Acta Biologica Turcica, 34(3), 128-139, 2021 Received 10 Mar. 2020; Accepted 20 Mar. 2021; Published Online 29 Mar. 2021

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.com

Research article

Gundelia cappadocica (Asteraceae); a new lactiferous species from Cappadocia (Kapadokya) Turkey, belonging to *G.* subg. *Gundelia* sect. *Komagenenses*

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Abstract: *Gundelia cappadocica* Fırat *sp. nov*., is described as a new species and illustrated from Cappadocia (Kapadokya) region of Turkey. From the morphological point of view, *G. cappadocica* appears to be similar to *G. komagenensis* and *G. vitekii,* but from which it differs in several morphological features including general habit, plant indumentum, colour of corolla externally and internally, size of fruit complex (disseminule). A comprehensive description of this species are provided, including detailed photographs, geographical distribution, habitat and ecology, vernacular name, ethnobotanical usage, including section and IUCN conservation status.

Keywords: Anatolia, Asteraceae, *Gundelia*, new species, sections

Citing: Fırat, M. (2021). *Gundelia cappadocica* (Asteraceae); a new lactiferous species from Cappadocia (Kapadokya) Turkey, belonging to *G*. subg. *Gundelia* sect. *Komagenenses*. *Acta Biologica Turcica,* 34(3), 128-139.

Introduction

Gundelia L. belongs to the tribe Lactuceae according to the chloroplast ndhF gene (Karis et al., 2001). The recent taxonomical studies based on morphological data as well as ITS based molecular data suggested that the genus *Gundelia* L. (Asteraceae) should be divided into two subgenera; *Gundelia* subgen. *Gundelia* and *Gundelia* subgen. *Anatolia* Fırat. Additionally, morphological data suggest that there should be two sections within the subgenus *Gundelia*; *Gundelia* L. subgen. *Gundelia* sect. *Gundelia* and *Gundelia* subgen. *Gundelia* sect. *Komagenenses* Fırat (Fırat, 2021). Karyotype data for 12 taxa are reported in Genç and Fırat (2019). According to the molecular dating the distinction of the genus *Gundelia* from the relative genera was around 14.1 million years ago (mya) (Tarikahya Hacioğlu and Fırat, 2017).

Gundelia tournefortii was described by Linne (1753) Type: Habitat in Armenia, Syria. Lectotype (Vitek and Jarvis, 2007): (Aleppo) Rauwolf (1583), Epitype (selected by Vitek and Jarvis, 2007): (Aleppo), Rauwolf. To recent years, *Gundelia* genus evaluated as monotypic, and many described taxa after *G. tournefortii* were assesment under this species as synonymous (e.g. Rechinger, 1989; Kupicha, 1975; De Candolle, 1836).

In order of, *Gundelia glabra* Mill. (1768), Type: near Baibout (Bayburt) in Armenia. *Gundelia tournefortii* L. var. *glabra* (Mill.) DC. (1836). *Gundelia tournefortii* L. var. *araneosae* DC. (1836), nom. illegit. effectively based on *Gundelia tournefortii* L. *Gundelia tournefortii* L. [unranked/var.] β *tenuisecta* Boiss., Boissier (1875). Type: Turkey in monte Berytdagh Cataoniae. *Gundelia tournefortii* L. var. *asperrima* Trautv. (1876). Type: In Turciae districtu Erzerum, in montibus Palanteken, *Gundelia asperrima* (Trautv.) Fırat, is taxon raised to the rank of species by Fırat (2017a). *Gundelia tournefortii* L. var. *armata* Freyn & Sint. (1892). Type: Armenia turcica. Egin in monte Hodschadur-Dagh. *Gundelia armata* (Freyn & Sint.) Fırat, is taxon raised to the rank of species by Fırat (2019a). *Gundelia tenuisecta* Freyn & Sint. (1892), Type: Armenia turcica, Egin: prope Szanduk. *Gundelia tournefortii* var. *microcephala* Bornm. (1906) Type: Inter Kermandschahan et Bagdad, prope Khanegyn (Chanekin) ad fines Persiae, Grenzstation. *Gundelia microcephala* (Bornm.) Vitek, is taxon raised to the rank of species by Vitek (2018). *Gundelia tournefortii* L. f. *purpurascens* Bornm. (1936) Type: Iter Persico-turcicum, Kurdistania, (Assyria orient.), in montis Kuh-Sefin reg. infer. ad pagum Schaklava ditionis Erbil (*Gundelia*

purpurascens Bornm. (1939) is actually published in synonymy only (as a nom. in sched.) and thus not validly published at the rank of a species, is taxon raised to the rank of species by Fırat (2018a). *Gundelia rosea* Hossain & Al-Taey, (1984). Type: Kurdistan region of Iraq.

