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

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Abstract. A new endemic species from western Iran,\textit{Teucrium elymaiticum} Attar, Sotoodeh & Mirtadzadini, \textit{spec. nova} is described. It belongs to section \textit{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 \textit{T. scordium} subsp. \textit{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. \textit{Teucrium elymaiticum}; section \textit{Scordium}; Lamiaceae; taxonomy; endemism; Ilam; Iran.

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

Abstract. \textit{Teucrium elymaiticum} Attar, Sotoodeh & Mirtadzadini, \textit{spec. nova} es una nueva especie endémica encontrada en Irán occidental. Pertenece a la sección \textit{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 \textit{T. scordium} subsp. \textit{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. \textit{Teucrium elymaiticum}; sección \textit{Scordium}; taxonomía; Lamiaceae; endemismo; Ilam; Irán.

Introduction

\textit{Teucrium} L. is a large genus of Lamiaceae with more than 260 species in the world (Tutin & Wood 1972; Harley \textit{et al.} 2004). This genus is distributed in the Mediterranean region, which is a major speciation center of the genus (Tutin & Wood, 1972; Cantino \textit{et al.}, 1992; Navarro & El Oualidi, 2000; Harley \textit{et al.}, 2004; Crespo \textit{et al.}, 2018). \textit{Teucrium} is distinguished from the other members of Lamiaceae by lack of corolla upper lip and nongynobasic style (Navarro & El Oualidi, 2000; De Martino \textit{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 \textit{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, \textit{T. persicum} Boiss., a Saharo-Sinidian element, is present only at elevations of southern regions, and \textit{T. hyrcanicum} L. (with bilabiate calyx), a hyrcanian element, grows in north of Iran. Some species like \textit{T. polium} L. and \textit{T. orientale} L., are widely distributed in steppes, arid, and semiarid regions of Iran (Eshratifar \textit{et al.}, 2011).

During a field trip to Ilam in 1996, a province located in western Iran, an interesting specimen of \textit{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 \textit{Teucrium scordium} subsp. \textit{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 \textit{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.

| Plant indumentum               | *Teucrium elymaiticum* spec. nova | *T. scordium* subsp. _scordioides_ | *T. melissoides* |
|--------------------------------|----------------------------------|----------------------------------|-----------------|
| 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-scorbiculate, ellipsoid-oblong, covered by brilliant stipitate glands | 1.5 x 1 mm, brown, rugose, broad-ovate, more or less spherical, covered by stipitate glands |

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

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 *Teucrium 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-scrobiculate, ellipsoid-oblong).

![Figure 2. *Teucrium scordium* subsp. *Scordioides*.](image)

**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* Lehms., *O. sericeum* Willd., *Salvia bracteata* Bank. & Soland., *S. multicaulis* Vahl., *S. ceratophylla* L.

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 capitulate........................................2
2. Inflorescence elongate, spike-like, and attenuate toward apex ................................. *T. hyrcanum* 3
3. Calyx densely tomentose, white; flowers white .................................................. *T. polium* 4
4. Calyx not as above; flowers violet, purple, brown, rarely white ...............................
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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4. Calyx teeth unequal .................. T. persicum
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
8. Plant glabrous .................. T. procerum
8’. Plant pilose in lower part ............... 9
9. Lowers and medians leaves shortly 3–5 lobed; filaments hisrute in lower part .... T. oliverianum
9’. Lowers and medians leaves bi-pinatisected or bi-pinatifiparted; stamens glandulose-papillose near the base .................................. T. orientale
10. Verticillasters numerous, up to 50 on the main shoot .................. T. elymaiticum
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. mellissoides