

ALLIED SECTION AND EMENDED DESCRIPTION OF SCORZONERA HELODES RECH.F. (ASTERACEAE)

S. R., Safavi, E. Jarchi, & M. Mahmoodi

Received 2022.10.14; accepted for publication 2022.11.01

Safavi, S.R., Jarchi, E. & Mahmoodi, M. 2022.12.30: Allied section and emended description of *Scorzonera helodes* Rech.f. (Asteraceae). *Iran. J. Bot.* 28 (2): 150-155. Tehran.

The type specimen of *Scorzonera helodes* Rech.f. was collected by Rechinger, the Austrian botanist in 1974 from the high mountain wet meadows between Daran and Buin in Esfahan. At the same time and on the same trip, another specimen was collected by the Finnish botanist, Alava, from the same place. 38 years later in 2012, another specimen of the species was collected by Maroofi, the Iranian botanist, from Kharke on the road from Sanandaj to Divandareh in Kurdistan Province. All of these specimens lack ripened achenes (which is necessary for accurate identification and determination of the sections in the genus). The section of the species was not specified when it was introduced by Rechinger (1977). Finally, in 2015, the second author collected several standard specimens with ripened achenes from an area around Tazeh-kand-e Fakhriou village in Zanjan Province, NW Iran. By extensive and detailed examination of the specimens, the authors came to the conclusion that these specimens are *Scorzonera helodes* Rech.f. and belong to Subgen. *Scorzonera* Sect. *Dimorphopapposa* Lipsch. In addition, here the description of the species is emended.

Seyed Reza Safavi & Mohammad Mahmoodi (correspondence <mahmoodi@rifr-ac.ir>), Research Institute of Forests and Rangelands, P.O. Box 13185-116, Tehran, Iran, Agricultural Research, Education and Extension Organization (AREEO). -Esmail jarchi, Department of plant Biology, Faculty of Biological Sciences, Tarbiat Modarres University, Tehran, Iran.

Keywords: *Scorzonera*; section *Dimorphopapposa*; endemic; rare species; Iran

تعیین بخش و تکمیل شرح گونه *Scorzonera helodes* Rech.f.

سیدرضا صفوی: استادیار پژوهش، بخش تحقیقات گیاه‌شناسی، موسسه تحقیقات جنگلها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران

اسمعیل جارچی: دانشجوی دکتری، گروه علوم گیاهی، دانشکده علوم زیستی، دانشگاه تربیت مدرس، تهران، ایران

محمد محمودی: استادیار پژوهش، بخش تحقیقات گیاه‌شناسی، موسسه تحقیقات جنگلها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران

نمونه تیپ *Scorzonera helodes* Rech.f. در سال ۱۳۵۳ ه. ش. توسط رشینگر، گیاه‌شناس اتریشی از چمنزارهای مرطوب و مرتفع کوهستانی بین داران و بوئین در استان اصفهان جمع‌آوری و نام‌گذاری شد. همزمان و در همان سفر نمونه دیگری نیز توسط گیاه‌شناس فنلاندی، آلاوا از همان محل جمع‌آوری گردید. ۳۸ سال بعد در سال ۱۳۹۱ ه. ش. نمونه دیگری از این گونه توسط معروفی، گیاه‌شناس ایرانی از ایستگاه خرکه واقع در جاده سندانج به دیواندره در استان کردستان جمع‌آوری شد. همه این نمونه‌ها ناقص بوده و فاقد فندقه رسیده (که برای شناسایی دقیق و تعیین بخش در این جنس ضروریست) هستند و به همین دلیل هنگامی که این گونه توسط رشینگر معرفی شد، بخش آن مشخص نشد (۱۳۵۶). سرانجام

جارچی در سال ۱۳۹۴ ه. ش. چندین نمونه استاندارد (به همراه فندقه رسیده) از این گونه را از منطقه‌ای در اطراف روستای تازه‌کند فخری‌لو در استان زنجان در شمال‌غرب ایران جمع‌آوری کرد. پس از بررسی دقیق نمونه‌های اخیر، نویسندگان به این نتیجه رسیدند که آنها متعلق به گونه *Scorzonera helodes* Rech.f. و زیرجنس *Scorzonera*، از بخش *Dimorphopapposa* Lipsch. می‌باشند. در این مقاله شرح گونه *S. helodes* تکمیل شده است تا در برگزیده همه صفات مورفولوژیک آن باشد.

