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The Effect of Intense Construction and Population Pressure on Flora Changes in Gölköy Campus of Abant Izzet Baysal University in the Last Two Decades

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ABSTRACT: *Food security requires plant genetic resources (PGR), which is seriously risked by climatic changes, urbanization, and population growth. Therefore, collection, conservation, utilization, and improvement of PGR in diverse regions have higher priority. Turkey, situated among gene centers and historical migration routes, enjoys an environmental and genetic diversity. Gölköy Campus of Abant Izzet Baysal University, Bolu, which is a junction between Euro-Siberian and Irano-Turanian phytogeographic regions, has been intensively investigated in different historical periods. In this study, the changes for species diversity on the flora in the last two decades have been measured and compared. Twenty years apart, 332 plant species in 46 families decreased to 153 plant species in 45 families, which was a serious decrease of 66.77% in total plant species. Construction and human population seriously narrowed genetic diversity even in diverse regions.*

Keywords: *Bolu, Species, Plant Genetic Resources, Urbanization, Population pressure.*

Yoğun İnşaat ve Nüfus Baskısının Son Yirmi Yılda Abant İzzet Baysal Üniversitesi Bolu-Gölköy Yerleşkesinde Flora Değişimine Etkisi

ÖZ: *İklim değişiklikleri, kentleşme ve nüfus artışının ciddi tehdidi altında olan bitki genetik kaynaklarına (BGK) gıda güvenliği için gerek duyulmaktadır. Bu nedenle; BGK'nın genetik çeşitlilikce zengin bölgelerden toplanması, korunması, kullanılması ve iyileştirilmesine öncelik verilmektedir. Gen merkezleri arasında ve tarihsel göç yolları üzerinde yer alan Türkiye de bu çevresel ve genetic çeşitlilikten bolca yararlanmaktadır. Avrupa – Sibirya ve İran–Turan fito-coğrafi bölgeleri arasında yer alan Abant İzzet Baysal Üniversitesi Bolu - Gölköy Yerleşke'sinde bugüne kadar birçok çalışma yapılmıştır. Bu çalışma ile ise, son yirmi yılda kampüste bulunan bitki türlerinin ve endemic bitkilerin genetik çeşitliliği belirlenmiştir. Yırmı yıllık bir sürede 46 familyada 332 olan tür sayısı 45 familyada 153'e düşmüştür. Bu azalma; toplam tür sayısında % 66,77 olmuştur. Artan inşaat faaliyetleri ve yogunlaşan insan nüfusu bu genetic çeşitliliği yüksek alanda bile ciddi bir genetik çeşitlilik daralmasına yol açmıştır.*

Anahtar Kelimeler: *Bolu, Bitki Genetik Kaynakları, Türler, Kentleşme, Nüfus baskısı.*

INTRODUCTION

Plant genetic resources (PGRs) are the sum of all genes in plants, in other words, the biodiversity in modern cultivars, which contain land races, obsolete cultivars, breeding stocks, wild crop forms, and wild species. The universally accepted "genetic diversity" term by Rio de Janeiro Convention on Biodiversity (Anonymous, 1996),

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does not only covers entities but also their ecosystems and habitats (Karagöz, 2006). Plant genetic diversity disappears too rapidly due to climatic changes, pests, replacement of traditional local cultivars, and human activities including deforestation, town spreading, road construction, overgrazing, urbanization, and population pressures (Harlan, 1976; Harlan and de Wet, 1971; Hawkes, 1977; Thompson and Jones, 1999; Thompson *et al*., 2003; Babalık, 2004).

PGRs have been highlighted across the world including main diversity regions such as Turkey. Turkey's rich vegetation has been investigated by many scientists (Kaya *et al*., 1997; Karagöz, 2006; Tan, 2009a). Studies on Turkish flora have been accelerated, especially after "*Flora of Turkey and the East Aegean Islands*" (Davis, 1965-1985; Davis *et al*., 1988). This masterpiece book includes over 11,000 vascular plant taxa compared with 12,500 species in whole Europe. Turkish flora covers up many economically important medicinal, aromatic, industrial, and ornamental plants (Tan, 2009b) and microcenters for some crops: *Lens culinaris* Medik*., Phaseolus vulgaris* L*., Vicia faba* L*., Vitis vinifera* L., and *Zea mays* L. *Medicago sativa* L. *Pistachia* Salisb. spp., *Prunus* L. spp., *Pyrus* L. spp., *Trifolium* L. spp. (Harlan, 1951). Moreover, Mirza Gökgöl's collections and evaluations of wheat landraces were deserved to be accredited (Gökgöl, 1935; 1939; Karagöz, 2014).

Plant genetic resources (PGRs) can be conserved either *in situ* (in their natural settings) or *ex situ* (outside their natural settings) or in a blend of both (Bakır, 1998). The assets of *in situ* and *ex situ* conservation of PGRs have much been deliberated (Prescott-Allen and Prescott-Allen, 1981; Marshall, 1989; Hawkes, 1991; Schoen and Brown 1995). *Ex situ* conservation was to safeguard PGRs when *in situ* conservation of landraces was still unpractical during the 1970s and 1980s. Therefore, scientific community did not clasp *in situ* conservation until the 1990s although Frankel (1970) and Jain (1975) had advised it earlier. The plans for *in situ* conservation were generally based on all species in a crop genera (Maxted, 2004; Al-Atawneh *et al*., 2008; Maxted *et al*., 2008; Ramirez-Villegas *et al*., 2010). Using genus diversity for priority may mask the specific conservation necessities or miss vital opportunities for the competent conservation of the priority and most useful resources.

