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A new subspecies of *Stachys cretica* (section *Eriostomum*, Lamiaceae) from Turkey

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Abstract: *Stachys cretica* L. subsp. *kutahyensis* Akçipek subsp. nova is described as a new subspecies from West Anatolia, Turkey. It is related to *Stachys cretica* L. subsp. *vacillans* Rech. f. and *Stachys cretica* L. subsp. *anatolica* Rech. f., from which it differs in stem, leaf, and flower characters. Diagnostic characters, description, detailed illustrations, and taxonomic comments of the new subspecies are given. The geographical distribution of the subspecies is mapped. IUCN threat category and observations on the population are noted.

Key words: Endemic, Lamiaceae, *Stachys cretica*, Turkey

Türkiye'den *Stachys cretica* (section *Eriostomum*, Lamiaceae)' nın yeni bir alt türü

Özet: *Stachys cretica* L. subsp. *kutahyensis* Akçipek Türkiye'den yeni bir alt tür olarak tanımlanmıştır. *Stachys cretica* L. subsp. *kutahyensis* Akçipek, *Stachys cretica* L. subsp. *vacillans* Rech. f. ve *Stachys cretica* L. subsp. *anatolica* Rech. f.'ya yakındır, onlardan gövde, yaprak ve çiçek özellikleri bakımından farklıdır. Yeni alt türün ayırt edici özellikleri, betimi, detaylı resimleri ve taksonomik yorumlar verilmiştir. Alt türlerin coğrafik dağılımı haritalanmıştır. IUCN tehlike kategorisi ve populasyon üzerine gözlemler kaydedilmiştir.

Anahtar sözcükler: Endemik, Lamiaceae, *Stachys cretica*, Türkiye

Introduction

Stachys L. (Lamiaceae, Lamioideae), one of the largest genera of the Lamiaceae, contains about 300 taxa. It is a cosmopolitan genus centred in the warm temperate regions of the Mediterranean and South-West Asia, with secondary centres in North and South America and southern Africa. The genus has not been reported from Australia or New Zealand. There are 2

main centres of diversity as assessed by the number of species. One is confined to South and East Anatolia, Caucasia, north-west Iran, and North Iraq, and the other to the Balkan Peninsula. The majority of the species grow in rocky places, mainly on limestone and other basic rocks (Bhattacharjee, 1980).

Stachys was revised by R. Bhattacharjee for the flora of Turkey (Bhattacharjee, 1982). Since then, 11

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new species have been described from Turkey. *Stachys* has 82 species (107 taxa) belonging to 2 subgenera and 15 sections in Turkey. Of the 107 taxa, 51 (48%) are endemic to Turkey (Davis et al., 1988; Sümbül, 1990; Gemici & Leblebici, 1998; Duman, 2000; Dinç & Doğan, 2006; İlçim et al., 2008). The endemic taxa are mostly East Mediterranean elements.

Some *Stachys* specimens were collected between Kütahya and Balıkesir provinces during the field studies for the revision of *Stachys* sect. *Eriostomum* in Turkey (Figure 1). After a thorough examination of all *Stachys* spp. in herbaria (ANK, BM, BULU, E, EGE, G, GAZI, HUB, ISTE, ISTF, ISTO, K, KNYA, SU, W, and WU) and consultation of the relevant literature

(Linnaeus, 1753; Bentham, 1834; Boissier, 1875; Stoianoff & Stefanoff, 1925; Hayek & Markgraf, 1931; Keissler, 1937; Savulescu, 1961; Ball, 1972; Bhattacharjee 1974, 1980, 1982; Knorrning, 1977; Davis, 1988; Jordanov, 1989; Baden, 1991; Falciani, 1997; Duman, 2000; IUCN, 2001; Dinç & Öztürk, 2008; Özhatay et al., 2009) it was concluded that the specimens represented a previously undescribed subspecies of *S. cretica*.

