

Teucrium elymaiticum (Lamiaceae): a new species for Flora of Iran

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Abstract. A new endemic species from western Iran, *Teucrium elymaiticum* Attar, Sotoodeh & Mirtadzadini, *spec. nova* is described. It belongs to section *Scordium*. Considering the combination of some characteristics like indumentum, bracts, pedicel, calyx, corolla size, and nutlet shape and size, the new species is related to *T. scordium* subsp. *scordioides* (Schreb.) Arcang.. The differences between these two species are highlighted. Images, distribution map and an updated identification key for the genus are presented.

Keywords. *Teucrium elymaiticum*; section *Scordium*; Lamiaceae; taxonomy; endemism; Ilam; Iran.

Teucrium elymaiticum (Lamiaceae): una nueva especie para la flora de Irán

Abstract. *Teucrium elymaiticum* Attar, Sotoodeh & Mirtadzadini, *spec. nova* es una nueva especie endémica encontrada en Irán occidental. Pertenece a la sección *Scordium*. Basándose en la combinación de algunos caracteres morfológicos, como indumento, brácteas, pedicelo, cáliz, tamaño de la corola, la forma y el tamaño del fruto, la nueva especie está próxima a *T. scordium* subsp. *scordioides* (Schreb.) Arcang.. Se destacan las diferencias entre ambas especies y se presentan las imágenes, mapas de la distribución y la clave de identificación actualizada para el género.

Keywords. *Teucrium elymaiticum*; sección *Scordium*; taxonomía; Lamiaceae; endemismo; Ilam; Irán.

Introduction

Teucrium L. is a large genus of Lamiaceae with more than 260 species in the world (Tutin & Wood 1972; Harley *et al.* 2004). This genus is distributed in the Mediterranean region, which is a major speciation center of the genus (Tutin & Wood, 1972; Cantino *et al.*, 1992; Navarro & El Oualidi, 2000; Harley *et al.*, 2004; Crespo *et al.*, 2018).

Teucrium is distinguished from the other members of Lamiaceae by lack of corolla upper lip and non-gynobasic style (Navarro & El Oualidi, 2000; De Martino *et al.*, 2010). Based on the general habit of the plant, leaf type, calyx shape, and inflorescence structure, the genus has been divided into seven sections, six of them are included in the Flora Iranica (Rechinger, 1982).

A total of 19 taxa of *Teucrium* naturally occur in Iran, three of them are endemic which mainly grow in the Irano-Turanian region between 700 and 2000 m above sea level (Rechinger, 1982; Jamzad, 2012). Besides, *T. persicum* Boiss., a Saharo-Sinidian element, is present only at elevations of southern regions, and *T. hyrcanicum* L. (with bilabiate calyx), a hyrcanian element, grows in north of Iran. Some species like *T. polium* L. and *T. orientale* L., are widely distributed in

steppes, arid, and semiarid regions of Iran (Eshratifar *et al.*, 2011).

During a field trip to Ilam in 1996, a province located in western Iran, an interesting specimen of *Teucrium* was collected. A careful examination of the morphological features of the specimen revealed that it did not correspond with any of the previously described species and it was determined that the specimen is a new species to flora of Iran.

The aim of this paper is to provide a detailed morphological description, information on habitat, a distribution map of the new species, and its morphological relationship with its allied species. This new species is similar to *Teucrium scordium* subsp. *scordioides* (Schreb.) Arcang., but it differs by its indumentum, bracts, pedicel size, calyx length, corolla diameter, verticillasters and nutlet size and shape.

Material and Methods

The new species was found during a systematic revision of *Teucrium* specimens of Iran at Central Herbarium of Tehran University. The specimen was compared

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meticulously with different Iranian *Teucrium*, regional and non-regional collections in various European (G, K, P) and Iranian (IRAN, MIR, TUH) herbaria, and checked in several floras (Yuzepchuk, 1954; Tutin & Wood, 1972; Ekim, 1982; Rechinger, 1982; Jamzad, 2012).

In total, 10 quantitative and qualitative morphological traits were studied (Table 1). Indumentum, flowers and nutlets were photographed by Dino-Lite Handheld Digital Microscope AM413T. The general views of the plant were done with Canon PowerShot SX260 HS camera. All micro-measurements were done using integrated software of Dino-Lite Digital Microscope. A

magnification of 35x has been used for photography of indumentum of leaves and calyx, and 186x for nutlets.

