گونه‌ای جدید از سرده قدومه بخش *Alyssum* (تیره کلمیان) از ایران

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چکیده. نمونه هایی قابل توجه از مناطق جنگلی کجور، بین لشکناره و گندیس کلای استان مازندران جمع آوری گردید که شباهتهای زیادی با گونه *A. szowitsianum* دارد، با این تفاوت که میوه آنها فاقد کرک است. مطالعات بیشتر نشان داد که این نمونه‌ها گونه‌ای جدید است، که *A. mazandaranicum* نامیده می‌شود. این گونه جدید از مناطق همپوشانی بین دو ناحیه اروپا-سیبری و ایرانی-تورانی جمع آوری شده است. جمعیتهای دیگری نیز از این گونه با زیستگاه مشابه یافت گردید. در این تحقیق به شرح گونه و مقایسه آن با گونه نزدیک به آن پرداخته شد.

واژه‌های کلیدی. استان مازندران، چلیپائیان، شمال ایران، گونه جدید

A new species of the genus *Alyssum* section *Alyssum* (Brassicaceae) from Iran

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Abstract. Specimens collected from the forest areas of Mazandaran Province (Iran), Kojour, between Lashkenareh and Gandis-Kala village showed significant characteristics. At first glance, these specimens looked similar to *A. szowitsianum*, but with no indumentum on fruit. Further studies showed that those specimens belong to a new species, *Alyssum mazandaranicum* Mirzadeh & Assadi *sp. nov*., which was confined to the ecotone area between Euro-Siberian and Irano-Turanian regions. More populations of this new species were also found in other localities with similar ecological circumstances. Here, the new species is described, illustrated and compared with the closest taxon.

Keywords. *Alyssum*, Cruciferae, Mazandaran province, N. Iran, new species

INTRODUCTION

The Brassicaceae family comprises 49 tribes, 321 genera, and 3660 species, of which 20 genera and 34 species remain to be assigned to tribes (Al-Shehbaz, 2012). Genus *Alyssum* consists of about 170-195 species worldwide, native to Europe, Asia and northern Africa (Al-Shehbaz, 1987; Appel & Al-Shehbaz, 2003; Warwick *et al*. 2006; Li *et al.*, 2014). Most of its species grow on rocky slopes in arid regions. 28 species and 7 varieties were introduced in Iran (Rechinger, 1968). Later, *A. stipitatum* Kavousi & T.R.Dudley, *A. mozaffarianii* Kavousi and *A. hezarmasjedense* Kavousi & Nazary were described (Kavousi, 2001; Kavousi *et al*., 2014).

Comprehensive taxonomic studies of *Alyssum* in Iran are rare; therefore, the first author started a

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Fig. 1. Plant on sheet of Herbarium (*A. mazandaranicum).*

