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A new species of *Teucrium* sect. *Scordium* (Lamiaceae) from SE of Turkey

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Abstract: A new species of *Teucrium* L. from Southeast Anatolia (Turkey), *Teucrium sirnakense* Özcan & Dirmenci, is described and illustrated. The new species belongs to the sect. *Scordium* Boiss. and is closely related to *Teucrium melissoides* Boiss. & Hausskn. and *Teucrium scordium* L. s.l. The differences between the new species and its allies are discussed. A description, distribution map, ITS nrDNA phylogeny, and taxonomic comments on the new species are provided.

Key words: ITS, nrDNA, phylogeny, Lamiaceae, Şırnak, *Teucrium*, Turkey

1. Introduction

Teucrium L. is one of the largest genera belonging to Lamiaceae, subfamily Ajugoideae (Harley et al., 2004). The genus is very large, polymorphic, and cosmopolitan consisting of about 260 species (more than 370 taxa) (Tutin and Wood, 1972; Govaerts et al., 2013). Approximately 250 species in the genus are distributed around the Mediterranean basin, which is the major center of diversity (Cantino et al., 1992; Navarro and El Oualidi, 2000; Govaerts, 2013). *Teucrium* is distinguished from the other members of Lamiaceae by a lack of corolla upper lip and nongynobasic style (Ekim, 1982; Navarro and El Oualidi, 2000; De Martino et al., 2010).

The genus *Teucrium* has been divided into sections distinguishable by general habit, leaf characters, calyx shape, and inflorescence structure (Ekim, 1982). *Teucrium* comprises 34 species (with 46 taxa) in Turkey, and 16 of these taxa are endemic (Ekim, 1982; Duman, 2000; Dönmez, 2006; Dönmez et al., 2010; Dinç and Doğu, 2012; Dirmenci, 2012). The species are classified into 8 sections in the *Flora of Turkey* (Ekim, 1982): sect. *Teucrium* Benth., with 13 taxa; sect. *Chamaedrys* (Mill.) Schreb., with 13 taxa; sect. *Polium* (Mill.) Schreb., with 2 taxa; sect. *Isotriodon* Boiss., with 10 taxa; sect. *Scorodonia* (Hill) Schreb., with 1 taxon; sect. *Stachybotrys* Benth., with 3 taxa; sect. *Scordium* (Mill.) Benth., with 3 taxa; and sect. *Spinularia* Boiss., with 1 taxon.

Sect. *Scordium* is represented by 4 taxa in the Mediterranean area (Navarro and El Oualidi, 2000). In Turkey, *T. scordium* L. (*T. scordium* subsp. *scordium* and *T. scordium* subsp. *scordioides* (Schreb.) Arcang.) and *T. melissoides* Boiss. & Hausskn. are placed in this section (Ekim, 1982; Dönmez et al., 2010). These taxa are either stoloniferous or erect, leaves are conspicuously toothed, crenate, subcordate at base, not petiolate or subpetiolate; verticillasters 2–8 flowers in upper leaf axils, calyx tubular-campanulate, subgibbose at base and calyx tooth triangular-acuminate; nutlet with glandular hairs (Zohary, 1963; Ekim, 1982).

During the revisionary study of the Turkish *Teucrium* species some interesting specimens were collected from Şırnak Province in Turkey in June 2013 (Figure 1). After detailed studies, it was concluded that the specimens represented here are species new to science, and that they show a close relationship with *T. melissoides* and *T. scordium* s.l.

In this study a new species from the genus *Teucrium* is described and investigated based on morphologic and molecular phylogenetic data.

2. Materials and methods

2.1. Plant collection

The specimens were identified using the relevant literature (Boissier, 1879; Post, 1932; Feinbrun, 1978; Ekim, 1982; Rechinger, 1982) and compared with material found in the following herbaria, ANK, B, BCN, E, EGE, GAZI, HUB, INONU, ISTE, ISTF, ISTO, K, KNYA, L, LE, MA, MARE, RO, TO, VANF, W, WIR, and WU and with our own herbarium specimens at Balıkesir University (Appendix; on the journal's website).

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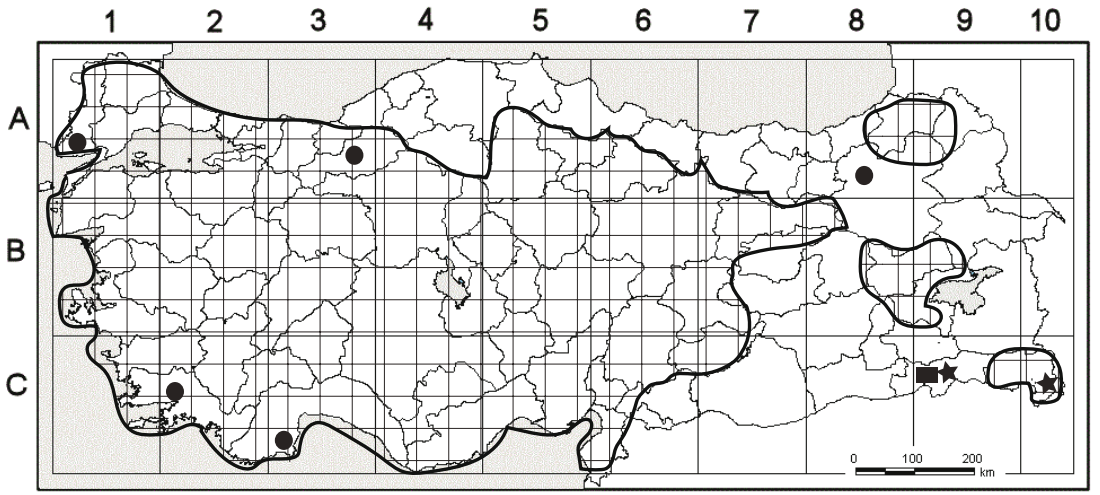

Figure 1. Distribution map of *Teucrium sirnakense* (■), *T. scordium* subsp. *scordium* (●), *T. scordium* subsp. *scordioides* (⊕), *T. melissoides* (★) in Turkey.

