

# A Study on the Distribution of Geophyte Taxa in Trabzon Province in Türkiye

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## ABSTRACT

This study aims to identify the geophyte taxa of Trabzon Province (NE Anatolia) and to assess their potential distribution. Plant samples were collected using standard herbarium procedures between 2015 and 2021. The research employed a comprehensive field survey methodology, aligned with the specific vegetation periods of each taxon. A digital database was created by converting both field-collected and literature-based data into spatial data layers within a Geographic Information System (GIS). This GIS-based system allows for advanced data querying and spatial mapping. In addition, the study evaluated specific areas with regard to taxonomic diversity and density, placing particular emphasis on endemic and rare taxa. A total of 95 geophyte taxa were identified, distributed across 1271 unique locations. These taxa represented 20 families and 45 genera. Eight endemic and eight rare geophyte taxa were documented and classified according to the International Union for Conservation of Nature (IUCN) threat categories. The family Orchidaceae had the highest representation, comprising 31 taxa, followed by Asparagaceae with 16, Liliaceae and Amaryllidaceae with 7 each, and Iridaceae with 6 taxa. The most taxon-rich genera were *Orchis* (7 taxa), *Dactylorhiza* (6), *Ornithogalum* (6), *Crocus* (4), *Allium* (4), and *Gagea* (4). The findings of this study will contribute to the conservation and sustainable management of biodiversity, particularly concerning geophyte species, which are vital natural resources within forestry practices. By establishing a balance between conservation and utilization, this research supports biodiversity protection while enabling sustainable use. Moreover, the study provides a valuable framework for identifying priority areas for future conservation initiatives and for sourcing plant material to support the cultivation of endangered geophyte species.

**Keywords:** biodiversity, geophyte, endemic and rare taxa, Trabzon

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## INTRODUCTION

Türkiye, located at the intersection of biologically diverse regions such as the Caucasus, the Mediterranean Basin, and Iran-Turan, boasts remarkable species richness comparable to that of the entire European continent, with a total of 12.354 taxa (Terzioğlu et al. 2021). Compared to many European countries, Türkiye exhibits a higher level of endemism, with 3.649 endemic taxa and an endemism rate of 31.82% (Güner 2012). The country is home to 1.056 naturally occurring geophyte taxa, of which 424 are endemic, corresponding to an endemism rate of 40% (Özhatay 2013). Geophytes are plants with specialized underground storage organs, such as bulbs, tubers, rhizomes, and corms, which are used for storing nutrients (Giray 2001, Selimov 2008). Most geophytes bloom during the early weeks of spring, although some flower as late as October (Özuslu and Iskender 2009). They are valued for their aesthetic appeal, use as cut flowers, and in fragrances, which makes them popular ornamental plants (Çakır 2017). Geophytes can thrive in a wide range of climatic conditions, from the sea level to high-altitude regions.

Previous studies have documented the presence of various geophyte genera in Trabzon Province, including *Galanthus*, *Orchis*, *Dactylorhiza*, *Ophrys*, *Serapias*, *Allium*, *Bunium*, *Cyclamen*, *Anemone*, *Iris*, *Tulipa*, *Lilium*, *Fritillaria*, *Muscari*, *Arum*, *Asphodeline*, *Geranium*, *Colchicum* and *Crocus*. According to these studies, approximately 90 geophyte taxa from these genera have been identified in Trabzon (Davis 1965–1985; Anşin 1979; Davis 1988; Berber 1993; Coşkunçelebi 1995; Terzioğlu 1994, 1998, 1999; Güner et al. 2000; Karaköse 2008; Kreutz and Çolak 2009; Akbulut 2009; Palabaş Uzun 2009; Orman ve Su İşleri Bakanlığı 2014). The eighth volume of *Flora of Turkey and the East Aegean Islands* documents the distribution of petaloid monocots, while the sixth volume focuses on *Cyclamen*. The first volume details the natural occurrence of *Anemone* and *Eranthis* species in Türkiye. These plants also possess considerable commercial and medicinal value (Demir et al. 2013). Several species from genera such as *Anemone*, *Crocus*, *Colchicum*, *Cyclamen*, *Eranthis*, *Fritillaria*, *Galanthus*, *Iris*, *Leucojum*, *Muscari*, *Ornithogalum*, *Orchis*, *Arum* and *Scilla* exhibit medicinal and aromatic characteristics (Seyidoğlu and Yayım 2009, Sargın et al. 2013). Geophytes have been exported since the era of the Ottoman Empire. The populations of *Galanthus* and *Sternbergia* species have suffered adverse effects due to excessive collection, as reported by Ergun et al. (1997) and Çelik et al. (2004). However, these plants are also threatened by clearing and overgrazing, industrialization, agricultural pressures, forest fires, road widening and new road construction activities along highways (Şekeroğlu et al. 2013).

Numerous studies have been conducted on geophytes in various regions of Türkiye (Koyuncu and Demirkuş 2000, Mammadov and Sahranç 2003, Çelik et al. 2004, Pınar et al. 2008, Yıldırım and Gemici 2008, Yüzbaşıoğlu et al. 2008, Duman 2010, Akan 2012, Kayıkçı et al. 2012, Sargın et al. 2013, Şekeroğlu et al. 2013, Sarıhan and Asil 2013, Avcu et al. 2016, Akbaş and Varol 2017, Babacan and Eker 2017, Ekici 2017, Sefalı and Gıdık 2019, Yener and Seyidoğlu Akdeniz 2020, Alhasan and Akan 2021, Bozkurt 2021). Despite the abundance of studies on flora and vegetation in Trabzon, a region characterized by significant plant biodiversity, a

comprehensive study focusing specifically on geophytes across the entire province has yet to be conducted. This study aims to develop a database incorporating both field and literature-based information, including coordinates, population densities, and conservation statuses of identified geophyte species in Trabzon. The resulting database will support the evaluation of geophytes as an important botanical resource, contributing to the balance between conservation and utilization through essential forestry-related activities such as biodiversity assessments, inventory studies, and ecotourism, as well as through regulatory processes for infrastructure projects like dams, hydroelectric power plants, and quarries. Furthermore, the study will help identify key areas that can provide the necessary biological materials and data to implement conservation measures for high-priority or at-risk plant species.

## MATERIALS AND METHODS

The study area, Trabzon Province, is located within squares A7 and A8 according to Davis's floristic grid system (Figure 1). Floristically, this area belongs to the Colchic Sector of Euxine Province within the Euro-Siberian Phytogeographical Region. The study was conducted based on the Forest Sub-District Directorates under the jurisdiction of the Forestry Management Directorates. In the province, the altitude starts from the sea level up to 3376 m (Demirkapı Summit).

In this study, geophyte taxa in Trabzon were determined through a comprehensive field survey conducted between the years 2015 and 2021. The habitats of the taxa were periodically observed in the study area during the vegetation periods of the taxa. Due to both Trabzon province's elevation and the mountainous ranges running parallel to the sea, the field studies were started from the sea level and continued towards higher altitudes. The coordinates were obtained for each geophyte plant taxa found in the field or from the midpoint of the populations. These taxa were identified primarily using *Flora of Turkey and East Aegean Islands* (Davis 1965–1985, Davis 1988, Güner et al. 2000) and *Illustrated Flora of Türkiye* (Güner et al. 2023, 2024). Furthermore, some visual materials (Ekim 2007, Tarım ve Köy İşleri Bakanlığı 2008, Kreutz and Çolak 2009, Simpson 2012, Eminağaoğlu 2012, Eminağaoğlu 2015), published articles (Özhatay and Özhatay 1995), dictionaries of botanical terms (Baytop 1998, Harris and Harris 1999), and theses (Gürsoy 2009, Yüzbaşıoğlu 2010, Ünlü 2010, Demir 2019) were used. Endemic and rare taxa were categorized according to the IUCN Red list categories on the basis of *Red Data Book of Turkish Plants* (Ekim et al. 2000). However, the latest threat categories of these taxa on a global scale have been updated according to IUCN (2012). Nomenclature follows the Catalogue of Life Annual Checklist (2025), and *Turkey Plant List* (Güner et al. 2012). A list of 95 geophyte plant taxa identified in this study was created according to APG IV (Angiosperm Phylogeny Group 2016). The list is provided in the Appendix. In the list, the following details are stated: family, genus, species, habitat of the taxa, altitude and densely populated localities of the taxa, phytogeographical region, endemism status, the element, underground stem type, collection date, and collection number. The data obtained during the field studies were recorded using the ArcGIS and a database was created in GIS environment. This database can also be used for other

tasks such as querying and mapping. All plant material was stored at the Eastern Black Sea Forestry Research Institute Herbarium in Trabzon.

