

# JOURNAL OF SCIENCE



SAKARYA UNIVERSITY

## Sakarya University Journal of Science

ISSN 1301-4048 | e-ISSN 2147-835X | Period Bimonthly | Founded: 1997 | Publisher Sakarya University |  
<http://www.saujs.sakarya.edu.tr/en/>

Title: The Geophytes of Sakarya City

Authors: Mehmet SAĞIROĞLU

Received: 2020-04-10 12:55:52

Accepted: 2020-07-27 19:59:44

Article Type: Research Article

Volume: 24

Issue: 5

Month: October

Year: 2020

Pages: 991-1007

How to cite

Mehmet SAĞIROĞLU; (2020), The Geophytes of Sakarya City. Sakarya University Journal of Science, 24(5), 991-1007, DOI:

<https://doi.org/10.16984/saufenbilder.717563>

Access link

<http://www.saujs.sakarya.edu.tr/en/pub/issue/56422/717563>

New submission to SAUJS

<http://dergipark.org.tr/en/journal/1115/submission/step/manuscript/new>



## The Geophytes of Sakarya City

Mehmet SAĞIROĞLU\*<sup>1</sup>

### Abstract

Sakarya city is within the Europe-Siberia phytogeographic region in Turkey. The effect of the Black Sea climate is usually seen in the study area. Black sea climate is effective in the northern part, while the Mediterranean climate is generally dominant in the South. In the area under the influence of the Mediterranean climate, there is a vegetation where the maquis-pseudomaquis communities are seen. The main research area of this study is chosen to be the geophyte plants collected in the city of Sakarya, Turkey. 1051 plant specimens were collected during field studies between 2009-2020. From the plant collection, 220 taxa and 80 genus belonging to 29 families have been identified. 18 of these taxa, are endemic. Of the total taxa in the area are 40 elements Euro-Siberian, 41 widespread, 79 Mediterranean, 7 Iranian-Turan, 16 Euxine, 34 phytogeographically unknown, 1 Hyrcano, 1 Hyrcano-Euxine, 1 North Americana elements.

**Keywords:** Geophyte, Endemic, Sakarya, Turkey

---

\*Corresponding Author: [msagioglu@sakarya.edu.tr](mailto:msagioglu@sakarya.edu.tr)

<sup>1</sup>Sakarya University, ORCID: <http://orcid.org/0000-0001-8654-3361>

## 1. INTRODUCTION

The term of Geophyte means ground plants. They are commonly known as onion, tuber, rhizome, corm plants. Turkey stays in mild climate zone in the World. From the plant variety point of view, it appears in the first rank. In Turkey there are exists about 12 000 plant taxa.

Geophyte plants are of importance within this wealth flora. About 2500 geophyte plants grow in Turkey [1]. These plants are attractive for their alluring flowers. Geophytes are accepted to be the herald of the spring and the source of inspiration of arts and love. With this biodiversity in Turkey, the flora becomes preivilged and the works carried upon these flora may thus have the potential to obtain different results. The goephyte species are the main part in the flora of Sakarya. In this study it is aimed to determine the geophyte taxa growing the city of Sakarya.

Sakarya city stays within the Europe-Siberia phytogeographic region (Figure 1). The effect of the Black Sea climate is mostly seen in the study area. While the black sea climate has a prominent effect in the northern part of the province, the Mediterranean climate is seen in the south. In the area under the influence of the Mediterranean climate, there is a vegetation where the maquis-pseudomaquis communities are seen.



Figure 1 Study are map

There are various habitats in Sakarya provinve such as mauntainous areas, hills, valleys, wide sands, lakes, rivers, floodplain ranging from to 0 to 1600 m.

There are many and different species in these particular habitat types. In this study geophyte species in Sakarya are given.

## 2. MATERIALS AND METHODS

The main materials for that study were geophyte plants spread in the city of Sakarya. The plants were collected between the years 2009 and 2020.

For the identification process of the taxa we used the books titled “Flora of Turkey and the East Aegean Islands [2-4]. The names of the detected species were organized according to the book “Türkiye Bitkileri Listesi (Damarlı Bitkiler)” [5]. The threat categories of these endemic and rare taxa were determined using the criteria described in the boks “Türkiye Bitkileri Kırmızı Kitabı [6]” and IUCN [7]. Plants were made Herbarium materials and conserved at the herbarium of Biology Department, Sakarya University.

Some geofit taxa given in Geyve flora could not be found in the specified localities [8]. It has been observed that most of these localities have turned into agricultural lands or settlements. Taxa that we believe can be in the area but cannot be found by us are given with their records in this list.

Taxons collected in this study are given together with their localities, phytogeographic elements and endemism states.

### 2.1 Abbreviations

Sakarya University: **SAU**, Iranian Turanian Element: **Ir.-Tur.** Widespread: **Widesp.**, -Siberian Element: **Euro-Sib.**, Element: Mediterranean; **Medit.**, Euxine Element: **Eux.**, Hyrcano Element: **Hyrc.**, Hyrcano-Euxine Element: **Hyrc.-Eux.**, North America Element: **N.Ame.**, Unknown: **Unk.**, Critically endangered: **CR**, Endangered: **EN**, Vulnerable: **VU**, Near Threatened: **NT**, Least concern: **LC**.

### 3.RESULTS

#### Geophyte Flora of Research Area

#### ALISMATACEAE

##### *Alisma plantago-aquatica*L.

Sapanca lake, 10.06.2012, M.Sağiroğlu  
3421. **Euro.-Sib.**

##### *Alisma lanceolatum* With.

Acarlar longozu, 15.06.2020, M.Sağiroğlu  
6766. **Widesp.**

##### *Alisma gramineum* Lej.

Acarlar longozu, 15.06.2020, M.Sağiroğlu  
6767. **Unk.**

#### AMARYLLIDACEAE

##### *Allium rubellum*M. Bieb

SAU- Aşağıdereköy way 100 m,  
20.06.2012, M. Sağiroğlu 3544. **Ir.-Tur.**

##### *Allium paniculatum* L.subsp. *paniculatum*

SAU, surroundings of Engineering  
Faculty 180 m, 14.06.2012 M. Sağiroğlu  
3541. **Medit.**

##### *Allium paniculatum* L.subsp. *fuscum* (Waldst. & Kit) Soó

Pamukova Hayrettin village, 400 m,  
15.07.2013, M.Sağiroğlu 3948. **Medit.**

##### *Allium pallens* L. subsp. *pallens*

Karasu-Akkum village, 40 m, 15.06.2012,  
M.Sağiroğlu 3848. **Medit.**

##### *Allium rupestre*Steven

Geyve, Kışlaçay-Doğançay, 2<sup>nd</sup> Km, 100  
m, 14.11.2016, M. Sağiroğlu 5485. **Eux.**

##### *Allium hirtovaginatatum* Kunth

Pamukova-Kırca upland, 850 m,  
05.06.2013, M.Sağiroğlu 3940. **Medit.**

##### *Allium sativum* L.

Pamukova-Hüseyinli village way, 3<sup>rd</sup> km,  
200 m, 17.06.2012, M. Sağiroğlu 3524.  
**Widesp.**

