IRANIAN JOURNAL OF BOTANY 26 (2), 2020
DOI: 10.22092/ijb.2020.343548.1290

SCORZONERA ALBORZENSIS, A NEW SPECIES OF SUBGEN. SCORZONERA SECT. NERVOSAE (ASTERACEAE) FROM IRAN

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Received 2020. 07. 04; accepted for publication 2020. 12. 01

Safavi, S. R. & Amini Rad, M., 2020. 12. 30: *Scorzonera alborzensis*, a new species of Scorzonera subgen. Scorzonera sect. *Nervosae* (Asteraceae) from Iran. *-Iran. J. Bot. 26 (2): 93-99.* Tehran.

A new species of *Scorzonera* (subgen. *Scorzonera* sect. *Nervosae* Lipsch.) is described and illustrated. *Scorzonera alborzensis* Safavi & Amini Rad collected from Siah Sang mountain in Central Alborz. It is related to the *Scorzonera cinerea* Boiss., in which it can be distinguished by the stems form and size, leaves size and arrangement, involucral bracts size, and achene size. An illustration and a scanned image of the type specimen of the new species are provided.

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Key words: *Scorzonera;* new species; alpine flora; Iran

Scorzonera alborzensis، گونه جدیدی از زیرجنس **Scorzonera** و بخشه **Nervosae** (**Asteraceae**) از ایران

سیدرضا صفوی: عضو هیأت علمی بخش تحقیقات گیاه‌شناسی مؤسسه تحقیقات جنگل‌ها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی تهران، ایران

محمد امینی‌راد: عضو هیأت علمی بخش تحقیقات گیاه‌شناسی مؤسسه تحقیقات جنگل‌ها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی تهران، ایران

گونه جدیدی از جنس Scorzonera (متعلق به زیرجنس Scorzonera و بخشه Nervosae) به همراه تعدادی تصویر معرفی می‌شود. Scorzonera alborzensis از کوه سیاه‌سنگ در البرز مرکزی جمع‌آوری شده است. این گونه از نظر ریخت‌شناسی نزدیک به Scorzonera cinerea است و با توجه به اندازه و شکل ساقه، اندازه و نحوه پراکندگی برگ‌ها بر روی ساقه، اندازه برگه‌های گریبانی و همچنین اندازه فندقه‌ها از آن متمایز می‌گردد. یک نقاشی و تصویر اسکن شده از نمونه تیپ گونه جدید نیز ارائه شده است.

INTRODUCTION

In preparation a taxonomical treatment for the genus *Scorzonera* L. (Linnaeus 1753) in Iran, the collections of *Scorzonera*, collected since 1998 have been examined in TARI Herbrium. Among the studied specimens, a new species of *Scorzonera* was found that had been collected from Siah Sang mountain in Central Alborz. This specimen was compared with many specimens of *Scorzonera* species deposited in the main Iranian herbaria (TARI, IRAN and TUH) and cross-checked with descriptions of *Scorzonera* species in Iran and neighbor floras as well (Chamberlain 1975; Komarov 1964; Rechinger 1955, 1977; Safavi & al. 2013); The studies reaveled that this specimen is new to science. Since the genus *Scorzonera* was revised by Rechinger (1977) for the Flora Iranica, Two new species (Safavi 2006a, 2016), one new variety (Safavi 2006b) and four new records has been added to flora of Iran (Dyanat-Nejad & al. 1998, Safavi 2004, 2019a, 2019b).

MATERIALS & METHODS

Specimens of *Scorzonera* species were collected from the alpine zones of Central Alborz Mountains. The specimen was identified using (Rechinger 1977; Safavi & al. 2013) determination keys. Morphological characteristics and other information of the newly collected species such as distribution, habitat and a key for identification of subgen. *Scorzonera* sect. *Nervosae* Lipsch. species in Iran were studied.

RESULTS & DISCUTION

New species

Scorzonera alborzensis Safavi & Amini Rad, **sp. nov.** (figs. 1, 2)

Type: Iran, Mazandaran, Baladeh to Nour road, Siah Sang Mt., 3023 m, 14 July 2019, Amini Rad 107037 (holotype TARI).

Fig. 1. *Scorzonera alborzensis* Safavi & Amini Rad (TARI).