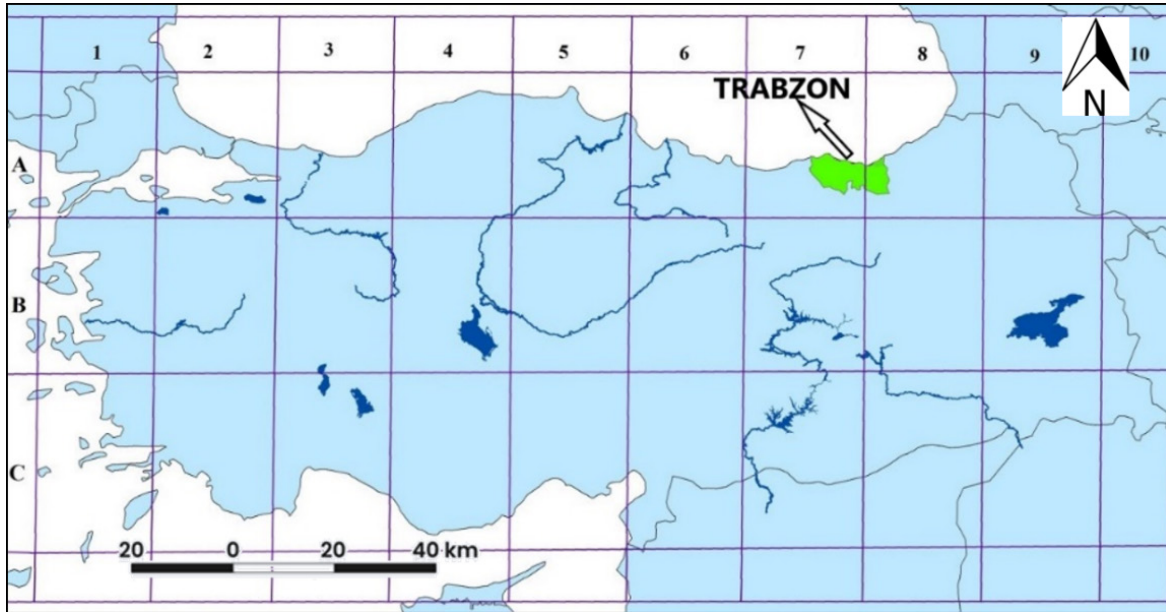


Figure 1 The location of the study area according to Davis's floristic grid system.

## RESULTS

The results of this study, a total of 95 geophyte plant taxa belonging to 20 families and 45 genera, were determined. The proportional distributions of taxa richness from the richest five families are shown in Figure 2.

Families with the most taxa are as follows: Orchidaceae (31 taxa), Asparagaceae (16 taxa), Liliaceae (7 taxa), Amaryllidaceae (7 taxa) and Iridaceae (6 taxa). The genera *Orchis* (7 taxa), *Dactylorhiza* (6 taxa) and *Ornithogalum* (6 taxa) have the most species, followed by *Crocus* (4 taxa), *Allium* (4 taxa) and *Gagea* (4 taxa). The phytogeographical regions of 53 (55.79%) taxa in the present study were determined. The plant taxa categorization according to phytogeographical

regions is as follows: Euro-Siberian elements 15 (15%), Euxine 18 (19%), Mediterranean 9 (9%), Irano-Turanian 5 (5%), Hyrcano-Euxine 3 (3%), East Mediterranean 2 (2%), and Euxine (mountain) 1 (1%). The remaining 42 taxa were of unknown phytogeographic regions. The underground stem types of the detected taxa were evaluated in four groups according to Davis (1965–1985) as bulbous, tuberous, cormous, and rhizome. It was determined that 39% of these taxa were tuberous, 29% bulbous, 25% rhizome, and 7% cormous. In total, 8 taxa were endemic to Türkiye, with an endemism rate of 8.4%. According to the *Red Data Book of Turkish Plants* (Ekim et al. 2000), 8 taxa were also classified as rare (Figure 3). These taxa were evaluated according to the IUCN threat categories (IUCN 2012).

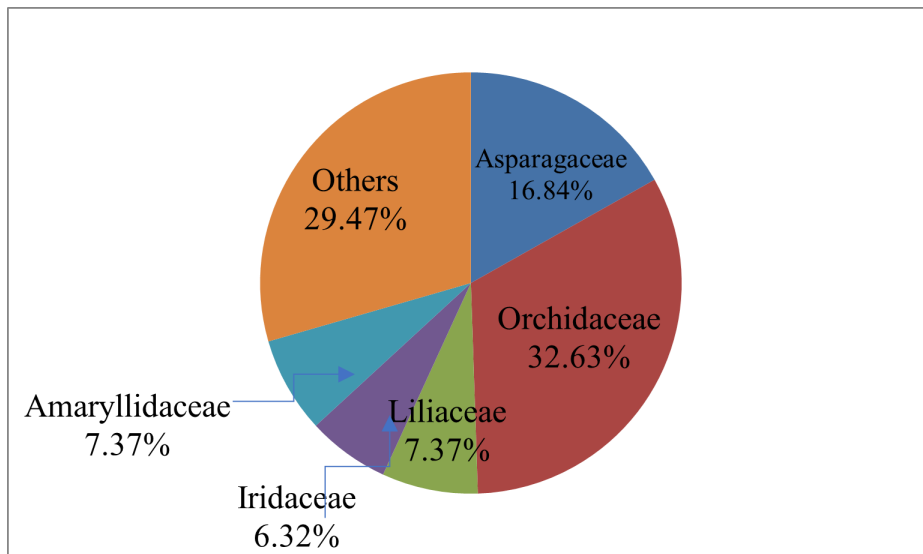
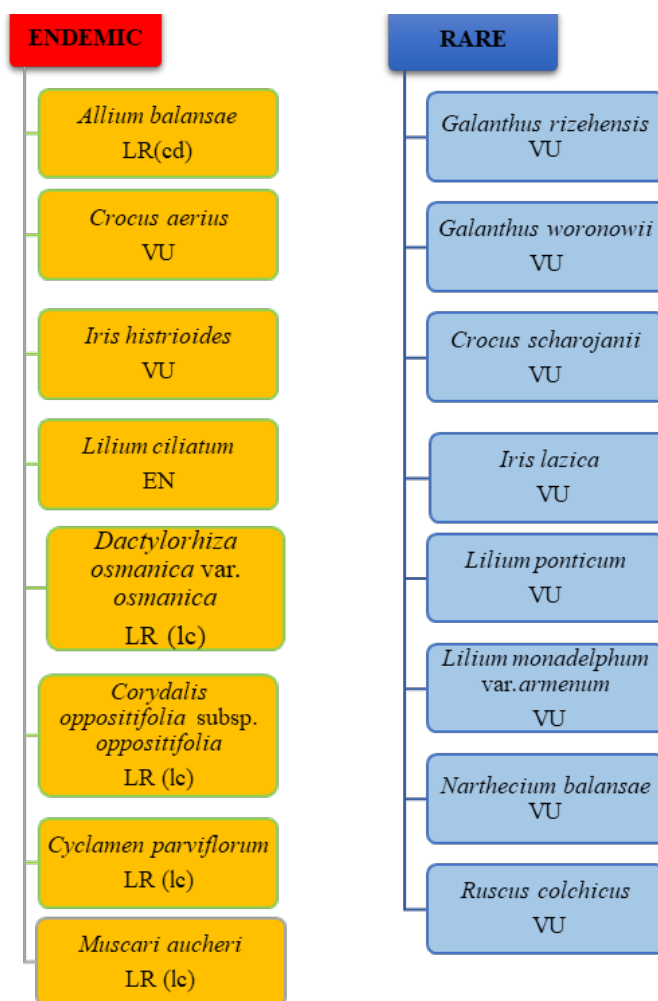


Figure 2 The proportional distributions of the richest five families.