2.2. DNA isolation

DNA isolation was performed using the modified phenol/chloroform/isoamyl alcohol method of Dellaporta et al. (1983). First, dried silica gel leaf samples were powdered using liquid nitrogen. Then 600 µL of isolation buffer and 500 µL of phenol/chloroform/isoamyl alcohol solution (24:24:1) were added to the powdered plant tissue. The solution was mixed carefully and centrifuged. The supernatant was taken into a new tube. Then 3 M NaAc (10% of supernatant) was added, followed by an isopropanol addition (in this step, the DNA was visible and so we continued the process). This solution was centrifuged, and the pellet was visible to the eye at the bottom of the tube. The pellet was dissolved using 500 µL of TE (10 mM, pH 8). Then 5 µL of RNase A was added and mixed in gently. This was incubated at 37 °C for 30 min. After 30 min, 50 µL of NaAc (3 M) was added and mixed in. Then 1 mL of 90% ethyl alcohol was added to the solution and pipetted. It was refrigerated at –80 °C for about 10 min (or at –20 °C for about 30 min). After refrigeration the tube was centrifuged, and the supernatant was discarded; 70% ethyl alcohol was added to the pellet and centrifuged. After centrifugation ethyl alcohol was removed, and the pellet was dried on blotting paper. As a last step, the dried pellet was dissolved using 50 µL of TE or 200 µL of H_2O. Finally, the DNA solution was stored at –20 °C.

2.3. PCR amplification and editing of the ITS nrDNA data

In this study the internal transcribed spacer (ITS) region of the nuclear ribosomal DNA (nrDNA) sequences was used for molecular analysis of the *Teucrium* species. Polymerase chain reaction (PCR) amplifications of the ITS nrDNA were performed using ITS5A (5'-CCTTATCATTTAGAGGAAGGAG-3') (Stanford et al., 2000) and ITS4 (5'-TCCTCCGCTTATTGATATGC-3') (White et al., 1990) primers. Total volume of each PCR tube was 25 µL and comprised 2.5 µL of CoralLoad PCR Buffer, 1.5 µL of $MgCl_2$, 2.5 µL of Q-solution, 0.3 µL of Taq DNA polymerase (Qiagen), 2.5 µL of ITS5A and 2.5 µL of ITS4 (Sigma-Aldrich), 0.4 µL of 20 µm dNTP solution (Qiagen), and autoclaved deionized water.

During the PCR amplification, a thermal cycler machine (Techne-Prime) was used for the routine protocol. Initial denaturation was performed for 5 min at 95 °C. The following 35 cycles were carried out for 1 min at 94 °C for denaturation, 1 min at 51 °C for annealing, and 2 min at 72 °C for extension. A final extension cycle (8 min at 72 °C) followed.

PCR products were sent to the RefGen (Gene Research and Biotechnology Company) for sequencing. The sequenced DNAs were edited using Sequencher version 4.9 (2009). Some nucleotides from 5′ end of the ITS1 and 3′ end of ITS2 were cut to avoid doubted base callings and redundant gaps. Finally, a sequence 660–672 nucleotide base pairs in length was produced.

Edited DNA sequences were aligned using CLUSTAL W2 online software (2007) after the addition of some taxa (*Ajuga decumbens* gi|33320111|, *Teucrium melissoides* gi|395484439|, *T. montanum* gi|395484441|, *T. alpestre* gi|395484392|, and *T. cyprium* subsp. *cyprium* gi|395484411|) from GenBank (NCBI). The aligned DNA sequences of the ITS nrDNA of the *Teucrium* taxa was about 760 nucleotides in length. The aligned sequences were formatted as a #NEXUS file. This #NEXUS file was executed in PAUP* version 4.0b10 for Macintosh (PPC) (Swofford, 2002) for phylogenetic analysis. Analyses were

performed on a Mac OS 9.1 with built-in memory (128 MB; Apple Computer, Inc., 1983–2001).

2.4. Data analysis

We employed parsimony and genetic distance analyses. Parsimony analysis with a branch-and-bound search used the following search settings. Optimality criterion was set to parsimony. Character-status summary included a total of 756 molecular characters (A, T, C, G) with all characters of 'unordered' type. All characters had equal weight, with 565 constant characters. The variable parsimony-uninformative characters were 91, and the number of parsimony-informative characters was 100. Gaps were treated as missing data, multistate taxa were interpreted as uncertainty, and the initial MaxTrees setting was 100. Branches were collapsed (creating polytomies) if maximum branch length was zero. The MulTrees option was in effect. Topological constraints were not enforced, and the trees were unrooted for the analysis.

3. Results and discussion

Teucrium sirnakense Özcan & Dirmenci **sp. nov.** (Figures 2–4) (*T.* sect. *Scordium* (Mill.) Benth.)