Bolu, a highly diverse province for plant genetic resources, was a pilot site in the "*In situ* Conservation of Plant Genetic Resources in Turkey Project" in 1993 (Kaya *et al*., 1997). Any conservation study has not been carried out in the area although some floristic and vegetation studies have been conducted. Floristic studies were: Gerede and Aktaş forests by Akman and Ketenoğlu (1979a), Bolu and Semen Mountains by Akman and Yurdakulol (1981a; 1981b), Yedigöller Natural Park by Ekim and İlarslan (1982), campus flora of Abant İzzet Baysal University by Turgut (1996), Gökçeler Mountain by Uluğ (1999), Lake Abant by Türker and Güner (2003), Lake Yeniçağa by Sümer (2002), Lake Gölcük by İkinci and Güner (2007), Karakiriş Mountain by Aksoy (2009), Lake Sünnet by İkinci (2011), Kartalkaya by Sungurlu (2011), Lake Sülüklü by Kanoğlu (2011), Taşlıyayla and Kızık surrounding by Tunçkol (2012), Argözü Valley by Güneş Özkan *et al*. (2015), and the petaloid monocotyledons in Bolu by Demir and Eker (2015). The vegetational studies were Köroğlu Mountains by Akman and Ketenoğlu (1978; 1979b), Bolu and Semen Mountains by Akman *et al*. (1983a; 1983b), Gerede-Aktaş forest by Ketenoğlu (1983), and Mudurnu surroundings by Akman and İlarslan (1983). Furthermore, wider diversity in different plants of Bolu was also reported: *Solanum* L. (Anonymous 2010), bread, durum, and emmer wheat (Zencirci and Kün, 1995; Koç *et al*., 2000; Karagöz and Zencirci, 2005; Zencirci and Karagöz, 2005; Giuliani *et al*., 2009), hazelnut (Moore and Ballington, 1991), *Trifolium* (Uslu *et al*., 2013), rosehip (Özen, 2013), and bryophytes (Alataş and Uyar, 2015). Therefore, after perceiving the suitability of the Gölköy Campus for a comparison study, we compared the fluctuations for species there during a 20 year period.

MATERIALS AND METHODS

The site

The research site, Gölköy Campus (300 ha) of Abant İzzet Baysal University, established in 1992 (Fig. 2; Anonymous 2015b) lays at the A3 Grid square of the Western sector of the Euxine. The latitude is 40°43'25" N, the longitude is 31°30'45" E, and the highest altitude is 899 m in the west (Turgut, 1996). It is at Bolu province (827,600 ha) in the western Black Sea region (Fig. 1; Anonymous 2015a), where topography, soil structure, and climate are very variable (Turak *et al*., 2011) as plant genetic diversity does. The Gölköy Campus was also in the one of the pilot sites – Bolu- for "*In situ Conservation Project of Plant Genetic Resources in Turkey*" (Tan, 2009a). Bolu demonstrates climatic features between Mediterranean and Oceanic ones. The average precipitation during 1970-2012 was 558.3 (487.0-754.5) mm. The rainiest months were December, January, and May. The least rainy month was August. The highest temperature was 39.8 °C in August and the lowest one was -24.3 °C in January (Anonymous, 2015c). Some soil characteristics were also analyzed from the samples taken from a depth of 0-30 cm in the Soil Laboratories of Agriculture and Livestock Directorate, Bolu (Table 1).

Plant sampling

The plant sampling in the Gölköy Campus was carried out both during 1994-1995 and 2011-2014. The sampling months were from February to November with a collection peak between June to July in both sampling periods. In 1994-1995, 307 and in 2011-2014, 102 flowering and fruiting plant samples were collected, dried, and classified at the family, genus and species level. For identification of plant species, first "*Flora of Turkey and the East Islands*" (Davis, 1965-1985; Davis *et al*. 1988; Güner *et al.* 2000) and *Flora Europaea* (Tutin *et al*., 1964-1980) were used and some other sources were consulted for doubtful identifications and nomenclature checking such as "*Türkiye Bitkileri Listesi* – the List of Turkish Plants (Güner *et al*., 2012)" as well as web sites, "*World Checklist of Selected Plant Families* (Govaerts, 2015)", "*International Plant Name Index* (IPNI, 2015)" and "*the Plant List* (2015)". Brummitt and Powell (1992) and IPNI (2015) were referred for author abbreviations.

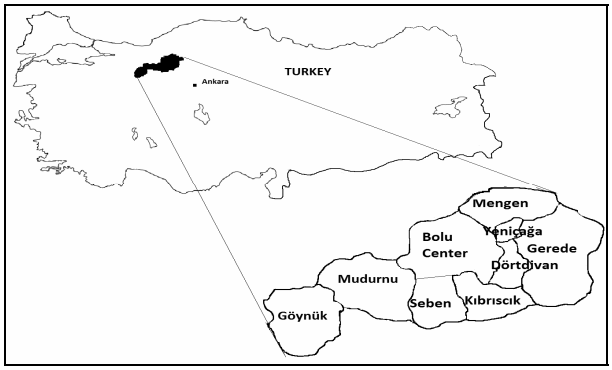

Figure 1. The location and counties of Bolu province in Turkey.
Resim 1. Bolu ilinin yeri ile kazaları.

Table 1. Some soil characteristics of 5 sites sampled in the Gölköy Campus 2011-2014.
Çizelge 1. Gölköy Yerleşkesinde 2011-2014'de örneklenen 5 alanın bazı toprak özellikleri.

Soil characteristics Toprak karakteristikleri	1st	2nd	3rd	4th	5th
Total salt % (%Toplam tuz)	Low Salty	Saltless	Low Salty	Low Salty	Saltless
pH	Neutral	Light Alkaline	Light Alkaline	Neutral	Light Alkaline
Lime % (% Kireç)	Medium	High	High	High	High
P_2O_5	Highest	Low	Very Low	Highest	Low
K_2O	Richest	Sufficient	Sufficient	Richest	Sufficient
Organic substance (Organik madde)	High	Medium	High	High	Medium
Total nitrogen (Toplam azot)	Rich	Well	Rich	Rich	Well

