

Derleme/Review

New Geophyte Taxa Described From Turkey At Last Decade

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Abstract: Turkey has a rich flora due to its geographical location, climate, topographic features and being on the junction of three phytogeographical regions. This rich flora consists of approximately 10.000 ferns and flowering plants. Since 1/3 of these species are endemic species, our flora is especially important. Approximately 900 geophyte taxa growing in our country naturally (plants with bulbs, tubers and rhizomes) contribute significantly to this richness. With the increasing number of floristic studies, both the number of geophytes and other group plants increased year by year. New taxa that have been identified until the end of 2000 have been published in the supplemental volume of Flora of Turkey and the East Aegean Islands. In this study, we prepared a list of geophytes taxa that have been identified from our country since 2001 according to their families and genera and also included their short descriptions.

Key words: Anatolia, Bulb plants, Biodiversity, New Taxa, Taxonomy

Son On Yılda Türkiye’de Tanımlanan Yeni Geofit Taksonları

Özet: Türkiye, coğrafi konumu, iklim, topoğrafik özellikleri ve üç fitocoğrafik bölgenin kesişme noktasında bulunması gibi özellikleri ile zengin bir floraya sahiptir. Bu zengin flora yaklaşık 10.000 kadar eğrelti ve çiçekli bitki türünü içermektedir. Bu türlerin 1/3’ünün endemik olması ile de floramız ayrı bir öneme sahiptir. Ülkemizde doğal olarak yetişen yaklaşık 900 adet Geofit (soğanlı, yumrulu ve rizumlu bitkiler) taksonları bu zenginliğin önemli bir kısmını oluştururlar. Yapılan floristik çalışmalarla gerek geofitlerin ve gerekse diğer grup bitkilerimizin sayısı yıldan yıla artış göstermektedir. 2000 yılı sonuna kadar tanımlanan yeni taksonlar Flora of Turkey’ın ek ciltlerinde yer almıştır. Bu çalışmada 2001 yılından günümüze kadar geçen sürede ülkemizden tanımlanarak yayınlanmış bulunan Geofit taksonların ailesi ve cinslere göre listesi hazırlanmış ve kısa tanımları yapılmıştır.

Anahtar kelimeler: Anadolu, Soğanlı bitkiler, Biyoçeşitlilik, Yeni Takson, Taksonomi

Introduction

Turkey has a rich flora and the origin of many species since the geographical location, climate and topographical features of Anatolia provides optimal conditions. These properties also allowed the diversity of plant species of Anatolia. Geophytes (plants with bulbs, tubers and rhizomes) establish a significant part of this plant richness. Geophytes stay under the ground most of the year as bulbs, tubers and rhizomes, therefore they are known by this name which also means underground plants. Most of the geophytes form beautiful and showy flowers during the spring and some of them during the autumn. They attract attention since spring flowering species herald the coming of spring and autumn flowering species announce that the weather is getting cold and winter is approaching, and are also important as ornamental plants. For example: *Galanthus* (snowdrop), *Tulipa* (tulip), *Fritillaria*, *Hyacinthus* (hyacinth), *Lilium* (lily), *Ornithogalum* (star-of-bethlehem flower), *Muscari* (common grape hyacinth), *Colchicum* (meadow saffron), *Crocus* (crocus) are among them.

Most of the geophytes are found in the class *Moncotyledonae* and a few of them are found in the class *Dicotyledones*. In this study we only investigated the geophytes species belonging to the class *Moncotyledones*. Families that are rich in number of geophytes species are: *Amaryllidaceae*, *Liliaceae*, *Iridaceae*, *Orchidaceae*, *Araceae* and the newly identified species belong to the genera of these families.

The Flora of Turkey and the East Aegean Islands have been published between 1965 and 1988 as 10 volumes (9 volumes+1 supplement). However, many taxa from Turkey that are new for the scientific community have been identified in the eventual years and the 2nd supplemental volume of the Flora of Turkey and the East Aegean Islands has been written by Turkish Botanists and published in 2000. Native and foreign scientists continue to publish new records for our country and also new taxa for the world of science and these efforts still continue. Since taxa that have been published before and during 2000 are found in the supplemental volumes of Flora of Turkey and the East Aegean Islands, the subject of this study is only the geophytes taxa that have been newly identified between 2001 and 2011. Brief information on these species including the names, authors of these species according to their families and genera, where and when they are published, the localities where type specimens are collected from and the herbariums that these specimens are kept, their flowering times, protection status are also given. With this study, we aimed to aid the person(s) who will be in charge of the preparation of the 3rd supplemental volume of Turkish flora. As you can see from the information provided for these new taxa, they are narrowly-distributed taxa which are also endemic for our country. Therefore their protection and the measures that should be taken for their protection are very important. It should be noted that countries with rich plant biodiversity has the responsibility to protect this richness sustainably.

NEW GEOPHYTES

Turkish flora includes over 10,000 known native vascular plants which the one third is endemic. Geophytes hold an important role in the Turkish flora with 905 taxa during the period 1965-1985. Since 2000, 560 papers published about additional taxa for Turkish flora, of which 80 are on geophytes. Additional geophytes of taxa are as the following;

I-Fam.: AMARYLLIDACEAE

1-Genus: ALLIUM L.

1. *A. antalyense* Eren, Çinbilgel & Parolly, Willdenowia 37:259 (2007).[Parolly & Eren, 2007].

Type: Turkey, C3 Antalya:Teke Dağı, ascent to summit region from Belen Yayla (above Akçağal village), gappy *Elytrigia divaricata* swards with torn-cessions, limestone, 1980 m, 13.7.2004, Eren 272/04 & Çinbilgel (holo.AYDN, iso. B, GAZİ, herb. Paroly).

