

A new record for the flora of Turkey: *Scorzonera ketzkhovellii* Grossh. (Asteraceae)

Ergin HAMZAOĞLU^{1,*}, Ahmet AKSOY², Esra MARTİN³, Nur Münevver PINAR⁴, Hatice ÇÖLGEÇEN⁵

¹Department of Biology, Faculty of Science and Arts, Bozok University, 66200 Yozgat - TURKEY

²Department of Biology, Faculty of Science and Arts, Erciyes University, 38039 Kayseri - TURKEY

³Department of Biology, Faculty of Science and Arts, Niğde University, 51350 Niğde - TURKEY

⁴Department of Biology, Faculty of Science, Ankara University, 06100 Ankara - TURKEY

⁵Department of Biology, Faculty of Science and Arts, Karaelmas University, 67100 Zonguldak - TURKEY

Received: 05.05.2009

Accepted: 14.12.2009

Abstract: *Scorzonera ketzkhovellii* Grossh. (Asteraceae) was recently collected from Yusufeli, Artvin (north-east Anatolia) and it has been reported as a new species record for the flora of Turkey. It is described and illustrated. In addition, its karyological features and pollen morphology are given.

Key words: *Scorzonera*, new record, karyology, pollen morphology, Turkey

Türkiye florası için yeni bir kayıt: *Scorzonera ketzkhovellii* Grossh. (Asteraceae)

Özet: Yusufeli, Artvin'den (kuzeydoğu Anadolu) toplanan *Scorzonera ketzkhovellii* Grossh. (Asteraceae) Türkiye florası için yeni bir kayıttır. Tür betimlendi ve resmedildi. Ayrıca, türün karyolojik özellikleri ve polen morfolojisi verildi.

Anahtar sözcükler: *Scorzonera*, yeni kayıt, karyoloji, polen morfolojisi, Türkiye

Introduction

The genus *Scorzonera* L. encompasses about 180 species and, being Ancient Mediterranean by origin, it is widely spread among the arid regions of Eurasia and northern Africa (Lack, 2007).

In Turkey, *Scorzonera* was revised by Chamberlain (1975) for "Flora of Turkey and the East Aegean Islands", some other new species, such as *Scorzonera pisidica*

Hub.-Mor., *S. latifolia* (Fisch. & C.A.Mey.) DC. var. *angustifolia* Prilipko apud. Lipsch., *S. sandrasica* Hartvig & Strid, *S. longiana* Sümbül, *S. ulrichii* Parolly & N.Kilian, *S. adilii* A.Duran, *S. karabelensis* Parolly & N.Kilian, and *S. yildirimli* A.Duran & Hamzaoglu, have been added (Davis et al., 1988; Güner et al., 2000; Duran, 2002; Kilian & Parolly, 2002; Parolly & Kilian, 2003; Duran & Hamzaoglu, 2004; Dinç Bağcı, 2009; Özhatay et al., 2009).

* E-mail: erginhamzaoglu@yahoo.com

During a field excursion in the Yusufeli-Kaçkar Mountains (Artvin) in 2008, an interesting *Scorzonera* sample was found. A more detailed examination revealed it to be *Scorzonera ketzkhovellii* Grossh., which is a new record for the flora of Turkey (Chamberlain, 1975; Chater, 1976; Rechinger, 1977; Lipschitz, 2000). This paper describes and illustrates the new record of the *Scorzonera* species. In addition, its karyological features and pollen morphology are given. Forty-nine *Scorzonera* species are now known to be found in Turkey.

Scorzonera ketzkhovellii Grossh., Fl. Kavk. 4: 240 (1934) (Figures 1 and 2).

