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Makedonya Meşesinin (*Quercus trojana* Webb) Ankara'dan İlk Kaydı

The First Record of a Macedonian Oak (Quercus trojana Webb) from Ankara, Türkiye

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ÖZ

Çoğunlukla küçük-orta boylu, geniş tepeli, yaprağını döken bir ağaç olan Makedonya meşesi (*Quercus trojana* Webb), en batıda Güney İtalya'dan başlayarak doğuya doğru Balkanlar ve Türkiye'nin batısı ile güneyini kapsayan kesintili bir yayılış gösterir. Makedonya meşesi saf ormanlar oluşturmamaktadır. Yapraklı ormanlarda diğer meşe taksonlarıyla, maki elemanı çalı ve ağaççıklarla karışıma girmekte, ayrıca karaçam, kızılçam, sedir ve Toros göknarı ormanlarında da bulunabilmektedir. Farklı araştırmacılar tarafından günümüze kadar yayınlanan kayıt ve yayılış alanlarına göre, Makedonya meşesinin İç Anadolu'nun kuzeyinde ve Ankara'da kaydı bulunmamakla birlikte bu çalışma ile birlikte türün Ankara'nın kuzeybatısında yayılış gösterdiği tespit edilmiştir. Makalenin amacı, Makedonya meşesinin ülkemizdeki yayılış alanlarını irdeleyerek yeni bir yayılış alanını ve bu yayılış alanındaki bireylerin botanik özelliklerini tanımlamaktır. Çalışma ile Ankara'nın Beypazarı ilçesi, Çakıloba mahallesi civarında 900-1100 m yükseltiler arasında Makedonya meşesi topluluğu tespit edilmiştir. Alandan toplanan herbaryum örnekleri, morfolojik özellikleri en yakın olan Makedonya ve Lübnan meşesi ile detaylı olarak karşılaştırılmış olup ölçülen tüm parametreler *Q. trojana* türü ile uyumlu bulunurken özellikle yaprak sapı boyu ve yaprak kenarı dişlerinin kısa olmasıyla *Q. libani* türünden ayrılmaktadır. Beypazarı Çakıloba'nın güneyinde yaklaşık 4 km civarı bir hat boyunca Makedonya meşesi yer yer hâkim tür olmak üzere, tüylü meşe ve karaçam ile birlikte karışık ormanlar oluşturmaktadır. Ayrıca, alanda iki farklı mevkide 75-85 cm çaplı ve 150-200 civarı yaşlı anıtsal Makedonya meşesi örneklerine de rastlanmıştır. Ankara'dan Makedonya meşesinin ilk kaydı niteliğindeki bu topluluğa en yakın Makedonya meşeleri daha batıda Bilecik, Kütahya ve Eskişehir illerinde, kuş uçuşu 150 km civarı mesafededir.

Anahtar Kelimeler: Yeni kayıt, Beypazarı, yeni yayılış, anıtsal Makedonya meşesi, Türkiye meşeleri

ABSTRACT

The Macedonian oak (*Quercus trojana* Webb) is a mostly small- to medium-sized broad-crested deciduous tree that shows an interrupted distribution starting from Southern Italy in the far west and spreading eastward, covering the Balkans as well as western and southern Türkiye. Macedonian oaks do not form pure stands. They mix with other oak taxa in broad-leaf forests and with shrubs and small trees in sclerophyllous habitats and can also be found in black pine (*Pinus nigra* J. F. Arnold), Turkish pine (P. brutia Ten.), Taurus cedar (*Cedrus libani* G. Olivier), and Taurus fir (*Abies cilicica* [Antoine & Kotschy] Carrière) forests. According to the records and distribution areas published by different researchers, although no record exists for Macedonian oaks in the northern area of Central Anatolia or in Ankara, this study has determined the species to be distributed in the area northwest of Ankara. The article aims to examine the distribution areas of Macedonian oak in Türkiye and to present a new distribution area and the botanical characteristics of the specimens within this distribution area. The study has identified an assemblage of Macedonian oak between 900-1100 m above sea level around the village of Çakıloba in Ankara's Beypazarı district. A detailed comparison of the herbarium specimens collected from the area was made with Macedonian and Lebanese oaks, and all the measured parameters were found to be compatible with *Q. trojana* while differing from *Q. libani*, especially with respect to the length of the petiole and short sharp-edged teeth along the leaf margins. In terms of habitat, while the Macedonian oak trees are the dominant species in some locations, they are also found in mixed forests of downy oak (*Q. pubescens*) and black pine. In the studied area, two monumental Macedonian oak trees between 75-85 cm in diameter and between 150-200 years old were also found. The closest Macedonian oaks to this newly discovered community around Ankara are located further west in the provinces of Bilecik, Kütahya, and Eskişehir at a bird-flight distance of 150 km.

Keywords: New record, Beypazarı, new distribution, monumental Macedonian oak, oaks of Türkiye

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Extended Abstract

The Macedonian oak (*Quercus trojana* Webb) is a mostly small- to medium-sized broad-crested deciduous tree that shows an interrupted distribution starting from Southern Italy in the far west and spreading eastward, covering the Balkans and western and southern Türkiye. Macedonian oaks are situated among the Cerris section of the red oak group and is morphologically very similar to the Lebanese oak (*Q. libani* Oliv.). These two oak species can be distinguished by features such as their petioles, leaf margin, tooth length, number of teeth and veins, leaf size, and cupule scale shape. In addition, the Lebanese oak geographically spreads further east than the Macedonian oak in eastern and southeastern Türkiye and Iran.

Macedonian oaks do not form pure forests. They mix with other oak taxa in broad-leaf forests and with shrubs and small tress in maquis habitats and can also be found in black pine (*Pinus nigra* Arnold), Turkish pine (*P. brutia* Ten.), Taurus cedar (*Cedrus libani* Oliv.), and Taurus fir (*Abies cilicica* [Antoine & Kotschy] Carrière) forests. According to the records and distribution areas published by different researchers, the Macedonian oak was known to not be distributed in northern Central Anatolia or in Ankara province. In 2020, however, Macedonian oak communities were found around the village of Çakıloba in Ankara's Beypazarı district. Herbarium samples were collected from these oaks in order to determine the species of the oak community found in the Çakıloba neighborhood of Beypazarı. Information about the herbarium sample is provided below:

A3 Ankara: Beypazarı, south and east of Çakıloba village, mixed oak forest between Fındıcak valley and Ziyarettepe, 900-1060 m, 11.10.2020, T. Körüklü (ANK 21102)!

The morphological features of the collected samples were evaluated according to the identification key from the Cerris section. Afterwards, herbarium samples collected from the field were examined with a stereo microscope for detailed species identification, with morphological measurements being made and compared to the morphological values for *Q. trojana* and *Q. libani* as found in the literature.

After the first evaluation following the identification key, the samples were found to have features similar to *Q. trojana* and *Q. libani* based on the long lanceolate (i.e., linear leaves), leaf margins with sharp-edged teeth, cupule of the acorn with scales closed on each other at the bottom while loose and elongated at the tip, and old trunk bark cracked into small scales.

For a more detailed comparison, the study examined 27 leaves from nine different samples under a stereo microscope and recorded the leaf sizes, petiole lengths, leaf margin tooth count measurements, and indumentum characteristics. This evaluation determined the oak samples collected from the forests of Çakıloba village in Ankara's Beypazarı district to be Macedonian oak (*Q. trojana*), as the values for all parameters were within the range of *Q. trojana*. While evaluating all parameters holistically is important when comparing two oak species, the petiole length and short leaf margin teeth are particularly prominent for distinguishing between these two species, as they are very similar in appearance.

During the field visits, the Macedonian oak communities were determined to be distributed between 900-1100 m above sea level and to cover an area of about 400 ha, extending along the northeast-southwest axis south of Çakıloba. In terms of habitat, the Macedonian oak trees were mostly observed in abundance in the mixed forests of downy oak (*Q. pubescens*) and black pine (*P. nigra*), while *Juniperus oxycedrus, Crataegus* sp., *Q. ithaburensis* subsp. *macrolepis, Pinus brutia, Pistacia terebinthus, Pistacia atlantica, Rosa sp., Rhamnus sp., Prunus divaricata, Colutea cilicica* and *Rhus coraria* were seen seldomly. Considering that *Q. trojana* is generally a Mediterranean and Balkan oak species, the vegetative structure of Çakıloba is seen to be consistent with the habitat of the Macedonian oak as provided in the literature. Beypazarı district is located in northwestern Ankara, which is a region that transitions from the Mediterranean in the west to the Black Sea region in the north. Therefore, many Mediterranean species including *Pinus brutia, Rhus coraria, Pistacia terebinthus* are naturally distributed in this region.

In addition, the study found two monumental Macedonian oak trees with diameters between 75-85 cm and between 150-200 years old in the Ziyarettepe and Fındıcak localities of the village. In addition to covering a large area with its abundant presence, the observation of old Macedonian oak trees in the area also support the species' natural distribution. This also marks the first record from Ankara province.

GİRİŞ

Quercus trojana ayrı bir meşe türü olarak ilk defa P.B. Webb'in 1839 tarihli bir mektubunda, Biga yarımadasından topladığı meşeler arasında bahsedilmektedir. Webb, Alexandria Troas antik kentinin güneyinde (Ezine İlçesi, Dalyan Köyü sınırları içerisinde Kestanbolluk mevkiinde) rastladığı bu yeni meşe türünün palamut kadehinin bir şekilde Palamut meşesinin (*Q. ithaburensis* Decne.) kadehine benzediğini, diğer taraftan sert yapraklarının iki yüzünün de parladığını belirtmektedir (Webb, 1839). Latince ismini (*Quercus trojana*) ilk defa tanıtıldığı Truva bölgesinden almakla birlikte, Türkçe adını İngilizce'den (Macedonian oak) çevrilmiş olan Makedonya meşesi adından almaktadır.

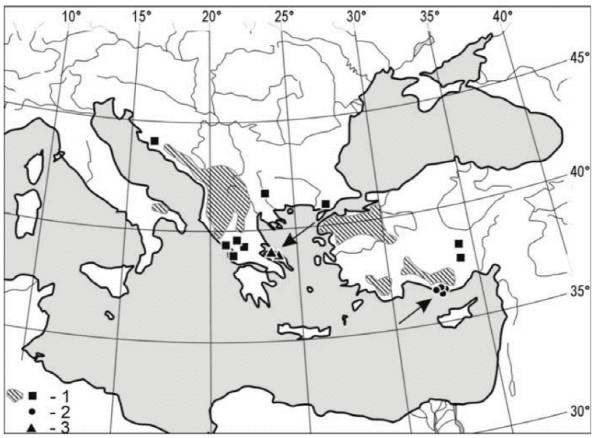
Makedonya meşesi çoğunlukla küçük-orta boylu, geniş tepeli, yaprağını döken veya yarı-herdem yeşil bir ağaçtır (Yaltırık, 1984). Makedonya meşesi, en batıda Güney İtalya'dan başlayarak doğuya doğru Balkanlar ve Türkiye'nin batısı ile güneyini kapsayan kesintili bir yayılış gösterir (Şekil 1) (Browicz 1982, Jalas & Suominen 1976). Kırmızı meşeler grubunda, Cerris seksiyonunda yer alan Makedonya meşesi, bu meşeyi ilk yayınlayan Webb tarafından Palamut meşesine benzetilmekle birlikte aslında kadeh pullarının yapısı, yaprak şekli ve tüy durumuyla bu meşe türünden kolaylıkla ayrılabilir. Diğer taraftan, morfolojik olarak Makedonya meşesine en yakın tür Lübnan meşesi (*Q. libani* G. Olivier) olup Lübnan meşesi Makedonya meşesine göre daha doğuda, Türkiye'nin doğu ve güneydoğusu ile İran'da yayılış göstermektedir. Birbirlerine oldukça benzeyen bu iki meşe türü yaprak sapı, yaprak kenarı diş uzunluğu, diş-damar sayısı, yaprak boyutu ve kadeh pulu şekli gibi özellikleriyle ayrılabilmektedir.

Makedonya meşesi saf ormanlar oluşturmamaktadır. Yapraklı ormanlarda diğer meşe taksonlarıyla (*Q. ithaburensis* subsp *macrolepis* (Kotschy) Hedge & Yalt., *Q. pubescens* Willd., *Q. infectoria* G.Olivier, *Q. cerris* L.) karışıklığa giren Makedonya meşesi, bozuk meşe baltalıklarının pseudo-maki'ye dönüştüğü yerlerde *Pistacia terebinthus* L., *Juniperus oxycedrus* L., *Phillyrea latifolia* L., *Pyrus spinosa* Forssk., *Crataegus* spp. ile birlikte bulunur. Ayrıca, karaçam (*Pinus nigra* J.F.Arnold), kızılçam (*Pinus brutia* Ten.), sedir (*Cedrus libani* A.Rich.) ve Toros göknarı (*Abies cilicica* (Antoine & Kotschy) Carrière) ormanlarında da görülür (Yaltırık, 1984). Kavgacı ve ark. (2021) tarafından Akdeniz ormanlarının vejetasyon sınıflandırmasına göre Makedonya meşesi, kayacığın (*Ostrya carpinifolia*) baskın olduğu, yaprak döken meşelerin (*Q. trojana, Q. vulcanica*) ve ağaç/çalıların (*Acer hyrcanum*, *A. monspessulanum*, *Cornus sanguinea* ve *Fraxinus ornus* gibi) karışıma girdiği 9. vejetasyon grubunda yer almaktadır. Yazarlar bu vejetasyon grubunun Akdeniz'de daha yüksek kesimlerde, yağışın nispeten daha çok ve sıcaklık mevsimselliğinin daha az etkili olduğu supra- ve oro-Akdeniz vejetasyon kuşağında yetiştiğini belirtmektedir.

Farklı araştırmacılar tarafından günümüze kadar yayınlanan kayıt ve yayılış alanlarına göre, Makedonya meşesi ülkemizde Çanakkale, Balıkesir, Bursa, Bilecik, Manisa, Kütahya, Eskişehir, Isparta, Aydın, Niğde, Aksaray, Uşak, Burdur, Afyon, Konya, Karaman, Antalya ve Mersin illeri sınırlarında yayılış gösterirken (Hedge ve Yaltırık, 1982; Yaltırık, 1984; Zielinski ve ark., 2006 ve Yılmaz, 2018), Orta Anadolu'da Sakarya nehrinin doğusunda ve Ankara'da yayılış alanı bulunmamaktadır (Şekil 1).

Ancak, 2020 yılında Ankara'nın Beypazarı ilçesi, Çakıloba mahallesi civarında gerçekleştirilen arazi gezisi esnasında 900-1100 m arasındaki meşe-karaçam karışık ormanlarında anıtsal nitelikte çap ve yaşa sahip örnekleri dahil olmak üzere Makedonya meşesi topluluklarına rastlanmıştır.

Bu makalede, Makedonya meşesinin botanik özellikleri ve ülkemizdeki yayılış alanlarının tanıtılmasının ardından, İç Anadolu'da Sakarya nehrinin doğusundan ve Ankara ilinden bu meşe türünün ilk kaydı hakkında bilgiler verilmiştir.



Şekil 1. *Q. trojana*'nın dünyadaki yayılış alanı. Taralı alanlar ve kare işaretleri *Q. trojana*'nın ana alttürü *Q. trojana* subsp. *trojana*'nın yayılışını gösterirken, üçgen işaretleri Yunanistan'daki *Q. trojana* subsp. *euboica* alttürünün yayılışını, yuvarlak işaretler ise Türkiye'nin güneyinde Mersin ve Antalya civarında yayılış gösterdiği yayınlanan *Q. trojana* subsp. *yaltirikii* alttürünü göstermektedir (Kaynak: Zielinski ve ark., 2006).

MAKEDONYA MEŞESİNİN BOTANİK ÖZELLİKLERİ, TANI ANAHTARI VE YAYILIŞI

Makedonya meşesinin botanik özellikleri ve Cerris seksiyonu içerisindeki yerini gösteren tanı anahtarı, literatür bilgilerine dayanarak aşağıda verilmiştir;

10-18 m'ye kadar boylanabilen, yaprağını döken ya da yarı herdem yeşil, yuvarlak veya geniş tepeli bir ağaçtır. Sivri uçlu, yumurta, uzun eliptik veya dar dikdörtgen biçimindeki yapraklar 3-8 (10) x 1,5-3 (-4) cm boyutlarındadır. Yaprak kenarları 8-10 (-12) çift dikensi dişlidir. Yaprak sapı 2-8 mm (Yaltırık, 1984) veya 1 cm'den küçüktür (Yılmaz, 2018). Yaprak şekli, boyutu, kenarındaki diş sayısı, tüylülük durumu ve kadeh pulları açısından çok değişkenlik göstermektedir. Yaprakların üst yüzü tüysüz ve parlak koyu yeşil ya da seyrek/yoğun yıldız tüylü ve donuk yeşil iken, alt yüzü ise hemen hemen tüysüz ve açık yeşil ya da yoğun yıldız tüylü, gri renkli olabilmektedir (Zielinski ve diğ., 2006).

Kadeh pulları birbiri üzerine sıkıca kapanmış veya tüm pullar sapa doğru geri kıvrılmış ya da alt ve ortada yer alan pullar geriye doğru kıvrık olduğu halde, kadeh kenarına yakın olanlar birbiri üzerine sıkıca kapanmış ve düz olabilmektedir (Yaltırık, 1984). Gövde kabukları genç yaşlarda düzgün ve koyu gri renkli iken, ileri yaşlarda gövde kabukları küçük ya da uzunca parçalar halinde çatlaklı, açık gri-kahverengidir.

Q. trojana'nın da içinde yer aldığı Cerris seksiyonu için aşağıda sunulan tanı anahtarı (Yaltırık, 1984; Yılmaz, 2018) kullanılarak Makedonya meşesi diğer meşe türlerinden ve kendisine en yakın meşe türü *Q. libani*'den ayırt edilebilir.

1. Meyve olgunlaşması 2. yılda olur; olgunlaşan kupulaların sapı kalındır (2,5-5 mm çapında); yaprak loplarının ucunda az veya çok belirgin kılçıksı-dikenli çıkıntılar bulunur; kadeh pulları çoğunlukla birbiri üzerine gevşek kapanmış veya geriye doğru kıvrık (seksiyon Cerris)

2. Yapraklar yumurtamsı-eliptik veya dar yumurta biçiminde; alt yüzleri keçe gibi sık yıldız tüylerle kaplı; kadeh büyük, tırnaklar uzun, şeritsi, çoğunlukla birbiri üzerine gevşek kapanmış veya geriye doğru kıvrık.

3. Tomurcuk dış pulları saç gibi ince ve uzundur ve dökülmezler; yapraklar az veya çok derin lopludur ve lopların ucunda oldukça kısa dikenleri vardır; kupulanın pulları (tırnaklar) iplik gibi incedir..... ***Quercus cerris***

3. Tomurcuk dış pulları saç gibi uzamamıştır. Yapraklar dişli veya çoğunlukla sığ loplu; diş ve lopların ucu uzun kılçıksı dikenlidir; kupula pulları (tırnaklar) geniş şeritsi veya köşelidir.

4. Yaprak kenarları düzenli aralıklarla dişli, loplu değil; kupula pulları geniş veya dar üçgen şeklinde, geriye kıvrılmamış..... ***Quercus brantii***

5. Yaprak kenarları düzensiz aralıklarla loplu, loplar sivri uçlu; kupula pulları dar şerit şeklinde ve köşeli, olgunlaştığında odunlaşır, çoğunlukla geriye kıvrık..... ***Quercus ithaburensis* subsp. *macrolepis***

2. Yaprak uzun mızrak veya geniş şeritsi biçimde; alt yüzleri çıplak veya seyrek yıldız tüylü bazen her iki yüzü de yoğun yıldız tüylü (*Q. trojana* subsp. *yaltırıkii*) ; yaprak kenarları sivri keskin dişli; kadehin pulları dip tarafta birbiri üzerine kapanmış; kadeh kenarına doğru pulların ucu gevşemiş.

6. Yaprak sapları 1 cm'den kısa; yapraklar 3-8 (-10)x(1,5-3 (-4) cm boyutlarında; yaprak kenarlarındaki diş sayısı 8-10 (-12) çift ..... ***Quercus trojana***

7. yaprak sapları 1-2 cm uzunluğunda; yapraklar 6-10 (-15) x 2-3 (-6) cm boyutlarında; yaprak kenarlarındaki diş sayısı 10-14 çift ..... ***Quercus libani***

Tablo 1. Makedonya ve Lübnan meşeleri arasındaki farklar

	Q. trojana	***Q. libani***
Yaprak sapı uzunluğu	1 cm'den kısa	1-2 cm
Yaprak uzunluğu	3-8 (-10) cm	6-10 (-15) cm
Yaprak genişliği	1,5-3 (-4) cm	2-3 (-6) cm
Yaprak kenarı diş sayısı	8-10 (-12) çift	10-14 çift
Dişlerin uzunluğu	Kısa	Uzun
Yaprak altı tüy durumu	Alt yüzleri çıplak veya seyrek yıldız tüylü (subsp. *trojana*)	Çoğunlukla her iki yüzü de çıplak veya alt yüzü sık ya da seyrek yıldız tüylü
	Her iki yüzü de yoğun yıldız tüylü (subsp. *yaltırıkii*)	

Ülkemizde yayılışı

Yapılan literatür ve gözlem kayıtları taramasına göre, Makedonya meşesinin yayılış gösterdiği alanlar Davis'in Türkiye florasında kullandığı kareleme sistemi esas alınarak aşağıda verilmiştir.

Q. trojana subsp. *trojana*

A1 Çanakkale: Dümrekçay serisi, 4 nolu Bölme, Kızılkeçili, 300m, 1972 Yaltırık (ISTO l7588!); Eceabat (Yaltırık, 1984).

A2 Bilecik: Bilecik yakını, Dingler 733.; Aşağıköy yakını, Dingler 558 (Yaltırık, 1973).;

B1 Çanakkale: Ezine, Alexandria Troas antik kentinin güneyi (Geyikli'nin doğusu), (holo. K!); Bayramiç, Yiğitler nahiyesi, Ağılaltı, 150m, Göktürk ISTO 15039 (Yaltırık, 1973); Manisa: Kırkağaç, Sarıkaya zirve yakınında, Peşmen ISTO 769! (ISTO 5574!);

B2 Bursa: M. Kemalpaşa, Devecikonağı bölgesi, 370 m, Gül 101291, 10128! (Yaltırık, 1973); Uluabat gölü civarı, A. Baytop (ISTE 18711)!; Balıkesir: Dursunbey, Gölcük bölgesi, İsmailler köyü, Şahmardı, 640 m, ISTO 15038! (Yaltırık, 1973); Uşak: Güre (https://www.gezenadam.com/biota/support/biota_Observation.php?ID=302&sID=1624214069), Kütahya: Tavşanlı-İnegöl arası, Tavşanlı'dan 5km sonra, 800 m, Dudley, D. 36137 (ISTO 3113)!; Domaniç, eski mezarlık, 900 m, Davis ve Coode, D. 36416 (ISTO 3738) !; Domaniç, Hisar, Dinler 770.

B3 Afyon: Sultan dağları, Dereçine, 1100 m, A. Baytop (ISTE 28987)!; Eskişehir: Kırka, Kunduzlar Barajı çevresi, N: 39o 21' 27.9"-E: 30o 34' 08.8", 1064 m., 20.05.2010, D. Akd. El., OUFE: 15091.

B5 Aksaray: Hasan Dağı, Helvadere-Yenipınar arası tarla ve yol kenarları, 1300–1400 m, 09.06.2009, Başköse 1540; Hasan Dağı, Karacaören üst kesimleri, yüksek tepelik alanlar, Ali'nin Korusu mevkii, 1600-1750 m, 17.06.2009, Başköse 1598; Niğde: Murtaza barajının etrafındaki yamaçlar, 38º 09' 16" N - 34º 32' 52" E, 1765 m, 11.07.2010, N. Kenar 1291; Çiftlik, Azatlı ve Kömürcü köyleri arasındaki kuzey yamaçlar, 38º 12' 05" N - 34º 31' 58" E, 1655 m, 17.07.2011, N. Kenar 1706.

C2 Denizli: Acıpayam (Bulut ve ark., 2017); Çardak, Gemiş köyü, Acıgöl'ün güneyindeki ardıç ormanları, 1400-1500 m (https://www.gbif.org/occurrence/3466118356); Burdur: Tefenni, Eşeler Yaylası, *Pinus nigra* ormanı, 1498 m, 21.11.2009, ZCA, GA, HUEF09426; Antalya: Elmalı, Çığlıkara'nın güneyi, Kohu dağı, Fitz & Spitz. 924!.

C3 Isparta: Beyşehir gölünün batısı ve güneyi, 1400 m (Özkan ve Kantarcı, 2008); Afyonkarahisar: Başmakçı, Söğüt Dağları, Çığrı Köyü, Değirmendere Kanyonu, 1130 m, 11.09.2013, Kargıoğlu 7739 (Kargıoğlu ve Baygül, 2019); Konya: Beyşehir gölünün 24 km güneybatısı, 1200 m, Sorger65-40-1!; Hüyük'ün 4 km kuzeydoğusu, Suludere-Mutlu arası, Koru belbaşı mevkii, 1400-1450m (A. Demirtaş gözlemi); Bozkır, Akçapınar ve Üçpınar yaşlı karaçam ormanları, 1300-1400 m (Kırsal Çevre, 2019); Antalya: Akseki, Çini yaylasi, 1350 m, Karatas & Avci ISTO 15623! (yaprak altı kalıcı-yoğun yıldız tüylü, kadeh pulları hep yatık form); Bayatbademler, 950 m (Kavgacı ve ark., 2021).

C4 Karaman: Ermenek'in 30 km Batı-Kuzeybatısı, Adiller, 1500 m, Spitzenberger 77!; Karapınar-Emirgazi, Karacadağ, 1400 m (Kırsal Çevre, 2019).

C5 Konya: Ereğli, Aydos dağı, Çakıllar köyü, 1600 m, Erik 2493!.

Q. trojana* subsp. *yaltirikii

Holotip: Mersin: İçel, Hacı Ahmetli ve Çukurbağ arasında, Çukurbağ yakınında, Mut'un 18-20 km Kuzey-Kuzeydoğusunda, 1200 m, Kızılçam ormanının kenarı, taşlı-killi yamaçlar, 31.5.1991, Boratyoski, Browicz & Zielioski 6863 (KOR 25094).

C4 Mersin: İçel, Ermenek yolu kenarında, Abanoz yakınında, kayalar arasında küçük mera, 29.5.1991, Boratyoski, Browicz & Zielioski 6780 (KOR 31026); Antalya: Geyik dağları, 1500 m, kireçtaşı kayalık arazi üzerinde Toros göknarı-karaçam (*Abies cilicica-Pinus nigra*) ormanı, 5.8.2005, Boratyoski & Boratyoska TU-05/32 (B, KOR 44631).

GEREÇ VE YÖNTEM

Ankara'nın Beypazarı ilçesi, Çakıloba mahallesinde rastlanan meşe topluluğunun tür tespiti için öncelikle bu meşelerden herbaryum örnekleri toplanmış olup toplanan örneklerin morfolojik özellikleri, Cerris seksiyonunun teşhis anahtarına göre değerlendirilmiştir. Sonrasında detaylı tür tespiti için araziden toplanan herbaryum örnekleri stereo mikroskop ile incelenmiş, morfolojik ölçümleri yapılarak *Q. trojana* ve *Q. libani*'nin literatürde yer alan morfolojik değerleri ile kıyaslanmıştır.