2. *A. elmaliense* Deniz & Sümbül, Ann. Bot. Fenn. 41: 147 (2004).[Deniz & Sümbül, 2004].

Type: Turke, C2/3 Antalya: Elmali, entering road of Cedrus Research Forest, openings in *Juniperus exelsa* and *Quercus coccifera* forests, 1150 m, 30.iv.2001. I.G.Deniz 1254 (holo. AKDU, iso. HUB, GAZİ, AİBU).

3. *A. ertugrulii* Demir. & Uysal, Nord. J. Bot. 25: 315 (2007). [Demirelma & Uysal, 2007].

Type: Turkey, C3 Konya: Kızıldağ, stony places openings in *Pinus nigra* forests, 1400-1550 m, 19.v.2006, Demirelma 3125 & Uysal (holo.KNYA).

4. *A. retrorsum* (N.Özhatay & Kollmann) Brullo, Guglielmo, Pavone & Salmeri, Bocconea 21: 334 (2007). [Brullo, 2007].

A. deciduum subsp.*retrorsum* N. Ozhatay & Kollmann, Notes R.B.G. Edinb. 41 :247 (1983).

Type: Turkey, C5 İçel: Arslanköy, Bolkar Dağları, Boğazağzı etekleri, 1750 m, 6.viii.1976, K. Alpınar (holo. İSTE 35799).

5. *A. roseum* L., Sp. Pl. 296 (1753)

subsp. *gulekense* Koyuncu & Eker, Nordic Journal of Botany 29: 391-396 (2011). (Koyuncu & Eker, 2011].

Type: Turkey, C5 Mersin: Gülek, Taurus mountains, rocky moist places and shades of forest, 1500 m a.s.l., 15 May 1992, Koyuncu (AEF 18568) (holo. AEF, iso. AIBU).

6. *A. arsuzense* Koyuncu & İ.Eker, Nordic Journal of Botany 29: 391-396 (2011).[koyuncu & Eker, 2011]

Type: Turkey, C6 Hatay:Amanus, Arsuz, above Aydınli village, rocky and stony plains at higher altitudes in maquis, 1450 m, a.s.l., 5. June .2008, Eker 2189 (holo. AIBU, iso.AEF)

7. *A. rumelicum* M.Koçyiğit & N.Özhatay, Phytologia Balcanica 16(3): 355-359, Sofia, 2010. [Özhatay, Koçyiğit & Akalın, 2010].

Type: Turkey, A1(E) Kırklareli: Demirköy, above Dupnisa Cave, 27.vii.2009, E.Akalın, Y.Yeşil, U.Uruşuk, (holo. İSTE 86112, iso. EDTU).

2. Genus: **GALANTHUS** L.

1. *G. trojanus* A.P.Davis & N.Özhatay, Bot. J. Linn. Soc. 137 (4): 409-412 (2001). [Davis & Özhatay, 2001]

Type: Turkey, A1 (A) Çanakkale: near Çan, 350-400 m, 13.iii.2000 (fl.), N.& E.Özhatay ISTE 79123 (holo. ISTE, iso. K).

II-Fam.: **LILIACEAE**

3. Genus: **COLCHICUM** L.

1. *C. leptanthum* K. Persson, Botanical Journal of the Linnean Society, 135(1):85 (2001).[Persson, 2001]

Type: Turkey, Çoruh, c. 10 km SW of Yusufeli, open stony steppe, 660 m, 13.ii.1996, (cult. in Göteborg Botanical Garden 6.xii.1998) *Kerndorff & Pasche* 96-02 (holo.GB).

2. *C. figlalii* (Ö.Varol) Paroly & Eren, Willdenowia 37: 267 (2007). [Paroly & Eren, 2007; Persson, 2007].

Syn.: *Merendera figlalii* O.Varol in Belg. J.Bot.138:89 (2005).

Type: Turkey: C2 Muğla: Sandras D. above A8la, ascent from Çirali to Çiçekbaba T. (main summit), 1900-2150 m, ophiolite, snowbed meadows and meltwater communities,

21.6.1999, *Döring, Parolly 6095&Tolimir* (B, herb. Parolly). G. Parolly&Ö. Eren

3. *Colchicum manissadjianii* (Azn.) K. Perss., *Bot. Jahrb. Syst.* 127: 202 (2007) [Persson, 2007]

Syn.: *Merendera manissadjianii* Azn., *Bull. Herb. Boissier ser.2*, 8: 248 (1908).

4. *Colchicum szovitsii* Fish. & C.A.Mey.

subsp. *brachyphyllum* (Boiss. & Hausskn.) K. Perss., *Bot. Jahrb. Syst.* 127: 165 (2007) [Persson, 2007].

Syn.: *C. brachyphyllum* Boiss. & Hausskn. In Boiss., *Fl. Orient.* 5: 164 (1882).

C. fassiculare (L.) R.Br. var. *brachyphyllum* (Boiss. & Hausskn.) Stef., in *Sborn. Balg. Akad. Nauk., Klon Prir.-Mat.* 22:29 (1926).

C. uluginosum Boiss. & Hausskn., in *Sched.*, nom.nud.

4-Genus: **FRITILLARIA** L.

1. *F. frankorum* R. Wallis & R.B.Wallis, *The Plantsman* 2(1): 15 (2003). [Wallis & Wallis, 2003]

Syn. *F. pinardii* sensu Mousterde in *Nouvelle Flore du Liban et de la Syrie*.1:234 (1966)

Type: Turkey, a cultivated specimen based on Walls 93.16, from Turkey, Hatay, N.of Yayladağı, weed of cultivated fields in seasonally moist or wet soils, 8.iv.1993 (WSY).