Respectively, taxa defined in recent years *Gundelia aragatsi* Vitek, Fayvush, Tamanian & Gemeinholzer (2010) Type: Armenia, Aragatsotn province, Mt. Aragats SW-slope, track between Avtona water reservoir and Kakavadzor, *Gundelia aragatsi* subsp. *steineri* Vitek, Fayvush, Tamanian & Gemeinholzer (2010) Type: Armenia, Vayots Dzor province, mainroad to south Armenia, W of Yeghegnadzor, SE of crossroad to Erechgnadzor, slope S of river. *Gundelia armeniaca* Nersesyan (2014) Type: Armenia, Abovian region, surroundings of Geghadir village. *Gundelia dersim* Vitek, Yüce & Ergin (2014) Type: Turkey. Province Tunceli (Dersim): Ovacık, c. 11.7 km WWSW Ovacık, 1.9 km Ene Ziyaret (fountains of river Munzur). *Gundelia munzuriensis* Vitek, Yüce & Ergin (2014) Type: Turkey. Province Tunceli (Dersim): Ovacık, c. 2 km WWSW Ovacık. *Gundelia vitekii* Armağan (2016) Type: Turkey, province Tunceli (Dersim), Tunceli Merkez, c. 8 km N of Tunceli, mountain slope nw of Tüllük Bucağı. *Gundelia komagenensis* Fırat (2016) Type: Turkey. C7 Adıyaman: Kahta Province, Nemrut Mountain. *Gundelia colemerikensis* Fırat (2016) Type: Turkey. C9 Hakkâri: Hakkâri Province (Colemerîk) from Karadağ hill to Berçelan plateau, open erode region and steppe. *Gundelia cilicica* Fırat (2016) Type: Turkey. C5 Mersin: Erdemli province, Tozlu village, open forrest. *Gundelia anatolica* Fırat (2016) Type: Turkey. B4 Kırıkkale: Delice province, Tuzkayası region. *Gundelia mesopotamica* Fırat (2017b) Type: Turkey. C8 Mardin: 2-3 km from Mardin to Nusaybin, eroded slopes. *Gundelia tehranica* Vitek & Noroozi (2017) Type: Iran, Tehran, Tuchal Mt., above Velenjak. *Gundelia siirtica* Fırat (2019b) Type: Turkey. C8 Siirt: Kurtalan District, 12 km from Kurtalan to Batman.

According to Fırat (2016), important diagnostic characters in the genus *Gundelia* are the number of flowers forming one cephaloid (= flower complex, heads of second order, pseudocephalia) in the synflorescence the size and shape of the fruit complex (disseminule), the color of the flowers, the indumentum in the synflorescence, the habitat, and flower closure at ± noon, opening in ± late afternoon.

Gundelia species are known by the local people under many names in Kurdish; e.g. "Kênger", "Qorav", "Kereng", "Kerenk", "Keven", "Kengel", and in Turkish; e.g. "Has kanger", "Acı kenger", "Eşek dikeni", "Kenger" (Fırat, 2013).

Materials and Methods

During floristic surveys of *Gundelia*, in central Anatolia Nevşehir, Kayseri, Kırşehir and Yozgat between 2017 and 2020 (Figure 1), author collected specimens of one unidentified species from genus *Gundelia*, therefore decided to pay much attention on the species. Then collected some other specimens and examined using a wide range of literature; in the flora books (Nikitin, 1960; Sofieva, 1961; Vasilchenko, 1961; Kupicha, 1975; Feinbrun-Dothan, 1978; Rechinger, 1989; Avetisian, 1995 etc.). *Gundelia tournefortii* Linnaeus (1753) is the only species of the genus *Gundelia* and all other names were recorded as synonyms. The new introduced species *Gundelia aragatsi* Vitek, Fayvush, Tamanyan & Gemeinholzer (2010), *Gundelia armeniaca* Nersesian (2014) from Armenia, *Gundelia dersim* Vitek, Yüce & Ergin (2014), *Gundelia munzuriensis* Vitek, Yüce and Ergin (2014), *Gundelia vitekii* Armağan (2016), *Gundelia komagenensis* Fırat (2016), *Gundelia colemerikensis* Fırat (2016), *Gundelia cilicica* Fırat (2016), *Gundelia anatolica* Fırat (2016), *Gundelia mesopotamica* Fırat (2017b) and *Gundelia siirtica* Fırat (2019b) from Turkey, *Gundelia tehranica* Vitek and Noroozi (2017) from Iran. And added new record for the flora of Turkey *Gundelia rosea* Hossain & Al-Taey Fırat (2017c), *Gundelia armeniaca* Nersesyan Fırat (2018b), *Gundelia purpurascens* (Bornm.) Fırat (Fırat, 2018a). The resurrection and a new status of *Gundelia asperrima* (Trautv.) Fırat (Fırat, 2017a), *Gundelia armata* (Freyn & Sint.) Fırat (Fırat, 2019b). Because of this effort and taking into account the new diagnostic characters, the unidentified species is described here as new to science.

Photos of the living material were taken with a Sony DSCR1 digital camera. Geographical positions were identified using a Magellan eXplorist 710 GPS. A total of 10 herbarium specimens of the new species were collected from three adjacent localities and deposited in the herbaria (acronyms according to Thiers 2016), and in the personal herbarium of the author (Herb. Fırat). The conservation status of the new species was assessed according to the IUCN criteria (IUCN, 2017).

