

HYPERICUM EKERII (HYPERICACEAE), A NEW SPECIES FROM TURKEY

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Abstract

Hypericum ekerii Yüce & Aytaç sp. nov. (Hypericaceae) is described and illustrated from Düzgün Baba Mountain in Eastern Anatolia, Turkey. The new taxon grows on volcanic rocks in Tunceli Province. It is closely related to *H. capitatum* Choisy s.l. an Irano-Turanian element of Anatolia. Diagnostic morphological characters were discussed. The pollen characters of threetaxa were examined by scanning electron microscopy (SEM).

Key words: *Hypericum*, New takson, Tunceli, Turkey.

Introduction

Hypericum Linnaeus (1753: 783) is the largest genus of the family Hypericaceae, having ca. 500 species, distributed almost throughout the entire world (Robson, 2012). Although it is predominantly distributed in the temperate regions of the Northern Hemisphere (Meseguer *et al.*, 2013), the genus *Hypericum* L. is represented in Turkey by 96 species, 2 subspecies, 6 varieties distributed in 20 sections [sect. *Hypericum*, *Eremanthe* (Spach.) Endl., *Androsaemum* (Duham.) Endl., *Inodorum* Stef., *Bupleuroides* Stef., *Arthrophyllum* Jaub. & Spach., *Triadenioides* Jaub. & Spach., *Heterophyllum* Robson, *Triadenia* (Spach) R. Keller, *Drosanthe* (Spach.) Endl., *Taeniocarpum* Jaub. & Spach., *Coridium* Spach., *Adenosephalum* Spach., *Drosocarpium* Spach., *Oligostema* (Boiss.) Stef., *Thasia* Boiss., *Crossophyllum* Spach., *Olympia* (Spach.) Endl., *Campylopus* (Spach.) Endl. and *Origanifolia* Stef.]. Eastern Turkey and Transcaucasia are considered to be a kind of distribution center for the genus (Robson 2010a; 2010b; 2012). The sections *Taeniocarpum* and *Drosanthe* have 15 and 16 species, respectively, and the rate of endemism is over 50% in Turkey. Out of 96 species present in Turkey, 47 taxa are endemic (45%), 44 taxa belong to the Eastern Mediterranean, 31 to the Irano-Turanian and 17 to the Euro-Siberian phytogeographic regions and 14 taxa are multiregional (Robson, 1967 & 1996; Aslan, 2012; Ocak *et al.*, 2009).

Phylogenetic hypotheses for the large cosmopolitan genus *Hypericum* (St.-John's-wort) have previously been based on morphology and molecular studies have thus far included only a few species. According to Nürk *et al.* (2013), relative to the most recent classification, around 60% of the sections of *Hypericum* were monophyletic.

After the description of the new species in sect. *Drosanthe* (Spach.) Endl., the number of taxa in the sect. reached 26 in Turkey (Robson, 1967, 1988 & 2012). The sect. *Drosanthe* is perennial and woody at the base; black glands are confined usually to sepals and petal margins; petals and stamens persistent; stamen's fascicles 3; styles 3; capsule valves longitudinally vittate; and seeds almost smooth to tuberculate.

Materials and Methods

During botanical trips in 2012 and 2014 to Tunceli Province, the first author encountered some peculiar specimens of *Hypericum* L. It was looking like *H. capitatum* Choisy var. *luteum* that grows in southeastern Turkey (Diyarbakır, Urfa, Gaziantep and Kahramanmaraş) at an elevation of 800 m. These plants were growing in the southern part of Anatolia (Tunceli Province) at elevations of 1800–2060 m. On the other hand, the new species has oblong-elliptic and large-scale leaves, oblong to linear and sometimes revolute in *H. capitatum*. After going through the detailed descriptions of various species of *Hypericum* in Boissier, 1867; Robson, 1967; and Tutin, 1968; as well as comparing the materials with specimens in the ANK, GAZI, HUB and E herbaria, it became clear that these specimens belong to an undescribed species, which is described here as a new species.

The pollen morphology of the new species and other close species were examined with scanning electron microscopy (SEM) at GAZI. The SEM photomicrographs were taken with the JEOL JSM 6060 SEM at the Gazi University. The samples are deposited at the GAZI herbarium (*E. Yüce*3000, 2212 and 2284).