2. *F. milasense* M.Tekşen & Aytaç, *Isr. J. Plant Sci.*52: 347 (2004).[Tekşen & Aytaç, 2004].

Type: Turkey, C2 Muğla: Between Yatağan and Milas, Katrancı village, 22.iii.2001, 700 m, in the screen of *Pinus pinea* L. forest, sandy soil, M.Tekşen 1999, E. Tekşen & M.Soydemir (holo. GAZİ, iso. ANK, İTF, HUB).

3. *F. serpenticola* (Rix) M.Tekşen & Aytaç in *Isr. J. Plant Sci.*52: 347-355 (2004). [Tekşen & Aytaç, 2004].

[Syn.: *F. carica* Rix subsp. *serpenticola* Rix, *Notes R.B.G. Edinb.* 41: 52 (1983).]

Type: Turkey, [C2] Antalya: between Karaçulha and Altınyayla, in bare brown sree, 1700 m. 5.iv. 1980, O. Sonderhausen 680 (holo. E).

4. *F. mughlae* Tekşen & Aytaç, in *Ann. Bot. Fenn.* 45: 141-147 (2008).[Tekşen & Aytaç, 2008].

Type: Turkey, C1 Muğla: Marmaris-Datça, between Hisarönü and Emecik, 45 km to Datça, 70-80 m, rocky slopes, 01.iii.2001, M. Tekşen 1996, E. Tekşen and U. Soydemir (GAZİ, iso. ANK, İSTE, HUB).

5. *F. amana* (Rix) Wallis & Wallis, *The Plantsman* 1(2): 114 (2002). [Wallis & Wallis, 2002]

Syn.: *F. hemonis* subsp. *amana* Rix, *Kew Bull.* 29: 647 (1975).

Type: Turkey, [C6] Maraş: Zetun, Kuru Dağ, limostone screes and turf, 1700 m, 10.v.1934, balls 1034 (holo. E, iso. BM, K).

5 -Genus: **GAGEA** Salisb.

1. *Gagea sivasica* Hamzaoğlu, *Türk J. Bot.* 32:261-264 (2008).[Hamzaoğlu, 2008].

Type: Turkey, B6 Sivas: Hafik, Tödürge Lake, around resort of Cumhuriyet University, 1310 m, damp grassy places on gypsaceous rocks, 07.v. 2006. Hamzaoğlu, Aksoy & Budak 3832 (holo. BOZOK Hb, iso. ANK, ERCİYE Hb., GAZİ, HUB).

6-Genus: **HYACINTHELLA** Schur

1. *H. venusta* K. Persson, *The New Plantsman*, 7(4): 204 (2000).[Persson, 2000].

Type:Turkey, [C4] Konya: Ermenek to Hadim, calcareous slopes with deep, gravelly red clay, 1750 m, 14.04.1999, K. & G. Jonasson (GB).

7-Genus: **MUSCARI** Miller

1. *M. sivrihisardaghlarensis* Yıldırım & B. Selvi, Ot Sistematik Botanik Dergisi, 9(1): 9-10 (2002).[Yıldırım & Selvi, 202]

Type:Turkey, B3 Eskişehir: Sivrihisar, from Günyüzü bridge and Bademli petrol office, Sivrihisar Dağları towards peak.slopes, hilly, screes, gypseous places and steppe, 1000-1500 m, (c.1300 m), 17.iii.2001, Ş.Yıldırım 25788 & B.Selvi

(holo. Hb.Yıldırım, iso.GAZİ, HUB, K, UPA, Hb.Nydegger).

2. *M. babachii* Eker & Koyuncu, Nord. J. Bot.26: 49-52 (2008).[Eker & Koyuncu, 2008].

Type: Turkey, C6 Hatay: Amonoslar, Arsuz, Karlı Tepe, 1788 m, a.s.l. 13.vi.2005 İ. Eker 1196 (holo.AIBU, iso.AEF).

3. *M. sirnakenese* Yıld., Ot Sistematik Botanik Dergisi 17(2): 1-114 (2010). [Yıldırım, 2010].

Type: Turkey, C9 Şırnak: Şırnak, Hoşiplin'den Galoşki yaylasına, yayla, çayırılık, karın kalktığı yerler, 1750 m, 10.iv.2010, Ş. Yıldırım 36530 (holo. Hb. Yıldırım, iso. HUB, İSTE).

4. *M. vuralii* Bağcı & Doğu, in Nord. J. Bot. 27: 243-246 (2009).[Doğu & Bağcı, 2009].

Type: Turkey, C4 Karaman : Sarıveliler, Atalanı, stony places, steppe, 1950 m, 13.iv.2006, S.Doğu 106 and Bağcı (holo. KNYA, iso. GAZİ, Hb. Yıldırım).

5. *M. turcicum* Uysal, Ertuğrul & Dural in Botanical Journal of the Linnean Society, 154: :233-236 (2007 [Uysal et. al., 2007]

Type: Turkey, C4 Konya: Bozkır, Tufan Deresi, Avdan yaylası, alpine steppe, 1950-2100 m, 11.v.2005, Ertuğrul 3430, T.Uysal, M.Küçüköyük, H.Dural (holo.KNYA, iso.GAZİ)

8-Genus: **ORNITHOGALUM** L.

1. *O. nallihanense* Yıld. & Doğru Koca, Nord. J. Bot.28: 329-331 (2010).

[Doğru-Koca & Yıldırım, 2010].

Type: Turkey, A3 Ankara. Nallihan, 18 km from Nallihan to Mudurnu, opposite Doğandere village, Quercetum, inside and slopes of valley, 750-900 m a.s.l., stones and screes, 02.iv.2006, Ş. Yıldırım 30620 & A.Doğru-Koca (holo. Hb. Yıldırım, iso.HUB, , K).Turkey, ibid. 29.iv.2007, A.Doğru-Koca 2988 (par. Hb. Yıldırım),.

