

A New Genus Record for the Flora of Turkey: *Tetradiclis* Stev. ex M.Bieb. (*Zygophyllaceae*)

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Abstract: *Tetradiclis tenella* (Ehrenb.) Litw. (*Zygophyllaceae*), recently collected from Kırıkkale (Central Anatolia), is a new record for the flora of Turkey. A description, its phytogeographical importance, a distribution map and an illustration are given.

Key Words: *Tetradiclis*, *Zygophyllaceae*, new record, Turkey

Türkiye Florası İçin Yeni Bir Cins Kaydı: *Tetradiclis* Stev. ex M.Bieb. (*Zygophyllaceae*)

Özet: Kırıkkale'den (Orta Anadolu) toplanan *Tetradiclis tenella* (Ehrenb.) Litw. (*Zygophyllaceae*) Türkiye florası için yeni bir kayıttır. Türün betimi, fitocoğrafik önemi, yayılış haritası ve çizimi verilmiştir.

Anahtar Sözcükler: *Tetradiclis*, *Zygophyllaceae*, yeni kayıt, Türkiye

Introduction

Tetradiclis Stev. ex M.Bieb. is a bitypic genus mainly found in the Irano-Turanian region (Takhtajan, 1986). The genus was classically known as a member of *Zygophyllaceae* (Brummitt, 1992) until new molecular phylogenetic studies showed its position within *Nitrariaceae* or alternatively as its own separate family *Tetradiclidaceae* (APGII, 2003). However, here the genus was evaluated in the family *Zygophyllaceae*, in accordance with the systematic of the Flora of Turkey. *Tetradiclis tenella* (Ehrenb.) Litw. is widely distributed in the desert and semi-desert zones of the Middle East, and is also found in S & E Europe (S, E & S Russia), the Caucasus, Afghanistan and Central Asia (mainly Turkmenistan) (Bobrov, 1949; Nikitin, 1950; Tutin, 1968; El Hadidi, 1972; Zohary, 1972, 1973; Agnew, 1980).

The first and second authors collected some interesting plants during floristic studies in Delice (Kırıkkale), during the summer of 2002 and spring 2004. From among these was identified by the third

author *Tetradiclis tenella*, during a short visit to Gazi University (Ankara) in August 2004. A description, illustration, notes on phytogeography, a distribution map and the endangered status of the species are provided (Figures 1, 2).

TETRADICLIS Stev. ex M.Bieb.

Tetradiclis tenella (Ehrenb.) Litw., Trav. Mus. Bot. Acad. Pétersb. 3: 122 (1907). (Figure 1).

Syn.: *Anatropa tenella* Ehrenb. in Linnaea 4: 404 (1809); *T. salsa* C.A.Mey. in Verz. Pflanz. Cauc.: 226 (1831); *T. caspia* Lindl. in Chesney. Narr. Euphr. Exp. T. 95 (1868).

Type: [Egypt] Alexandria (1824). Ehrenberg (K; G, n.v.).

Annual, 3-12 cm tall, erect to subprostrate, delicate, glabrous, with filiform roots. Stems simple or branching at the base and dichotomous above. Leaves succulent, subsessile, glabrous, the lowest opposite, the others alternate, 4-8 x 1.5-2.5 mm, pinnatisect with linear