Ayrıca, tespit edilen Makedonya meşesinin yaprak, palamut, genç-yaşlı gövde, anıtsal ağaçlar ve habitat özellikleri sahada detaylı biçimde fotoğraflanmıştır. Ankara'dan Makedonya meşesinin bu ilk kaydı, türün literatürde sunulan kayıtları ve Lübnan meşesinin yayılışı ile birlikte coğrafi bilgi sistemleri (CBS) kullanılarak haritalanmıştır.

BULGULAR

Ankara'nın Beypazarı ilçesine 2020 yılında yapılan bir arazi gezisi sırasında, Çakıloba mahallesinin çevresinde, 900-1100 m yükseltiler arasındaki meşe-karaçam karışık ormanlarında bölgenin yaygın meşe türlerinden yaprak ve palamut özellikleriyle belirgin farklılıklar gösteren (Şekil 2.A) ve Makedonya meşesinin özelliklerini yansıtan meşe ağaçlarına rastlanmıştır.

Ankara'da Makedonya meşesinin ve ona en yakın Lübnan meşesinin kaydı bulunmaması nedeniyle, tür tespiti için bu ağaçlardan herbaryum örnekleri toplanmış ve Ankara Herbaryumu'na teslim edilmiştir. Herbaryum örneğinin bilgileri aşağıda sunulmuştur:

A3 Ankara: Beypazarı, Çakıloba köyünün güneyi ve doğusu, Fındıcak vadisi ve Ziyarettepe arsındaki karışık meşe ormanı, 900-1060 m, 11.10.2020, T. Körüklü (ANK 21102)!

Yaprakları uzun mızrak ya da şeritsi biçimli, kenarları sivri keskin dişli; palamut kadehinin pulları dip tarafta birbiri üzerine kapanmış, uç tarafta gevşek ve uzamış; yaşlı gövde kabukları küçük pullar halinde çatlaklı özellik gösteren bu ağaçlar (Şekil 3) teşhis anahtarına göre yapılan ilk değerlendirmede *Q. trojana* ve *Q. libani*'nin özellikleri ile uyumlu bulunmuştur.

Teşhis anahtarında (Yaltırık, 1984; Yılmaz, 2018) Makedonya ve Lübnan meşeleri arasındaki farkların yaprak morfolojisi ile ilgili olması nedeniyle, toplanan 9 farklı örnekten 27 yaprağın (her

Şekil 2. Beypazarı Çakıloba'da ve civar bölgede rastlanan meşe türlerinin palamutlarının karşılaştırılması (**A.** *Q. trojana*-Çakıloba, **B.** *Q. ithaburensis* subsp. *macrolepis*-Çakıloba, **C.** *Q. cerris*-Nallıhan ve **D.** *Q. pubescens*-Çakıloba).

Şekil 3. Beypazarı, Çakıloba köyü çevresinde rastlanan Makedonya meşesinin **A.** yaprak, **B.** Palamut, **C.** genç gövde ve **D.** yaşlı gövde görünümü.

örnekten küçük, orta ve büyük 3 yaprak seçilerek) ölçümleri yapılmış ve tüy özellikleri incelenmiştir. Karşılaştırma sonuçları Tablo 2'de açıklanmıştır.

Tablo 2'de görüldüğü üzere, özellikle yaprak sapı boyu ve yaprak kenarı dişlerinin kısa olmasıyla Çakıloba örneği *Q. libani* türünden ayrılmaktadır. Ankara'nın Beypazarı ilçesine bağlı Çakıloba mahallesi ormanlarından toplanan meşe örneklerinin Makedonya meşesi (*Q. trojana*) olduğu anlaşılmaktadır. Alt tür olarak ise yaprak tüy durumu değişken olmakla birlikte her iki yüzü de yoğun yıldız tüylü örnek gözlenmediğinden, incelenen örnekler yaygın alttür olan *Q. trojana* subsp. *trojana* olarak değerlendirilmiştir. İki meşe türünün karşılaştırılmasında tüm parametrelerin bütünlüklü olarak değerlendirilmesi önemli olmakla birlikte, birbirine oldukça yakın bu iki türün ayrımında yaprak sapı uzunluğu özellikle öne çıkmaktadır.

Daha sonra aynı alana ilave saha ziyaretleri gerçekleştirilmiş, tekil ağaçların ötesinde Çakıloba'nın doğusundaki Ziyarettepe mevkiinden güneybatıya doğru uzanan yaklaşık 4 km civarı bir hat boyunca, yer yer hâkim tür olmak üzere, Makedonya meşesinin tüylü meşe ve karaçam ile birlikte karışık ormanlar oluşturduğu gözlenmiştir (Bkz. Şekil 4). Ankara'nın kuzeybatısında Beypazarı-Nallıhan boyunca uzanan ve Akdeniz'e özgü kızılçam ormanlarının

Şekil 4. Beypazarı-Çakıloba'da Makedonya meşesinin gözlendiği bölgenin genel habitat yapısı.

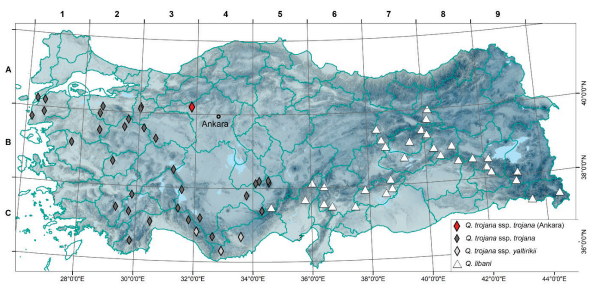
doğal yayılış gösterdiği bir hattın doğu ucunda yer alan bölgede, diken ardıcı (*Juniperus oxycedrus*), kuşburnu (*Rosa sp.*), cehri (*Rhamnus sp.*), yunus eriği (*Prunus divaricata*), patlangaç (*Colutea cilicica*), alıç (*Crataegus sp.*) yanında, Anadolu palamut meşesi (*Q. ithaburensis* subsp. *macrolepis*), menengiç (*Pistacia terebinthus*),

Tablo 2. Çakıloba örneğinin Makedonya meşesi (*Q. trojana*) ve Lübnan meşesinin (*Q. libani*) morfolojik karşılaştırması

	Çakıloba örneği	***Q. trojana***	***Q. libani***
Yaprak sapı uzunluğu	0,52 (0,2-1) cm	1 cm'den kısa	1-2 cm
Yaprak uzunluğu	6 (3,3-10,4) cm	3-8 (-10) cm	6-10 (-15) cm
Yaprak genişliği	2,3 (1,1-3,9) cm	1,5-3 (-4) cm	2-3 (-6) cm
Yaprak kenarı	Sivri dişli (akut) ya da uzunca sivri dişli (akuminat)	Sivri dişli (akut) ya da uzunca sivri dişli (akuminat)	Kılçıksı dişli (aristat)
Yaprak kenarı diş sayısı	9 (5-15) çift	8-10 (-12) çift	10-14 çift
Yaprak altı tüy durumu	Tüy durumu oldukça değişken. Üst yüzü çıplak-alt yüzü seyrek yıldız tüylü veya üst yüzü seyrek-alt yüzü yoğun yıldız tüylü yapraklar yaygın iken, her iki yüzü çıplak yaprak da nadiren gözlenmiştir.	Alt yüzleri çıplak veya seyrek yıldız tüylü (subsp. *trojana*)	Çoğunlukla her iki yüzü de çıplak veya alt yüzü sık ya da seyrek yıldız tüylü
		Her iki yüzü de yoğun yıldız tüylü (subsp. *yaltırıkii*)	

*Tablodaki Çakıloba değerleri tüm ölçümlerin ortalamasını gösterirken, parantez içindeki değerler minimum ve maksimum ölçümlerdir.

Şekil 5. Ziyarettepe (**A.** göğüs çevresi: 245 cm) ve Fındıcak (**B.** göğüs çevresi: 270 cm) mevkilerindeki anıtsal Makedonya meşeleri. **C.** 245 cm göğüs çevreli ağacın (A) yaprak ve palamut detayları.



Şekil 6. Beypazarı-Çakıloba'da tespit edilen Makedonya meşesinin (*Q. trojana*) konumu (Kırmızı) ve *Q. trojana* ve ona en yakın *Q. libani* türlerinin Türkiye'deki dağılımı (Tür dağılımı haritalarında *Q. trojana* için 'Ülkemizde yayılışı' bölümündeki kayıtlar kullanılırken, *Q. libani* için Hedge ve Yaltirik (1982), Çoban ve ark. (2020), Aykut ve ark. (2008)).

sakızlık (*Pistacia atlantica*), sumak (*Rhus coraria*) ve kızılçam (*P. brutia*) gibi Akdeniz elementi ağaç ve çalılar da bulunmaktadır.

Arazi çalışmaları sırasında, Çakıloba'nın Ziyarettepe ve Fındıcak mevkiilerinde 75-85 cm çaplı ve 150-200 civarı yaşlı (alınan karot örneğine göre) anıtsal Makedonya meşesi ağaçları da gözlenmiştir (Şekil 5). 400 hektarı aşan bir alanda her yaştan Makedonya meşelerinin orman karışımına girmesi ve 150-200 civarı yaşlı bireylerinin de gözlenmesi türün bu bölgede doğal yayılışının göstergesidir.

Şekil 6'da görüldüğü üzere, Ankara'dan Makedonya meşesinin ilk kaydı niteliğindeki bu topluluğa en yakın Makedonya meşeleri daha batıda kuş uçuşu 150 km civarı mesafede Bilecik, Kütahya ve Eskişehir illerinde bulunurken, bu noktaya güneydeki Afyon Sultan dağlarındaki Makedonya meşeleri kuş uçuşu 200 km mesafede, güneydoğuda Aksaray Hasan dağındaki Makedonya meşeleri ise yaklaşık 300 km mesafededir.

TARTIŞMA VE SONUÇLAR

Bu makale ile Makedonya meşesinin Ankara'dan ilk kaydı verilmiş ve türün Orta Anadolu'da Sakarya nehrinin doğusuna kadar yayılış gösterdiği ortaya konulmuştur. Hem Beypazarı-Çakıloba bölgesinin civarında hem de Bilecik-Eskişehir-Ankara hattında benzer yapılardaki ormanlarda yapılacak araştırmalarla Makedonya meşesinin yeni topluluklarına ulaşılması olasıdır.

Birbirlerine oldukça benzeyen Makedonya ve Lübnan meşelerinin ayrımı için literatürde yaprak sapı ve yaprak

kenarı diş uzunluğu, diş-damar sayısı, yaprak boyutu ve kadeh pulu şekli gibi parametreler öne çıkmaktadır. Aynı ağaçtan yaprakların bile boyut, şekil, diş-damar sayısı ve kadeh pulu şeklinin değişkenlik gösterdiği dikkate alındığında, bu tür morfolojik karşılaştırmaların mevcut popülasyonun varyasyonunu yansıtacak sayıda örnek kullanılarak yapılması daha sağlıklı sonuçlar verecektir. Bununla birlikte, Çakıloba örneğinde bu iki türün ayrımı için yaprak sapı uzunluğu en tutarlı parametre olarak öne çıkmıştır.

Yaltırık (1984)'te vurgulandığı üzere Makedonya meşesinin palamut kadehleri boyut ve şekil olarak büyük varyasyon göstermektedir. Çakıloba'da rastlanan Makedonya meşesi topluluklarında da palamut kadehlerinin şekli büyük varyasyon göstermektedir. Şekil 7'de farklı form ve kadeh pulu şekline sahip palamut örnekleri gösterilmiştir.

Literatürde Makedonya meşesi, yaprağını döken veya yarı-herdem yeşil bir ağaç olarak belirtilmektedir (Yaltırık, 1984). Bununla birlikte, Ankara-Beypazarı'nda ve başka noktalarda bugüne kadar rastladığımız örneklerde yarı-herdem yeşil özelliğe rastlanmamış olup Makedonya meşelerinin sonbaharda yapraklarının kuruduğu ve kahverengi kuru yaprakların kışı ağacın üzerinde dökülmeden geçirdiği gözlenmiştir (Şekil 4).

Coğrafi olarak batıdan doğuya birbirinin devamı niteliğinde olan ve morfolojik olarak özellikleri birbirine benzeyen Makedonya ve Lübnan meşelerinin ayrımının daha iyi anlaşılabilmesi için hem bu meşeleri karşılaştıran hem de Anadolu'nun tüm meşe taksonlarını kapsayan filogenetik araştırmalar, Anadolu'da meşelerin türleşmesinin anlaşılmasına katkılar sağlayacaktır.

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Şekil 7. Beypazarı Çakıloba'dan farklı form ve kadeh pul şekilli Makedonya meşesi palamutları. Alt ve ortadaki kadeh pulları birbiri üzerine sıkıca kapanmış (A) veya pullar dikleşmiş/geriye kıvrık (B, C, D), uçtaki pullar düze yakın ya da geriye kıvrık.

KAYNAKÇA/REFERENCES

Arıtuluk, Z. C., Ezer, N., ve Akaydın, G. (2014). Flora of Tefenni district (Burdur/Turkey). Biological Diversity and Conservation, 7/3, 146-166.

Aykut, Y., Uslu, E., ve Babaç, M.T. (2008). Karyological studies on four *Quercus* L. species in Turkey. Caryologia, 61:4, 397-401, DOI:10.1080/00087114.2008.10589653

Browicz, K. (1982). Chorology of trees and shrubs in south-west Asia and adjacent regions Volume 1. Warszawa & Poznao, Davis, P.H. (ed.).

Bulut, G., Haznedaroğlu, M.Z., Doğan, A., Koyu, H., Tuzlacı, E. (2017). An Ethnobotanical Study of Medicinal Plants in Acıpayam (Denizli-Turkey). Journal of Herbal Medicine. http://dx.doi.org/10.1016/j.hermed.2017.08.001

Çoban, H. O., Örücü, Ö. K., ve Arslan, E.S. (2020). MaxEnt Modeling for Predicting the Current and Future Potential Geographical Distribution of Quercus libani Olivier. Sustainability 12, no. 7: 2671. https://doi.org/10.3390/su12072671

Davis, P. H.(ed.). (1965-1988). Flora of Turkey and East Aegean Islands, 9 vols. + Supplement. University Press, Edinburgh.

Dere, H.H., Koyuncu, O., Yaylacı, Ö.K., Öztürk, D., Özgişi, K., Sezer, O., Savaroğlu, F. (2013). Kırka (Eskişehir) ve Çevresinin Damarlı Bitki Florası. Artvin Çoruh Üniversitesi Orman Fakültesi Dergisi, ISSN:2146-1880 (basılı) 2146-698X (elektronik).

Hedge, I. ve Yaltirik, F. (1982). *Quercus* L. in: Davis P. H. (ed.), Flora of Turkey and the East Aegean Islands 7. University Press, Edinburgh, Pp. 659-683.

Jalas, J. ve Suominen, J. (ed.). (1976). Atlas Florae Europeae 3. Helsinki.

Kargıoğlu, M. ve Baygül, İ. (2019). Değirmendere Kanyonu Florası. Afyon Kocatepe Üniversitesi Fen ve Mühendislik Bilimleri Dergisi, 19, 031002 (508-532).

Kavgacı, A., Balpınar, N., Öner, H.H., Arslan, M., Bonari, G., Chytrý, M., Čarni, A. (2021). Classification of forest and shrubland vegetation in Mediterranean Turkey. Appl Veg Sci, 24(2):e12589.

Kırsal Çevre. (2019). İç Anadolu'nun Kalıntı Ormanları. Kırsal Çevre ve Ormancılık Sorunları Araştırma Derneği Yayını, ISBN: 978-9944-0142-7-4, Arkadaş Basım Sanayi Ltd. Şti., Ankara.

Özkan, K. ve Kantarcı, M.D. (2008). Beyşehir Gölü Havzası'nın Orman Yetişme Ortamı Alt Bölgeleri ve Yöreleri Grupları. Süleyman Demirel Üniversitesi Orman Fakültesi Dergisi, Seri: A, Sayı: 2, ISSN: 1302-7085, 123-135.

Webb, P.B. (1839). Gard. Mag. & Reg. Rural Domest. Improv, 15: 590.

WFO (2023, 13 Ocak): World Flora Online. Retrieved from http://www.worldfloraonline.org.

Yaltırık, F. (1984). Türkiye meşeleri. Yenilik Basımevi, İstanbul.

Yaltırık, F. (1973). Some Notes on the Morphological Characteristics and the Distribution of a Balkan Woody Species Grown in Turkey: Macedonian Oak (*Quercus trojana* Webb). First International Symposium on the Problems of Balkan Flora and Vegetation, 4-7 June 1973.

Yılmaz, H. (2018). *Quercus* L. (Ed. Ü. Akkemik) Türkiye'nin Doğal-Egzotik Ağaç ve Çalıları. Orman Genel Müdürlüğü Yayınları, Ankara, 338-356.

Zielinski, J., Petrova, A. ve Tomaszewski. (2006). *Quercus trojana* subsp. *yaltirikii* (Fagaceae), a new subspecies from southern Turkey. Willdenowia, DOI: 10.3372/wi.36.36214.

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Illustration of Succulent Taxa from Amaranthaceae: Problems and Proposed Solutions

Amaranthaceae Familyasındaki Sukulent Taksonların Illüstrsasyonu: Sorunlar ve Çözüm Önerileri

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ABSTRACT

The illustration of each taxon in "Illustrated Flora of Turkey" is attached to a reference herbarium specimen. In most cases, the dried herbarium specimens provide suitable reference specimens, but especially for succulent taxa like Amaranthaceae/*Salicornia*, it is not possible to draw each three-dimensional structure without fresh or spirit specimens. The focus of this article is the problems faced during the illustration of succulent taxa of the Amaranthaceae family and the authors' attempts to solve these problems and to share their solutions.

Keywords: Botanical illustration, Amaranthaceae, succulent, *Salicornia*, spirit collections

ÖZ

Resimli Türkiye Florası projesi kapsamında Türkiye bitkilerinin tamamı ilüstrasyonun yapılacağı herbaryum örneğine bağlanarak çizilmektedir. Bir çok durumda kurutulmuş herbaryum örnekleri uygun referans materyal sağlamaktadır, ancak özellikle Amaranthaceae familyası gibi sukulent taksonların bulunduğu familyalarda kuru herbaryum örnekleri yeterli gelmemektedir. Bu gibi durumlarda canlı bitkiden veya alkol örneğinden çizim bilimsel olarak doğru bir çizimin yapılabilmesi için gerekli olmaktadır. Bu makale ile Amaranthaceae familyasındaki sukulent taksonların çizimlerinde karşılaşılan zorluklar ve bu zorlukların aşılması için yazarların çözüm önerileri paylaşılmaktadır.

Anahtar Kelimeler: Botanik illüstrasyon, Amaranthaceae, sukulent, *Salicornia*, alkol örneği

INTRODUCTION

The species of Amaranthaceae are mainly annual or perennial herbs, subshrubs, and shrubs, and, rarely, small trees. There are 10 Subfamilies: Amaranthoideae, Betoideae, Camphorosmaoideae, Chenopodioideae, Corispermoideae, Gomphrenoideaea, Polycnemoideae, Salicornioideae, Salsoloideaeae, and Suaedoideae. Because of their ecological preferences, especially in saline, arid and semi-arid areas, Salicornioideae and Suaedoideae are succulent and/or have articulated stems (Kühn et al., 1993). The changing ecological conditions result in great plasticity and variability, especially in the stem morphology of succulent or non-succulent plants. This article focuses on the succulent Amaranthaceae species, whose stems are terete, thick, often articulate, and mainly leafless and show mostly opposite branching (Kühn et al., 1993). The succulent species of the family are in the Salicornioideae subfamily and the genera *Salicornia* L., *Halocnemum* M.Bieb., *Halostachys* C.A.Mey., *Halopeplis* Bunge, *Kalidium* Moq., *Bienertia* Bunge, *Sarcocornia* A.J.Scott, *Microcnemum* Ung.-Sternb.

To explain the illustration-related problem without getting involved in the taxonomical ones, we concentrated on *Salicornia* to express the complexity and difficulty of the succulent structures, especially from herbarium material.

The members of Salicornieae tribe are characterized by reduced leaves and flowers, with simple and similar morphological

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structures. Morphological differentiation can only be possible with fresh specimens, especially in flowering or fruit bearing periods (Gehu et al., 1979). Also, the members of this tribe have a high degree of phenotypic plasticity.

Salicornia L. (glasswort, saltwort, samphire) is a well-known genus with succulent, articulated, and leafless stems and branches. In addition, the floral structure is specified with aggregated spike like inflorescences (Kadereit et al., 2007; Shepherd et al., 2005).

Salicornia members are gnarled, succulent, and annual herbaceous plants. Stems prostrate or erect, simple, or branched; stems are succulent, hairless, and articulated. Stem leaves are opposite, reduced, scale-like, glabrous, sessile, fused to each other at the base, and cover the stem like a sheath. Inflorescence is a branched spike. Perianth 2-4 lobed. The flowers are hermaphrodite, 1-3-flowered, fused with each other and with brackets, and partially embedded in the major axis of the inflorescence (Yaprak, 2008; Ball, 1967). In Turkey, the *Salicornia* genus has 6 species (Yaprak, 2012; 2022).

Spirit collections are a fairly common storage method for succulents, large fruits, and mushrooms that are not suitable for drying, pressing, or placing in an herbarium file. Because drying the samples can cause shrinkage, it is often possible to get more accurate measurements from materials preserved in spirit liquids. In addition, this method allows the three-dimensional arrangement of flower parts to be clearly observed and illustrated. (Bridson and Forman, 1999; Hodges, 1989). According to this method, samples are sometimes stored in 70% ethyl alcohol or Copenhagen Solution (70% industrial methylated spirits, 28% distilled water, and 2% glycerol). Alcohol is a good preservative and glycerol prevents samples from becoming too brittle.

With this article we would like to find answers to the following problems:

- Succulent species lose their three-dimensional shapes and it is not possible to draw them in scientifically correct form from the two-dimensional, dried out herbarium specimen.
- The inflorescence of the genus *Salicornia* has a specialized and reduced structure with minute flowers lacking in many floral components.
- Lack of spirit collections at Türkiye's herbaria.

MATERIALS AND METHODS

Two types of plant materials were used during this study: the spirit collection of Prof. Dr. Ahmet Emre Yaprak from the Tohumlu Bitkiler Sistematiği Lab, and dried herbarium materials from the Tohumlu Bitkiler Sistematiği Lab. Morphological illustrations are done with ink from spirit materials. The spirit collections and dried herbarium materials were compared in light of plant illustration.

DISCUSSION AND CONCLUSION

With the development of modern techniques, it is expected that interest in plant illustrations will decrease as a result of developments in photography and microscopy techniques. However, in Türkiye, scientific botanical illustration is gaining attention, particularly as a result of the project "Illustrated Flora of Turkey," which is attempting to illustrate every plant species in the country.

During illustration processes, technical problems specific to families or even genera can arise. The focus of this work is the problems that arise during the illustration of succulent taxa of the Amaranthaceae family and the authors' attempts to solve these problems and share their solutions.

The Amaranthaceae family consists of both succulent and non-succulent taxa. For the scientifically correct illustration of succulent and articulated taxa, the specimen should be precise, with all the specific characteristics.

The habitus and inflorescence of *Salicornia* sp. as a succulent taxon can be seen in Figure 1. It is clear that it is not easy to differentiate each taxon without specialization or exact knowledge of the structure. The determination process of the succulent and articulated taxa can only be done if the specimens are fresh or deposited in 70% ethanol solution.

The form of dried specimens of succulent taxa from Amaranthaceae, *Salicornia freitagii*, can be seen in Figure 2, and it is not easy to determine discriminative characteristics

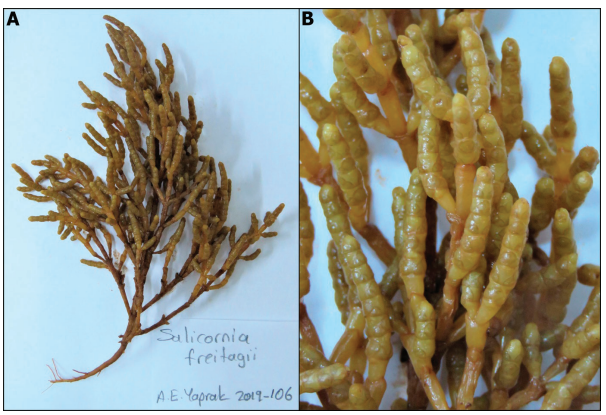

Figure 1. *Salicornia freitagii* specimen from spirit collection. A-habitus B-Inflorescence.

such as flowers and scale-like structures at each segment and three-dimensional structure of the specimen. For this reason, it is not possible to illustrate the scientifically correct form of succulent species of the Amaranthaceae family from dried herbarium specimens (Figure 2).

If it is not possible to draw the specimen when it is still fresh, spirit collections provide an opportunity to solve this problem. Specimens from spirit collections are very important and can be used to draw scientifically correct structures of reduced flowers and three-dimensional structures of shoots and branches. However, even at the biggest herbaria in Türkiye, the lack of spirit collections makes it difficult or impossible to compare the

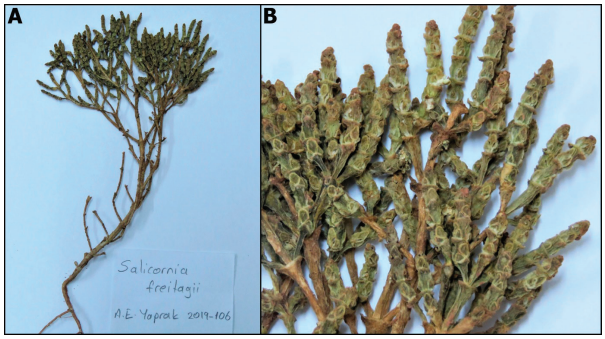

Figure 2. Dried herbarium specimen of *Salicornia freitagii*. A-habitus B-Infloresence.

specimen with the reference herbarium materials and to draw scientifically proper illustrations. In addition, succulence makes these taxa stay fresh for longer periods, and being kept at +4 °C during the illustration process can increase this duration.

As can be seen from Figures 1 and 3, the three-dimensional structure can easily be understood from spirit collection and provide convenience during illustration.

It is also better to evaluate the floral structure of the genus *Salicornia,* which is much reduced, from fresh specimens or spirit collections. The structure and parts of inflorescence of the *Salicornia* species can be seen in Figure 4, where fertile spikes and general flower structure were drawn. The illustrated fertile segments of three species, *S. emerici*, *S. freitagii*, and *S. dolychostachia*, are very similar to each other and can be differentiated by the sizes of their central and lateral flowers, and also the prominence of their scaleous borders, which are a reduced leaf at the upper parts of their fertile segments.

In light of all this information, we can conclude that the lack of spirit collections, especially for succulent taxa in Türkiye, is a weakness of Turkish herbaria. As with most succulent plants, it is not easy to illustrate the exact details of a specimen from a dried herbarium specimen. In some cases, dried specimens placed in hot water for 24 hours may regain their succulent structure, but according to the authors' experiences and trials with the succulent Chenopodiacea species, this process did not yield any positive results. During the preparation of "Illustrated flora of Turkey," all the species should be illustrated with water color or ink. As the illustrators of the family Amaranthaceae (s.l.) in "Illustrated Flora of Turkey," to deal with the succulent structures, we used specimens preserved in 70% alcohol or fresh specimens that were dried as an herbarium specimen after illustration.