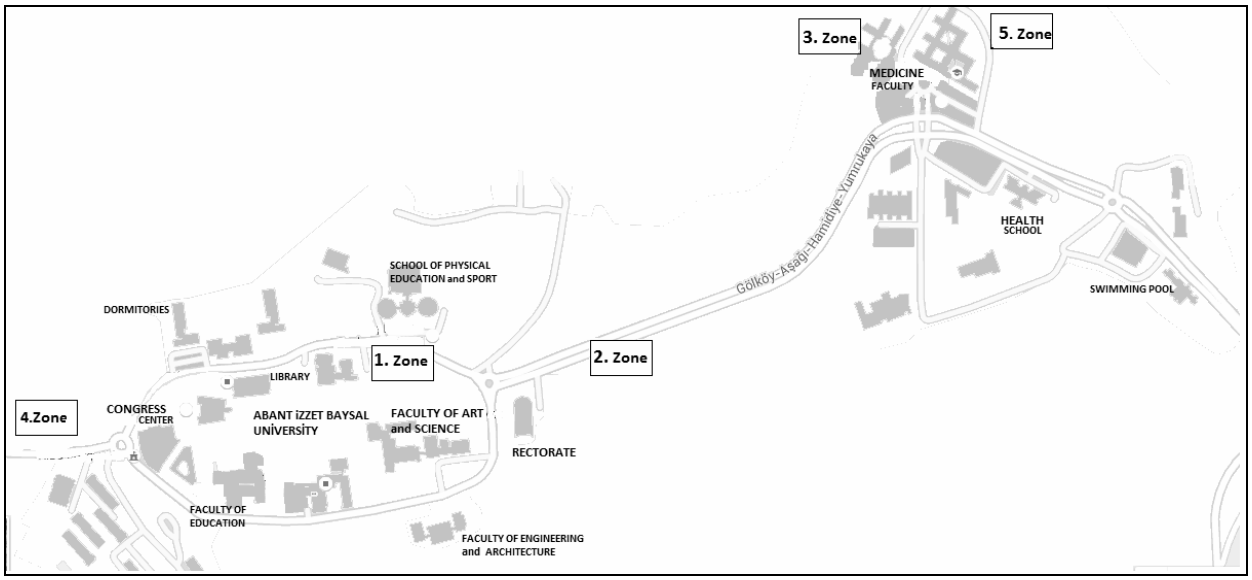

Figure. 2. The Gölköy Campus and five possible gene management zones: 1. The front of the Science and Art Faculty (East of Cultural Center), 2. The right of the road, between the Rectorate and Medical Faculty, 3. North of Morphology Building, behind the Memorial Forest, 4. West of dormitories, 5. Behind the Medical Faculty and next to Tennis Court.

Resim 2. Gölköy yerleşkesi ve 5 olası gen koruma ve yönetim alanı: 1. Fen ve Edebiyat Fakültesi önü (Kültür Merkezi'nin doğusu), 2. Rektörlük ve Tıp Fakültesi arasındaki yolun sağı, 3. Anı ormanı arkası, Morfoloji binası kuzeyi, 4. Yurtların batısı, 5. Tıp fakültesi arkasında tenis kortlarına bitişik alan.

Selecting study sites in 2011-2014

In 2011-2014, first, five study sites, which were most likely secure against destroys by human, grazing, urbanization, etc. were selected (Fig. 2; Anonymous, 2015b), based on the pre-field surveys (Bakır, 1998).

Then, the vegetation was sampled during May–July. The study sites identified were the following:
1. The front side of the Science and Art Faculty (East of Cultural Center),
2. Between the Rectorate building and Medical Faculty, on the right of the road,
3. North of Morphology Building, behind the Memorial Forest,
4. West of dormitories, and
5. Behind the Medicine faculty, near the Tennis Court.

In 1994-1995 and 2011-2014, plant samples were collected. In 2011-2014, the second term of the study, modified loop method (Kinsinger *et al*., 1960; Şen, 2010; Ünal *et al*., 2012, 2013; Sürmen *et al*., 2013; Yavuz *et al*., 2012, 2013) was applied in the study sites. The transect lines, which were originated from the likely cross-sections of each two likely sides of the study sites were established and were used for loop procedure (Kinsinger *et al*., 1960). The wheel was run and a total of 534 plant samples stroked to loop were collected in all 5 study sites. The plants at each point were counted, recorded, and identified with the help of "*Flora of Turkey*" (Davis, 1965-1985; Davis *et al*., 1988; Güner *et al*., 2000). Then, plant coverage (%) was calculated (Table 2). Campus road and Yumrukaya village plus west of dormitories (Fig. 2) in 1994-95 were set common in study sites 1-5 in 2011-2104. The changes in number of families, genera, species, subspecies, and varieties (Table 3) were, then, compared between these two sites.

RESULTS

In this study, the changes in the species diversity on the flora in the last two decades were evaluated. Out of 956 samples collected during 1994-1995, 307 species, 86 subspecies, and 28 varieties were named in 53 families and 205 genera. After 20 years, 115 plant species and 39 subspecies were identified from 45 families in 534 plant samples which were collected (Table 3) during 2011-2014. The most common 7 genera in 1994-95 were *Trifolium, Veronica, Taraxacum* L., *Salvia* L., *Epilobium* L., *Orabanche* L., and *Verbascum* in

Table 2. Plant covered areas (%) in five study sites.
Çizelge 2. Beş çalışma alanındaki bitkiyle kaplı alan (%).

Study sites (Çalışma alanları)	1st	2nd	3rd	4th	5th	Total
Number of spots plants detected (n) Bitki bulunan toplam nokta sayısı	128	116	99	77	72	502
Number of total spots sampled (n) Örneklenen toplam nokta sayısı	143	121	109	86	75	534
Plant covered area (%) % Bitkiyle kaplı alan	89.5	95.8	90.8	89.5	96.0	94

Table 3. Changes of plant samples into taxonomic categories around the Campus road and in Yumrukaya Village, west of dormitories region during 1994-2014.
Çizelge 3. 1994-2014 döneminde yurtların batısında kalan kampüs yolu ile Yumrukaya köyü arasındaki alandaki bitki örneklerinin taksonomik sınıflara göre gruplanması.

Taxonomic categories (Taksonomik kategoriler)	1994-2014	2011-2014
Families (Familya)	46	45
Genera (Cins)	63	94
Species (Tür)	332	153
Subspecies (Alt tür)	59	39
Varieties (Varyete)	63	11

1994-95 and the most common 4 genera in 2011-2014 were *Trifolium, Lathyrus* L.*, Geranium* L.*,* and *Veronica.* The most common families for the number of taxa in 1994-1995 were Asteraceae (n=42), Fabaceae (n=31), Lamiacae (n=24), Rosaceae (n=18), and Poacea (n=17) while in 2011-2014, Fabaceae (n=19), Asteraceae (n=91), Lamiacae (n=7), Rosaceae (6), and Ranunculaceae (6).