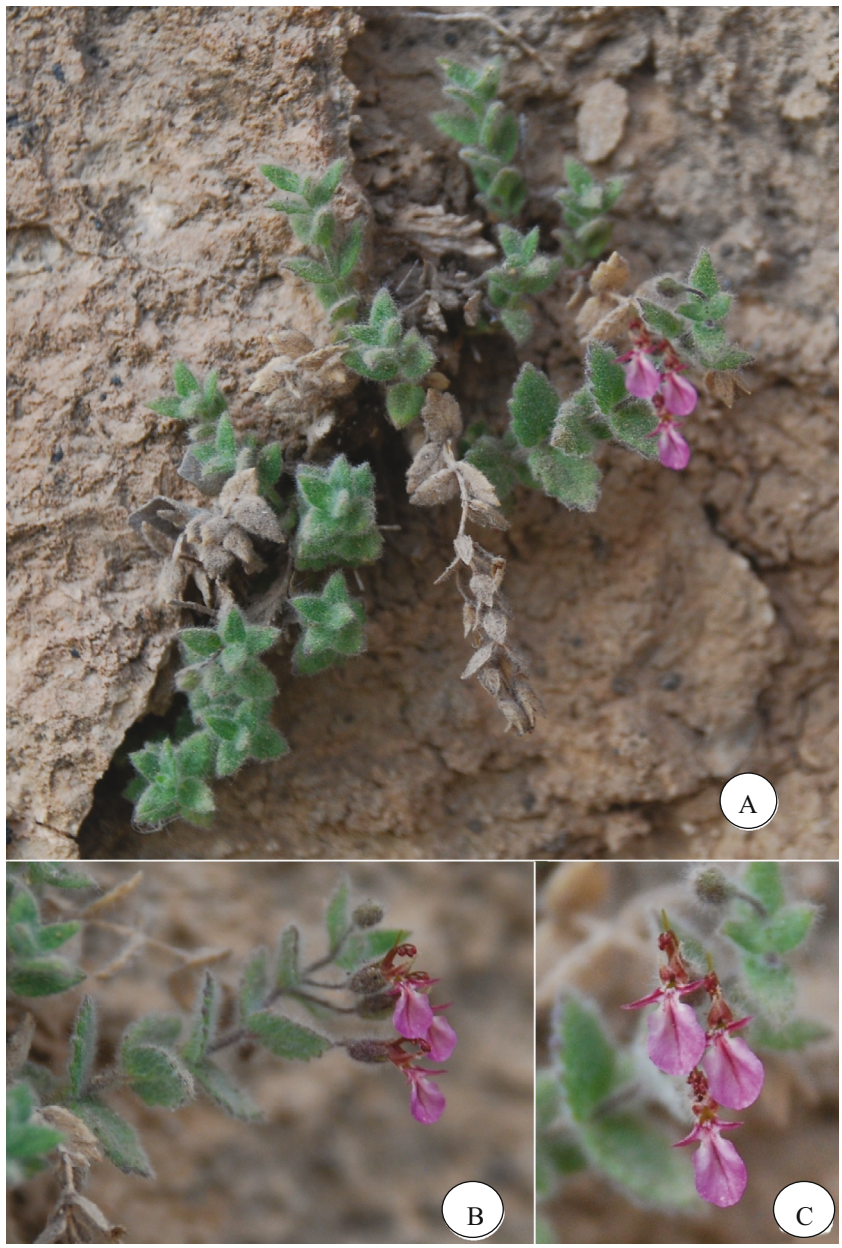

Figure 2. *Teucrium sirnakense*. A- habit, B- flowering stem and calyces corollas, C- flowers.

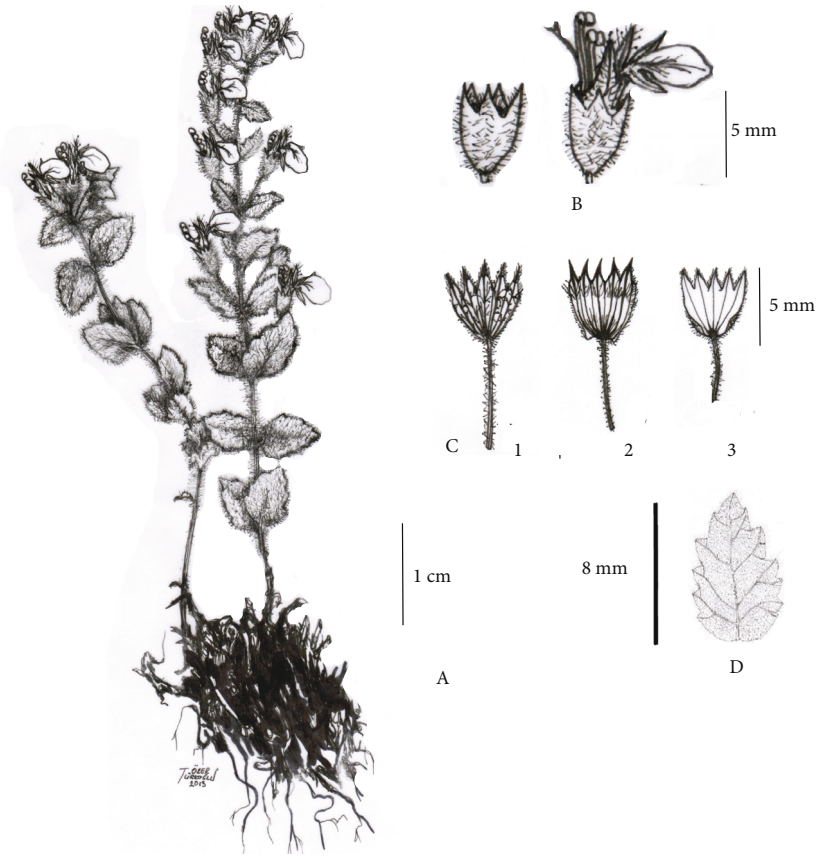

Figure 3. *Teucrium sirnakense*. A- general habit, B- calyx and corolla, C- inner of calyx (1- *T. sirnakense*, 2- *T. melissoides*, 3- *T. scordium* subsp. scordioides), D- leaf.

