

ONOSMA ALBURZENSIS (BORAGINACEAE), A NEW SPECIES FROM CENTRAL ALBURZ MOUNTAINS, NORTH IRAN

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A new species of genus *Onosma* is described from Central Alburz Mountains, N. Iran. *Onosma alburzensis* is placed in the sect. *Onosma* subsect. *Asterotricha* (Boiss.) Gürke based on its stellate-hairy tubercles. Its closest taxon is *Onosma cardiostegia* Bornm., which is distributed in the west of Iran, and differs from it by the shape and size of bracts and sepals, indumentum type, indumentum of the corolla, as well as distribution range. The new species is the first taxon of subsect. *Asterotricha*, which is present out of the previous distribution range. The ecology, distribution, and conservation status of the new species are noted. Also, illustrations and a distribution map of the new species and its relative are presented.

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Onosma alburzensis, گونه جدیدی از کوههای البرز مرکزی از شمال ایران

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گونه جدیدی از جنس *Onosma* از کوههای البرز مرکزی از ایران شرح داده می‌شود. *Onosma alburzensis* با توجه به داشتن غده‌های کرک‌دار در قاعده کرکهای زیر بلند در زیربخش *Asterotricha* قرار می‌گیرد. این گونه با *Onosma cardiostegia* در شکل و اندازه برگ‌ها و کاسبرگ‌ها، نوع کرک‌پوش، کرکهای بیرونی جام گل و همچنین پراکنش جغرافیایی تفاوت دارند. این گونه اولین آرایه از زیربخش *Asterotricha* است که خارج از محدوده جغرافیایی این زیربخش دیده شده است. اکولوژی، پراکنش و وضعیت حفاظتی گونه بحث می‌شود. همچنین، نقشه پراکنش، تصویر گیاه و سایر اطلاعات این گیاه ارائه شده است.

INTRODUCTION

Onosma L. includes ca. 170 taxa in the world (Naqinezhad & Attar 2016). Most taxa are distributed in SW Asia, Central Asia, and the Mediterranean area, on the steppe and open habitats (Kolarčik & al. 2015; Binzet 2016). Diversity centers of the genus are Iran, Turkey (Anatolia), and Central Asia (Teppner 1991;

Binzet & al. 2014). In Iran, many species occur at the margin of oak forests in the Zagros Mountains.

Boissier (1879), divided *Onosma* species into three groups: *Haplotricha* with glabrous setae tubercles, *Asterotricha* with stellate hairy setae tubercles, and *Heterotricha* with irregularly hairy setae tubercles. In Flora Iranica, Riedl (1967) used three sections:

Protonosma M.Pop., *Podonosma* (Boiss.) Gürcke, and *Onosma*. The section *Onosma* was divided into two subsections: subsect. *Onosma* and subsect. *Asterotricha* (Boiss.) Gürcke. The important diagnostic characters of this section are indumentum type, anther position, calyx size, and color of the corolla. Also, changing the color of the corolla and increasing the size of calyx during drying of the plant can be used for distinguishing the taxa. Kolarčik & al. (2010, 2014) studied the evolution and phylogeny of *Onosma* in the south and center of Europe based on nrDNA ITS, AFLP, and plastid *rpl32-trnL* sequence data as well as karyological evidence. Their results confirmed the monophyly of the subsect. *Asterotricha* and the hybrid origin of the *Heterotricha* group which was mentioned as a sect. *Heterotricha*.

During the study on the genus *Onosma*, an interesting specimen of subsect. *Asterotricha* was found from the steppe area of Central Alburz Mts. The collected specimens were studied at TUH, IRAN, and TARI. The literatures related to *Onosma* of Iran and adjacent regions were also studied (Candolle 1846; Boissier 1879; Popov 1951, 1953; Riedl 1967, 1978; Ponert 1973; Teppner 1980; Binzet 2016; Ghahreman & Attar 1996; Khatamsaz 2002; Attar & Joharchi 2007; Attar & Hamzeh'ee 2007; Mehrabian & al. 2013; Saman 2014; Mehrabian & Mozaffarian 2018; Almasi & Ranjbar 2015; Naquinezhad & Attar 2016). Further studies demonstrated that the specimen is related to *Onosma cardiostegia* Bornm.

MATERIALS AND METHODS

Specimens of *Onosma* species were collected from the alpine zones of the Central Alburz Mountains. The specimens were identified using different floras. Morphological terminology is based on Flora Iranica (Riedl 1967) and Flora of Turkey (Riedl 1978). The holotype is deposited and preserved in IRAN Herbarium.

RESULTS & DISCUSSION

Onosma alburzensis Attar, Amini Rad & Mirtadzadini, **sp. nov.** (figs. 2, 3)

Type: Iran, Qazvin, Alamout Road, 22 km from Kuraneh to Rajae Dasht, 2280 m a.s.l., 6 June 2017 Amini Rad 74588 (holotype IRAN). *Paratype:* Qazvin: ca. 22 km from Koraneh to Rajae Dasht, 2280 m, 20.06.2021, Amini Rad 108473 (TARI); Gilan, Tarom valley, 65 km to Zanjan from Abbar, N 36 48 05.5 E 48 33 51.8, 1389 m a.s.l., 21 May 2016 Mirtadzadini 3146 (MIR, TUH).

