Biodiv. Res. Conserv. 54: 1-6, 2019

BRC
www.brc.amu.edu.pl

DOI 10.2478/biorc-2019-0006

Submitted 04.12.2018, Accepted 11.06.2019

The genus *Matricaria* L. (Asteraceae) in Turkey

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Abstract. In this study, a report on the genus *Matricaria* in Turkey is provided based on floristic studies. Previously recorded taxa are compared with new ones from our collections. Four taxa of *Matricaria* in Turkish flora are recognized: *M. aurea*, *M. chamomilla* var. *chamomilla*, *M. chamomilla* var. *recutita* and *M. matricarioides*. On the other hand, *M. chamomilla* var. *coronata* is an erroneous record for the flora of Turkey. Diagnostic morphological characters together with data on phenology, habitat and distribution as well as dichotomous keys for *Matricaria* taxa are presented. Proportions of various phytogeographical elements of *Matricaria* taxa in Turkey are provided.

Key words: *Matricaria*, morphology, phytogeography, taxonomy, Turkish flora

1. Introduction

Matricaria L. is a small genus of the tribe Anthemideae with 6 species, mostly distributed in Europe, northern Africa, Macaronesia, western, south-western and central Asia, and western North America (Oberprieler *et al*. 2007). The wide range of geographical distribution and diversity of habitats, such as disturbed meadows, vacant lots, areas along roads and railroads, waste and dry areas, in which *Matricaria* occurs may result in different adaptations to diverse environments (Inceer 2011).

Matricaria is classified in subtribe Matricariinae of the Anthemideae (Bremer & Humphries 1993), together with several other similar genera, for instance, *Tripleurospermum* Sch.Bip., which is distinguished by its adaxially strongly 3-ribbed fruits (Bremer *et al*. 1996). However, these genera have been confused with one another, both taxonomically and nomenclaturally (Applequist 2002). Additionally, Rauschert (1974) and Kay (1976) misapplied the name *Matricaria* to refer, exclusively, to the species of *Tripleurospermum* (Bremer & Humphries 1993).

The systematic position of *Matricaria* taxa has been determined differently by a number of authors. In particular, the opinions of various authors on *M. chamomilla* L. and *M. recutita* L. are very different. Some authors recognized a single species as *M. recutita* (=*M. chamomilla*) or *M. chamomilla* (Bremer & Humphries 1993; Greuter & Raab-Straube 2008), while some authors preferred *M. chamomilla* with two varieties as var. *recutita* (L.) Fiori, var. *coronata* J. Gay ex Boiss or var. *pappulosa* Margot & Reut. (Grierson 1974, 1975; Applequist 2002).

The genus *Matricaria* was revised for the Flora of Turkey and the East Aegean Islands (Grierson 1975), with five taxa and three species recognized: *M. aurea* (Loefl.) Sch. Bip., *M. chamomilla* var. *chamomilla*, *M. chamomilla* var. *recutita M. chamomilla* var. *pappulosa* and *M. macrotis* Rech. f. Later, *M. matricarioides* (Less.) Porter ex Britton was added to the Flora of Turkey (Davis *et al*. 1988). However, Oberprieler & Vogt (2006) transferred *M. macrotis* to *Anthemis* L. Recently, this classification was followed by Inceer (2012), and *Matricaria chamomilla* var. *pappulosa* as *M. chamomilla* var. *coronata* was noted as a doubtful record for the Turkish flora by the same author. The total number of *Matricaria* taxa as well as phytogeographical elements of the taxa in Turkey is still unclear. The aim of this study is to expand taxonomic knowledge of *Matricaria* taxa in Turkey, including the main diagnostic morphological characters, habitat, distribution patterns and keys for the identification of the taxa.

2. Materials and methods

The present investigation was built upon extensive field studies and inspection of herbarium collections at ANK, B, E, EGE, EDTU, G, GAZI and HUB. Plant materials were collected from many parts of Turkey. Vouchers are deposited in the herbarium at Karadeniz Technical University, Department of Biology (KTUB).

The nomenclature adopted by Grierson (1975), Vogt & Oberprieler (2006) and Inceer (2012) are herein followed. Terminology of the main phytochoria (East Mediterranean, Central Anatolian, Euxine, Armeno-Iranian) is based on the classical work of Takhtajan (1986). Life form of the taxa is identified following the system of Raunkiaer (1934).