##### *Allium atroviolaceum* Boiss.

Kaynarca-Oflak Mountain, Around  
Taşoluk village, 170 m, M.Sağiroğlu  
3954. **Widesp.**

##### *Allium scorodoprasum* L.subsp. *rotundum*(L.) Stearn

Geyve, Doğançıl village, 1340 m,  
18.05.2017, M. Sağiroğlu 6065. **Widesp.**

##### *Allium ampeloprasum* L.

Kaynarca-Karasu way, 3<sup>rd</sup> km, 60 m,  
15.06.2012, M.Sağiroğlu 3993. **Widesp.**

##### *Allium sphaerocephalon* L. subsp. *sphaerocephalon*

Hendek-Çamlıca village, 700 m,  
M.Sağiroğlu 5032. **Euro.-Sib.**

##### *Allium amethystinum*Tausch

Geyve, Doğançıl village, 1350 m,  
18.05.2017, M. Sağiroğlu 6065. **Medit.**

##### *Allium guttatum* Steven subsp. *sardoum* (Moris) Stearn

Pamukova-Hüseyinli village way, 450 m,  
17.06.2012, M. Sağiroğlu 3521. **Medit.**

##### *Allium guttatum* Steven subsp. *guttatum*

Akyazı-Şerefiye village, 750 m,  
15.08.2009, M.Sağiroğlu 2781. **Euro.-Sib.**

##### *Allium lycaonicum* Siehe ex Hayek

Geyve, kulfalar-kamışlı road, 647 m,  
20.04.2008, OUF 15878 [8] **Unk.**

*Leucojum aestivum* L subsp. *aestivum*

Karasu, around Karapınar village, 11 m,  
05.04.2017, M. Sağıroğlu 5738. **Euro.Sib.**

*Sternbergia lutea* (L.) Ker Gawl. ex Spreng.

Serdivan-Kazımpaşa way, 2<sup>nd</sup> km,  
09.10.2016, M. Sağıroğlu 5341. **Widesp.**

*Panocratium maritimum* L.

Karasu, Denizköy coast, 5 m, 18.09.2016,  
M. Sağıroğlu 5095. **Medit.**

*Narcissus poeticus* L. subsp. *poeticus*

Arifiye-Akçay stream, roadside, 50 m,  
01.06.2011, M. Sağıroğlu 3096. **Medit.**

*Narcissus jonquilla* L.

Kaynarca-Kefken way, 2<sup>nd</sup> km, 120 m,  
15.06.2012, M. Sağıroğlu 3489. **Medit.**

*Narcissus pseudonarcissus* L.

Karasu-Denizköy, roadside, 16.03.2020,  
M. Sağıroğlu 6628. **Unk.**

**ARACEAE**

*Arum italicum* Mill

Sapanca, İkramiye valley, 170 m,  
01.06.2011, M. Sağıroğlu 3051. **Unk.**

*Arum byzantinum* Blume

Kaynarca, Uğurlu vilage, clearings forest,  
170 m, 27.04.2017, M. Sağıroğlu 5893.  
**Eux.**

*Arum maculatum* L.

Geyve, Epçeler village, 250 m, 13.06.2017,  
M. Sağıroğlu 5771. **Unk.**

*Arum orientale* M.Bieb.

Pamukova, Şahmelek village, 350 m,  
02.04.2017, M. Sağıroğlu 5701. **Eux.**

*Arum higraphilum* Boiss. subsp. *euxinum*  
(R.R.Mill.) Alpınar. **Endemic**

Akyazı, Keremali mountain, 980 m,  
09.03.2017, M. Sağıroğlu 5587. **Eux.**

*Arum elongatum* Steven

Sapanca, İkramiye valley, 250 m,  
01.06.2011, M. Sağıroğlu 3091. **Unk.**

*Dracunculus vulgaris* Schott

Geyve, Hacılar village, 300 m, 25.05.2017,  
M. Sağıroğlu 6228. **Medit.**

**ARISTOLOCHIACEAE**

*Asarum europaeum* L.

Hendek-Kocaali road, Kırızlı village, 350  
m, 25.04.2017, M. Sağıroğlu 5864. **Euro.-  
Sib.**

*Aristolochia clematitis* L.

Kaynarca-Oflak mountain, 150 m,  
24.07.2013, M. Sağıroğlu 3955. **Euro.-Sib.**

*Aristolochia pallida* Willd.

Pamukova, Kazımiye, Kırca upland, 1000  
m, 01.05.2017, M. Sağıroğlu 5931. **Euro.-  
Sib.**

*Aristolochia bodamae* Dingler

Akyazı, Sultanpınar upland, 1230 m,  
08.06.201, M. Sağıroğlu 6247. **Unk.**

*Aristolochia pontica* Lam.

Geyve, Akıncı village, 570 m, 04.05.2016,  
M. Sağıroğlu 5000. **Eux.**

**ASPARAGACEAE**

*Agave americana* L. subsp. *americana*

Serdivan mountain, roadside, 210  
m, 02.07.2011, M. Sağıroğlu 3148.  
**Widesp.**

*Asparagus acutifolius* L.

Geyve, between Kışlaçay-Doğançay, 150 m, 14.11.2016, M. Sağıroğlu 5487. **Medit.**

*Asparagus aphyllus* L.subsp. *orientalis* (Baker) P.H. Davis

Kaynarca, between Şeyhtımarı-Yenice, 180 m, 16.10.2016, M. Sağıroğlu 5344. **Medit.**

*Asparagus tenuifolius* Lam.

Pamukova, West of Kemaliye village, 732 m, 28.09.2016, M. Sağıroğlu 5266. **Euro.-Sib.**

*Asparagus officinalis* L. subsp. *officinalis*

Kaynarca, around Karaboğaz village, 120 m, 09.05.2017, M. Sağıroğlu 5964. **Widesp.**

*Prospero autumnale* ( L. ) Speta

Karasu, Denizköy coast, 5 m, 18.09.2016, M. Sağıroğlu 5101. **Medit.**

*Bellevalia clusiana* Griseb. **Endemic**

Sakarya, around Poyrazlar Lake, 30 m, 02.05.2017, M. Sağıroğlu 5954. **Ir.-Tur.**

*Hyacinthella lineata* (Steud. ex Schult. &Schult.f.) Chouard **Endemic.**

Geyve-Akıncı village, Beşiktaş stream, 525 m, 13.04.2013, M. Sağıroğlu 3815. **Medit.**

*Hyacinthella micrantha* (Boiss.) Chouard. **Endemic**

Taraklı-Karagöl upland, 1122 m, 26.03.2017, M.Sağıroğlu 5659.**Medit.**

*Galanthus plicatus* M.Bieb.subsp. *byzantinus* (Baker) D.A. Webb

Taraklı, east of Karagöl, 1153 m, 26.03.2017, M. Sağıroğlu 5668. **Eux.**

*Galanthus elwesii* Hokk.f. subsp. *elwesii*

Akyazı, Keremali mountain, 550 m, 09.03.2017, M. Sağıroğlu 5585. **Medit.**

*Galanthus gracilis* Čelak.