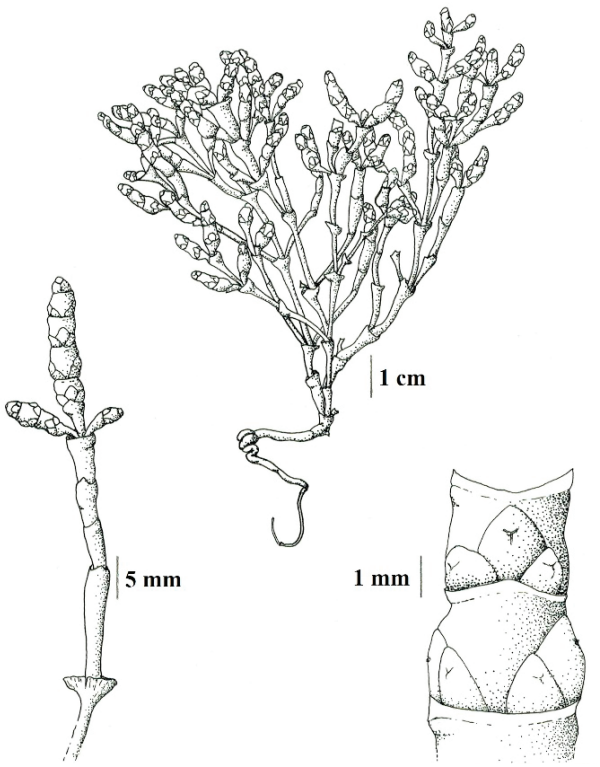

Figure 3. Illustration of *Salicornia freitagii* species from spirit specimen.

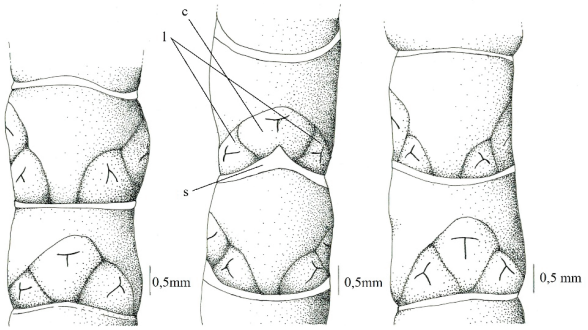

Figure 4. Flower of three different *Salicornia* species; *S. emerici*, *S. freitagii* and *S. dolychostachia* (from left respectively). c central flower, l lateral flower.

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REFERENCES / KAYNAKÇA

Ball, P. W., (1967). *Salicornia* L. In: Davis, P. H. (ed.) Flora of Turkey and East Aegean Islands, vol 2. Edinburgh University Press.

Bridson, D. & Forman, L. (1999). The Herbarium Handbook. Royal Botanic Gardens KEW.

Gehu J. M., Caron B., Franck J., (1979). Essai de cle´ pour les salicornes annuelles pre´ sentes sur les coˆ tes du projet de carte floristique I.F.F.P. Doc. Flor. 2: 17–24

Hodges, E.R.S. (1989). The Guild Handbook of Scientific Illustration. Van Nostrand Reinhold.

Kadereit, G., Ball, P., Beer, S., Mucina, L., Sokoloff, D., Teege, P., Yaprak, A.E., & Freitag, H., (2007). A taxonomic nightmare comes true: phylogeny and biogeography of glassworts (*Salicornia* L., Chenopodiaceae). *Taxon*, 56(4), 1143-1170.

Kühn, U., Bittrich, V., Carolin, R., Freitag, H., Hedge, I. C., Uotila, P., & Wilson, P.G., (1993). Chenopodiaceae. In Kubitzki, K., Rohwer, J.G., Bittrich, V. (eds) Flowering Plants Dicotyledons. The Families and Genera of Vascular Plants, vol 2. Springer.

Shepherd, K.A., Macfarlane, T.D., Colmer, T. D., (2005). Morphology, Anatomy and Histochemistry of Salicornioideae (Chenopodiaceae) Fruits and Seeds. *Annals of Botany*, 95(6), 917–933.

Yaprak, A.E., (2008). *Salicornia*, *Sarcocornia* ve *Arthrocnemum* cinslerinin (Chenopodiaceae) Türkiye taksonomik revizyonu (Doctoral dissertation). Retrieved from; https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Yaprak, A.E., (2012). Salicornia. In Güner, A., Aslan, S., Ekim, T., Vural, M., Babaç, M.T. (Eds.) Türkiye Bitkileri Listesi (Damarlı Bitkiler) (pp. 27-28). İstanbul: Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını.

Yaprak, A.E., (2022). *Salicornia hamzaoglui* (Amaranthaceae), Türkiye'den Yeni Bir Geren Türü. *Türler ve Habitatlar*, 3(1), 1–6.

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Contributions to the Flora of Şahinler Natural Park (Kızılcahamam/Ankara)*

Şahinler Tabiat Parkının (Kızılcahamam/Ankara) Florasına Katkılar

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ABSTRACT

Şahinler Natural Park is one of the 262 natural parks in Turkiye and was studied to identify its flora. Şahinler Natural Park is threatened by rapid population growth and rapidly expanding human activities, like all other natural areas. Accordingly, it is important to know and protect existing plant species in the Şahinler Natural Park. The study area is within the boundaries of the Kizilcahamam District of Ankara. According to P.H. Davis's grid system, it is located in the A4 square and Irano-Turanian phytogeographic region. The altitude of the study area varies between 1450 and 1500 m. The general vegetation of the area consists of forests and glades. As a result of the evaluation of the samples collected from the study area, 112 species and sub-species taxa belonging to 84 genera were identified from 40 families. 10 of these taxa are endemic and the endemism ratio is 8.9%. According to the information and data obtained from the List of Threatened Plant Species, the conservation status of 7 species in the area was evaluated. Accordingly, there are 4 species evaluated in the LC (Low Risk) category, 1 species in the NT (Near Threatened) category, 1 species in the VU (Vulnerable) category, and 1 species in the CD (Subject to Conservation) category. When evaluated according to the red book of Turkish plants, 14 taxa were determined to be in the LC category, 1 taxon was determined to be in the NT category, and 2 taxa were determined to be in the VU category. The study area was evaluated according to the EUNIS Habitat classification criteria.

Keywords: Flora, natural park, Ankara, Kızılcahamam

ÖZ

Ülkemizde bulunan 262 tabiat parkından biri olan Şahinler Tabiat Parkı, diğer tüm doğal alanlar gibi, hızlı nüfus artışı ve hızla genişleyen insan faaliyetleri yüzünden tehdit altındadır. Bu anlamda, alandaki mevcut bitki türlerinin bilinmesi ve korunması önem taşımaktadır. Çalışma alanı Ankara İli, Kızılcahamam İlçesi sınırları içerisindedir. P.H. Davis'in grid sistemine göre A4 karesinde ve İran- Turan fitocoğrafya bölgesinde yer almaktadır. Çalışma alanında yükseklik 1450 ve 1500 m aralığında değişiklik göstermektedir. Genel bitki örtüsü orman ve orman açıklıklarından oluşmaktadır. Çalışma alanından toplanan örneklerin değerlendirilmesi sonucu 40 familyadan 84 cinse ait 112 tür ve tür altı seviyede takson tespit edilmiştir. Bu taksonlardan 10'u endemiktir ve alanın endemizm oranı %8,9'dur. Tehdit Altında Bitki Türleri Listesi'nden elde edilen bilgi ve verilere göre alanda bulunan 7 türün koruma statüleri değerlendirilmiştir. Buna göre alanda LC (Düşük Riskli) kategorisinde değerlendirilen 4, NT (Tehdite yakın) kategorisinde 1, VU (Duyarlı) kategorisinde 1 ve CD (Korumaya tabi) kategorisinde değerlendirilen 1 tür bulunmaktadır. Türkiye Bitkileri Kırmızı Kitabı'na göre değerlendirilme yapıldığında ise LC kategorisinde 14, NT kategorisinde 1 ve VU kategorisinde 2 takson belirlenmiştir. Alan EUNIS Habitat Sınıflandırması kriterlerine göre de değerlendirilmiştir.

Anahtar Kelimeler: Flora, tabiat parkı, Ankara, Kızılcahamam

* Professor Ahmet Emre Yaprak, Dr. İsa Başköse and S. Tuğrul Körüklü for their assistance during field trips and identification of the plant specimen.

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INTRODUCTION

Turkiye is located in one of the world's richest geographies in terms of floristic diversity. The reasons for Turkiye's substantial biological diversity are the existence of different types of soils, variations in topography and climatic diversity, as well as the fact that it is located in a region where three of the world's 37 phytogeographical regions (namely, the Euro-Siberian, Irano-Turanian, and Mediterranean phytogeographical regions) intersect. Another important feature of the flora of Turkiye is that it contains many endemic taxa. The number of endemic taxa in Turkiye is 3,649, and the endemism rate is 31.82% (Guner et. al., 2012).

Wildlife habitats have narrowed due to the increase in human population, urbanization, and industrialization. Therefore, there is negative pressure on protected areas. Research shows that environmental awareness and an increase in the number of protected areas lead to a decrease in this negative pressure (Sezen, 2017). Environmental awareness for protected areas in Turkiye is still in its development phase. In her study, Sezen (2017) concluded that the industrialization and urbanization impact on protected areas should be assessed in detail and policies should be reviewed to eliminate regulatory inconsistencies. The UNEP (United Nations Environment Program), WCMC (World Conservation and Monitoring Center), and IUCN (International Union for Conservation of Nature) have taken a leading role in the recognition and scientific promotion of protected areas in the world. (www.iucn.org/sites/dev/files/important/downloads/natural_solutionturkish.pdf.2016,21.02.2017).

Protected areas in Turkiye are specified in the legislative framework under the relevant ministries. Protected areas that are regulated by the Ministry of Agriculture and Forestry in Turkiye have protected status as national parks, nature parks, nature conservation areas, natural monuments, and wildlife development areas. Special environmental protection areas, natural protected areas, and natural assets (monumental trees, caves) are managed as protected areas by the Ministry of Environment, Urbanization, and Climate Change. As of 2022, there are 634 protected areas registered in Turkiye, including 48 national parks, 262 nature parks, 113 natural monuments, 31 nature protection areas, 95 wetlands, and 85 wildlife development areas (https://www.tarimorman.gov.tr/DKMP). The study area is in the nature park category. Nature parks are natural areas that have vegetation and wildlife characteristics and are suitable for the recreation and entertainment of people in the integrity of the landscape (https://www.tarimorman.gov.tr/DKMP/Menu/34/Temel-Kavramlar). Nature parks, similar to all other natural areas, are threatened by rapid population growth and rapidly expanding human activities. Şahinler Nature Park (see Figure 1), which is one of the 262 nature parks in Turkiye, has had protected status since 17.07.2009 and attracts attention with its natural structure (https://www.tarimorman.gov.tr/DKMP/Menu/28/Tabiat-Parklari). Therefore, it is important to know and protect the existing plant species in the area. This study aims to identify the seed plant flora of the area, reveal the habitat types with respect to EUNIS habitat classification, and develop a foundation for studies regarding the protection of the nature park.

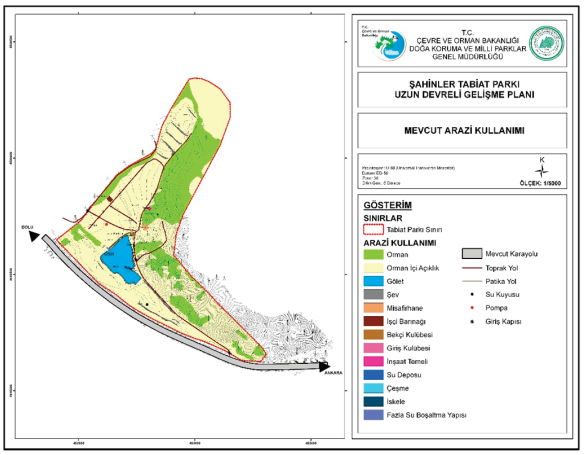

Figure 1. *Şahinler Natural Park Land Use Map (Ministry of Environment, Urbanization and Climate Change).*

No previous study has been conducted in the study area, however, studies have been conducted in nearby regions. Summaries of the studies previously conducted in the area are given below:

Güner and İkinci (2006) investigated the vascular plant flora of the Gölcük (Bolu) region in their study. As a result of the study, 277 genera, 461 species, and a total of 475 taxa belonging to 80 families were identified. The number of endemics in the area was determined to be 16, and the endemism rate was evaluated as 3.5%.

Uçar and Güner (2002) evaluated the plant diversity of Abant Nature Park (Bolu) in their study. As a result of the research, 1,440 plant samples were collected from the area. The number of endemic taxa in the area is 55. Therefore, the endemism rate of the area is 8.1%. As a result of the evaluation of the samples, 332 genera, 664 species, 150 subspecies, and 67 varieties belonging to 84 families were identified.

Tekin, K. (2005) investigated the synecological and syntaxonomic characteristics of the coniferous forests located between Gerede and Çamlıdere in the northwestern part of the Central Anatolia region in his study. It was determined that the research area had a transitional zone characteristic.

Topaloğlu, S. (2005) collected 931 plant samples in his study on the flora of Çamkoru Lake and its surroundings. As a result of the identification of the samples, 59 families, 217 genera, 377 species, 4 subspecies, and 1 variety were identified. According to this study, which provides us with information about the general vegetation of the research area, it was determined that the largest family in the area was Asteraceae, with 42 species.

MATERIAL AND METHODS

Plant Material

Sampling activities were carried out between 2016 and 2019. Şahinler Nature Park was visited during the vegetation period, during which plant samples bearing roots, stems, leaves, flowers, and fruits were collected in doublets. Samples which

were identified to be incomplete were subject to subsequent sampling during the following sampling survey. Samples were registered with respect to their locality information.

The locality information of the samples collected from the field was recorded. All samples were pressed and dried. The dried samples were left for sterilization for 72 hours at -20 degrees to remove parasites. The work titled "Flora of Turkiye and East Aegean Islands" (Davis, 1965-1988) was used for the identification of dried and sterilized samples. Identified specimens were verified in the herbarium ("Herbaryum ANK") located at the Ankara University, Faculty of Science, Department of Biology.

Climate of the Study Area

The climate data of the study area were obtained from the General Directorate of Meteorology of the Ministry of Agriculture and Forestry. Using the climate data, the bioclimatic characteristics of the region were identified and ombrothermic climate diagrams were generated.

Evaluation of the Habitat Types

Habitat types in the study area were identified using the European Nature Information System (EUNIS) database, which provides comparative habitat data (EUNIS, 2012).

Evaluation of the Collected Material

The list of the collected plant samples was generated in accordance with family, genus, species name, author and the distribution in the research area, name of the sampler, date, sample ID, plant's geographic region, and endemism status. The identified taxa were sorted according to the alphabetical order of the family names. Recent modifications in the classification were revised in accordance with the Türkiye Bitkileri Listesi Damarlı Bitkiler Kitabı (Guner et. al., 2012).

The classification of the samples which bear uncertainties was carried out with expert guidance. The identified samples were verified through comparisons with samples in the Herbarium ANK. The sampling date, endemism status, and chorology of each species are given in the flora list.

RESULTS

The study area is located within the Şahinler Nature Park, in the Kizilcahamam district of Ankara province, and lies in grid square A4 according to the grid system set up by P.H. Davis. The Şahinler Nature Park was founded in 2009 and has a total surface area of 40 Ha. The area lies between the longitudes 32º 26´ 24´´- 32º 26´ 49´´ and latitudes 40º 37´ 24´´- 40º 38´ 01´´. The Şahinler Nature Park is located 107 km from Ankara city center, 30 km from the center of the Kizilcahamam district, and 30 km from the Gerede district of Bolu province (http://sahinler.tabiat.gov.tr).

In order to distinguish the samples and facilitate the identification phase, the area was categorized into three stations: forest, pond and its surroundings, and glades. The dominant vegetative cover in the area is *Pinus slyvestris* forests. There is a pond in the study area which is recharged by precipitation and groundwater flow. The pond's surface area is 1.7 Ha and it is located 1465 meters above sea level. The total perimeter of the pond is 682 m, with a maximum depth of 2 meters.

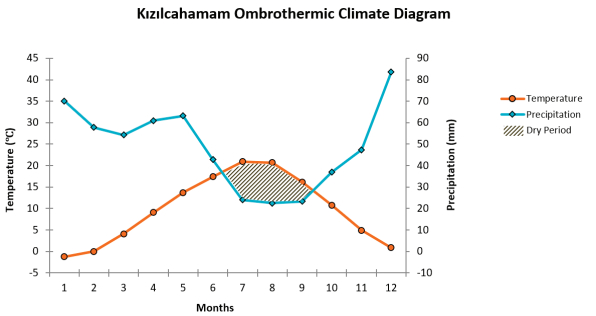

Figure 2. Kizilcahamam Ombrothermic Climate Diagram.

Using the data obtained from the Kizilcahamam meteorological station, mean monthly temperatures, mean monthly precipitation, maximum mean temperature of the warmest month, minimum mean temperature of the coldest month, and summer season mean precipitation values were evaluated to generate ombrothermic (precipitation – temperature) climate diagrams and to identify climate types in accordance with the Emberger method (Figure 1 and Figure 2) (Akman 1999). The following results were achieved:

The annual precipitation in the study area is 586.8 mm.

Maximum precipitation occurs in the winter season, whereas minimum precipitation occurs in the summer season at meteorological station.

The study area shows semi-arid Mediterranean climate characteristics (Table 1).

As a result of the study, 84 genera and 112 taxa belonging to 40 families were identified. One of these taxa (*Asplenium*

Table 1. Bioclimatic Synthesis

Meteorological Station	P (mm)	M (°C)	m (°C)	Q	PE	S	Precipitation Regime	Bioclimate
Kızılcahamam	586.8	27,9	-4,1	64,3	89.3	3,2	W. Sp.Su.F.	Semi-arid upper, very cold Mediterranean climate

P: Annual precipitation M: Maximum mean temperature for the warmest month PE: Summer precipitation (mm)
m: Minimum mean temperature for the coldest month Q: Precipitation-Temperature index S: Drought index **W: winter Sp: spring Su: summer F: fall.**

onopteris) belongs to the Lycopodiophyta division. Three of the taxa belong to the Pinophytina subdivision of Magnoliophyta. The remaining 108 taxa belong to the Magnoliidae class of the Magnoliophytina subdivision of the Magnoliophyta division. The Asteraceae family contains the most taxa in the area, with 12 taxa (10.7%). The Asteraceae family is followed by Brassicaceae and Fabaceae (8.9%), with 10 taxa, Caryophyllaceae and Plantaginaceae (5.4%), with 6 taxa, and Poaceae, Rosaceae, Asparagaceae, and Lamiaceae (4.5%), with the same rate (5 taxa). The remaining families include 48 taxa and 42.9% of the taxa in the area. The taxa numbers and their percent distributions for each family are provided Table 2.

Table 2. Taxa Numbers and Their Percent Distributions for Each Family

Family	Number of Taxa	%
Asteraceae	12	10.7
Brassicaceae	10	8.8
Fabaceae	10	8.8
Caryophyllaceae	6	5.4
Plantaginaceae	6	5.4
Poaceae	5	4.5
Rosaceae	5	4.5
Asparagaceae	5	4.5
Lamiaceae	5	4.5
Others	48	42.9
Total	**112**	**100**

The families which were found to have the most genera in the study area are Asteraceae, with 10 genera (11.9%), Brassicaceae and Fabaceae, with 6 genera (7.1%), Caryophyllaceae and Rosaceae, with 5 genera (5.9%), Boraginaceae and Lamiaceae, with 4 genera (4.8%), and Asparagaceae, Plantaginaceae, and Poaceae, with 3 genera (3.6%). The remaining families include 35 genera, which comprise 41.7% of the total number of genera in the area. The genus numbers and percent distributions for the families are given in Table 3.

According to the evaluation of the collected samples in the research area, the genera containing the most taxa are *Veronica,* with 4 taxa (3.57%) and *Ranunculus*, *Poa*, *Hypericum*, *Trifolium*, *Barbarea,* and *Thlaspi,* with 3 taxa (2.68%). The remaining genera comprise 90 taxa, which corresponds to 80.36%. The number of taxa for the genera and their percent distributions are given in Table 4.

The distribution rates of the taxa according to the phytogeographic regions show that Euro-Siberian, Irano-Turanian and Mediterranean elements comprise 9.82% (11 taxa), 16.07% (18 taxa), and 5.36% (6 taxa). The ratio of widespread taxa or the taxa whose distribution is not known is 68.75%, with 77 taxa. The phytogeographic distribution of the taxa are given in Table 5.

Table 3. Genus Numbers and Their Percent Distributions for Each Family

Family	Number of Genus	%
Asteraceae	10	11.90
Brassicaceae	6	7.14
Fabaceae	6	7.14
Caryophyllaceae	5	5.95
Rosaceae	5	5.95
Boraginaceae	4	4.76
Lamiaceae	4	4.76
Asparagaceae	3	3.57
Poaceae	3	3.57
Plantaginaceae	3	3.57
Others	35	41.67
Total	**84**	**100**

Table 4. Number of Taxa and Their Percent Distribution for Each Genus

Genus	Number of Taxa	%
Veronica	4	3.57
Ranunculus	3	2.68
Poa	3	2.68
Hypericum	3	2.68
Trifolium	3	2.68
Barbarea	3	2.68
Thlaspi	3	2.68
Others	90	80.36
Total	**112**	**100**

Table 5. Distribution of Taxa with respect to Phytogeographic Regions

Phytogeographic Region	Number of Taxa	%
Euro–Siberian	11	9.82
Irano-Turanian	18	16.07
Mediterranean	6	5.36
Widespread / unknown	77	68.75
Total	**112**	**100**

The evaluations show that, following the widespread and unknown taxa, the most common taxa in the study area were identified as belonging to the Irano-Turanian element. 10 of the collected samples were found to be endemic. Accordingly, the endemism rate in the area was estimated to be 8.9%. The list of endemic species and their conservation status are given in Table 6.

Figure 3. *Crocus ancyrensis* (Endemic).

Figure 4. *Eremogone ledebouriana* (Endemic).

Figure 5. *Helichrysum arenarium* (Endemic).

Plant List

Divisio: Lycopodiophyta

Subdivisio: Lycopodidae

1. Aspleniaceae

Figure 6. *Muscari aucheri* (Endemic).

Table 6. Endemic Plants and Their Conservation Status

Species	Conservation Status	Endemism Status
Achillea aleppica subsp. *zederbaueri*	-	+
Barbarea trichopoda	NT	+
Bornmuellera cappadocica	-	+
Crocus ancryrensis (Figure 3)	LC	+
Dianthus ancyrensis	VU	+
Digitalis lamarckii	LC	+
Eremogone ledebouriana (Figure 4)	-	+
Helichrysum arenarium (Figure 5)	-	+
Helianthemum nummularium subsp. *Lycaonicum*	-	+
Muscari aucheri (Figure 6)	LC	+

1. *Asplenium* L.

1. *Asplenium onopteris* L., around pond, B. Erdem 1051-1052, 06.05.2016

Divisio: Spermatophyta

Subdivisio: Gymnospermae

1. Cupressaceae

1. *Juniperus* L.

1. *J. communis* Pall. var. *saxatilis*, B. Erdem 1180, 1014, 1020, 1022, 1121, 1122, 09.04.2016

1. Pinacaea

1. *Pinus* L.

1. *P. sylvestris* L., forest, B. Erdem 1120, 1124, 1189. 10.06.2016, Euro-Siberian

2. *P. nigra* (Lamb.) Holmboe subsp. *pallasiana* forest, B.

Erdem 1015, 1016, 1021, 1123. 09.04.2016.

Subdivisio: Magnoliophytina

Classis: Magnoliidae

1. Adoxaceae

1. *Sambucus* L.

1. *S. nigra* L., Glade, B. Erdem, 08.10.2016, 1198.

2. Apiaceae

1. *Anthriscus* Pers.

1. *A. nemorosa* (M.Bieb.) Spreng., Glade, B. Erdem, 10.06.2016, 1125. 2.

2. *Daucus* L.

1. *D. guttatus* Sibth. & Sm., Glade, B. Erdem, 10.06.2016, 1184.

3. Asparagaceae

1. *Muscari* Mill.

1. *Muscari armeniacum* Leichtlin ex Baker, Glade, B. Erdem, 09.04.2016, 1005-1045-1063.

2. *M. aucheri* (Boiss.) Baker, Glade, B. Erdem, 06.05.2016, 1096, endemic.

2. *Ornithogalum* L.

1. *Ornithogalum armeniacum* Baker, Glade, B. Erdem, 09.04.2016 – 06.05.2016, 1004-1027-1043-1057, East Mediterranean.

2. *O. montanum* Cirillo, Glade, B. Erdem, 06.05.2016, 1041-1049, East Mediterranean.

3. *Scilla* L.

1. *Scilla bifolia* L., Glade, B. Erdem, 09.04.2016, 1023-1018-1003, Euro-Siberian.

4. Asteraceae

1. *Achilliea* L.

1. *A. aleppica* (Hayek) Hub.-Mor. subsp. *zederbaueri*, Glade, B. Erdem, 17.07.2018 - 01.07.2016, 2001-1216, Irano-Turanian, endemic.

2. *Centaurea* L.

1. *Centaurea virgata* Lam., Glade, B. Erdem, 01.08.2016, 1181-1178, Irano-Turanian.

3. *Cyanus* Mill.

1. *Cyanus pichleri* (Boiss.) Holub subsp. *pichleri*, Glade, B. Erdem, 10.06.2016, 1106-1210.

4. *Cota* J.Gay

1. *Cota austriaca* (Jacq.) Sch.Bip., Glade, B. Erdem, 01.07.2016, 1118-1149.

5. *Helichrysum* Mill.

1. *Helichrysum arenarium* (L.) Moench, Glade, B. Erdem, 01.08.2016, 1174, Irano – Turanian, endemic.

6. *Scorzonera* L.

1. *Scorzonera cana* (W.Koch) D.F.Chamb. var. *jacquiniana*, Glade, B. Erdem, 10.06.2016, 1115.

2. *S. mollis* (DC.) D.F.Chamb. subsp. *szowitzii*, Glade, B. Erdem, 06.05.2016, 1083, Irano – Turanian.

7. *Tanacetum* L.

1. *Tanacetum armenum* (DC.) Sch. Bip., Glade, B. Erdem, 06.05.2016, 1038.

8. *Taraxacum* F.H.Wigg.

1. *Taraxacum buttleri* Soest, Glade, B. Erdem, 09.04.2016, 1011.

9. *Tripleurospermum* Sch.Bip.

1. *Tripleurospermum oreades* (Boiss.) Rech. f., Glade, B. Erdem, 09.04.2016 – 06.05.2016, 1055-1030-1031-1048-1010-1054.

10. *Xeranthemum* L.

1. *Xeranthemum annuum* L., Glade, B. Erdem, 01.08.2016 - 17.07.2018, 2013- 2012-1168.

2. *X. longipapposum* Fisch. & C.A.Mey., Glade, B. Erdem, 01.08.2016, 1175-1166, Irano-Turanian.

5. Berberidaceae

1. *Berberis* L.

1. *Berberis crataegina* DC., Glade, B. Erdem, 17.07.2018, 2009.

6. Betulaceae

1. *Betula* L.

1. *Betula pendula* Roth, Glade, B. Erdem, 09.06.2019, 3000.

7. Boraginaceae

1. *Anchusa L.*

1. *Anchusa leptophylla* Roem. & Schult. subsp. *leptophylla*, Glade, B. Erdem, 10.06.2016, 1143-1199-1031-1098.

2. *Buglossoides* Moench

1. *Buglossoides arvensis* (L.) I. M. Johnst., Glade, B. Erdem, 06.05.2016, 1056.

3. *Echium* L.

1. *Echium vulgare* L., Glade, B. Erdem, 01.07.2016, 1188-1137-1133, Euro-Siberian.

4. *Myosotis* L.

1. *Myosotis sylvatica* Hoffm., Glade, B. Erdem, 10.06.2016, 1209-1108-1105.

8. Brassicaceae

1. *Alyssum* L.