Abbreviations of the authors of plant names follow Brummitt & Powell (1992).

Results and Discussion

Hypericum ekerii E. Yüce & Aytaç **spec. nov.** Sect. *Drosanthe*, figs. 1–2, (in Turkish “Tunceli kantoronu”).

Type: TURKEY. B7 Tunceli, Mazgirt, c. 21 km E of Tunceli, c. 3 km SE of Çevrecik, Düzgün Baba Dağı (Munzur Mountain ranges), 1800–2060 m, 11.06.2015, E. Yüce 3000 (holo. GAZI, iso. ANK).

Diagnosis: It is close to *H. capitatum* Choisy var. *luteum* Robson, but differs from it with oblong-elliptic and flat leaves (not oblong-linear, revolute), with greenish dots on lower surface; petals 9–10 × 4–5 mm (not 5–7 mm), without red-tinges. They are also close to *H. capitatum* var. *capitatum*, but flowers yellow (not red); leaves oblong-elliptic and flat (not oblong-linear, revolute at margin).

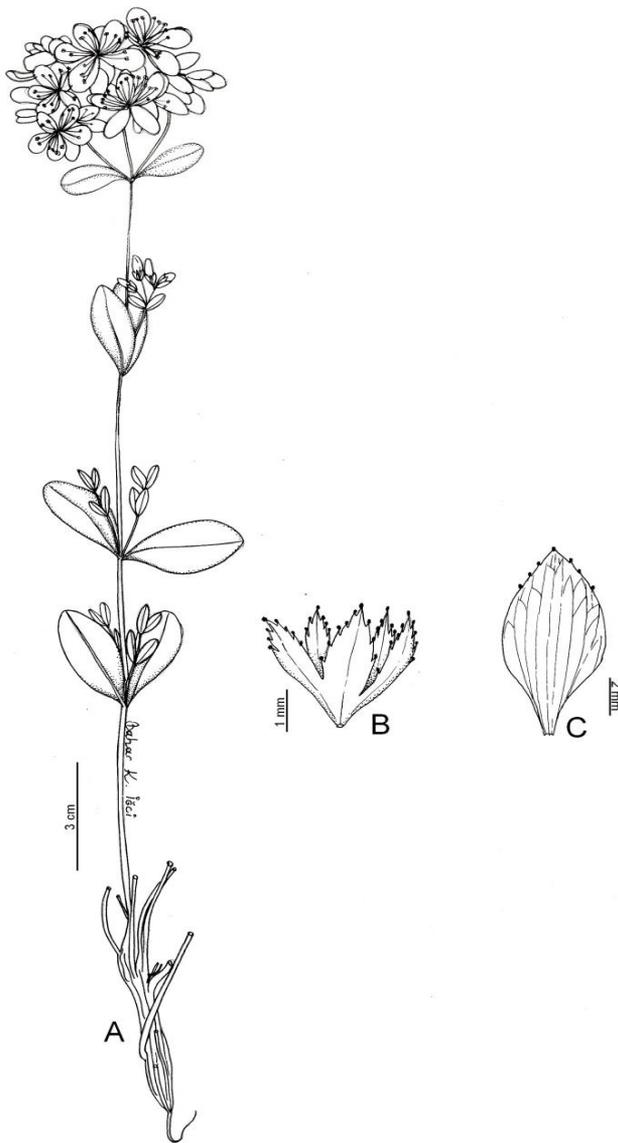


Fig. 1. A habitus of *H. ekerii*, B calyx, C petal.

Para: Turkey, Tunceli, Mazgirt, c. 21 km E of Tunceli, c. 3 km SE of Çevrecik, Düzgün Baba Dağı, 1800–2060 m, 31.06.2012, *E. Yüce* 2246, *ibid.* 2060 m, 15.06.2013, *E. Yüce* 2826, GAZI.