INTRODUCTION

The genus *Scorzonera* was first introduced in 1753 by Carl Linnaeus (Linnaeus 1753). Currently, there are ca. 200 species of this genus in the world (Lendzion & al. 2021). There are 55 species of *Scorzonera* in Iran and 19 of them are endemic to Iran (Safavi & al. 2013). Since the genus *Scorzonera* was revised by Rechinger (1977) for the Flora Iranica, three new species (Safavi 2006a, 2016, 2020), one new variety (Safavi 2006b) and four new records have been added to the flora of Iran (Dyanat-Nejad & al. 1998, Safavi 2004, 2019a, 2019b).

In a phylogenetic study of the genus (Zaika & al. 2020), *Scorzonera* s. l. was examined and 36 species were transferred to the genus *Pseudopodospermum*. The results of this study revealed that *Scorzonera helodes* Rech.f., belonged to the genus *Scorzonera* s.s. In 1974, the type specimen of *Scorzonera helodes* Rech.f. was collected by Rechinger, the Austrian botanist (Reichinger 1972 & 1977) from the high mountain wetlands (2500 m), between Daran and Buin in Esfahan Province and deposited with the number 47666 in the herbarium of Natural History Museum in Vienna (W). At the same time and on the same trip, another specimen was collected by the Finnish botanist, Alava (Reino Olavi Alava, 1915-2011) from the same place and deposited in the herbarium of the University of Turku, Finland (TUR) under the number 13706. 38 years later in 2012, another specimen of the species was collected by Maroofi, the Iranian botanist, from Kharke station at 65 Km. on the road from Sanandaj to Divandareh at an altitude of 2000 m a.s.l., in Kurdistan province and deposited in the herbarium of the Research Institute of Forests and Rangelands (TARI) under the number 86156 (Safavi & al. 2013). All of these specimens lack ripened achenes (which is necessary for accurate identification and determination of sections in the genus), so its section was not specified when citing this species in Flora Iranica (Rechinger 1977). Finally, in 2015, the second author collected several standard specimens of the species population (with ripened achenes) in "Mahnesan to Pari, around Tazeh-Kand-e Fakhrlou village, 2250 m, Zanjan Province. All specimens were identified as *Scorzonera* L. (Linnaeus 1753) and were deposited in TARI under the numbers 108722 & 108723. Despite

careful studies, the exact taxonomic position of specimens remained ambiguous for the second and third authors, who have been studying the flora of northwestern Iran for a long time (Mahmoodi & al. 2022). These specimens, along with several other specimens of the genus *Scorzonera*, were given to the first author, for accurate identification. The specimens were examined in detail and cross-checked with descriptions of *Scorzonera* species in Iran (Rechinger 1972, 1977; Safavi & al. 2013). After the extensive and detailed examination of the specimens, the authors came to the conclusion that these specimens are *Scorzonera helodes* Rech.f. Subgen. *Scorzonera* Sect. *Dimorphopapposa* Lipsch., a rare endemic species from Iran.

MATERIALS & METHODS

Specimens of *Scorzonera helodes* Rech.f., Subgen. *Scorzonera* Sect. *Dimorphopapposa* Lipsch. were collected from Zanjan Province, Mahnesan. The specimens were identified using determination keys and description of the species (Rechinger 1977; Safavi & al. 2013), and compared with type specimens in virtual herbaria (e.g., W, TUR, E, K, and B), (acronyms according to Thiers, 2016). The specimens are preserved in the TARI herbarium.

RESULTS & DISCUSSION

Scorzonera helodes Rech.f. Fl. Iranica 122: 76 (1977) (Figs. 1, 2, 3 & 4).

Subgen. *Scorzonera* Sect. *Dimorphopapposa* Lipsch. Sect. *Dimorphopapposa* Lipsch., Fragm. Monogr. Gen. Scorz 2: 152 (1939).

Tuberous, herbaceous, moisture-loving, and without hairs. Achens streaked-grooved, white; marginal achenes compact-blade with muricate costa and plumose-persistent pappus; central achenes angulate cylindrical with smooth surface; pappus scabrous, sparsely setose, fragile.

Perennial herb, stemless, glabrous, light green, 10 to 15 cm high, tuberose. Tuber ovoid or almost spherical, 10 to 15 mm in diameter. Collum short, without the remnants of previous years' petioles with rosulate leaves. Leaves numerous, lanceolate, membranous, gradually widens from the middle towards the base, vaginate, distinctly petiolate, with a

petiole as long as lamina; lamina usually 4–5 cm long and 0.5–1.2 cm wide, glabrous, light green, lanceolate, entire, narrow at the base, sharp, distinctly pale midrib, secondary veins indistinct. Peduncles numerous, unequal, erect, glabrous, 10–15 cm high, cylindrical (in length with the same diameter), sometimes lateral peduncles slightly bent outward, 10–20 mm long and 2 to 3 mm wide, with one to three linear-lanceolate and sharp leaves. Involucre almost cylindrical, tapering upwards and glabrous; 12 to 16 mm long in flowering and up to 20 mm in fruiting stages; bracteoles more or less 9 mm long, herbaceous, green, narrow, with longitudinal grooves