3. Results and taxonomical discussion

Based on herbarium and field studies, four taxa and three species of *Matricaria* in Turkish flora are recognized: *M. aurea*, *M. chamomilla* var. *chamomilla*, *M. chamomilla* var. *recutita* and *M. matricarioides*. On the other hand, *M. chamomilla* var. *coronata* is an erroneous record for the flora of Turkey. Therefore, this erroneous record was excluded from Turkish *Matricaria* in this paper. A revised identification key for *Matricaria* in Turkey is provided below:

Key to the species of *Matricaria* in Turkey

1. Capitula radiate ..... *M. chamomilla*
1* Capitula discoid 2
2. Achenes copiously mucilaginous; corona absent .... *M. aurea*
2* Achenes non-mucilaginous; corona present .... *M. matricarioides*

1. *Matricaria aurea* (Loefl.) Sch. Bip. Bonplandia 8: 369 (1860), (Fig. 1a).

M o r p h o l o g y : The plant is annual. Roots are slender, weak with numerous branches. Stems are 5-45 cm tall, glabrous or, sometimes, sparsely pubescent below inflorescence. Leaves are 2-3-pinnatisect and linear-oblanceolate. Capitula are solitary or 2-3 at branch ends, glabrous or sparcely pubescent peduncles. The receptacle is ovoid. Involucral bracts are elliptical, obtuse, green with brown and whitish membranous margins. All florets are tubular, numerous, yellow with 4 lobes, ca. 1.25 mm long. Achenes are small, 0.4-0.8 mm long, 0.15-0.25 mm wide, ecoronate, brown and copiously mucilaginous. Their anterior surface is smooth and posterior surface has 3-4 whitish ribs.

P h e n o l o g y : Flowering and fruiting from March to May.

H a b i t a t : Growing along roadsides and cultivated ground/arable land, sand, flood-plain meadows with stony soil.