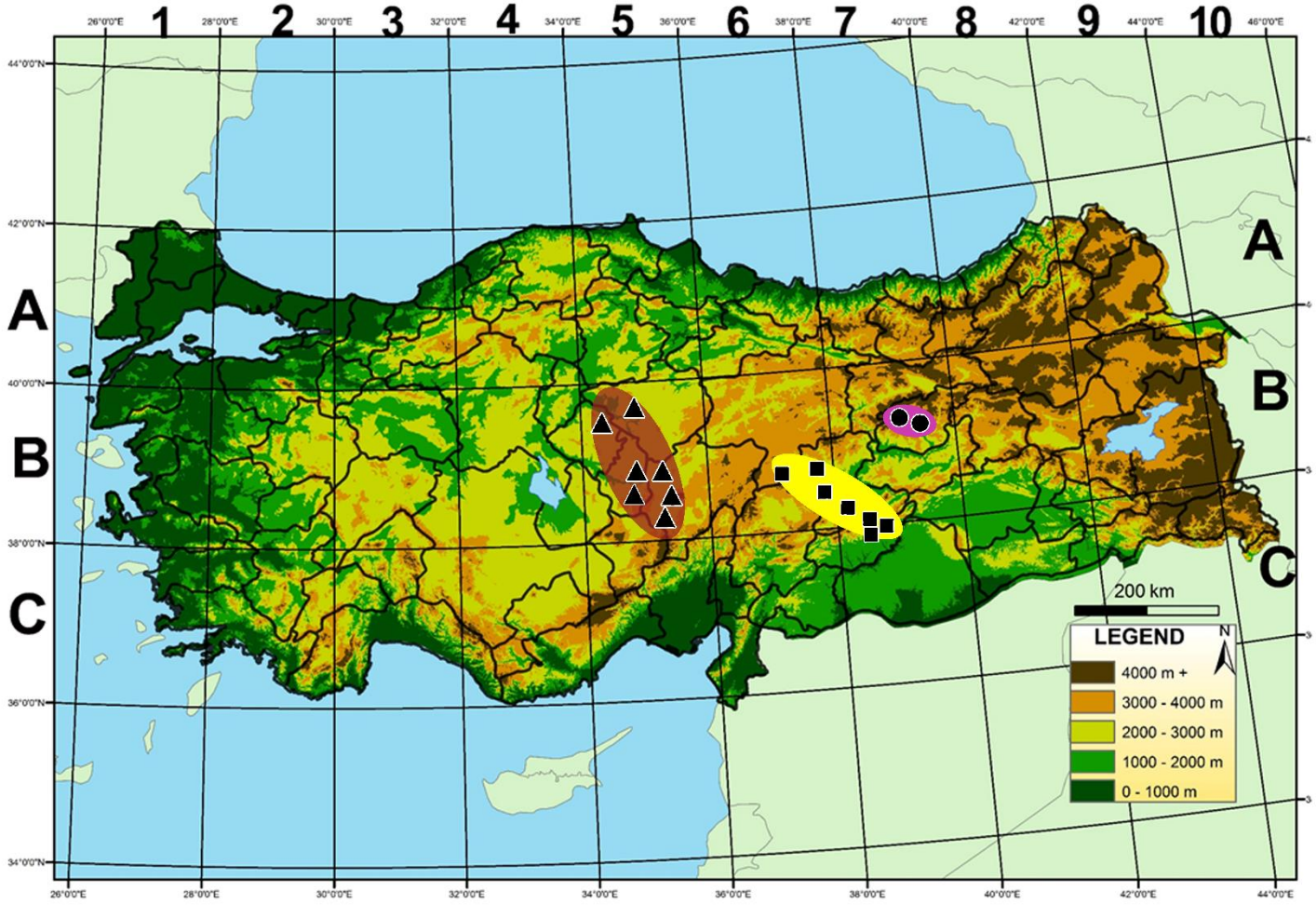

Figure 1. Distribution map of *Gundelia cappadocica* (triangle), *G. komagenensis* (square) and *G. vitekii* (circle) in Turkey.

Results and Discussion

Gundelia cappadocica Fırat *sp. nov.* (Figures. 2–6).

Diagnosis: *Gundelia cappadocica* is morphologically different from all other *Gundelia* species. Especially, it shows some similarities to *G. komagenensis* and *G. vitekii.* Differs from *G. komagenensis* with colour of corolla (externally reddish-brown, purplish-brown, greenish-brown with gland; internally yellow, yellowish to purplish *vs.* corolla externally greenish, yellowish to greenish-yellowish, internally yellow). Differs from *G. vitekii* with colour of corolla (externally reddish-brown, purplish-brown, greenish-brown with gland; internally yellow, yellowish to purplish *vs.* greenish-brownish to reddish-brownish, internally dark pink, dark red or intensive red).

Type: TURKEY. B5 Nevşehir: Avanos district, around of Bozca village, rocky limestone and igneous slopes, 1012 m, 38°45′82″ N, 34°59′85″ E, coll. 17 May 2017, *M. Fırat 33754* (holotype VANF, isotypes HUB and Herb. M. Fırat).