1. *Alyssum linifolium* Stephan ex. Willd., Glade, B. Erdem, 06.05.2016, 1081.

2. *Barbarea* W.Aiton

1. *Barbarea plantaginea* DC., Glade, B. Erdem, 09.04.2016, 1006.

2. *B. trichopoda* Hausskn.ex Bornm., Glade, B. Erdem, 06.05.2016, 1065-1067, Akdeniz, endemic.

3. *B. vulgaris* R. Br., Glade, B. Erdem, 06.05.2016, 1073.

3. *Bornmuellera* Hausskn.

1. *Bornmuellera cappadocica* (Willd.) Cullen & T.R. Dudley, Glade, B. Erdem, 1070-1072, Irano – Turanianendemic.

4. *Draba* L.

1. *Draba verna* L., Glade, B. Erdem, 06.05.2016, 1040-1090.

5. *Microthlaspi* F.K. Mey.

1. *Microthlaspi perfoliatum* (L.) F. K. Mey., Glade, B. Erdem, 06.05.2016, 1095.

6. *Thlaspi* L.

1. *Thlaspi arvense* L., Glade, B. Erdem, 06.05.2016, 1088.

2. *T. huetii* Boiss., Glade, B. Erdem, 06.05.2016, 1093.

3. *T. oxyceras* (Boiss.) Hedge, Glade, B. Erdem, 06.05.2016, 1071.

9. Campanulaceae

1. *Campanula* L.

1. *Campanula persicifolia* L., Glade, B. Erdem, 01.07.2016, 1109.

2. *C. rapunculus* L., Glade, B. Erdem, 01.07.2016, 1146.

10. Caryophyllaceae

1. *Arenaria* L.

1. *Arenaria serpyllifolia* L., Glade, B. Erdem, 01.07.2016, 1165, East Mediterranean.

2. *Cerastium* L.

1. *Cerastium diffusum* Pers. subsp. *diffusum*, Glade, B. Erdem, 06.05.2016, 1058.

2. *C. dubium* (Bastard) O. Schwarz, Glade, B. Erdem, 10.06.2016, 1201.

3. *Dianthus* L.

1. *Dianthus ancyrensis* Hausskn. & Bornm., Glade, B. Erdem, 01.07.2016 - 17.07.2018, 2005-1158-1164-1151-1192, Irano – Turanian, endemic.

4. *Eremogone* Fenzl

1. *Eremogone ledebouriana* (Fenzl) Ikonn., Glade, B. Erdem, 09.04.2016 – 06.05.2016, 1064-1112-1079-1160-1009, endemic.

5. *Silene* L.

1. *Silene compacta* Fisch. ex Hornem., Glade, B. Erdem, 01.07.2016, 1134-1135- 1185-2004.

11. Caprifoliaceae

1. *Dipsacus* L.

1. *Dipsacus laciniatus* L., Glade, B. Erdem, 01.08.2016, 1147.

2. *Scabiosa* L.

1. *Scabiosa argentea* L., Glade, B. Erdem, 01.08.2016 – 17.07.2018, 2008-1176-1177- 1195.

12. Cistaceae

1. *Helianthemum* Mill.

1. *Helianthemum nummularium* (L.) Miller subsp. *lycaonicum* Coode & Cullen, Glade, B. Erdem, 10.06.2016, 1097, endemic.

13. Crassulaceae

1. *Sedum* L.

1. *Sedum album* L., Glade, B. Erdem, 17.07.2018, 2003.

2. *S. steudelii* Boiss., Glade, B. Erdem, 01.08.2016, 1167, Irano-Turanian.

2. *Sempervivum* L.

1. *Sempervivum armenum* Boiss. & A.Huet subsp. *armenum*, Glade, B. Erdem, 01.07.2016 - 01.08.2016, 1155, 1169, 2006.

14. Euphorbiaceae

1. *Euphorbia* L.

1. *Euphorbia myrsinites* L., Glade, B. Erdem, 01.07.2016 – 01.08.2016, 2006-1155- 1169.

15. Fabaceae

1. *Astragalus* L.

1. *Astragalus ptilodes* Boiss. var. ptilodes, Glade, B. Erdem, 06.05.2016 – 10.06.2016, 1033-1204-1029.

2. *A. microcephalus* Willd., Glade, B. Erdem, 10.06.2016, 1103, Irano-Turanian

2. *Cytisus* Desf.

1. *Cytisus hirsutus* L., Glade, B. Erdem, 10.06.2016, 1077.

2. *C. pygmaeus* Willd., Glade, B. Erdem, 10.06.2016, 1102-1214, Euro-Siberian.

3. *Dorycnium* Mill.

1. *Dorycnium graecum* (L.) Ser., Glade, B. Erdem, 01.07.2016, 1140, Karadeniz.

4. *Genista* L.

1. *Genista januensis* Viv. subsp. *lydia* (Boiss.) Kit Tan & Ziel., Glade, B. Erdem, 06.05.2016, 1044-1213, East Mediterranean.

5. *Lotus* L.

1. *Lotus aegaeus* (Griseb.) Boiss., Glade, B. Erdem, 01.07.2016, 1138.

6. *Trifolium* L.

1. *Trifolium campestre* Schreb., Glade, B. Erdem, 01.07.16, 1162.

2. *T. nigrescens* Viv., Glade, B. Erdem, 10.06.2016, 1113.

3. *T. pratense* L., Glade, B. Erdem, 10.06.2016 – 01.07.2016, 1110-1196.

16. Gentianaceae

1. *Centaurium* Hill.

1. *Centaurium erythraea* Roth. subsp. *turcicum* (Velen.) Melderis, Glade, B. Erdem, 01.07.2016, 1156.

17. Geraniaceae

1. *Erodium* L'Hér. ex Aiton

1. *Erodium cicutarium* (L.) L Hér., Glade, B. Erdem, 06.05.2016, 1078.

2. *Geranium* L.

1. *Geranium pyrenaicum* Burm.f., Glade, B. Erdem, 10.06.2016, 1130-1104.

18. Hypericaceae

1. *Hypericum* L.

1. *Hypericum elongatum* Ledeb. ex Rchb., Glade, B. Erdem, 01.08.2016, 1173.

2. *H. lydium* Boiss., Glade, B. Erdem, 01.07.2016, 1136.

3. *H. pseudolaeve* N. Robson, Glade, B. Erdem, 01.08.2016, 1171, Irano – Turanian.

19. Iridaceae

1. *Crocus* L.

1. *Crocus ancyrensis* (Herb.) Maw, Forest and forest opening, B. Erdem, 09.04.2016- 25.03.2017, 1218, endemic.

20. Juncaceae

1. *Luzula* DC:

1. *Luzula multiflora* (Ehrh.) Lej., Glade, B. Erdem, 06.05.2016, 1074-1094-1092.

21. Lamiaceae

1. *Lamium* L.

1. *Lamium album* L., Glade, B. Erdem, 10.06.2016, 1129.

2. *L. purpureum* L. var. purpureum, Glade, B. Erdem, 09.04.2016 – 06.05.2016, 1025-1206-1215-1084, Euro-Siberian.

2. *Salvia* L.

1. *Salvia verticillata* L., Glade, B. Erdem, 17.07.2018, 2007.

3. *Stachys* L.

1. *Stachys iberica* M.Bieb., Glade, B. Erdem, 01.07.2016, 1157.

4. *Thymus* L.

1. *Thymus longicaulis* C.Presl subsp. *longicaulis*, Glade, B. Erdem, 01.07.2016, 1187-1159-1161-1170-1172-1202-1150-1154, Euro-Siberian.

22. Liliaceae

1. *Gagea* Salisb.

1. *Gagea reticulata* (Pall.) Schult. & Schult.f., Glade, B. Erdem, 09.04.2016, 1001-1007-1028, Irano – Turanian.

23. Oleaceae

1. *Ligustrum* L.

1. *Ligustrum vulgare* L., Glade, B. Erdem, 08.10.2016, 1194, Euro-Siberian.

24. Onagraceae

1. *Epilobium* L.

1. *Epilobium hirsutum* L., A4, Ankara, Kızılcahamam, Şahinler Natural Park, pond and its near vicinity, B. Erdem, 17.07.2018, 2002.

2. *E. minutiflorum* Hausskn., Glade, B. Erdem, 01.09.2016, 1186-1193, Irano – Turanian.

25. Orobanchaceae

1. *Rhinanthus* L.

1. *Rhinanthus angustifolius* C.C.Gmel., Glade, B. Erdem, 10.06.2016, 1205.

26. Papaveraceae

1. *Corydalis* DC.

1. *Corydalis cava* L. subsp. *marschalliana* (Willd.) Hayek, Glade, B. Erdem, 09.04.2016, 1002-1026-1019, Euro-Siberian.

27. Plantaginaceae

1. *Digitalis* L.

1. *Digitalis lamarckii* Ivanina, Glade, B. Erdem, 01.07.2016, 1141, Irano – Turanian, endemic.

2. *Globularia* L.

1. *Globularia trichosantha* Fisch & C.A.Mey. subsp. *trichosantha*, Glade, B. Erdem, 10.06.2016, 1100, Irano-Turanian.

3. *Veronica* L.

1. *Veronica anagallis-aquatica* L., Glade, B. Erdem, 01.07.2016, 1132.

2. *V. multifida* L., Glade, B. Erdem, 06.05.2016-10.06.2016, 1035-1037-1099, Irano – Turanian.

3. *V. pectinata* L., Glade, B. Erdem, 06.05.2016, 1060-1061-1117.

4. *V. polita* Fr., Glade, B. Erdem, 10.06.2016, 1203.

28. Poaceae

1. *Poa* L.

1. *Poa angustifolia* L., Glade, B. Erdem, 09.06.2019, 3001.

2. *P. pratensis* L., Glade, B. Erdem, 06.05.2016, 1066-1085.

3. *P. sterilis* M. Bieb., Glade, B. Erdem, 09.06.2019, 3002. 39

2. *Dactylis* L.

1. *Dactylis glomerata* L., Glade, B. Erdem, 03.06.2019, 3003, Euro-Siberian.

3. *Bromus* L.

1. *Bromus tomentellus* Boiss., Glade, B. Erdem, 09.06.2019, 3004, Irano-Turanian.

29. Polygonaceae

1. *Rumex* L.

1. *Rumex acetosella* L., Glade, B. Erdem, 10.06.2016 , 1107-1148-1200.

30. Potamogetonaceae

1. *Potamogeton* L.

1. *Potamogeton praelongus* Wulfen., A4, Ankara, Kızılcahamam, Şahinler Natural Park, pond and its near vicinity, B.Erdem, 06.05.2016, 1075-1076.

31. Primulaceae

1. *Lysimachia* L.

1. *Lysimachia vulgaris* L., A4, Ankara, Kızılcahamam, Şahinler Natural Park, pond and its near vicinity, B. Erdem, 17.07.2018, 2015.

2. *Primula* L.

1. *Primula acaulis* subsp. *acaulis* (L.) L., Glade, B. Erdem, 09.04.2016-06.05.2016, 1013-1024-1068-1069, Euro-Siberian.

32. Ranunculaceae

1. *Ranunculus* L.

1. *Ranunculus argyreus* Boiss., Glade, B. Erdem, 10.06.2016, 1101. 40

2. *R. arvensis* L., Glade, B. Erdem, 06.05.2016, 1211-1212.

3. *R. damascenus* Boiss. & Gaill., Glade, B. Erdem, 06.05.2016, 1039-1053-1127, Irano-Turanian.

33. Rosaceae

1. *Cotoneaster* Medik.

1. *Cotoneaster nummularius* Fisch. & C.A.Mey., Glade, B. Erdem, 06.05.2016, 1046-1047.

2. *Crataegus* L.

1. *Crataegus orientalis* Pall. ex M.Bieb. subsp. *orientalis*, Glade, B. Erdem, 01.08.2016, 1182-1183-1191.

3. *Potentilla* L.

1. *Potentilla recta* L., Glade, B. Erdem, 10.06.2016-17.07.2018, 1114-1163-2010.

4. *Pyrus* L.

1. *Pyrus elaeagnifolia* Pall. subsp. *elaeagnifolia*, Glade, B. Erdem, 10.06.2016, 1126.

5. *Rosa* L.

1. *Rosa canina* L., Glade, B. Erdem, 01.07.2016, 1144-1152-1179-1197.

34. Rubiaceae

1. *Cruciata* Mill.

1. *Cruciata taurica* (Pall. ex Willd.) Ehrend., Glade, B. Erdem, 06.05.2016, 1036-1042-1062-1207, Irano – Turanian.

35. Salicaceae

1. *Salix* L.

1. *Salix caprea* L., Glade, B. Erdem, 09.04.2016, 1012, Euro-Siberian.

36. Typhaceae

1. *Sparganium* L.

1. *Sparganium erectum* L. subsp. *neglectum* (Beeby) K. Richt., Glade, B. Erdem, 01.09.2016, 1190, Euro-Siberian.

37. Violaceae

1. *Viola* L.

1. *Viola parvula* Tineo, Glade, B. Erdem, 06.05.2016, 1082.

2. *V. suavis* M.Bieb., Forest, B. Erdem, 06.05.2016, 1032-1059.

Conservation Status

The knowledge on the conservation status of plants provides identification of threatened plants and increases awareness among people, which prevents the collection of plants and improves protection. Therefore, the conservation status was established for the taxa in Şahinler Nature Park. The conservation status was determined using The Red Book of Turkish Plants (Ankara, 2000), the IUCN official website (https://www.iucnredlist.org/), and the List of Threatened Plant Species (Nezahat Gökyiğit Botanical Garden and ANG Foundation official web site http://www.tehditaltindabitkiler.org.tr/v2/).

According to the information and data obtained from the List of Threatened Plant Species, the conservation status of 7 species in the area was evaluated. Accordingly, there are 4 species evaluated in the LC (Low Risk) category, 1 species in the NT (Near Threatened) category, 1 species in the VU (Vulnerable) category, and 1 species in the CD (Subject to Conservation) category. When evaluated according to The Red Book of Turkish Plants, 14 taxa were determined to be in the LC category, 1 taxon was determined to be in the NT category, and 2 taxa were determined to be in the VU category. This paper takes into account the conservation status of the Threatened Plant Species List, since it contains more up-to-date data. Five of the 7 species evaluated according to the List of Threatened Plant Species are endemic.

It does not seem possible to protect biodiversity while meeting the nutritional and shelter needs of people and contributing to economic development at the same time. However, efficient and sustainable use of existing resources can be achieved (Arslan et. al., 2013). In order to achieve this, each country should carry out studies to determine its biodiversity. European Union countries have developed a classification system for this purpose. The goal of this classification system, which they call the European Nature Information System (EUNIS), is to create habitat types with European references and to obtain habitat data comparable to nature conservation by making a hierarchical classification (EUNIS, 2012). The study area was evaluated according to the EUNIS Habitat classification criteria. The evaluation of the research area according to the EUNIS habitat types hierarchical ranking is as follows (https://eunis.eea.europa.eu/habitats/2826):

C: Inland surface waters

C1: Surface standing waters

C1.3 : Permanent eutrophic lakes, ponds, and pools

R: Grasslands and lands dominated by forbs, mosses, or lichens

R1: Dry grasslands

R1B: Continental Dry Grasslands

R1B9: Irano-Anatolian Steppes

T: Forests and other wooded land

T3: Coniferous forests

T36: Temperate and sub-Mediterranean montane *Pinus sylvestris-Pinus nigra* forests

Irano-Anatolian steppes are included in Bern Convention Annex 1 at a higher rank, and conservation measures are needed at the level of Continental Dry Grasslands. Temperate and sub-Mediterranean montane *Pinus sylvestris-Pinus nigra* forests are listed in Bern Convention Annex 1 as an endangered habitat that requires conservation measures.

DISCUSSION

The study area (Şahinler Nature Park) is within the borders specified by the Ministry of Agriculture and Forestry. A large portion of the study area consists of forests and glades. The terrestrial ecosystem is dominant in the Nature Park, which consists of flat areas and gentle and steep slopes. While the terrestrial ecosystem is represented by a forest ecosystem, the aquatic ecosystem is represented by a permanent standing water ecosystem (pond). The dominant vegetation in and around the area consists of coniferous forests. This explains the limited diversity of plant taxa in the area. During field studies carried out from 2016-2019, it was observed that the number of visitors to Şahinler Nature Park increased gradually. Visitors were observed to have picnics and light campfires in the study area. It was observed that visitors did not collect their garbage when leaving the site. For this reason, the increase in the number of visitors causes environmental pollution. As a result, it is believed that the natural vegetation of the nature park will be affected in the future.

Since there is no meteorological station located in the study area, the bioclimatic conditions were identified using the nearest station that has meteorological data spanning over 30 years (Kizilcahamam). The altitude of the study area is around 1,500 m, whereas the altitude of the Kizilcahamam meteorological station is 1,033 m. The temperature decrease (0.5°C on average every 100 m) and location at a higher elevation makes the study area colder and more humid, which further results in a shorter vegetation period.

The study area was evaluated according to the EUNIS habitat types hierarchical sorting. According to this habitat classification, 3 habitat types were in from the area: permanent eutrophic lakes, ponds and pools; Irano-Anatolian steppes; and temperate and sub-Mediterranean montane *Pinus sylvestris-Pinus nigra* forests. EUNIS habitat classification was developed according to the habitats observed in European Union countries. When applied to Turkiye, differences are observed due to characteristic taxa. For this reason, the classification was limited. With more detailed studies, new habitat types that are unique and suitable for Turkiye can be defined. The same applies to the EUNIS classification of the pond in the study area. The classification of stagnant surface waters is carried out according to chemical analysis of the water and its trophy status. As there is no relevant data available for the study area, the classification was kept at the "Surface standing waters" level and could not be carried out to provide further detail. The *Pinus nigra* forest and glades have shaped the general status of the area. In addition, the temporary streams that dry up during the summer season and the pond in the area increases the habitat diversity in the area. As a result of the identification of the samples, the Asteraceae family was determined to have the most taxa in the area. The ratio between the number of taxa in the Asteraceae family and the number of taxa in the other families is 10.7%. A flora study completed in Camkoru Nature Park, which is approximately 7 km southeast of the study area, revealed that the largest family was Asteraceae, with 42 species (Topaloglu, 2005). The remaining families with the highest number of taxa and their percent distributions are Brassicaceae and Fabaceae (8.93%), Caryophyllaceae and Plantaginaceae (5.4%), and Poaceae, Rosaceae, Asparagaceae, and Lamiaceae (4.5%), with the same percentage. The family with the highest number of genera in the area is also the Asteraceae family, whereas the genus containing the most taxa in the area is Veronica. Most of the identified specimens belong to the Irano-Turanian phytogeographic region, with a value of 16.1%. 10 of the taxa are endemic and the endemism rate in the area is 8.9%. A comparison of the families with the highest taxa content of previous studies in the study area and its near vicinity has been carried out and is given in Table 8.

The table shows the ratio of families to the total number of taxa determined in the study area. As seen in this table, the family with the most taxa in the area is Asteraceae, which is similar to other studies. The data presented in Table 8. indicate that the number of taxa belonging to the Asteraceae family has a distribution above 10% in all four studies. While the ratio between the number of taxa for the Caryophyllaceae family and the number of taxa for other families is 5.4%, it varies between 3.4% and 3.5% in studies conducted in the immediate environment. Similarly, the percentage of taxa for the Poaceae family (4.5%) in the study area differs from studies in the immediate environment (8.3-9%). The relatively low percentage of Poaceae is attributed to the altitude and climatic characteristics of the study area, which allows an enhanced floristic diversity at this elevation zone. When compared to other areas, our study area covers a smaller area and also, since the area is largely covered by Pinus nigra forests, it is thought that the proportion of Poaceae family members is low. The conservation status of 7 species identified in the area was determined to be 4 species of LC, 1 species of NT, 1 species of VU, and 1 species of CD. 5 of these 7 species with that conservation status have been determined to be endemic. The remaining species were found to have insufficient data and therefore were registered as "not evaluated." In addition, while only 3 of the remaining taxa are endemic, the fact that the others are widely distributed is also effective in this case. It has been observed that the number of visitors to the area has increased gradually during the field studies carried out over 3 years. It was observed that activities in the field increased especially in the spring months. Visitors camp in the area, have picnics, and leave a significant amount of garbage in the area. In order to prevent impacts on the existing vegetative cover and the other living species in the area, and to improve sustainability, it is recommended that additional studies be conducted. Furthermore, the recommended measures include establishing informative signboards about endemic plants and other living species and placing warning signs regarding environmental damage. Understanding biodiversity is of primary importance for the sustainable and efficient use of resources. Accordingly, studies on biodiversity should be expanded and improved to provide more detail. The data obtained will allow the determination of the flora of the study area, which is a protected area, and will emphasize the importance and value of the area in terms of biodiversity, drawing attention to the importance of its protection. The data will provide the necessary information for visitors about the plant diversity present in the area.

Table 8. Comparison of the Taxa Percentages Between the Study Area and its Surrounding Areas

Family	Erdem (2019)	Uçar (1996)	Topaloğlu (2005)	İkinci et. al., (2007)
Asteraceae	10.7	10.4	11.2	10.3
Brassicaceae	8.9	4.6	6.1	4.7
Fabaceae	8.9	7.1	8.0	6.9
Caryophyllaceae	5.4	3.4	3.4	3.5
Poaceae	4.5	8.3	9.0	8.3
Rosaceae	4.5	5.3	6.9	5.3
Asparagaceae	4.5	3.0	4.2	-
Lamiaceae	4.5	6.7	6.4	6.8
Others	42.9	43.2	35.0	-

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REFERENCES / KAYNAKÇA

Arslan, M., Kılınç, İ. ve Vural, M. 2013. Kale-Bolu Fındığı Tabiatı Koruma Alanı florası. Biyoçeşitlilik ve Koruma,107-119.

Akman, Y. 1999. İklim ve Biyoiklim (Biyoiklim Metodları ve Türkiye İklimleri). Ankara. 350 pp.

Davis, P. H. 1965-1985. Flora Of Turkey And The East Aegean Islands. Volume 1-9, University Press., Edinburgh.

Davis, P. H., Mill, R. R. And Tan, K. 1988. Flora Of Turkey And The East Aegean Islands (Supplement). Volume 10, University Press., Edinburgh.

Ekim, Tuna & Koyunce, M. & Vural, H. & Duman, H. & Aytaç, Zeki & Adıguzel, Nuri. (2000). The red book of Turkish plants, Turkish Association for the Conservation of Nature TTKD and Van Yuzuncu Yil Unv. Ankara.

EUNIS, 2012. European Environment Agency (Avrupa Çevre Ajansı), https://eunis.eea.europa.eu/ index.jsp

Güner A, Aslan S, Ekim T, Vural M, Babaç MT (2012). Türkiye Bitkileri Listesi (Damarlı Bitkiler). Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul.

İkinci, N. ve Güner, A 2007. Flora Of The Gölcük Area (Bolu, Turkey). Turkish Journal of Botany, 87 (107), 87-107.

Sezen, J., 2017. Türkiye'de ve Dünyada Kolunan Alanlara Yönelik Çevre Bilincinin Önemi. Uluslararası Bilimsel Araştırmalar Dergisi. 2 (2), 165-177.

Tekin, K. Gerede ve Çamlıdere Arasında Kalan İğne Yapraklı Ormanların Bitki Sosyolojisi Yönünden Araştırılması. Doktora Tezi, Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Topaloğlu, S. 2005.Çamkoru Göleti Çevresi Florası (Çamlıdere). Yüksek Lisans Tezi, Hacettepe Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Uçar, A. 1996. Flora Of Abant. Yüksek Lisans Tezi, Abant İzzet Baysal Üniversitesi, Fen Bilimleri Enstitüsü, Ankara

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Teaching Old Collections New Tricks: Initial Findings of the ISTF Herbarium Digitization Project*

Eski Koleksiyonlara Yeni Yollar Açmak: ISTF Herbaryumunun Dijitalleşmesinin İlk Çıktıları

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ABSTRACT

The digitization of herbaria and other scientific collections has been championed by many researchers, especially taxonomists, who are acutely aware of their importance for the future. Both technological developments and the progression of globalization have accelerated digitization efforts worldwide in recent years. The digitization of the Istanbul University Faculty of Science Herbarium (ISTF) is one example of such a project, which has spanned many years, through various challenges, constantly changing conditions, and technological advancements. This article aims to briefly document the history of efforts made to this end, from the very first spark of an idea to the eventual procurement of institutional support and the start of digitization in October 2022. As of February 2023, data entries for 25,584 specimens (53% of the collection), 3,442 (8% of the collection) of which include high-quality photos, can be accessed through the ISTF virtual herbarium website. We also aim to outline the methods used at ISTF, which we hope will serve as a reference for virtual herbaria yet to be established. We discuss the place of undergraduate and graduate students in digitization alongside best practices to manage these volunteer students so that they may effectively contribute to herbarium work for the long-term benefit of themselves and the collections.

Keywords: Herbarium management, digitization, natural history collections, imaging

ÖZ

Herbaryumlar ve diğer bilimsel koleksiyonların dijitalleşmesinin önemi, başta taksonomistler olmak üzere çok sayıda bilim insanının uzun zamandır farkında olduğu bir konudur. Son yıllarda hem teknolojik gelişmeler hem de küreselleşme, dijitalizasyona dünya çapında hız kazandırmıştır. İstanbul Üniversitesi Fen Fakültesi Herbaryumunun (ISTF) dijitalleşme süreci, çeşitli zorluklardan, değişen koşullardan ve teknolojik ilerlemelerden geçen, uzun yıllara yayılmış bir çabanın ürünüdür. Makalede bu çabanın ilk hayal edilen fikirden, nihayet kurumsal destek sağlanmasına ve dijitalleşme sürecinin başlangıncına kadar kısa bir tarihini anlatmak amaçlanmıştır. Ekim 2022'den Şubat 2023'e kadar toplam 25,584 örneğin (koleksiyonun %53'ü) veri girişi yapılmış ve bu örneklerden 3,442'si (koleksiyonun %8'i) fotoğraflanmış olarak ISTF sanal herbaryum web sitesinden erişilebilir. Ayrıca, ISTF herbaryumunun sayısallaşması konusunda hangi yolun izlendiğini anlatmak ve daha sonra kurulacak diğer sanal herbaryumlar için bir referans olmak amaçlanmıştır. Lisans ve lisansüstü öğrencilerin sayısallaşmadaki yeri tartışılırken, öğrenciler ve herbaryum için faydalı olacak şekilde, hangi şartlarda çalışmada yer almalarının ve nasıl yönetilmelerinin sağlıklı olduğuna da değinilmiştir.

Anahtar Kelimeler: Herbaryum yönetimi, sayısallaşma, doğa tarihi koleksiyonları, görüntüleme

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INTRODUCTION

With 3,100 registered herbaria globally, and the 390 million plant, algae, and fungus specimens they house (Thiers, 2017), herbaria constitute a vast and extremely valuable databank of the world's biodiversity. However, the majority of these collections remain "inaccessible" to the worldwide scientific community, which prevents them for being used to their full potential (Thiers, 2017). The movement toward digitization and online mobilization of herbarium specimens has helped overcome this impasse and stands to revolutionize the biological sciences. At the time of his writing, Seregin (2016) reported that more than 17 million specimens had been recorded in digital herbaria worldwide. Although this is but a small fraction of the total number of specimens found around the world, these efforts have had an outsized effect in terms of contributions to science. Before the digitization movement began, herbarium collections were a database used almost exclusively by taxonomists. Today, their reach has expanded to include all plant-related scientific studies, from studies on biodiversity to global ecological changes (Heberling et al., 2019). In particular, massive and diverse collections such as the US National Herbarium housed at the Smithsonian Museum of Natural History, whose 3.8 million herbarium sheets were digitized over seven years in 2015-2022, have ensured that their data is useable by researchers around the world (Tamisiea, 2022). Today, it is becoming increasingly feasible for smaller herbaria to digitize their collections.