Results

***Stachys cretica* L. subsp. *kutahyensis* Akçiçek subsp. nov. (Figures 2, 3)**

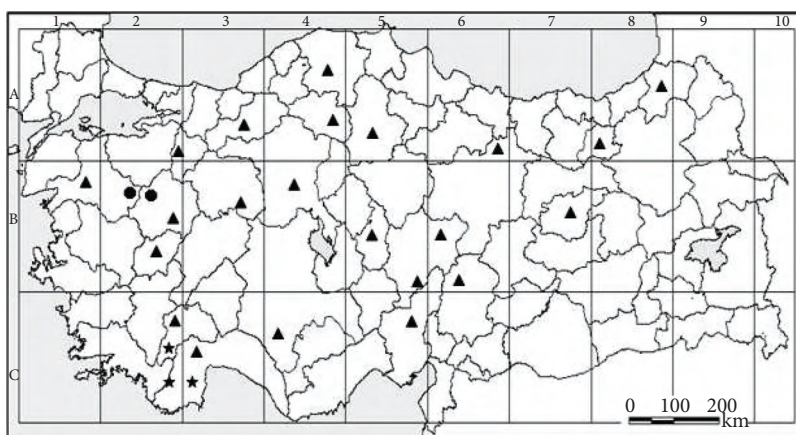


Figure 1. Geographical distribution of *Stachys cretica* subsp. *kutahyensis* (●), *S. cretica* subsp. *vacillans* (*) and *S. cretica* subsp. *anatolica* (▲).

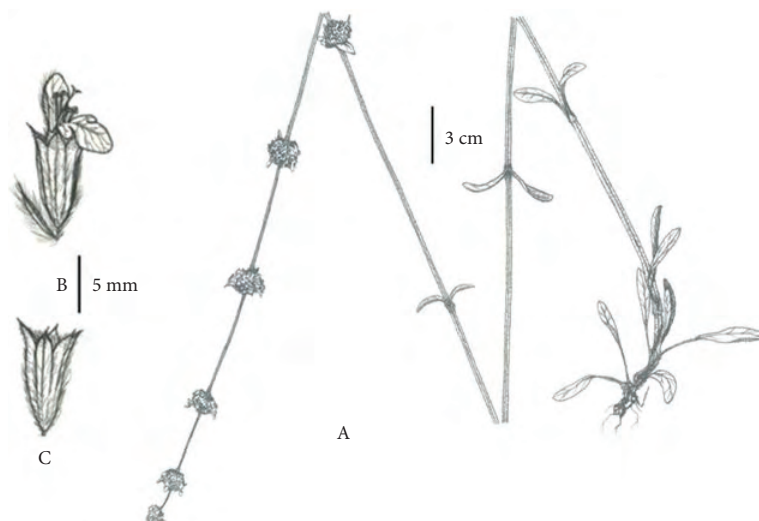


Figure 2. *Stachys cretica* subsp. *kutahyensis* subsp. nov. (from holotype Akçiçek 4609). A: Habit, B: Flower, C: Calyx



Figure 3. *Stachys cretica* subsp. *kutahyensis*: Habit and habitat photographs.

Diagnosis: Affinis *S. cretica* subsp. *vacillans* sed caulibus puberulis (non adpressis tomentoso-villosis vel lanato-villosis); foliis caulium 3-8(-9) mm (non 8-20 mm); dentibus calycum recurvis maturescentibus (non erectis vel recurvis leviter) et corollis albis (non purpureosubroseis) differt.

Type: Turkey. B2 Kütahya: 20 km from Tavşanlı to Harmancık, stony places, 39°39'230"N, 029°16'613"E, 850 m, 07.06.2007, Akçiçek 4609 & Dirmenci (holo: GAZI; iso: ISTE, ANK, HUB).