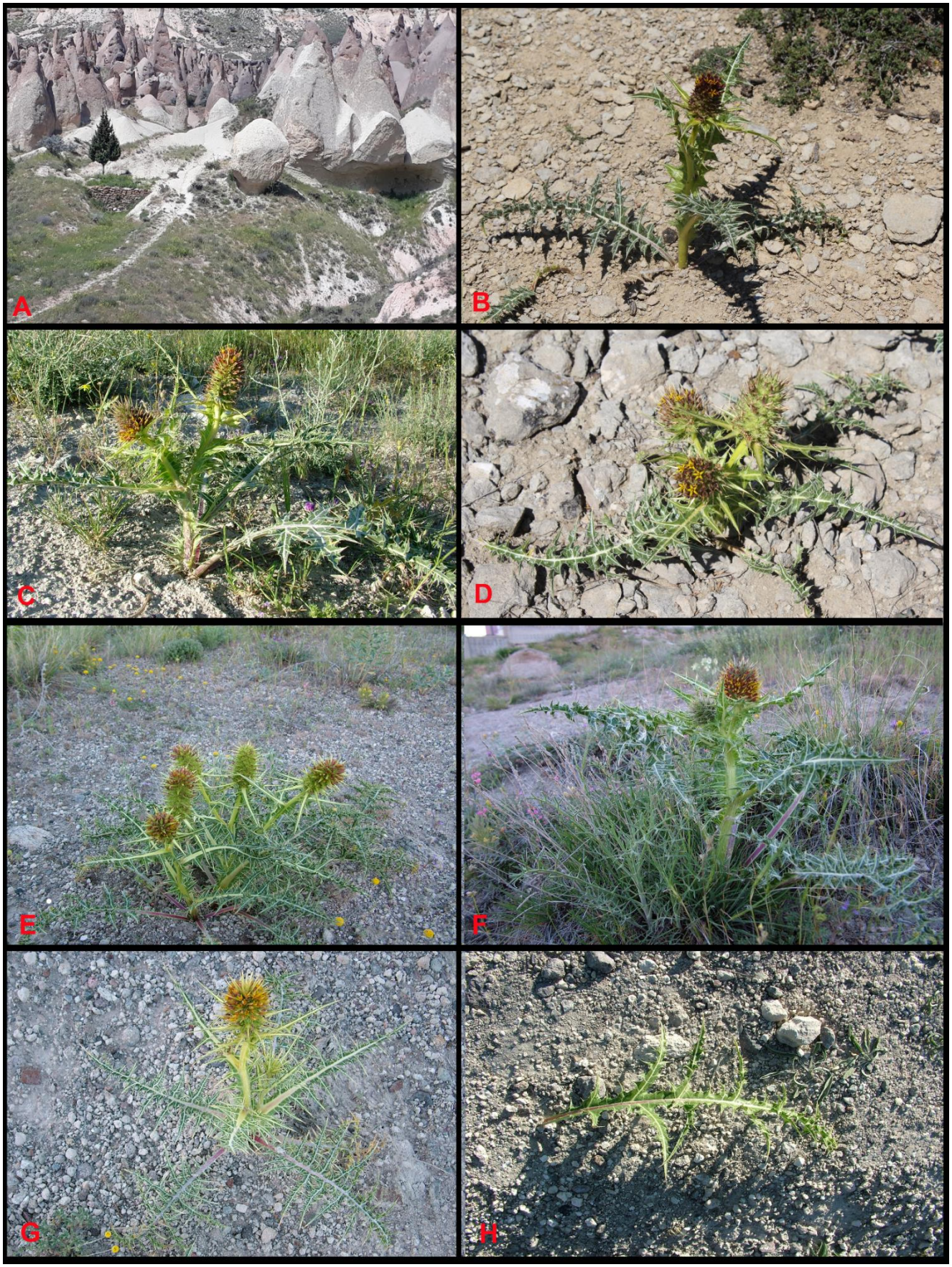

Figure 2. *Gundelia cappadocica;* **A.** habitat, **B-G**. habit, **H.** basal leaves.

Figure 3. *Gundelia cappadocica;* **A-E.** synflorescence in three, four and five flowers, **F.** detail of cephaloid compound of three flowers, **G.** synflorescence in early fruits (individual with three and four fruits).