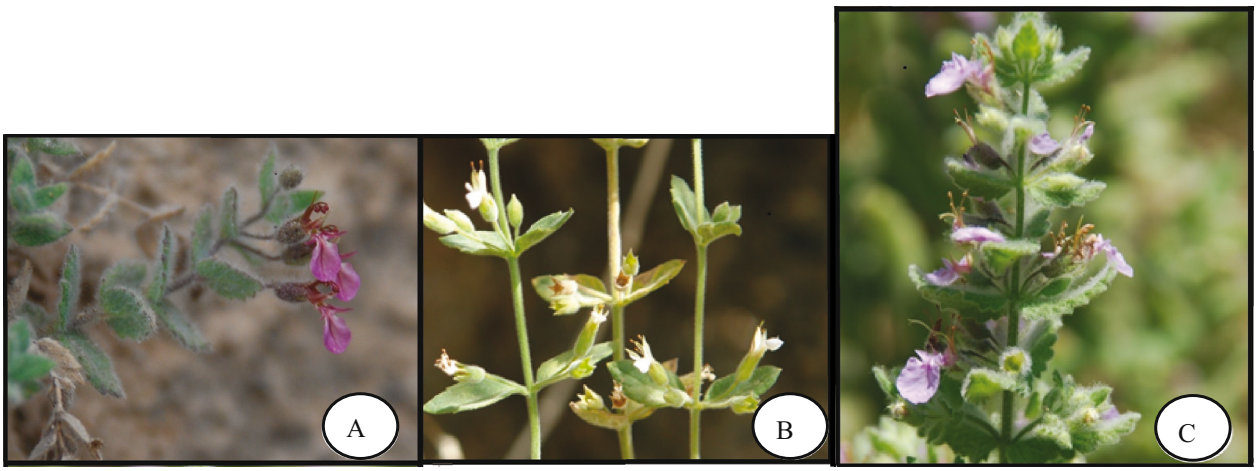

Figure 4. Floral stems and flowers. A- *Teucrium sirnakense*, B- *T. melissoides*, C- *T. scordium* subsp. *scordioides*.

Type: Turkey C9 Şırnak: between Çukurca and Şırnak, 47 km from junction of Şırnak road, Taşdelen village, rocky slopes, 37°23′636″N, 042°51′882″E, 1037 m, 10.06.2013, *Dirmenci* 3892, *Akçiçek* & *Ö.Güner*. (Holotype: GAZI, isotypes: ANK, HUB, ISTE, NGBB, VANF).

Diagnosis: *Teucrium sirnakense* is similar to *T. melissoides* and *T. scordium* s.l., but it differs from *T. melissoides* by its saxatile perennial habit (not stoloniferous perennial), 4–12 cm (not 22–75 cm) and densely villous (not velutinous) stems, 5–9 × 3–6 mm (not 15–45 × 10–20 mm) and densely villous (not tomentose) leaves, 5–7 mm and purplish-pink (not 7–8 mm and whitish) corollas. It can be easily distinguished from *T. scordium* s.l. by its saxatile habit (not stoloniferous), 4–12 cm (not 30–45 cm) stems, hairs longer than diameter of stem (not shorter than diameter of stem), and ovate to ovate-lanceolate and 5–9 × 3–6 mm (not oblong to ovate-oblong, 12–35 × 5–17 mm) leaves.

Description: Saxatile, perennial plants. Stems single or loosely branched from the woody base, erect or ascending, flowering stems 4–12 cm, densely villous with glandular papillate and sessile glands longer than the diameter of stem, densely villous with sessile glands and densely glandular papillate on both surfaces. Leaves ovate to ovate-lanceolate, 5–9 × 3–6 mm, sessile, subcordate to rounded at base, acute to obtuse at apex, crenate to serrate at margin, teeth 3–8 on each side, densely long villous on both surfaces with glandular papillate and sessile glands. Inflorescence lax raceme, verticillasters 2-flowered. Bracts similar to leaves, shorter than calyx, densely villous with glandular papillate. Flowers pedicellate, pedicels 3–7 mm, mostly longer than calyx, densely villous with densely glandular papillate. Calyx 4–5 mm, actinomorphic, purplish-green, subgibbous, densely villous with densely glandular papillate and sessile glands, glabrous inside; teeth equal, 1.5–2 mm, triangular-lanceolate, acute. Corolla 5–7 mm, pinkish-purple, scarcely exceeding calyx, sparsely long pilose with sessile glands and densely glandular papillate, bearded on middle lobe on lower lip, ciliate on margins of posterior and lateral lobes. Stylus long exceeding corolla tube, glabrous, divided to 2 subequal branches. Stamens 4, fertile, exceeding calyx, posteriors longer than anteriors; filaments glabrous to anthers, hairy below. Mature nutlets unknown, immature nutlets with many sessile glands on all surfaces.

Flowering and fruiting time: The species flowering time was during the collection, 10 June, 2013. Fruiting time was end of June 2013.

Etymology: The specific epithet is derived from the name Şırnak, the province where the type material was collected.

Habitat and ecology: The new species grows in calcareous rocky slopes together with a few *Nepeta italica* L., *Polygonum* sp., *Satureja macrantha* C.A.Mey., *Thymbra spicata* L., *Parietaria judaica* L., *Quercus* sp., and *Stachys* sp.

Distribution and conservation status: The new species is distributed in Şırnak Province. It is an Irano-Turanian element. The type locality is a few hundred meters from the North Iraq border and so it probably grows in Iraq. Therefore, its endemism is suspected. It is only known from the type locality where its distribution is apparently less than 10 km^2, and the total number of known individuals is approximately 50. There are threats to the new species in its habitat as it lies next to a village settlement on the main roadside of Şırnak and Hakkari provinces; road widening in the near future could destroy the new species habitat (B2abi, ii). It should, therefore, be regarded as Critically Endangered (CR) (IUCN, 2001).

4. Discussion

Teucrium sirnakense belongs to the section *Scordium*. The members of sect. *Scordium* are stoloniferous perennial herbs and grow in moist habitats such as stream banks and/or meadows. The sect. *Scordium* is represented by a single species, *T. scordium*, in the *Flora of Turkey* (Ekim, 1982). Afterwards, *T. melissoides* was added as a new record by Dönmez et al. (2010) from the southeast of Turkey near the Iraq border. These 2 species grow near a stream. The new species grows in rocky crevices and is nonstoloniferous (Figures 2 and 3). It differs from the other 2 species in habit and in habitat. However, it shares some characteristics with them such as subsessile or sessile leaves, actinomorphic calyx, subgibbous, teeth ±equal (Figures 3 and 4). Nevertheless, *T. sirnakense* is an isolated species in sect. *Scordium*. The specific differences among the species are summarized in the Table. In addition to the morphological data, *T. sirnakense* is placed in sect. *Scordium* based on molecular phylogenetic data.