and a narrow membranous margin; outer bracteoles 3 to 4, lanceolate-ovate and long-pointed; internal bracteoles rectangular-lanceolate, tapering upwards and obtuse at the tip, three to four times as long as the outer bracteoles. Ligule yellow, on the outer surface pale yellow tending to violet or purple, longer than the bracteoles. Achenes 6 to 7 mm long, striated, grooved, and bi-shaped; pappus 12 to 14 mm long with plumose marginal fibers and plumose central fibers with setulose tips; marginal achenes compressed, blade-like, with muricate veins central achenes cylindrical, angular and glabrous.



Fig. 1. *Scorzonera helodes* Rech.f.



Fig. 2. *Scorzonera helodes* Rech.f. A, central achene; B, marginal achene; C, involucre at flowering; D, involucre at fruiting (108722-TARI).

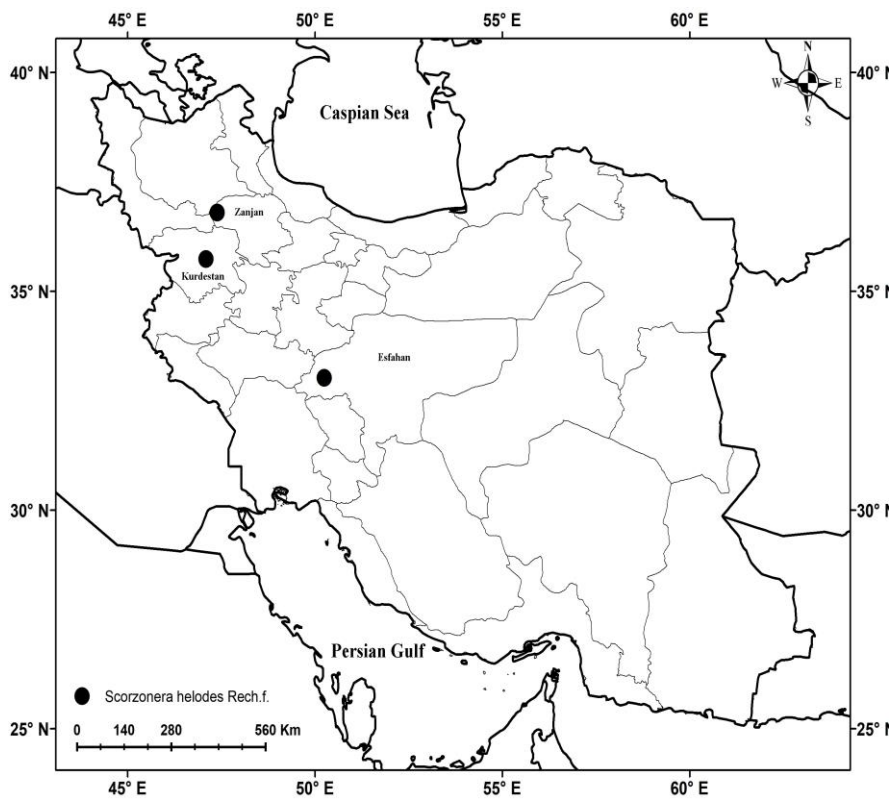


Fig. 3. Distribution map of *Scorzonera helodes* Rech.f. in Iran.



Fig. 4. *Scorzonera helodes* Rech.f. (Type specimen, 47666- NHMW).

Specimens examined: Zanjan Province: Mahneshan to Pari, around Tazeh-Kand-e Fakhriou village, 36° 48' 16" N, 47° 23' 34" E, 2250 m, Jarchi 108722 & 108723 (TARI); Kurdistan province: Kharke station in 65 Km on the road from Sanandaj to Divandareh, 2000 m, Maroofi 86156 (TARI); Esfahan province: between Daran and Buin, 2500 m, Rechinger 47666 (type W, E, K, B); Alava 13706 (paratype TUR).

Affinities

Scorzonera helodes Rech.f. is related to *Scorzonera limnophila* Boiss., which belongs to "Subgen. *Scorzonera* Sect. *Dimorphopapposa* Lipsch." and is reported from Afghanistan and two locations in Iran: Dowrud (1500 m) in Lorestan province and Dena mountains (2500 m) in Fars Province (Rechinger 1977). *Scorzonera helodes* differs from *S. limnophila* in the following characteristics: Scape 10-15 cm long (not 2-5 cm long); tuber 10-15 mm diameter (not 3 mm); leaf lamina dimensions 40-50 × 5-12 mm (not 10-30 × 2-5 mm); involucre bracts 12-16 mm long (at flowering) and 20 mm (at fruiting), (not 10-14 mm long); achenes 6-8 mm long and brown (not 5 mm long and white); pappus 14-16 mm (not 10 mm).