Results

Teucrium elymaiticum Attar, Sotoodeh & Mirtadzadini, *spec. nova*

Holotypus: Iran, Ilam, Road of Darreh-shahr, 50 km to Darreh-shahr, 1000 m, 5 July 1996, *Attar; Mirtadzadini, Sheikh-al-eslami 19889* (TUH) (Figure 1); *Isotypes*: MIR, P.

Etymology. The species name *elymaiticum* refers to the Elamite Empire (c. 1210 – 1100 BC) where Ilam province is a part of.

Table 1. Morphological comparison between *Teucrium elymaiticum* sp. nov., *T. scordium* subsp. *scordioides* and *T. melissoides*, from Flora Iranica (Rechinger 1982), and new observations.

	<i>Teucrium elymaiticum</i> spec. nova	<i>T. scordium</i> subsp. <i>scordioides</i>	<i>T. melissoides</i>
Plant indumentum	Densely velutinouse	Sparsely hairy to subglabrous	White or grey appressed velutinouse, rarely subglabrous
Leaves blade	20–30 x 10–15 mm	10–40 x (4–) 6–15 mm	ca. 45 x 20 mm
Bracts	4–5 mm long, shorter than pedicel	8–18 mm long, longer than pedicel	ca. 14 mm long, longer than pedicel
Pedicel size	6–9 mm	8–12 mm	5–8 mm
Calyx length	4.5–5.5 mm	3–4.5 mm	4–5 mm
Calyx teeth	Shorter than ½ tube– 1.3–1.6 mm	Equaling or longer than ½ tube, 1.5–2 mm	Equaling or a little longer than 1/3 of tube, 1.3–1.8 mm
Corolla	Lilac, 6 mm	Purplish-pink, 7–10 mm	White, yellowish at base, 7–8 mm
Verticillasters	1–6 flowered, dense	1–4 flowered, not dense	2–4 flowered, not dense
Nutlet	1 x 0.5 mm, dark brown, rugose, oblong, slightly narrower towards base, covered by brilliant stipitate glands	0.7 x 0.3 mm, brown, reticulate-scribuculate, ellipsoid-oblong, covered by brilliant stipitate glands	1.5 x 1 mm, brown, rugose, broad-ovate, more or less spherical, covered by stipitate glands