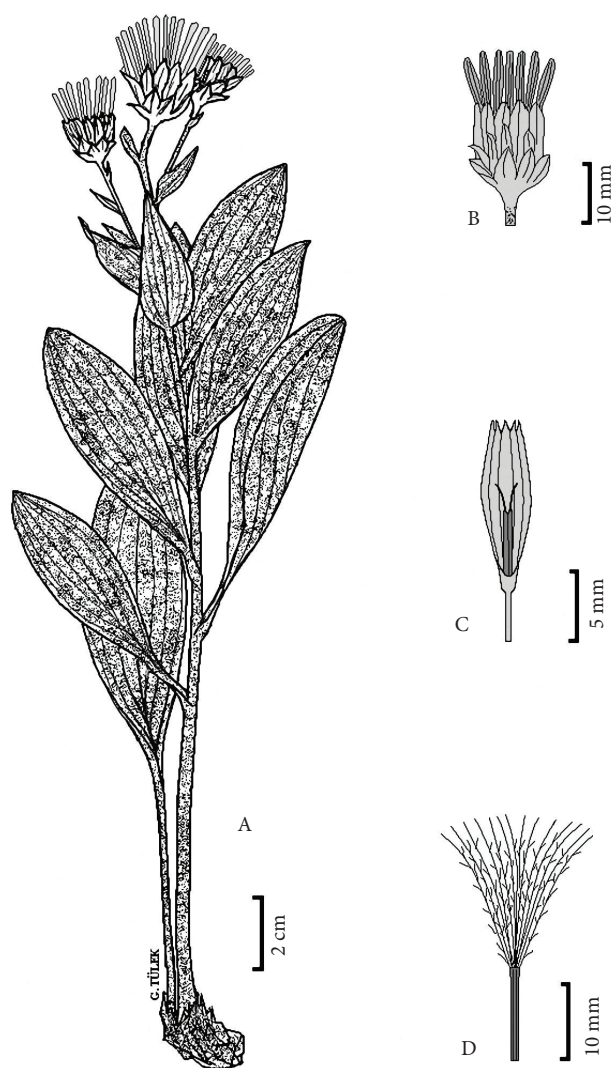


Figure 1. *Scorzonera ketzkhovellii*: A-Habit, B-Capitula, C-Flower, D-Achene.

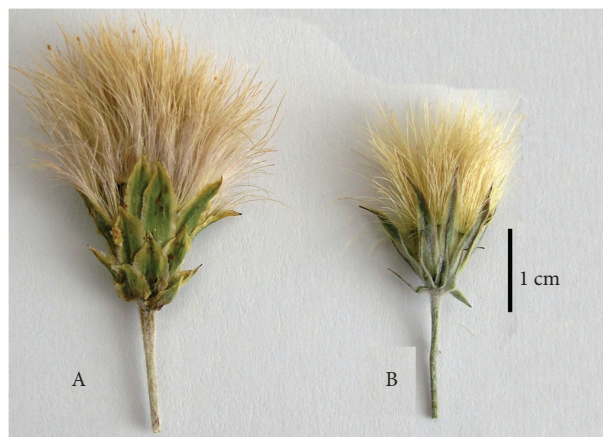


Figure 2. Capitula of *Scorzonera ketzkhovellii* (A) and *S. tomentosa* (B).

Type: Described from the Akhalkalaki region (Tetrobo-Chobaret range) (Tbilisi).

Perennial herb. Rootstock thick, cylindrical. Stems numerous, erect, striate, 25-45 cm tall, 5-8 mm in diameter below; divaricately branched in upper part, leafy up to inflorescence; whole plant very densely canescent-pannose, except capitula. Basal leaves long-petiolate, broadly ovate to elliptic-lanceolate, 15-25 × 3-6 cm, obtuse, with many (up to 10) veins, entire, not undulate; lower cauline leaves ovate-elliptic to oblong-lanceolate, short-petiolate; median and upper sessile, ovate-elliptic to lanceolate, subacute, gradually reduced towards apex of stem. Capitula 2-6 per stem, homogamous, ligulate, solitary in the end of the branches, peduncles sparsely to densely canescent-pannose. Involucre rather large, 16-20 × 8-13 mm; all phyllaries almost glabrous and membranous along margin; outer ones broadly ovate to suborbicular, 5-7 × 4-6 mm, acuminate; inner ones oblong-lanceolate, 16-20 × 3.5-5 mm, acuminate. Corolla yellow, longer than involucre, 13-18 × 2.5-3.5 mm, ligules 5 toothed, lobes 0.5-1 mm long; style branches filiform, 8-10 mm long, densely papillose, obtuse; anthers oblong-linear, c. 6 mm long, sagittate at base. Achenes completely glabrous, 11-13 long and c. 1 mm wide, slightly obpyramidal, tetraquetrous, straw-coloured, ridges obtuse; pappus 16-19 mm, pale brownish to dirty white, pappus hairs barbellate and plumose below, barbellate above. *Fl.* 7-8, *Fr.* 8-9, *stony slopes and rock crevices*, 2050 m.