Rhizomatous, subshrub. Stem 20–30 cm, erect, glabrous, reddish-brown, with yellowish glands not prominent. Leaves in main stem 15–30 × 15–20 mm, oblong-elliptic, ± glaucous, rounded, with greenish dots on lower surfaces; axillary leaves similar, but smaller. Inflorescence subcorymbose, many flowered. Bracts 4–6 mm, linear-oblong, glabrous, undulate, margin slightly membranous, with black glandular ciliate. Sepals green, 3 × 1–1.5 mm, ovate to oblong, acute, united at the base, with ± 9–10 black glandular denticulate. Petals yellow, 9–10 × 4 × 5 mm, ovate, rarely yellowish dots on lower surface with ± 9 black glands on margin. Stamens fascicles 3, without black glands. Styles 3. Capsule ovoid to ovoid trigonous, 8–10 mm. Fl.: June to July.

Pollen structure (Fig. 3 A-D): The pollen grains of *H. ekerii* are radially symmetrical and isopolar, the outline is elliptic or compressed oval in the meridional section and

trilobulate in the polar optical section. The pollen grains are subprolate with the polar axes 12–15 μm and the equatorial axes 11–12 μm. The P/E ratio is 1.17. The aperture type is trizonocolporate. The colpi are very long and narrow with clear margins (clt 0.9–1.2 μm, clg 11–13 μm) and aperture membrane granulates. The pori are lolongate (plt 1.25–1.75 μm, plg 2.5–3.1 μm) (cruciform porus, with short lateral and meridional extensions). The exine sculpture is tectate with one layer of columellae and microreticulate-perforate in the meridional optical section and is microperforate in the polar section. The edge of colpus is psilate-perforate ornamentation. The lumen width is 0.2–0.4 μm and regular and polygonal-shaped. The murus width is 0.2–0.4 μm. The apocolpium is 2 μm broad.

The pollen grains of *H. capitatum* var. *capitatum* are radially symmetrical and isopolar, the outline is elliptic or compressed oval in the meridional section and trilobulate in the polar optical section. The pollen grains are subprolate with the polar axes 11–13 μm and the equatorial axes 9–11 μm. The P/E ratio is 1.2. The aperture type is trizonocolporate. The colpi are long and narrow with clear margins (clt 0.8–1.1 μm, clg 7–8 μm) and aperture membrane granulates. The pori are lolongate (plt 1–2.5–1.75 μm, plg 2.5–3.1 μm) (cruciform porus, with short lateral and meridional extensions). The exine sculpture is tectate with one layer of columellae and microreticulate-perforate in the meridional optical section and is microreticulate-perforate in the polar section. The edge of colpus is microreticulate ornamentation. The lumen width is 0.3–0.6 μm and regular and polygonal-shaped. The murus width is 0.15–0.4 μm. The apocolpium is 2 μm broad.

The pollen grains of *H. capitatum* var. *luteum* are radially symmetrical and isopolar, the outline is elliptic or compressed oval in the meridional section and trilobulate in the polar optical section. The pollen grains are prolate-spheroidal with the polar axes 11–14 μm and the equatorial axes 11–12 μm. The P/E ratio is 1.09. The aperture type is trizonocolporate. The colpi are long and narrow with clear margins (clt 0.6–1 μm, clg 9–10 μm) and aperture membrane granulates. The pori are lolongate (plt 1–1.5 μm, plg 3–4.5 μm) (cruciform porus, with short lateral and meridional extensions). The exine sculpture is tectate with one layer of columellae and microreticulate-perforate in the meridional optical section and is microreticulate-perforate in the polar section. The edge of colpus is psilate-perforate ornamentation. The lumen width is 0.3–0.65 μm and regular and polygonal-shaped. The murus width is 0.3–0.45 μm. The apocolpium is 3 μm broad, *Yüce* 2284.

Distribution and ecology: *Hypericum ekerii* is an Irano-Turanian element, endemic to Tunceli Province, elevations of 1800–2060 m. It grows on volcanic steppes at Düzgün Baba Mountain together with *Allium balansae* Boiss., *Campanula conferta* A.D., *Arenaria gypsophiloides* L., *Lamium garganicum* L., *Lotus gebelia* Vent., *Astragalus garaensis* Sirj., *Veronica cinerea* Boiss. & Balansa, *Cotoneaster nummularius* Fisch. & C.A.Mey., *Galium subuliferum* Sommier & Levier, *Verbascum duzgunbabadagensis* Karavel. & E. Yüce, *Bunium microcarpum* (Boiss.) Freyn. & Bornm. ex Freyn., most of them are endemic to Turkey (Fig. 4).