TLR (cd): Lower risk (conservation dependent) LR (lc): Lower risk (least concern) VU: Vulnerable EN: Endangered

**Figure 3** IUCN threat categories of endemic and rare taxa.

## DISCUSSION

A total of 95 geophyte plant taxa belonging to 45 genera and 20 families were identified in the present study. The families with the highest number of taxa in the research area are Orchidaceae (31 taxa), Asparagaceae (16 taxa), Liliaceae (7 taxa), Amaryllidaceae (7 taxa), and Iridaceae (6 taxa). A comparison with previous studies revealed discrepancies in the number of taxa reported within certain families. Notably, the number of geophyte taxa in the Liliaceae family was higher in earlier studies than in the present study (see Table 1). In contrast, the number of taxa in the Asparagaceae

family was higher in this study, a difference attributed to recent taxonomic revisions in which many taxa previously classified under Liliaceae were reclassified into Asparagaceae. Furthermore, the broader geographic coverage of the present study, relative to prior studies, contributed to a higher number of Orchidaceae taxa recorded. Table 2 lists the plant families with the highest number of geophyte taxa reported in studies conducted across Türkiye. These consistently identify Orchidaceae, Liliaceae, Asparagaceae, Amaryllidaceae, and Iridaceae as the families in which geophyte taxa are most frequently encountered.

**Table 1** The comparison of five families containing the most species in previous studies conducted in in this region (number of taxa).

Families	Present study	Berber (1993)	Terzioğlu (1998)	Palabaş (2002)	Uzun (2002)	Palabaş Uzun (2009)
Orchidaceae	31	8	16	9	9	10
Asparagaceae	16	-	-	-	-	-
Liliaceae	7	11	28	15	12	17
Amaryllidaceae	7	-	-	-	-	-
Iridaceae	6	1	6	3	6	1

**Table 2** Families with the most geophyte taxa in the studies conducted in Türkiye.

Families	Present study	Avcu et al. (2016)	Çakır (2017)	Akbaş and Varol (2017)	Sefali and Gıdık (2019)	Yener and Seyidoğlu Akdeniz (2020)
Orchidaceae	31	11	3	17	-	27 (%)
Asparagaceae	16	10	14	7	-	-
Liliaceae	7	-	9	-	2	-
Amaryllidaceae	7	-	9	-	-	18
Iridaceae	6	-	5	5	12	-

Euxine (18) and Euro-Siberian (15) elements are prevalent in the study area. It has also been noted that Euro-Siberian elements are prominent in other studies conducted in this region (Terzioğlu 1998, Palabaş 2002, Uzun 2002, Uzun and Terzioğlu 2008, Özkan 2016, Yazar 2019).

Trabzon Province boasts a rich variety of geophyte taxa owing to its expansive coverage from the coast to mountain summits, encompassing diverse habitat types. In this study, eight identified taxa were found to be endemics. Among these, *Allium balansae*, discovered in a very small population within a stony-rocky habitat at 2797 meters altitude, is exclusively located within the Çaykara Forest Sub-District Directorate. This taxon is categorized as LR (cd) in the IUCN threat assessment (Ekim et al. 2000), necessitating protection. Hence, the formulation of *in-situ* conservation plans for this taxon holds paramount importance in safeguarding biological diversity. Another endemic species, *Iris histrioides*, was exclusively located at the snowline (2373 meters altitude) within the Çaykara Forest Sub-District Directorate. It falls under the VU category according to the IUCN assessment (Ekim et al. 2000), signaling high risk and predicted future threats. The habitat supporting this species is threatened by proposed road construction activities, necessitating all future endeavors in this area to be meticulously planned to ensure the preservation of the species' habitat.

*Corydalis oppositifolia* subsp. *oppositifolia* was exclusively found in the field on the snowline of wet meadow grasslands at 2364 meters altitude, within the borders of the Çaykara Forest Sub-District Directorate, alongside several other geophyte taxa (*Crocus aeriens*, *Ornithogalum oligophyllum*, *Scilla siberica* subsp. *armena*, *Colchicum szowitsii*, *Gagea villosa*, *Orchis pallens*, *Muscari* spp., *Cyclamen parviflorum*). This taxon is classified as LR (lc) according to Ekim et al (2000), and is not considered threatened. *Crocus aeriens* was documented in various locations in the Çaykara Forest Sub-District Directorate and on the plateaus adjacent to the Maçka Altındere Valley. Its IUCN threat category is VU according to Ekim et al. (2000), and it was further evaluated as EN according to Ekim et al. (2013) and IUCN (2012). This classification indicates a very high risk of extinction in the near future. The primary threats to this taxon in its distribution area are tourism activities, as noted by Solomon et al. (2014), who also highlighted overgrazing and global climate change as significant threats. The populations of *Lilium ciliatum*, an endemic species, were discovered in Hamsiköy, Çatak, Düzköy, and Araklı Forest Sub-District Directorates. While originally listed as LR (cd) according to Ekim et al. (2000), it was reassessed as EN by Ekim et al. (2013) and IUCN (2012). This reevaluation suggests a decline in habitats over the years and indicates a high risk. The primary threats in the

study area are overgrazing and grass-cutting activities, with instances observed where the entire populations were eradicated within a short time frame, such as in the village of Boğalı. Solomon et al. (2014) noted a decline in population across distribution areas, attributing it to human threats like ecotourism, recreational activities, and road construction.

Despite being endemic, *Cyclamen parviflorum* exhibited dense populations ranging from 965 to 2578 meters altitude in numerous Forest Sub-District Directorates within Trabzon Province. Classified as LR (lc) according to Ekim et al. (2000), this taxon is not considered threatened. *Muscari aucheri*, an endemic species, boasts a sizable population spanning areas from 2116 to 2900 meters in Çaykara and Altındere Forest Sub-District Directorates. Classified as LR (lc) according to Ekim et al. (2000), this taxon is not considered threatened. *Dactylorhiza osmanica* var. *osmanica*, another endemic species, also exhibits a substantial population occupying wet meadow areas from 2039 to 2400 meters in Köprübaşı, Sürmene, Karadere, and Esiroğlu Forest Sub-District Directorates. The results underscore the importance of protecting endemic geophytic taxa, which often have restricted distributions. Implementing measures such as the installation of barbed wire and designation as gene sources is crucial, particularly in areas where transhumance and grazing activities are intensive. A significant population of the rare *Crocus schorojanii* subsp. *schorojanii* was exclusively found around Balıkgöl in the Çaykara Forest Sub-District Directorate. Although this species is not endemic, it was not observed in any other location during this study. However, it has been reported to have a dense population in Maçka-Kasapoğlu Plateau (Tarımsal Kalkınma Vakfı 2010). *Galanthus rizehensis*, *Galanthus woronowii*, *Iris lazica*, *Lilium ponticum*, and *Lilium monadelphum* subsp. *armenum*, rare species listed in Ekim et al. (2000) under the VU category, were extensively observed in numerous locations across the study area.

As a result, we concluded that the Çaykara Forest Sub-District Directorate is particularly rich in endemic and rare geophyte plants. This region exhibits high floristic biodiversity owing to its diverse ecosystems, including forests, alpine meadows, stony-rocky habitats, and wet meadows. Geophyte taxa were densely detected up to 2900 meters in the study area, encompassing Uzungöl and Yedigöller. Similarly, a study reported by the Agricultural Development Foundation (2010) also identified *Crocus aeriens*, *Iris histrioides*, *Cyclamen parviflorum*, *Lilium ponticum*, *Crocus schorojanii*, *Allium balansae*, *Dactylorhiza osmanica* var. *osmanica*, *Lilium ciliatum*, *Galanthus woronowii*, and *Cyclamen coum* among the target plant taxa sensitive to the ecosystem present in Uzungöl. Uzungöl, located within the Çaykara Forest Sub-District Directorate, is a prominent tourist attraction center.

However, habitats containing numerous endemic and rare species in this region have been subjected to damage due to excessive construction in recent years. Therefore, priority should be given to the protection of these plants when planning forest and tourism activities, and road construction works in this area. Considering the potential of significant geophyte plant taxa of this region, the planning of studies as geophyte taxon gene resource reserve areas will contribute to the protection and sustainability of this rich biodiversity.

Geophyte taxa, particularly species in the family Orchidaceae, are abundant in the Hamsiköy Forest Sub-District Directorate. This region harbors 30 geophyte taxa including Orchidaceae taxa. Kreuz and Çolak (2009) also identified 24 species in the Orchidaceae family in this area and its surroundings. The integration of these studies into forest management plans will maintain biological variety in order to conserve rich biodiversity in this region. The Altındere Valley Forest Planning Unit also stands out in terms of plant diversity within the study area, hosting 40 geophyte taxa. Similarly, Anşin (1979) identified 40 geophyte taxa, while Uzun and Terzioğlu (2008) reported 34 in the study area and its close environments. This valley attracts tourists due to the presence of the Sumela Monastery. Therefore, diversifying tourism with ecotourism activities, such as botanical tourism, can enhance the regional economy while simultaneously protecting species in their habitats and showcasing them to visitors in a conservation-friendly manner.