2. *O. beyazoğlu* Y.Bağcı, Savran & O.D.Düşen, Bangladesh, J. Plant Taxon 18(1):51-55(2011).[Bağcı & al., 2011].

Type: Turkey, A1 İzmir: Ödemiş, Bozdağ, High mountain steppe, 1750-1900 m, 9.6.2009, Bağcı 3936, Savran and Tutar (holo. KNYA, iso. GAZİ, PAMUH, Hb. Yıldırım).

3. *O. anamurense* Speta, Perslia, Praha, 72 (24): 373 (2000).[Speta, 2000 a].

Type:Turkey, [C4] İçel : İçel, km 76 n Anamur, 1500 m, 4. 1995, E. Markus, cult. LI. 20.v.1996. 15.iv.1997 (holo.), 17.iv.1997, 16.v.1997 (alle Sp. In LI).

4. *O. isauricum* O.D.Düşen & H.Sümbül, Isr. J. Plant Sci., 51(1): 78-77 (2003).[Düşen & Sümbül, 2003].

Type: Turkey, C3 Antalya: Manavgat to Gündoğmuş, 23 km from Gündoğmuş, 600-700 m, , on rocky and stony places, 11.iii.2002, O.D.Düşen (2479) & S. Düşen, A. Dinç (holo. AKDU; iso.HUB, GAZİ, AİBU).

5. *O. microcarpum* Speta, Phytion, 40(1): 128 (2000). [Speta, 2000 b].

Type: Turkey, Kastamonu: Ilgaz Dağları, Yaman Tepe, 1650 m, 9.vi.1986, F. Speta (holo. Sp. In LI).

6. *O. munzurense* Speta, Preslia , Praha 72(24): 392 (2000). [Speta, 2000 a].

Type: Turkey, [B7] Tunceli : 19 km from Tunceli along Munzur-River towards Ovacık, steppe scree-slopes and cliff-ledges, calcareous rock, 950 m, [11.iv.1990], E. Pasche KPPZ 90205, cult.LI: 21.v.1993, 18.v.1992 (holo., Sp in LI).

7. *O. pamphylicum* O.D.Düşen & H.Sümbül, Isr. J. Plant Sci., 50(1): 73 (2002).[Düşen & Sümbül, 2002].

Type:Turkey, C3 Antalya : above Fesleğen yaylası, Sakarpmar, 1850-1900 m, calcareous slopes, 04.iv.2001, O.D. Düşen (2235) & S.Düşen, K. Çetinkaya (holo. AKDU, iso.HUB, GAZİ, AİBU).

Type: Turkey, C4 Konya: Bozkır, Yazı Yaylası, , 2000 m, 10.v.2003, T.Uysal 207, K. Ertuğrul & H. Dural (holo. KNYA, iso. GAZİ).

8. *O. malatyanum* Mutlu, Turk J. Bot. 36: 1-9 (2012). [Mutlu & Karakuş, 2012].

Type: Turkey, B7 Malatya: Venk village, Tavşan Hill, calcareous area, 1500-1600 m, 08.vi.1996, B.Yıldız 13368 (holo. (holo. INU, iso. HUB).

9. *O. mekselinae* Varol, Nordic Journal of Botany 23 (4): 607-609 2004.[Varol, 2004].

Type: Turkey, C2 Muğla: Muğla to Denizli, 20. Km., Yarab local, 600 m, 09.iii.2003 damp-field and water meadows, Varol 4249 (holo. MUKLA, iso. GAZI).

10. *O. nurdaniae* Y. Bağcı & Savran, Turk J. Bot. 33: 163-167 (2009). [Bağcı, Savran & Başköse, 2009].

Type: Turkey, A2 Bursa: Uludağ (Bithynian Olympos); opening in *Juniperus communis* communities, 1750-1900 m, 09.06.2008, Bağcı 3782 & Savran (holo. KNYA, iso. GAZI, Hb. Yıldırımli).

11. *O. subbuliamum* O.D. Düşen & I.G.Deniz, Pak. J. Bot. 36 (4): 33-36 (2005). [Düşen & Deniz, 2005].

Type: Turkey, C2 Antalya: Elmalı, Çamkuyusu, 1600-1650 m, sparse *Cedrus libani* forests, 15.iv.2002, İ.G.Deniz 2127 (holo. AKDU, iso. ANK, HUB, GAZI).

12. *O. sandrasicum* Yıld., Ot Sistematiik Botanik dergisi 16: 1-8 (2009). [Yıldırımli, 2009].

Type: Turkey, C2 Muğla: Köyceğiz, Ağla Köyü, Sandras Dağı, bulak karşısı, karaçam ormanı açıklığı, çarşak, 1275-1300 m, 30.v.2009, Ş. Yıldırımli 35960, G. Yıldırımli & H.İşıl Yıldırımli (holo. Hb. Yıldırımli, iso. GAZI, HUB).

9-Genus **HONORIUS** Gray

1. *Honorius chetikianus* (Uysal, Ertugrul & Dural) Mart.-Azorin, M.B.Crespo & Juan, Ann. Bot. (Oxford) 107: 34 (2011).

Syn O. chetikianum Uysal, Ertugrul & Dural, Botanical Journal of the Linnean Society, 148: 501-504 (2005) [Uysal et. al., 2005]

Type: Turkey, C4 Konya: Bozkır, Yazı Yaylası, , 2000 m, 10.v.2003, T.Uysal 207, K. Ertugrul & H. Dural (holo. KNYA, iso. GAZI).

10-Genus: **TULIPA** L.