Fig. 2 A. *H. ekerii* (Habit).



Fig. 2. B. *H. ekerii* showing habit and closed flowers, E. Yüce 3000.

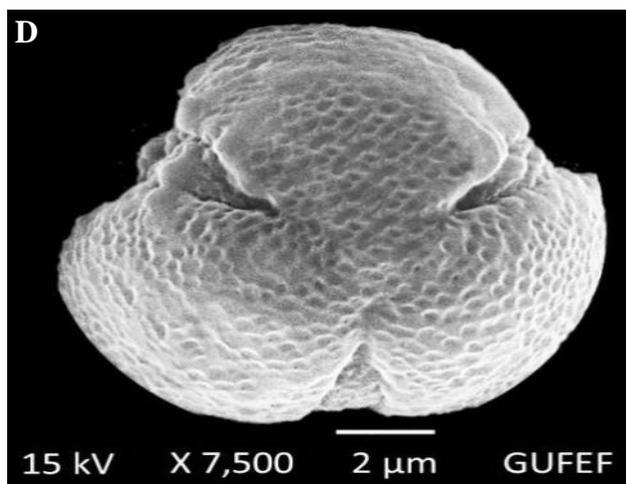
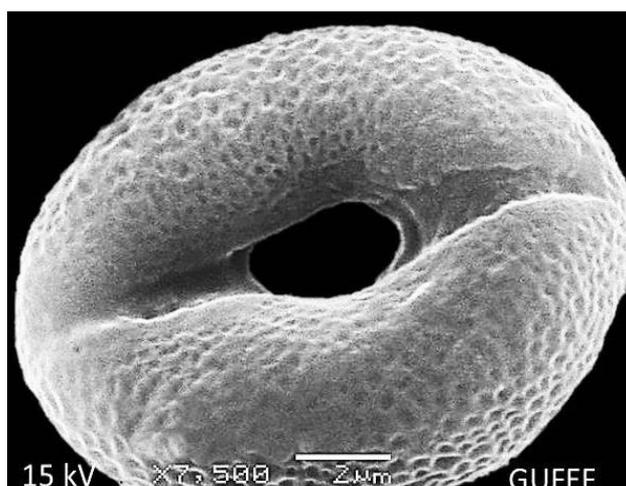
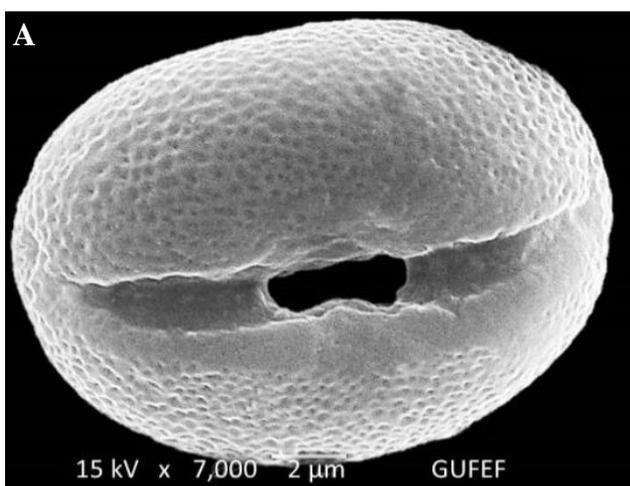


Fig.3. *H. ekerii* A–B, E. yüce 3000; *H. capitatum* var. *capitatum* C, E. yüce 2284; and *H. capitatum* var. *luteum* D, E. yüce 2212.

Conservation status: The specimens were collected from Tunceli Province, where the species seem to be rare in its habitat. It is known only from from the type locality. The range of this local endemic species is restricted to a single location (IUCN Criteria B1a). The population is pure, with an area of occupancy smaller than 10 km² and according to field observations, it is estimated that the total number of individuals of this endemic species does

not exceed 70–80 in its single locality (criteria B2a). Therefore, we suggest that *Hypericum ekerii* should be evaluated as Critically Endangered (CR) according to the IUCN (2011).