Geyve, Kışlaçay village, 133 m, 13.11.2016, M. Sağıroğlu 5476. **Medit.**

*Galanthus nivalis* L.subsp. *nivalis*

Kaynarca- Acarlar longozu, 20, m, 14.03.2020, M. Sağıroğlu 6635, **Euro.-Sib.**

*Scilla bithynica* Boiss.

Sakarya, Sinanoğlu village, open Quercus, 60 m, 28.02.2017, M. Sağıroğlu 5557. **Eux.**

*Scilla bifolia* L.

Akyazı. Dokurcun, Davlumbaz upland, 1000 m, M. Sağıroğlu 06.04.2017. **Medit.**

*Muscari comosum* (L.) Mill.

Pamukova, Şahmelek village, 300 m, 01.05.2017, M. Sağıroğlu 5905. **Widesp.**

*Muscari armeniacum* Leichtlin ex Baker

Kaynarca, around Karaboğaz village, 110m, 09.05.2017, M. Sağıroğlu 5963. **Widesp**

*Muscari tenuiflorum* Tausch.

Geyve, around Akıncı village, 140 m, 24.05.2017, M. Sağıroğlu 6186. **Widesp.**

*Muscari bourgaei* Baker

Akyazı, Dokurcun-Davlumbaz upland, 1450 m, 06.04.2017, M. Sağıroğlu 5749. **Medit. Endemic**

*Muscari neglectum* Guss. ex Ten.

Karasu, Sakarya riverside, 15, m, 09.05.2017, M. Sağıroğlu 5987. **Medit.**

*Muscari aucheri* (Boiss.) Baker **Endemic.**

Pamukova-Kazımiye-Kırca upland, 1020 m, 01.05.2017, M. Sağıroğlu 5932. **Ir.-Tur.**

*Ornithogalum pyrenaicum* L.

Pamulova, Hüseyinli way, 3<sup>rd</sup> km, 11.05.2019, M. Sağıroğlu 6520. **Euro.-Sib.**

*Ornithogalum sphaerocarpum* Kerner

SAU campus, 170 m, 18.05.2010, M.Sağıroğlu 2897. **Widesp.**

*Ornithogalum narbonense* L.

Akyazı-Mudurnu, Taşkesti-Bakdemirler, 550 m, 08.05.2014, M.Sağıroğlu 4975. **Widesp.**

*Ornithogalum oligophyllum* E.D.Clarke

Pamukova, Kırca upland, 950 m, 02.04.2017, M. Sağıroğlu 5688. **Eux.**

*Ornithogalum montanum* Cirillo.

Karasu-Karapınar village, 40 m, 05.04.2017, M. Sağıroğlu 5740. **Medit.**

*Ornithogalum fimbriatum* Willd.

Pamukova, Çilekli village, 700 m, 23.06.2019, M. Sağıroğlu 6487. **Medit.**

*Ornithogalum wiedemannii* Boiss. var. *wiedemannii*

Karasu, Camitepe village, 20 m, 06.03.2017, M.Sağıroğlu 5578. **Widesp.**

*Ornithogalum sigmoideum* Freyn & Sint.

Taraklı-Şehren way, 300 m, 13.06.2017, M. Sağıroğlu 5783. **Euro.-Sib.**

*Ornithogalum comosum* L.

Taraklı-Şehren way, 410 m, 13.04.2017, M. Sağıroğlu 5788. **Medit.**

*Ornithogalum umbellatum* L.

Hendek-karadere way 8. Km, 640 m, 20.03.2017, M. Sağıroğlu 5652. **Medit.**

*Ornithogalum orthophyllum* Ten.

Hendek-Düzce border, left hand, 300 m, 20.03.2017, M. Sağıroğlu 5657. **Widesp.**

*Ornithogalum nutans* L.

Geyve-Akıncı village, 536 m, 15.04.2013, M.Sağıroğlu 3818. **Medit.**

*Polygonatum orientale* Desf.

Geyve-Akıncı village, Beşiktaş stream, 370 m, 07.05.2013, M.Sağıroğlu 3887. **Eux.**

*Polygonatum multiflorum* (L.) All.

Geyve, Doğancıl, 1352 m, 18.05.2017, M. Sağıroğlu 6078. **Widesp.**

*Ruscus aculeatus* L.

Geyve-Akıncı vilage, Beşiktaş stream, 105 m, 19.11.2016, M. Sağıroğlu 5503. **Medit.**

*Ruscus hypoglossum* L.

Geyve-Akıncı village, Beşiktaş stream, 105 m, 19.11.2016, M. Sağıroğlu 5502, **Euro.-Sib.**

**ASTERACEAE**

*Helianthus tuberosus* L.

Kaynarca-Şeyhtımarı village, 180 m, 16.10.2016, M. Sağıroğlu 5353. **N. Ame.**

*Leontodon tuberosus* L.

Hendek-Kocaali, 17<sup>th</sup> km, 800 m, 25.04.2017, M. Sağıroğlu 5873. **Medit.**

*Lactuca tuberosa* Jacq.

Geyve-Setçe, 340 m, 10.05.2017, M. Sağıroğlu 6016. **Widesp.**

## BRASSICACEAE

*Cardamine bulbifera* (L.) Crantz

Sapanca-İstanbulderesi, 300 m,  
15.06.2011, M.Sağiroğlu 3119. **Euro.-Sib.**

*Cardamine quinquefolia* (M.Bieb.)  
Schmalh.

Karasu, Sinanoğlu köyü, under forest, 60  
m, 14.03.2020, M. Sağiroğlu 6616. **Euro.-  
Sib.**

## BORAGINACEAE

*Symphytum bulbosum* K.F.Schimp.

Karasu-Başoğlu- 15 m, 07.04.2013, D.  
Karaduman 1748,[9] **Medit.**

*Symphytum tuberosum* L.subsp.  
*nodosum* (Schur) Soó

Karasu-Manavpınar village, 20 m,  
06.04.2017, M.Sağiroğlu 5706. **Euro.-Sib.**

## BUTOMACEAE

*Butomus umbellatus* L.

Sapanca Lake, 30 m, 14.06.2012, M.  
Sağiroğlu 3515. **Euro.-Sib.**

## COLCHICACEAE

*Colchicum umbrosum* Steven

Akyazı, Açelya upland, 1218 m,  
08.08.2018, M. Sağiroğlu 6437. **Medit.**

*Colchicum turcicum* Janka

Pamukova, Çilekli village, 700 m,  
16.10.2018, M. Sağiroğlu 6452. **Medit.**

*Colchicum speciosum* Steven

Geyve, Şehren-Gündüzler villages, 3<sup>rd</sup> km,  
09.10.2016, M. Sağiroğlu 5332. **Eux.**

*Colchicum atticum* Spruner ex Tommas

Pamukova-Mekece village, 600 m,  
25.10.2017, M.Sağiroğlu 6417. **Medit.**

## CYPERACEAE

*Carex flacca* Schreb. subsp.  
*erythrostachys* (Hoppe) Holub

Sapanca Lake, 30 m, 18.05.2010,  
M.Sağiroğlu 2900. **Medit.**

## DIOSCOREACEAE

*Dioscorea communis* (L.) Caddick &  
Wilkin

Geyve, Akıncı village, Beşiktaş stream,  
170 m, 07.05.2013, M.Sağiroğlu 3891.  
**Unk.**

## GERANIACEAE

*Geranium tuberosum* L.