Possible protection sites in the Gölköy Campus

The plant covered area ranged between 89.5-96.0% in the all of sites studied (Table 2), with an average of 94% in the sampling of 2011-2014. Considering the sum of 502 samples, with a range of 72-128 in each study site of the Gölköy Campus had very intensive plant coverage well enough for effective cultural practices (Çomaklı *et al*., 2012). Loop method, as reported by Kinsinger *et al*. (1960) did not differ from variable-plot. Then, here we were confident in loop method for coverage percentage as well. One concern was coverage was higher than other 3 methods, which are ellipse formula, line perception, and variable plot as given by the same authors.

The number of species in five study sites was different. The total number of species was 41, 38, 29, 23, and 22 in 1st, 2nd, 3rd, 4th, and 5th study sites, respectively (Supplementary Table 1). Sampled numbers in study sites are assumed to be higher based on a study by Kinsinger *et al*. (1960) and sampling numbers were needed to be higher, which we sampled higher enough in this study. Only two species, *Bellis perennis* L. and *Primula acaulis* (L.) Hill subsp. *acaulis* (Syn. *P. vulgaris* Huds.) existed in all five study sites. These two were followed by *Filipendula vulgaris* Moench. in 4 study sites. *Anacamptis pyramidalis* (L.) Rich., *Clinopodium vulgare* L., *Dactylis glomerata* L., *Geranium asphodeloides* Burm., *Microthlaspi perfoliatum* (L.) F. K. Mey. (Syn. *Thlaspi perfoliatum* L.), *Polygala anatolica* Boiss. & Heldr.*, Potentilla argentea* L., *Trifolium campestre* Schreb., and *Viola sieheana* W. Becker in three study sites (Supplementary Table 1).

The total number of families in five study sites, was 22, 15, 18, 16, and 17 in 1st, 2nd, 3rd, 4th, and 5th study sites, respectively. Fabaceae and Asteraceae existed in all five study sites, Brassicaceae, Rosaceae, and Ranunculaceae, in 4 study sites,

Convolvulaceae, Dipsacaceae, and Orchidaceae, and Lamiaceae in 3 study sites.

The possible study sites orders for future conservation studies based on species diversity was 1, 2, 3, 4, and 5 study sites, respectively. The same order based on the total number of families was 1, 3, 5, 4, and 2 study sites. The heavy construction in the Campus caused already the disappearance of 2nd study site. Among the other four study sites which were available for future, the 1st study sites was the most appropriate one due to a lesser possibility of construction and higher chance of protection in the Gölköy Campus. The 1st study sites was followed by the 3rd, 5th, and 4th study sites. The last three were also advantageous since they were protected against the constructions by "Meadow Law, Dated 1998 and Numbered 4342" (Anonymous, 1998). They were, on the other hand, disadvantageous since they were relatively away from the center of the Campus and open to heavy grazing. Therefore, the 1st study sites was seemed the most appropriate site for future *in situ* conservation research.

Turkey has very diverse geographic and genetic diversity zones in its many sites. The Gölköy Campus, Bolu with its diverse environmental conditions have induced genetic diversity and become a suitable site for genetic diversity studies (Moore and Ballington 1991; Kaya *et al*. 1997; Anonymous, 2001; Türker and Güner, 2003; İkinci and Güner, 2007; Zencirci and Karagöz, 2005; Karagöz and Zencirci, 2005; Giuliani *et al*., 2009; Kandemir, 2013; Özen, 2013). However, the increased number of buildings, which were constructed in the Gölköy Campus and higher number of students, who attained the University have unfortunately decreased bio-diversity in the Campus in two decades.

We, here, studied the changes in the numbers of species caused by heavy construction and human activities in the Gölköy Campus for follow-up researches. In the last two decades, 332 species belonging to 46 families in the Gölköy Campus decreased to 154 species belonging to 45 families (Table 3). Thirteen endemic species which were collected 20 year ago from research area, decreased to 2: *Trifolium elongatum* and *Arum hygrophilum* subsp. *euxinum*. Two endured stubbornly while the others existed in 1994-1995 were lost. The number of species in the genera has also changed and reduced. The genus *Trifolium, Veronica, Taraxacum* L.*, Salvia* L.*, Epilobium* L.*, Orabanche* L, and *Verbascum* had the largest species numbers in 1994-1995 and *Trifolium, Lathyrus* L.*, Geranium* L.*,* and *Veronica* in 2011-2014. *Taraxacum, Salvia, Epilobium, Orobanche* and *Verbascum* did not even exist after 20 years. *Trifolium*, *Mentha, Dianthus* L.*, Ajuga* L.*,* and *Veronica* L. emerged in 2011-2014. The reason for that decrease was most likely the increased number of buildings and human population in the Gölköy Campus. Buildings went up from one or two in 1994-94 to 10-12 faculty and accommodation buildings in 2011-2014. The number of students reached 30.000 today from 1.000 in 1994-1995. The existence of endemic and non-endemic species in the study sites was likely affected by other diverse environmental factors including weather, rainfall and temperature.

The protection of endemic and/or endangered species must be prioritized for sustainability of these valuable species under the displeasing conditions, such as construction, population growth, rural development, climate changes, and pressure of other constituents. These threats, as seen in other risky areas, have severely decreased endemic and non-endemic plant species in Gölköy Campus in the last two decades. The combined approaches including *ex situ* and *in situ* conservation methods, which were highly required, would most likely save valuable plant genetic diversity for our future.

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Supplementary Table 1. Species collected from the potential study sites.
Ek Çizelge 1. Olası çalışma alanlarından toplanan tür örnekleri.