Description

Perennial herb, with basal sterile rosettes, many stemmed from base. Flowering stems erect or ascending, (50-) 85-145 cm, simple or rarely branched above, eglandular, puberulent. Basal leaves narrowly oblong-spathulate, 30-40 (-60) × 4-8 (-12) mm, margin obscurely crenulate, apex obtuse to subacute, attenuate or rarely subrounded at the base, petiole 2-5 cm. Cauline leaves 3-5 paired, sessile or petiolate to 5 cm, narrowly oblong-spathulate to oblong-lanceolate, 10-65 × 3-9 mm, gradually becoming smaller above, margin obscurely crenulate, apex obtuse to subacute, attenuate or rarely subrounded at base. All leaves rugose on upper surface, green, sparsely adpressed-tomentose above and densely adpressed grey-tomentose beneath. Floral leaves ovate-lanceolate to lanceolate, sessile, 5-22 mm, longer than, equal to, or shorter than verticillasters, entire to obscurely crenulate. Verticillasters (3-) 4-7, usually 5-16.5 cm distant throughout, rarely few approximate above, 10-35 flowered. Bracteoles

lanceolate to linear-lanceolate, 6-7 mm, herbaceous, shorter than calyx, eglandular. Pedicels 1-1.5 mm. Calyx subbilabiate, subcampanulate, 8-10 mm, densely white lanate-villose, mouth with dense hairy ring; teeth 2-2.5 mm, subequal, ovate-lanceolate or linear-lanceolate, 1/3-1/4 × tube, recurved in fruit, with glandular hairs inside, tip spinescent, mucro 0.6-0.8 mm. Corolla 13-15 mm, white, tube subexserted, bilabiate, upper lip entire, lower lip 3-lobed, middle lobe much larger than 2 lateral lobes, upper lip densely sericeous-tomentose on outside, hairs usually exceeding the lip. Style not exceeding the upper lip, glabrous, 2-branched, branches equal. Stamens 4, included, thecae divaricate, filaments with stipitate glandular and eglandular hairs from base to middle. Nutlets obovoid, faintly trigonous, 2.5-3 × 1.8-2 mm, slightly winged near base, smooth, glabrous, blackish-brown at maturity.

Phenology: Flowering and fruiting times from June to August.

Habitat and ecology: *Stachys cretica* subsp. *kutahyensis* grows in *Pinus nigra* forest openings and stony places in 235-870 m with plants such as *Pinus nigra* subsp. *nigra*, *Campanula lyrata* subsp. *lyrata*, *Bromus sterilis*, *Aegilops biuncialis*, *Sonchus asper* subsp. *glaucescens*, *Silene* sp., *Picris* sp., *Anthemis* sp., *Alyssum* sp., and *Papaver* sp.

Paratypes: Turkey. B2 Kütahya: 20 km from Tavşanlı to Harmancık, stony slopes, 39°39'122"N, 029°17'228"E, 870 m, 04.06.2008, Akçiçek (5077) & Dirmenci; B2 Kütahya: 24 km from Tavşanlı to Harmancık, forest openings, 850 m, 06.07.2007, Akçiçek 4726; B2 Balıkesir: 9 km from Dursunbey to Harmancık, forest openings, 39°37'981"N, 028°46'192"E, 235 m, 04.06.2008, Akçiçek (5099) & Dirmenci.

Specimens examined: *Stachys cretica* subsp. *vacillans*: C2 Burdur: Altınyayla, 4. km from Ballık to Ören village, stony places, 36°51'485"N, 029°24'523"E, 1560 m, 12.09.2008, Akçiçek (5246) & Dirmenci; C3 Antalya: Kemer, between Gedelma and Ovacık, forest openings, 36°38'606"N, 030°26'259"E, 1100 m, 08.06.2007, Akçiçek (4623) & Dirmenci; C3 Antalya: Kemer, Ovacık village, forest openings, 36°39'249"N, 030°25'893"E, 1180 m, 07.06.2008, Akçiçek (5126) & Dirmenci; C3 Antalya: 16 km from