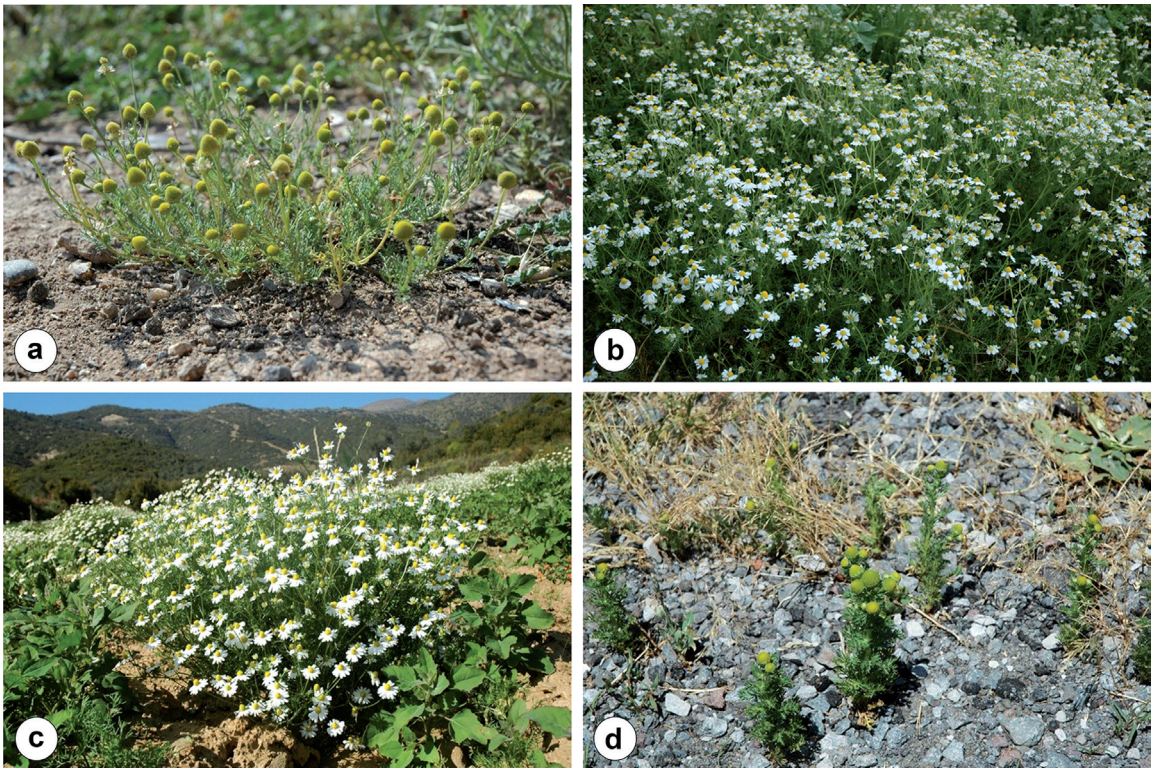

Fig. 1. General habit of *Matricaria* taxa
Explanations: a – *M. aurea*, b – *M. chamomilla* var. *chamomilla*, c – *M. chamomilla* var. *recutita*, d – *M. matricarioides*. Photographs: a – Murat Bal with permission; b, c & d – Huseyin Inceer

Distribution: This species is distributed in south and southeast Anatolia, rare.
Notes: This species is similar to *M. matricarioides*, but differs in having mucilaginous and ecoronate achenes. It is especially adapted to dry habitats. The presence of mucilage in the achenes is an important adaptive feature for this species.
Chromosome number: 2n = 2x = 18 (Inceer & Hayırlıoğlu-Ayaz 2010).
Specimens examined: Turkey. C3 Antalya: Myra, 5 m, 18 April 2007, Inceer 310b (KTUB); C6 Gaziantep/Şanlıurfa: Between Nizip and Birecik, 440 m, 8 May 2007, Inceer 322 (KTUB); C6 Gaziantep: Nizip, 448 m, 9 May 2009, Inceer 720 (KTUB).

2. *Matricaria chamomilla* L., Sp. Pl. 891 (1753).
Morphology: The plant is annual. Stems are 10-50 cm tall, glabrous or sparsely pubescent. Leaves are 2-3-pinnatisect, and ultimate segments of them are narrow. Lower leaves are 5-7 cm long and glabrous, but they are sometimes pubescent. The primer segments of the leaves are 9-12-paired. Capitula are usually solitary, and, sometimes, corymbose or subcorymbose with short or long peduncles. Receptacle is oblong-conical. Involucral bracts are usually 1-seriate, green and obtuse with whitish-membranous margins. Ray flowers are female with 11-20 per capitulum, ligules are white and 3-8.5 mm long, which are patent at first, and then recurved. Disc flowers are 10-20 mm long, numerous, hermaphrodite and yellow with 5 lobes. Achenes are vey small, 0.7-1.05 mm long, 0.25-0.4 mm wide, coronate or ecoronate, brown and mucilaginous. Their anterior surfece is smooth and posterior surface has 4-5 whitish ribs.

Key to the varieties of *M. chamomilla*

1. Peripheral achenes only with coronas .... 2a.var. *chamomilla*
1* Achenes all naked, ecoronate ..... 2b.var. *recutita*

2a. *Matricaria chamomilla* L. var. *chamomilla* (Fig. 1b).
Phenology: Flowering and fruiting from March to June.
Habitat: Growing along roadsides, waste and cultivated grounds/arable land.
Distribution: It is distributed in west, south Anatolia and the European part of Turkey. This taxon is widespread as a cosmopolitan weed in other territories as well as Turkey.
Chromosome number: 2n = 2x = 18 (Inceer & Ozcan 2011).
Notes: var. *chamomilla* is distinguished by having coronas on peripheral achenes. The central achenes are ecoronate. The presence of mucilage in the achenes is an important adaptive feature for this taxon.
Specimens examined: Turkey. A1 Çanakkale: Koru Dağı, 70 m, 11 May 2007, Inceer 331-332 (KTUB); A2 Tekirdağ: Silivri, 45 m, 16 April 2008, Inceer 505 (KTUB); C1 Muğla: Fethiye, 50 m, 17 April 2007, Inceer 295 (KTUB); C1 Muğla: Marmaris, between Marmaris and Köyceğiz, 20 m, 18 April 2007, Inceer 305 (KTUB); C2 Denizli: Pamukkale, 160 m, 11 April 2008, Inceer 500 (KTUB); C2 Aydın: İncirlikova, 65 m, 11 April 2008, Inceer 503 (KTUB); C3 Antalya; Finike, 26 m, 18 April 2007, Inceer 309 (KTUB); C3 Antalya: Elmalı, 220 m, 19 April 2007, Inceer 312 (KTUB).