No. Species No. Tür	1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
	2011-2014					1994-1995	
1 *Alisma plantago-aquatica* L.	-	-	-	-	-	-	+
2 *Acer campestre* L. subsp. *campestre*	-	-	-	-	-	+	-
3 *Achillea nobilis* L. subsp. *neilreichii* (A.Kern.) Velen.	-	-	-	-	-	+	-
4 *Aegilops geniculata* Roth	-	-	-	-	-	+	-
5 *Aegonychon purpurocaeruleum* (L.) Holub	-	+	-	-	-	-	-
6 *Agrimonia eupatoria* L. subsp. *eupatoria*	-	-	-	-	-	+	-
7 *Agrostemma githago* L.	-	-	-	-	-	+	-
8 *Ajuga chamaepitys* (L.) Schreb. subsp. *chia* (Schreb.) Arcang.	-	+	-	-	-	+	+
9 *Ajuga reptans* L.	-	-	-	-	-	-	+
10 *Allium rotundum* L.	-	-	-	-	-	+	-
11 *Althaea hirsuta* L.	-	-	-	-	-	+	-
12 *Amaranthus hybridus* L.	-	-	-	-	-	+	-
13 *Anacamptis coriophora* (L.) R.M.Bateman, Pridgeon, M.W.Chase	+	-	-	-	-	-	-
14 *Anacamptis morio* (L.) R.M.Bateman, Pridgeon , M.W.Chase	-	-	-	-	-	-	+
15 *Anacamptis pyramidalis* (L.) Rich.	+	-	+	-	+	+	-
16 *Anagallis arvensis* L. subsp. *foemina* (Mill.) Schinz , Thell.	-	-	-	-	-	+	-
17 *Anagallis arvensis* L. var. *arvensis*	+	+	-	-	-	+	-
18 *Anchusa azurea* Mill. var. *azurea*	-	-	-	-	-	+	-
19 *Anchusa undulata* L. subsp. *hybrida* (Ten.) Cout.	-	-	-	-	-	-	+
20 *Anthemis pseudocotula* Boiss.	-	-	-	+	-	+	+
21 *Anthyllis vulneraria* L. subsp. *boissieri* (Sagorski) Bornm.	-	-	-	-	-	+	-
22 *Arctium minus* (Hill) Bernh.	-	-	-	-	-	+	-
23 *Arenaria serpyllifolia* L. subsp. *serpyllifolia*	-	-	-	-	-	+	-
24 *Arum hygrophilum* Boiss. subsp. *euxinum* (R.R.Mill) Alpınar	-	+	+	-	-	-	-
25 *Asperugo procumbens* L.	-	-	-	-	-	+	-
26 *Asperula involucrata* Wahlenb.	-	-	-	-	-	+	-
27 *Asperula pestalozzae* Boiss.	-	-	-	-	-	+	-
28 *Astragalus hamosus* L.	-	-	-	-	-	+	-
29 *Asyneuma limonifolium* (L.) Janch. subsp. *limonifolium*	-	-	-	-	-	+	-
30 *Avena sterilis* L. subsp. *sterilis*	-	-	-	-	-	+	-
31 *Ballota nigra* L.	-	-	-	-	-	+	-
32 *Bellis perennis* L.	+	+	+	+	+	+	-
33 *Beta vulgaris* L.	-	-	-	-	-	+	-
34 *Brachypodium pinnatum* (L.) P.Beauv.	-	-	-	-	-	+	-
35 *Briza media* L.	-	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. No.	Species Tür	1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
36	*Bromus japonicus* Thunb. subsp. *japonicas*	-	-	-	-	-	+	-
37	*Bromus ramosus* Huds.	-	-	-	-	-	+	-
38	*Bromus sterilis* L.	-	-	-	-	-	+	-
39	*Buglossoides arvensis* (L.) I.M.Johnst. subsp. *sibthorpiana* (Griseb.) R.Fern.	+	-	-	-	-	+	-
40	*Buglossoides purpurocaerulea* (L.) I.M.Johnst.	-	-	-	-	-	+	-
41	*Bupleurum rotundifolium* L.	-	-	-	-	-	+	-
42	*Bupleurum sulphureum* Boiss. & Balansa	-	-	-	-	-	+	-
43	*Campanula glomerata* L. subsp. *hispida* (Witasek) Hayek	-	-	-	+	-	+	-
44	*Campanula persicifolia* L. subsp. *persicifolia*	-	-	+	-	-	+	-
45	*Capsella bursa-pastoris* (L.) Medik.	-	-	-	-	-	-	+
46	*Carduus acanthoides* L. subsp. *acanthoides*	-	-	-	-	-	+	-
47	*Carpinus betulus* L.	+	-	-	-	-	+	-
48	*Carthamus lanatus* L.	-	-	-	-	-	-	+
49	*Centaurea iberica* Trevir. ex Spreng.	-	-	-	-	-	+	+
50	*Centaurea solstitialis* L. subsp. *solstitialis*	-	-	-	-	-	+	-
51	*Centaurium pulchellum* (Sw.) Druce	-	-	-	-	-	+	-
52	*Cephalanthera epipactoides* Fisch. , C.A.Mey.	-	-	-	-	-	+	-
53	*Cephalanthera rubra* (L.) Rich.	-	-	+	-	-	+	-
54	*Cerinthe minor* L. subsp. *auriculata* (Ten.) Domac	-	-	-	-	-	+	-
55	*Chaenorhinum minus* (L.) Lange subsp. *minus*	-	-	-	-	-	+	-
56	*Chenopodium album* L.	-	-	-	-	-	+	-
57	*Chondrilla juncea* L.	-	+	-	-	-	+	-
58	*Cichorium intybus* L.	-	-	+	-	-	+	-
59	*Circium arvense* (L.) Scop subsp. *vestitum* (Wimmer , Grab.) Petrak	-	-	-	-	-	+	-
60	*Circium ligulare* Boiss.	-	-	-	-	-	+	-
61	*Cistus creticus* L.	-	-	-	-	-	-	+
62	*Clinopodium graveolens* (M.Bieb.) Kuntze subsp. *rotundifolium* (Pers.) Govaerts	-	-	-	-	-	+	-
63	*Clinopodium vulgare* L. subsp. *arundanum* (Boiss.) Nyman	-	-	-	-	-	+	-
64	*Clinopodium vulgare* L. subsp. *vulgare*	+	+	+	-	-	+	-
65	*Colchicum umbrosum* Steven	-	-	+	-	-	+	-
66	*Conringia orientalis* (L.) Dumort.	-	-	-	-	-	+	-
67	*Consolida orientalis* (J.Gay) Schrödinger	-	-	-	-	-	+	-
68	*Consolida regalis* Gray subsp. *paniculata* (Host.) Soó.	-	+	-	-	-	+	-
69	*Convolvulus arvensis* L.	-	+	-	-	+	+	-
70	*Convolvulus cantabrica* L.	-	-	-	-	-	-	+