The number of *Scorzonera* species of section *Dimorphopapposa* in Iran now reaches to two, including *S. limnophila* and *S. helodes*.

Identification key to the species of section *Dimorphopapposa*.

1. Scape 10-15 cm long. Tuber 10-15 mm diameter. Leaf 40-50 × 5-12 mm. Achenes 6-8 mm long and brown, pappus 14-16 mm long *S. helodes*
- Scape 2-5 cm long. Tuber 3 mm diameter. Leaf 10-30 × 2-5 mm. Achenes 5 mm long and white, pappus 10 mm long *S. limnophila*

REFERENCES

- Lendzion, K., Gornowicz, A., Bielawski, K., & Bielawska, A. 2021: Phytochemical Composition and Biological Activities of *Scorzonera* Species. – *Int.J.Mol.Sci.* 22(10):5128. doi: <https://doi.org/10.3390/ijms22105128>
- Linnaeus, C. 1753: *Species Plantarum*, Vol. 2: 790.
- Mahmoodi, M., Ghahremaninejad, F. & Maassoumi, A. 2022: Diversity of Vascular Plants in Damiarli Mountains (Zanjan Province, NW of Iran). –

- Rostaniha, 23 (Supplement 1): 1-131. doi: [10.22092/bot.j.iran.2022.356130.1274](https://doi.org/10.22092/bot.j.iran.2022.356130.1274).
- Rechinger, K. H. 1972: *Scorzonera*. In: *Symbolae Afghanicae* Vol. 2: 191–202. – Graz.
- Rechinger, K. H. 1977: *Scorzonera*. In: *Flora Iranica*, no. 122: 16–79. – Graz.
- Safavi, S. R. 2004: A new record and an interesting species of the genus *Scorzonera* L. from Iran. – *Iran. J. Bot.* 10 (2): 159–162. doi: [10.1029788.1383.10.2.8.7](https://doi.org/10.1029788.1383.10.2.8.7).
- Safavi, S. R. 2006a: A new species of *Scorzonera* (Asteraceae) from Khorasan, Iran. – *Nord. J. Bot.* 24(3): 261–264. doi: <https://doi.org/10.1111/j.1756-051.2004.tb00840.x>
- Safavi, S. R. 2006b: Notes on the genera *Scorzonera* L. and *Scolymus* L. (Asteraceae) in Iran. – *Iran. J. Bot.* 12(1):59–62. doi: [10.1029788.1385.12.1.10.1](https://doi.org/10.1029788.1385.12.1.10.1).
- Safavi, S. R. 2013: *Scorzonera*. In: *Flora of Iran*, no. 70: 353-442. – Tehran.
- Safavi, S. R. 2016: A new species of *Scorzonera* L. (Asteraceae) from Natanz Iran. – *Iran. J. Bot.* 22(1): 1–5. doi: [10.1029788.1395.22.1.1.2](https://doi.org/10.1029788.1395.22.1.1.2).
- Safavi, S. R. 2019a: *Scorzonera tomentosa* L. (Asteraceae), a new record for the Flora of Iran. – *Iran. J. Bot.* 25(1):40–43. doi: [10.22092/IJB.2019.119243](https://doi.org/10.22092/IJB.2019.119243).
- Safavi, S. R. 2019b: *Scorzonera incisa* (Asteraceae), as a new record from NW Iran. – *Nova Biologica Reperta*, 6 (3): 334–337. doi: [10.29252/nbr.6.3.334](https://doi.org/10.29252/nbr.6.3.334).
- Safavi, S. R. & Amini Rad, M. 2020: *Scorzonera alborzensis*, a new species of *Scorzonera* subgen. *Scorzonera* sect. *Nerrosae* (Asteraceae) from Iran. – *Iran. J. Bot.* 26(2): 93-99. doi: [10.22092/IJB.2020.343548.1290](https://doi.org/10.22092/IJB.2020.343548.1290).
- Thiers, B. 2016 [continuously updated]: *Index herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden, Bronx, NY. Available from: <http://sweetgum.nybg.org/ih/> (accessed 20 Jul 2022).
- Zaika, M. A., Kilian, N., Jones, K., Krinitsina, A. A., Nilova M. V., Speranskaya, A. S., Sukhorukov, A. P. 2020: *Scorzonera sensu lato* (Asteraceae, Cichorieae) – taxonomic reassessment in the light of new molecular phylogenetic and carpological analyses. – *PhytoKeys*. 137:1-85. doi: [10.3897/phytokeys.137.46544](https://doi.org/10.3897/phytokeys.137.46544).