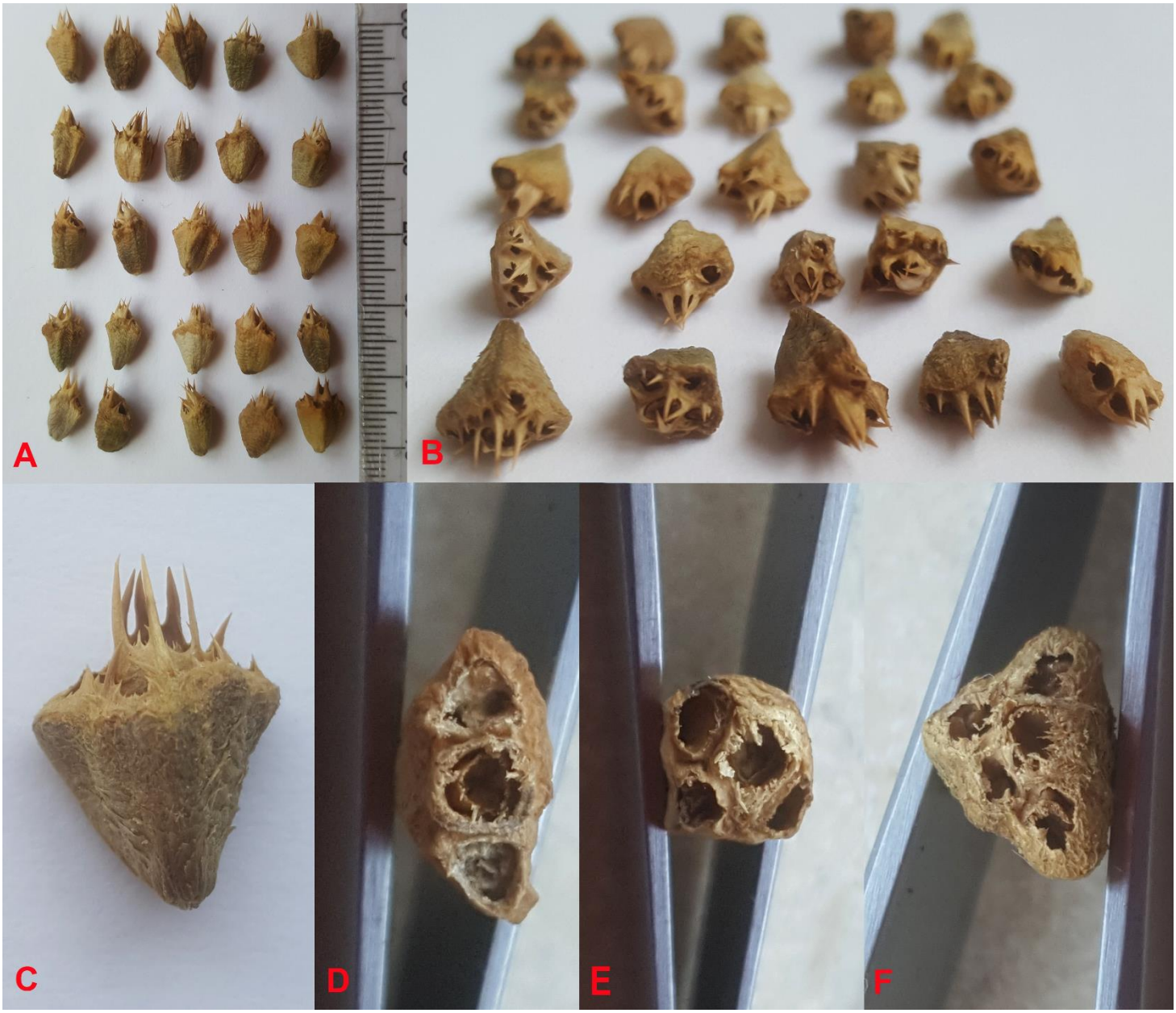

Figure 4. *Gundelia cappadocica;* **A.** variability of ripe disseminules, **B.** detail cephaloid compound three, four or five ripe disseminules, **C.** ripe disseminules, **D.** compound three hole of ripe disseminules, **E.** compound four hole of ripe disseminules, **F.** compound five hole of ripe disseminules.

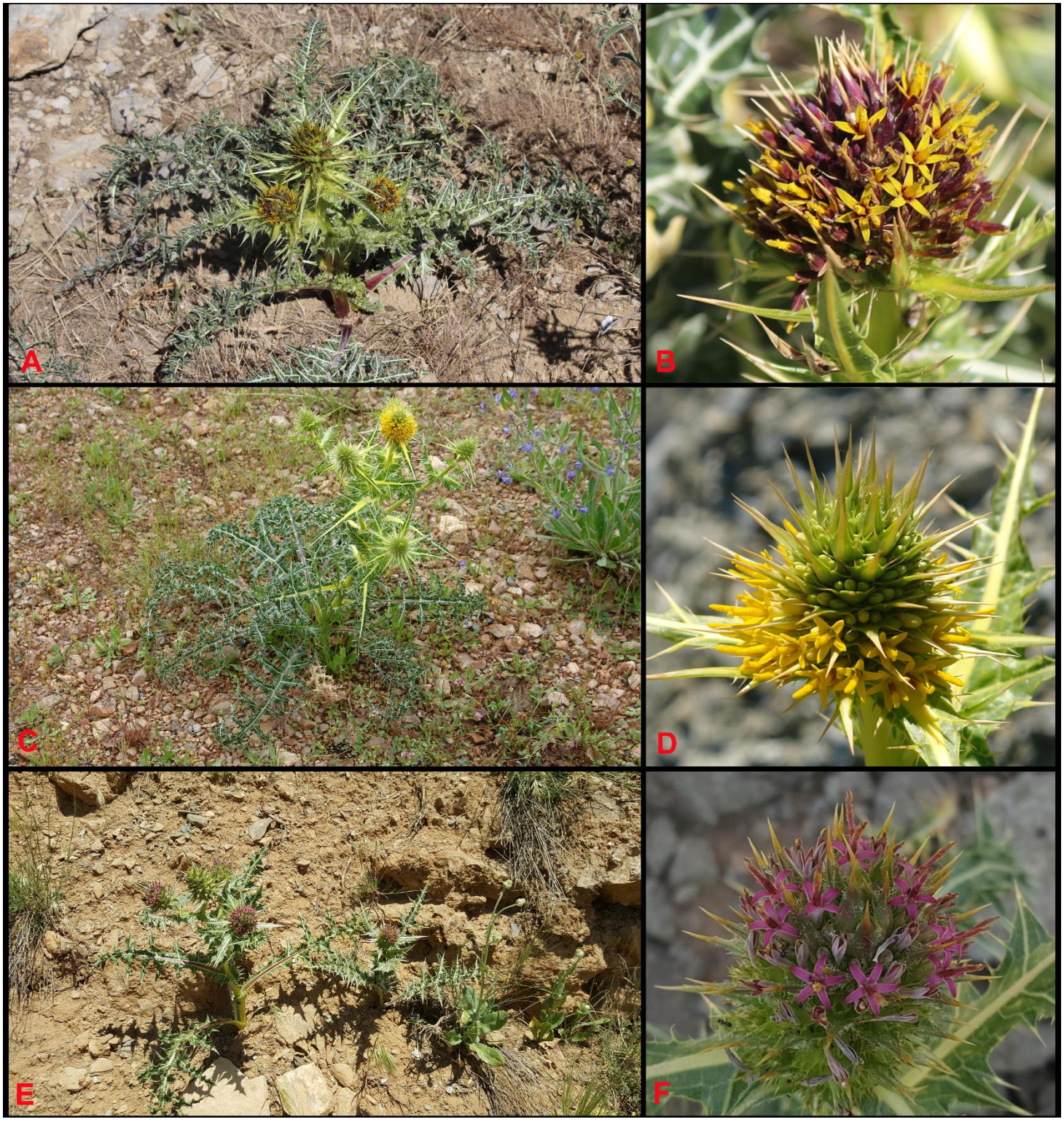

Figure 5. *Gundelia cappadocica:* **A.** habit, **B.** synflorescence; *G. komagenensis*: **C.** habit, **D.** synflorescence; *G. vitekii*; **E.** habit, **F.** synflorescence.

Figure 6. *Gundelia cappadocica*: **A.** detail of cephaloid compound of three flowers, **D.** ripe disseminules; *G. komagenensis*: **B.** detail of cephaloid compound of three flowers, **E.** ripe disseminules; *G. vitekii*: **C.** detail of cephaloid compound of three flowers, **F.** ripe disseminules.