*Galanthus alpinus* var. *alpinus*, found in the study area, is a new record for Trabzon Province. A study that reevaluated the *Galanthus* genus revealed that *Galanthus alpinus* is exclusively found within the confines of Rize Province in Türkiye (Emir and Ünver Somer 2018). Extensive literature investigations indicated that the distribution of this species in Trabzon Province was unknown. However, a dense population of the species was observed in two nearby fields on the edge of forest and roadside habitats at 657 meters in the Uğurlu District. In this study, the Tonya-Düzköy region exhibited rich plant diversity, particularly with spring taxa (such as *Scilla siberica* var. *armena*, *Scilla monanthos*, *Colchicum szovitsii*, *Gagea glacialis*, and *Ornithogalum montanum*) and fall taxa (such as *Crocus vallicola*, *Crocus speciosus* subsp. *speciosus*, and *Colchicum speciosum*), blooming and displaying high population density. During spring, the Kadiralak Plateau, located within this region, attracts tourists due to the striking appearance of the *Scilla* species, known locally as “mavi yıldız”. Additionally, numerous other regions in the vicinity have potential for tourism. Therefore, based on the flowering dates of the species obtained in the study, it is recommended that these taxa be incorporated into ecotourism activities in the region.

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## Appendix

### FLORISTIC LIST OF THE STUDY AREA

#### ANGIOSPERMS

##### MONOCOTS

##### ALISMATALES

##### ARACEAE

###### 1 – *Arum* L.

1 – *Arum italicum* Mill.

Akçaabat-Meşeli village, 10.03.2020, 147 m, agricultural areas; Maçka-Coşandere, 1094 m, under forest; Vakfıkebir-Kirazlık district, 19.02.2016, 125 m, agricultural areas; Akçaabat-Osmanbaba village, 10.03.2020, 141 m, agricultural areas; Trabzon-Gürbulak district, 24.01.2019, 151 m, under hazelnut plantation, tuberous, HEG50.

2 – *Arum maculatum* L.

Araklı-Yalıboyu district, 18.02.2016, 10 m, under hazelnut plantation; Arsin-Çardaklı village, 10.05.2016, 547 m, field margins; Akçaabat-Kavaklı district, 10.03.2020, 167 m, hazelnut plantation, tuberous, HEG51.

##### DIOSCOREALES

##### NARTHECIACEAE

###### 2 – *Narthecium* Huds.

3 – *Narthecium balansae* Briq.

Sürmene-Seslikaya plateau, 11.07.2018, 2049 m, wet areas; Hayrat-Büyükharman plateau, 19.07.2018, 2033 m, roadsides; Çaykara-Hanımdüzü plateau, 19.07.2018, 2303 m, meadow pasture, Euxine element, rhizome, HEG116.

##### LILIALES

##### COLCHICACEAE

###### 3 – *Colchicum* L.

4 – *Colchicum speciosum* Steven

Tonya-Karşular district, 16.09.2020, 1427 m, forest clearings; Maçka-Güzelyayla district, 30.05.2019, 1458 m, meadow pasture; Çaykara-Küçükyayla plateau, 21.05.2019, 2269 m, rocky areas; Düzköy, 12.04.2019, 1116 m, under forest; Maçka-Meryemana, 23.02.2018, 1124 m, under forest, Euro.-Sib. element, cormous, HEG132.

5 – *Colchicum szovitsii* Fisch. & C.A.Mey. subsp. *szovitsii*

Düzköy-Haçkalıbaba plateau, 12.04.2019, 1849 m, meadow pasture; Maçka-Fırınoba plateau, 06.05.2021, 2387 m, meadow pasture; Şalpazarı-Gökçeköy village, 03.03.2016, 1375 m, cemetery; Çaykara-Demirkapı village, 15.05.2021, 2188 m, meadow pasture; Çaykara-Uzungöl, 13.02.2019, 1194 m, meadow pasture, Irano-Turanian element, cormous, HEG52.

6 – *Colchicum umbrosum* Steven

Ortahisar-Zafanoz village, 31.08.2020, 200 m, field; Ortahisar-KTÜ campus, 17.09.2020, 120 m, under forest, Euxine element, cormous, HEG131.

##### MELANTHIACEAE

###### 4 – *Paris* L.

7 – *Paris incompleta* M.Bieb.

Düzköy-Gürgendağ, 16.05.2019, 1521 m, under beech forest; Arsin-Çardaklı village, 10.05.2016, 693 m, hazelnut

plantations; Düzköy-Çalköy, 30.04.2016, 1300 m, forest; Düzköy-Aykut district, 22.06.2021, 1005 m, under beech forest, Euxine element, rhizome, HEG88.

###### 5 – *Veratrum* L.

8 – *Veratrum album* L.

Düzköy-Gürgendağ, 16.05.2019, 1627 m, forest clearings; Maçka-Ormanüstü plateau, 23.07.2018, 1744 m, forest clearings; Hayrat-Ağaçbaşı plateau, 19.07.2018, 2103 m, meadow pasture; Araklı-Taşlı plateau, 08.06.2021, 2373 m, meadow pasture; Maçka-Balehor plateau, 1858 m, meadow pasture, 09.07.2019, Euro.-Sib. element, rhizome, HEG66.

##### LILIACEAE

###### 6 – *Gagea* Salisb.

9 – *Gagea bohémica* (Zauschn.) Schult. & Schult.f.

Maçka-Fırınoba plateau, 06.05.2021, 2406 m, meadow pasture; Sürmene-Ağaçbaşı peatland, 25.05.2019, 2000 m, swamp; Maçka-Papazyurdu plateau, 2356 m, meadow pasture, 06.05.2021, bulbous, HEG77.

10 – *Gagea glacialis* K.Koch

Maçka-Kutlusu plateau, 28.05.2019, 2127 m, meadow pasture; Çaykara-Küçükyayla, 21.05.2019, 2263 m, stony meadow pasture; Çaykara-Balıkligöl district, 15.05.2021, 2568 m, meadow pasture; Sürmene-Ağaçbaşı plateau, 28.05.2019, 1984 m, meadow pasture; Düzköy-Çalköy, 12.04.2019, 1414 m, meadow pasture, Irano-Turanian element, bulbous, HEG75.

11 – *Gagea luteoides* Stapf

Düzköy-Çalköy, 07.04.2016, 1137 m, meadow pasture, bulbous, HEG78.

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

Düzköy-Çalköy, 13.04.2017, 1108 m, meadow pasture; Çaykara-Küçükyayla surroundings, 21.05.2019, 2364 m, meadow pasture, Mediterranean element, bulbous, HEG76.

###### 7 – *Lilium* Tourn. ex L.

13 – *Lilium ciliatum* P.H.Davis

Maçka-Hamsiköy, 09.07.2019, 1728 m, meadow pasture; Araklı-Boğalı village, 28.06.2018, 2034 m, damp open areas; Düzköy-Fengo plateau, 22.06.2021, 1597 m, roadside; Maçka-Büyükşelen plateau, 18.06.2020, 1824 m, forest clearings; Köprübaşı-Arpalı, 11.07.2018, 1618 m, forest clearings, endemic, bulbous, HEG119.

14 – *Lilium monadelphum* var. *armenum* (Misch. ex Grossh.) P.H. Davis & D.M. Hend.

Maçka-Balehor plateau, 09.07.2019, 1842 m, meadow pasture; Maçka-Bekçiler district, 24.06.2020, 1510 m, under *Picea orientalis* forest; Maçka-Livera, 01.07.2020, 1342 m, forest clearings; Maçka-Yerlice village, 23.07.2018, 1571 m, meadow pasture; Düzköy-Çalköy, 03.07.2016, 1149 m, forest sides, bulbous, HEG118.

15 – *Lilium ponticum* K.Koch.

Araklı-Bahçecik plateau, 28.06.2018, 1819 m, *Picea orientalis* forestsides; Çaykara-Sultanmurat plateau, 02.07.2018, 2057 m, meadow pasture; Maçka-Kusal plateau, 01.07.2020, 1840 m, meadow pasture; Sürmene-Vizara plateau, 18.06.2019, 1924 m, meadow pasture; Araklı-Kal plateau, 18.06.2019, 2012 m, stony areas, bulbous, HEG120.

**ASPARAGALES****ORCHIDACEAE****8 – *Anacamptis* Rich.**

16 – *Anacamptis pyramidalis* (L.) Rich.