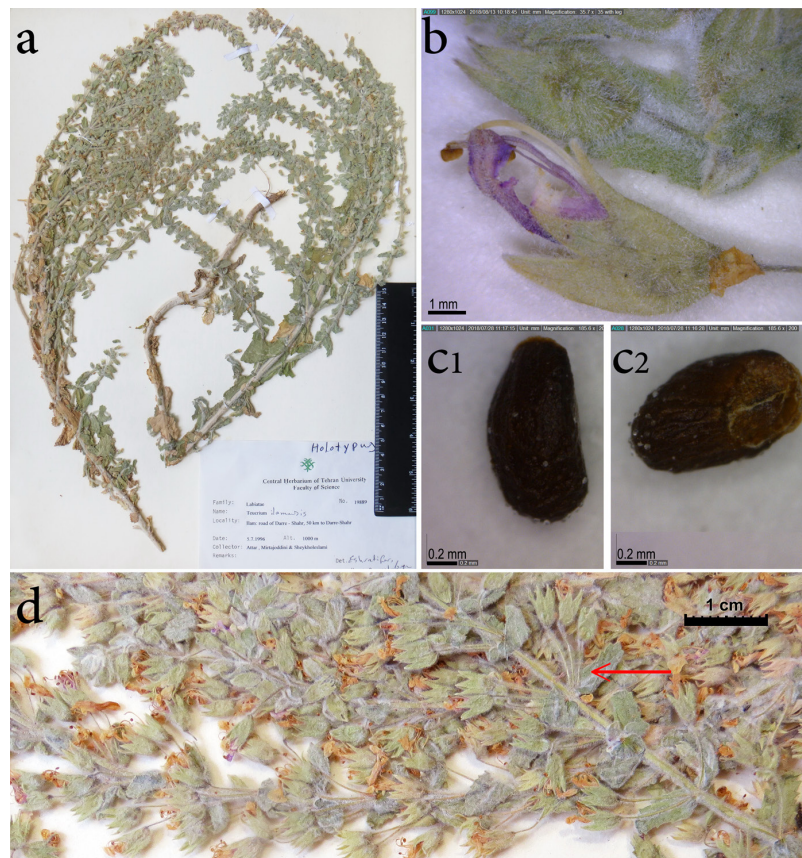


Figure 1. *Teucrium elymaiticum* Attar, Sotoodeh & Mirtadzadini, *spec. nova*. a) Herbarium specimen (holotype: TUH), b) Flower at anthesis, c) Nutlet (c1 – view from above, and c2 – view from the bottom), d) Bracts and verticillasters (pointing with arrow).

Description

Perennial herb, 30–50 cm tall. Stems erect-ascending, repeatedly branched from the base, branches more or less quadrangular but ridges rounded, densely canescent-velutine. Leaves oblong, truncate at base, acute, irregularly dentate on margin, sessile, abaxial surface densely velutinous, adaxial surface sparsely to moderately velutinous, 20–30 x 10–15 mm. Bracts shorter than flowers, leaf-like, gradually reduced, ca. 4–5 x 1–1.5 mm. Inflorescence axillary, elongate; verticillasters 1–6-flowered, about 50 verticillasters in the main and about 20 in the lateral branches. Pedicels thin, about 0.2 mm thickness, 6–9 mm long. Calyx grayish-green, campanulate, gibbous at base, 4.5–5.5 mm long, densely tomentose, tube length 2.7–3.4 mm, calyx teeth divided to 1/3, 1.3–1.8 mm long, ca. 1 mm width at base, triangular, equal, shorter than tube. Corolla lilac, ca. 6 mm long, outer surface sparsely to moderately hairy. Stamens inserted ca. 1.5 mm above base of corolla, exserted. Filaments hairy in the lower half, filaments to 8 mm long, a little curve-ascending. Anthers nearly oblong-reniform, ca. 0.4 mm long, mediofixed, with a few glands around attachment

with filament. Nutlets 1 x 0.5 mm, oblong, slightly narrower towards base, dark brown, rugose, covered by brilliant stipitate glands.

Taxonomic relationships

Regarding to the Flora Iranica (Rechinger, 1982), the morphologically closely related species is *T. scordium* subsp. *scordioides*, so we compared with it as the following diagnosis.

Teucrium elymaiticum can be distinguished from *T. scordium* subsp. *scordioides* (Figure 2) by a combination of the following characters: densely velutine indumentum (vs. sparsely hairy to sub-glabrous), bracts shorter than pedicel (vs. longer than pedicel), verticillasters ca. 50 in the main branch (vs. ca. 25), 1–6 flowered and dense (vs. 1–4 flowered, not dense), pedicel 6–9 mm long (vs. 8–12 mm), calyx length 4.5–5.5 mm, (vs. 3–4.5 mm), corolla diameter 6 mm (vs. 7–10 mm), nutlet 1 x 0.5 mm, oblong, slightly narrower towards base, dark brown, rugose (vs. 0.7 x 0.3 mm, brown, reticulate-scribbulate, ellipsoid-oblong).



Figure 2. *Teucrium scordium* subsp. *Scordioides*. a) Herbarium specimen (TUH), b) Flower after the anthesis, c) Nutlet, (c1 – view from above, and c2 – view from the bottom), d) Bracts and verticillasters.

Habitat, ecology and distribution

Teucrium elymaiticum occurs on rocky slopes at margin of xerophyte oak (*Quercus brantii* var. *persica* (Jaub. & Spach) Zohary) woodlands of Ilam province, near

Darreh-Shahr, in West and South-West of Iran, ca. 1000 m a.s.l. (Figure 3). Being located in the western part of Zagros Mountains gives the province its special landscape which feature hot summers and mild winters and fairly high annual precipitations (about 400 mm)

mostly in form of rain, although snow is not rare. The climate of the region is semi-arid, and the soil texture is mostly sandy loam and silt loam. *Teucrium elymaiticum* was found growing together with some species such as

Cousinia jacobsii Rech. f., *C. calocephala* Jaub. & Spach, *Nepeta laxiflora* Benth., *N. glomerulosa* Boiss., *Onosma rostellatum* Lehm., *O. sericeum* Willd., *Salvia bracteata* Bank. & Soland., *S. multicaulis* Vahl., *S. ceratophylla* L.