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. No.	Species Tür	1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
71	*Convolvulus galaticus* Rost. ex Choisy	-	+	+	-	-	+	-
72	*Cornus mas* L.	+	-	-	-	-	+	-
73	*Coronilla scorpioides* (L.) Koch	-	-	-	-	-	+	-
74	*Corylus avellana* L. var. *avellana*	-	-	-	-	-	+	-
75	*Cota coelopoda* (Boiss.) Boiss. var. *bourgaei* (Boiss.) U.Özbek , Vural	-	-	-	-	-	+	-
76	*Cota tinctoria* (L.) J.Gay var. *discoidea* (All.) Özbek , Vural	-	-	-	-	-	+	-
77	*Crataegus microphylla* K.Koch subsp. *microphylla*	-	-	-	-	-	+	-
78	*Crepis foetida* L. subsp. *rhoeadifolia* (M.Bieb.) Čelak.	-	-	-	-	-	-	+
79	*Crepis smyrnaea* DC. ex Froel.	-	-	-	-	-	+	-
80	*Crocus biflorus* Mill. subsp. *pulchricolor* (Herb.) B.Mathew	-	-	-	-	-	+	-
81	*Crocus olivieri* J.Gay subsp. *olivieri*	-	-	-	-	+	-	-
82	*Crocus speciosus* M.Bieb. subsp. *speciosus*	-	-	-	+	-	+	-
83	*Cruciata laevipes* Opiz	-	-	+	-	-	-	-
84	*Cruciata taurica* (Pall. ex Willd.) Ehrend.	-	-	-	-	-	+	-
85	*Cyanus depressus* (M.Bieb.) Soják	-	-	-	-	-	+	-
86	*Cyanus triumfettii (*All.) Dostál ex Á.Löve , D.Löve subsp. *triumfettii*	-	+	-	-	-	+	-
87	*Cyclamen coum* Mill. subsp. *coum*	-	+	-	-	-	-	-
88	*Cynodon dactylon* (L.) Pers.	-	-	-	-	-	-	+
89	*Cynoglossum creticum* Mill.	-	-	-	-	+	+	-
90	*Cynoglossum montanum* L.	-	-	-	-	-	+	-
91	*Cytisus hirsutus* L.	-	-	+	+	-	+	-
92	*Dactylis glomerata* L. subsp. *glomerata*	+	+	-	-	+	+	-
93	*Daphne pontica* L. subsp. *pontica*	-	-	-	-	-	+	-
94	*Dasiphora fruticosa* (L.) Rydb.	+	-	-	-	-	-	-
95	*Datura stramonium* L.	-	-	-	-	-	+	-
96	*Daucus carota* L.	-	-	-	-	-	+	-
97	*Descurainia sophia* (L.) Webb ex Prantl subsp. *sophia*	-	-	-	-	-	+	-
98	*Dianthus armeria* L. subsp. *armeria*	-	-	-	-	-	-	+
99	*Dianthus calocephalus* Boiss.	-	-	-	-	-	+	+
100	*Digitalis ferruginea* L. subsp. *ferruginea*	-	-	-	-	-	-	+
101	*Dipsacus laciniatus* L.	-	-	-	-	-	-	+
102	*Dorycnium graecum* (L.) Ser.	-	+	-	-	-	+	-
103	*Dorycnium pentaphyllum* Scop. subsp. *anatolicum* (Boiss.) Gams	-	-	-	-	-	+	-
104	*Dorycnium pentaphyllum* Scop. subsp. *herbaceum* (Vill.) Rouy	-	-	-	-	+	+	-
105	*Draba verna* L.	-	-	-	+	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
106	*Dysphania botrys* (L.) Mosyakin , Clemants	-	-	-	-	-	+	-
107	*Echinochloa oryzoides* (Ard.) Fritsch	-	-	-	-	-	+	-
108	*Echium italicum* L.	-	-	-	-	-	+	-
109	*Echium vulgare* L. subsp. *vulgare*	+	+	-	-	-	+	-
110	*Eleocharis quinqueflora* (Hartmann) O.Schwarz	-	-	-	-	-	-	+
111	*Epilobim hirsutum* L.	-	-	-	-	-	+	-
112	*Epilobim montanum* L.	-	-	-	-	-	+	-
113	*Epilobim parviflorum* Schreb.	-	-	-	-	-	+	-
114	*Epilobum tetragonum* L. subsp. *tetragonum*	-	-	-	-	-	+	-
115	*Erigeron canadensis* L.	-	-	-	-	-	+	-
116	*Erodium acaule* (L.) Bech. , Thell.	+	-	-	-	-	+	-
117	*Erodium cicutarium* (L.) L'Hér. subsp. *cicutarium*	+	-	-	-	-	+	+
118	*Eryngium bithynicum* Boiss.	-	-	-	-	-	+	-
119	*Euphorbia aleppica* L.	-	-	-	-	-	+	-
120	*Euphorbia falcata* L. subsp. *macrostegia* (Bornm.) O.Schwartz	-	-	-	-	-	+	-
121	*Euphorbia helioscopia* L. subsp. *helioscopia*	-	-	-	-	+	-	-
122	*Euphorbia seguieriana* Neck. subsp. *niciciana* (Borbás ex Novák) Rech.f.	-	-	-	+	-	-	-
123	*Euphorbia stricta* L.	-	-	-	-	-	+	-
124	*Euphrasia pectinata* Ten.	-	-	-	-	-	+	-
125	*Ferulago thirkeana* Boiss.	-	-	-	-	-	+	-
126	*Festuca heterophylla* Lam.	-	-	-	-	-	+	-
127	*Ficaria verna* Huds. subsp. *ficariiformis* (Rouy , Foucaud) B.Walln.	-	+	-	-	-	-	-
128	*Filipendula vulgaris* Moench	+	+	+	-	+	+	-
129	*Fumaria officinalis* L. subsp. *officinalis*	-	-	-	-	-	+	-
130	*Gagea taurica* Steven	-	-	-	-	-	+	-