1. *T. koyuncui* Eker & Babaç, Nord. J.Bot. 28: 324-328 (2010). [Eker & Babaç, 2010]

Type: Turke, B9 Van: between Van and Başkale, Güzeldere pass, roky and stony slopes, 2738 m., 19.v.2006, Eker 1565 (holo. AIBU, iso. AEF)

2. *T. cannabarina* K. Persson, The New Plantsman, 7(4):200 (2000). [Persson, 2000].

Syn.: *T. karamanica* N. Özhatay & B. Koçak, Fl. of Turkey 11:324 (2000).

Type: (Turkey) Konya: between Ermenek and Hadim, calcerous slopes, 1750-1800 m, 3.04.1990, Kammerlander, Pasche, Person & Zetterlund 90-37 GB.

3. *T. gumussanica* Terzioğlu in Ann. Bot. Fennici 39(2): 150 (2002).

Type: Turkey, A7 Gümüşhane: Zigana mountain, northern rocky slopes and screes, , 1550 m, 11.vi.2000, Terzioğlu 13362 (holo. KATO, iso. KTUB).

11- Genus: **PUSCHKINIA** Adams

1. *P. peshmenii* Rix & B. Mathew, Curtis's Botanical Magazine 24 (1): 54-57 (2007). [Rix & Mathew, 2007].

Type: Turkey, [C10] Hakkari: Yüksekova, in the George leading into the valley from the west, among dwarf shrubs, E.M.Rix et al.1926 (holo. İSTE, iso. K).

III-Fam: **IRIDACEAE**

12-Genus: **CROCUS** L.

1. *C. antalyensis* B. Mathew, Kew Bull. 27(2): 327 (1972).

a) subsp. *gemici* Şık & O.Erol, Plant Syst. Evol. 294: 281-287 (2011). [Şık & Erol, 2011].

Type:?

b) subsp. *striatus* O. Erol & Koçyiğit, Nordic. J. Bot. 28:186-188 (2010). [Erol & Koçyiğit, 2010].

Type: Turkey, C1 Muğla: surrounding hill of Muğla, 900-1050 m, a.s.l., 16.ii.2007, O.Erol & I. Şık, İSTF 40079 (holo.İSTF)

2. *C. biflorus* Miller, Gard. Dict. ed. 8: 4 (1768)

a) subsp. *atrospermus* Kernd.& Pasche, Plantsman 2(2): 86 (2003). [Kenndoff & Pasche, 2003]

Type: Turkey) Lycia. Muğla: Boncuk Dağları, 1580-1990 m, 10.iii.1997. HKEP 9377(K).

b) subsp. *caelestis* Kernd.& Pasche, Linzer Biol. Beitr. 38(1): 179 (2006).

Type: ?

c) subsp. *ionopharynx* Kernd.& Pasche, Linzer Biol. Beitr. 36(1): 6 (2004). [Kerndorff & Pasche, 2004]

Type: Turkey, [C1]Caria, provence Muğla, Batı Menteşe dağları, 800-1200 m, 14.3.2003, HKEP 0306 (LI).

- d) subsp. caricus** Kernd.& Pasche, Linzer Biol. Beitr. 36(1): 7 (2004) [Kerndorff & Pasche, 2004]
Type: Turkey, [C1] Caria, provence Muğla: Batı Menteşe dağları, 900-1200 m, 14.3.2003, HKEP 0307 (LI).
- e) subsp. leucostylosus** Kern.& Pasche, Plantsman 2(2): 87 (2003).[Kenndoff & Pasche, 2003]
Type: (Turkey) [C2] Pisidia. Denizli: Gatma Dağı (Çatma Dağı), 1750-1930 m, 11.iii.2002, HKEP 0214 (K).
- f) subsp. yataganensis** Kernd.& Pasche, Linzer Biol. Beitr. 38(1): 178 (2006).
Type: ?
- 3. C. minutus** Kernd.& Pasche, Stapfia 95: 2-5 (2011).
Type: ?
- 4. C. nerimaniae** S. Yüzbaşıoğlu, Plantsman 3(2): 104-106 (2004).
Type: (Turkey). C1 Aydın: Milas, 5 km from Labranda to Çine, 29 October 2000, N. ve E. Özhatay, İSTE 79808 (İSTE).
- 5. C. roseviolaceus** Kernd.& Pasche, Stapfia 95: 2-5 (2011).
Type: .. ?
- 6. C. scharojanii** Rupr., *Gartenflora* 17: 134 (1868).
+ **subsp. lazicus** (Boiss.) B. Mathew, Plantsman, 1: 51 (2002).
Type: ?

13-Genus: GLADIOLUS L.

- 1. Gladiolus attilae** Kit Tan, B.Mathew & A. Baytop in *Phytologia Balcanica* 12(1): 71-73, Sofia (2006).[Kit Tan, B.Mathew & A.Baytop, 2006]
Type: Turkey, Flowering material cultivated in the garden of Mr. Ahmet Attila at Samandıra in A2(A) İstanbul, originating from corms brought from **B7** Elazığ by his son-in-law, pressed on 22 June 1991, A. Baytop İSTE 62995 (holo. İSTE, iso. K).