Arifiye, E5 Motorway, 70 m, 21.04.2010,  
M.Sağiroğlu 2830. **Ir.-Tur.**

*Geranium sylvaticum* L.

West of Sapanca Lake, 23.05.2011,  
M.Sağiroğlu 3038. **Euro.-Sib.**

*Geranium asphodeloides* Burm.subsp.  
*asphodeloides*

Serdivan mountain, 315 m, 28.04.2012,  
M.Sağiroğlu 3227. **Euro.-Sib.**

*Geranium sanguineum* L.

Pamukova, Kazımiye-Kırca upland way,  
560 m, 01.05.2017, M. Sağiroğlu 5929.  
**Euro.-Sib.**

*Geranium pyrenaicum* Burm.f.

SAU, around guesthouse, 90 m,  
24.05.2009, M.Sağiroğlu 2686. **Unk.**

*Erodium acaule* (L.) Becherer & Thell.

SAU campus, 110 m, 08.05.2011,  
M.Sağiroğlu 3029. **Medit.**



## IRIDACEAE

*Crocus abantensis* T. Baytop & B. Mathew **Endemic**

Sakarya-Akyazı, Sülüklü Lake, 1450 m, 26.03.2017, M. Sağıroğlu 5671. **Euro.-Sib.**

*Crocus chrysanthus*(Herb.) Herb.

Pamukova-Kırca upland, 992 m, 02.04.2016, M. Sağıroğlu 5686. **Unk.**

*Crocus danfordiae* Maw subsp. *danfordiae***Endemic**

Pamukova, Çilekli village, 750 m, 12.02.2019, M. Sağıroğlu 6465. **Unk.**

*Crocus pestalozzae* Boiss. **Endemic**

Pamukova, Şahmelek-Kırca upland, 992 m, 02.04.2017, M. Sağıroğlu 5687. **Medit.**

*Crocus flavus* Weston subsp. *flavus*

Sakarya Taşkısığı Lake, clearings forest, 100 m, 27.02.2017, M. Sağıroğlu 5523. **Euro.-Sib.**

*Crocus flavus* Weston subsp. *dissectus* T. Baytop & B. Mathew **Endemic**

Akyazı-Dokurcun, Davlumbaz upland, 1450 m, 06.04.2017, M. Sağıroğlu 5748. **Unk.**

*Crocus antalyensis*B. Mathew subsp. *antalyensis* **Endemic**

Pamukova, Mesruriye way, 740 m, 22.02.2019, M. Sağıroğlu 6467. **Medit.**

*Crocus olivieri*J.Gay subsp. *istanbulensis* B. Mathew **Endemic**

Pamukova, Çilekli village, 755 m, 19.03.2017, M. Sağıroğlu 6544, **Euro.-Sib.**

*Crocus olivieri*J. Gay subsp. *olivieri*

Pamukova-Kadıköy, Pamukova, 2<sup>nd</sup> km, 653 m, 02.03.2017, M.Sağıroğlu 5566. **Euro.-Sib.**

*Crocus pallasii* Goldb. subsp. *pallasii*

Doğançay-karaçam road, 90 m, 10.04.2007, OUFE 15888 [8]. **Unk.**

*Crocus speciosus*M.Biebsubsp. *speciosus*

Akyazı, Açelya upland, 1157 m, 23.10.2016, M. Sağıroğlu 5425. **Euro.-Sib.**

*Crocus speciosus*M.Bieb subsp. *sakariensis* Rukšāns **Endemic**

Akyazı, Keremali mountain, 1300 m, 06.11.2016, M. Sağıroğlu 5454. **Euro.-Sib.**

*Crocus pulchellus* Herb.

Pamukova- Hüseyinli upland, 1140 m,16.9.2018, M.Sağıroğlu 6454. **Medit.**

*Romulea columnae* Sebast. & Mauri subsp. *columnae*

Sakarya, Aşağıdere -Eşme way, 1<sup>st</sup> km, 40 m, 18.03.2012, M. Sağıroğlu 3212. **Medit.**

*Romulea linaresii* Parl.subsp. *graeca* Bég.

Geyve-Akıncı village, Beşiktaş stream, 540 m, 13.02.2013, M. Sağıroğlu 3812. **Medit.**

*Gladiolus italicus* Mill.

Geyve, Akıncı village, Hacılar station, 570 m, 04.05.2016, M. Sağıroğlu 4998. **Medit.**

*Gladiolus atroviolaceus* Boiss.

Geyve, Akıncı village, 400 m, roadside, 05.07.2016, M. Sağıroğlu 5012. **Ir.-Tur.**

## JUNCACEAE

*Juncus acutus* L. subsp. *acutus*

Kaynarca, Ortaköy, 30 m, 06.05.2012, D. Karaduman 1232 [9]. **Widespr.**

*Juncus heldreichianus* Marssonsubsp.  
*heldreichianus*

Geyve-Pamukova yolu, 50 m, 10.05.2017,  
M.Sağiroğlu 6010. **Medit.**

*Juncus compressus* Jacq.

Sapanca lake, 30 m, 01.06.2012, M.  
Sağiroğlu 3374. **Unk.**

*Juncus articulatus* L. subsp. *articularis*

Geyve-Sakarya Nehri kenarı, 40 m,  
10.05.2017, M. Sağiroğlu 6013. **Widespr.**

## LILIACEAE

*Lilium martagon* L.

Hendek-Kocaali way, 22 km, 680 m,  
14.06.2012, M. Sağiroğlu 3490. **Euro.-Sib.**

*Fritillaria pontica* Wahlenb.

Geyve, between Doğançay-Boğazköy, 560  
m, 20.04.2017, , M. Sağiroğlu 5794.  
**Euro.-Sib.**

*Fritillaria bithynica* Baker

Pamukova, Kazımiye, Kırca upland, 1000  
m, 01.05.2017, , M. Sağiroğlu 5930.  
**Medit.**

*Gagea bithynica* Pasch. **Endemic.**

Sakarya, west of Taşkısığı lake, 220 m,  
27.02.2017, M. Sağiroğlu 5531. **Medit.**

*Gagea bohemica* (Zauschn.) Schult.  
&Schult.f.

Pamukova, Şahmelek village, 690 m,  
02.03.2017, M. Sağiroğlu 5562. **Medit.**

*Gagea granatelli* (Parl.) Parl.

Akyazı-Dokurcun davlumbaz upland, 1400  
m, 06.04.2017, M. Sağiroğlu 5751. **Medit.**

*Gagea villosa* (M.Bieb.) Sweet var. *villosa*

Geyve-Akıncı village, 520 m, 07.05.2013,  
M. Sağiroğlu 3902. **Widespr.**

## NYMPHAEACEAE

*Nuphar lutea* (L.) Sm.

Sapanca lake, 30 m, 14.04.2009,  
M.Sağiroğlu 2733. **Unk.**

*Nymphaea alba* L.

Sapanca lake, 30 m, 24.05.2007,  
M.Sağiroğlu 2677. **Unk.**

## ORCHIDACEAE

*Cephalanthera rubra* (L.) Rich.