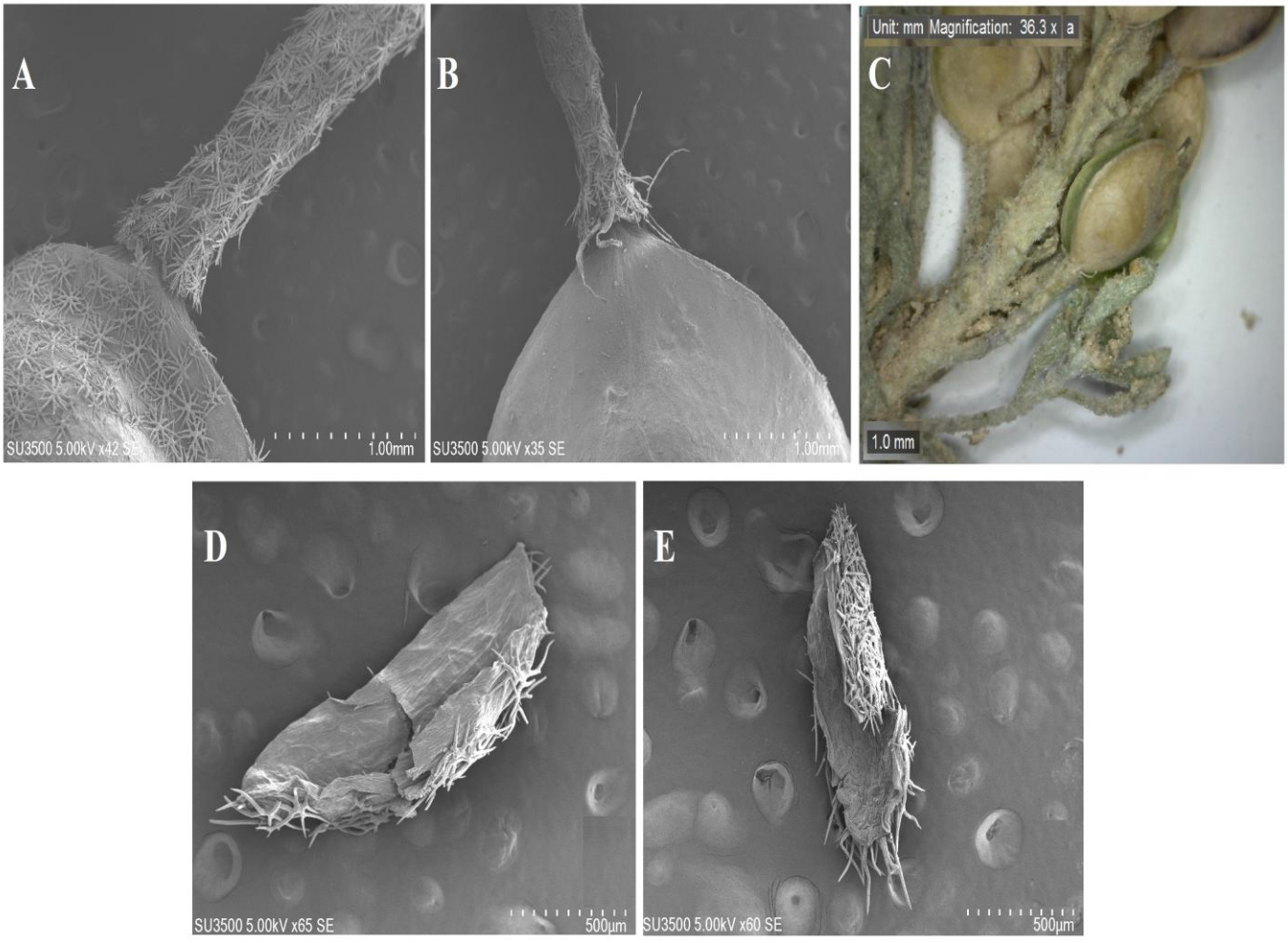


Fig. 2. A: Silicule of *A. szowitsianum*; **B**: Silicule of *A. mazandaranicum*; **C**: Inflated Pedicel of *A. mazandaranicum*; **D**: Sepals (*A. szowitsianum*); **E**: Sepals (*A. mazandaranicum*).

taxonomic revision of the genus in Iran in the framework of a Ph.D. research project. Herbarium specimens from large herbaria in Iran (TARI, IRAN) and the Natural History Museum of Vienna (W) were also studied.

In addition, excursions to different parts of Iran to collect new specimens and field observations were made. This paper aims to describe the new species and compare it with the close affinities.

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MATERIAL AND METHODS

The new species was first collected in 2012 by the first author from the higher areas of forests in Kojour, between Lashkenareh and Gandis-Kala villages, Mazandaran Province, Iran. Fifteen individuals' were collected from this location. Flora Iranica (Rechinger, 1978), Flora of Turkey (Dudley, 1965), Flora of Iraq (Townsend & Guest, 1980), Flora of the USSR (Bush, 1939) and Flora Europaea (Dudley & Ball, 1964) were used to compare the new species with the taxa reported by them.

All specimens of TARI and IRAN were examined. Two other populations of the species were also found among unidentified materials. Characteristics of this species were compared with those of *A. szowitsianum* Fisch. & C.A.Mey. as its closest affinity.

The samples were examined with a binocular microscope and Planapo lens at 7.5 X to 64.5 X magnifications. Silicules and pedicels of dry samples were selected for scanning electron microscopy (SEM). They were mounted on the stubs using double-adhesive tapes and coated with gold-palladium. Coated specimens were viewed with a SU 3500 Electron microscope at 15kv.

RESULTS AND DISCUSSION

Remarkable morphological characters of the new species include its glabrous silicule with inflated pedicels, 2 seeds in each silicule, petals clearly exceeding from the sepal, and monomerphic sepals. These characters indicate that the new species belong to the *Alyssum* sect. *Alyssum*. Among the species of this section *A. szowitsianum* is the closest affinity.

Taxonomy

Alyssum mazandaranicum Mirzadeh & Assadi, *sp. nov.* (Figs.1 , 2)

Typus. Iran, Mazandaran province, Kojour, between Lashkenareh and Gandis-Kala villages, higher areas of forest with scattered trees, 1158 m,12.06.2012, Mirzadeh 101593 (holotypus TARI!, isotypi T!, W!).

Species nova differt a *A. szowitsianum* siliculis glabris (non pilis stellatis), sepalis linearis (non ovatis), stylis glabris (non ad basem pilosis). Annual, 5-9 cm high, branched from the base, ascending, stellate hairy. Leaves oblanceolate, linear or spathulate, 1-1.3-×0.2-0.3 cm, stellate–hairy.

Racemes elongating in fruit, 2.5 to 4 cm long. Pedicles in fruiting stage 3-4 mm long, stellate-hairy with unequal rays, inflated, slightly spreading.

Sepals linear, 1.5-1.7×0.5 mm, membranous at margin, deciduous, stellate-hairy. Petals long cordate, sometimes narrowed at the middle, yellow, sparsely hairy on the upper surface, glabrous below. Long filaments 1 mm long, entire or unilaterally toothed above the middle; short filaments 0.7 mm long, toothed above the middle.