14. Genus: IRIS L.

- 1-I. celikii** Akpulat & K.I.Chr., *Nordic J. Bot.* 24 :207 (2006). [Christensen & Akpulat, 2004].
Type: Turkey, [B6] Sivas, along the road from Celalli to Hafik, approx. 1 km before the village of Hafik, gypsum fields, deep soil, 1350 m, 4. Apr. 2003, Akpulat 3205 (holo.C, iso. CUFH).
- 2-I. nezahatiae** Güner & H.Duman, *Türk J. Bot.* 31: 311-315 (2007). [Güner & Duman, 2007].
Type: Turkey, A8 Artvin: Yusufeli, Kılıçkaya (ersis) yukarısı [above Kılıçkaya (Ersis)], 1315 m, metamorfik dik yamaçlar [metamorphic steep slopes], 19.v.2006, A.Güner14024-M.Johnson, M.Öztekın, R. Unwin, P. Ravenhill, NGBB accession 2006-401 (holo. Hb. Of NGBB; iso. GAZI)

IV-Fam.: ORCHIDACEAE

15- Genus: DACTYLORHIZA Necker ex Nevski

- 1. D. armeniaca** Hedren, *Plant Syst. Evol.* 229(1-2): 42 (2001).
Type: (Turkey) Ardahan: adm.region ca. 5 km east Şavşat, *Hedren & Hansson* s.n., 9 June 2000 (LD).

16-Genus: OPHRYS L.

- 1. O. aramaeorum** P. Delforge, *Natural, belges (Orchid.)* 13) 81(3):228 (2000).
Type: Turkey, Diyarbakır: apud Kulp (UTM 37SF6260), alt. s.m.870 m, 27.v.1990. In herb. P.
- 2. O. iceliensis** C.A.J. Kreutz in *Jour. Eur. Orch.* 32(3/4): 528 (2000).[Kreutz, 2000].
Type: (Turkey) İçel: Soğucak, 15 km N. Mersin, UTM XF 38.89, Friedhoff mit lockerem Kiefernwald, niederem Laubwald und grasigen *Feiflachen*, 850 m, 21.v.1997, leg. C.A.J. Kreutz, in *Herbio Leiden*, L. (NL).
- 3. O. lyciensis** H.F.Paulus, E. Gügel, D.& U.Ruckbrodt, *Ber. Arbeitskrs. Heim. Orchid.* 18(1): 23 (2001). [Paulus et al., 2001].
Type: (Turkey) Antalya: (Attaleia) ad vicum Çıralı, alt.30 m., 07.04.1998, leg.H.F.& U.Paulus, D.&U. Rückbrodt, TR-07-248-01/98 (WU) Abb.501..
- 4. O. fuciflora** (F.W.Schmidt) Moench subsp.*pallidiconi* Faurh., *J. Eur.Orch.* 43 (3): 563 (2011).
Type: [C3 Antalya], Tekkeköy (Tekke) north of Abdurrahmanlar north of road 400 between Antalya and Serik, 22.iii.2011, N.Faurholdt (holo.C).
- 5. O. lapethica** Gözl & H.R. Reinhard subsp.*papmphylica* Kreutz. *Ber. Arbeitskreis. Heimische Orchid.* 28: 283 (2011).

Type:Turkey, [C3 Antalya, Managat], Zwischen Oymapınar und Yaylaalan, 20.iii.2011, C.A.J.Kreutz (holo. L.).

6. *O. holoserica* (Burm. f.) Greuter subsp *toroslaria* Kreutz, Gügel & Zaiss, Ber. Arbeitskreis. Heimische Orchid. 28(2): 286 (2011).

Type: Turkey, Western Asia, Bel der Rast- und Freizeitanlage am Aladağ bei Yeniköy, 21.v. 1995, C.A.J.Kreutz (holo. L.).

7. *O. herae* M. Hirth & H. Spaeth subsp. *osmanica* Kreutz, Ber. Arbeitskreis. Heimische Orchid. 28(2): 279 (2011).

Type: Turkey, [C3 Antalya] Am Abzweig nach Gündoğmuş, von der Strasse Managat-Akaseki, 22.iii.2011, C:A:J.Kreutz (holo. L.).

17-Genus: EPIPACTIS Zinn

1. *E. densifolia* W.Hahn, J. Passin & R.Wegener, Brer. Arbeitskrs. Heim. Orchid. 20(1): 59 (2003).[Hahn et al., 2003].

Type: Turkey, Konya: Friedhof 6.2 km östlich Sarioğlan. 1335 m NN, 20.vi. 2002, leg.W.Hahn, J. Passin & R. Wegener, hinterlegt im Herbar der Abant İzzet Baysal Üniversitesi, Bolu, Türkei.

V-Fam.: ARACEAE

18-Genus: ARUM L.

1. *A. alpinariae* (Alpinar & R.R.Mill) P.C. Boyce, Arum-a Decade of Change 29: 133 (2006) a. [Boyce, 2006].

Syn.: *Arum elongatum* subsp. *alpinariae* Alpinar & R.R.Mill, Fl. of Turkey 10:236 (1988).

Type: Turkey, A3 Bolu:Seben to Bolu, Ağu Da., Kesik Yaylası, among Juniperus , 1600 m, 6. vi.1983, K. Alpinar ISTE 50605 (holo. ISTE, iso. E).

19-Genus: BIARUM Schott

1. *B. marmarisense* (P.C.Boyce) P.C.Boyce, Aroideana 29: 34 (2006) b.[Boyce, 2006].

Syn.:*Biarum davisii* subsp.*marmarisense* P.C.Boyce, Aroideana 10(4): 14 (1987).

Type: Turkey, [C1] Muğla: Marmaris, Bozburun, Taşlıca Köyü, T. Baytop et al. [holo.EGE (accession no:EGE 8796), iso.E, K].

Conclusion

The distribution of geophyte taxa that have been identified from Turkey during the last decade according to their families and genera:

As you can see from the table, 67 geophyte taxa belonging to 19 genera of the “Class Monocotyledons” have been published since 2001. All of these taxa are endemic for Turkey. In the last 10 years, averages of 5 new taxes, including at least 3 species are found. These taxes are from Antalya region with 12 species, from Muğla region with 8 species and from Konya region with 7 species. Antalya is neighbor with Konya city in the northeast and neighbor with Muğla city in the west and, all these three cities are located in the Mediterranean Basin. These data prove once again that Mediterranean Basin is an important gene center for geophyte plants. Possibilities of cultivation, production as ornamental plants and usage in landscaping should be researched for the new discovered geophyte species which are in the natural flora of Turkey and easily grown under suitable conditions.