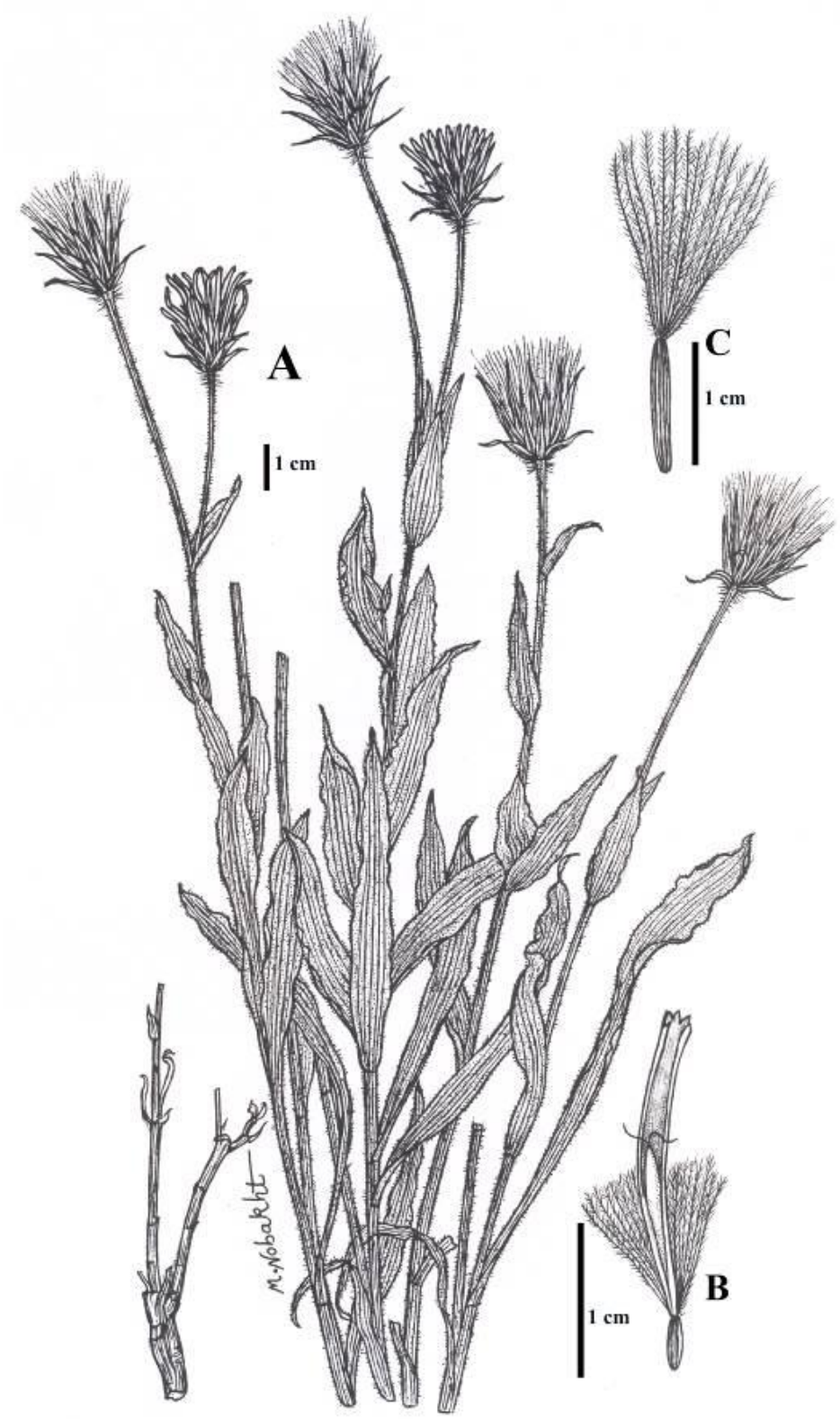

Fig. 2. *Scorzonera alborzensis* Safavi & Amini Rad (107037-TARI): (A) general view; (B) floret; (C) achene.

Perennial herb. Roots spindle, thick and vertical. Rootstock ± indurate, with a few remnants of dried petioles. Stems 25-35 cm, numerous, branched from base, erect, densely covered by sericeous-lanate hairs; leafy in all part. Leaves entire, lanceolate, with wavy margins and densely canescent-hairy; stem leaves 2-6 × 0.8-1.1 cm, three nerved, sessile; basal leaves 16-18 ×1-1.2 cm, five nerved, with petiole. Involucres campanulate, rounded at the base, 10-15 mm wide; phyllaries lanceolate, attenuate, acute, villose, with narrow-membranaceous margin and distinct middle vein; phyllaries length of inner row more than the others, 18-20 × 2-3 mm at flowering and 21-23 × 3-4 mm at fruiting. Capitula 1-2 per stem; ligules yellow, slightly longer than phyllaries. Achenes 11-12 mm, smooth and striate, dark brown, non stipitate. Pappus 14-16 mm, pale yellow, with numerous hairs; hairs plumos with bristles or serrulate, scabrous at the apx, central ones longer than marginal (figs. 1, 2, 3).