2b. *Matricaria chamomilla* L. var. *recutita* (L.) Fiori, Nouv.Fl. Ital. 2: 620 (1927), (Fig. 1c).
Phenology: Flowering and fruiting from March to June.
Habitat: Growing along roadsides, waste and cultivated grounds/arable land.
Distribution: It is widespread in Turkey. This taxon is widespread as a cosmopolitan weed in other territories as well as Turkey.
Chromosome number: 2n = 2x = 18 (Inceer & Hayırlıoğlu-Ayaz 2010).
Notes: var. *recutita* is very similar to the typical variety, but is distinguished by having ecoronate achenes. The presence of mucilage in the achenes is an important adaptive feature for this taxon.
Specimen examined: Turkey. A1 Tekirdağ: Köse İlyas Village, 130 m, 10 May 2007, Inceer 324 (KTUB); A1 Edirne: Keşan, 100 m, 11 May 2007, Inceer 326 (KTUB); A1 Balıkesir: Bandırma, 150 m, 12 May 2007, Inceer 341 (KTUB); A2 Bursa: Uludağ, 1700 m, 28 June 2007, Inceer 365 (KTUB); A7 Trabzon: Değirmendere, 10 m, 14 May 2007, Inceer 345 (KTUB); B1 İzmir: Yamanlar Dağı, 750 m, 15 April 2007, Inceer 278 (KTUB); B1 Çanakkale: Bayramiç, 250 m, 12 May 2007, Inceer 334 (KTUB); B3 Eskişehir: Mihalgazi, 282 m, 8 June 2008, Inceer 544 (KTUB), C1 Muğla: Bodrum, Ortakent, 132 m, 16 April 2007, Inceer 283a (KTUB); C2 Muğla: Köyceğiz, 12 m, 18 April 2007, Inceer 303 (KTUB).

3. *Matricaria matricarioides* (Less.) Porter, Mem. Torrey Bot. Club 5: 341 (1894), (Fig. 1d).
Morphology: The plant is annual, strongly aromatic and pineapple-scented. Roots are thick with numerous slender branches. Stems are several, 2-45 cm tall, erect or ascending, mostly branched in upper half, glabrous, sometimes minutely pubescent below capitula. Leaves 2-3-pinnatisect. The inflorescence is corymbose. Capitula are 5 to numerous, 5-15 mm width with short peduncles. Receptacles are ovoid-conical. Involucral bracts are 3-seriate, elliptical or obtuse with colourless with scarious margins. All florets are tubular, numerous,

yellow with 4 lobes. Achenes are oblong, brownish, 0.8-1.5 mm long, 0.4-0.6 mm wide non-mucilaginous. their anterior surface is smooth, posteriorly 4-ribbed, lateral ribs reddish, especially above. Pappus is a short rim, with entire margin.

Phenology: Flowering and fruiting from June to August.

Habitat: Roadsides, fields and meadows.

Distribution: It is distributed in east and northeast Anatolia. This species is widespread as a cosmopolitan weed in other territories.

Chromosome number: 2n = 2x = 18 (Inceer & Hayırlıoğlu-Ayaz 2010).

Notes: The distinguishing features of this species are non-mucilaginous achenes, greenish disc flowers and pineapple scent.

Specimens examined: Turkey. A9 Kars: From Ardahan to Göle, 1800 m, 18 July 2007, Inceer 420 (KTUB); A9 Artvin: Şavşat, 964 m, 20 June 2009, Inceer 744b (KTUB); B8 Erzurum: Erzurum, 1800 m, 13 July 2008, Inceer 655 (KTUB).

Matricaria chamomilla var. *coronata* J. Gay ex Boiss., Voy. Bot. Espagne 2: 316 (1840), erroneously reported.

Notes: This taxon has been poorly known/recognised in Turkey, and it has not been collected from Turkey since its introduction to the Flora of Turkey and the East Aegean Islands by Grierson (1974, 1975). In the taxonomic treatment of *Matricaria* in the Flora of Turkey, *M. chamomilla* var. *coronata* was considered synonym of *M. chamomilla* var. *pappulosa*, and it was cited with only one collection (*Huber-Morath 16838*) from Muğla Province (Grierson 1975). According to the most recent taxonomic treatment of *M. chamomilla* (Applequist 2002), *M. chamomilla* var. *pappulosa* is synonym of *M. chamomilla* var. *coronata*.