Araklı-Kayaiçi district, 28.06.2018, 750 m, stony areas; Maçka-Bakırcılar surroundings, 01.07.2020, 476 m, stony-rocky areas; Maçka-Velioğulları district, 27.05.2021, 473 m, in *Cistus* bush; Düzköy-Çalköy, 03.07.2016, 1164 m, forest clearings, Maçka-Livera, 01.07.2020, 1019 m, in forest, tuberous, HEG109.

**9 – *Cephalanthera* Rich.**

17 – *Cephalanthera damasonium* (Mill.) Druce

Maçka-Bağışlı, 25.05.2021, 966 m, deciduous forest; Maçka-Başarköy, 25.05.2021, 1236 m, forest clearings; Maçka-Anayurt village, 30.05.201, 968 m, in forest, Euro.-Sib. element, rhizome.

18 – *Cephalanthera longifolia* (L.) Fritsch

Maçka-Başarköy, 25.05.2021, 1240 m, in forest; Çaykara-Uzungöl, 15.05.2021, 1099 m, forest clearings; Araklı-Akocak village, 14.05.2019, 1177 m, meadow pasture; Maçka-Mataracı, 27.05.2021, 661 m, in *Cistus* bushes; Araklı-Örnek village, 01.05.202, 328 m, under hazelnut plantation, Euro.-Sib. element, tuberous, HEG81.

19 – *Cephalanthera rubra* (L.) Rich.

Düzköy-Çalköy, 08.07.2017, 1317 m, *Picea orientalis* forest, rhizome, HEG82.

**10 – *Coeloglossum* (L.) Hartm.**

20 – *Coeloglossum viride* (L.) Hartm.

Araklı-Kal plateau, 18.06.2019, 2012 m, stony area; Maçka-Küçükyurt plateau, 01.07.2020, 2181 m, meadow pasture; Sürmene-Harmantepe, 11.07.2018, 1973 m, swamp area; Çaykara-Sultanmurat plateau, 28.06.2018, 2240 m, meadow pasture; Sürmene-Taşlı plateau, 11.07.2018, 2086 m, streamside, tuberous, HEG110.

**11 – *Dactylorhiza* Necker ex Nevski**

21 – *Dactylorhiza euxina* var. *markowitschii* (Soó) Renz & Taubenheim

Araklı-Yılantaş plateau, 01.06.2021, 1819 m, meadow pasture; Köprübaşı-Arpalı village, 08.06.2021, 2028 m, wetland; Hayrat-Huso Santral, 19.07.2018, 2146 m, meadow pasture; Maçka-Paparza plateau, 24.06.2020, 2195 m, meadow pasture; Köprübaşı-Vartan plateau, 08.06.2021, 2118 m, meadow pasture, Euxine element, tuberous, HEG105.

22 – *Dactylorhiza euxina* (Nevski) Czerep.

Hayrat-Büyükharman plateau, 19.07.2018, 1873 m, forest clearings; Sürmene-Hanyeri plateau, 18.06.2019, 1845 m, meadow pasture; Hamsiköy-Paparza rocky places, 24.06.2020, 2010 m, meadow pasture; Çatak-Başar village, 24.06.2020, 2204 m, wet places; Esiroğlu-Dilaver pasture, 15.06.2021, 2196 m, Euxine element, tuberous, HEG106.

23 – *Dactylorhiza osmanica* var. *osmanica* (Klinge) P. F. Hunt & Summerh

Köprübaşı-Taşlı plateau, 11.07.2018, 2130 m, meadow pasture; Köprübaşı-Vartan Yaylası, 08.06.2021, 2097 m, wet meadow pasture; Sürmene-Lişiit plateau, 08.06.2021, 2069 m, meadow pasture; Maçka-Esiroğlu, 15.06.2021, 2400 m

wet meadow pasture, Irano-Turanian element, endemic, tuberous, HEG107.

24 – *Dactylorhiza romana* subsp. *georgica* (Klinge) Soó ex Renz & Taubenheim

Çaykara-Arpaözü village, 21.05.2019, 2004 m, meadow pasture; Köprübaşı-Vartan plateau, 08.06.2021, 2105 m, meadow pasture; Çaykara-Haldizen, 21.05.2019, 1809 m, forest clearings; Köprübaşı-Kutlusu plateau, 28.05.2019, 2088 m, meadow pasture; Maçka-Camiboğazi plateau, 15.06.2021, 2367 m, wet meadow pasture, tuberous, HEG85.

25 – *Dactylorhiza saccifera* (Brongn.) Soó

Hayrat-Hanımdüzü plateau, 19.07.2018, 2303 m, meadow pasture, Maçka-Livera, 01.07.2020, 1172 m, meadow pasture; Sürmene-Taşlı plateau, 08.06.2021, 1126 m, meadow pasture, Mediterranean element, tuberous, HEG108.

26 – *Dactylorhiza urvilleana* (Steud.) H.Baumann & Künkele  
Düzköy-Haçka, roadsides, 06.06.2018, 1124 m, forest clearings; Tonya-Kadıralak plateau, 06.08.2015, 1433 m, roadside; Çayırbağı-Hırsafa plateau, 22.06.2021, 1650 m, forest clearing; Hamsiköy-Başar village, 24.06.2020, 1541m, forest side; İpekyolu-Ormanüstü plateau, 23.07.2018, 1744 m, forest clearings, Euxine element, tuberous, HEG104.

**12 – *Gymnadenia* R.Br.**

27 – *Gymnadenia conopsea* (L.) R.Br.

Çaykara-Sultanmurat plateau, 02.07.2018, 1937 m, meadow pasture; Maçka-Yerlice roadside, 23.07.2018, 1838 m, meadow pasture; Maçka-Hamsiköy, 09.07.2019, 1751 m, meadow pasture; Köprübaşı-Parma plateau, 02.07.2018, 1865 m, meadow pasture; Sultanmurat-Hanlar district, 02.07.2018, 1841 m, meadow pasture, Euro.-Sib. element, tuberous, HEG112.

**13 – *Limodorum* Boehm.**

28 – *Limodorum abortivum* (L.) Sw. var. *abortivum*

Hamsiköy-Başarköy, 21.05.2021, 1004 m, under forest; Akçaabat-Mersin Saraçlar district, 25.06.2020, 104 m, under forest, rhizome, HEG67.

**14 – *Listera* R.Br.**

29 – *Listera ovata* (L.) R.Br.

Hamsiköy-Bağışlı, 25.05.2021, 966 m, under deciduous forest; İpekyolu-Kozağaç village, 27.05.2021, 788 m, roadside, Euro.-Sib. element, rhizome, HEG83

**15 – *Neottia* Guett.**

30 – *Neottia nidus-avis* (L.) Rich.

Düzköy-Çalköy, 08.07.2017, 1302 m, under *Picea orientalis* forest; Maçka-Hamsiköy, 09.07.2019, 1665 m, under forest, Euro.-Sib. element, rhizome, HEG113.

**16 – *Ophrys* L.**

31 – *Ophrys apifera* Huds.

KTÜ campus, 13.05.2019, 72 m, meadow places, tuberous, HEG70.

32 – *Ophrys oestrifera* M.Bieb.

Hamsiköy-Güzelce village, 25.05.2021, 985 m, meadow pasture, tuberous, HEG68.

33 – *Ophrys sphegodes* subsp. *caucasica* (Woronow ex Grossh.) Soó

İpekyolu-Kozağaç village, 27.05.2021, 788 m, roadside; İpekyolu-Kozağaç village, 27.05.2021, 110 m, meadow pasture, Euxine element, tuberous, HEG69.

#### 17 – *Orchis* L.

34 – *Orchis laxiflora* Lam.

KTU campus, 13.05.2019, 79 m, meadow pasture, tuberous, HEG100.

35 – *Orchis mascula* subsp. *longicalcarata* Akhalk., H.Baumann, R.Lorenz, Mosul. & Ruedi Peter

Köprübaşı-Ağaçbaşı peatland, 28.05.2019, 199 m, meadow pasture; Sürmene Seslikaya plateau, 18.06.2019, 2015 m, meadow pasture; Karadere-Yılantaş plateau, 1.06.2021, 1962 m, meadow pasture; Köprübaşı-Taşlı plateau, 11.07.2018, 2086 m, streamside; Karadere-Liştir plateau, 8.06.2021, 2053 m, wet meadow pasture, tuberous, HEG97.

36 – *Orchis militaris* L.