Seki to Elmalı, *Juniperus* sp. openings, 36°49'722"N, 029°45'593"E, 1460 m, 07.06.2008, *Akçiçek* (5129) & *Dirmenci*; C3 Antalya: Kemer, Ovacık village, *Pinus brutia* forest openings, 1240 m, 11.09.2008, *Akçiçek* (5244) & *Dirmenci*; C3 Antalya: Kemer, Ovacık village, forest openings, 36°39'273"N, 030°25'899"E, 1200 m, 08.06.2007, *Akçiçek* (4625) & *Dirmenci*; C2 Muğla: Köyceğiz, Kaletepe, 800-900 m, *Pinus brutia* forest and macchie, 19.06.1991, *A.Güner* (9520), *M.Vural*, *H.Duman*, *A.Dönmez*, *H.Şağban* (GAZI); C3 Antalya: Akseki, Sadıklar village, Geyran road, between bushes, 10.06.1995, 100 m, *A.Duran* (2666) (GAZI); C3 Antalya: Kemer, Teke Dağ, Ovacık, ca. 1100-1200 m, *P.H.Davis* 15174/a (ANK).

Stachys cretica subsp. *anatolica*: A2 Bilecik: Pazaryeri, 750 m, 02.07.1962, *Davis* (36493) & *Coode* (E); A4 Kastamonu: Ilgaz, TV tower, limestone bedrock, subalpine veg., ca. 2000 m, 20.07.1981, *E.Yurdakulol* (11579), *Y.Akman*, *N.Demirörs* (ANK); A5 Çorum: 15 km from Çorum to Osmaniye village, roadsides, 40°40'524"N, 034°54'870"E, 1080 m, 29.06.2008, *Akçiçek* (5178) & *Dirmenci*; A6 Sivas: Between Suşehri and Değirmentaşı villages, roadsides, 1000-1200 m, 27.06.1985, *B.Yıldız* (5794); A8 Gümüşhane: 26 km from Alucra to Şiran, roadsides, 40°15'018"N, 038°57'127"E, 1560 m, 28.06.2008, *Akçiçek* (5150) & *Dirmenci*; A9 Artvin: above Artvin, igneous, 800 m, fallow fields, 19.06.1957, *Davis* 29696 & *Hedge* (ANK); B1 Balıkesir: Madra Dağı, Gebeçinar village, forest openings, 400 m, 05.07.2006, *Akçiçek* (4197), *F.Satıl* & *S.Selvi*; B2 Afyon: Dazkırı, Darıcılar village, steppe, 980 m, 18.06.1984, *Z.Aytaç* 1263 (GAZI); B3 Afyon: Şuhut, Akyatak village, steppe, 38°34'693"N, 030°27'721"E, 1250 m, 07.06.2007, *Akçiçek* (4610) & *Dirmenci*; B4 Ankara: Haymana-Yenice, 1300 m, 26.09.1992, sparse woodland, *M.Vural* (6227), *N.Adıgüzel* & *F.Karavelioğulları*, (GAZI); B5 Adana: Bakır Dağ, ca. 1300 m, 27.06.1952, *P.H.Davis* 19267 (ANK); B6 Kayseri: Bakır dağ, above Kisge, 1400 m, steppe slopes, 28.06.1952, *Davis* (19267), *Dodds* & *Çetik* (K); C2 Denizli: Honaz, rocks, 11.06.1973, 800 m, *E.Tuzlacı* & *A.Baytop*, 25839 (ISTE); C3 Antalya: Tahtali Dağ (Kemer near Çukuryayla), 1500 m, 15.08.1947, *Davis* 14212 (E); C4 Konya: 8 km from Akseki to Seydişehir, *Juniperus-Cedrus* forest, 1370-1450 m, 16.07.1997, *Z.Aytaç* (7728) & *S.Kıyak*,

(GAZI); C5 Adana: Saimbeyli; Doğanbeyli, Akçal, 1300 m, 12.07.1952, *Davis* (19898), *Dodds* & *Çetik* (E); C6 Ankara: Kızılcahamam-Kargasekmez, *Q. pubescens* association, ca. 1100 m, 03.06.1974, *O.Ketenoğlu* 147 (ANK).