Specimens examined: *Scorzonera Ketzkhovellii* – A8 Artvin: Yusufeli, between Yaylalar and Körahmet, around transmitting station, 2050 m, 21.viii.2008, *Hamzaoğlu* 5363 & *Aksoy* (BOZOK Hb., ERCİYES Hb, ANK, GAZI); *Scorzonera Sosnowskyi* – A8 Artvin: Yusufeli, between Yaylalar and Körahmet, around transmitting station, 2050 m, 21.viii.2008, *Hamzaoğlu* 5364 & *Aksoy* (BOZOK Hb.); *ibid.*, around Bıçakçılar, 1585 m, 27.vii.2008, *Hamzaoğlu* 5302 & *Aksoy* (BOZOK Hb.); *ibid.*, between Bıçakçılar and Yüksekoba, 1600 m, 20.viii.2008, *Hamzaoğlu* 5347 & *Aksoy* (BOZOK Hb.); *ibid.*, Yaylalar köyü, 1710 m, 30.vii.1991, A.Güner 9932 et al. (GAZI).

Distribution and suggested conservation status:

In Turkey, *Scorzonera ketzkhovellii* is distributed in the province of Artvin (Yusufeli, Kaçkar Mountains) in north-east Anatolia. Georgia (East Transcaucasia) was previously the only known distribution area of the species (Lipschitz, 2000).

However, *Scorzonera ketzkhovellii*, which was known as endemic to Georgia, lost this characteristic after it was collected from Turkey. This species is rare in Turkey and only known from one locality (Artvin, Yusufeli, Yaylalar). By considering its narrow distribution area, Critically Endangered (B2a) conservation status is proposed (IUCN, 2001).

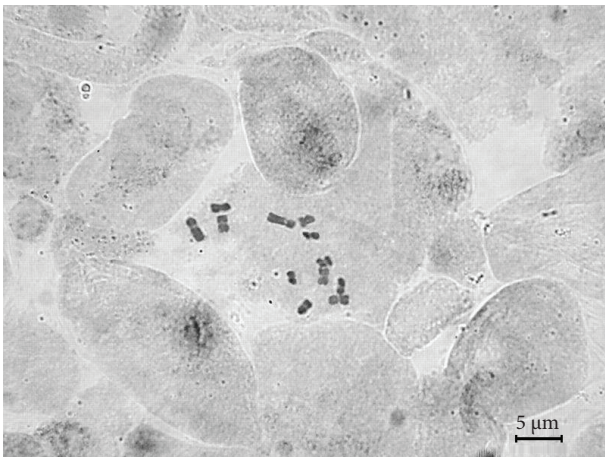


Figure 3. Metaphase chromosomes of *Scorzonera ketzkhovellii*.

Karyological features: Achenes were germinated at room temperature on moist filter paper in petri dishes (specimen *Hamzaoğlu* 5363). The other procedures followed were as described by Martin et al. (2008). The chromosome types were named according to the position of the centromer (Levan et al., 1964).

The karyomorphology of *Scorzonera tomentosa* L., belonging to the genus *Scorzonera*, had been previously determined (Martin et al., 2008). In *S. tomentosa* the somatic chromosome number is $2n = 12$. The somatic chromosome number of *S. tomentosa* was reported to be $2n = 2x = 12$. The somatic chromosomes range from 1.50 µm to 2.97 µm. The karyotype formula is $5m + 1sm$. The total length of the haploid set is 11.80 µm.

The chromosome number and morphology of *Scorzonera ketzkhovellii* were studied for the first time. The diploid chromosome number of the species was determined to be $2n = 2x = 12$ (Figure 3). The basic chromosome number for this species is $x = 6$. The metaphase chromosomes range from 1.75 µm to 3.45 µm. The karyotype formula is $5m + 1sm$. The total length of the haploid set is 15.17 µm. The ideogram of this species was arranged in order of decreasing length (Figure 4).

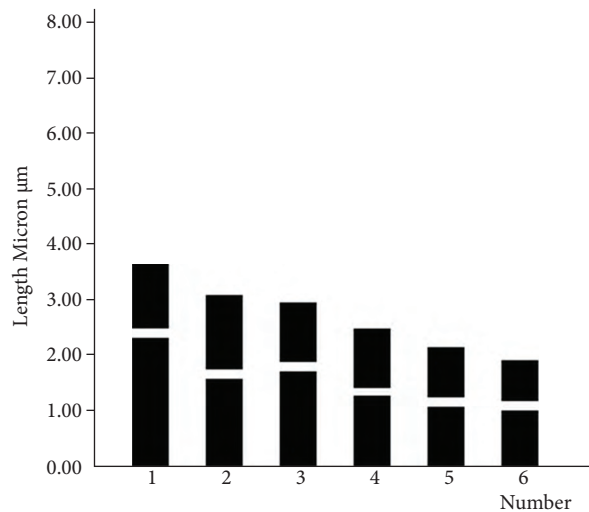


Figure 4. Ideogram of *Scorzonera ketzkhovellii*.