Hamsiköy-Güzelce village, 25.05.2021, 844 m, stony-rocky places; İpekyolu-Kozağaç village, 27.05.2021, 788 m, road-sides; Hamsiköy-Dikkaya village, 30.05.2019, 1019 m, road-sides; Hamsiköy-Güzelyayla, 30.05.2019, 1094 m, meadow pasture, Hyrcano-Euxine element, tuberous, HEG101.

37 – *Orchis pallens* L.

Çaykara-Küçükayla surroundings, 21.05.2019, 2364 m, meadow pasture; Köprübaşı-Harmantepe, 28.05.2019, 1989 m, meadow pasture; Hamsiköy, 30.05.2019, 1614 m, forest side Köprübaşı-Kutlusu plateau, 28.05.2019, 2088 m, meadow pasture, Euro.-Sib. element (?), tuberous, HEG98.

38 – *Orchis purpurea* Huds.

Çatak-Başarköy, 25.05.2021, 1240 m, under forest; Hamsiköy-Bağışlı, 25.05.2021, 938 m, forest clearings; Hamsiköy-Başarköy, 25.05.2021, 1239 m, forest clearings, tuberous, HEG102.

39 – *Orchis simia* Lam.

İpekyolu-Güzelce village, 25.05.2021, 533 m, forest clearings, Mediterranean element(?), tuberous, HEG103.

40 – *Orchis tridentata* Scop.

Hamsiköy-Güzelyayla plateau, 30.05.2019, 1094 m, meadow pasture; Yeşiltepe-Velioğulları road, 27.05.2021, 473 m, Cistus bushes; Hamsiköy-Anayurt village, 30.05.2019, 968 m, under forest; Yeşiltepe-Öğütlü village, 27.05.2021, 569 m, bushes places; Hamsiköy-Büyükselen plateau, 18.06.2020, 2056 m, meadow pasture, Mediterranean element, tuberous, HEG99.

#### 18 – *Platanthera* Rich.

41 – *Platanthera bifolia* (L.) Rich.

Maçka-Livera, 1.07.2020, 966 m, under forest; Çayırbaşı-Çalköy, 8.07.2017, 1303 m, under *Picea orientalis* forest; Akçaabat-Mersin Saraçlar district, 25.06.2020, 104 m, under forest, Euro.-Sib. element, tuberous, HEG91.

42 – *Platanthera chlorantha* (Custer) Rchb.

Düzköy-Erikli plateau, 25.06.2020, 1631 m, meadow pasture, tuberous, HEG92.

#### 19 – *Serapias* L.

43 – *Serapias orientalis* (Greuter) H.Baumann & Künkele subsp. *orientalis*

Akçabat-Mersin district, 25.06.2020, 454 m, meadow pasture; Arsin Yanbolu-Kuzguncuk district, 12.05.2021, 15 m,

stony-rocky places; KTÜ campus, 13.05.2019, 72 m, meadow pasture; Maçka-Öğütlü village, 27.05.2021, 548 m, meadow pasture, Mediterranean element, tuberous, HEG96.

#### 20 – *Spiranthes* Rich.

44 – *Spiranthes spiralis* (L.) Chevall.

Maçka-Pilav Dağı, 3.10.2018, 1075 m, forest clearings; Ortahisar-Gölçayır village, 19.09.2018, 242 m, under hazelnut plantations; Ortahisar-Çamoba village, 19.09.2018, 359 m, under hazelnut plantations; Yomra-Kaşüstü Murathan district, 7.10.2015, 30 m, under hazelnut plantations, Mediterranean element, tuberous, HEG123.

#### 21 – *Stenipennis* Schltr.

45 – *Himantoglossum satyrioides* Spreng.

Araklı-Yağmurdere, 14.05.2019, 975 m, roadsides; Maçka-Başarköy, 25.05.2021, 1240 m, under forest, Hyrcano-Euxine element, tuberous, HEG80.

#### 22 – *Traunsteinera* Rchb.

46 – *Traunsteinera sphaerica* (M.Bieb.) Schltr.

Maçka-Küçükayurt plateau, 1.07.2020, 2181 m, under hazelnut plantations; Maçka-Balehor plateau, 9.07.2019, 1800 m, meadow pasture; Sürmene-Vizara plateau, 18.06.2019, 1924 m, meadow pasture; Köprübaşı-Taşlı plateau, 11.07.2018, 2086 m, streamside, Hyrcano-Euxine element, tuberous, HEG114.

#### IRIDACEAE

#### 23 – *Crocus* L.

47 – *Crocus aerius* Herb.

Altındere Valley-Haliya plateau, 6.05.2021, 2068 m, meadow pasture; Çaykara-Uzungöl, 14.03.2015, 1120 m, meadow pasture; Çaykara-Küçükayla, 21.05.2019, 2364 m, meadow pasture; Çaykara-Demirkapı village, 15.05.2021, 2373 m, meadow pasture, Euro.-Sib. element, endemic, cormous, HEG121.

48 – *Crocus scharojanii* Rupr.

Çaykara-Küçükayla, 13.09.2018, 2451 m, streamside; Çaykara-Balıkli Lake, 18.09.2019, 2543 m, wet meadow pasture, cormous, HEG128.

49 – *Crocus speciosus* M.Bieb.

Düzköy-Honefter district, 18.10.2018, 1887 m, meadow pasture; Çatak-Üçgedik village, 18.10.2018, 1565 m, meadow pasture; Tonya-Şova plateau, 18.10.2018, 1906 m, meadow pasture; Tonya-Çayırbaşı, 18.10.2018, 1959 m, meadow pasture; Tonya-Kadıralak plateau, 1.09.2015, 1415 m, meadow pasture, cormous, 130.

50 – *Crocus vallicola* Herb.

Akçaabat-Hıdırnebi plateau, 5.10.2018, 1375 m, meadow pasture; Düzköy-Mula district, 18.10.2018, 1849 m, meadow pasture; Maçka-Yerlice village, 25.09.2018, 1830 m, meadow pasture; Düzköy-Zeliha district, 1.10.2015, 1448 m, meadow pasture; Düzköy-Kayabaşı plateau, 5.10.2018, 1804 m, meadow pasture, Euxine element, cormous, HEG129.

#### 24 – *Iris* L.

51 – *Iris histrioides* (G.F.Wilson) S.Arn.

Çaykara-Demirkapı village, 15.05.2021, 2373 m, snow line, Euxine element, endemic, rhizome, HEG93.

52 – *Iris lazica* Albov

Arsin-Karşiyaka district, 12.05.2021, 253 m, Corylus plantation side; Arsin-Elmalan village, 616 m, under forest; Sürmene-Çamburnu, 20.02.2019, 145 m, roadside; Of-Uğurlu Nazarlı district, 15.03.2021, 441 m, roadside; Sürmene-Zarha Mountain, 23.01.2019, 440 m, forest side; Of-Yazlık village, 20.02.2019, 16 m, road side, Euxine element, rhizome, HEG53.

#### ASPHODELACEAE

##### 25 – *Asphodeline Rchb.*

53 – *Asphodeline lutea* (L.) Rchb.

Hamsiköy-Bağışlı, 14.05.2016, 1250 m, stony-rocky places, Mediterranean element, rhizome, HEG79.

#### AMARYLLIDACEAE

##### 26 – *Allium* L.

54 – *Allium balansae* Boiss.

Çaykara-Büyükyayla, 13.09.2018, 2797 m, stony-rocky place, Irano-Turanian element, endemic, bulbous, HEG126.

55 – *Allium rupestre* Steven

Maçka-Bakircılar road, 1.07.2020, 498 m, stony-rocky places, Euxine element, bulbous, HEG125.

56 – *Allium schoenoprasum* L.

Çaykara-Büyükyayla, 13.09.2018, 2606 m, meadow pasture, bulbous, HEG127.

57 – *Allium scorodoprasum* subsp. *rotundum* (L.) Stearn

Düzköy-Honefter plateau, 24.07.2020, 1961 m, roadside; Hayrat-Hamzalı district, 10.06.2021, 467 m, *Camellia sinensis* sides; Maçka-Kozağaç village, 27.05.2021, 602 m, roadside; Of-Elmalı village, 2.05.2021, 183 m, roadside; Of-Uğurlu district, 2.05.2021, 345 m, *Camellia sinensis* sides, bulbous, HEG124.

##### 27 – *Galanthus* L. / *Kardelen*

58 – *Galanthus alpinus* Sosn. var. *alpinus*

Of-Uğurlu district, 15.03.2021, 657 m, forest side; Of-Uğurlu district, 15.03.2021, 645 m, roadside, bulbous, HEG49.