Etymology: This species was named in honor of Assoc. Prof. Dr. İsmail Eker, who is a plant taxonomist on Turkish *Tulips* at the Abant İzzet Baysal University.

Specimens examined: *H. capitatum* var. *capitatum*: Gaziantep, Nizip–Karkamış, 550 m, slopes with marl, 07.05.2001, M. Vural 8506 & Zeydanlı GAZI; *H. capitatum* var. *luteum*: Şanlıurfa, Ceylanpınar, Saraçtepe, 530 m, roadside, 12.06.1996, Adıgüzel 2651 & Ayaç, GAZI. Gaziantep to Nizip, 1.3 km from Gaziantep, 800 m, banks at edge of vineyards, Davis & Hedge 27892, E! (11614 Herbarium specimen RBGK UK K000677093 Fig. 5, isotypus); ibid. Robson NKB, 1968 KEW! *H. ekerii* : Turkey, Tunceli, Mazgirt, c. 21 km E of Tunceli, c. 3 km SE of Çevrecik, Düzgün Baba Dağı, 1800–2060 m, 31.06.2012, E. Yüce 2246, ibid. 2060 m, 15.06.2013, E.

Yüce 2826, ibid.1800–2060 m, 11. 06. 2015, E. Yüce 3000, GAZI!

Sect. *Drosanthe* (Spach) Endl. sect. *Taeniocarpum* Jaub. & Spach and sect. *Triadenia* (Spach) R. Keller are close to each other, but the sect. *Triadenia* differ from sect. *Drosanthe* by deciduous petals which are without black dots. On the other hand, *Drosanthe* has usually unguiculate petals and almost smooth to tuberculate seeds; petals not unguiculate and seeds rugulose to tuberculate in *Taeniocarpum* Jaub. & Spach.

The key to sect. *Drosanthe* species in Turkey (in *Flora of Turkey*, 1967).

1. Inflorescence subcorymbose to corymbose
2. Inflorescence subcorymbose; stem glabrous 3
3. Leaves narrow oblong to linear, revolute at margin *capitatum*
3. Leaves oblong to elliptic, flate *ekerii*
2. Inflorescence corymbose; stem pubescent or glandular-scabrid 4
4. Stem puberulous to pubescent; sepals free or united only at the base *scabroides*
4. Stem glandular-scabrid (± glabrous); sepals united for 1/3 to 2/3 of their length 5
5. Stem glands (when present) unbranched; stem 10–60 cm; inflorescence c. 15–many flowered *scabrum*
5. Stem glands branched; stem 3–11 cm; inflorescence c. 22 flowered *thymopsis*
1. Inflorescence broadly pyramidal to subspicate other members of section