Although digitization efforts are ongoing at several herbaria in Turkey, there are very few resources documenting their methods and processes (Yılmaz et al., 2012; Öztürk & Ege, 2018; Budak et al., 2021; Demirkuş et al., 2021). The first virtual herbarium established in Turkey was at the Izmir Ege University Faculty of Pharmacy Herbarium (IZEF) (Öztürk & Ege, 2018). While many herbaria in Turkey would soon follow IZEF's lead, many of these virtual collections remained inaccessible to third parties at the time this article was written. This indicates that maintenance and continuity is an often-overlooked issue that should be given the same consideration and planning as the initial establishment phase.

Prof. Dr. Hüsnü Demiriz took what may be considered the first steps towards digitizing the Istanbul University Faculty of Science Herbarium (ISTF) long before digitization works had been discussed. Demiriz devised a coding system in which he assigned numerical codes to all plant families, provinces, and districts. Although he never completed this work, the system he created represents a first step toward digitization. The current ISTF curator, Prof. Dr. Osman Erol, has led three digitization attempts. The first began in 2006, when the collection data of 1,775 specimens were entered into a simple offline software. The second started in 2009 after publication of the digitization plan and outline (Şimşek et al., 2008). This attempt called on the support of postgraduate students in the bioinformatics department and culminated in migration to an online system, as well as the entry of approximately 20,000 more specimens. Securing support was a major challenge throughout these earlier efforts, and lack of funds prevented the start of an imaging phase. At this point, the only specimens photographed and uploaded were the *Plantago* specimens featured in Çiftçi's thesis (2012); however, these did not make it into the present system. Meanwhile, all maintenance and digitization efforts were suspended with the closure of the herbarium due to it being moved three times from the middle of 2018 to 2022. The process picked up again only after ISTF settled into its permanent home at the beginning of 2022. The collections were opened to visiting researchers once again by early summer and digitization efforts took off in earnest in the fall of 2022, after procuring the necessary funding to establish a full imaging system.

The 3rd National Botanical Garden Symposium (2022) brought to the fore a plan to create a common, online National Herbarium Network comprising all of the herbaria of Turkey. The success of such an ambitious project will depend on the swift and successful digitization of each individual collection. This time-consuming and labor-intensive process will be facilitated by the establishment of best practices for digitization, especially in the realm of software, where a standard, effective and efficient program will ensure the creation of a common database and ultimately the success of this project on a national scale.

In this context, this article aims to outline a practical method for the digitization of medium- to large-scale herbaria, while summarizing the work done so far at ISTF. We share our experience in the face of challenges encountered over the last 15 years and provide tips and advice to herbarium workers who intend to follow a similar path toward collection digitization. At the same time, we hope that the opening up of the treasure trove of data in the form of specimens, plus their collection data and histories, on a platform to be used by all will benefit researchers around the world.

MATERIALS AND METHODS

Mounting of Specimens

Materials in use at ISTF include: 260-gram acid-free white cardboard and water-activated paper tape for mounting, graphite pencil to write specimen numbers, solvent-free solid adhesive for adhering labels to herbarium sheets, and scissors to cut tape to the desired size. For plant parts too small to be mounted, envelopes made of tissue paper are prepared and glued to cardboard using solid adhesive or paperclips (Çiftçi, 2012). We use the herbarium techniques specified in Forman & Bridson (1998) for mounting (Figure 1).

Data Entry and Printing of Labels

Collection information from each specimen is entered via an online digital herbarium software developed for easy data entry by Argenit, a company based in Turkey. The biggest advantage of an online system is that newly added data are instantly available to third-party users (Figure 1). Upon entry of collection data, the user may download a fully formatted A6-sized label directly from the website. Collection data includes standard headings used in herbaria worldwide, including accession number, taxonomic categories (plant family, genus,

species, subspecies, variety, and their respective authors), location data (country, province, location description, and coordinates), habitat, altitude, collector names, date of collection, identification information (researcher name and date), as well as endemism and type and a section for notes. These are printed and immediately fixed to the specimens.

Preparing Mounted Specimens for Imaging

The ISTF herbarium being moved three times in the past three years has led to extra wear and tear on previously mounted specimens. The damage most often seen includes loss of tape adhesion due to fluctuations in temperature and humidity, and breakage of plant material. As a result, specimens must be carefully checked, fixed, and cleaned of dust and debris using a brush or small bursts of air (a pipette bulb is useful for this purpose), and any missing or erroneous information is corrected on the labels (Figure 1).

Specimen Imaging and Uploading

Based on the specifications outlined in Davis et al. (2021), a small, single-user photo station was selected to suit the limited available space and to save labor while imaging specimens as quickly as possible. One addition we made to the system came

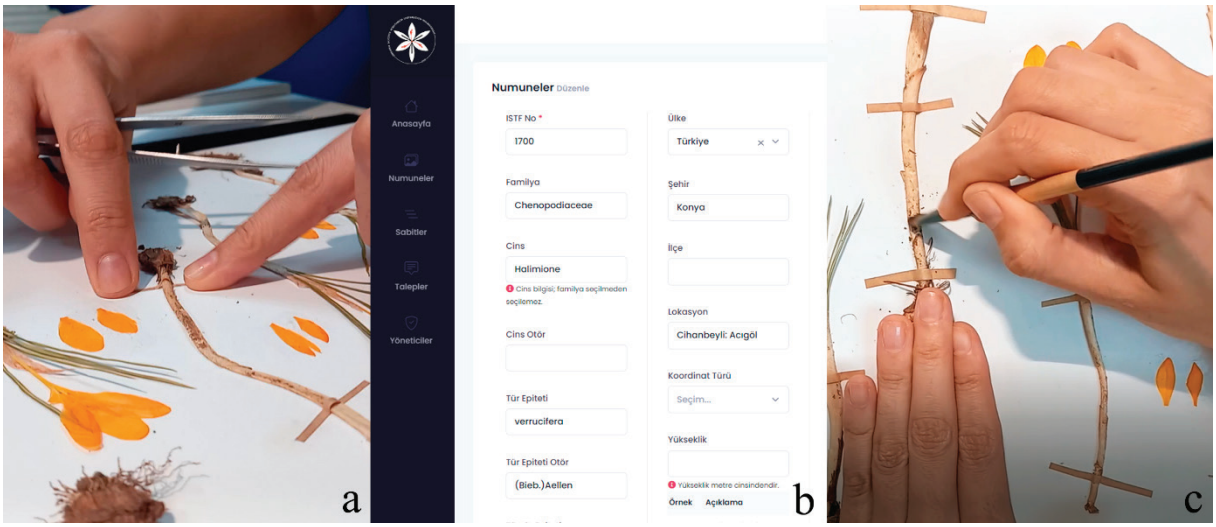

Figure 1. The stages of preparation undergone by specimens before photographing at ISTF: a. Mounting plant material to herbarium sheets, b. Entering label data into the virtual herbarium, c. Maintenance, repair, and cleaning of specimens to be photographed.

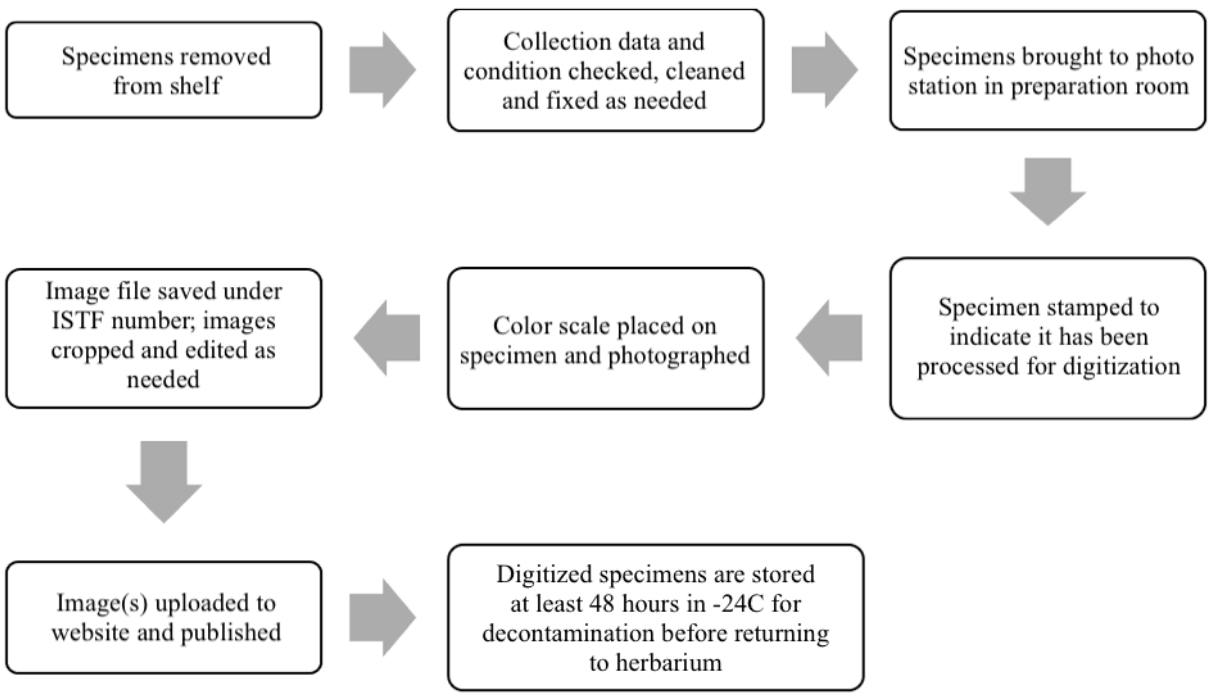

Figure 2. Work flow chart showing the process from removing and photographing the specimens to returning them to their original place in the collection.

in the form of thick rubber mats placed under the table, which was also modified to stand on four legs for added stability. These were necessary adaptations to minimize vibrations from the building. The system features a Sony brand ILCE-7RM4A model camera used with remote controller to avoid bumping or jarring the table during photography. Images are taken in both JPG format for uploading and high-quality raw format .ARW at 6336 × 9504 pixels for standard herbarium sheets. Camera settings are as follows: f value f/6.3, exposure: 1/100. An X-rite ColorChecker Classic color and millimetric scale is placed on each sheet and the sheet is stamped with the ISTF logo before imaging. The workflow for photographing specimens and uploading them to the online system via web browser is outlined in Figure 2.

Software specifications

The herbarium server is located at the Istanbul University computer center and operates using the Linux operating system. My Structural Query Language (MySQL) is the database management system application housing the herbarium data. The Laravel Framework, which was developed in the PHP programming language, was used to prepare the back end in accordance with the MVC structure. High-quality specimen photos are uploaded to the server using the "Dropzone.js" plugin and previews are produced using the PHP-Imagick module. To see high-resolution photos client-side, we use the "OpenSeadragon" JavaScript package. Photos are transformed into the multi-resolution DeepZoom (dzi) format so that OpenSeadragon viewer clients can access them. The PHP-Imagick library is employed to allow automatic label printing. Label typefaces and designs were the subject of a specific study and picture size of the printed label is a standard A6 sheet. The HTML5, CSS, Bootstrap, JavaScript and jQuery languages were used to construct the front-end. Any client device, whether a PC, notebook, tablet, or smart phone, can browse the website in any screen resolution. The Laravel Framework's localization capability is used to support several languages. Specimen locations are shown on the map using the mapbox code library. A sample specimen page from the ISTF virtual herbarium website is shown in Figure 3.

RESULTS

The population of the ISTF Virtual Herbarium is an ongoing process. Although it has been just a few short months since support was received, the entry of data for more than 20,000 specimens during the previous digitization efforts allowed for a quick start. Using the workflow and system outlined in this paper, approximately 30-100 specimens, or more, can be imaged and uploaded per day by one person, depending on their condition and the number of herbarium sheets per specimen.

As of February 2023, collection data for 25,584 specimens are available on the ISTF virtual herbarium website, and images have been uploaded for 3,442 of them. In all, this constitutes collection data for 53% and images for 8% of the ISTF herbarium now available to the public (Figure 4).

Data concerning the families with the largest presence in terms of data entry and photographic digitization at the ISTF Digital Herbarium (https://istf.istanbul.edu.tr) as of February 2023 can be found in Table 1.

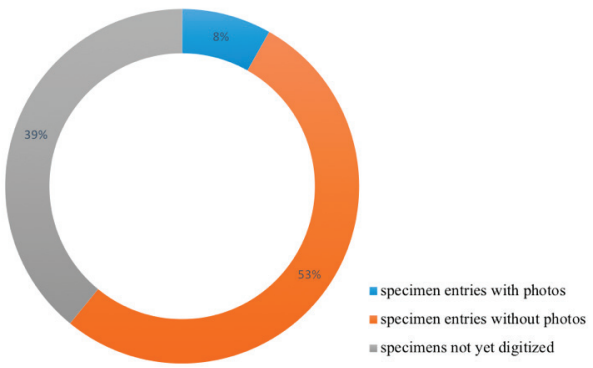

Figure 4. Graphic summarizing digitization work completed at ISTF as of February 2023. All specimen entries include collection data.

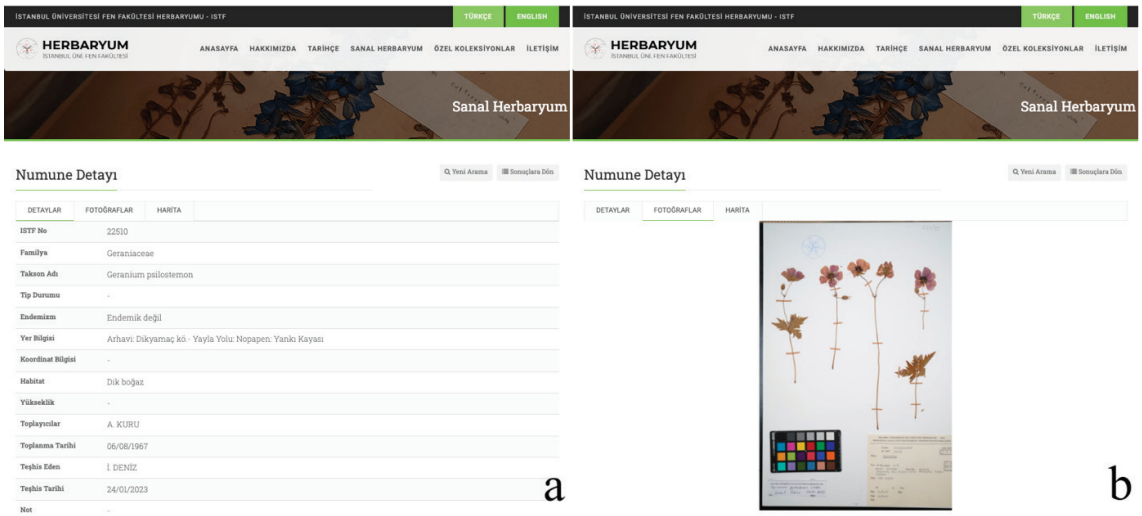

Figure 3. Example specimen page on ISTF Virtual Herbarium website: a. Specimen data tab and b. Specimen images tab.

Table 1. The 20 plant families with highest specimen data and image counts in the ISTF Digital Herbarium as of February 2023

Family	Specimen data entered	Specimens imaged	Family	Specimen data entered	Specimens imaged
Acanthaceae	32	32	Caryophyllaceae	2,350	274
Aceraceae	48	48	Crassulaceae	1,024	0
Amaranthaceae	33	33	Euphorbiaceae	605	0
Amaryllidaceae	74	42	Fabaceae	2,947	0
Asteraceae	3,713	58	Fagaceae	250	210
Boraginaceae	1,373	48	Geraniaceae	512	379
Brassicaceae	1,684	1,363	Iridaceae	474	270
Campanulaceae	510	493	Lamiaceae	1,589	0
Capparaceae	33	33	Plantaginaceae	544	0
Caprifoliaceae	88	88	Poaceae	1,484	0

Ideally, digitization would proceed in a more or less linear fashion to avoid skipping over specimens; however, practical concerns, such as the state of the collections and ongoing work, including that of visiting researchers, must be taken into account. For instance, mounting of the entire collection was never completed at ISTF, while many more specimens were mounted using outdated methods or otherwise need maintenance prior to imaging. The initial phase of digitization started from families such as Aceraceae, Brassicaceae, Campanulaceae, and Caryophyllaceae, which were ready to be imaged immediately, while other groups, including Iridaceae and Lamiaceae, entered into the mounting phase. Families that were previously mounted but for various reasons require work before imaging, such as Apiaceae and Amaryllidaceae, have entered into a maintenance phase that includes cleaning of the specimens, updating of mounting material, and entry of collection data into the system, as needed.

We have also prioritized the entry of specimens whose identifications have been updated by visiting researchers since the reopening of ISTF, including some groups of Boraginaceae and Geraniaceae. Entry of many specimens not identified to the species level has also been postponed in order to cut down on the labor-intensive task of updating their entries later. These will be entered either upon identification or after all identified specimens have been entered.

DISCUSSION AND CONCLUSION

Natural sciences and natural history collections around the world receive comparatively much less funding than other fields. Many herbaria struggle with a lack of permanent staff and financial support, as well as relocations (Personal communication, JE curator 2018, OSU curator 2021). Beyond digitization, the very existence and maintenance of herbaria is usually dependent on the personal efforts and dedication of their workers. In this context, the inclusion of undergraduate and graduate students in digitization efforts, at least in university herbaria, is a critical issue both for the development of students and for the longevity of the herbarium. The staff of the ISTF herbarium has long worked to involve students in many herbarium tasks, including mounting, maintenance, and digitization, as well as packing of specimens for relocations. While this has brought about a number of challenges, with proper management, working with student volunteers can make for a success story.

The most important aspect of working with students is ensuring they are properly trained and supervised for at least the first few months. While biology students in many institutions may learn about herbarium collection management in theory-based courses, each herbarium has its own system and the best way to learn is through actively working with the collection. It is helpful to break down work into clear tasks that are easily taught and learned in a modular fashion. At ISTF these include mounting, maintenance, data entry, and imaging. It is also desirable to instill in students a sense of responsibility and curiosity by teaching them about the collections and their importance, as well as encouraging them to take ownership and learn from mistakes to prevent ongoing or irreversible damage. Errors in data entry are unavoidable, especially when working with students, and are much more easily reversed than errors in management of physical collections. Checking of data entered on a regular basis by senior herbarium workers helps fix problems before they get out of hand. As long as these major issues are taken into consideration, including students in this process benefits both the students and the herbaria where they volunteer.

Alongside digitization, mounting of specimens is ongoing at ISTF. Some of the specimens deposited remain housed in newspapers with their collection information, while other specimens and collections were added to ISTF from other herbaria and private collections. These specimens are in various states of maintenance and many need updating to archival-quality mounting materials and methods, as well as cleaning and proper labels. While this process began before the relocations, transportation and storage in less-than-ideal conditions has made it even more critical. While imaging is ongoing at the photo-station in the preparation room for plant families in good condition, families that have yet to be mounted or need maintenance are worked on in the main herbarium, and these two processes are largely independent of one another. ISTF is arranged alphabetically by family and genus, and while the majority of work proceeds accordingly, recently updated groups are prioritized for imaging, while groups to be

used by visiting researchers, who are often working on revisions and taxonomic treatments for the ongoing Illustrated Flora of Turkiye (Güner et al., 2014) and constitute an important source of taxonomic updates for the collection, may be prioritized for mounting.

The software created by Argenit is especially useful to this end because it allows the user to create and print a standard label immediately upon creation of an herbarium entry. As previously noted, long-term maintenance of these systems seems to be a challenge in virtual herbaria in Turkey. Software and website selection should include planning for ongoing maintenance and bug fixing, which in the case of ISTF is handled through direct communication with Argenit, who then makes the necessary changes to the code. While larger institutions may be able to handle all technical aspects in-house, such an agreement may be appropriate for many smaller herbaria. Another option is to use commercially available or other ready-built programs, which have the benefit of previous testing and bug fixing, as well as good prospects for maintenance.

As far as management of data and images are concerned, we have found it helpful for the software to check the file name of the specimen image, which is labelled with its ISTF number, with the number of the entry in the system, and give an error if they do not match. This helps prevent errors uploading the image under the wrong specimen. We have found that a download to Excel feature that was built into the website for the benefit of researchers is also useful for checking other types of errors, including typos. Once the data is downloaded, it can be quickly checked with basic data-cleaning methods in Excel and the appropriate errors fixed on the system manually.

Another important outcome of the ongoing digitization at ISTF is the overhaul of old collections, updated identification of specimens and, ultimately, the rediscovery of the herbarium's richness. İsmail Deniz visited ISTF in January 2023 to work on the treatment of the genus *Geranium* in the Illustrated Flora of Turkey, and through his diligent work on the considerable number of unidentified *Geranium* specimens, revealed several rare specimens, including *G. lanuginosum* Lam., *G. macrorrhizum* L., and *G. gymnocaulon* DC, for which only one other known specimen is housed in Turkey, and that is incomplete. When conducted properly, such visits result in the updating of taxon data and identification of previously unidentified specimens, which may sometimes wait years waiting for specialist care. Other collections have come to ISTF from other herbaria or the personal collections of various researchers, such as Turhan Baytop's extensive geophyte collections and Ali Çırpıcı's specimens from Murat Mountain between Uşak and Kütahya, as well as plants of Uludağ Mountain in Bursa collected by ISTF founder Alfred Heilbronn and Mehpare Heilbronn. Some of these collections have been entered into the herbarium registry, while others contribute to a backlog of specimens to be entered. That some of these collections, and even the various curators of ISTF themselves, used very different systems for managing their collection information can make location and entry of data time consuming. While the official herbarium registry currently goes up to nearly 41,500 specimens, missing or mixed-up entries and lost specimens, as well as the backlog of unentered collections and problematic specimens, mean this number may change dramatically by the end of the project. The eventual registration and entry of the entire herbarium into the standardized, online data management system will bring all of these collections to the light of day to the benefit of herbarium staff and outside researchers alike.

Meanwhile, some important collections stored in improperly labeled boxes and forgotten were rediscovered while organizing the herbarium before and during its relocations. Among them are Bilgin Tözün's macroalgae collection from Florida (USA), a collection of fungi that cause diseases in forest trees from Germany from 1917, an algae and diatom collection from 1887, specimens collected from around the Dead Sea for Sultan Abdulhamid II at the turn of the 20th century and, perhaps most importantly, a number of specimens used in Boissier's Flora Orientalis. Parallel to digitization, our graduate students are conducting a survey of the Herbarium Boissier collection at ISTF to be prepared for publication. Once fully integrated into the registry, these collections will join the other herbaria and collections now housed and entered into the ISTF registry, including the 1,400 specimens of M. J. E. Coode and B. M. G. Jones from 1965, as well as collections by P.H. Davis and Arthur Huber-Morath, among others (Demiriz, 1969). These will all be fully accounted for and accessible online by the end of the project.

One source of difficulty in herbarium management is the confusion surrounding their museum status. Evaluating and managing herbarium collections within the same framework as, say, objects in an archeology museum ignores the dynamic nature of organic specimens and can lead to management practices that are impractical at best but more often outright harmful. While they still require a degree of care and upkeep, most museum objects are usually not small organic items in use as active research material that puts them in a constant state of change. Placing these very different types of objects in the same regulatory category results in mismanagement of collections. Institutions in some countries, including Turkey, dictate that each specimen be registered as an accession with monetary value attached, in addition to and independent of a standard international herbarium accession system. Aside from being poor use of already inadequate labor, this runs contrary to the dynamic nature of the material itself, to which no monetary value can be meaningfully assigned. Although herbarium material is ideally meant for long-term storage and use, it can hardly be classed as a permanent object any more than it can be understood as consumable inventory. Understanding this, herbarium curators are put in a difficult position, because placing high values on specimens constitutes risk, while underselling them sends the false message that herbaria collections lack value. In reality, herbarium collections constitute a priceless source of data whose uses are constantly changing and whose management must reflect the reality of the material they house. Transfer of the herbarium to a digital environment will help prevent damage to the specimens and benefit their long-term preservation through reduction of contact with specimens.

The relocations that have afflicted so many herbaria in Turkey seem to have hit ISTF the hardest. Having moved once within the same building and three times between buildings since its establishment in 1933, ISTF may hold the record in this regard. The collection was housed in temporary venues during its past three relocations due to improper planning and delays in the construction of its permanent location. Specimens were sealed in plastic bags and packed in cardboard boxes during this period. Due to the uncertain length of stay, the material was not unpacked or made accessible at these temporary venues, which lacked conditions conducive to the long-term health and safety of the specimens. This ensured that the collections were least affected by external factors. While there were concerns that long-term storage in plastic bags may lead to further damage in the form of mold and humidity, the result was overall very positive. The vast majority of the specimens arrived at their final destination intact, without mold or decay. We must conclude that this was the best decision for these collections. Open air storage in these temporary venues, which were older buildings that lack sterile, dry environments, would likely have resulted in severe mold damage and insect infestation. The critical factor here is that the specimens were very dry when packed, largely because ISTF is primarily made up of old, well-dried specimens. Improperly dried specimens should never be stored in airtight conditions. Ideally, digitization would have taken place before moving in order to mitigate the risk of damage to the specimens before imaging, as well as to keep the collections accessible for the duration of the herbarium's closure. However, adherence to these practices has brought the collection to its current location with minimal damage.

The staff of ISTF is fully aware that our work has only just begun. As this process continues, high-resolution image and collection data of more than 40,000 specimens will be processed. We believe that this data will inspire many scientific studies to come and serve as a database for future generations of researchers. We are also aware that herbaria are not just about macro-sized material. After the successful digitization of all the higher plant material in the herbarium we plan to take the necessary steps to digitize the various micro collections at ISTF, such as diatoms and algae.

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REFERENCES / KAYNAKÇA

Budak, İ., Güzel, N., & Serim, A. T. (2021). Zirai Mücadele Merkez Araştırma Enstitüsü Herbaryumu ve Veritabanı. Turkish Journal of Weed Science, 24(2), 57-63.

Çiftçi, A. (2012). Türkiye'deki Sinirotu (*Plantago* L.) Taksonlarının Çiçek Durumu Ve Tohumları Üzerinde Mikromorfolojik Çalışmalar (Yüksek Lisans Tezi). Accessed through YÖK National Thesis Center.

Davis, C. C., Kennedy, J. A., & Grassa, C. J. (2021). Back to the future: A refined single-user photo station for massively scaling herbarium digitization. Taxon, 70(3), 635-643.

Demiriz, H. (1969). Türkiye'deki herbaryumların durumuna toplu bakış. Türk Biologi Dergisi, 19-45.

Demirkuş, N., Yenilmez, A., Pınar, S. M., & İşler, S. (2021). Vanf Herbaryumunda Bulunan Bitki Örneklerinin Dijital Ortama Aktarılması Öncesinde Yapılan İşlemler. Ejons International Journal, 5(20), 824-828.

Forman, L. & Bridson, D., 1998, The Herbarium Handbook, Lubrecht & Cramer Ltd., England, 1900347431

Güner, A., Kandemir, A., Menemen, Y., Yıldırım, H., Aslan, S., Ekşı, G., Güner, I., Çimen, A. Ö., & Şen Gökmen, F. (Ed.). (2104–) Resimli Türkiye Florası, Istanbul: ANG Vakfı Yayınları

Heberling, J. M., Prather, L. A., & Tonsor, S. J. (2019). The changing uses of herbarium data in an era of global change: An overview using automated content analysis. BioScience, 69(10), 812-822.