59 – *Galanthus rizehensis* Stern

Altındere Valley, 11.03.2019, 1099 m, under forest; Arsin-Yalıboyu, 18.02.2016, 10 m, under hazelnut plantations; Arsin-Yeşilyalı-Yaylacık district, 23.01.2019, 222 m, under hazelnut plantations; Düzköy-Çayırbaşı-Gülcana district, 5.02.2019, 1109 m, field side; Maçka-Meryemana, 24.02.2016, 1015 m, under forest, bulbous, HEG43.

60 – *Galanthus woronowii* Losinsk.

Maçka-Altındere Valley Coşandere, 23.02.2018, 1094 m, under forest; Çaykara-Düzmahalle, 10.03.2016, 514 m, stony-rocky places; Akçaabat-Harmancık, 5.02.2019, 1027 m, meadow pasture; Çaykara-Uzungöl, 13.02.2019, 118 m, agricultural area; Köprübaşı, 20.03.2021, 1288 m, under forest, bulbous, HEG46.

#### ASPARAGACEAE

##### 28 – *Muscari* Mill.

61 – *Muscari armeniacum* H.J.Veitch

Çaykara-Arpaözü district, 21.05.2019, 1980 m, meadow pasture; Esiroğlu-Çilekli village, 12.03.2020, 137 m, under hazelnut plantation; Köprübaşı-Sulak district, 28.05.2019, 2100 m,

meadow pasture; Maçka-Paparza plateau, 24.06.2020, 2162 m, meadow pasture; Şalpazarı-Duraluşağı district, 9.04.2019, 733 m, under hazelnut plantation, bulbous, HEG55.

62 – *Muscari aucheri* (Boiss.) Baker

Maçka-Altındere-Haliya Plateau, 6.05.2021, 2033 m, meadow pasture; Maçka-Altındere-Dörtkelifler plateau, 6.05.2021, 2326 m, meadow pasture; Çaykara-Balıkgöl surroundings, 15.05.2021, 2578 m, meadow pasture; Çaykara-Balıkgöl surroundings, 3.06.2021, 2889 m, alpine meadow, endemic, bulbous, HEG84.

63 – *Muscari neglectum* Guss. ex Ten.

Akçaabat-Tütüncüler village, 10.03.2020, 183 m, under hazelnut plantation; Akçaabat-Kaleönü village, 10.03.2020, 393 m, under hazelnut plantation; Araklı-Akocak village, 14.05.2019, 1066 m, forest clearings; Çaykara-Arpaözü village, 21.05.2019, 1965 m, meadow pasture; Hamsiköy-Bağışlı, 25.05.2021, 1470 m, meadow pasture, bulbous, HEG54.

##### 29 – *Ornithogalum* L.

64 – *Ornithogalum montanum* Cirillo

Düzköy-Kayabaşı district, 12.04.2019, 1311 m, meadow pasture; Tonya-Zere plateau, 30.04.2019, 1336 m, meadow pasture; Tonya-Kadiralak plateau, 30.04.2019, 1428 m, meadow pasture; Sürmene-Ağaçbaşı peatland, 28.05.2019, 1991 m, meadow pasture; Maçka-Altındere Valley-Fırınoba plateau, 6.05.2021, 2406 m, meadow pasture, E. Mediterranean element, bulbous, HEG58.

65 – *Ornithogalum narbonense* L.

Maçka-Altındere Valley, 27.06.2016, 1539 m, stony-rocky places, Mediterranean element, bulbous, HEG60.

66 – *Ornithogalum oligophyllum* E.D.Clarke

Çaykara-Küçükayla, 21.05.2019, 2263 m, stony-meadow pasture; Maçka-Başar, Paparza plateau, 24.06.2020, 2162 m, meadow pasture; Köprübaşı-Ağaçbaşı peatland, 28.05.2019, 199 m, meadow pasture; Çaykara-Demirkapı village, 15.05.2021, 2386 m, meadow pasture; Hamsiköy-Çamlıbel, 24.06.2020, 2018 m, forest clearings, bulbous, HEG68.

67 – *Ornithogalum orthophyllum* Ten.

Şalpazarı-Akkese village, 6.03.2019, 152 m, under hazelnut plantation; Tonya-İskenderli, 9.04.2019, 1018 m, meadow pasture; Ortahisar-Esenyurt village, 12.03.2020, 565 m, under hazelnut plantation; Yomra-Bostancı, 12.03.2020, 732 m, under hazelnut plantation; Beşikdüzü-Beşikdağı roadside, 6.03.2019, 321 m, under hazelnut plantation, bulbous, HEG56.

68 – *Ornithogalum sigmoideum* Freyn & Sint.

KTU campus, 28.03.2019, 40 m, meadow pasture; Çimenli village, 28.03.2019, 401 m, under hazelnut plantations, Euro.-Sib. element, bulbous, HEG57.

69 – *Ornithogalum wiedemannii* Boiss.

Düzköy-Haçka road, 6.06.2018, 1328 m, forest clearings; Meryemana Valley-Kusal plateau, 1.07.2020, 1981 m, stony-rocky areas, bulbous, HEG61.

##### 30 – *Polygonatum* Mill.

70 – *Polygonatum multiflorum* (L.) All.

Şalpazarı-Gökçeköy, 29.05.2019, 1484 m, forest clearings; Çayırbaşı-Kayacan district, 11.05.2021, 872 m, forest side; Of-Uğurlu Nazarlı district, 2.05.2021, 311 m, under forest;

Hamsiköy-Bağışlı, 25.05.2021, 966 m, deciduous forests; Çayırbağı-Çalköy, 30.04.2016, 1279 m, forest clearings, rhizome, HEG94.

71 – *Polygonatum verticillatum* (L.) All.

Sürmene-Hanyeri plateau, 8.06.2021, 1648 m, bush areas, Euro.-Sib. element, rhizome, HEG95.

### 31 – *Prospero Salisb.*

72 – *Prospero autumnale* (L.) Speta

Yomra-Kaşüstü, Murathan district, 7.10.2015, 28 m, hazelnut plantation; Ortahisar-Aktoprak-Aşağı district, 19.09.2018, 394 m, meadow pasture; Beştaş village, 20.08.2020, 360 m, stony places, Mediterranean element, bulbous, HEG122.

### 32 – *Ruscus L.*

73 – *Ruscus aculeatus* L.

Maçka-Mataracı, 24.01.2019, 225 m, deciduous forest; Maçka-İsgoby village, 11.03.2019, 556 m, bush place; Beşikdüzü-Beşikdağı, 6.03.2019, 173 m, under forest; Maçka-Esroğlu, 24.01.2019, 192 m, under forest; Akçaabat-Tütüncüler village, 10.03.2020, 52 m, under forest, rhizome, HEG63.

74 – *Ruscus colchicus* Yeo

Arsin-Çardaklı village, 10.05.2016, 711 m, under hazelnut plantations; Of-Yazlık village, 20.02.2019, 16 m, under forest; Maçka-Yazlık village, 1.07.2020, 438 m, under forest, Euxine element, rhizome, HEG64.

### 33 – *Scilla L.*

75 – *Scilla monanthos* K.Koch

Köprübaşı-Ağaçbaşı swamp, 28.05.2019, 1969 m, meadow pasture; Tonya-Zere plateau, 30.04.2019, 1336 m, meadow pasture; Düzköy-Gürgendağ, 16.05.2019, 1627 m, forest clearings; Çaykara-Balıkgöl surroundings, 15.05.2021, 2568 m; Köprübaşı-Kutlusu plateau, 28.05.2019, 2127 m, meadow pasture, Euxine element, bulbous, HEG90.

76 – *Scilla siberica* subsp. *armena* (Grossh.) Mordak

Tonya-Kadıralak plateau, 30.04.2019, 1418 m, meadow pasture; Altındere Valley, 23.02.2018, 1094 m, under forest; Düzköy-Kayabaşı plateau, 12.04.2019, 1676 m, meadow pasture; Mağmat Boğazı, 15.03.2019, 763 m, hazelnut plantations; Köprübaşı-Ağaçbaşı, 28.05.2019, 1984 m, meadow pasture, Irano-Turanian element, bulbous, HEG89.

## EUDICOTS

### RANUNCULALES

#### PAPAVERACEAE

### 34 – *Corydalis D.C.*

77 – *Corydalis caucasica* Adams ex Steud. subsp. *caucasica*

Maçka-Altındere valley, 23.02.2018, 1094 m, under forest; Çayırbağı-Çalköy, 7.04.2016, 1135 m, meadow pasture; Tonya-Zere plateau, 30.04.2019, 1345 m, forest clearing, Euxine element, tuberous, HEG72.