Description: Perennial lactiferous herb with branched 10–40 cm long stem; young shoots with dense arachnoid hairs, probably losing part of the indumentum later, completely more ±arachnoid hairs. Leaves coriaceous, alternate, pinnatisect, spiny, both side ±arachnoid hairs, especially on or besides the veins, colour of basal leaves darker than cauline leaves. Synflorescences normally 1–3(-5), globose to ovoid, 10–40 mm long and 10–30 mm in diameter (excluding bracts), consisting of 7–35 cephaloids. Synflorescence more or less completely arachnoid hairy (when young densely arachnoid hairs). Bracts spiny, sparsely or densely hairy with short and arachnoid hairs, normally less exceeding cephaloids, with a strong terminal spine and 2–4 lateral spines, Cephaloid (in the middle of the synflorescence) compound of 3–5 flowers. Flowers campanulate to widely spreading, corolla externally reddish-brown, purplish-brown, greenish-brown with gland; internally yellow, yellowish to purplish, 5–9 mm long (usually central sorter than lateral). Cephaloids ±squamulose, fruit complex (disseminule) normally

triangular, straw coloured to greenish-grey, 4–7 mm long (without spines), in upper part 5–7 mm in diameter (when ripe); central and lateral flowers surrounded by spines originated from the involucels, spines of the central flowers 1–3 mm, of the lateral flowers 1–2 mm, obtained from 25 fruit of average weight 0.068 g (when ripe).

Phenology: Flowering from April to May and fruiting from June to July.

Etymology: The specific epithet is derived from the ancient name of the Cappadocia (Kapadokya) province where type material was collected.

Distribution: *Gundelia cappadocica*, is endemic to Nevşehir, Kayseri, Kırşehir and Yozgat Province, Kapadokya (Cappadocia) region of Turkey. According to the grid system (Davis 1965) the new species, which is present in Nevşehir, Kayseri, Kırşehir and Yozgat area, falls specifically within the B5 square (Figure 1). It is an element of the Irano-Turanian floristic region.

Habitat and ecology: *Gundelia cappadocica* grows in rocky limestone and igneous slopes at c. 900-1400 m, with other growing plant taxa near vicinity, such as; *Onobrychis* sp., *Genista* sp., *Erysimum* sp., *Onopordum* sp., *Artemisia* sp., *Echinops* sp., *Aegilops triuncialis* L. subsp. *Triuncialis*, *Senecio vernalis* Waldst. & Kit, *Thlaspi arvense* L., *Alyssum pateri* Nyar. subsp. *pateri*, *Amygdalus orientalis* Mill., *Astragalus micropterus* Fisch., *Atraphaxis billardieri* Jaub. & Spach var. *billardieri*, *Centaurea virgate* Lam., *Convolvulus assyricus* Griseb., *Cruciata taurica* (Pall. ex. Willd.) Ehrend., *Euphorbia anacampseros* Boiss. var. *anacampseros*, *Gypsophila sphaerocephala* Fenzl ex Tchich. var. *sphaerocephala*, *Helichrysum plicatum* DC subsp. *plicatum*, *Hypericum scabrum* L., *Onosma tauricum* Pall. ex Willd., *Rhamnus petiolaris* Boiss., *Scabiosa argentea* L., *Silene spergulifolia* (Desf.) M. Bieb., *Stipa holosericea* Trin., *Teucrium polium* L., *Thymus sipyleus* Boiss. subsp. *rosulans* (Borba´s) Jalas and *Centaurea aksoyi* Hamzaoğlu & Budak (Hamzaoğlu and Budak 2009).

Ethnobotanical usage: *Gundelia cappadocica* is known to be the tastiest and most consumed species. It is cooked as stew or egg-vegetable, obtained gum is chewed.

Vernacular name: *Gundelia cappadocica* is called as “Kenger” by the local people of the Nevşehir province. The other *Gundelia* species are known by the local people under many names in Kurdish; e.g. "Kênger", "Qorav", "Kereng", "Kerenk", "Keven", "Kengel", and in Turkish; e.g. "Has kanger", "Acı kenger", "Eşek dikeni", "Kenger" (Fırat 2013).

Red list assessment: The distribution area of *Gundelia cappadocica* is less than 50.000 km^2. The species was collected from three localities, and where it occurred, very much individuals were counted. Most consumed by the local people, some anthropogenic or grazing effects were observed on the population. Based on the above data and observations, the IUCN (2017) red list category of *Gundelia cappadocica* is suggested as “Vulnerable”, VU.

Other specimens examined:

Gundelia cappadocica. TURKEY. B5 Nevşehir: Avanos district, around of Bozca village, rocky limestone and igneous slopes, 1012 m, 38°45′82″ N, 34°59′85″ E, coll. 29 July 2017, *M. Fırat 33880* (Herb. M. Fırat) (in fruit); B5 Nevşehir: Ürgüp district, around of Ulaşlı village, rocky limestone and igneous slopes, 1199 m, 38°40′33″ N, 34°57′12″ E, coll. 21 May 2019, *M. Fırat 34808* (Herb. M. Fırat); B5 Nevşehir: Göreme district, rocky limestone and igneous slopes, 1210 m, 38°39′22″ N, 34°51′79″ E, coll. 21 May 2019, *M. Fırat 34809* (Herb. M. Fırat); B5 Nevşehir: around of Sulusaray town, rocky limestone and igneous slopes, 990 m, 38°43′59″ N, 34°43′46″ E, coll. 21 May 2019, *M. Fırat 34810* (Herb. M. Fırat); B5 Kayseri: Kocasinan district, around of Oymaağaç village, upper of cemetery, rocky limestone and igneous slopes, 1173 m, 38°47′22″ N, 35°22′36″ E, coll. 16 May 2017, *M. Fırat 33749* (Herb. M. Fırat); B5 Kayseri: Kocasinan district, around of Oymaağaç village, rocky limestone and igneous slopes, 1150 m, 38°46′94″ N, 35°21′01″ E, coll. 30 July 2017, *M. Fırat 33750* (Herb. M. Fırat); B5 Kayseri: Yahyalı district, rocky limestone and igneous slopes, 1274 m, 38°49′74″ N, 35°22′08″ E, coll. 16 May 2017, *M. Fırat 33751* (Herb. M. Fırat); B5 Kayseri: Kocasinan district, around of Oymaağaç village, upper of cemetery, rocky limestone and igneous slopes, 1173 m, 38°47′22″ N, 35°22′36″ E, coll. 30 July 2017, *M. Fırat 33881* (Herb. M. Fırat) (in fruit); B5 Kayseri: Kocasinan district, around of Oymaağaç village, upper of cemetery, rocky limestone and igneous slopes, 1173 m, 38°47′22″ N, 35°22′36″ E, coll. 20 May 2019, *M. Fırat 33812 &* M.Y. Dadandı

(Herb. M. Fırat); B5 Yozgat: from Yozgat to Salmanfakılı, lowland steppe, 1150 m, 39°43′29″ N, 34°45′01″ E, coll. 6 June 2019, *M. Fırat 34928 &* Ü. Budak (Herb. M. Fırat); B5 Yozgat: between Şefaatli and Yerköy, Karanlık dere valley, lowland steppe, 930 m, 39°31′14″ N, 34°44′09″ E, coll. 6 June 2019, *M. Fırat 34929 &* Ü. Budak (Herb. M. Fırat); B5 Yozgat: S. of Salmanfakılı garbage damp, lowland steppe, 1200 m, 39°43′48″ N, 34°45′24″ E, coll. 6 June 2019, *M. Fırat 34930 &* Ü. Budak (Herb. M. Fırat); TURKEY. B5 Kırşehir: Çiçekdağı district, around Çiçekdağı mountain, lowland steppe, 1342 m, 39°34′33″ N, 34°18′15″ E, coll. 30 May 2017, *M. Fırat 33799* (Herb. M. Fırat).

Gundelia komagenensis. TURKEY. C7 Adıyaman: Kahta Province, Nemrut mountain, rocky steppe, 1445 m, 37°57′01″ N, 38°45′38″ E, coll. 26 May 2015, *M. Fırat 32494* (holotype VANF, isotypes ANK, Herb. M. Fırat); TURKEY. C7 Adıyaman: Kahta Province, Nemrut mountain, rocky steppe, 1400 m, 37°57′03″ N, 38°45′28″ E, coll. 26 July 2016, *M. Fırat 32772* (Herb. M. Fırat) (in fruit); C7 Adıyaman: Kahta Province, 7 km east of Nemrut mountain, rocky steppe, 817 m, 37°56′37″ N, 38°40′28″ E, coll. 26 May 2016, *M. Fırat 32687* (Herb. M. Fırat) (in fruit); C7/B7 Adıyaman: 11 km from Sincik to Malatya, rocky steppe, 1606 m, 38°05′14″ N, 38°35′08″ E, coll. 26 May 2016, *M. Fırat 32688* (Herb. M. Fırat); B7 Malatya, 22 km from Malatya to Sincik, rocky steppe, 1620 m, 38°09′17″ N, 38°30′01″ E, coll. 26 May 2016, *M. Fırat 32689* (Herb. M. Fırat); B7 Malatya, Beydağı, rocky steppe, 2120 m, 38°14′44″ N, 38°23′26″ E, coll. 26 May 2016, *M. Fırat 32689* (Herb. M. Fırat).

Gundelia vitekii. TURKEY. B7 Tunceli (Dersim): Tunceli Merkez, c. 8–9 km N of Tunceli, mountain slope NW of Tüllük Bucağı, rocky steppe, 1760 m, 39°10'32"N, 39°32'04"E, coll. 28 May 2015, *M. Fırat 32694* (Herb. M. Fırat); TURKEY. B7 Tunceli (Dersim): Tunceli Merkez, c. 8–9 km N of Tunceli, mountain slope NW of Tüllük Bucağı, rocky steppe, 1760 m, 39°10'32"N, 39°32'04"E, coll. 30 July 2016, *M. Fırat 32860* (Herb. M. Fırat) (in fruit); TURKEY. B7 Tunceli (Dersim): Tunceli Merkez, c. 8–9 km N of Tunceli, mountain slope NW of Tüllük Bucağı, rocky steppe, 1760 m, 39°10'32"N, 39°32'04"E, coll. 22 May 2017, *M. Fırat 34815* (Herb. M. Fırat); TURKEY. B7 Tunceli (Dersim): Ovacık district, from Ovacık to Üçşelaleler rocky steppe, 1634 m, 39°25'55"N, 39°12'88"E, coll. 4 June 2019, *M. Fırat 34924* (Herb. M. Fırat); TURKEY. B7 Tunceli (Dersim): Tunceli Merkez, c. 8–9 km N of Tunceli, mountain slope NW of Tüllük Bucağı, rocky steppe, 1760 m, 39°10'32"N, 39°32'04"E, coll. 5 June 2019, *M. Fırat 34925* (Herb. M. Fırat).