Etymology: The specimen has been collected from Siah-Sang Mt. in Central Alborz and accordingly the species was named alborzensis. Formerly, many botanists have mistakenly used the name Elburz instead of Alborz and thus, we use the correct name of the Alborz Mountains in this paper.

Distribution, habitat and phenology: *Scorzonera alborzensis* is known from the type locality in Central Alborz Mountains in N. Iran. It was found in high altitude slopes of Siah Sang Mountain with the rocky bed at 3023 m a.s.l. The new species is a narrow endemic (fig. 4). Flowers appear in June and mature achenes in July.

Fig. 3. *Scorzonera alborzensis* Safavi & Amini Rad: (A & B) capitule; (C) achene (107037-TARI).

Relationships: *Scorzonera alborzensis* is similar to *S. cinerea* Boiss. (1849), which belongs to subgen. *Scorzonera* sect. *Nervosae* Lipsch. and distributed in N, NW & C of Iran, Mazandaran (1900-2800 m), West Azerbaijan (2400-2700 m), East Azerbaijan (2100-2200 m), Tehran (2400-2900 m) and Qazvin (2000 m) provinces. It differs from *S. cinerea* in the following characters: rootstock with a few remnants of dead petioles (not covered by remaining dead petioles). Stems erect, densly covered with sericeous-lanate hairs (not more or less erect, appressed, green-grey indumentum), 25-35 cm long (not 30-45cm long). Leaves in all part of the stems (not in the three quarters bottom of the stem); leaf surface densely canescent-hairy (not with appressed grey-green indumentum); basal leaves 16-18 × 1-1.2 cm (not 10-20 × 0.8-2 cm); stem leaves 2-6 × 0.8-1.1 cm (not 2-11 × 0.2-2 cm). Involucral bracts villose (not hirsute-tomentose, grey-green); inner bracts 18-20 × 2-3 mm, at flowering and 21-23 × 3-4 mmat fruiting (not 15-20 × 3-5 mm at flowering and 20-25 × 4-6 mm at fruiting). Achenes 11-12 mm and dark brown (not 10-12 mm and white); pappus 14-16 mm and pea color (not 12-19 mm and brownish), tab. 1.

The number of *Scorzonera* species of section

Nervosae in Iran, now reaches to eight, including: *S. xylobasis* Rech. f.; *S. wendelboi* Rech. f.; *S. ispahanica* Boiss.; *S. veratrifolia* Fenzl; *S. cinerea* Boiss.; *S. alborzensis* Safavi & Amini Rad; *S. persica* Boiss. & Buhse; *S. latifolia* (Fisch. & C. A. Mey.) DC. An identification key for the species is provided bellow:

List of *Scorzonera* species (subgen. *Scorzonera* sect. *Nervosae*) in Iran

1. *S. xylobasis* Rech. f.; 2. *S. wendelboi* Rech. f.; 3. *S. ispahanica* Boiss.; 4. *S. veratrifolia* Fenzl; 5. *S. cinerea* Boiss.; 6. *S. alborzensis* Safavi & Amini Rad; 7. *S. persica* Boiss. & Buhse; 8. *S. latifolia* (Fisch. & C. A. Mey.) DC.

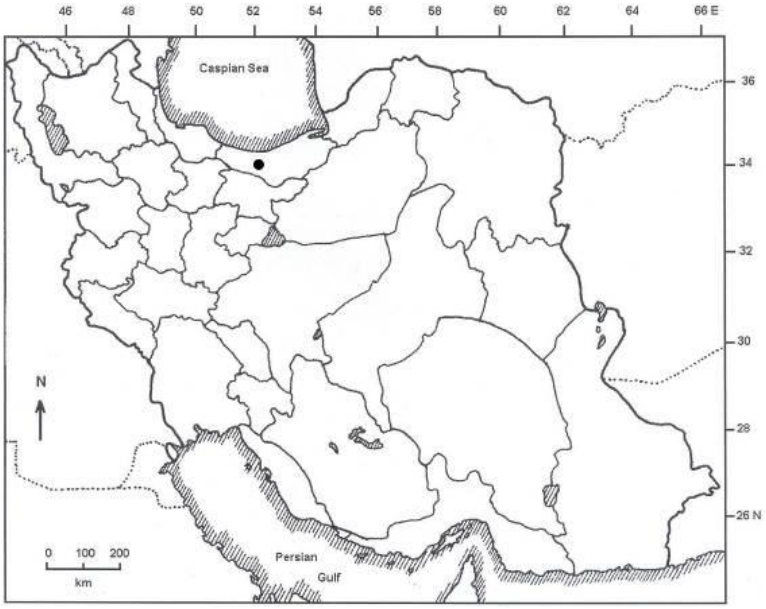

Fig. 4. Distribution map of *Scorzonera alborzensis* Safavi & Amini Rad in Iran.