During extensive field studies for the project "Revision of the Genera *Matricaria* and *Tripleurospermum* in Turkey", many *Matricaria* specimens were collected from Muğla Province as well as other provinces of Turkey. However, none of them was represented by *M. chamomilla* var. *coronata*, and it was noted doubtfully record for the flora of Turkey (Inceer 2012).

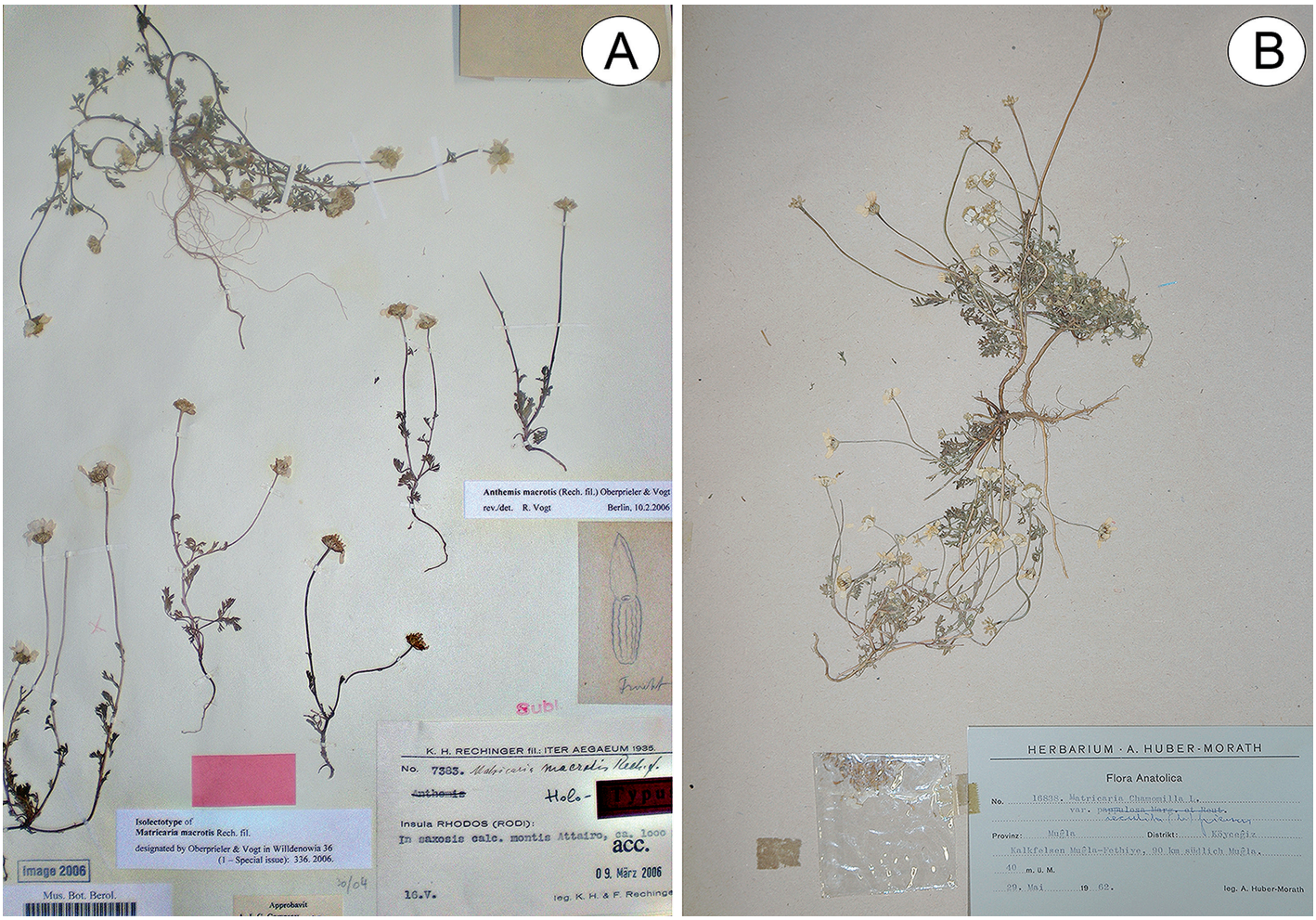

Fig. 2. Images of herbarium sheets of *Anthemis macrotis*
Explanations: A – Rechinger 7383 in the Berlin herbarium (B), B – Huber-Morath 16838 in the Geneva herbarium (G). Photographs: Huseyin Inceer