Table 1: The distribution of geophyte taxa that have been identified from Turkey during the last decade according to their families and genera

Families	Genus	sp. nova	subsp. nova
AMARYLLIDACEAE	Allium	6	1
	Galanthus	1	-
	Colchicum	3	1
	Fritillaria	5	-
	Gagea	1	-
	Hyacinthella	1	-
LILIACEAE	Muscari	5	-
	Ornithogalum	12	-
	Honorius	1	-
	Tulipa	3	-
	Puschkinia	1	-
	Crocus	3	9
IRIDACEAE	Gladiolus	1	-
	Iris	2	-
	Dactylorhiza	1	-
ORCHIDACEAE	Ophrys	3	4
	Epipactis	1	-
ARACEAE	Arum	1	-
	Biarum	1	-
TOTAL:	19	52	15

References

- Akan H, Eker İ (2005). Check-list of the Genus *Colchicum* in the Flora of Turkey. *Türk J. Bot.* 29: 327-331.
- Aslı DK, Yıldırım Ş (2010). *Ornithogalum nallihanense* sp.nov. (Hyacinthaceae) from Northwest Anatolia, Turkey. *Nord. J. Bot.* 28: 329-331.
- Bağcı Y, Savran A, Başköse İ, (2009). *Ornithogalum nurdaniae* (Liliaceae), a new species from North-West Anatolia, Turkey. *Türk J. Bot.* 33: 163-167.
- Bağcı Y, Savran A, Düşen OD, Tutar L (2011). *Ornithogalum beyazoglui* (hyacinthaceae), a new species from West Anatolia, Turkey. *Bangladesh J. Plant Taxon.* 18(1): 51-55 .
- Boyce PC (2006) a. A Taxonomic revision of *Arum* (Araceae). *Aroideana* 29: 133.
- Boyce PC (2006) b. A Taxonomic revision of *Biarum* (Araceae). *Aroideana* 29: 34.
- Christensen KI, Akpulat HA (2004). *Iris celikii* (Iridaceae), a new species from north-eastern Turkey. *Nordic Journal of Botany* 24(2): 207-210.
- Davis AP, Özhatay N (2001). *Galanthus trojanus*, a new species of *Galanthus* (Amaryllidaceae) from north-western Turkey. *Bot. Jour. Linn. Soc.* 137: 409-412.
- Delforge P (2000). *Ophrys aramaeorum* sp.nov, une espèce orientale du groupe d' *Ophrys tetraloia*. *Natural. Belges (Orchid 13)* 8 225-231.
- Demirelma H, Uysal T (2007). *Allium ertuğrulii* sp.nov. (Alliaceae) from Southern Turkey. *Nord. J. Bot.* 25: 315-317.
- Deniz İG, Sümbül H (2004). *Allium elmaltense* (Alliaceae), a new species from SW Anatolia, Turkey. *Ann. Bot. Fennici* 41: 147-150.
- Doğru S, Bağcı Y, (2009). *Muscari vuralii* sp.nov. (Liliaceae/Hyacinthaceae) from South Anatolia, Turkey. *Nord. J. Bot.* 27: 243-246 .
- Düşen OD, Deniz İG (2005). *Ornithogalum sumbulianum* (Hyacinthaceae), a new endemic species from South-West Anatolia. *Pak. J. Bot.* 36(4): 33-36.
- Düşen OD, Sümbül H (2002). *Ornithogalum pamphylicum*: New species from South Anatolia.. *Isr. J. Plant Sci.* 50: 73-76.