Pollen morphology: Pollen for examination by light microscopy was prepared according to Wodehouse (1935) and the measurements were made with a Nikon E600 microscope. The measured pollen diameters are based on at least 50 samples and the other characters on approximately 10. For SEM study, the pollen grains were coated with gold and the micrographs were obtained using a JSM-5600 microscope. The descriptive terminology given by Faegri & Iversen (1975) was followed.

Pollen grains 3-zonoporate, oblate-spheroidal to spheroidal, polar axis 26.6-40.4 μm (36.5 μm), equatorial axis 22.4-45.7 μm (40.5 μm) and echinolphate, with 15 lacunae (3 poral, 6 abporal and 6 paraporal). Amb semiangular. Ora circular and $3.2 \times 5.2 \mu\text{m}$ in diameter. Exine is 2.3-5.2 μm (4.2 μm) thick at centre of mesocolpia (spines not included); sexine thicker than nexine. Infratectum and tectum columellate. The ornamentation is echinate and perforate. Spines concave-conic, 1.6-5.5 μm in length with base diameter of 1.2-4.1 μm . One-rowed on the ridges. Presence of spine cavities at the base of the spine. Intine 0.35-0.95 μm thick (specimen Hamzaoglu 5363, Figures 5 and 6).

Discussion

Scorzonera ketzkhovellii and *Scorzonera sosnowskyi* are morphologically very similar. Both species are distributed in the same areas according the flora USSR and our collections. At the same time, these species

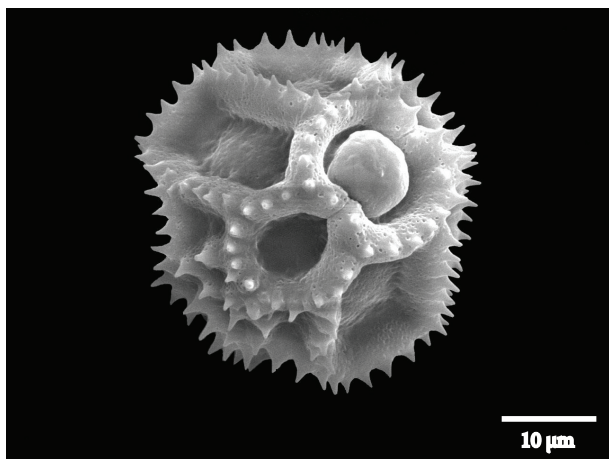


Figure 5. SEM micrographs of pollen of *Scorzonera ketzkhovellii*.

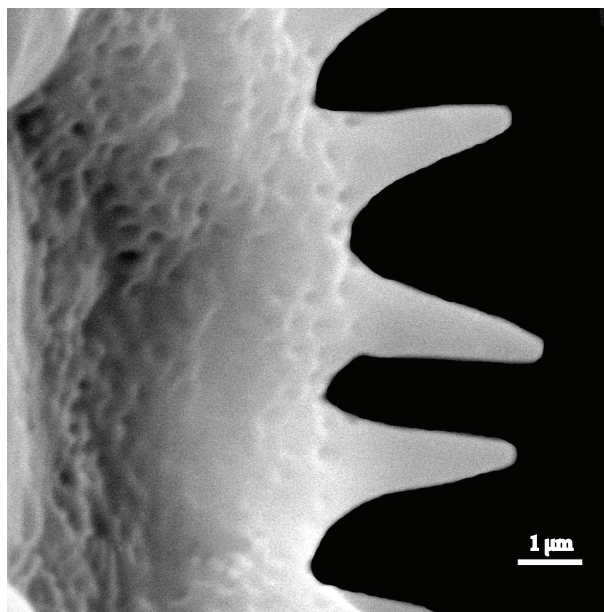


Figure 6. SEM micrographs of pollen of *Scorzonera ketzkhovellii*.

are closely related to *Scorzonera tomentosa*, which is distributed in central and northwest Anatolia (Chamberlain, 1975; Lipschitz, 2000). An identification key for these 3 species is provided below.