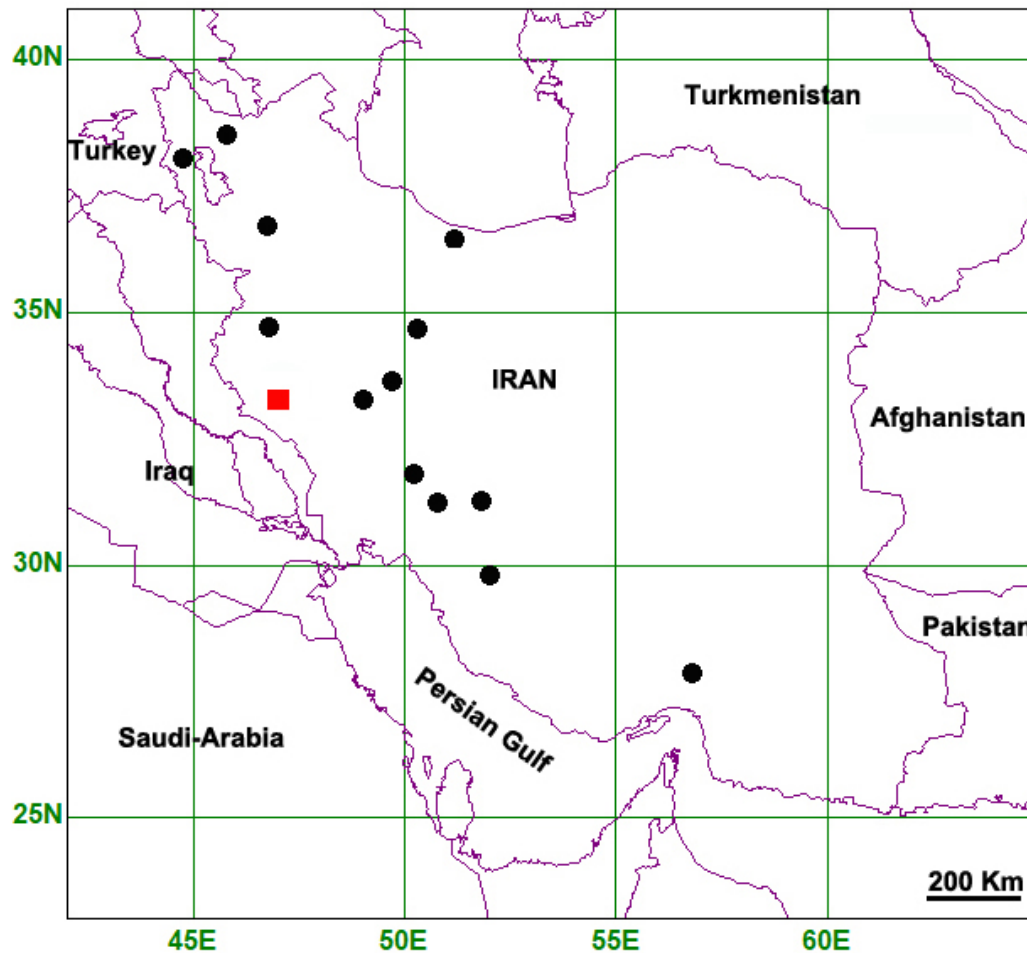


Figure 3. Distribution map of *Teucrium elymaiticum* Attar, Sotoodeh & Mirtadzadini, *spec. nova* (■), and *T. scordium* subsp. *scordioides* Arcang. (●).

Discussion

Based on some morphological characters, *Teucrium elymaiticum* belongs to section *Scordium* Boiss., with affinities to *T. scordium* subsp. *scordioides*. This section is characterized by being perennial and stoloniferous herbs and having toothed leaves, like *T. scordium* and *T. melissoides* from Iran (Rechinger, 1982; Ekim, 1982). The new species has some unique and remarkable features among the 19 species of Iranian *Teucrium* such as difference in nutlet shape and size, dense indumentum, short bracts and dense verticillasters. It shares some characteristics with two other species in the section *Scordium*, and it is mostly similar and related to *T. scordium* subsp. *scordioides* in habit, but it is an isolated species in this section. The specific differences among both species are indumentum, bracts, pedicel size, calyx length, corolla diameter, verticillasters, nutlet size and shape (Table 1, Figures 1 and 2). Special emphasis has been placed on differences in indumentum type, nutlet size and shape, three important taxonomic characters in

species classification in the genus *Teucrium* (Navarro & El Oualidi, 2000; Eshratifar *et al.*, 2011). They indicate considerable differences between these two related species and they confirm that the new species is different from all other *Teucrium* taxa previously described for Iran. As a consequence, an updated key on Iranian *Teucrium*, including the new species and taking into account the results of Flora Iranica by Rechinger (1982), is provided:

1. Verticillasters dense, terminally, spike-like or nearly capitate 2
- 1'. Verticillasters not dense, axillary, raceme-like or panicle 5
2. Inflorescence elongate, spike-like, and attenuate toward apex *T. hyrcanum*
- 2'. Inflorescence short 3
3. Calyx densely tomentose, white; flowers white *T. polium*
- 3'. Calyx not as above; flowers violet, purple, brown, rarely white 4

4. Calyx teeth unequal *T. persicum* *Teucrium scordium* L. subsp. *scordium*: Ethiopia. Urahut, 1844, *unknown 1766* (K000192983); Lebanon. Jabal Lubnan Chouf Ain Zehalte Ain Zahaltah river banks, 33° 44' 0 N, 35° 42' 0 E, Sept 1912, *s.coll* (K000315853); Ethiopia. Etchelicole, R. *Quartin-Dillon*, G. *Petit* (P00064924 Image!).
- 4'. Calyx teeth equal *T. stocksianum*
5. Leaves often incised or lobed 6
- 5'. Leaves not incised or lobed 10
6. Stamens included 7
- 6'. Stamens exerted 8
7. Calyx more or less 3 mm long *T. macrum*
- 7'. Calyx 4.5–6.5 mm long *T. parviflorum* *Teucrium scordium* subsp. *scordioides*: Iran. Khorassan, S. of Birhand, Razg, 1800 m, 24 Oct 1997, *Aliyabadi 22181* (TUH!); Hamedan to Salehabad, Chamou, 29 Aug 2006, *Eskandari & Torabi 56272* (IRAN); Lorestan Deh bideh, 15 June 1948, *Reshinger & Manouchehri 5660* (IRAN); Lorestan, Oshtorankuh, Saravand and Gohar lake, 16 June 1974, *Iranshahr 35393* (IRAN).
8. Plant glabrous *T. procerum*
- 8'. Plant pilose in lower part 9
9. Lower and medians leaves shortly 3–5 lobed; filaments hirsute in lower part *T. oliverianum*
- 9'. Lower and medians leaves bi-pinatisected or bi-pinnatifid; stamens glandulose-papillose near the base *T. orientale*
10. Verticillasters numerous, up to 50 on the main shoot *T. elymaiticum* *Teucrium scordium* subsp. *serratum* (Benth.) Rech.f.: Iran. Azerbaijan, between Urumieh and Salmas, Khantakhti, 1380 m, 16 July 1991, *Mozaffarian 70100* (TUH!).
- 10'. Verticillasters fewer, up to 25 on the main shoot 11
11. Flowers more or less sessile *T. chamaedrys*
- 11'. Flowers pedicellate 12
12. Flowers pink or purple; pedicel as long as calyx or shorter *T. scordium*
- 12'. Flowers white, yellow at base; pedicel longer than the calyx *T. mellisoides* *Teucrium melissoides* Boiss. & Hausskn. ex Boiss.: Iran, Lorestan, on road to Andimeshk Pole Dokhtar, 750 m, 28 Oct 1993, *Ghahraman, Mozaffarian, Sheikholeslami 17611* (TUH!); Mount. Schahu, 4000 m, 1867, *Haussknecht* (P00686329, P00686330, syntype, image!); Mount. Schahu, 1219 m, June 1867, *Haussknecht* (K000881624 image!); Bebehan, June 1868, *Haussknecht* (K000881623).

Specimens examined of *Teucrium* sect. *Scordium*

Teucrium elymaiticum: Iran. Ilam, Road of Darre-shahr, 50 km to Darre-shahr, 1000 m, 5 July 1996, *Attar, Mirtajaldini, Sheikholeslami* 19889 TUH (holotype TUH!).

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