Geyve, Akıncı village, 450 m, 05.06.2016,  
M. Sağiroğlu 5011. **Widespr.**

*Cephalanthera longifolia* (L.) Fritsch

Geyve, Akıncı village, Beşiktaş stream,  
340 m, 07.05.2013, M. Sağiroğlu 3883.  
**Medit.**

*Cephalanthera damosonium* (Mill.) Druce

Geyve, Akıncı village, 500 m, 10.05.2017,  
M. Sağiroğlu 6008. **Widespr.**

*Cephalanthera epipactoides* Fisch. &  
C.A.Mey

Geyve, Akıncı village, Beşiktaş stream,  
290 m, M. Sağiroğlu 5002-B, **Unk.**

*Dactylorhiza romana* (Seb.) Soó subsp.  
*romana*

Geyve-Akıncı village, 350 m, 09.04.2016,  
M. Sağiroğlu 4989. **Medit.**

*Dactylorhiza saccifera* (Brongn.)  
Soó subsp. *saccifera*

SAU campus, near 190 m, 21.04.2010, M.  
Sağiroğlu 2862-A. **Medit.**

*Dactylorhiza saccifera* (Brongn.)  
Soósubsp. *bithynica*(H.Baumann) Kreutz  
**Endemic.**

Geyve-Burhaniye village, 380  
m,10.05.2017, M. Sağıroğlu 6002. **Medit.**

*Dactylorhiza nieschalkiorum* H.Baumann  
& Künkele **Endemic.**

Pamukova-Kırca upland, 1000 m,  
05.06.2013, M. Sağıroğlu 3942. **Unk.**

*Dactylorhiza incarnata* (L.) Soó subsp.  
*incarnata*

SAU campus, near cafetaria, 190 m,  
21.04.2010, M. Sağıroğlu 2862-B. **Medit.**

*Epipactis helleborine*(L.) Crantz subsp.  
*helleborine*

Geyve-Akıncı village, 800 m, 25.07.2013,  
M. Sağıroğlu 3959. **Widespr.**

*Epipactis pontica* Taubenheim

Geyve-Akıncı village, 450 m, 15.07.2013,  
M. Sağıroğlu 3946. **Eux.**

*Limodorum abortivum* (L.) Schwartz  
subsp. *abortivum*

Geyve, Akıncı village, Beşiktaş stream,  
250 m, 07.05.2013, M. Sağıroğlu 3884.  
**Widespr.**

*Spiranthes spiralis* (L.) Chevall.

Geyve, Akıncı village, Beşiktaş stream,  
290 m, 07.05.2013, M. Sağıroğlu 3890.  
**Medit.**

*Platanthera bifolia* (L.) Rich.

Sapanca-İstanbul stream, 370 m,  
10.06.2011, M. Sağıroğlu 3395. **Euro.-Sib.**

*Platanthera chlorantha* (Cruster) Rchb.

Pamukova-Kırca upland, 990 m,  
05.06.2013, M. Sağıroğlu 3944. **Widespr.**

*Coeloglossum viride* (L.) Hartman

Pamukova-upland of Hüseyinli village,  
800 m, 17.06.2012, M. Sağıroğlu 3522.  
**Widespr.**

*Himantoglossum caprinum* (M.Bieb.)  
Spreng.

Kaynarca-Oflak mountain, 200 m,  
24.07.2013, M. Sağıroğlu3952. **Eux.**

*Himantoglossum comperianum* (Steven)  
P.Delforge

Geyve-Doğançay village, 560 m,  
01.06.2013, M. Sağıroğlu 3938. **Ir.-Tur.**

*Anacamptis pyramidalis*(L.) Rich.

SAU campus, near cafetaria, 180 m,  
14.05.2010, M. Sağıroğlu 2880. **Widespr.**

*Listera ovata* (L.)R.Br.

Serdivan mountain, 140 m, 02.07.2011. M.  
Sağıroğlu 3150. **Euro.-Sib.**

*Neottia nidus-avis* (L.) Rich.

Serdivan-Meşelik village, Fagus forest,  
191 m, 02.07.2011, M. Sağıroğlu 3137.  
**Medit.**

*Neotinea maculata*( Desf.) Stearn

SAU campus, 140 m, 05.05.2019, M.  
Sağıroğlu 6497. **Medit.**

*Stenisiella satyroides* (Spreng.) Schlrt.

Hendek, Kocaeli-Kirazlı 1<sup>st</sup> km, 285 m,  
15.06.2012, M. Sağıroğlu 3492. **Hyr.**

*Ophrys speculum*Link subsp. *speculum*

SAU campus, 164 m, 06.04.2019, M.  
Sağıroğlu 6608. **Medit.**

*Ophrys speculum*Linksubsp. *regis-*  
*ferdinandii*(Acht. & Kellerer ex Renz)Soó

Taraklı-Şehren junction, 2<sup>nd</sup> km, 410 m,  
13.04.2017, M. Sağıroğlu 5787. **Medit.**

*Ophrys mammosa* Desf. subsp. *mammosa*

SAU campus, 150 m, 06.04.2019, M.  
Sağıroğlu 6482. **Medit.**

*Ophrys oestrifera* M. Bieb subsp.  
*oestrifera*

SAU campus, Engineering M7, 90 m,  
31.05.2012, M. Sağıroğlu 3319. **Medit.**

*Ophrys apifera* Huds.

Around SAU campus cafeteria, 100 m,  
14.05.2010, M. Sağıroğlu 2874. **Medit.**

*Orchis tridentata* Scop.

SAU-Dereköy way, 90 m, 08.05.2011, M.  
Sağıroğlu 3005. **Medit.**

*Orchis lactea* Poir.

Sakarya-Aşağıdereköy-Eşme way, 1.5 km,  
55 m, 18.03.2012, M. Sağıroğlu 3213.  
**Medit.**

*Orchis purpurea* Huds. subsp. *purpurea*

SAU campus, cafeteria, 18.05.2010,  
M. Sağıroğlu 2896. **Euro.-Sib.**

*Orchis simia* Lam.

Pamukova, Şahmelek village, 650 m,  
01.05.2017, M. Sağıroğlu 5901. **Medit.**

*Orchis italica* Poir.

Geyve-Kulfalar village, 700 m,  
28.02.2017, M. Sağıroğlu 5548. **Medit.**

*Orchis morio* subsp. *morio* L.

SAU campus, Engineering Faculty, 90 m,  
21.04.2010, M. Sağıroğlu 2828. **Unk.**

*Orchis morio* L. subsp. *picta* (Loisel.)  
K. Richt.

Pamukova-Kazımiye, Kırca upland, 950 m,  
01.05.2017, M. Sağıroğlu 5918. **Widesp.**

*Orchis anatolica* Boiss.

Geyve, Kulfalar – Kamışlı way,  
12.03.2003, OUFÉ 12821 [8], **Medit.**

*Orchis mascula* (L.) L. subsp. *pinetorum*  
(Boiss. & Kotschy) G. Camus

Geyve, Doğançıl village, 1300m,  
18.05.2017, M. Sağıroğlu 6082-A.  
**Widespr.**

*Orchis pallens* L.