Molecular phylogenetic analysis of the new species, *T. sirnakense*, via ITS nrDNA sequences yielded 6 equally most parsimonious trees (Figure 5a) with 284 steps. The ITS nrDNA data set had a high phylogenetic signal. The ITS nrDNA tree of the *Teucrium* taxa after a branch-and-bound search with parsimony criterion resulted in the following tree statistics: tree # 1, length = 284, CI = 0.820, RI = 0.846, RC = 0.694, HI = 0.180, and G-fit = –87.750. As seen from the statistics, the consistency index (CI) is high, and the homoplasy index (HI) is low for this data set.

ITS nrDNA molecular data indicate that the new species, *T. sirnakense*, belongs to the section *Scordium* since it displays a close relationship with *T. melissoides* and *T. scordium* of this section. Based on the ITS nrDNA sequence data, the new species shows a sister taxon relationship with *T. melissoides*. Figure 5a shows bootstrap supports on the strict consensus of the 6 equally most parsimonious trees for the *Teucrium* taxa. *Teucrium sirnakense* is clearly distinguished from both *T. melissoides* and *T. scordium* with almost 90% bootstrap support. Another support for the distinction of the new species comes from the neighbor-joining analysis (Gascuel, 1997). Figure 5b shows the ITS

Table. Variation of characters in *Teucrium sirnakense*, *T. melissoides*, and *T. scordium* s.l.

Characters	T. sirnakense	T. melissoides	T. scordium s.l.
Stem	Saxatile, 4–12 cm	Stoloniferous, 22–75 cm	Stoloniferous, 30–45 cm
Stem indumentums	Densely villous, longer than the diam. of stem	Velutinous, hairs shorter than the diam. of stem	Densely villous, mostly shorter than the diam. of stem
Leaf	Ovate to ovate-lanceolate, 5–9 × 3–6 mm, sessile	Oblong, oblong-ovate, (10–)15–45 × 10–20 mm	Oblong, oblong-ovate, 12–35 × 5–17 mm
Leaf indumentums	Densely villous	Tomentose	Densely villous
Inflorescence	Lax raceme, verticillasters 2-flowered; pedicels 3–7 mm	Lax raceme, verticillasters mostly 4-flowered sometimes 2-flowered; pedicels 4–10(–12) mm	Raceme, verticillasters 1–4-flowered; pedicels (2–)–4(–6) mm
Calyx	4–5 mm, actinomorphic, subgibbous in fruiting time, villous; teeth equal	3–4(–5) mm, actinomorphic, subgibbous in fruiting time, hispid; teeth equal	3–4(–5) mm, actinomorphic, subgibbous in fruiting time, villous; teeth equal
Corolla	5–7 mm, pinkish-purple, tube in the calyx, sparsely long pilose	7–8 mm, whitish, scarcely exceeding calyx, pilose	6–7 mm, purplish-pink, longer than the calyx, sparsely long pilose
Nutlet	Mature nutlets unknown, immature nutlets with many sessile glands	Glabrous or rarely with sessile glands, sparsely unicellular hairs	Glabrous, sparsely unicellular hairs

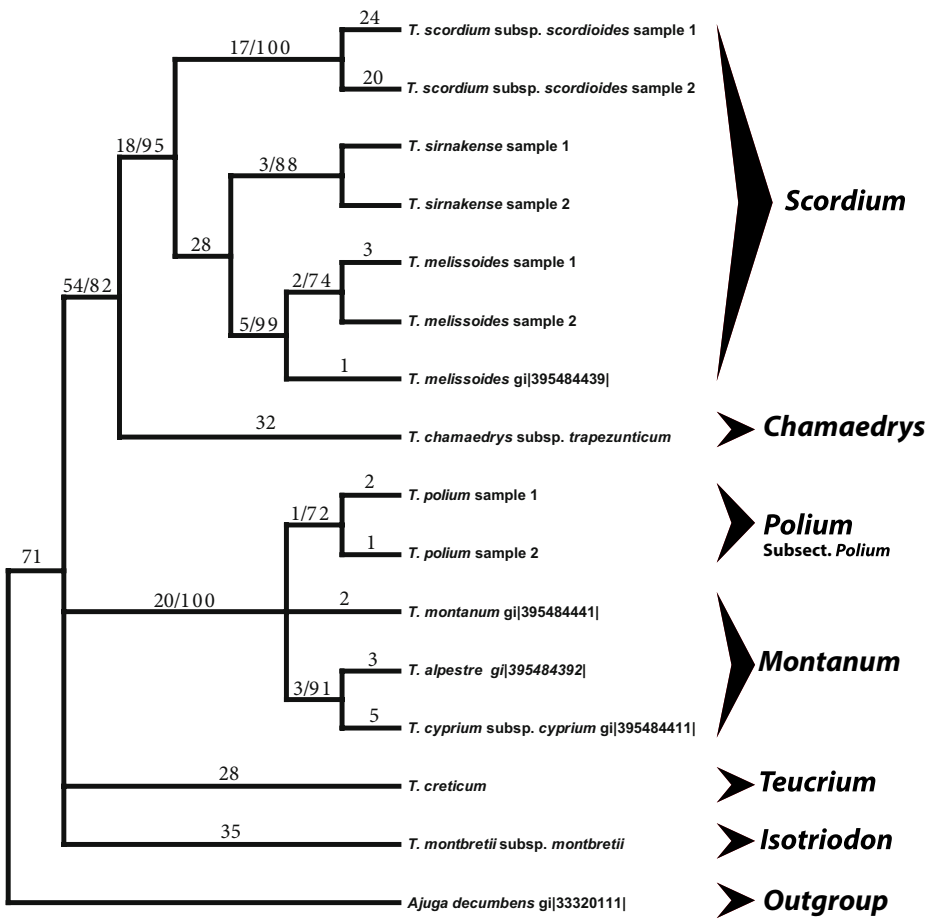

Figure 5a. Strict consensus of 6 equally most parsimonious ITS nrDNA trees of *Teucrium* taxa following a branch-and-bound search. Branch lengths are shown above the branches on the left, and the larger numbers above the branches display bootstrap values.