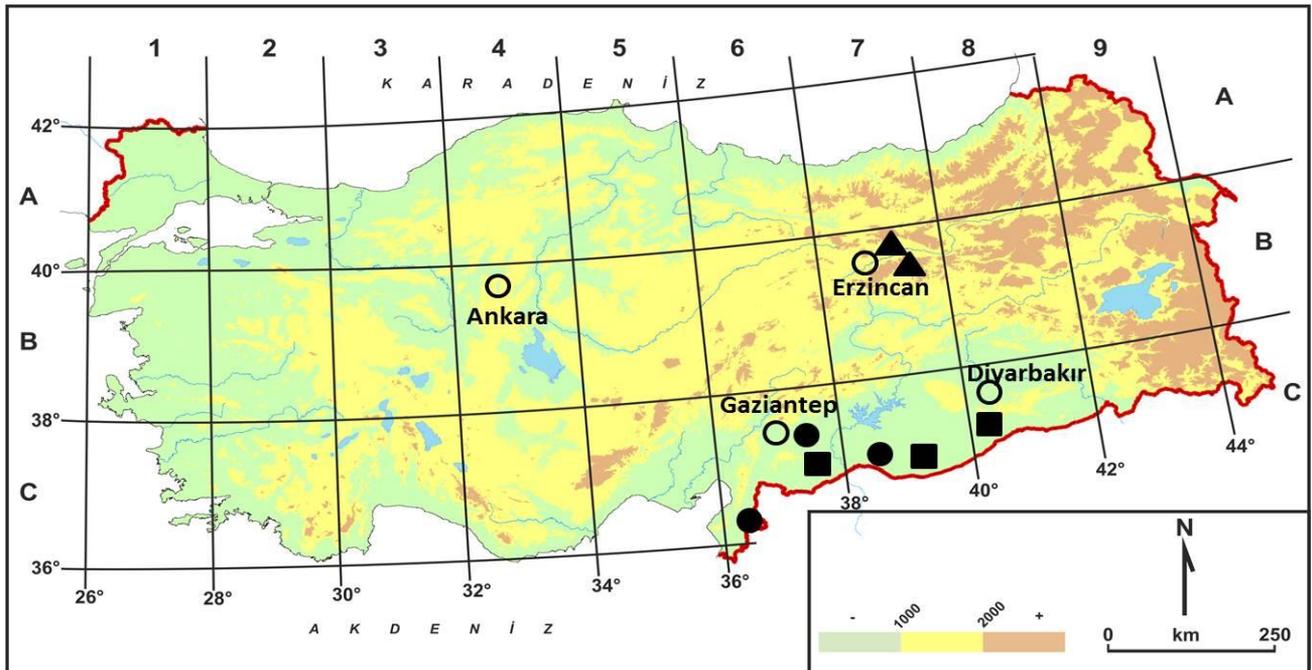


Fig. 4. Distribution map of ▲ *H. ekerii*, ■ *H. capitatum* var. *capitatum*, ● *H. capitatum* var. *luteum*.

H. ekerii is distinguished from *H. capitatum* var. *capitatum* with yellow petals (not orange to crimson), also differs from var. *luteum* with oblong to elliptic leaves and with greenish dots, not linear and mostly revolute and without dots (Table 1).

The leaf width is to 5 mm in *H. capitatum* complex and at least 15 mm in *H. ekerii* (Figs. 1 and 5).

In *H. capitatum* two varieties are recognized based on petals and color of sepals (in *Flora of Turkey*, 1967).

1. Petals orange to crimson; sepals dark red var. *capitatum*
1. Petals yellow; sepals green var. *luteum*

Table 1. Morphological comparison of *H. ekerii* with *H. capitatum* complex.

Characters	<i>H. ekerii</i>	<i>H. capitatum</i> var. <i>capitatum</i>	<i>H. capitatum</i> var. <i>luteum</i>
Leaves	oblong, elliptic, lower surface greenish dots, 30 × 15 mm	narrowly oblong-linear, revolute, 8–30 × 2–5 mm	narrowly oblong-linear, revolute, 8–30 × 2–5 mm
Bracts	4–6 mm, linear-oblong	5–7 mm, lanceolate	5–7 mm, lanceolate
Sepals	green	dark red	green
Petals	9–10 mm, yellow	5–7 mm, orange to crimson	5–7 mm, yellow
(Pollen) Apocolpium	2 µm broad psilate-perforate	2 µm broad microreticulate	3 µm broad psilate-perforate
Colpus ornamentation			
Elevation	1800–2060	350–900	350–900

Fig. 5. Isotype of *H. capitatum* var. *luteum*.

The pollen structures are very similar of all the three taxa, but, the P/E ratio is 1.17, colpus is psillate-perforate, lumen width is 0.2–0.4 µm and murus 0.2–0.4 µm in *H. ekerii*; the P/E ratio is 1.2, colpus is microreticulate, lumen width is 0.3–0.6 µm and murus 0.15–0.4 µm in *H. capitatum* var. *capitatum*; and the P/E ratio is 1.09, colpus is psillate-perforate, lumen width is 0.3–0.45 µm and murus 0.3–0.45 µm in *H. capitatum* var. *luteum*. The pollen of *H. capitatum* were also examined by Clarke, 1975 and 1976; Ottaghvari *et al.*, 2015 and Mártonfi *et al.*, 2002.

H. capitatum s. l. grows in open areas on calcareous slopes and steppes, to elevations of 300–900 m (Tarıkahya & Dönmez, 2003). The new species grows on volcanic slopes, at much higher elevations (1800–2060 m) (Table 1).

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