).

-B4 Ankara: Hasanoğlan-Mount Idris, 1450-1470 m, 21.06.2009, *M. Sağıroğlu* 2771 & *S. Aslan* (DUOF 3083); ibid., 10.08.2009, *M. Sağıroğlu* 2827; Mount Idris, Hasanoğlan stream, c. 1400 m, *Bilger* 314 (G-photo!).

S. cordifolium Boiss.

Type: In faucibus saxosis umbrosis montium prope Persepolin Persiae australis, 20.iv.1842, Kotschy 803 (K-photo!).

-Bitlis: Reşadiye-Pelli, 1900 m, hillside, 6.july.1954, *D.* 22368 & *O. Polunin* (E-photo!).

-B8 Bingöl: Bingöl-Elazığ highway 20. km, Kuruca area, 01.10.2011, 1200-1400 m, open *Quercus*, *B.Şahin* 5577; Bitlis: Bitlis, 05.06.1971, *T.Baytop* 20026 (WU-photo!).

-C10 Hakkari: 26 km from Yüksekova to Şemdilli, 15.july.1966, 2000 m, steppe slopes, *D.* 45119 (G-photo!).

-C10 Hakkari: Mount Sat above, 1970 m, 29.06.1966, *D.* 45556 (G-photo!).

3.2.Conservation status

Smyrnium galaticum is an endemic species restricted to North Anatolia identified in three localities (Fig. 2). It grows on stony rocky places and in open forests. Therefore, it is considered as 'Endangered' (criterion B1a). It could also be categorized as 'Critically Endangered' (criterion B2) for its population size is estimated to be fewer than 250 mature individuals (criterion C). We conclude that *S. galaticum* must be classified as 'Critically Endangered (CR)' on the basis of its 'reduction of population size' and the size of its 'area of occupancy' although it is known to live in three locations [IUCN, 2001].

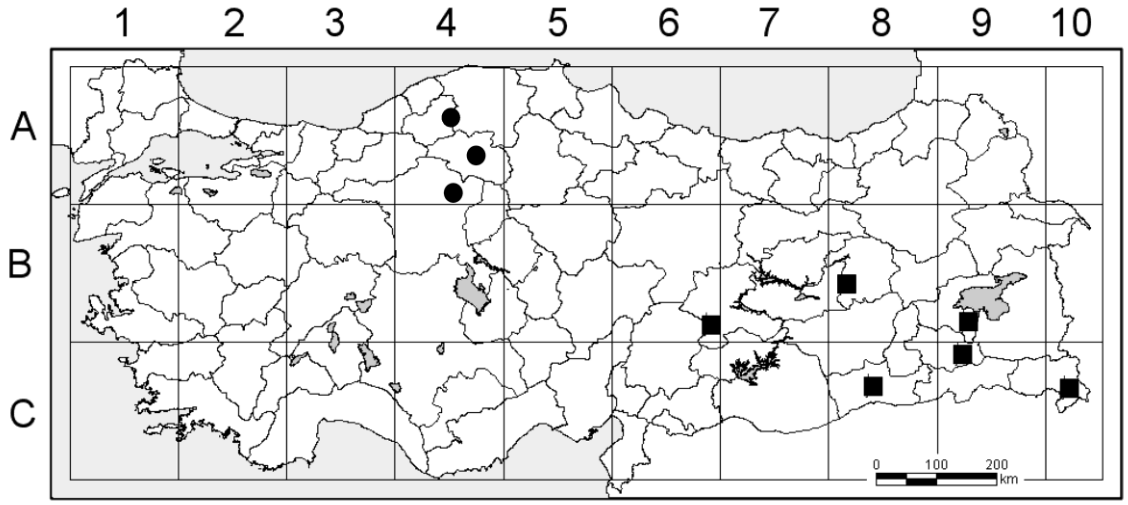

Figure 2. Distribution map of *Smyrnium galaticum* (●), *S. cordifolium* (■) in Turkey

3.3. Ecology

Smyrnium galaticum appears to be endemic to the central North-Anatolia. The specimens were collected in Northern Anatolia, where the species appears to be rare and local. *S. galaticum* grows on calcareous stony slopes and in open forest of *Elymus repens* (L.) Gould, *Poa bulbosa* L., *Stipa holosericea* Trin., *Bromus tomentellus* **Bo**iss., *Koeleria cristata* (L.) Pers., *Phleum exaratum* Hochst. ex Griseb., *Cynodon dactylon* (L.) Pers., *Dactylis glomerata* L., *Plumbago europaea* L., *Festuca valesiaca* Schleich. ex Gaudin, *Astragalus microcephalus* Willd., *Echium orientale* L., *Salvia recognita* Fisch. & C.A.Mey., *Salvia absconditiflora* (Montbret & Aucher ex Benth.) Greuter & Burdet, *Hypericum scabrum* L., *Prometheum sempervivoides* (Fisch. ex M.Bieb.) H.Ohba, *Verbascum cheiranthifolium* Boiss., *Acantholimon acerosum* (Willd.) Boiss., *Rosa canina* L., *Salix alba* L., *Pyrus elaeagnifolia* Pall. subsp. *elaeagnifolia*, *Amygdalus* sp. *Juniperus oxycedrus* L., *Crataegus orientalis* Pall. ex M.Bieb., *Quercus pubescens* Willd., *Cotoneaster*

nummularia Fisch. & C.A.Mey, *Pinus nigra* J.F. Arnold subsp. *nigra* var. *caramanica* (Loudon) Rehder [Frankis, 2000].