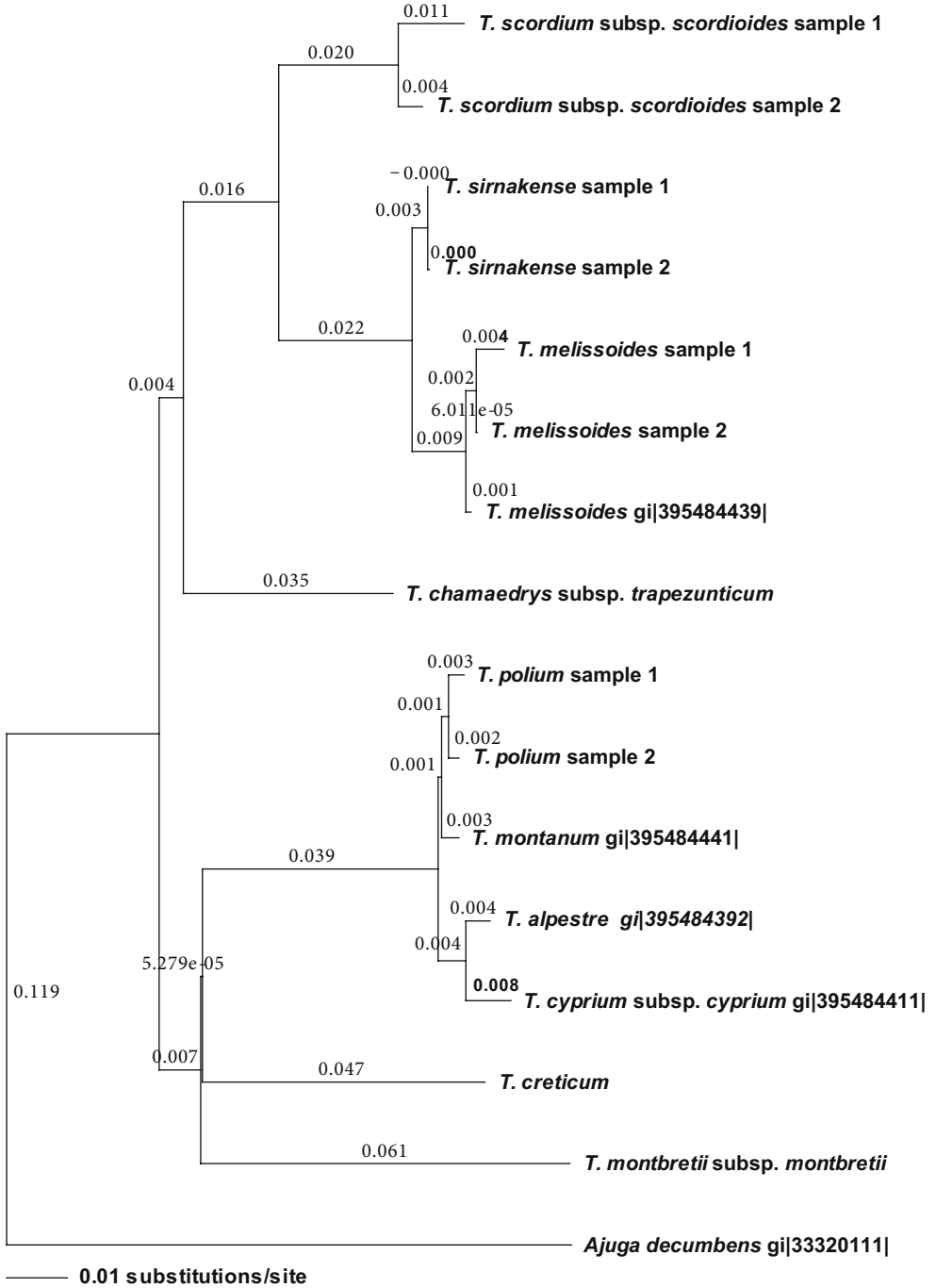

Figure 5b. Neighbor-joining ITS nrDNA tree of *Teucrium* taxa. Branch lengths are shown above the branches.

nrDNA neighbor-joining tree of the *Teucrium* taxa with similar results regarding parsimony.

This result along with the morphological results demonstrated that the new species is distinct from all other *Teucrium* taxa analyzed in this study in terms of molecular phylogenetic and morphological characters. The representatives of the other sections of this genus were also distinct from each other with high bootstrap supports.