Taxonomic relationships

Gundelia cappadocica resembles to *G. komagenensis* and *G. vitekii*, which find in *G.* subg. *Gundelia* sect. *Komagenenses* Fırat (Fırat, 2021). However, *G. cappadocica* differs from all *Gundelia* species with colour of corolla and fruit complex (disseminule). According to Fırat (2017a) the species is morphologically close to Cephaloid (in the middle of the synflorescence) compound of 3 flower groups Fırat (2017a), subgen. *Gundelia*, sect. *Komagenenses* (Fırat, 2021). The species differs from *G. komagenensis* generaly habit smaller (stem, leaf, synflorescences, corolla and disseminule) with stem length (10–40 cm *not* 30–60 cm); indumentum (completely more ±arachnoid hairs *not* ±glabrous); Synflorescences [10–40 mm long and 10–30 mm in diameter (excluding bracts), consisting of 7–35 cephaloids, more or less completely arachnoid hairy *not* 20–60 mm long and 30–40 mm in diameter (excluding bractes), consisting of 25–70 cephaloids, completely glabrous or rarely sparsely arachnoid hairy]; colour of corolla (externally reddish-brown, purplish-brown, greenish-brown with gland; internally yellow, yellowish to purplish, 5–9 mm long *not* corolla externally greenish, yellowish to greenish-yellowish, internally yellow, 9–12 mm long); Bracts (sparsely or densely hairy with short and arachnoid hairs with terminal spines and 2–4 lateral spines *not* glabrous, 4–6 lateral spines); Cephaloids [±squamulose, Fruit complex (disseminule) normally, straw coloured to greenish-grey, 4–7 mm long (without spines), in upper part 5–7 mm in diameter (when ripe); spines of the central flowers 1–3 mm, of the lateral flowers 1–2 mm, obtained from 25 fruit of average weight 0.068 g (when ripe) *not* glabrous, Fruit complex (disseminule) normally brown, 6–10 mm long (without spines), in upper part 4–8 mm in diameter (when ripe) spines of the central flowers 3–8 mm, of the lateral flowers 2–4 mm, obtained from 25 fruit of average weight 0.087 g (when ripe)].

The new species differs from *G. vitekii* with stem length (10–40 cm *not* to 70 cm); Leaves (pinnatisect *not* pinnatilobate, pinnatipartite or pinnatisect); Synflorescences [10–40 mm long and 10–30 mm in diameter (excluding bracts) *not* to 60 mm long and to 40 mm in diameter (excluding bracts)]; colour of corolla

(externally reddish-brown, purplish-brown, greenish-brown with gland; internally yellow, yellowish to purplish *not* corolla externally greenish-brownish to reddish-brownish, internally dark pink, dark red or intensive red); cephaloids [fruit complex (disseminule) normally 4–7 mm long (without spines), in upper part 5–7 mm in diameter (when ripe); spines of the central flowers 1–3 mm, of the lateral flowers 1–2 mm, obtained from 25 fruit of average weight 0.068 g (when ripe) *not* fruit complex (disseminule) normally 8–11 mm long (without spines), in upper part 7–11 mm in diameter (when ripe) spines of the central flowers 4–7 mm, of the lateral flowers 2–4 mm, obtained from 25 fruit of average weight 0.122 g (when ripe)].

Comments

Flowers colour, flowers number and hair condition of *Gundelia* should be carefully observed and noted while it is fresh in the field. It is difficult to diagnose from dry material after it turns into a herbarium sample. With the new described species of *Gundelia*, total number of species increased to twenty two. The *Gundelia* taxa are currently distributed in the East Mediterranean region, Asia Minor, Transcaucasia, Iran and Afghanistan. Their distribution areas are as follows: Cyprus, Lebanon, Jordan, Turkey, Israel and Syria: *Gundelia tournefortii*; Armenia: *Gundelia aragatsi* and *Gundelia armeniaca*; Nakhchivan: *Gundelia aragatsi*; Iraq: *Gundelia microcephala*, *Gundelia rosea* and *Gundelia purpurascens*; Iran: *Gundelia microcephala*, *Gundelia rosea*, and *Gundelia tehranica*; Turkey: *Gundelia anatolica*, *Gundelia armata, Gundelia armeniaca, Gundelia asperrima, Gundelia cappadocica, Gundelia cilicica*, *Gundelia colemerikensis*, *Gundelia dersim, Gundelia glabra*, *Gundelia komagenensis*, *Gundelia mesopotamica*, *Gundelia munzuriensis*, *Gundelia purpurascens*, *Gundelia rosea*, *Gundelia siirtica, Gundelia tenuisecta, Gundelia tournefortii, Gundelia tournefortii* var. *tenuisecta* and *Gundelia vitekii.* On the basis of current studies and taking newly described species into account, it is possible to claim that the genus still deserves much attention in order to clarify its taxonomy. *Gundelia* genus variation and mutant is very common (especially bracts, flowers number, leaf and indumentum). Moreover, some hybrids occur between some species. Hybridization should be consider when defining new species. In the current knowledge of the genus *Gundelia*, the diversity center of the genus seems to be the mountainous dry steppes of the eastern and south-eastern Anatolia region (Fırat, 2021).

Ethical Approval

The author declare that no need to ethical approval.

Conflicts of Interest

The author declare that they have no conflict of interest.

Funding Statement

The author does not declare any fund.

Acknowledgements

The author thanks to Dr. Mehmet Yaşar Dadandı (Erciyes Universty, Kayseri), Dr. Ümit Budak (Bozok Universty, Yozgat) and Mr. Mükremin Tokmak (historian and tourizm operator, Kapadokya/ Nevşehir) for their support and assistance during field studies 2019 and 2020 for genus *Gundelia*.

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