- 1. Achenes completely glabrous
 - 2. Phyllaries glabrous; outer broadly ovate to suborbicular..... **ketzkhovellii**
 - 2. Phyllaries densely lanate-villous; outer aristate-lanceolate **tomentosa**
- 1. Achenes densely lanate **sosnowskyi**

These 3 species, which have similar distributions and are morphologically very similar, are distinguished by characteristic such as achenes and phyllary hairs. To understand the importance of these differences, they should be compared using molecular techniques.

Acknowledgements

We are indebted to TÜBİTAK (Project no. TBAG-106T240) for its financial support. In addition, we thank Dr. Serdar MAKBUL (University of Rize, Turkey) for his helpful discussion.

References

- Chamberlain DF (1975). *Scorzonera* L. – In: Davis PH (ed.). *Flora of Turkey and the East Aegean Islands*, volume 5: 632-657. Edinburgh: Edinburgh University Press.
- Chater AO (1976). *Scorzonera* L. – In: Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM, Webb DA (eds.). *Flora Europaea*, volume 4: 317-322. Cambridge: Cambridge University Press.
- Davis PH, Mill RR & Tan K (1988). *Scorzonera* L. – In: Davis PH, Mill RR & Tan K (eds.). *Flora of Turkey and the East Aegean Islands*, volume 10 (Suppl.): 169-170. Edinburgh: Edinburgh University Press.
- Dinç M & Bağcı Y (2009). Taxonomical and chorological notes on the Turkish endemic *Scorzonera amasiana* Hauskn. & Bornm. (Asteraceae). *Turk J Bot* 33: 127-130.
- Duran A & Hamzaoglu E (2004). A new species of *Scorzonera* L. (Asteraceae) from south Anatolia, Turkey. *Biologia* 59 (1): 47-50.
- Duran A (2002). A new species of *Scorzonera* L. (Asteraceae) from Anatolia, Turkey. *Pak J Bot* 34 (3): 385-389.
- Faegri K & Iversen J (1975). *Textbook of Pollen Analysis*. Hafner Press, New York.
- Güner A (2000). *Scorzonera* L. – In: Güner A, Özhatay N, Ekim T & Başer KHC (eds.). *Flora of Turkey and the East Aegean Islands*, volume 11 (Suppl.): 167. Edinburgh: Edinburgh University Press.
- IUCN (2001). *IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission*. IUCN, Gland, Switzerland and Cambridge, UK.
- Kilian N & Parolly G (2002). *Scorzonera ulrichii* Parolly & N. Kilian, sp. nova. In: Greuter W & Raus T (eds), *Med-Checklist Notulae*, 21. *Willdenowia* 32: 198-200.
- Lack HW (2007). Tribe *Cichorieae* Lam. & DC.– In: Kubitzki (ed.): *The Families and Genera of Vascular Plants*, Vol. VIII, Flowering Plants. Eudicots, Asterales: Kadereit & Jeffrey (eds.): 180-199. Heidelberg, Berlin: Springer-Verlag.
- Levan A, Fredga K & Sandberg AA (1964). Nomenclature for centromeric position on chromosomes. *Hereditas* 52: 201-220.
- Lipschitz SJ (2000). *Scorzonera* L. – In: Bobrov EG & Tzvelev NN (eds.). *Flora of the U.S.S.R.*, volume 29: 26-111. Washington, D.C.: Smithsonian Institution Libraries.
- Martin E, Doğan B, Öztürk M, Duran A & Hasırcı E (2008). *Scorzonera kotschyi* Boiss. ve *Scorzonera tomentosa* L. (Asteraceae) taksonları üzerine karyolojik bir çalışma. IX. Ulusal Biyoloji Kongresi, Trabzon.
- Özhatay N, Kültür Ş & Aslan S (2009). Check-list of additional taxa to the supplement flora of Turkey IV. *Turk J Bot* 33: 191-226.
- Parolly G & Kilian N (2003). *Scorzonera karabelensis* (Compositae), A new species from SW Anatolia, with a key to the subscapigerous *Scorzonera* species in Turkey. *Willdenowia* 33: 327-335.
- Rechinger KH (1977). *Scorzonera* L. – In: Rechinger KH (ed.). *Flora Iranica*, 122: 16-79. Graz, Austria: Akademische Druck- u. Verlagsanstalt.
- Wodehouse RR (1935). *Pollen Grains*. McGraw-Hill, New York.