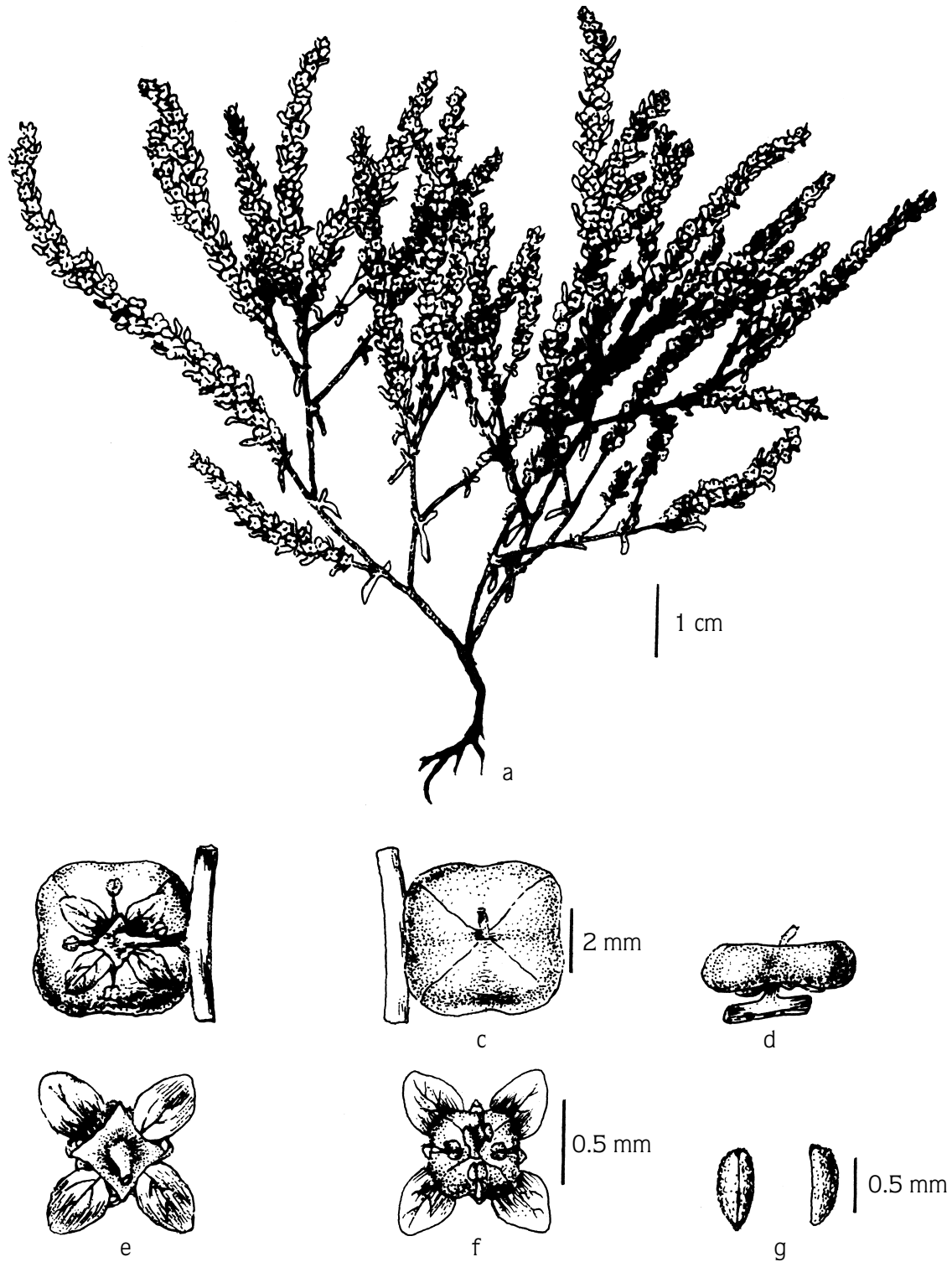
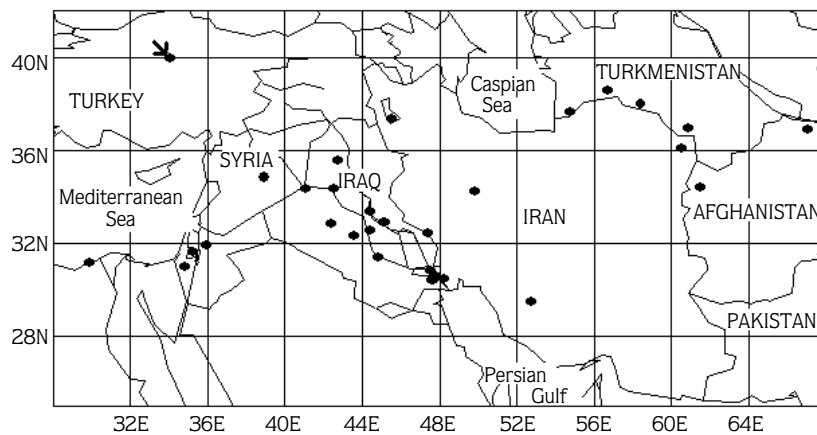


Figure 1. *Tetradiclis tenella* (Ehrenb.) Litw.: a-habit, b-aspect of fruit rear, c-aspect of fruit top, d- aspect of fruit side, e- aspect of flower rear, f- aspect of flower top, g-seeds [A part of this figure was completely redrawn from our specimen and copied from plate 55 in the Flora of Iraq (Agnew, 1980)].