Caespitose, perennial with lignified rootstocks.

Stem simple or rarely few branched, about 30 cm long, with numerous sterile shoots, covered with dried petioles at the base, usually erect, covered with erect-spreading and long (up to 4 mm) hairs. Leaves covered with robust white erect or spreading setae arising from appressed stellate hairy tubercles, shortly pubescent between tubercles; midrib prominent; leaves of sterile shoots narrow lanceolate, 3-12 cm × 3-10 mm. Basal and lower cauline leaves 7-10 cm × 3-7 mm, narrowly lanceolate, attenuate towards base into long petiole (15-20 mm long); middle and upper leaves sessile, similar to the lower but smaller, 20-45 × 3-7 mm. Inflorescence of 1-3 terminal or subterminal few-flowered scorpioid cymes, 2.5-5 cm long. Bracts lanceolate, 15-20 mm long, 2-3 mm wide. Pedicels 2-3 mm long with spreading setae. Calyx 12-13 mm long, accrescent in fruit up to 18 mm; lobes 5, divided to base, linear or linear-lanceolate, acute, 1-2 mm wide, outside covered with white adpressed setae; mixed with short hairs inside. Corolla 20-21 mm long, lobes 2.5 mm wide and 1 mm long. Anthers sagittate, included, 6.5-7 mm long, connate at base, apical sterile appendage 0.5-0.7 mm long. Filaments ca. 3.5 mm, arising from the base of the corolla tube. Annulus ca. 2 mm wide, glabrous, lobulate, crescent. Nutlets 7 mm long, 4-4.5 mm in diam., shining white, ovate, trigonal, acuminate (fig. 4).

Phenology

Flowering in May-June; fruiting in July-August.

Distribution and habitat

Onosma alburzensis is known from the western part of Central Alburz and grows on gravelly slopes of cold and dry mountain steppes, at 1390-2280 m a.s.l. It is an endemic species to the Irano-Turanian Region.

This species is geographically ca. 380 km far from the other members of the subsect. *Asterotricha* which have stellate setae. This is the first species of *asterotricha* group in the Alburz (Elburz) Mountain range, located in the north of Iran plateau. Other members of this group are distributed in the west and northwest of Iran. (fig. 1)

Etymology

The specific epithet refers to Mts. Alburz (Elburz) in North of Iran.

Additional specimens examined

Onosma cardiostegia: Kurdistan Province, Marivan, Dezli, Jalaneh pass, 1900 m a.s.l., Attar & Mirtadzadini 46629 (TUH); same location: 2226 m a.s.l., Attar, Advay & Mirtadzadini 48431 (TUH); Marivan, Dezli pass, bifurcation of Oramanat-Paveh, 2400 m a.s.l., Attar, Advay & Mirtadzadini 48432 (TUH).

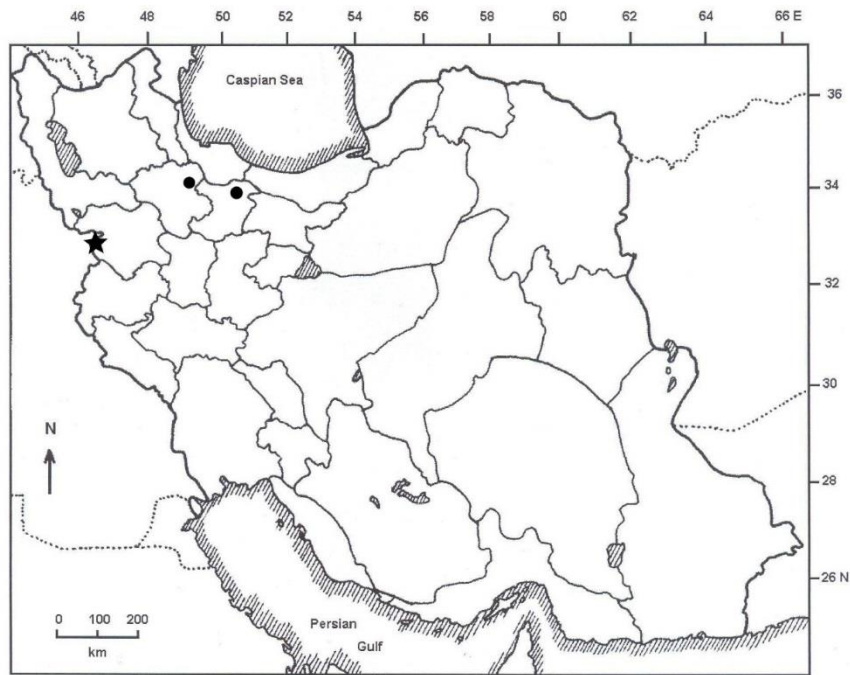


Fig. 1. Distribution map of the species. ● *Onosma alburzensis*; ★ *O. cardiostegia*.