Identification key to species of *Scorzonera* (subgen. *Scorzonera* sect. *Nervosae*)

1. Stem decumbent or flexuous, up to 20 cm height. Basal leaves 1-5 × 0.2-2 cm. Stem leaves 0.5-3 × 0.5-1.5 cm 2
-Stem erect, 20-40 cm height. Basal leaves 10-20 × 0.8-6 cm. Stem leaves 1-11 × 0.2-5 cm..... 3
2. Stem 15 cm long, with dense white tomentose-villose hairs. Involucral bracts with white-tomentose hairs, internal ones up to 14 mm long at flowering and up to 15 mm at fruiting ..... ***S. xylobasis***
-Stem up to 12 cm long, with scattered sericeous-lanate hairs. Involucral bracts surface lax villose, internal ones 14-18 mm long at flowering and 18-20 mm at fruiting ……. ..... ***S. persica***
3. Achenes covered by villose hairs..... 4
-Achenes glabrous..... 5
4. Stems numerous with white, pannose-tomentose persistent hairs. Peduncles shorter than the involucres. Involucres with white pannose persistent hairs. Achenes 8-10 mm ..... ***S. veratrifolia***
-Stems in small number with "grey-green, velutinous-tomentose hairs or glabrous". Peduncles longer than the involucres. Involucres with grey-tomentose indumentum or glabrous. Achenes up to 8 mm ..... ***S. latifolia***
5. Stems with lax floccose-tomentose hairs or glabrous-green. Upper leaves of the stem petiolate. Achenes 8-10 mm. Pappus with plumose hairs ..... ***S. ispahanica***
-Stems with dense-grey indumentums. Upper leaves of the stem without petiol. Achens 10-16 mm. Pappus plumose in the lower half and scabrous in the upper half 6
6. Stems decumbent-erect, dichotomusly branched. Involucral bracts a few lanate, internal ones 20 × 2-3 mm long at flowering and 26 × 2-3.5 mm at fruiting. Ligules longer than phyllaries ..... ***S. wendelboi***
-Stems more or less erect, branched. Involucral bracts hairy, internal ones 15-20 × 2-5 mm long at flowering and 20-25 × 3-6 mm at fruiting. Ligules slightly longer than phyllaries 7
7. Rootstock with a few remains of dead petioles. involucral bracts villose. Achenes dark brown. Pappus pale yellow ..... ***S. alborzensis***
-Rootstock covered by remains of dead petioles. involucral bracts hirsute-tomentose, grey-green. Achenes white. Pappus brownish ..... ***S. cinerea***

Table 1. Comparisons of morphological characters of *Scorzonera alborzensis* Safavi & Amini Rad and other members of subgen. *Scorzonera* sect. *Nervosae* Lipsch.