Geyve, Doğançıl village, 1400 m,  
18.05.2017, M. Sağıroğlu 6081. **Euro.-Sib.**

*Orchis palustris* Jacq. subsp. *palustris*

Geyve, north of Doğançıl village, 1400m,  
18.05.2017, M. Sağıroğlu 6082-B.  
**Widesp.**

*Orchis laxiflora* Lam. subsp. *laxiflora*

Around İkramiye village, clearings forest,  
400 m, 13.05.2012, M. Sağıroğlu 3272,  
**Medit.**

*Orchis coriophora* L. subsp. *coriophora*

SAÜ-Dereköy way, clearings forest, 50 m,  
08.05.2011, M. Sağıroğlu 3004. **Medit.**

*Serapias cordigera* L. subsp. *cordigera*

Karasu-Acarlar longozu, 27.05.2012, D.  
Karaduman 1371 [9]. **Medit.**

*Serapias vomeracea* (Burm.f.) Briq. subsp.  
*laxiflora* (Soó) Gözl & H. R. Reinhard

Geyve, karaçam-İlimbey way, 12.03.2003,  
OUFÉ 12809 [8]. **Medit.**

*Serapias bergonii* E.G. Camus

SAU campus, around cafeteria, 202 m,  
31.05.2012, M. Sağıroğlu 3320. **Medit.**

## OXALIDACEAE

### *Oxalis acetosella*L.

Geyve, between Doğançay-Maksudiye, 200 m, 20.04.2017, M. Sağıroğlu 5805. **Unk.**

### *Oxalis articulata* Savigny

Serdivan-Meşeli village, 110 m, 02.07.2011, M. Sağıroğlu 3144. **Unk.**

### *Oxalis corniculata* L.

Sapanca-İkramiye valley, 70 m, 01.06.2011, M. Sağıroğlu 3066. **Unk.**

## PAEONIACEAE

### *Paeonia peregrina*Mill.

Geyve, Doğancıl village, 650 m, 18.05.2017, M. Sağıroğlu 6052. **Unk**

### *Paeonia arietina* G. Anderson

Geyve-Tuzla, plateau path, 1450 m, 10.06.2020, M. Sağıroğlu 6697. **Ir.-Tur.**

## PAPAVERACEAE

### *Corydalis caucasica*DC.subsp. *abantensis*Lidén.**Endemic**

Geyve, Kamyşlı village, 1510 m, 30.03.2017, M. Sağıroğlu 5683. **Eux.**

### *Corydalis cava* (L.) Schweigg. & Körtesubsp. *marschalliana* (Willd.) Hayek

Taraklı, Karagöl upland, 1100 m, 26.03.2017, M. Sağıroğlu 5663. **Euro.-Sib.**

### *Corydalis solida*(L.) Clairv subsp. *solida*.

Pamukova, Kazımiye, Kırca upland, 950 m, 02.04.2017, M. Sağıroğlu 5690, **Euro.-Sib.**

## POLYGONACEAE

### *Rumex tuberosus* L. subsp. *creticus* (Boiss.)Rech.f.

Kaynarca-Oflak mountain, 150 m, 25.07.2013, M.Sağıroğlu 3956. **Medit.**

### *Rumex tuberosus* L. subsp. *tuberosus*

SAU, Engineering M7, 180 m, 20.06.2012, M. Sağıroğlu 3543. **Medit.**

## POACEAE

### *Hordeum bulbosum*L.

Serdivan mountain, 220 m, 02.07.2011, M.Sağıroğlu 3431. **Widesp.**

### *Poa bulbosa*L.

West of SAU campus, 110 m, 06.05.2011. M. Sağıroğlu 3256. **Widesp.**

### *Dactylis glomerata*L.subsp. *glomerata*

SAU, Engineering M7, 80 m, 27.05.2012, M.Sağıroğlu 3306. **Euro.-Sib.**

## PRIMULACEAE

### *Primula acaulis*(L.) L.subsp. *acaulis*

Geyve, between Boğazköy-Koru, 600 m, 16.03.2017, M. Sağıroğlu 5637-A, **Euro.-Sib.**

### *Primula acaulis*(L.) L subsp. *rubra* (Sm.) Greuter & Burdet

Geyve, between Boğazköy-Koru villages, 600 m, 16.03.2017, M.Sağıroğlu 5637-B. **Eux.**

### *Cyclamen hederifolium* Aiton

Geyve, Akıncı village, rocky fields, 210 m, 13.02.2013, M. Sağıroğlu 3810. **Medit.**

### *Cyclamen coum*Mill.subsp. *coum*

Geyve, between Doğançay-Kışlaçay, 100 m, 14.11.2016, M. Sağıroğlu 5483. **Unk.**

*Cyclamen coum* Mill.subsp. *caucasicum*  
(K. Koch) O. Schwarz

Karasu, Sinanoğlu village, 35 m, clearings forest, 11.12.2016, M. Sağıroğlu 5510. **Unk.**

*Lysimachia vulgaris* L.

Arifye- Kalaycı, 90 m, 25.05.2013, M. Sağıroğlu 3931. **Widesp.**

*Lysimachia punctata* L.

Pamukova, Hüseyinli İnönü upland, 950 m, 26.07.2019, M. Sağıroğlu 6607. **Euro.-Sib.**

*Lysimachia verticillaris* Spreng.

Hendek-Çamlıca village, 900 m, 04.08.2016, M. Sağıroğlu 5056. **Hyc.-Eux.**

## RANUNCULACEAE

*Helleborus orientalis* Lam.

SAU campus, Teras houses, 200 m, 14.04.2009, M. Sağıroğlu 2737. **Eux.**

*Anemone coronaria* L.

Pamukova-Şahmelek village way, 190 m, 28.02.2017, M. Sağıroğlu 5559. **Medit.**

*Anemone hortensis* L.

Pamukova, Mekece-Kemaliye road, 200 m, 22.03.2020, M. Sağıroğlu 6662. **Unk.**

*Adonis aestivalis* L. subsp. *aestivalis*

SAU campus, west entrance, 90 m, 08.05.2011, M. Sağıroğlu 3001. **Widesp.**

*Adonis flammea* Jacq.

Geyve, Akıncı village, 400 m, 04.05.2016, M. Sağıroğlu 5001. **Widesp.**

*Ranunculus brutius* Ten.

Saparnca, around İkramiye village, 200 m, 30.09.2011, M. Sağıroğlu 3190. **Euro.-Sib.**

*Ranunculus neapolitanus* Ten.

SAU campus, Hillside, 90 m, 20.06.2012, M. Sağıroğlu 3542. **Medit.**

*Ranunculus velutinus* Ten.

Geyve-Akıncı village, around church, 450 m, 25.04.2013, M. Sağıroğlu 3840. **Medit.**

*Ranunculus repens* L.

Sapanca Lake roadside, 30 m, 08.05.2011, M. Sağıroğlu 3017. **Widesp.**

*Ranunculus costantinopolitanus* (DC.) d'Urv.

Pamukova, Kırca upland, 950 m, 02.04.2017, M. Sağıroğlu 5690-A. **Widespr.**

*Ranunculus paludosus* Poir.