Acknowledgments

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Appendix

Examined specimens. - ***Teucrium scordium* subsp. *scordium*:** A1 Edirne: İpsala 2 km from border gate to Enez, 24.07.1968, *A.Baytop* (ISTE 15775); A3 Bolu: Aladağ, 1100 m, 30.08.1996, *Pinus sylvestris* forest, *M.Vural* 7607, *N.Adıgüzel & M.Öztekin* (ANK, GAZİ); B8 Erzurum: Hınıs, around Çatak village, 1640 m, stream beds, 04.08.1996, *A.A.Dönmez* 5420 (HUB); C2 Muğla: Sandras Dağı, Köklüce Y., Ca: 1500 m, *P.H.Davis* 13601 (ANK); C2 Muğla: Sandras Dağı, meadows, 1968, *Quezel et al.* (ANK 35); C3 Antalya: Kemer, 500 m west of Kasaba, meadows, c. 10 m, 21.08.1973, *H.Peşmen* 4058 *& A.Güner* (HUB). - ***Teucrium scordium* subsp. *scordium*:** Ankara: sandige Lagen des Teichgebietes von Gölbasi, südl. Ankara, 02.08.1965 (E 28a); Antalya: Elmalı– Finike road. Stream side. 26.07.1960, *Khan, Prance & Ratcliffe* (E 210); Antalya: Kaş– Elmalı road, roadside, 27.07.1960, *Khan, Prance & Ratcliffe* (E 231); Erzincan: plain east of Erzincan. 1250 m, slightly saline marsh, 30.07.1957, *P.H.Davis* 31845 *& I.Hedge* (E); Hakkari: Colemerik, 1600 m, banks of stream. 14.08.1954, *P.H.Davis* 24352 *& O.Polunin* (E); İstanbul: Araplıdere 22.07.1968, *A.Baytop* 14069 (E); İstanbul: Araplıdere, near Değirmenköy, meadows, 22.07.1968, *A.Baytop* (ISTE 14453); İstanbul: between Çilingir and Yassıviran, 10.07.1952, *A.Berk & T.Baytop* (ISTE 3104); Kırklareli: Büyükkarıştıran, 23.07.1968, *A.Baytop* 14089 (E); Muğla: Marmaris, Turgud, in *Juncus* clumps in sand dunes, 14.07.1960, *Khan, Prance & Ratchliffe* (E 52); Mugla: Marmaris, Köz Cakara Dağ. 150 m, stream banks, 15.07.1960, *Khan, Prance & Ratchliffe* (E 61); Tunceli: Ovacık, 1400 m, marshy ground by river. 14.07.1957, *P.H.Davis* 31113 *& I.Hedge* (E); Van: Başkale–Hakkari (Çolemerik), c. 50 km from Başkale 1800 m, marshy ground in partial shade, 30.08.1956, *McNeill* 689 (E); A1 Çanakkale: Eceabat, 15 km from Havuzlar to Şarlayandere, 24.04.1984, *A.Çırpıcı, R.İlarslan, H.Malyer* (BULU 6758); A1 Edirne: Enez, Harmanlı G. sl. 26.07.1984, Ö.Seçmen *& E.Leblebici* 5170 (EGE, B); A1 Tekirdağ: Malkara, Karaidemir village, 20.09.1992, *E.Akalın* (ISTE 64541); A1 Tekirdağ: c. 27 km from Tekirdağ to Malkara. 200 m, stream banks, 11.08.1966, *P.H.Davis* 47827 (E, ISTO); A1 Balıkesir: Marmara island, around Viranköy, 13.07.1978, *E.Tuzlacı* (ISTE 40361); A2 Bursa: Maksempınar–Unçukuru, 3 km, stream banks, 19.09.1998, 300 m, *R.Günay* (BULU 10819); A2 İstanbul: north of Küçükçekmece lake, meadows, 17.07.1969, *A.Baytop* (ISTE 15681); A2 İstanbul: near Büyükçekmece lake, 13.10.1966, *A.Baytop, N.Temker & A.Ahi* (ISTE 10306); A2 İstanbul: near Terkos lake, 29.07.1952, *A.Berk & T.Baytop* (ISTE 3087); A2 İstanbul: Subaşı, 11.08.1967, *T.Baytop* (ISTE 11827); A2 İstanbul: Güzelceköy, Yoğurthane, near sea level, 12.07.1970, *F.Öktem* (ISTE 18158); A2 İstanbul: near Sefaköy, meadows, 05.07.1978, *E.Tuzlacı* (ISTE 40281); A2 Kocaeli: 20 miles east of İstanbul, off the Ankara road. 100–200 yds. from sea, dryish banks. 20.08.1965 *G.W.D.Findlay* 2 (E); A3 Bolu: near Abant lake, 28.08.1975, 1350 m, *A.Baytop & A.Meriçli* (ISTE 39655); A3 Sakarya: east of Sapanca lake, 13.07.1978, *A.Baytop & P.Uotila* (ISTE 40273); A3 Sakarya: Ormanköy to Adapazarı, 50 m, *Fraxinus oxycarpa* forest in flood plain, 06.08.1962, *P.H.Davis* 39064 *& D.Coode* (E, B); A4 Kırıkkale: Koçubaba district, bağlar, 1200 m, 14.07.1990, *A.A.Dönmez* 2688 (HUB, E); B1 Balıkesir: Edremit-Akçay, 15.07.1962, *K.Çilenti* (GAZİ); B1 Balıkesir: Mitralyöz Burnu-Gümüşlü Burnu, Araplar stream, 5 m, 02.09.1997, *K.Alpınar* (ISTE 74389); B1 Balıkesir: south of Mitralyöz Burnu, 10 m, 29.10.1996, *K.Alpınar* (ISTE 73005); B2 Denizli: Demirciköy, Tatarcık, stream banks, 1250 m, 23.08.1984, *Z.Aytaç* (GAZİ 1538); B3 Afyonkarahisar: Dinar, Akdağ Tabiat Parkı, 26.07.2007, *G.Kaynak* (BULU 29624); B3 Afyonkarahisar: Şuhut, Kumalar Dağı, Anayurt village, meadows, 1100 m, 18.08.2000, *E.Akçiçek* (GAZİ 3242); B3 Afyonkarahisar: Çay, near Eber lake, meadows, 960 m, 10.08.1992, *A.A.Dönmez* 2959 (HUB); B3 Afyonkarahisar: 3 km from south of turning to Sincanlı (Sinanpasa) beside Afyon–Sandıklı road, wet place on limestone, 28.08.1970, *R.F.Jenkins* 2158 (E); B3 Konya: west of Akşehir lake (Gölçeyir), 1000 m, 05.08.1982, *M.Küçüködük* 148 (KON); Konya: Aslım, 1026 m, 09.08.1966, *E.Yurdakul* 60 (B); B4 Ankara: Ayaş, north of Bayındır dam 965–975 m, 16.07.1995, *M.Soydemir* 1905 (GAZİ); B5 Aksaray: Kireçlik hill, 1000–1100 m, 03.08.2005, *M.Öztürk* 639 (MR); B5 Aksaray: Salmanlı village, Karaçayır stream banks, 1300–1350 m, 27.06.1997, *M.Dinç* 359 (MR); B6 Adana: Feke, Göksu gorge below Himmetli, 700–800 m, 09.07.1952, *P.H.Davis* 19857, *Dodds & R.Cetik* (B); B6 Sivas: 5 km from Ulaş to Kangal, 1400–1500 m, 06.08.1982, *P.H.Davis* 68724 *& T.Ekim* (ANK); B6 K. Maraş: Göksun, Kınıkkoz village, Gözpınar mt., 1500 m, 22.08.1977, *B.Yıldız* 1521 (HUB); B6 K. Maraş: Göksun, Kınıkkoz village, Kandil mt., south face, 1800 m, *Pinus* forest, stream banks, 25.10.1980, *B.Yıldız* 2376 *&* Ş.Kaplan (HUB); B6 K. Maraş: Göksun, Kumlupınar, stream banks, 1300 m, 27.10.1980, *B.Yıldız* 2399 *&* Ş.Kaplan (HUB); C1 Muğla: südufer des Bafa gölü bei Mersinet iskelesi, 5 m, 01.10.1989, *T.H.Raus* 14533 (B); C1 Muğla: Marmaris, Köz Çakara Dağ., 150 m, 15.07.1960, *T.Ekim* 61 (ANK); C1 Muğla: from Marmaris to Datça, around 35–40 km, fountain edge, 13.06.2011, Özcan 182, *Dirmenci & Akçiçek*; C2 Muğla: Köyceğiz, Hamitköy Namnam Çayı, 10 m, 16.07.1991, *A.Güner* 9570-*H. Duman, Z.Aytaç & H.Şağban* (HUB); C2 Muğla: Gökova, Kerme gulf, sea level, semifallow pastureland, 30.07.1968, *M.R.K.Lambert & T.K. Thorp* (E 508); C3 Isparta: Eğridir, between Pazarköy and Darıbükü, stream banks, 850–1200 m, 06.08.1974, *H.Peşmen & A.Güner* 1914 (HUB); C3