Diagnostic characters	*S. xylobasis*	*S. wendelboi*	*S. ispahanica*	*S. veratrifolia*	*S. cinerea*	*S. alborzensis*	*S. persica*	*S. latifolia*
Rootstock	with remains dead petioles	covered with remains dead petioles	covered with remains dead petioles	without remains dead petioles	covered with remains dead petioles	with a few remains dead petioles	covered with remains dead petioles	without remains dead petioles
Stems number; form & surface coating	numerous; flexuous, unbranched; dense white tomentose-villose hairs	numerous; decumbent-erect, dichotomus branched; dense, white-grey tomentose-lanate hairs	numerous; erect, unbranched; lax floccose-tomentose hairs or glabrous-green	numerous; erect, branched, white pannose-tomentose hairs	numerous; more or less erect, branched; appressed, green-grey indumentum	numerous; erect, branched; dense covere of sericeous-lanate hairs	in small number; decumbent, unbranched; scattered sericeous-lanate hairs	in small number; erect, branched; velutinous-tomentose hairs or glabrous
Stems length	15 cm	35-45cm	30-40 cm	20-70 cm	30-45 cm	25-35 cm	8-12 cm	30-80 cm
Leaves dispersion	in all long of the stems	in the bottom four-fifths of the stem	in the bottom half of the stem	in the bottom half of the stem	in the bottom three quarters of the stem	in all long of the stems	in the bottom three quarters of the stem	in all long of the stems
Leaves surface coating	white-tomentose hairs	tomentose-lanate hairs	floccose-lanate hairs	pannose-velutinous hairs	appressed grey-green indumentum	densely canescent-hairs	appressed sericeous-pilose	velutinous, grey-green hairs
Basal leaves size	3-5 × 1.5-2 cm	10-14 × 2-3 cm	10-12 × 2-4 cm	10-14 × 2-4 cm	10-20 × 0.8-2 cm	16-18 × 1-1.2 cm	1-3 × 0.2-0.7 cm	18-20 × 4-6 cm
Stem leaves size	2-3 × 0.5-1.5 cm	1.5-8 × 0.3-2.3 cm	1-8 × 0.2-1 cm	2-10 × 0.7-3 cm	2-11 × 0.2-2 cm	2-6 × 0.8-1.1 cm	0.5-2 × 0.05-0.4 cm	3-6 × 1-5 cm
involucral bracts surface	white-tomentose	a few lanate, in the lower half	gossypine lanate or glabrous	white-pannose	hirsute-tomentose, grey-green	villose	lax villose	tomentose-grey indumentum or glabrous
Inner involucral bracts size	13-14 × 2.5-3.5 mm (at flowering) 14-15 × 2.5-3.5 mm (at fruiting)	20 × 2-3 mm (at flowering) 26 × 2-3.5 mm (at fruiting)	10-12 × 2-2.5 mm (at flowering) 12-14 × 2-2.5 mm (at fruiting)	10-14 × 2-3 mm (at flowering) 14-17 × 3-4 mm (at fruiting)	15-20 × 3-5 mm (at flowering) 20-25 × 4-6 mm (at fruiting)	18-20 × 2-3 mm (at flowering) 21-23 × 3-4 mm (at fruiting)	14-18 × 2-3 mm (at flowering) 18-20 × 3-4 mm (at fruiting)	12-18 × 3-4 mm (at flowering) 17-25 × 4-5 mm (at fruiting)
Ligules color	yellow	sordid white	yellow	yellow	yellow	yellow	yellow	yellow
Ligules size	longer than phyllaries	longer than phyllaries	slightly longer than phyllaries	conspicously longer than phyllaries	slightly longer than phyllaries	slightly longer than phyllaries	conspicously longer than phyllaries	longer than phyllaries
Achenes color	pea color	pea color	pea color-brownish	pea color	white	dark brown	pea color	pea color
Achenes length	6-8 mm	12-14 mm	8-10 mm	8-10 mm	10-12 mm	11-12 mm	7-9 mm	6-8 mm
Pappus color	brownish	golden-brownish	sordid white-brownish	sordid white	brownish	pea color	sordid white	sordid white
Pappus length	10-12 mm	19-22 mm	10-12 mm	8-11 mm	12-19 mm	14-16 mm	8-12 mm	12-16 mm

Taxonomic notes: In this paper, *S. cinerea* Boiss. (subgen. *Scorzonera* sect. *Nervosae* Lipsch.) is considered as a related species to the *Scorzonera alborzensis* Safavi & Amini Rad. Recently, *S. cinerea* has been transferred to the genus *Gelasia* Cassini in a phylogenetic study (Maxim & al. 2020), based on molecular and anatomical ata analysis. In this account, 17 species of the genus *Scorzonera*, including different subspecies, from different sections, have been transferred to the genus *Gelasia*. Of these, the 6 following species occur in the flora of Iran: *S. latifolia* (Fisch. & C. A. Mey.) DC. and *Scorzonera rigida* Aucher ex DC., from section *Pulvinares* (Boiss.) Lipsch.; *S. cinerea* Boiss. and *S. seidlitzii* Boiss. from section *Nervosae* Lipsch.; *S. litwinowii* Krasch. & Lipsch. and *S. pseudolanata* Grossh. from section *Tuberosa* Lipsch.

These species belong to three different sections and they are distinguishable easily by the reproductive organs characteristics. However, the species included in the genus *Gelasia* are not morphologically similar. We decided to consider the new species in the genus *Scorzonera* for the time being, to reduce the complexity of this genus, until more data be achieved in these genera in future.

ACKNOWLEDGMENTS

The authors are very grateful to Mrs. Nobakht for drawing the illustration.

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