Table 1. Distribution and life form of *Matricaria* taxa studied in Turkey

Taxon	Chorotype	Life form	NW	N	NE	W	E	S	SE	C
Matricaria aurea	EM/ARI	Th						+	+	
Matricaria chamomilla var. *chamomilla*	EM	Th	+			+		+		
Matricaria chamomilla var. *recutita*	EM/CA/E	Th	+	+		+		+		+
Matricaria matricarioides	ARI	Th			+		+			

Explanations: + – present, Th – therophyte, ARI – Armeno-Iranian Province, EM – East Mediterranean Province, EM/CA/E – East Mediterranean Province/ Central Anatolian Province/Euxine

The specimens of *M. chamomilla* var. *coronata* cited in the Flora of Turkey were traced at herbarium G. After a close examination of the specimens deposited at G and cross-checking with descriptions in the Flora of Turkey, it was realized that the specimens were morphologically different from *M. chamomilla* var. *coronata*. These specimens (Fig. 2) belong to *Anthemis macrotis* (≡ *Matricaria macrotis*). This finding revealed that there was a misidentification for Huber-Morath's collection cited in the Flora of Turkey. As a result, the gathering record cited in the Flora of Turkey of *M. chamomilla* var. *coronata* belong to *A. macrotis*. It was concluded that *M. chamomilla* var. *coronata* was erroneously reported for the flora of Turkey. Additionally, inspection of *Matricaria* collections at the ANK, B, E, EGE, EDTU, GAZI and HUB herbaria as well as field surveys to date have not confirmed the occurrence of this taxon in Turkey.

Specimens examined: Turkey. C2 Muğla: 90 km from Muğla to Fethiye, 40 m, Köyceğiz, Hub-Mor 16838 (G!). *Anthemis macrotis*: Greece. Rodhos, M. Attairo, Kastterrain, ca. 1000 m, Rechinger 7383 (holotype B!).

4. Phytogeographical patterns and life form

Phytogeographical elements of the *Matricaria* taxa in Turkey are Mediterranean, Armeno-Iranian, Central Anatolian and Euxine (Table 1). As seen from Table 1, fifty percent of the taxa of *Matricaria* are mono-regional elements. The rest are bi- or tri-regional in distribution. On the other hand, Mediterranean elements are predominant. These findings confirm the previous data about the chrology of the taxa of *Matricaria* in the Turkish flora (Yildirimli 1999).

Oberprieler (2005) reported that the Mediterranean region played a paramount role in the diversity of the Asteraceae tribe Anthemideae. In addition, the likely ancestral distribution of *Matricaria* was Asia Minor, Caucasus and east Europe (Oberprieler 2005). The taxonomic diversity of this genus is highest in Asia Minor, the Caucasus and the Near East. The present findings showed that the Mediterranean region of Turkey is rich in *Matricaria* taxa.

Matricaria chamomilla var. *chamomilla* and *M. chamomilla* var. *recutita* are widely distributed in Turkey (Table 1), while *M. aurea* and *M. matricarioides* have limited distribution. The present results are in agreement with previous data (Grierson 1975; Davis *et al.* 1988; Yildirimli 1999; Inceer 2012).

The present results show that the life form of the *Matricaria* taxa is therophyte (Table 1). According to Raunkiaer (1934), the biological spectra of Mediterranean-type regions are characterized by high percentages of therophytes. The short life cycle in therophytes may play an important role in the adaptation at low altitudes as well as mild climates of the Mediterranean.

Acknowledgements. The author thanks Dr. Melahat Ozcan, Dr. Faik Ahmet Ayaz and Murat Bal for help during the development of this study; the curators of the ANK, B, E, EGE, EDTU, G, GAZI and HUB herbaria for help in the herbarium studies, and the Scientific and Technological Research Council of Turkey (TUBITAK, Project No. 106T162) for financial support. SYNTHESYS provided the funding for the visit to the Royal Botanic Garden, Edinburgh (GB-TAF-1175) for the corresponding author.

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