Öztürk, B., & Ege, M. (2014). Türkiye'nin ilk sanal herbaryumu IZEF örneği ve sanal herbaryumların bitkisel ilaç hammaddesi araştırmaları açısından önemi. Marmara Pharmaceutical Journal, 18(2), 79-84.

Seregin, A. P. (2016). Making the Russian flora visible: fast digitisation of the Moscow University Herbarium (MW) in 2015. Taxon, 65(1), 205-207.

Şimşek, İ., Erol, O., Şişman, B., & Erol, Ç. (2008). Towards A Virtual Herbarium: ISTF (Istanbul University, Science Faculty Herbarium). In: Gülseçen, Sevinç & Ayvaz Reis, Zerrin (Eds.) Proceedings of the 2nd International Conference on Innovations in Learning for the Future 2008: e-Learning. İstanbul 2008.

Tamisiea, J. (2022, December 20). 2022 in Review: The National Herbarium Goes Digital. *Smithsonian Magazine Smithsonian Voices*, Smithsonian Institution Museum of Natural History. Retrieved from: https://www.smithsonianmag.com/blogs/national-museum-of-natural-history/2022/12/20/2022-in-review-the-national-herbarium-goes-digital/

Thiers, B. (2017). Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih

Yılmaz, R., Nesibe, K. Ö. S. E., Akkemik, Ü., Yılmaz, O. Y., Karlıoğlu, N., Yılmaz, H., Güner, H. T., Ertuğrul, G., & Dalfes, H. N. (2012). ISTO Sanal Herbaryumu'nun Oluşturulması. 21. Ulusal Biyoloji Kongresi.

LETTER TO THE EDITOR / EDİTÖRE MEKTUP
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Dare to be Wild: My Journey into the Fern World

Eğreltiler Dünyasına Yolculuğum

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ABSTRACT

My interest in plants, which started at a young age, was shaped over time and led me to becoming a collector who started collecting during my university years. My journey to the magical world of ferns began with a fern I came across in the Alfred Heilbronn Botanical Garden of Istanbul University. After that, the tropical fern house I created in the basement of my home in Istanbul started to develop over time. I started collecting biological species as well as tropical ferns. This adventure took me to Thailand, where I had the chance to observe and collect tropical specimens in the field. I continue to advance this collection by adding different collection plants in Antalya.

Keywords: Collection, fernery, ferns, Thailand, Turkey

ÖZ

Küçük yaşlarda başlayan bitkilere olan merakım, zamanla üniversite yılları zamanında başlayan bir koleksiyoncu olma yönünde şekillendi. İstanbul Üniversitesi Alfred Heilbronn Botanik Bahçesi'nde rastladığım bir eğrelti otu ile eğreltiotlarının büyülü dünyasına yolculuğum başladı. Bundan sonra İstanbul'da evimin bodrumunda oluşturduğum tropical eğrelti evi zamanla gelişmeye başladı. Tropikal eğreltilerin yanı sıra doğal türleri de toplamaya başladım. Bu macera beni Tayland'a kadar sürükledi, orada tropical örnekleri arazide gözlemleme ve toplama şansını elde ettim. Şimdi bu koleksiyon üzerinde Antalya'da farklı koleksiyon bitkilerini de katarak ilerletmeye devam ediyorum.

Anahtar Kelimeler: Eğrelti evi, eğreltiler, koleksiyon, Tayland, Türkiye

One of the oldest memories I have of my surroundings and living things is the anthill at my father's pastry shop entrance. Whenever I remember it, it makes me happy. I was a six-year-old boy, and I spent my whole time watching the ants every time at the pastry shop. I was fascinated with the movements, behaviors, and attitudes of the ants. I placed food scraps around the nest, and I watched them for hours with great interest while they carried the food scraps to their nest. Meanwhile, we moved to an apartment with a garden which allowed me to introduce an environment in which I could spend more time with living things. I spent most of my time watching ant species and other insects. I sometimes trapped the ants in a jar, and I was amazed at their movements. Also, I named the ant species depending on their physical differences and behaviors and told them to my friends, *i.e.*, fast-moving racing ants, bigheaded ants, biting vampire ants, and *so on*.

I have always been in touch with nature and living things since my childhood. During primary school, I was growing beans in damp cotton, which made me very excited. It was amazing how a small bean quickly turned into a plant and gave beans again! After this experiment, I started growing watermelons, melons, zucchini, and ornamental peppers on our balcony, which can be considered to be my first collection. Wherever I saw a different type of pepper, I asked my mom for pepper seeds. Again, one of my friends in primary school gave me a *Betta splendens* (Regan, 1910) fish as a birthday present, which paved the way for having an aquarium hobby for long years. This hobby also made me meet Prof. Osman Erol, a distinguished botanist, at the aquarium club of our university.

While I was studying the teaching of German at Istanbul University, I spent almost my whole free time at the Department of Biology. I used to take hydrobiology classes voluntarily, and I was attempting to gain a better understanding of the genus *Aphanius* (Nardo, 1827), mainly, which is an inland water fish. I harbored these fish species, which are of many endemic species in Turkey, in an aquarium and observed

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their breeding. Even after graduation, I tried to maintain my relations with the Department of Biology as much as possible. One day when I visited the Istanbul University Alfred Heilbronn Botanical Garden, a plant caught my attention: a bird's nest fern belonging to the genus *Asplenium* L. had a very different structure from the usual fern form with its large fancy and full-form fronds (Figure 1). I couldn't believe it, when I first learned that this plant was a type of fern! That day was the beginning of a new adventure for me. It was such a unique and gorgeous plant that I couldn'tget it out of my mind. As I started to search for this splendid species, which grows on trees as epiphytes in nature, I opened the door to the magical world of ferns.

Figure 1. *Asplenium australasicum* Hook. in Alfred Heilbronn Botanical Garden.

Ferns also took me back to one of my old curiosities. When I was in primary school, I always wanted to be a paleontologist. The world of dinosaurs fascinated me like every child. Ferns, an indispensable part of the age of dinosaurs, were one of the earliest inhabitants of our world, and it was stunning that I was traveling in time as I watched them. As I was curious about these subjects, I started to read and investigate today's ferns, as well as the evolution of land plants and paleobotany. In a short time, my love of ferns turned into a passion, and I started to create my living plant collection. Undoubtedly, *Asplenium australasicum* Hook. was the first plant. As a result of a web search, I put it in a sun-drenched corner of the house and watered it almost daily. What a mistake! It rotted in 10 days. Then, I realized that there was a lot to learn.

For us, a shadow and low light spot away from the glass can be quite dark for plants. Although the need for light varies depending on the plant species, plant care can be complex if the interior of the home is not bright enough in general for ferns. For appropriate plant care at home, proper lighting is required. In general, ferns in nature need wet areas such as damp brooks and waterfalls, and irrigation should be carried out without overdoing it. In particular, rot is inevitable if parameters such as light and heat are not feasible. After my first failure, I attempted many types of lamps starting with aquarium lamps. I started to use the basement of my house in Istanbul as my new laboratory. I achieved quite favorable results with sodium lamps and metal halide lamps. I was easily able to keep the humidity at high levels, as it was an indoor place that I only used for plants. During the winter, I used to heat with a central heating system to maintain the room temperature at >22°C and to minimize the loss with 70 to 80% humidity and plant lighting. Meanwhile, I visited plant importers located in Istanbul every week and tried to discover new species. After a while, the number of species in my collection increased from 70 to 80. Although the environment was quite satisfactory, as the collection grew, I considered that there might be different requirements for each type of species. For instance, some species are epiphytes growing on a tree trunk, while others are limestones, or in the forest and rich in organic materials. In addition, some species are green throughout the year, while some others go through periods of dormancy or disappear and sprout out when seasonal conditions are met. The environment I provided was stable without these alterations. As a result, I cared for tropical evergreen ferns the most successfully. (Figure 2, 3).

The essential species I had were not all tropical species and some were even grown in the Black Sea region of our country. I exposed these species to seasonal transitions in the north-facing windows of the house. By the way, these plants formed the greenest windows of the street and attracted a lot of attention from outsiders. Some found them very attractive and took photos, while others considered that I had a plant obsession which made me famous in my neighborhood in those days. I spent my days watching healthy and good-looking fiddleheads of ferns with a delicate touch (Figure 4). As a reminder, observing and imitating nature are the

Figure 2. Tropical fernery in the basement.

key steps to making plants happy at home. I also tried to enrich my knowledge and gain a better understanding of the natural habitat of ferns by visiting the groves and forests of Istanbul as much as possible. I observed many natural species grown in our country in the Northern forests of Istanbul, on the historical buildings in the city and on the islands. One of them was *Pteris multifida* Poir. that became naturalized in the Süleymaniye region of the city, probably when spores escaped from the Istanbul University botanical garden and came to life on the nearby historical buildings. The article that I wrote on our naturalized species was first published in Nezahat Gökyiğit Botanical Garden *Bağbahçe Bilim Dergisi* in 2016 (Figure 5).

Figure 3. Tropical fernery in the basement

Figure 4. Ferns grew on the window of the house in Istanbul.

Figure 5. *Pteris multifida* on the wall in the Süleymaniye region of Istanbul.

The Antalya province, located in the southwest of the country, was the second region where I carried out my fern travels. The province is an essential region with fascinating *Adiantum capillus-veneris* L. landscapes that are completely covered with limestone in the waterfalls and many small rock fern species adapted to the hot and dry Mediterranean climate of its mountains and canyons (Figure 6). Undoubtedly, when it comes to ferns, the Black Sea region comes to mind first in terms of the amazing species diversity. Ferns are common almost everywhere in this region, more than in the Mediterranean region. My first trip to the Black Sea was with one of my friends, Ergün Bacak, who is a birdwatcher. It was a delightful trip with many conversations about birds and ferns. The Rize province fascinated me with its glorious nature and greenery and has a tremendous fern species diversity. I remember the moment I first saw the *Matteuccia struthiopteris* (L.) Tod. so widely and I felt that I was in a prehistoric forest and would encounter a dinosaur at any time. If you are interested in ferns, you would probably like to visit the Black Sea region again and again. My second trip to this region was with Prof. Adil Güner and the team of Nezahat Gökyiğit Botanical Garden (Figure 7). Besides having the chance to offer my assistance on the fern specimens for the illustrated flora of Turkey to be prepared, I had an unforgettable moment when I first found the *Woodsia alpina* (Bolton) Gray that has been widely mentioned in the previous flora of Turkey, but has no herbarium specimens or records. Fortunately, the specimen of this species can now be found in the Nezahat Gökyiğit Botanical Garden herbarium (Figure 8) . In addition to Black Sea trips, Çanakkale was the second place that I frequently visited with Prof. Ersin Karabacak (Figure 9). Meanwhile, I was also trying to produce almost every species I had spores (Figure 10, 11). The germination ability of spores varies depending on the species. To illustrate, some species are grown on the walls or on the bottom of the pots, even if it is undesirable. Some others are incredibly picky about the germination medium. I was germinating spores in small storage containers using specific materials according to the species: limestone for those growing on the limestones, peat moss or cocopeat for those that need organic materials (Figure 12).

After visiting many regions for ferns in Turkey, I dreamed of going to tropical countries. I recently met Patra Sangdanuch, who lives in Bangkok, Thailand, and together we planned our first trip. Meanwhile, Patra was writing a book about plants, particularly ferns, and also had a large fern collection. We made fern trips four times in Thailand and once in Malaysia. We visited Chiang Mai, Nakhon si Thammarat, Khao Yai, Pahto Chumpon, Chanthaburi in Thailand, Cameron Highlands in Malaysia, and many natural habitats on our way. There was an incredible variety of species; we could see new species at almost every step in some areas (Figure

Figure 6. *Adiantum capillus veneris* in Kurşunlu waterfall in Antalya.

Figure 7. An excursion view to Black Sea region with Nezahat Gökyiğit Botanical Garden collecting team.

Figure 8. Habitus of *Woodsia alpina*.

Figure 9. Çanakkale excursion with Prof. Dr. Ersin Karabacak.

Figure 10. Gathering in the field.

Figure 11. Mature spore collecting on white paper for germination studies.

Figure 12. Spore germination in small storage containers.

13, 14, 15, 16). In addition, there were many plant collectors in Thailand. Indeed, some collectors had much more species than we saw on a forest trip. It was a fascinating experience for me to meet academics working on ferns in Thailand, recognize new collectors, and make these useful trips with Patra Sangdanuch (Figure 17, 18). The number of living fern species I observed until that time reached about 500. As a result of these experiences, it was a pleasure for me to be a co-author of the latest book of Patra Sangdanuch, Ferns, published in the Thai language.

Figure 13. Observing open forest areas in Thailand.

Figure 14. The jungle in Thailand.

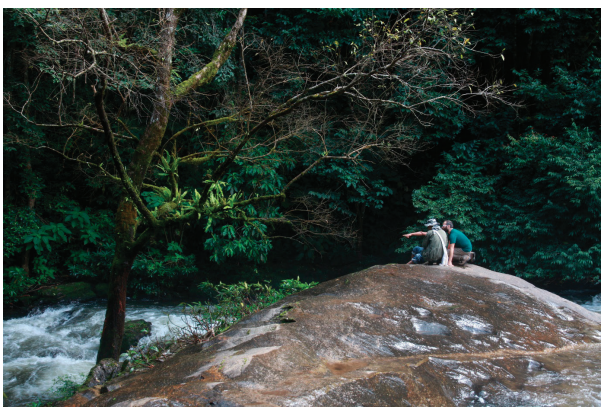

Figure 15. Observing river banks in Thailand.

Figure 16. Checking sporangia in the forest.

Figure 17. One of the fern collections in Thailand.

Figure 18. Another fern collection in Thailand.

In my humble opinion, it is of utmost importance to identify species by observing them alive and *on-site*. It is undeniable that herbarium specimens are long-lasting and essential for scientific research; however, visiting the habitats and observing them alive, and even creating living plant collections would make the picture in mind much clearer, if possible. Of note, many species are similar to each other that can be easily mistaken. If you have a living plant collection, their presence and abundance is everywhere and at any time, like your family members at home, allowing you to learn every detail about them. Beyond any doubt, this leads to space problems over time. In my experience, I made a significant change in my life and moved to Antalya from Istanbul, as the basement of my house in Istanbul became inadequate. My parents were living in a house with a large terrace in Antalya. Despite the common belief that tropical plants can be easily looked after in the climate of Antalya, the truth is not like that at all, in particular, for the ferns! If you can find microclimate areas in this harsh climate, tropical species with a high tolerance for temperature alterations can probably be kept under natural conditions. However, the terrace of my parent's house had a southwest facade that did not meet the appropriate conditions. Eventually, I covered the part of our terrace and its top to form a glass greenhouse and I planned to control heat as much as possible with an air conditioner, considering the hot and dry summer days (Figure 19,20). Although I attempted to maintain the temperature at 22°C at night and 27°C at daytime throughout the year, these values might be slightly below or above depending on the season. I also used shade net 75% to prevent overheating and provide my plants with the filtered light they needed. I first saw this system in the Nezahat Gökyiğit Botanical Garden tropical greenhouses. Since I moved to Antalya in 2018, I have had some difficulties in maintaining the relevant parameters stable, except for having better-quality natural light. Despite the use of an air conditioner, there were the effects of seasonal and day & night temperature differences in the glass greenhouse. It was also not always possible to keep the humidity high due to the effect of the air conditioner. As the greenhouse's ceiling was not high, the plants close to the glass at the top of the plant shelves experienced heat or cold stress depending on the season. Consequently, the lack of appropriate conditions and opportunities resulted in species losses.

Figure 19. Fern collection in the greenhouse in Antalya.

Calcareous tap water in Antalya was the second main problem for me. Watering the plants with limewater caused lime accumulation in the pots over time and the pH range of the material on which the plant was seeded increased and became alkaline, thereby leading to plant illness due to inadequate nutrition. To overcome this situation, it is reasonable to harvest rain, particularly in regions like Antalya, where there is plenty of rain precipitation. On my terrace, I have a water system coming from the top of the greenhouse to the water drain and to the water tanks with a total capacity of 5.000 liters which is adequate until the summer season comes to an end. In addition,

Figure 20. Fern collection in the greenhouse in Antalya.

Figure 21. *Alocasia* Neck. collection in the greenhouse in Antalya.

I use a reverse osmosis system to prevent the plants from any harm caused by the limewater in the summer; however, I also plan to create a more professional fernery in the near future.

Currently, I am working with many tropical plant species, particularly aroids, zingiberales, bromeliads, palms, and many other plants that I can achieve much more satisfactory results in my greenhouse (Figure 21, 22, 23). Despite harsh conditions from time to time, I keep my motivation and desire for success and to better understand the fern world. I hope to pursue and share this adventure where I find true happiness from my new experiences and excitement.

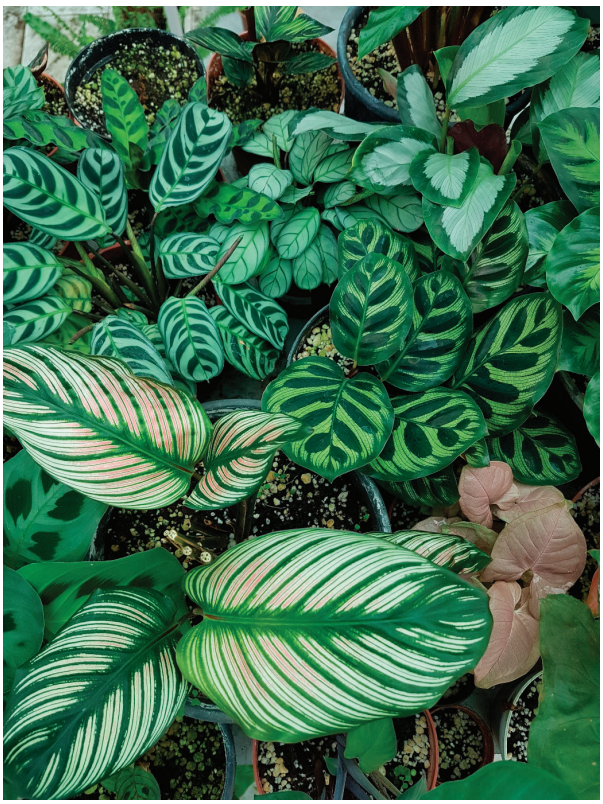

Figure 22. *Calathea* G. Mey collection in the greenhouse in Antalya.

Figure 23. *Caladium* Vent collection in the greenhouse in Antalya.

AIM AND SCOPE

The journal Herbarium Turcicum is devoted to phylogenetic studies, modern herbarium techniques, computer-based plant identification including machine-learning and data-science-driven methods and morphometric studies, in order to fill the current gap in this type of literature. The journal's purpose and scope are summarized below:

1. New taxa, synonyms, transfers, revisional studies, typification studies
2. Plant taxa previously deposited in herbaria but not later collected and those preserved in herbaria but endangered in the wild
3. Organizational and digitization activities of herbaria
4. Herbarium stories: new species described from herbarium specimens, scientific work resulting from international collaborations among scientists working in various herbaria,
5. Herbaria and their relationships with other disciplines, such as molecular phylogeny, plant anatomy, forensic biology and graphology studies using herbarium specimens
6. Herbarium pests: modern techniques and methods of control
7. Herbarium curators and their academic lives
8. Interesting and historical collections
9. Live plant collections
10. Historical and ancient place and region names on herbarium labels
11. Invalid names persisting on herbarium labels
12. Monumental trees and their presentation
13. Plants and history
14. Plants in culture and art
15. Stories of plant epithets
16. Ethical rules
17. Herbarium techniques and innovations
18. Fighting pests and physical conditions
19. Herbarium types
20. Archaeobotanical studies and collections
21. Technology and herbaria, machine learning and digital classification studies

POLICIES

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- Research participants should participate in the research voluntarily, not under any coercion.
- Any possible harm to participants must be avoided. The research should be planned in such a way that the participants are not at risk.
- The independence of research must be clear; and any conflict of interest or must be disclosed.
- In experimental studies with human subjects, written informed consent of the participants who decide to participate in the research must be obtained. In the case of children and those under wardship or with confirmed insanity, legal custodian's assent must be obtained.
- If the study is to be carried out in any institution or organization, approval must be obtained from this institution or organization.
- In studies with human subject, it must be noted in the method's section of the manuscript that the informed consent of the participants and ethics committee approval from the institution where the study has been conducted have been obtained.

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Editor-in-Chief is responsible for the contents and overall quality of the publication. S/he must publish errata pages or make corrections when needed.

Editor-in-Chief does not allow any conflicts of interest between the authors, editors and reviewers. Only he has the full authority to assign a reviewer and is responsible for final decision for publication of the manuscripts in the Journal.

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Only those manuscripts approved by its every individual author and that were not published before in or sent to another journal, are accepted for evaluation.

Submitted manuscripts that pass preliminary control are scanned for plagiarism using iThenticate software. After plagiarism check, the eligible ones are evaluated by editor-in-chief for their originality, methodology, the importance of the subject covered and compliance with the journal scope.

The editor hands over the papers matching the formal rules to at least two national/international referees for double-blind peer review evaluation and gives green light for publication upon modification by the authors in accordance with the referees' claims.

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The selected manuscripts are sent to at least two national/international referees for evaluation and publication decision is given by editor-in-chief upon modification by the authors in accordance with the referees' claims.

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- Does the abstract clearly and accurately describe the content of the manuscript?
- Is the problem significant and concisely stated?
- Are the methods described comprehensively?
- Are the interpretations and consclusions justified by the results?
- Is adequate references made to other Works in the field?
- Is the language acceptable?

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The editor informs the reviewers that the manuscripts are confidential information and that this is a privileged interaction. The reviewers and editorial board cannot discuss the manuscripts with other persons. The anonymity of the referees is important.

MANUSCRIPT ORGANIZATION AND SUBMISSION

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Manuscpript is to be submitted online via https://dergipark.org.tr/en/pub/hturcicum and it must be accompanied by a cover letter indicating that the manuscript is intended for publication, specifying the article category (i.e. research article, review etc.) and including information about the manuscript (see the Submission Checklist), title page, author form, and Copyright Agreement Form that has to be signed by all authors.

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Ensure that you provide all relevant editable source files. Failing to submit these source files may lead to unnecessary delays in the review and production process.

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All tables should be numbered using Arabic numerals.

Tables should always be referenced in the text in sequential numerical order.

Provide a title describing the components of each table.

For tables taken from other sources, provide the source as a reference at the end of the title.

Footnotes should be shown in superscript lowercase (or asterisks for significance values and other statistical data) and included at the bottom of the table.

Herbarium Turcicum encourages online-only publication of comprehensive tables that supplement the article but are more user-friendly in electronic form.

Visual Material

For the best end result, it is highly recommended that all work (including photos, drawings, etc.) is submitted in electronic format. Published work is a direct reflection of the quality of the visual material provided.

Electronic Figure Submission

Numbers and letters used in figures must be on a separate layer.

Specify the image editor used.

The preferred format for vector graphics is EPS. For black and white images, use the TIFF format. MS Office files are also acceptable.

Name Figure files "Figure" and the number.

Figure Numbering

Figures must be numbered using Arabic numerals.

All figures should be referenced in the text in sequential order.

Figure parts should be indicated with lowercase letters (a, b, c, etc.).

If an appendix appears in your article and contains one or more figures, continue with the sequential numbering of the main text. Do not number appendix figures "A1, A2, A3, etc." However, figures found only in the online appendices [Supplementary Information (SI)] should be numbered separately.

Figure Titles

Each figure should have a short title that describes exactly what it represents. Include subtitles in the text file, not the image file.

Figure titles begin with "Figure" followed by the figure number, both in bold.

Do not use punctuation after the figure number or at the end of the title.

Define all the figure elements in the title and use boxes, circles, etc. as coordinate points in images.

Identify any and all previously published material by citing the original source as a reference at the end of the figure title.

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Herbarium Turcicum publishes original articles related to herbariums and live collections that take plant systematics as the main theme. The journal encourages the inclusion of original drawings and high-quality original photographs of rare and endangered species to accompany descriptions. The full spectrum of articles accepted by the journal is presented below. The topic should be original and of interest to our readers. Submitted texts should be written in either Turkish or English with the utmost attention paid to language and spelling rules.

Original Research Articles

Articles presenting the results of empirical and theoretical research that address questions or hypotheses regarding herbariums, living collections and plant systematics.

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Articles dealing with herbariums, living collections and the latest significant developments and advances in plant systematics. Reviews should be of interest to a wide audience and are expected to both summarize current knowledge and propose new ideas and hypotheses for future research.

Letters To The Editor

Short Communications

These are short articles written in response or in addition to previously published research articles and provide additional scientific contributions, comments and criticism, and new findings that offer an alternative interpretation. A maximum of 3 pages (4,000 words) is recommended.

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Please ensure your title page contains the following information.

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The title should be concise and informative.

Author information
The name(s) of the author(s),

The affiliation(s) of the author(s), and their addresses,

A clear indication of the corresponding author and their active e-mail address.

Abstract
The abstract should be 150 to 250 words and should not contain any undefined abbreviations or unspecified references.

Keywords
Please provide 4 to 6 keywords to be used for indexing purposes.

Statements and Declarations
Competing Interests: Authors are required to disclose any and all financial or non-financial interests directly or indirectly related to the work submitted for publication.

Please note that the abstract should be available as a stand-alone document presenting the main results and conclusions of the article using simple, factual statements.

Manuscript Structure

The text of a research paper should be divided into: Title Page, Abstract, Introduction, Materials and Methods, Results and Discussion, Final Word (optional), Acknowledgments, and References.

Figure captions should follow the text. Tables, Figures and Electronic Supplementary Material must be uploaded as separate files.

Introduction

The introduction should state the reason for carrying out the study and the questions under consideration, and outline the essential background information. The introduction section typically ends with specific, testable hypotheses.

Materials and methods

The materials and methods section should describe applied methods and techniques in sufficient detail to allow replication of all parts of the study. Standard techniques and approaches need not be described in detail; use references to previously published work instead.

Note that for all plant material studied, a voucher specimen must be submitted to an herbarium registered with the Index Herbariorum (http://sweetgum.nybg.org/science/ih/).

Discussion and Conclusion

The Discussion section should describe and evaluate the findings in terms of the questions and hypotheses presented in the introduction and in the context of other relevant studies. The conclusion section should logically state the results, drawing attention to important details in the tables and figures.

Final Word (Optional)

In this section, the authors can briefly describe the main contributions and results of the research and make a clear statement about its importance and relevance.

Taxonomic Treatment

Descriptions and taxonomic innovations should be presented in separate paragraphs immediately after the “Discussion and Conclusion” section.

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Manuscripts should be submitted in Word.

Regular 10-point Times New Roman font should be used for text. Use single-line spacing and 6 pt before and after paragraph spacing. Italics may be used for emphasis.

All page margins should be 2.5 cm.

The automatic page numbering function should be used to number the pages.

Tab stops or other commands should be used for indentations, not the spacebar.

Use the table function rather than spreadsheets to make tables.

Use the equation editor or MathType for equations.

Files should be submitted in .docx format (Word 2007 or higher) or .doc format (older Word versions).

Headings
Please use no more than three levels of displayed headings.

Abbreviations
Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes
Footnotes should avoided except in special circumstances which require additional clarification for a reference not adequately described by a standard citation.

Acknowledgments
Acknowledgments of persons, donations, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

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- Use SI units and internationally accepted signs and symbols.
- Species and subspecies names should be italicized in normal text. Higher taxonomic levels should not be italicized.
- It is sufficient to provide plant author names at first mention of the relevant taxon, except in special circumstances. We recommend www.ipni.org for plant authors. Please provide your source in the reference list as appropriate.
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Genetic information, such as DNA, RNA, or protein sequences, should be sent to an appropriate database such as GenBank (http://www.ncbi.nlm.nih.gov/genbank/) or EMBL (www.ebi.ac.uk/embl/).