Distribution and proposed conservation status:

Stachys cretica subsp. *kutahyensis* is endemic to Kütahya and Balıkesir provinces (Tavşanlı-Harmancık-Dursunbey) in West Anatolia. The new subspecies grows at 235-870 m altitude, where the number of mature individuals is fewer than 2500 and is known from 3 locations. The habitat of the taxon is threatened by human impact in the areas (e.g. road construction works, overgrazing, and deforestation). Therefore, it should be regarded as belonging to the IUCN Endangered (EN) threat category (IUCN, 2001).

Key to related *Stachys cretica* subspecies

1. Cauline leaves oblong-spathulate to oblong-lanceolate, 30-90 × (8-)10-22 (-30) mm, tomentose-villous or lanate-villous; corolla purplish-pink
 2. Cauline leaves tomentose-villous, crenate or crenate-serrate; verticillasters 2-4 (-7) cm; calyx teeth recurved in fruit..... subsp. *anatolica*
 2. Cauline leaves adpressed tomentose-villous or lanate-villous, crenulate; verticillasters 4-10 (-12) cm; calyx teeth erect or slightly recurved in fruitsubsp. *vacillans*
1. Cauline leaves narrowly oblong spathulate to oblong-lanceolate; 10-60 (-65) × 3-8 (-9) mm, adpressed tomentose; corolla whitesubsp. *kutahyensis*

Discussion

Stachys cretica has 11 subspecies in total. Nine of these subspecies grow in Turkey. *S. cretica* is related to *S. thirkei* and *S. byzantina*. The species is very variable in density of indumentum, length:breadth ratio of leaves, calyx teeth shape, tube:teeth ratio, and length of calyx teeth mucros. A certain amount of morphological overlap occurs between subspecies in contact areas (Bhattacharjee, 1982).

Table. Comparison of characters used to distinguish between *Stachys cretica* subsp. *kutahyensis* and *S. cretica* subsp. *vacillans* and *S. cretica* subsp. *anatolica*.

Character	<i>S. cretica</i> subsp. <i>kutahyensis</i>	<i>S. cretica</i> subsp. <i>vacillans</i>	<i>S. cretica</i> subsp. <i>anatolica</i>
Flowering stem	(50-) 85-145 cm, puberulent	50-115 cm, adpressed tomentose-villous or lanate-villous	30-90 (-110) cm, adpressed tomentose-villous
Cauline leaves	narrowly oblong-spathulate to oblong-lanceolate, obscurely crenulate, 10-60(-65) × 3-8(-9) mm, adpressed tomentose	oblong-spathulate to oblong-lanceolate, crenulate, 30-75 × 8-20 mm, adpressed tomentose-villous or lanate-villous	oblong-spathulate to oblong-lanceolate, crenate or crenate-serrate, 35-90 × (8-)10-22(-30) mm, tomentose-villous
Distance of Verticillasters	usually 5-16.5 cm	4-10 (-12) cm	2-4 (-7) cm
Calyx	densely white lanate-villous	grey tomentose-villous or lanate-villous	grey, tomentose-villous
Calyx teeth (in fruit)	recurved	erect or slightly recurved	recurved
Corolla	white	purplish-pink	purplish-pink

Stachys cretica subsp. *kutahyensis* is related to *S. cretica* subsp. *vacillans* and *S. cretica* subsp. *anatolica*, from which it differs in stem, indumentum, leaf, and flower characters (Table). It differs from *S. cretica* subsp. *vacillans* by its long (50-) 85-145 cm (not 50-115 cm) and puberulent stems (not adpressed tomentose-villous or lanate-villous), narrower cauline leaves 3-8 (-9) mm (not 8-20 mm), calyx teeth recurved in fruit (not erect or slightly recurved), and corolla white (not purplish-pink). It can be distinguished from *S. cretica* subsp. *anatolica* by its narrower 3-8 (-9) mm and obscurely crenulate cauline leaves [not 10-22 (-30) mm and crenate or crenate-serrate], distance of verticillasters 5-16.5 cm [not 2-4 (-7) cm], and corolla white (not purplish-pink).

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