Ovary with 2 ovules in each loculus. Silicule 4×3-3.5 mm, elliptic-ovate, inflated on one side, flat on the other side, truncate or emarginated at the apex, often 2 seeded, glabrous. Nectar gland long. Style 0.5-0.7 mm. long, broad at base. Seeds 1.5-1.7× 1.2-1.5 mm, wingless or with narrowly winged.

Etymology. Specific epithet refers to the province Mazandaran (Iran), where type specimens were collected.

Other specimens studied. Iran. Gilan province, Asalem to Khalkhal, Kerman village, Moradi 102832 (TARI); Azarbayejan province, Arasbaran protected area, Mahmoodkaghi, above Ebrich-Jadid, Hamzeh'ee & Asri 81416 (TARI).

Distribution. The new species is endemic to transitional areas between Euro-Siberian and Irano-Turanin regions in Iran (Fig. 3).

Ecology. The new species grows in an open forest with scattered trees of mainly *Fagus orientalis* Lipsky and *Ulmus glabra* Hudson.

Chromosome number. The chromosome number of this species is determined to be 2n=4x=32 (x=8) (Fig. 4).

A. mazandaranicum is closely related to *A. szowitsianum*, but with spreading pedicles, elliptical silicules, shape and size of petals, style size, seed size, 2 ovulate loculus and apical placentation.

The two species may be readily distinguished on sepal morphology, leaf size, silicule size and indumentums, nectar glands, pedicel trichomes, chromosome number and geographical distribution, as summarized in Table 1.



Fig. 3. Distribution of *Alyssum szowitsianum* (●) and *A. mazandaranicum* (▲) in Iran.

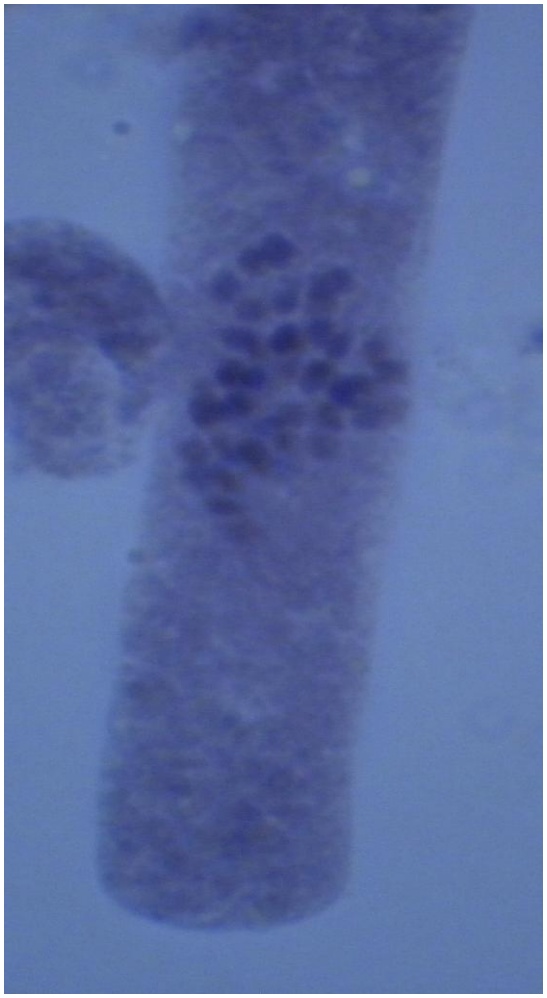


Fig. 4. Chromosome number of *A. mazandaranicum* (2n=32).

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Table 1. Comparison of morphological characteristics between ***A. mazandaranicum*** and *A. szowitsianum*.

	A.mazandaranicum	*A. szowitsianum*
Leaf	Linear, spathulate and oblanceolate	Oblanceolate
Leaf size (mm)	10-11×2-3	13-40×2.5-8
Petal Size(mm) and Shape	1.2-2×0.2-0.7, long cordate	1.5-1.7×0.5, long cordate
Sepal form	Linear	Ovate
Style size(mm)	0.5-0.7	0.5-1
Silicule	Glabrous, elliptic-ovate	Hairy, elliptic
Silicule size(mm)	4× 3-3.5	3.5-5×3-4.5
Ovulate loculus	2	2
placentation	apical	apical
Style	Glabrous	Hairy at base or glabrous
Pedicel	Spreading and Swollen	Spreading and Swollen
Trichomes of pedicel	With unequal rays	With equal rays
Seed size(mm)	1.5-1.7 × 1.2-1.5	1.2-2 × 1-1.5
Geographical distributions	North of Iran (Mazandaran & Azarbayejan provinces.)	Mostly in center and south of Iran
Nectar glands	Long	very short
Chromosome number	2n=32 (Fig. 4)	n=8, 2n=16 (Ghahremaninejad *et al*., 2013; Aryavand,1975) 2n=14 (Ghahremaninejad *et al*., 2013; Bolourian *et al*., 2011)
Floristic region	Transitional area of Irano-Turanian and Euro-Siberian Regions	Irano-Turanian region

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