Pamukova-Ahiler village, 250 m, 09.05.2014, M. Sağıroğlu 4979. **Unk.**

*Ranunculus illyricus* L. subsp. *illyricus*

Serdivan mountain, roadside, 150 m, 02.07.2011, M. Sağıroğlu 3153. **Widesp.**

*Ranunculus gracilis* E.D.Clarke.

Akyazı, between Şerefiye-Reşadiye, 1,5 km, 276 m, 08.05.2014, M. Sağıroğlu 4971. **Unk.**

*Ranunculus ficaria* L. subsp. *ficariformis*  
Rouy & Foucaud

SAU campus-Eşme way, 240 m, 08.05.2011, M. Sağıroğlu 3003. **Unk.**

*Ranunculus peltatus* Schrank subsp. *fucoides* (Freyn) Muñoz Garm.

Arifye-İkramiye village way, moist places, 150 m, 01.06.2011, M. Sağıroğlu 3053. **Unk.**

## ROSACEAE

*Geum coccineum* Sibth. & Sm.

Pamukova, İnönü upland way, 1000 m,  
10.06.2019, M. Sağiroğlu 6533. **Euro.-Sib.**

*Geum urbanum* L.

Sapanca Lake, around Dereköy,  
13.06.2012, M. Sağiroğlu 3473. **Widesp.**

## SMILACACEAE

*Smilax aspera* L.

Sakarya, Serdivan mountain, 350 m,  
31.05.2012, M. Sağiroğlu 3338. **Unk.**

*Smilax excelsa* L.

SAU campus, 140 m, 31.05.2012, M.  
Sağiroğlu 3332. **Eux.**

## TYPHACEAE

*Sparganium erectum* L. subsp. *neglectum*  
(Beeby) K. Richt.

West of Sapanca Lake, 25 m, 10.06.2010,  
M. Sağiroğlu 2956. **Euro.-Sib.**

## XANTHORRHOEACEAE

*Iris orientalis* Mill.

Pamukova-Hayrettin village, 600 m,  
05.06.2013, M. Sağiroğlu 3949. **Medit.**

*Iris kerneriana* Asch. & Sint. Ex Baker

Geyve, Taşoluk village, 2<sup>nd</sup> km, 600 m,  
25.05.2017, M. Sağiroğlu 6236. **Euro.-Sib.**

*Iris sintenisii* Jankasubsp. *sintenisii*

Geyve, Akıncı village, 450 m, 26.05.2017,  
M. Sağiroğlu 6200. **Euro.-Sib.**

*Iris germanica* L.

Akyazı-Sultanpınar upland, 3<sup>rd</sup> km, 450 m,  
08.06.2017, M. Sağiroğlu 6241. **Widesp.**

*Iris purpureabractea* B. Mathew & T.  
Baytop **Endemic**

Geyve-Doğançıl village, 1340 m,  
18.05.2017, M. Sağiroğlu 6063. **Medit.**

*Iris suaveolens* Boiss. & Reut.

SAU campus, Hillside, 80 m, 27.05.2012,  
M. Sağiroğlu 3305. **Medit.**

*Iris pseudacorus* L.

Acarlar Longoz, 6 m, 16.05.2010, M.  
Sağiroğlu 2886. **Unk.**

*Asphodeline lutea* (L.) Rchb.

Geyve, Doğançıl village, 1350 m,  
18.05.2017, M. Sağiroğlu 6064. **Medit.**

*Asphodeline damascena* (Boiss.) Baker  
subsp. *damascena*

Geyve, Doğançay village, 100 m,  
23.05.2017, M. Sağiroğlu 6172. **Medit.**

*Aloe vera* (L.) Burm.f.

SAU campus, Hillside, 40 m, 08.05.2011,  
M. Sağiroğlu 3021. **Unk.**

*Yucca filamentosa* L.

Arifiye, Sapanca way, 40 m, 15.07.2010,  
M. Sağiroğlu 2995. **Unk.**

## CAPRIFOLIACEAE

*Valeriana dioscoridis* Sm.

Pamukova, Şahmelek köyü, 700 m, 02.04.  
2017, M. Sağiroğlu 5698. **Medit.**

## 4. DISCUSSION and CONCLUSIONS

As a result of the diagnosis; taxa identified 80 genus, 220 in 29 families in research area. Of these, 29 were identified as endemic and rare species, 13.1% respectively. 29 taxa are endemic and non-endemic taxa (Table 1), risk categories of

CR, 2 EN, 15 VU, 2 NT and 8 LC. 5 families were the largest in terms of number of taxa included in the numerical distribution are as follows; Orchidaceae (43), Asparagaceae (37), Amaryllidaceae (21), Iridaceae (17), Ranunculaceae (15).

Siberian character, 41 multi phytogeographical region character, 34 unknown region character, 16 Euxine character, 7 Irano-Turanian character, 1 Hyrcano character, 1 Hyrcano-euxine character and North Americana character.

According to the taxa phytogeographic region distributions are as follows; 79 taxa Mediterranean character, 40 Euro-

Table 1  
Endemic /rare taxon and their danger category for the current study

Familya	Taxon	Endemic / rare	Danger category
Asparagaceae	<i>Bellevalia clusiana</i>	Endemic	LC
Asparagaceae	<i>Hyacinthella lineata</i>	Endemic	LC
Asparagaceae	<i>Hyacinthella micrantha</i>	Endemic	VU
Asparagaceae	<i>Galanthus nivalis</i> subsp. <i>nivalis</i>	Rare	VU
Asparagaceae	<i>Muscari aucheri</i>	Endemic	LC
Asparagaceae	<i>Muscari bourgaei</i>	Endemic	LC
Iridaceae	<i>Crocus abantensis</i>	Endemic	EN
Iridaceae	<i>Crocus antalyensis</i> subsp. <i>antalyensis</i>	Endemic	NT
Iridaceae	<i>Crocus danfordiae</i> subsp. <i>danfordiae</i>	Endemic	LC
Iridaceae	<i>Crocus olivieris</i> subsp. <i>istanbulensis</i>	Endemic	CR
Iridaceae	<i>Crocus flavus</i> subsp. <i>dissectus</i>	Endemic	VU
Iridaceae	<i>Crocus pestalozzae</i> subsp. <i>pestalozzae</i>	Endemic	VU
Iridaceae	<i>Crocus speciosus</i> subsp. <i>sakariensis</i>	Endemic	CR
Iridaceae	<i>Iris purpureabractea</i>	Endemic	NT
Iridaceae	<i>Iris germanica</i>	Rare	VU
Iridaceae	<i>Iris suaveolens</i>	Rare	VU
Iridaceae	<i>Iris pseudacorus</i>	Rare	VU
Liliaceae	<i>Gagea bithynica</i>	Endemic	LC
Orchidaceae	<i>Dactylorhiza saccifera</i> subsp. <i>bithynica</i>	Endemic	VU
Orchidaceae	<i>Dactylorhiza nieschalkiorum</i>	Endemic	VU
Orchidaceae	<i>Orchis lactea</i>	Rare	VU
Orchidaceae	<i>Orchis anatolica</i>	Rare	VU
Orchidaceae	<i>Orchis coriophora</i> subsp. <i>coriophora</i>	Rare	VU
Paeoniaceae	<i>Paeonia peregrina</i>	Rare	VU
Papaveraceae	<i>Corydalis caucasica</i> subsp. <i>abantensis</i>	Endemic	EN
Araceae	<i>Arum higrrophyllum</i> subsp. <i>euxinum</i>	Endemic	LC
Araceae	<i>Dracunculus vulgaris</i>	Rare	LC
Amaryllidaceae	<i>Leucojum aestivum</i>	Rare	VU
Amaryllidaceae	<i>Pancratium maritimum</i>	Rare	VU

Five genus were the largest in terms of number of taxa included in the numerical distribution are as follows; *Allium* (15), *Crocus* (13), *Orchis* (12), *Ranunculus* (10), *Iris* (7).