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TreeBase (http://www.treebase.org) and Dryad http://datadryad.org/) are public access and recommended for alignments used for phylogenetic work.

References

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Herbarium Turcicum complies with APA (American Psychological Association) style 6th Edition for referencing and quoting. For more information:

- American Psychological Association. (2010). Publication manual of the American Psychological Association (6th ed.). Washington, DC: APA.
- http://www.apastyle.org

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If more than one citation is made within the same paranthesis, separate them with (;).

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More than one citation;
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Citation with one author;
(Akyolcu, 2007)
Citation with two authors;
(Sayıner & Demirci, 2007)
Citation with three, four, five authors;
First citation in the text: (Ailen, Ciambrune, & Welch, 2000) Subsequent citations in the text: (Ailen et al., 2000)
Citations with more than six authors;
(Çavdar et al., 2003)

Citations in the Reference
All the citations done in the text should be listed in the References section in alphabetical order of author surname without numbering. Below given examples should be considered in citing the references.

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a) Turkish Book
Karasar, N. (1995). *Araştırmalarda rapor hazırlama* (8th ed.) [Preparing research reports]. Ankara, Turkiye: 3A Eğitim Danışmanlık Ltd.
b) Book Translated into Turkish
Mucchielli, A. (1991). *Zihniyetler* [Mindsets] (A. Kotil, Trans.). İstanbul, Turkiye: İletişim Yayınları.
c) Edited Book
Ören, T., Üney, T., & Çölkesen, R. (Eds.). (2006). *Türkiye bilişim ansiklopedisi* [Turkish Encyclopedia of Informatics]. İstanbul, Turkiye: Papatya Yayıncılık.
d) Turkish Book with Multiple Authors
Tonta, Y., Bitirim, Y., & Sever, H. (2002). T*ürkçe arama motorlarında performans değerlendirme* [Performance evaluation in Turkish search engines]. Ankara, Turkiye: Total Bilişim.
e) Book in English
Kamien R., & Kamien A. (2014). *Music: An appreciation.* New York, NY: McGraw-Hill Education.
f) Chapter in an Edited Book
Bassett, C. (2006). Cultural studies and new media. In G. Hall & C. Birchall (Eds.), *New cultural studies: Adventures in theory* (pp. 220–237). Edinburgh, UK: Edinburgh University Press.
g) Chapter in an Edited Book in Turkish
Erkmen, T. (2012). Örgüt kültürü: Fonksiyonları, öğeleri, işletme yönetimi ve liderlikteki önemi [Organization culture: Its functions, elements and importance in leadership and business management]. In M. Zencirkıran (Ed.), *Örgüt sosyolojisi* [Organization sociology] (pp. 233–263). Bursa, Turkiye: Dora Basım Yayın.
h) Book with the same organization as author and publisher
American Psychological Association. (2009). *Publication manual of the American psychological association* (6th ed.). Washington, DC: Author.

Article

a) Turkish Article
Mutlu, B., & Savaşer, S. (2007). Çocuğu ameliyat sonrası yoğun bakımda olan ebeveynlerde stres nedenleri ve azaltma girişimleri [Source and intervention reduction of stress for parents whose children are in intensive care unit after surgery]. *Istanbul University Florence Nightingale Journal of Nursing, 15*(60), 179–182.
b) English Article
de Cillia, R., Reisigl, M., & Wodak, R. (1999). The discursive construction of national identity. *Discourse and Society, 10*(2), 149–173. http://dx.doi.org/10.1177/0957926599010002002

c) Journal Article with DOI and More Than Seven Authors

Lal, H., Cunningham, A. L., Godeaux, O., Chlibek, R., Diez-Domingo, J., Hwang, S.-J. ... Heineman, T. C. (2015). Efficacy of an adjuvanted herpes zoster subunit vaccine in older adults. *New England Journal of Medicine, 372,* 2087–2096. http://dx.doi.org/10.1056/NEJMoa1501184

d) Journal Article from Web, without DOI

Sidani, S. (2003). Enhancing the evaluation of nursing care effectiveness. *Canadian Journal of Nursing Research, 35*(3), 26–38. Retrieved from http://cjnr.mcgill.ca

e) Journal Article wih DOI

Turner, S. J. (2010). Website statistics 2.0: Using Google Analytics to measure library website effectiveness. *Technical Services Quarterly, 27,* 261–278. http://dx.doi.org/10.1080/07317131003765910

f) Advance Online Publication

Smith, J. A. (2010). Citing advance online publication: A review. *Journal of Psychology.* Advance online publication. http://dx.doi.org/10.1037/a45d7867

g) Article in a Magazine

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time, 135,* 28–31.

Doctoral Dissertation, Master's Thesis, Presentation, Proceeding

a) Dissertation/Thesis from a Commercial Database

Van Brunt, D. (1997). *Networked consumer health information systems* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9943436)

b) Dissertation/Thesis from an Institutional Database

Yaylalı-Yıldız, B. (2014). *University campuses as places of potential publicness: Exploring the politicals, social and cultural practices in Ege University* (Doctoral dissertation). Retrieved from http://library.iyte.edu.tr/tr/hizli-erisim/iyte-tez-portali

c) Dissertation/Thesis from Web

Tonta, Y. A. (1992). *An analysis of search failures in online library catalogs* (Doctoral dissertation, University of California, Berkeley). Retrieved from http://yunus.hacettepe.edu.tr/~tonta/yayinlar /phd/ickapak.html

d) Dissertation/Thesis abstracted in Dissertations Abstracts International

Appelbaum, L. G. (2005). Three studies of human information processing: Texture amplification, motion representation, and figure-ground segregation. *Dissertation Abstracts International: Section B. Sciences and Engineering, 65*(10), 5428.

e) Symposium Contribution

Krinsky-McHale, S. J., Zigman, W. B., & Silverman, W. (2012, August). Are neuropsychiatric symptoms markers of prodromal Alzheimer's disease in adults with Down syndrome? In W. B. Zigman (Chair), *Predictors of mild cognitive impairment, dementia, and mortality in adults with Down syndrome.* Symposium conducted at the meeting of the American Psychological Association, Orlando, FL.

f) Conference Paper Abstract Retrieved Online

Liu, S. (2005, May). *Defending against business crises with the help of intelligent agent based early warning solutions.* Paper presented at the Seventh International Conference on Enterprise Information Systems, Miami, FL. Abstract retrieved from http://www.iceis.org/iceis2005/abstracts_2005.htm

g) Conference Paper - In Regularly Published Proceedings and Retrieved Online

Herculano-Houzel, S., Collins, C. E., Wong, P., Kaas, J. H., & Lent, R. (2008). The basic nonuniformity of the cerebral cortex. *Proceedings of the National Academy of Sciences, 105,* 12593–12598. http://dx.doi.org/10.1073/pnas.0805417105

h) Proceeding in Book Form

Parsons, O. A., Pryzwansky, W. B., Weinstein, D. J., & Wiens, A. N. (1995). Taxonomy for psychology. In J. N. Reich, H. Sands, & A. N. Wiens (Eds.), *Education and training beyond the doctoral degree: Proceedings of the American Psychological Association National Conference on Postdoctoral Education and Training in Psychology* (pp. 45–50). Washington, DC: American Psychological Association.

i) Paper Presentation

Nguyen, C. A. (2012, August). *Humor and deception in advertising: When laughter may not be the best medicine.* Paper presented at the meeting of the American Psychological Association, Orlando, FL.

Other Sources

a) Newspaper Article

Browne, R. (2010, March 21). This brainless patient is no dummy. *Sydney Morning Herald, 45.*

b) Newspaper Article with no Author

New drug appears to sharply cut risk of death from heart failure. (1993, July 15). *The Washington Post,* p. A12.

c) Web Page/Blog Post

Bordwell, D. (2013, June 18). David Koepp: Making the world movie-sized [Web log post]. Retrieved from http://www.davidbordwell.net/blog/page/27/

d) Online Encyclopedia/Dictionary

Ignition. (1989). In *Oxford English online dictionary* (2nd ed.). Retrieved from http://dictionary.oed. com

Marcoux, A. (2008). Business ethics. In E. N. Zalta (Ed.). *The Stanford encyclopedia of philosophy.* Retrieved from http://plato.stanford.edu/entries/ethics-business/

e) Podcast

Dunning, B. (Producer). (2011, January 12). *inFact: Conspiracy theories* [Video podcast]. Retrieved from http://itunes.apple.com/

f) Single Episode in a Television Series

Egan, D. (Writer), & Alexander, J. (Director). (2005). Failure to communicate. [Television series episode]. In D. Shore (Executive producer), *House;* New York, NY: Fox Broadcasting.

g) Music

Fuchs, G. (2004). Light the menorah. On *Eight nights of Hanukkah* [CD]. Brick, NJ: Kid Kosher.

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AMAÇ VE KAPSAM

Anadolu üç farklı bitki coğrafyası bölgesinin kesiştiği bir noktada, yine üç farklı iklimin etkisinde, çok çeşitli kayaç ve topraklarda ve bunların çeşitli topografik formlarından oluşan çok özel bir yaşam alanıdır. Üzerinde yaşadığımız bu topraklar bir zamanlar yabancı doğa gezginlerinin taktığı bir adla Küçük Asya olarak anılmıştır. Türkiye bir ülke olduğu halde bitki örtüsü bakımından kıta özelliği göstermektedir. Bu bitki zenginliğinin bilimsel hafızası herbaryumlardır. Herbaryumlarla ve barındırdıkları bitki zenginliğiyle Sistematik Botanikçiler çalışmaktadır.

Ülkemizde biyoloji ve botanik alanında uluslararası saygın dizinlerce taranan birkaç dergi olsa da Sistematik Botanik ve Herbayum odaklı bir dergimiz ne yazık ki bulunmamaktadır. Avrupa kıtasının tümünden daha fazla bitki türüne sahip ülkemizde bu durum ciddi bir eksikliktir.

Biz bu eksikliği gidermek amacıyla, filogenetik çalışmalara, modern herbaryum tekniklerine, makine öğrenmesine dayalı bitki teşhis yöntemlerine, morfometrik çalışmalara yönelik bir dergi çıkarmayı hedefliyoruz.

ANA KONU BAŞLIKLARI

1. Yeni türler, sinonimler, aktarımlar, revizyonel çalışmalar
2. Geçmişte toplanmış, herbaryumda saklanan ancak daha sonra doğadan toplanamamış bitki örnekleri, herbaryumlarda saklanan ancak nesli tükenen bitki taksonları
3. Herbaryumların düzeni ve dijitalleştirme faaliyetleri
4. Herbaryum hikayeleri: herbaryum örnekleri üzerinden tanımlanmış yeni türler, geçmişte belli herbaryumlarda çalışmış bilim insanlarının uluslararası ilişkiler ve bunların bilimsel sonuçları, tiplendirme çalışmaları
5. Herbaryum ve diğer disiplinlerle ilişkileri; herbaryum örneklerinden moleküler filogeni çalışmaları, bitki anatomisi çalışmaları, adli biyoloji, grafolojik çalışmalar
6. Herbaryum zararlıları, mücadele yolları, modern teknikler
7. Herbaryum küratörleri ve akademik yaşamları
8. İlginç ve tarihi koleksiyonlar
9. Canlı bitki koleksiyonları
10. Herbaryum etiketlerindeki tarihi yer isimleri, antik yer ve bölge adları
11. Herbaryum etiketlerinde kalmış, geçersiz isimler
12. Anıt ağaçlar ve tanıtımı
13. Bitkiler ve tarih
14. Bitkiler ve kültür-sanat
15. Bitki epitetlerinin hikayeleri
16. Etik kurallar
17. Herbaryum teknikleri ve yenilikler
18. Fiziki koşullar
19. Herbaryum çeşitleri
20. Arkeobotanik çalışmaları ve koleksiyoları
21. Teknoloji ve herbaryum, makine öğrenmesi, dijital sınıflama çalışmaları

POLİTİKALAR

Yayın Politikası

Dergi yayın etiğinde en yüksek standartlara bağlıdır ve Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers Association (OASPA) ve World Association of Medical Editors (WAME) tarafından yayınlanan etik yayıncılık ilkelerini benimser; Principles of Transparency and Best Practice in Scholarly Publishing başlığı altında ifade edilen ilkeler için: https://publicationethics.org/resources/guidelines-new/principles-transparency-and-best-practice-scholarly-publishing

Gönderilen makaleler derginin amaç ve kapsamına uygun olmalıdır. Orijinal, yayınlanmamış ve başka bir dergide değerlendirme sürecinde olmayan, her bir yazar tarafından içeriği ve gönderimi onaylanmış yazılar değerlendirmeye kabul edilir.

Makale yayınlanmak üzere Dergiye gönderildikten sonra yazarlardan hiçbirinin ismi, tüm yazarların yazılı izni olmadan yazar listesinden silinemez ve yeni bir isim yazar olarak eklenemez ve yazar sırası değiştirilemez.

İntihal, duplikasyon, sahte yazarlık/inkar edilen yazarlık, araştırma/veri fabrikasyonu, makale dilimleme, dilimleyerek yayın, telif hakları ihlali ve çıkar çatışmasının gizlenmesi, etik dışı davranışlar olarak kabul edilir. Kabul edilen etik standartlara uygun olmayan tüm makaleler yayından çıkarılır. Buna yayından sonra tespit edilen olası kuraldışı, uygunsuzluklar içeren makaleler de dahildir.

İntihal

Ön kontrolden geçirilen makaleler, iThenticate yazılımı kullanılarak intihal için taranır. İntihal/kendi kendine intihal tespit edilirse yazarlar bilgilendirilir. Editörler, gerekli olması halinde makaleyi değerlendirme ya da üretim sürecinin çeşitli aşamalarında intihal kontrolüne tabi tutabilirler. Yüksek benzerlik oranları, bir makalenin kabul edilmeden önce ve hatta kabul edildikten sonra reddedilmesine neden olabilir. Makalenin türüne bağlı olarak, bunun oranın %15 veya %20'den az olması beklenir.

Çift Kör Hakemlik

İntihal kontrolünden sonra, uygun olan makaleler baş editör tarafından orijinallik, metodoloji, işlenen konunun önemi ve dergi kapsamı ile uyumluluğu açısından değerlendirilir. Editör, makalelerin adil bir şekilde çift taraflı kör hakemlikten geçmesini sağlar ve makale biçimsel esaslara uygun ise, gelen yazıyı yurtiçinden ve /veya yurtdışından en az iki hakemin değerlendirmesine sunar, hakemler gerek gördüğü takdirde yazıda istenen değişiklikler yazarlar tarafından yapıldıktan sonra yayınlanmasına onay verir.

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Dergi açık erişimlidir ve derginin tüm içeriği okura ya da okurun dahil olduğu kuruma ücretsiz olarak sunulur. Okurlar, ticari amaç haricinde, yayıncı ya da yazardan izin almadan dergi makalelerinin tam metnini okuyabilir, indirebilir, kopyalayabilir, arayabilir ve link sağlayabilir. Bu BOAI açık erişim tanımıyla uyumludur.

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Derginin tüm giderleri İstanbul Üniversitesi tarafından karşılanmaktadır. Dergide makale yayını ve makale süreçlerinin yürütülmesi ücrete tabi değildir. Dergiye gönderilen ya da yayın için kabul edilen makaleler için işlemleme ücreti ya da gönderim ücreti alınmaz.

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Düzeltme, Geri Çekme, Endişe İfadesi

Editörler, yayınlanan makalede, bulguları, yorumları ve sonuçları etkilemeyen küçük hatalar tespit edilirse düzeltme yayınlamayı düşünebilirler. Editörler, bulguları ve sonuçları geçersiz kılan büyük hatalar / ihlaller söz konusu olduğunda, makaleyi geri çekmeyi düşünmelidir.

Yazarlar tarafından araştırma veya yayını kötüye kullanmaya yönelik olasılık söz konusu ise; bulguların güvenilir olmadığına ve yazarların kurumlarının olayı soruşturmadığına dair kanıtlar var veya olası soruşturma haksız veya sonuçsuz görünüyor ise, editörler endişe ifadesi yayınlamayı düşünmelidir. Düzeltme, geri çekme veya endişe ifadesi ile ilgili olarak COPE ve ICJME yönergeleri dikkate alınır.

Arşiv Politikası

Dergide yayınlanan tüm yazıların korunmasını ve kalıcı olarak erişilebilir olmasını sağlamak için makaleler, ulusal bir arşiv sitesi olarak hizmet veren ve aynı zamanda LOCKSS'in içeriği toplamasına, korumasına ve sunmasına izin veren Dergipark'ta saklanmaktadır.

Ek olarak, yazarların kendilerinin makalelerinin son PDF sürümünü Open Archives Initiative (https://www.openarchives.org/) standartlarına uygun açık elektronik arşivlerde arşivlemeleri önerilir. Yazarlar, yayınladıkları arşiv versiyonundan, İ.Ü. Yayınevinin dergi web sitesinin URL'sine bağlantı sağlamalıdır.

ETİK

Yayın Etiği Beyanı

Herbarium Turcicum, yayın etiğinde en yüksek standartlara bağlıdır ve Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers Association (OASPA) ve World Association of Medical Editors (WAME) tarafından yayınlanan etik yayıncılık ilkelerini benimser; Principles of Transparency and Best Practice in Scholarly Publishing başlığı altında ifade edilen ilkeler için: https://publicationethics.org/resources/guidelines-new/principles-transparencyand-best-practice-scholarly-publishing

Gönderilen tüm makaleler, orijinal ve yayınlanmamış (tam metin konferans bildirisi dahil) olmalı ve başka bir dergide değerlendirme sürecinde olmamalıdır. Her bir makale, editörlerden biri ve en az iki hakem tarafından çift kör değerlendirmeden geçirilir. İntihal, duplikasyon, sahte yazarlık/inkâr edilen yazarlık, araştırma/veri fabrikasyonu, makale dilimleme, dilimleyerek yayın, telif hakları ihlali ve çıkar çatışmasının gizlenmesi, etik dışı davranışlar olarak kabul edilir.

Kabul edilen etik standartlara uygun olmayan tüm makaleler yayından çıkarılır. Buna, yayından sonra tespit edilen olası kuraldışı ve uygunsuzluklar içeren makaleler de dahildir.

Araştırma Etiği

Herbarium Turcicum, araştırma etiğinde en yüksek standartları gözetir ve aşağıda tanımlanan uluslararası araştırma etiği ilkelerini benimser. Makalelerin etik kurallara uygunluğu, yazarların sorumluluğundadır.

Uluslararası Araştırma Etiği İlkeleri

- Araştırmanın tasarlanması, tasarımın gözden geçirilmesi ve araştırmanın yürütülmesinde bütünlük, kalite ve şeffaflık ilkeleri sağlanmalıdır.
- Araştırma ekibi ve katılımcılar, araştırmanın amacı, yöntemleri ve öngörülen olası kullanımları; araştırmaya katılımın gerektirdikleri ve varsa riskleri hakkında tam olarak bilgilendirilmelidir.
- Araştırma katılımcılarının sağladığı bilgilerin gizliliği ve yanıt verenlerin gizliliği sağlanmalıdır. Araştırma katılımcıların özerkliğini ve saygınlığını koruyacak şekilde tasarlanmalıdır.
- Araştırma katılımcıları gönüllü olarak araştırmada yer almalı ve herhangi bir zorlama altında olmamalıdırlar. Katılımcıların zarar görmesinden kaçınılmalıdır. Araştırma, katılımcıları riske sokmayacak şekilde planlanmalıdır.
- Araştırma bağımsızlığıyla ilgili açık ve net olunmalı; çıkar çatışması varsa belirtilmelidir.
- Deneysel çalışmalarda, araştırmaya katılmaya karar veren katılımcıların yazılı bilgilendirilmiş onayı alınmalıdır. Çocukların ve vesayet altındakilerin veya tasdiklenmiş akıl hastalığı bulunanların yasal vasisinin onayı alınmalıdır.
- Çalışma, herhangi bir kurum ya da kuruluşta gerçekleştirilecekse bu kurum ya da kuruluştan çalışma yapılacağına dair onay alınmalıdır.
- İnsan öğesi bulunan çalışmalarda, "yöntem" bölümünde, katılımcılardan "bilgilendirilmiş onam" alındığının ve çalışmanın yapıldığı kurumdan etik kurul onayı alındığının belirtilmesi gerekir.

Yazarların Sorumluluğu

Makalelerin bilimsel ve etik kurallara uygunluğu yazarların sorumluluğundadır. Yazar makalenin orijinal olduğu, daha önce başka bir yerde yayınlanmadığı ve başka bir yerde, başka bir dilde yayınlanmak üzere değerlendirmede olmadığı konusunda teminat sağlamalıdır. Uygulamadaki telif kanunları ve anlaşmaları gözetilmelidir. Telife bağlı materyaller (örneğin tablolar, şekiller veya büyük alıntılar) gerekli izin ve teşekkürle kullanılmalıdır. Başka yazarların ve katkıda bulunanların çalışmaları ya da yararlanılan kaynaklar, uygun biçimde kullanılmalı ve referanslarda belirtilmelidir.

Gönderilen makalede tüm yazarların akademik ve bilimsel olarak doğrudan katkısı olmalıdır. Bu bağlamda "yazar", yayınlanan bir araştırmanın kavramsallaştırılmasına ve dizaynına, verilerin elde edilmesine, analizine ya da yorumlanmasına belirgin katkı yapan, yazının yazılması ya da bunun içerik açısından eleştirel biçimde gözden geçirilmesinde görev yapan birisi olarak görülür. Yazar olabilmenin diğer koşulları ise makaledeki çalışmayı planlamak veya icra etmek/revize etmektir. Fon sağlanması, veri toplanması ya da araştırma grubunun genel gözetimi tek başına yazarlık hakkı kazandırmaz. Yazar olarak gösterilen tüm bireyler, sayılan tüm ölçütleri karşılamalıdır. Yukarıdaki ölçütleri karşılayan her birey yazar olarak gösterilebilir. Yazarların isim

sıralaması, ortak verilen bir karar olmalıdır. Tüm yazarlar, yazar sıralamasını, Telif Hakkı Anlaşması Formunda imzalı olarak belirtmek zorundadırlar.

Yazarlık için yeterli ölçütleri karşılamayan ancak çalışmaya katkısı olan tüm bireyler "teşekkür/bilgiler" kısmında sıralanmalıdır. Bunlara örnek olarak ise sadece teknik destek sağlayan, yazıma yardımcı olan ya da sadece genel bir destek sağlayan, finansal ve materyal desteği sunan kişiler verilebilir.

Bütün yazarlar, araştırmanın sonuçlarını ya da bilimsel değerlendirmeyi etkileyebilme potansiyeli olan finansal ilişkiler, çıkar çatışması ve çıkar rekabetini beyan etmelidirler. Bir yazar, kendi yayınlanmış yazısında belirgin bir hata ya da yanlışlık tespit ederse bu yanlışlıklara ilişkin düzeltme ya da geri çekme için editör ile hemen temasa geçme ve iş birliği yapma sorumluluğunu taşır.

Editör ve Hakem Sorumlulukları

Baş editör, makaleleri, yazarların etnik kökeninden, cinsiyetinden, uyruğundan, dini inancından ve siyasi felsefesinden bağımsız olarak değerlendirir. Yayına gönderilen makalelerin adil bir şekilde çift taraflı kör hakem değerlendirmesinden geçmelerini sağlar. Gönderilen makalelere ilişkin tüm bilginin, makale yayınlanana kadar gizli kalacağını garanti eder.

Baş editör, içerik ve yayının toplam kalitesinden sorumludur. Gerektiğinde hata sayfası yayınlamalı ya da düzeltme yapmalıdır. Baş editör; yazarlar, editörler ve hakemler arasında çıkar çatışmasına izin vermez. Dergide yayınlanacak makalelerle ilgili nihai kararı vermekle yükümlüdür.

Hakemlerin araştırmayla ilgili, yazarlarla ve/veya araştırmanın finansal destekçileriyle çıkar çatışmaları olmamalıdır. Değerlendirmelerinin sonucunda tarafsız bir yargıya varmalıdırlar. Gönderilmiş yazılara ilişkin tüm bilginin gizli tutulmasını sağlamalı ve yazar tarafında herhangi bir telif hakkı ihlali ve intihal fark ederlerse editöre raporlamalıdırlar.

Hakem, makale konusu hakkında kendini vasıflı hissetmiyor ya da zamanında geri dönüş sağlaması mümkün görünmüyorsa, editöre bu durumu bildirmeli ve hakem sürecine kendisini dahil etmemesini istemelidir.

Değerlendirme sürecinde editör, hakemlere gözden geçirme için gönderilen makalelerin gizli bilgi olduğunu ve bunun imtiyazlı bir iletişim olduğunu açıkça belirtir. Hakemler ve yayın kurulu üyeleri, başka kişilerle makaleleri tartışamazlar. Hakemlerin kimliğinin gizli kalmasına özen gösterilmelidir. Bazı durumlarda editörün kararıyla, ilgili hakemlerin makaleye ait yorumları aynı makaleyi yorumlayan diğer hakemlere gönderilerek hakemlerin bu süreçte aydınlatılması sağlanabilir.

HAKEMLİK HAKKINDA

Hakem Değerlendirme Politikaları

Daha önce yayınlanmamış ya da yayınlanmak üzere başka bir dergide halen değerlendirmede olmayan ve her bir yazar tarafından onaylanan makaleler değerlendirilmek üzere kabul edilir. Gönderilen ve ön kontrolü geçen makaleler iThenticate yazılımı kullanılarak intihal için taranır. İntihal kontrolünden sonra, uygun olan makaleler baş editör tarafından orijinallik, metodoloji, işlenen konunun önemi ve dergi kapsamı ile uyumluluğu açısından değerlendirilir.

Seçilen makaleler en az iki ulusal/uluslararası hakeme çift taraflı kör hakemlik ile değerlendirmeye gönderilir; yayın kararı, hakemlerin talepleri doğrultusunda yazarların gerçekleştirdiği düzenlemelerin ve hakem sürecinin sonrasında baş editör tarafından verilir.

Editör ve Hakem Sorumlulukları

Baş editör, makaleleri, yazarların etnik kökeninden, cinsiyetinden, uyruğundan, dini inancından ve siyasi felsefesinden bağımsız olarak değerlendirirler. Yayına gönderilen makalelerin adil bir şekilde çift taraflı kör hakem değerlendirmesinden geçmelerini sağlar. Gönderilen makalelere ilişkin tüm bilginin, makale yayınlanana kadar gizli kalacağını garanti eder.

Baş editör içerik ve yayının toplam kalitesinden sorumludur. Gereğinde hata sayfası yayınlamalı ya da düzeltme yapmalıdır.

Baş editör; yazarlar, editörler ve hakemler arasında çıkar çatışmasına izin vermez. Hakem atama konusunda tam yetkiye sahiptir ve dergide yayınlanacak makalelerle ilgili nihai kararı vermekle yükümlüdür.

Hakemler, araştırma, yazarlar ve/veya araştırmaya fon sağlayanlarla çıkar çatışması içinde olmamalıdır. Hakemler değerlendirmelerinin sonucunda tarafsız bir yargıya varmalıdırlar. Gönderilmiş yazılara ilişkin tüm bilginin gizli tutulmasını sağlamalı ve yazar tarafında herhangi bir telif hakkı ihlali ve intihal fark ederlerse editöre raporlamalıdırlar.

Hakem, makale konusu hakkında kendini vasıflı hissetmiyor ya da zamanında geri dönüş sağlaması mümkün görünmüyorsa, editöre bu durumu bildirmeli ve hakem sürecine kendisini dahil etmemesini istemelidir.