- Düşen OD, Sümbül H (2003). A new *Ornithogalum* L. species (Liliaceae) from Turkey. *Isr. J. Plant Sci.* 51(1): 78-77.
- Eker İ, Babaç T (2010). *Tulipa koyuncui* Eker & Babaç sp.nov. (Liliaceae) from east Anatolia, Turkey. *Nord. J. Bot.* 28: 324-328
- Eker İ, Koyuncu M (2008). *Muscari babachii* sp.nov. (Hyacinthaceae) from South Anatolia. *Nord.J.Bot.* 26: 49-52.
- Erol O, Koçyiğit M, Şık I, Özhatay N, Küçüker O (2010). *Crocus antalyensis* subsp.*striatus* subsp.nov. (Iridaceae) from South Anatolia. *Nord. J. Bot.* 28:186-188.
- Güner A, Duman H (2007). A New Juno *Iris* from North-east Anatolia, Turkey. *Türk J. Bot.* 31: 311-315.
- Güner A, Özhatay N, Ekim T, Başer KHC (2000). Flora of Turkey and the East Aegean Islands (Supplement 2), vol. 11., *University Press*, Edinburgh.
- Hahn W, Passin J, Wegener R (2003). *Epipactis densifolia* W. Hahn, J.Passin, R. Wegener, species nova ein neues Orchideen taxon aus der südlichen Türkei. *Ber. Arbeitskrs. Heim. Orchid.* 20: 54-62.
- Hamzaoğlu E, Budak Ü, Aksoy A (2008). A new species of *Gagea* Salisb. (Liliaceae) from Sivas (Central Anatolia, Turkey). *Türk J. Bot.* 32: 261.
- Heldrén M (2001). Systematics of the *Dactylorhiza euxina/ incarnata, maculata* polyploid complex (Orchidaceae) in Turkey: evidence from allozyme data. *Plant Syst. Evol* 229: 23-44.
- IUCN (2001). IUCN Red list Categories and Criteria. Version 3.1. IUCN Species Survival Commission. *Gland & Cambridge.*
- Kerndorff H, Pasche E (2003). *Crocus biflorus* in Anatolia. *The Plantsman* N.S. 8(2): 77-89.
- Kit T, Mathew B, Baytop A (2006). *Gladiolus attilae* (Iridaceae), a new species from East Anatolia, Turkey. *Phytologia Balcanica* 12(1): 71-73, Sofia.
- Koyuncu M, Eker İ (2011). *Allium arsuense* sp.nov and *A. roseum* subsp.*gulekense* subsp.nov. from Turkey. *Nordic Journal of Botany* 29: 391-396.
- Kreutz CAJ (2000). *Ophrys iceliensis*, eine neue Art aus der mittleren Südtürkei. *Jour.Eur. Orch.* 32: 527-537.
- Mutlu B, Karakuş ŞA (2012). New species of *Ornithogalum* (Hyacinthaceae) from East Anatolia, Turkey. *Türk J. Bot.* 36: 1-9.
- Özhatay N, Koçyiğit M, Akalm E (2010). *Allium rumelicum*, Sect. *Codoprasum*, a new species from European Turkey. *Phytologia Balcanica* 16(3):355-359, Sofia.
- Özhatay N, Kültür Ş (2006). Check-list of Additional Taxa to the Supplement Flora of Turkey III. *Türk J. Bot.* 30: 281-316.
- Özhatay N, Kültür Ş, Arslan S (2009). Check-list of Additional Taxa to the Supplement Flora of Turkey IV. *Türk J. Bot.* 33: 191-226.
- Özhatay N, Kültür Ş, Gürdal MB (2011). Check-list of Additional Taxa to the Supplement Flora of Turkey V. *Türk J. Bot.* 35: 1-36.
- Parolly G, Eren Ö (2006). Contributions to the Flora of Turkey, 1. *Willdenowia* 36: 823-844.
- Parolly G, Eren Ö (2007). Contributions to the Flora of Turkey, 2. *Willdenowia* 37: 259-268.
- Paulus HF, Gügel E, Rückbrodt D, Rückbrodt U (2001). *Ophrys lyciensis* H.F.Paulus, E.Gügel, D. Rückbrodt, U. Rückbrodt spec. nov., eine neue Art aus dem *Ophrys holoserica*- Artekreis der S-Türkei (Orchidaceae). *Ber. Arbeitskrs. Heim. Orchid.* 18: 19-33.
- Persson K (2000). Two new bulbous species from the central Taurus Mountains of Turkey. *The New Plantsman* 7(4): 200-208.
- Persson K (2001) a. A new soboliferous species of *Colchicum* in Turkey. *Bot. Jour. Linn. Soc.* 135: 85-88.
- Persson K (2001) b. *Colchicum* L. in A. Güner et al., Flora of Turkey and the East Aegean Islands. Vol.11 (Supplement 2): 246-265, *Edinburgh University Press*, Edinburgh.
- Persson K (2007). Nomenclatural synopsis of the genus *Colchicum* (Colchicaceae), with some new species and combinations. *Bot. Jahrb. Syst.* 127: 165-242.
- Rix M, Mathew B (2007). *Puschkinia peshmenii* (Hyacinthaceae). *Curtis's Botanical Magazine* 24 (1): 54-57.
- Speta F (2000) a. *Ornithogalum sphaerolobum* und seine Dappalgönger. *Preslia, Praha* 72:369-398.
- Speta F (2000) b. Bemerkungen zu *Ornithogalum sintenisii* Freyn (Hyacinthaceae) und ähnlichen Arten. *Phyton* 40: 115-140.
- Tekşen M, Aytaç Z (2004). New *Fritillaria* L. taxa from Turkey. *Isr. J. Plant Sci.* 52: 347-355.
- Tekşen M, Aytaç Z, (2011). The revision of the genus *Fritillaria* L. (Liliaceae) in the Mediterranean region (Turkey). *Türk J. Bot.* 35:-32.

- Uysal T, Ertuğrul K, Dural H (2005). A new species of *Ornithogalum* (Liliaceae) from South Anatolia, Turkey. *Bot. Jour. Linn. Soc.* 148: 501-504
- Uysal T, Ertuğrul K, Dural H, Küçüködük M (2007). *Muscari turcicum* (Liliaceae /Hyacinthaceae), a new species from south Anatolia, Turkey. *Bot. Jour. Linn. Soc* 154: 233-236.
- Varol Ö (2004). *Ornithogalum mekselinae* (Liliaceae), a new species from south-westen Anatolia, Turkey. *Nordic Journal of Botany* 23(4): 607-609.
- Wallis R, Wallis RB (2002). *Fritillaria amana*. *The Plantsman* 1(2): 114.
- Wallis R, Wallis RB (2003). *Fritillaria frankonum*, a new species. *The Plantsman* 2: 15-17.
- Yıldırım Ş (2009). A new species of *Ornithogalum*, *O. Sandrasicum* Yıld. (Liliaceae from SW Anatolia, Turkey. *Ot Sistemik Botanik Dergisi* 16: 1-8.
- Yıldırım Ş, Selvi B (2002). A new species. *Muscari sivrihisardaghlarensis* (Liliaceae) from Central Anatolia, Turkey. *Ot Sistemik Botanik Dergisi* 9: 7-12.
- Yıldırım Ş (2010). Some new taxa, records and taxonomic treatments from Turkey. *Ot Sistemik Botanik Dergisi* 17(2): 1-114.
- Yüzbaşıoğlu S, Varol O (2004). A new autumn flowering *Crocus* from SW Turkey. *The Plantsman N.S.* 3: 104-106.