220 plant taxa belonging to 29 families have been collected from the working area. Amongst them 18 are endemic. If we look at the geographical regions it seems that the endemic



taxa are focused on the south region of the city Sakarya. The towns Pamukova and Geyve display Mediterrenian like climate conditions. Therefore, the great amount of endemic taxa have been found in those regions.

studies on the geophyte plants are very limited in Turkey. In that current work we have investigated only the geophyte plants in the region of research area. In the works by Değerli (2018) and Öz (2019) the geophytes of the Muğla city have been investigated (Table 2). In these works Değerli (2018) has found 77 geophyte taxa, whereas Öz (2019) has observed 84 of them [10,11]. From that point of view this work is a comprehensive study carried out on a specific region.

Table 2  
Comparison with other studies

Area worked	Taxa
Sakarya city	220 geophytes
Muğla, [11]	77 geophytes
Muğla (Dalaman) [12]	84 geophytes

People of Sakarya use plants intensively for ethnobotanical purposes [12,13, 14]. Some plants are used extensively by the public in the study area. The most important of these is the *Leucojum aestivum* (Göl Soğanı) plant [15]. As a result of scientific studies, this plant; The emergence of its usability in the treatment of Alzheimer's disease has further increased the public's demand for this plant. In addition to the use of the people, the plant is completely dismantled and sold. Unfortunately, this is not in a plan. Wherever the people find the plant, it disassembles and sells it. Similar or close conditions are valid for species belonging to *Asparagus*, *Aristolochia*, *Crocus*, *Orchis*, *Ophrys*, *Arum*, *Dracunculus* genus. This situation causes the natural populations of plants to decrease rapidly.

Our natural onions are at risk due to unconscious picking, grazing pressure, unconscious export, tourism activities and many other reasons. Our people should be properly trained in the use of these plants, both in terms of conservation of our biodiversity and our country's economy.

### ***Acknowledgements***

The author thank the Curators GAZI, ANK, HUB, who allowed me to study their Plant species, for their assistance in herbarium studies Didem KARADUMAN and Ali Can Bahadır SEMERCİ, Melike TURNA, and Sakarya University Project no: 2010-02-20-010, Dr. Kenan TUNÇ Sakarya University, from Akıncı village Kamuran TAN, Ministry of Agriculture and Forestry Project no: 2016/192135 (Sakarya İli Biyoçeşitliliği) for financial support.

### ***Declaration of Conflict of Interest/Common Interest***

No conflict of interest or common interest has been declared by the author.

### ***The Declaration of Ethics Committee Approval***

The author declares that this document does not require an ethics committee approval or any special permission.

### ***The Declaration of Research and Publication Ethics***

The author of the paper declares that he complies with the scientific, ethical and quotation rules of SAUJS in all processes of the paper and that he does not make any falsification on the data collected. In addition, he declares that Sakarya University Journal of Science and its editorial board have no responsibility for any ethical violations that may be encountered, and that this study has not been evaluated in any academic publication environment other than Sakarya University Journal of Science.

## REFERENCES

- [1] S.C. Demir, İ. Eker. Petaloid Monocotyledonous Flora Of Bolu Province, Including Annotations On Critical Petaloid Geophytes Of Turkey. Pegem Akademi, Ankara, 2015.
- [2] P.H. Davis, 'Flora Of Turkey And The East Aegean Islands', Edinburgh, A.Univ. Press., Edinburgh, vol.1-9, 1965-1985.
- [3] P.H. Davis, R.R. Mill, K. Tan, 'Flora of Turkey and the East Aegean Islands', Edinburgh Univ. Press., Edinburgh, vol. 10, 1988.
- [4] A. Güner, N. Özhatay, T. Ekim, K.H.C. Başer, 'Flora of Turkey and the East Aegean Islands', (supple. 2), Edinburgh Univ. Press., Edinburgh, vol. 11, 2000.
- [5] A. Güner, B. Akyıldırım, M.F. Alkayış, B. Çingay, S.S. Kanoğlu, A.M. Özkan, M. Öztekin, G.N. Tuğ, Türkiye Bitkileri Listesi (Damarlı Bitkiler). Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını. İstanbul, 2012.
- [6] T. Ekim, M. Koyuncu, M. Vural, H. Duman, Z. Aytaç, N. Adıgüzel, Türkiye Bitkileri Kırmızı Kitabı. Türkiye Tabiatını Koruma Derneği, Van 100. Yıl Üniv., Ankara, 2000.
- [7] IUCN Standards and Petitions Subcommittee, Guidelines for Using the IUCN Red List Categories and Criteria. Version 13. Prepared by the Standards and Petitions Subcommittee. <<http://www.iucnredlist.org/documents/RedListGuidelines.pdf>>, 2017.
- [8] O. Koyuncu, Ö.K. Yaylacı, Ö Derviş, S. Tokur, Vascular Plant Diversity in Geyve Gorge (Sakarya/Turkey) and its Environs. Biological Diversity and Conservation, vol. 5, no. 3, pp. 98-122, 2012.
- [9] D. Karaduman, Acarlar Longozu (Sakarya) Florası. Sakarya Üniversitesi Fen Bilimleri Enstitüsü Yüksek Lisans Tezi, Haziran, Sakarya.2019.
- [10] Y. Değerli, Ö. Varol, Geophytes of Kızıldağ, Masa Mountain and Yılanlı Mountain (Muğla/Turkey). Biological Diversity and Conservation, vol. 11, no. 3, pp. 71-75, 2018.
- [11] A. Öz, H. Akan, The geophyte flora of Dalaman and Ortaca districts of Muğla/Turkey province. Biological Diversity and Conservation, vol. 12, no.1, pp. 39-49, 2019.
- [12] M. Sağiroğlu, E. Olgaç B. Ertürk, M. Turna, An Ethnobotanical Survey from Şile (İstanbul) and Karasu (Sakarya). Ot Sistemik Dergisi, vol. 19, no. 2, pp. 93-104, 2012.
- [13] M. Sağiroğlu, S.T. Köseoğlu, M. Turna, Medicinal Plants in Flora of İkraniye Sapanca-Sakarya-Türkiye).Sakarya University Journal of Science, vol. 2, no. 3, pp. 527-539,2017.
- [14] J. Rukšāns, Seven new Corcuses from the Balkans and Turkey, Alpine Garden Society, pp. 13-21, June, 2013.
- [15] A. Demir, Medical Resource Value Appraisal for *Leucojum aestivum* in Turkey. American Journal of Alzheimer's Disease & Other Dementias, vol. 29, no. 5, pp. 448-451, 2014