Antalya: Tahtalı Dağ., 08.07.1949, *P.H.Davis* 15131 (ANK); C3 Antalya: Kemer, around Faselis, 0–150 m, 23.06.1978, *H.Peşmen* 4012*, B.Yıldız &* Ş.Kaplan (HUB); C3 Antalya: Kemer, around Kındıl fountain, *P. brutia* forest, 30 m, 27.07.1979, *H.Peşmen* 4439*, A.Güner &* Ş.Kaplan (HUB, E); C3 Antalya: Finike. Freshwater marsh by sea, 1967. *M.G.Schultz* 145 (E); C3 Konya: east of Beyşehir lake, Akburun village, reed bed, 1120 m, 15.07.1985, *M.Küçüködük* 333 (KON); C3 Konya: south of Beyşehir, Davutlar reed bed, 1120 m, 11.08.1985, *M.Küçüködük* 378 (KON); C3 Konya: Beyşehir, shore of Beyşehir Gölü, nutrient-rich, grazed reed-beds. 07.08.2005, *H.Kürschner & Parolly* (B-Parolly); C4 Antalya: Gazipaşa, Sugözü village, Maha plateau, 1450 m, 06.08.1983, *H.Sümbül* 2381 (HUB); C4 Konya: between Seydişehir and Gölyüzü village, near Suğla lake, 1150 m, 20.07.1980, *H.Ocakverdi* 866 (KON); Konya: Cihanbeyli, between Gölyazı and Eskil, 2 km from Karaküllük, 920 m, *Juncus* meadows, 18.07.1996, *M.Vural* 7569*, N.Adıgüzel & M.Öztekin* (GAZI); C5 Adana: Karinca Da. 2 miles northeast of Alpu, 3 miles north of Pozanti, fallow field, 1100, 18.07.1971, *G.W.D.Findlay* 2448 (E); C5 Adana: Pozanti; 3 miles north on eastward slopes of Toros Dağı, 750–800 m. 16.07.1971, *P.H.Davis* 1229 (E); C5 Adana: Karataş area south of Adana, 10.09.1965, *G.W.D.Findlay* 285 (E); C5 Konya: Ereğli, Aydos Dağı, Halkapınar, stream banks, 1400 m, 27.07.1978, *S.Erik* 2968 (HUB); C6 Hatay: Amanus Nurdağları, 1 mile north of Kaypak, 750 m. 24.07.1971, *J.Darrah* 1643 (E); C6 Hatay: valley above Yeşilkent, stream muddy gravel, 305 m, 11.08.1969, *J.Darrah* 613 (E); C6 Osmaniye: between Yarpuz and Yağlıpınar, 1 km east of Yarpuz, 37°02′404″N, 36°26′766″E, 1060 m, 15.07.2013, *Dirmenci* 3998*, Akçiçek &* Ö.Güner; C6 K. Maraş: Engizek Dağı, around Aksu mahallesi, 1000–1100 m, meadows, 25.07.1987, *H.Duman* 3724 (GAZI); C6 K. Maraş: Süleymanlı, Avcılar village, *Pinus* forest, 800 m, 21.07.1977, *B.Yıldız* 1215 (HUB). - ***Teucrium melissoides:*** C9 Şırnak: 12.5 km from Uludere road junction to Beytüşşebap, around the spring, wet places, 37°23′353″N, 42°54′026″E, 1070 m, 18.06.2003, *A.A.Dönmez* 11230 *& B.Mutlu* (HUB, INU); ibid 08.06.2013, *Dirmenci* 3912*, Akçiçek &* Ö.Güner*;* C10 Hakkari: Yüksekova, between Varegöz and Yeşiltaş village, water's edge, 15.08.2008, *B.Yıldız* 16926, *Dirmenci* & *M.Fırat*; 31 km from Şemdinli to Derecik, near foundation, water's edge, 37°12′203″N, 44°26′414″E, 08.06.2013, *Dirmenci* 3910*, Akçiçek &* Ö.Güner.