78 – *Corydalis conorhiza* Ledeb.

Çaykara-Balıkgöl surroundings, 3.06.2021, 2582 m, alpine meadow, Euxine element, tuberous, HEG73.

79 – *Corydalis oppositifolia* DC. subsp. *oppositifolia*

Çaykara-Küçükayla, 21.05.2019, 2364 m, snow line, endemic, tuberous, HEG71.

### BERBERIDACEAE

### 35 – *Epimedium L.*

80 – *Epimedium pubigerum* (DC.) C.Mooren & Decne.

Araklı-Yağmurdere, 14.05.2019, 975 m, under forest; Arsin-Karatepe district, 12.05.2021, 407 m, stony-rocky places; Maçka-Yazlık village, 15.03.2019, 633 m, bush places; Çaykara-Filak district, 13.02.2019, 1059 m, under forest; Maçka-Güney district, 15.03.2019, 449 m, bush places, Euxine element, rhizome, HEG62.

## RANUNCULACEAE

### 36 – *Anemone L.*

81 – *Anemone blanda* Schott & Kotschy

Çaykara-Demirkapı-Küçükayla road, 21.05.2019, 2192 m, meadow pasture; Araklı-Bahçecik village, 14.05.2019, 1636 m, meadow pasture; Maçka, 11.03.2019, 348 m, roadside; Of-Elmalı village, 20.02.2019, 171 m, under forest; Maçka-Yeşiltepe-Hıdrellez Boğazı, 15.03.2019, 712 m, hazelnut plantation, tuberous, HEG42.

82 – *Anemone narcissiflora* L.

Köprübaşı-Arpalı road, 28.05.2019, 1821 m, stony-rocky places; Sürmene-Kal plateau, 18.06.2019, 2012 m, stony places, Euro.-Sib. element, rhizome, HEG133.

### 37 – *Ranunculus L.*

83 – *Ranunculus ficaria* subsp. *bulbifer* Lawalrée

Akçaabat-Kavaklı district, 10.03.2020, 205 m, under hazelnut plantation; Beşikdüzü-Türkelli village, 6.03.2019, 248 m, under hazelnut plantation; Beşikdüzü-Dolanlı village, 6.03.2019, 372 m, under hazelnut plantation; Vakfikebir-Çeşmeönü district, 2.03.2016, 55 m, under hazelnut plantation; Sürmene-Çamlıca district, 23.01.2019, 213 m, roadside, bulbous, HEG65.

## CORE EUDICOTS

### SAXIFRAGALES

### PAEONIACEAE

### 38 – *Paeonia L.*

84 – *Paeonia daurica* subsp. *macrophylla* (Albov) D.Y.Hong

Köprübaşı-Arpalı village, 28.05.2019, 1656 m, under forest, tuberous, HEG134.

85 – *Paeonia arietina* G.Anderson

Hamsiköy-Zigana road, 14.05.2016, 1703 m, stony-rocky places, tuberous, HEG135.

## ROSIDS

### FABIDS/ROSID I

### OXALIDALES

### OXALIDACEAE

### 39 – *Oxalis L.*

86 – *Oxalis acetosella* L.

Altındere Valley-Sumela Monastery pathway sides, 23.02.2018, 1375 m, under forest; Çayırbağı-Çal village, 13.04.2017, 1092 m, under forest; Düzköy-Gürgendağ, 16.05.2019, 1395 m, stony-rocky places; Maçka-Hamsiköy, 9.05.2016, 1686 m, forest clearings; rhizome, HEG74.

## ROSALES

### ROSACEAE / GÜLGİLLER

### 40 – *Aruncus L. / Hoşkeçisakalı*

87 – *Aruncus vulgaris* Raf.

Araklı-Yağmurdere, 28.06.2018, 1320 m, roadsides; Düzköy-Haçka road, 6.06.2018, 1328 m, forest clearings; Hayrat-Büyükharman plateau, 19.07.2018, 1225 m, under forest; Sultanmurat-Hanlar district, 2.07.2018, 1839 m, roadside; Sürmene-Oylum, 8.06.2021, 784 m, under forest, rhizome, HEG115.

## MALVIDS/ROSID II

### BRASSICALES

#### BRASSICACEAE

##### 41 – *Cardamine* L.

88 – *Cardamine bulbifera* (L.) Crantz

Çayırbağı-Çal village, 30.04.2018, 1308 m, under forest, Euro.-Sib. element, rhizome, HEG41.

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

Maçka-Altındere valley, 23.02.2018, 1124 m, under forest; Beşikdüzü-Kutluca village, 2.03.2016, 342 m, under forest; Tonya-İskenderli, 9.04.2019, 824 m, streamsides; Maçka-Dolaylı village, 24.02.2016, 425 m, stony places; Beşikdüzü-Oğuz district, 6.03.2019, 216 m, hazelnut plantation, rhizome, HEG40.

##### 42 – *Pachyphragma* Rchb

90 – *Pachyphragma macrophyllum* (Hoffm.) N.Busch

Altındere Valley National Park, 23.02.2018, 1094 m, under forest; Düzköy-Gürgendağ, 16.05.2019, 1395 m, under beech forest; Çilekli village, 12.03.2020, 137 m, streamsides; Beşikdüzü-Kutluca village, 2.03.2016, 342 m, under forest; Tonya-İskenderli-Taşlı district, 9.03.2016, 77 m, under forest, rhizome, HEG86.

## CARYOPHYLLALES

### POLYGONACEAE

##### 43 – *Polygonum* L.

91 – *Polygonum bistorta* subsp. *carneum* (K.Koch) Coode & Cullen

Hamsiköy-Başarköy-Çamlıbel district, 24.06.2020, 1727 m, meadow pasture; Araklı-Limonşuyu road, 28.06.2018, 2100 m, meadow pasture; Çaykara-Parma plateau, 2.07.2018, 1865 m, meadow pasture; Köprübaşı-Arpalı plateau, 11.07.2018, 2170 m, meadow pasture; Çaykara-Sultanmurat plateau,

2.07.2018, 2057 m, meadow pasture, Euxine (mountain) element, rhizome, HEG117.

## ASTERIDS

### ERICALES

#### PRIMULACEAE

##### 44 – *Cyclamen* L.

92 – *Cyclamen coum* subsp. *caucasicum* (K.Koch) O. Schwarz  
Çaykara-Uzungöl, 13.02.2019, 822 m, meadow pasture; Maçka-Altındere Valley road, 23.02.2018, 604 m, streamsides, Maçka-Altındere Valley road sides, 11.03.2019, 1301 m, under *Picea orientalis* forest; Şalpazarı-Dorukkiriş district, 3.03.2016, 855 m, under forest; Şalpazarı-Simenli village, 3.03.2016, 1010 m, cemetery open areas, tuberous, HEG37.

93 – *Cyclamen coum* Mill. subsp. *coum*

Arsin-Çubuklu village, 18.02.2016, 40 m, hazelnut plantation; Düzköy-Çayırbağı-Gülcana district, 5.02.2019, 1109 m, hazelnut plantation; Düzköy-Çayırbağı-Doğankaya district, 5.02.2019, 1137 m, under *Picea orientalis* forest; Çaykara-Kamelaj district, 13.02.2019, 973 m, open areas; Çaykara-Uzungöl, 10.03.2016, 1155 m, roadsides, tuberous, HEG38.

94 – *Cyclamen parviflorum* Pobed.

Araklı-Bahçecik village, 14.05.2019, 1838 m, forest clearings; Maçka-Hamsiköy, 9.05.2016, 1686 m, forest clearings; Düzköy-Gürgendağ, 16.05.2019, 1627 m, under forest; Altındere Valley National Park, 23.02.2018, 1375 m, under forest; Düzköy-Gülcana district, 16.02.2018, 1117 m, stony-rocky places, endemic, tuberous, HEG39.

## LAMIID/ASTERID I

### BORAGINALES

#### BORAGINACEAE

##### 45 – *Trachystemon* D. Don

95 – *Trachystemon orientale* (L.) D. Don

Akçaabat-Osmanbaba village, 10.03.2020, 410 m, under hazelnut plantation; Araklı-Hürriyet district, 12.05.2021, 134 m, roadsides; Arsin-Çubuklu village, 1.05.2021, 44 m, hazelnut plantation; Of-Kıyıcık district, 8.05.2021, 196 m, forest sides; Of-Saraçlı village, 2.05.2021, 262 m, under forest, Euxine element, rhizome, HEG87.