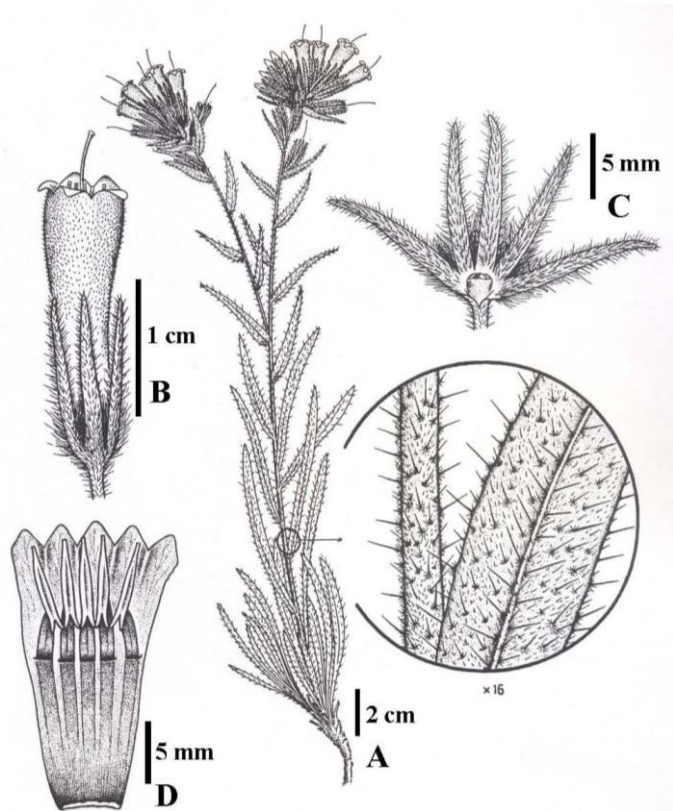


Fig. 2. *Onosma alburzensis*. A. Habit; B. Flower; C. Calyx; D. Corolla.



Fig. 3. *Onosma alburzensis*. Holotype (74588-IRAN).

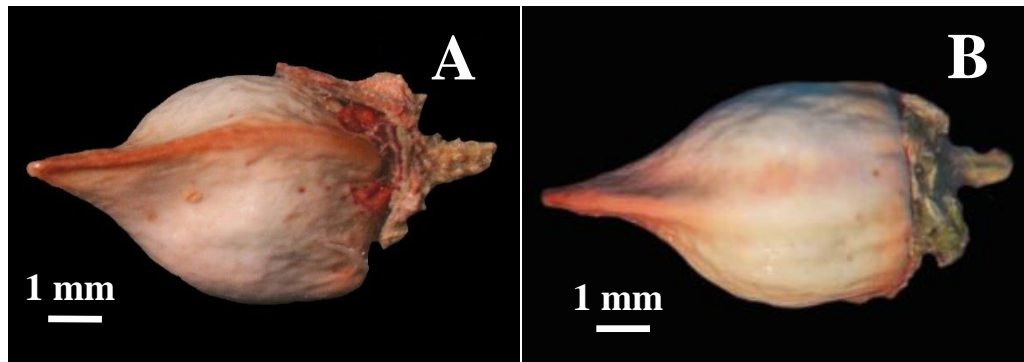


Fig. 4. Nut; A. Ventral surface; B. Dorsal surface.

Taxonomical remarks

Onosma alburzensis is most closely related to *Onosma cardiostegia* which belongs to sect. *Onosma* subsect. *Asterotricha* (Riedl 1967; Khatamsaz 2002).

According to Riedl (1967), *Onosma cardiostegia* is a rare species in the west of Iran and Iraq. It has a compact and multi-flowered cyme and yellow corolla.

Onosma alburzensis is similar to *O. cardiostegia* by the stellate hairy bulb, glabrous annulus but there are some morphological differences between them such as corolla color, size, and shape of bracts and number of hairs of tubercles that are summarized in table 1. Also, the distribution of *O. cardiostegia* is very far from to new species.

Table 1: Comparison of the morphological characters of *Onosma alburzensis* and its relative *O. cardiostegia*.

Characteristics	<i>O. alburzensis</i>	<i>O. cardiostegia</i>
Plant height (cm)	±30	15-25
Hair density of tubercles	loose, few	dense, numerous
Basal leaf shape	narrow lanceolate	oblong-spathulate or linear-spathulate
Leaf margin	flat	revolute
The shape of stem leaves	narrow lanceolate	flattened
Petiole of basal leaves	attenuate towards base	very short or absent
Petiole size	15-20 mm long	very short or absent
Inflorescence length (cm)	2.5-5	12-13
Bract (mm)	15-20 × 2-3	30 × 17
Calyx length (flowering state) (mm)	12-13; lobes equal	15-17; lobes unequal in length and width
Calyx length (fruiting state) (mm)	18	25-27
Corolla	in upper half pubescent	glabrous
Filament length (mm)	3.5	12-14

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