Değerlendirme sürecinde editör hakemlere gözden geçirme için gönderilen makalelerin, yazarların özel mülkü olduğunu ve bunun imtiyazlı bir iletişim olduğunu açıkça belirtir. Hakemler ve yayın kurulu üyeleri başka kişilerle makaleleri tartışamazlar. Hakemlerin kimliğinin gizli kalmasına özen gösterilmelidir. Bazı durumlarda editörün kararıyla, ilgili hakemlerin makaleye ait yorumları aynı makaleyi yorumlayan diğer hakemlere gönderilerek hakemlerin bu süreçte aydınlatılması sağlanabilir.

Hakem Süreci

Daha önce yayınlanmamış ya da yayınlanmak üzere başka bir dergide halen değerlendirmede olmayan ve her bir yazar tarafından onaylanan makaleler değerlendirilmek üzere kabul edilir. Gönderilen ve ön kontrolü geçen makaleler iThenticate yazılımı kullanılarak intihal için taranır. İntihal kontrolünden sonra, uygun olan makaleler baş editör tarafından orijinallik, metodoloji, işlenen konunun önemi ve dergi kapsamı ile uyumluluğu açısından değerlendirilir. Editör, makaleleri, yazarların etnik kökeninden, cinsiyetinden, cinsel yöneliminden, uyruğundan, dini inancından ve siyasi felsefesinden bağımsız olarak değerlendirir. Yayına gönderilen makalelerin adil bir şekilde çift taraflı kör hakem değerlendirmesinden geçmelerini sağlar.

Seçilen makaleler en az iki ulusal/uluslararası hakeme değerlendirmeye gönderilir; yayın kararı, hakemlerin talepleri doğrultusunda yazarların gerçekleştirdiği düzenlemelerin ve hakem sürecinin sonrasında baş editör tarafından verilir.

Hakemlerin değerlendirmeleri objektif olmalıdır. Hakem süreci sırasında hakemlerin aşağıdaki hususları dikkate alarak değerlendirmelerini yapmaları beklenir.

- Makale yeni ve önemli bir bilgi içeriyor mu?
- Öz, makalenin içeriğini net ve düzgün bir şekilde tanımlıyor mu?
- Yöntem bütünlüklü ve anlaşılır şekilde tanımlanmış mı?
- Yapılan yorum ve varılan sonuçlar bulgularla kanıtlanıyor mu?
- Alandaki diğer çalışmalara yeterli referans verilmiş mi?
- Dil kalitesi yeterli mi?

Hakemler, gönderilen makalelere ilişkin tüm bilginin, makale yayınlanana kadar gizli kalmasını sağlamalı ve yazar tarafında herhangi bir telif hakkı ihlali ve intihal fark ederlerse editöre raporlamalıdırlar. Hakem, makale konusu hakkında kendini vasıflı hissetmiyor ya da zamanında geri dönüş sağlaması mümkün görünmüyorsa, editöre bu durumu bildirmeli ve hakem sürecine kendisini dahil etmemesini istemelidir.

Değerlendirme sürecinde editör hakemlere gözden geçirme için gönderilen makalelerin, yazarların özel mülkü olduğunu ve bunun imtiyazlı bir iletişim olduğunu açıkça belirtir. Hakemler ve yayın kurulu üyeleri başka kişilerle makaleleri tartışamazlar. Hakemlerin kimliğinin gizli kalmasına özen gösterilmelidir.

MAKALE HAZIRLAMA VE GÖNDERİM

Dil

Derginin yayın dili Türkçe ve İngilizcedir.

Makale Gönderimi

Makale gönderimi online olarak ve https://dergipark.org.tr/tr/pub/hturcicum üzerinden yapılmalıdır. Gönderilen yazılar, yazının yayınlanmak üzere gönderildiğini ifade eden, makale türünü belirten ve makaleyle ilgili bilgileri içeren (bkz: Son Kontrol Listesi) bir mektup, kapak sayfası, yazar formu, yazının elektronik formunu içeren Microsoft Word 2003 ve üzerindeki versiyonları ile yazılmış elektronik dosya ve tüm yazarların imzaladığı Telif Hakkı Anlaşması Formu eklenerek gönderilmelidir.

Bir makalenin sunulması: gönderilen çalışmanın daha önce yayınlanmamış olmadığı, aynı anda başka bir yerde yayınlanmak üzere değerlendirilmediği; yayınlanmasının, varsa tüm ortak yazarlar tarafından ve ayrıca çalışmanın yürütüldüğü birimdeki sorumlu makamlar tarafından- zımnen veya açıkça – onaylandığı anlamına gelir. Herhangi bir tazminat talebi olması durumunda yayıncı yasal olarak sorumlu tutulamaz.

İzinler
Halihazırda başka bir yerde yayınlanmış olan şekil, tablo veya metin pasajlarını dahil etmek isteyen yazarların hem basılı hem de çevrimiçi format için telif hakkı sahibinden izin almaları ve makalelerini gönderirken bu iznin verildiğine dair kanıt eklemeleri gerekmektedir. Bu tür kanıtlar olmadan alınan herhangi bir materyalin yazarlardan geldiği varsayılacaktır.

Çevrimiçi Gönderim
Yönergeleri izleyerek makalenize ait tüm dosyaları yükleyiniz.

Lütfen ilgili tüm düzenlenebilir kaynak dosyaları sağladığınızdan emin olun. Bu kaynak dosyaların gönderilmemesi, inceleme ve üretim sürecinde gereksiz gecikmelere neden olabilir.

Tablolar

Tüm tablolar Arabik rakamlar kullanılarak numaralandırılır.

Tablolara metin içinde her zaman ardışık sayısal sırayla atıfta bulunulmalıdır.

Her tablo için lütfen tablonun bileşenlerini açıklayan bir tablo başlığı veriniz.

Tablo alıntıysa, başlığının sonunda bir referans şeklinde orijinal kaynağı veriniz.

Tablolara ilişkin dipnotlar, üst simge küçük harflerle (veya anlamlılık değerleri ve diğer istatistiksel veriler için yıldızlarla) gösterilmeli ve tablo gövdesinin altına dahil edilmelidir.

Herbarium Turcicum, makaleyi destekleyen ancak elektronik biçimde daha uygun olan kapsamlı tabloların yalnızca çevrimiçi yayınlanmasını teşvik eder.

Görsel Materyaller

En iyi kalitede nihai ürün için, tüm çalışmalarınızı (fotoğraflar, çizimler vb.) elektronik formatta göndermeniz önemle tavsiye edilir. Yayınlanan çalışma, sağlanan görsel materyalin kalitesini doğrudan yansıtacaktır.

Elektronik Şekil Gönderimi

Tüm rakamlar, kullanılan harfler ayrı birer katman olacak şekilde gönderilmelidir.

Resmi oluşturmak için hangi editörün kullanıldığını belirtin.

Vektör grafikleri için tercih edilen format EPS'dir; siyah beyaz resimler için lütfen TIFF biçimini kullanın. MS Office dosyaları da kabul edilebilir.

Şekil dosyalarınızı "Şekil" ve şekil numarası ile adlandırın.

Şekil Numaralandırma

Tüm şekiller Arabik rakamlar kullanılarak numaralandırılmalıdır.

Şekiller metin içinde her zaman ardışık numara sırasına göre belirtilmelidir.

Şekil bölümleri küçük harflerle (a, b, c, vb.) gösterilmelidir.

Makalenizde bir ek görünüyorsa ve bir veya daha fazla şekil içeriyorsa, ana metnin ardışık numaralandırmasına devam edin. Ekteki şekillere "A1, A2, A3, vb." şeklinde numara vermeyin. Bununla birlikte, çevrimiçi eklerdeki [Ek Bilgiler (SI)] içindeki rakamlar ayrıca numaralandırılmalıdır.

Şekil Başlıkları

Her şeklin, şeklin neyi tasvir ettiğini tam olarak açıklayan kısa bir başlığı olmalıdır. Alt yazıları şekil dosyasına değil, yazının metin dosyasına ekleyin.

Şekil başlıkları, kalın yazı tipiyle Şekil terimiyle başlar, ardından yine kalın yazı tipiyle şekil numarası gelir.

Numaradan sonra noktalama işareti konulmamalı ve başlığın sonuna herhangi bir noktalama işareti konulmamalıdır.

Şekilde bulunan tüm öğeleri şekil başlığında tanımlayın ve grafiklerde koordinat noktaları olarak kutuları, daireleri vb. kullanın.

Eğer alıntıysa, şekil başlığının sonunda bir referans alıntısı şeklinde orijinal kaynağı vererek daha önce yayınlanmış materyali tanımlayın.

Makale Türleri

Yayınlanmak üzere gönderilecek makaleler, bitki sistematiği ana tema olmak üzere herbaryumlar ve canlı koleksiyonlarlalar ilgili konulara yönelik olmalıdır. Dergimiz bitki nadir ve tehdit altında olan türlerin orijinal çizimleri ile yüksek kalitede orijinal fotoğrafları da betimleriyle birlikte kabul etmektedir. Derginin tayfı maddeler halinde aşağıda sunulmuştur. Konu özgün olmalı ve okuyucularımızın ilgisini çekmelidir. Gerek Türkçe ve gerekse İngilizce dillerinde gönderilen metinler dil ve yazım kurallarına azami ölçüde dikkat edilerek sunulmalıdır.

Orijinal Araştırma Makalesi

Herbaryumlar, canlı koleksiyonlar ve bitki sistematiği ile ilgili soruları veya hipotezleri ele alan ampirik ve teorik araştırmaların sonuçlarını sunan makaleler.

Derleme

Herbaryumlar, canlı koleksiyonlar ve bitki sistematiği alanlarındaki son gelişmelerin ve kayda değer ilerlemelerin sunumu ele alan makaleler. Derleme geniş bir kitlenin ilgisini çekmelidir. Derlemenin hem mevcut bilgileri özetlemeli hem de gelecekteki araştırmalar için yeni fikirler ve hipotezler önermeleri beklenir.

Editöre Mektup

Dergilerde yayınlanmış araştırma makaleleri için editöre yazılmış ek bilimsel katkı, yorum ve eleştiri getiren, alternatif yorum sağlayan önemli yeni bulguları bildiren kısa makalelerdir. En fazla 3 sayfa (4000 kelime) olması önerilir.

Kapak Sayfası

Lütfen kapak sayfanızın aşağıdaki bilgileri içerdiğinden emin olun.

Başlık
Başlık kısa ve bilgilendirici olmalıdır.

Yazar bilgileri
Yazar(lar)ın ad(lar)ı,

Yazar(lar)ın bağlı olduğu kurum(lar) ve adresleri,

Bir kuruma bağlı olmayan yazarlar için ikamet adresleri,

Sorumlu yazarın açık ve aktif e-posta adresi.

Özet
Özet, 150 ila 250 kelimeden oluşur, tanımsız kısaltmalar veya referanslar içermez.

Anahtar Kelimeler
İndeksleme amacıyla kullanılabilecek 4 ila 6 anahtar kelime verilir.

Açıklamalar ve Beyanlar

Çıkar çakışması/çatışması: Yazarların, yayınlanmak üzere gönderilen çalışma ile doğrudan veya dolaylı olarak ilgili olan finansal veya finansal olmayan çıkarlarını açıklamaları gerekmektedir.

Özetin, makalenin ana sonuçlarını ve sonuçlarını basit, olgusal ifadeler kullanarak sunan bağımsız bir belge olarak kullanılabilir olması gerektiğini lütfen unutmayın.

Makale Yapısı

Sunulan araştırma makalesinin metni şu bölümlere ayrılmalıdır: Başlık sayfası, Özet, Giriş, Gereç ve Yöntemler, Tartışma ve Sonuç, Sonsöz (isteğe bağlı), Teşekkür, Kaynaklar.

Metni Şekil başlıkları takip eder. Tablolar, Şekiller ve Elektronik Ek Materyaller ayrı dosyalar olarak yüklenir.

Giriş

Giriş, makalede sunulan çalışmanın yapılma nedenini, incelenen soruları belirtmeli ve temel arka planı özetlemelidir. Giriş bölümü tipik olarak spesifik, test edilebilir hipotezlerle sona erer.

Gereç ve Yöntemler

Gereçler ve yöntemler bölümü, çalışmanın tüm bölümlerinin tekrarlanabilirliğine imkan vermek için uygulanan yöntem ve teknikler hakkında yeterli ayrıntı sağlamalıdır. Standart tekniklerin ve yaklaşımların ayrıntılı olarak açıklanmasına gerek yoktur; bunun yerine daha önce yayınlanmış çalışmalara atıfta bulunun. Her çalışılan bitkisel materyal için Index Herbariorum (http://sweetgum.nybg.org/science/ih/)'a kayıtlı bir herbaryuma bir şahit örnek verilmesi gerekliliğini unutmayınız.

Tartışma ve Sonuç

Tartışma bölümü, giriş bölümünde sunulan sorular ve hipotezlerle ilgili sonuçların önemine işaret etmeli ve yeni bulguları diğer çalışmalar bağlamında değerlendirmelidir. Sonuç bölümü, tablo ve şekillerde gösterilen önemli ayrıntılara dikkat çekerek, sonuçları mantıklı bir şekilde belirtmelidir.

Sonsöz (İsteğe Bağlı)

Bu bölümde, yazarlar araştırmanın ana katkısını/sonucunu kısaca tanımlayabilir ve önemi ve uygunluğu hakkında net bir açıklama yapabilir.

Taksonomik İfadeler

Betimler ve taksonomik yenilikler, "Tartışma ve Sonuç" kısmından hemen sonra ayrı bir paragrafta sunulmalıdır.

Metin

Metin Biçimi
Yazılar Microsoft Word programında yazılmalı, gönderilmelidir.

Metin için normal, 10 punto Times New Roman yazı tipini kullanın. Satır aralığı tek, paragraf aralığı öncesinde ve sonrasında 6 nk olacak şekilde kullanın. Vurgu için italik kullanın.

Sayfa kenar boşluklarının tümünün 2,5 cm olmasını sağlayın.

Sayfaları numaralandırmak için otomatik sayfa numaralandırma işlevini kullanın.

Girintiler için boşluk çubuğunu değil, sekme duraklarını veya diğer komutları kullanın.

Tablo yapmak için elektronik tabloları değil tablo işlevini kullanın.

Denklemler için denklem düzenleyiciyi veya MathType'ı kullanın.

Dosyanızı docx biçiminde (Word 2007 veya üstü) veya doc biçiminde (eski Word sürümleri) kaydedin.

Başlıklar
Lütfen görüntülenen başlıkların üç seviyesinden fazlasını kullanmayın.

Kısaltmalar
Kısaltmalar ilk geçtiği yerde tanımlanmalı ve bundan sonra tutarlı bir şekilde kullanılmalıdır.

Dipnotlar
Dipnotlar, sadece gerektiği durumlarda; yapılan bir atıfla ilgili ek açıklama gerektiğinde, standart atıfla belirtilemeyecek özel durumlarda kullanılmalıdır.

Teşekkür
Kişilerin, bağışların, fonların vb. teşekkürleri başlık sayfasında ayrı bir bölüme yerleştirilmelidir. Finansman sağlayan kuruluşların isimleri tam olarak yazılmalıdır.

Bilimsel Stil
- Birimler, SI birimleri için lütfen her zaman uluslararası kabul görmüş işaret ve sembolleri kullanın.
- Tür ve alt tür adları italik, normal metinde daha yüksek taksonomik düzeyler italik yazılmamalıdır.
- Bitki otörlerinin isimleri, ilgili taksonun ilk geçtiği yerde verilmesi, eğer özel bir durum yoksa, yeterlidir. Bitki otörlerini bulmak için www.ipni.org adresinden yararlanabilirsiniz. Eğer yararlandıysanız, uygun bir biçimde referans listesinde bu adresi veriniz.
- Herbarium Turcicum, makalenin nihai kabulünden önce okuyucu erişimini kolaylaştırmak için destekleyici verilerin uygun bir havuzda saklanmasını gerektirir. DNA, RNA veya protein dizileri gibi genetik bilgiler GenBank (http://www.ncbi.nlm.nih.gov/genbank/) veya EMBL (http://www.ncbi.nlm.nih.gov/genbank/) gibi uygun bir veri bankasına gönderilmelidir.

www.ebi.ac.uk/embl/). Yazarların, yeni nesil dizileme tekniklerinden üretilen tüm dizileri, NCBI Dizi.

Okuma Arşivi (http://www.ncbi.nlm.nih.gov/sra), Dizi Okuma Arşivi gibi uygun bir halka açık havuzda arşivlemeleri önerilir. ENA (http://www.ebi.ac.uk/ena/about/sra_submissions) veya Dryad.

TreeBase (http://www.treebase.org) ve Dryad http://datadryad.org/) halka açık erişimdir ve filogenetik çalışma için kullanılan hizalamalar için önerilir.

Kaynaklar

Kabul edilmiş ancak henüz sayıya dahil edilmemiş makaleler Erken Görünüm olarak yayınlanır ve bu makalelere atıflar “advance online publication” şeklinde verilmelidir. Genel bir kaynaktan elde edilemeyecek temel bir konu olmadıkça “kişisel iletişimlere” atıfta bulunulmamalıdır. Eğer atıfta bulunulursa parantez içinde iletişim kurulan kişinin adı ve iletişimin tarihi belirtilmelidir. Bilimsel makaleler için yazarlar, bu kaynaktan yazılı izin ve iletişimin doğruluğunu gösterir belge almalıdır.

Referans Stili ve Formatı

Herbarium Turcicum, metin içi alıntılama ve kaynak gösterme için APA (American Psychological Association) kaynak sitilinin 6. edisyonunu benimser. APA 6.Edisyon hakkında bilgi için:

- American Psychological Association. (2010). Publication manual of the American PsychologicalAssociation (6th ed.). Washington, DC: APA.
- http://www.apastyle.org/

Kaynakların doğruluğundan yazar(lar) sorumludur. Tüm kaynaklar metinde belirtilmelidir. Kaynaklar aşağıdaki örneklerdeki gibi gösterilmelidir.

Metin İçinde Kaynak Gösterme

Kaynaklar metinde parantez içinde yazarların soyadı ve yayın tarihi yazılarak belirtilmelidir. Birden fazla kaynak gösterilecekse kaynaklar arasında (;) işareti kullanılmalıdır. Kaynaklar alfabetik olarak sıralanmalıdır.

Örnekler:

Birden fazla kaynak;
(Esin ve ark., 2002; Karasar 1995)
Tek yazarlı kaynak;
(Akyolcu, 2007)
İki yazarlı kaynak;
(Sayıner ve Demirci 2007, s. 72)
Üç, dört ve beş yazarlı kaynak;
Metin içinde ilk kullanımda: (Ailen, Ciambrune ve Welch 2000, s. 12–13) Metin içinde tekrarlayan kullanımlarda: (Ailen ve ark., 2000)
Altı ve daha çok yazarlı kaynak;
(Çavdar ve ark., 2003)

Kaynaklar Bölümünde Kaynak Gösterme

Kullanılan tüm kaynaklar metnin sonunda ayrı bir bölüm halinde yazar soyadlarına göre alfabetik olarak numaralandırılmadan verilmelidir.

Kaynak yazımı ile ilgili örnekler aşağıda verilmiştir.

Kitap

a) Türkçe Kitap
Karasar, N. (1995). *Araştırmalarda rapor hazırlama* (8.bs). Ankara: 3A Eğitim Danışmanlık Ltd.
b) Türkçeye Çevrilmiş Kitap
Mucchielli, A. (1991). *Zihniyetler* (A. Kotil, Çev.). İstanbul: İletişim Yayınları.
c) Editörlü Kitap
Ören, T., Üney, T. ve Çölkesen, R. (Ed.). (2006). *Türkiye bilişim ansiklopedisi.* İstanbul: Papatya Yayıncılık.
d) Çok Yazarlı Türkçe Kitap
Tonta, Y., Bitirim, Y. ve Sever, H. (2002). *Türkçe arama motorlarında performans değerlendirme.* Ankara: Total Bilişim.
e) İngilizce Kitap
Kamien R., & Kamien A. (2014). *Music: An appreciation.* New York, NY: McGraw-Hill Education.
f) İngilizce Kitap İçerisinde Bölüm
Bassett, C. (2006). Cultural studies and new media. In G. Hall & C. Birchall (Eds.), *New cultural studies: Adventures in theory* (pp. 220–237). Edinburgh, UK: Edinburgh University Press.
g) Türkçe Kitap İçerisinde Bölüm
Erkmen, T. (2012). Örgüt kültürü: Fonksiyonları, öğeleri, işletme yönetimi ve liderlikteki önemi. M. Zencirkıran (Ed.), *Örgüt sosyolojisi kitabı* içinde (s. 233–263). Bursa: Dora Basım Yayın.
h) Yayımcının ve Yazarın Kurum Olduğu Yayın
Türk Standartları Enstitüsü. (1974). *Adlandırma ilkeleri.* Ankara: Yazar.

Makale

a) Türkçe Makale
Mutlu, B. ve Savaşer, S. (2007). Çocuğu ameliyat sonrası yoğun bakımda olan ebeveynlerde stres nedenleri ve azaltma girişimleri. *İstanbul Üniversitesi Florence Nightingale Hemşirelik Dergisi, 15*(60), 179–182.
b) İngilizce Makale
de Cillia, R., Reisigl, M., & Wodak, R. (1999). The discursive construction of national identity. *Discourse and Society, 10*(2), 149–173. http://dx.doi.org/10.1177/0957926599010002002
c) Yediden Fazla Yazarlı Makale
Lal, H., Cunningham, A. L., Godeaux, O., Chlibek, R., Diez-Domingo, J., Hwang, S.-J. ... Heineman, T. C. (2015). Efficacy of an adjuvanted herpes zoster subunit vaccine in older adults. *New England Journal of Medicine, 372,* 2087–2096. http://dx.doi.org/10.1056/NEJMoa1501184

d) DOI'si Olmayan Online Edinilmiş Makale

Al, U. ve Doğan, G. (2012). Hacettepe Üniversitesi Bilgi ve Belge Yönetimi Bölümü tezlerinin atıf analizi. *Türk Kütüphaneciliği, 26,* 349–369. Erişim adresi: http://www.tk.org.tr/

e) DOI'si Olan Makale

Turner, S. J. (2010). Website statistics 2.0: Using Google Analytics to measure library website effectiveness. *Technical Services Quarterly, 27,* 261–278. http://dx.doi.org/10.1080/07317131003765910

f) Advance Online Olarak Yayımlanmış Makale

Smith, J. A. (2010). Citing advance online publication: A review. *Journal of Psychology.* Advance online publication. http://dx.doi.org/10.1037/a45d7867

g) Popüler Dergi Makalesi

Semercioğlu, C. (2015, Haziran). Sıradanlığın rayihası. *Sabit Fikir, 52,* 38–39.

Tez, Sunum, Bildiri

a) Türkçe Tezler

Sarı, E. (2008). *Kültür kimlik ve politika: Mardin'de kültürlerarasılık.* (Doktora Tezi). Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

b)Ticari Veritabanında Yer Alan Yüksek Lisans Ya da Doktora Tezi

Van Brunt, D. (1997). *Networked consumer health information systems* (Doctoral dissertation). Available from ProQuest Dissertations and Theses. (UMI No. 9943436)

c) Kurumsal Veritabanında Yer Alan İngilizce Yüksek Lisans/Doktora Tezi

Yaylalı-Yıldız, B. (2014). *University campuses as places of potential publicness: Exploring the politicals, social and cultural practices in Ege University* (Doctoral dissertation). Retrieved from Retrieved from: http://library.iyte.edu.tr/tr/hizli-erisim/iyte-tez-portali

d) Web'de Yer Alan İngilizce Yüksek Lisans/Doktora Tezi

Tonta, Y. A. (1992). *An analysis of search failures in online library catalogs* (Doctoral dissertation, University of California, Berkeley). Retrieved from http://yunus.hacettepe.edu.tr/~tonta/yayinlar/phd/ickapak.html

e) Dissertations Abstracts International'da Yer Alan Yüksek Lisans/Doktora Tezi

Appelbaum, L. G. (2005). Three studies of human information processing: Texture amplification, motion representation, and figure-ground segregation. *Dissertation Abstracts International: Section B. Sciences and Engineering, 65*(10), 5428.

f) Sempozyum Katkısı

Krinsky-McHale, S. J., Zigman, W. B. & Silverman, W. (2012, August). Are neuropsychiatric symptoms markers of prodromal Alzheimer's disease in adults with Down syndrome? In W. B. Zigman (Chair), *Predictors of mild cognitive impairment, dementia, and mortality in adults with Down syndrome.* Symposium conducted at American Psychological Association meeting, Orlando, FL.

g) Online Olarak Erişilen Konferans Bildiri Özeti

Çınar, M., Doğan, D. ve Seferoğlu, S. S. (2015, Şubat). *Eğitimde dijital araçlar: Google sınıf uygulaması üzerine bir değerlendirme* [Öz]. Akademik Bilişim Konferansında sunulan bildiri, Anadolu Üniversitesi, Eskişehir. Erişim adresi: http://ab2015.anadolu.edu.tr /index.php?menu=5&submenu=27

h) Düzenli Olarak Online Yayımlanan Bildiriler

Herculano-Houzel, S., Collins, C. E., Wong, P., Kaas, J. H., & Lent, R. (2008). The basic nonuniformity of the cerebral cortex. *Proceedings of the National Academy of Sciences, 105,* 12593–12598. http://dx.doi.org/10.1073/pnas.0805417105

i) Kitap Şeklinde Yayımlanan Bildiriler

Schneider, R. (2013). Research data literacy. S. Kurbanoğlu ve ark. (Ed.), Communications in Computer and Information Science: Vol. 397. *Worldwide Communalities and Challenges in Information Literacy Research and Practice* içinde (s. 134–140). Cham, İsviçre: Springer. http://dx.doi.org/10.1007/978-3-319-03919-0

j) Kongre Bildirisi

Çepni, S., Bacanak A. ve Özsevgeç T. (2001, Haziran). *Fen bilgisi öğretmen adaylarının fen branşlarına karşı tutumları ile fen branşlarındaki başarılarının ilişkisi.* X. Ulusal Eğitim Bilimleri Kongresi'nde sunulan bildiri, Abant İzzet Baysal Üniversitesi, Bolu

Diğer Kaynaklar

a) Gazete Yazısı

Toker, Ç. (2015, 26 Haziran). 'Unutma' notları. *Cumhuriyet,* s. 13.

b) Online Gazete Yazısı

Tamer, M. (2015, 26 Haziran). E-ticaret hamle yapmak için tüketiciyi bekliyor. *Milliyet.* Erişim adresi: http://www.milliyet

c) Web Page/Blog Post

Bordwell, D. (2013, June 18). David Koepp: Making the world movie-sized [Web log post]. Retrieved from http://www.davidbordwell.net/blog/page/27/

d) Online Ansiklopedi/Sözlük

Bilgi mimarisi. (2014, 20 Aralık). Vikipedi içinde. Erişim adresi: http://tr.wikipedia.org/wiki/Bilgi_mimarisi

Marcoux, A. (2008). Business ethics. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy*. Retrieved from http://plato.stanford.edu/entries/ethics-business/

e) Podcast

Radyo ODTÜ (Yapımcı). (2015, 13 Nisan). *Modern sabahlar* [Podcast]. Erişim adresi: http://www.radyoodtu.com.tr/

f) Bir Televizyon Dizisinden Tek Bir Bölüm

Shore, D. (Senarist), Jackson, M. (Senarist) ve Bookstaver, S. (Yönetmen). (2012). Runaways [Televizyon dizisi bölümü]. D. Shore (Baş yapımcı), *House M.D.* içinde. New York, NY: Fox Broadcasting.

g) Müzik Kaydı

Say, F. (2009). Galata Kulesi. *İstanbul senfonisi* [CD] içinde. İstanbul: Ak Müzik.

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