131	*Galega officinalis* L.	-	-	-	-	-	+	-
132	*Galium palustre* L.	-	-	-	-	-	-	+
133	*Galium verum* L. subsp. *verum*	-	-	-	-	-	+	-
134	*Geranium asphodeloides* Burm.f. subsp. *asphodeloides*	+	-	+	+	-	+	-
135	*Geranium dissectum* L.	+	-	-		-	-	-
136	*Geranium macrostyllum* Boiss.	+	-	-		-	+	-
137	*Geranium pyrenaicum* Burm.f.	+	-	-	+	-	-	+
138	*Gladiolus italicus* Mill.	-	-	-	-	-	+	-
139	*Globularia trichosantha* Fisch. , C.A.Mey. subsp. *trichosantha*	-	-	+	-	-	+	-
140	*Helianthemium mummularium* (L.) Mill. subsp. *mummularium*	-	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
141	*Heliotropium europaeum* L.	-	-	-	-	-	+	-
142	*Heliotropium supinum* L.	-	-	-	-	-	+	-
143	*Helleborus orientalis* Lam.	-	-	-	-	+	+	-
144	*Helminthotheca echioides* (L.) Holub	-	-	-	-	-	+	-
145	*Herniaria incana* Lam.	-	-	-	-	-	-	+
146	*Hieracium murorum* C.B.Clarke subsp. *ovalifrons* (Woronow , Zahn) Zahn.	-	-	-	-	-	+	-
147	*Hippocrepis unisiliquosa* L. subsp. *unisiliquosa*	-	-	-	-	-	+	-
148	*Hordeum brevisubulatum* (Trin.) Link subsp. *violaceum* (Boiss. ,Huet) Tzvelev	-	-	-	-	-	+	-
149	*Hyoscyamus niger* L.	-	-	-	-	-	+	-
150	*Hypericum perforatum* L. subsp. *perforatum*	-	-	-	+	-	+	+
151	*Hypochaeris radicata* L.	-	-	-	-	-	-	+
152	*Iris sintenisii* Janka subsp. *sintenisii*	+	-	-	-	-	+	-
153	*Juncus inflexus* L. subsp. *inflexus*	-	-	-	-	-	+	+
154	*Jurinea consanguinea* DC.	-	-	-	-	-	+	-
155	*Knautia integrifola* (Honck. ex L.) Bertol. var. *bidens* (Sm.) Borbas	+	-	+	-	-	-	-
156	*Lactuca saligna* L.	-	-	-	-	-	+	-
157	*Lactuca serriola* L.	-	-	-	-	-	+	-
158	*Lamium amplexicaule* L. var. *amplexicaule*	-	-	-	-	-	+	-
159	*Lamium purpureum* L. var *purpureum*	+	+	-	-	+	-	-
160	*Lapsana communis* L. subsp. *alpina* (Boiss. & Balansa) P.D.Sell	-	-	-	-	-	+	-
161	*Lathyrus aphaca* L. var. *biflorus* Post	-	+	-	-	-	-	-
162	*Lathyrus digitatus* (M.Bieb.) Fiori	-	+	-	-	-	+	-
163	*Lathyrus laxiflorus* (Desf.) Kuntze subsp. *laxiflorus*	+	-	-	-	-	+	-
164	*Lathyrus nissolia* L.	-	-	+	-	-	-	+
165	*Legousia pentagonia* (L.) Thell.	-	-	-	-	-	+	+
166	*Leontodon hispidus* L. subsp. *hispidus*	-	-	-	-	-	+	+
167	*Ligustrum vulgare* L.	-	-	-	-	-	+	-
168	*Linaria genistifolia* (L.) Mill. subsp. *genistifolia*	-	-	-	-	-	+	-
169	*Linum corymbulosum* Rchb.	-	-	-	-	-	+	+
170	*Linum nodiflorum* L.	-	-	-	-	-	+	-
171	*Lobularia maritima* (L.) Desv.	-	-	-	-	-	+	-
172	*Lolium perenne* L.	-	-	-	-	-	+	-
173	*Lotus alpinus* (DC.) Ramond	-	+	-	+	-	+	-
174	*Lycopus europaeus* L.	-	-	-	-	-	+	-
175	*Lysimachia atropurpurea* L.	-	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. No.	Species Tür	1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
176	*Lythrum salicaria* L.	-	-	-	-	-	+	-
177	*Malus sylvestris* (L.) Mill. subsp. *orientalis* (Uglitzk.) Browicz var. *orientalis*	-	-	-	-	-	+	-
178	*Malva neglecta* Wallr.	-	-	+	-	-	+	-
179	*Marrubium vulgare* L.	-	-	-	-	-	+	-
180	*Medicago lupulina* L.	-	-	-	-	-	+	+
181	*Medicago minima* (L.) Bartal. var. *minima*	-	-	-	-	-	+	-
182	*Medicago sativa* L. subsp. *sativa*	-	+	-	-	-	-	-
183	*Medicago x varia* Martyn	-	-	-	-	-	+	-
184	*Melampyrum arvense* L. var. *arvense*	+	+	-	-	-	+	-
185	*Melica uniflora* Retz.	-	-	-	-	-	+	-
186	*Melilotus albus* Medik.	-	-	-	-	-	+	-
187	*Melilotus officinalis* (L.) Pall.	+	+	-	-	-	+	-
188	*Mentha aquatica* L.	-	-	-	-	-	-	+
189	*Mentha longifolia* (L.) L. subsp. *typhoides* (Briq.) Harley	-	-	-	-	+	+	+
190	*Mentha pulegium* L.	-	-	-	-	-	-	+
191	*Mespilus germanica* L.	-	-	-	-	-	+	-
192	*Microthlaspi perfoliatum* (L.) F.K.Mey.	+	-	-	+	+	+	-
193	*Moenchia mantica* (L.) Bartl.	-	-	-	-	-	-	+
194	*Muscari armeniacum* Leichtlin ex Baker	+	-	-	-	-	+	-