4. Discussion

By means of this study, problems related to the taxonomy of *Smyrnium galaticum* were solved. *S. galaticum* is a very distinct species, with no obvious allies in Turkey, Russia, Iran, and Europe, owing to its bigger basal leaves, fruiting pedicel, long branches, and distinct ribs of mericarp. *S. galaticum* is related to *S. cordifolium*, with opposite, ovate upper leaves. *S. galaticum* differs from it with its bigger and thicker stem, glaucous leaves, number of rays and prominent ribs of mericarp (Fig. 3a,b; 4). A more detailed comparison of the species with related species is given in Table 1.

Specimen collected by *Bilger* was determined as *S. cordifolium* in Flora of Turkey (Stevens, 1972). But, the specimen *Bilger 314* is belonging to species *S. galaticum* that we understand the based on our field observations and collected specimens (Stevens, 1972). It is found that *S. cordifolium* is distributed in S-SE Anatolia (not in Central Anatolia). Paleopalynological data show that Anatolia had a dense vegetation cover in the last interglacial period. The topography of Turkey had changed many times since then, which resulted in the manifestation of different microclimates in the tectonic valleys [Gemici, 1933]. Çankırı and its environment is a very interesting area located in the Irano-Turanian phytogeographical region and is very rich in local endemic plants. Recently several new species have been described in this region, including *Alyssum nezaketiae* Aytaç & H.Duman, *Acantholimon lycaonicum* Boiss. & Heldr. subsp. *cappadocicum* Doğan & Akaydın, *Genista vuralii* A.Duran & H.Dural, *Astragalus fallacinus* Podlech, *Centaurea cankiriensis* A.Duran & H.Duman, *Erysimum jacquemoudii* Yıld., *Astragalus rausianus* Podlech & Ekici, *Linum mucronatum* Bertol subsp. *gypsicola* Davis [Aytaç and Duman, 2000; Doğan and Akaydın, 2007; Duran and Duman, 2002; Duran and Dural, 2003; Podlech, 1999; Podlech and Ekici, 2008; Yıldırımlı, 2008; Yılmaz et al., 2011].

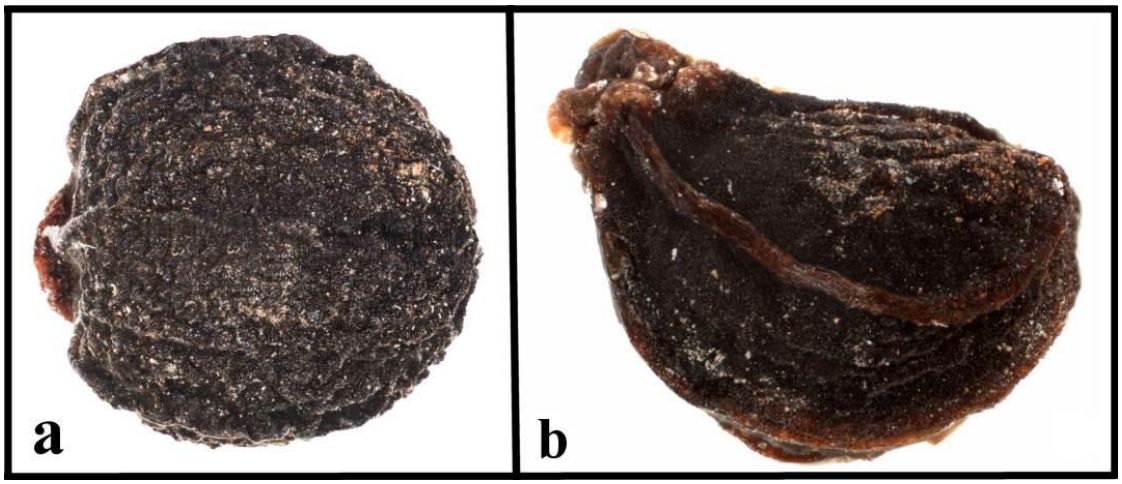

Figure 3.General view of maricarp (a) *Smyrnium cordifolium*, (b) *Smyrnium galaticum*

Tab**le**. 1 Comparison of the diagnostic characters of *Smyrnium galaticum* and *S. **c**ordifolium*

Characters	*S. galaticum*	*S. cordifolium*
Base of stem	2.5-3.5 **cm** diam	1-2.5 **cm** diam.
Stem	100-150 **cm**	70-110 **cm**
Basal leaves	30-45 x 20-30 **cm**	10-25 x8-15 cm
Petiole of basal leaves	5-10 **cm**	2-6 **cm**
Stem	solid	hollow
Stem and leaves color	glaucous	coriaceous
Upper leaves	ovate with weakly cordate base	ovate-orbicular with cordate base
Rays of central umbel	8-12	16-22
Lateral umbels	sterile	fertile
Fruiting pedicel	10-13 (-14) **mm**	4-8 (-10) **mm**
Bracteoles	1-2	absent
Mericarps	2-3 x 2.5 **mm**	3-3.5 x 3 **mm**
Dorsal ridges of mericarp	prominent	obscure
Stylopodium	0.5-0.7 **mm**	0.5 **mm**
Style	2-3 **mm**	1.5-2 **mm**

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