Figure 2. Habit of *Tetradiclis tenella* .Figure 3. Distribution map of *Tetradiclis tenella* in the Middle East. The new Turkish locality is indicated by an arrow (the localities in the Caucasus and Pakistan are not shown).

segments or lacinate, obtuse. Inflorescence a spike-like scorpioid cyme, 1-3 cm long in flower, elongating to 12 cm long in fruit. Flowers tetramerous, 0.5-1 mm in diameter during anthesis; pedicels up to 1.5 mm long, in

axils of leaf-like bracts. Sepals, petals and stamens 4, persistent. Sepals c. 0.5 mm long. Petals twice as long as sepals, oblanceolate to spatulate, whitish. Ovary 4-locular, dorsiventrally flattened; each loculus divided by

2-false septa into 3 compartments, the 2 outer ones containing 1 ovule each, the inner with 4 or fewer. Fruit a loculicidal capsule, tetragonal, 1.5-2 x 2-4 mm, at first fleshy, later drying. Seeds small, with little endosperm; embryo erect. *Fl.* 4-5, *Fr.* 5-6, *saline places*, 640-650 m.

Specimens examined: Central Anatolia. **B5** Kırıkkale: Delice, around Tekel Tuzla İşletmesi, 650 m, salty areas, 2 vi 2002, *Hamzaoğlu* 2859 & *A.Duran* (ADO); Delice, Tekel Tuzlası, abandoned salt ponds, 644 m, 39° 58.548' N – 034° 03.932' E, 19 v 2004, *Hamzaoğlu* 3569 & *A.Duran* (ADO, GAZI, ANK, HUB, KNYA, hb. Akhani, hb. Yıldırımılı).

Discussion

Tetradiclis tenella usually grows in moist saline places in desertic and semi-desertic zones. It is an Irano-Turanian species with a wide distribution range from NE Africa (Egypt), throughout SW Asia (Palestine, Jordan, Syria, Iraq, Iran, Afghanistan and Pakistan) and northwards in Central Asia (mainly Turkmenistan), the Caucasus and S Russia (Figure 3). In spite of its rather wide range it is poorly represented in herbaria. The data available in the Flora of Iraq (Agnew, 1980) indicate that it is more common in Iraq than elsewhere. In Iran it is very rare and is only known from a few localities (El Hadidi, 1972).

The disjunct occurrence of *Tetradiclis* in Central Anatolia adds another species to a series of species which link the flora of salty habitats in Central Anatolia, central and NW Iran, Syria and the Caucasus. A good example is *Microcnemum coralloides* (Loscos & Pardo) Buen, which occurs disjunctively in Central Anatolia (around the saline Tuz Lake), central Iran (Kavire Meyghan), NW Iran, the Syrian desert, the Caucasus and, of special interest, Spain. Interestingly all localities except Spain more or less overlap with the localities of *Tetradiclis tenella*. Recently the third author reported *Asparagus lycaonicus* P.H.Davis from central Iran, an extremely endangered species from

Tuz Lake (Akhani, 2002). Freitag et al. (1999) reported *Anabasis aphylla* L. from a locality in Central Anatolia (28 km ESE Nallihan-Ankara) disjunct from the nearest localities in East Anatolia. We also agree with parts of their interpretation that the occurrence of such halophytic species indicates a more continuous distribution during a drier period in the past and former stronger floristic links between Central Anatolia and western and southern salt habitats.

With regard to conservation and biodiversity, we consider this species endangered; its habitat needs to be legally protected by the Turkish government.

The number of genera of *Zygophyllaceae* in the Flora of Turkey is increased to 6 with the addition of *Tetradiclis*. The genus identification key of the family was reordered and given as follows;

Key to the genera of *Zygophyllaceae* in Turkey

1. Shrubs or perennial herbs
 2. Leaves alternate
 3. Leaves entire; plants shrubby.....4. **Nitraria**
 3. Leaves divided; herbs.....5. **Peganum**
 2. Leaves opposite
 4. Leaves simple; spiny stipules present.....
.....2. **Fagonia**
 4. Leaves with one pair of leaflets; spiny stipules absent.....1. **Zygophyllum**
1. Annuals
 5. Leaves with many pairs of leaflets, not succulent; fruit schizocarpic, heavily ornamented with spines and tubercles.....3. **Tribulus**
 5. Leaves with one pair of leaflets, succulent; fruit loculicidal capsule, smooth and glabrous.....6. **Tetradiclis**

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