195	*Myosotis ramosissima* Rochel	-	-	-	-	-	-	+
196	*Myosotis sicula* Guss.	-	-	-	-	-	+	-
197	*Nasturtium officinale* R.Br.	-	-	-	-	-	-	+
198	*Odontites vulgaris* Moench	-	-	-	-	-	+	+
199	*Onobrychis oxyodonta* Boiss.	-	-	+	-	-	+	-
200	*Ononis spinosa* L. subsp. *leiosperma* (Boiss.) Sirj.	-	-	-	-	-	+	-
201	*Onosma taurica* Willd. var. *taurica*	-	-	-	-	-	+	-
202	*Origanum vulgare* L. subsp. *vulgare*	-	-	-	-	-	+	+
203	*Ornithogalum fimbriatum* Willd.	+	-	-	+	-	-	-
204	*Ornithogalum narbonense* L.	-	-	-	+	-	+	-
205	*Orobanche anatolica* Boiss. , Reut.	-	-	-	-	-	+	-
206	*Orobanche elatior* Sutton	-	-	-	-	-	+	-
207	*Orobanche lutea* Baumg.	-	-	-	-	-	+	-
208	*Orobanche minor* Sm.	-	-	-	-	-	+	-
209	*Papaver rhoeas* L.	+	+	-	-	-	+	-
210	*Pastinaca umbrosa* Steven	-	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
211	*Persicaria lapathifolia* (L.) Delarbre	-	-	-	-	-	-	+
212	*Persicaria maculosa* Gray	-	-	-	-	-	+	-
213	*Persicaria orientalis* (L.) Spach	-	-	-	-	-	+	-
214	*Phleum bertolonii* DC.	-	-	-	-	-	+	-
215	*Phleum phleoides* (L.) H.Karst.	-	-	-	-	-	+	-
216	*Picris hieracioides* Sibth. , Sm. subsp. *hieracioides*	-	-	+	-	-	-	-
217	*Pilosella pilisquama* (Nägeli , Peter) Dostál	-	-	-	-	-	+	-
218	*Pilosella piloselloides* (Vill.) Soják subsp. *magyarica* (Peter) S.Bräut. , Greuter	-	-	-	-	+	+	+
219	*Plantago lanceolata* L.	+	+	-	-	-	+	-
220	*Plantago major* L. subsp. *major*	-	-	-	-	-	-	+
221	*Platanthera bifolia* (L.) Rich.	-	-	-	-	-	+	-
222	*Poa pratensis* L.	-	-	-	-	-	+	-
223	*Podospermum laciniatum* (L.) DC.	-	-	-	-	-	+	-
224	*Polygala anatolica* Boiss. , Heldr.	+	-	+	+	-	-	+
225	*Polygala supina* Schreb. subsp. *supina*	-	-	-	-	-	+	-
226	*Polygonum arenastrum* Boreau	-	-	-	-	-	+	-
227	*Polygonum aviculare* L.	-	-	-	-	-	+	+
228	*Potentilla argentea* L.	+	-	+	+	-	-	+
229	*Potentilla astracanica* Jacq. subsp. *astracanica*	-	-	-	-	-	+	-
230	*Potentilla cf. visianii* Pančić	-	-	-	-	-	+	-
231	*Potentilla micrantha* Ramond ex DC.	-	-	-	-	-	+	-
232	*Potentilla recta* L.	-	-	-	-	+	-	-
233	*Primula acaulis* (L.) Hill subsp. *acaulis*	+	+	+	+	+	-	-
234	*Prospero autumnale* (L.) Speta	-	-	-	-	-	-	+
235	*Prunella laciniata* (L.) L.	-	-	-	-	-	+	-
236	*Prunella vulgaris* L.	-	-	-	-	-	+	-
237	*Prunus divaricata* Ledeb. var. *divaricata*	-	-	-	-	-	+	-
238	*Prunus spinosa* L.	-	-	-	-	-	+	-
239	*Pteridium aquilinum* (L.) Kuhn	-	+	-	-	-	+	-
240	*Pulicaria dysenterica* (L.) Gaertn. subsp. *dysenterica*	-	-	-	-	-	+	+
241	*Pyracantha coccinea* M.Roem.	-	-	-	-	-	+	-
242	*Quercus petraea* (Matt.) Liebl. subsp. *petraea*	-	-	-	-	-	+	-
243	*Quercus pubescens* Willd. subsp. *pubescens*	-	-	-	-	-	+	-
244	*Quercus robur* L.	-	-	-	-	-	+	-
245	*Ranunculus arvensis* L.	+	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
246	*Ranunculus constantinopolitanus* (DC.) d'Urv.	+	-	-	-	-	-	-
247	*Ranunculus gracilis* E.D.Clarke	-	-	+	-	-	-	-
248	*Raphanus raphanistrum* L. subsp. *raphanistrum*	-	-	-	-	-	-	+
249	*Rapistrum rugosum* (L.) All.	-	+	-	-	-	-	-
250	*Reseda lutea* L. var. *lutea*	-	-	-	-	+	+	-
251	*Reseda luteola* L.	-	-	-	-	-	+	-
252	*Rhinanthus serotinus* (Schönh.) Oborny subsp. *aestivalis* (N.W.Zinger) Dostál	+	-	-	-	-	+	-
253	*Rorippa sylvestris* (L.) Besser subsp. *sylvestris*	-	-	-	-	-	-	+
254	*Rosa canina* L.	+	-	-	-	-	+	-
255	*Rosa horrida* Fisch.	-	-	-	-	-	+	-
256	*Rubus canescens* DC. var. *canescens*	-	-	-	-	-	+	-
257	*Rumex crispus* L.	-	-	-	-	-	+	-
258	*Salix babylonica* L. var. *babylonica* f. *babylonica*	-	-	-	-	-	-	+
259	*Salvia aethiopis* L.	-	-	-	-	-	+	-
260	*Salvia sclarea* L.	-	-	-	-	-	+	-
261	*Salvia verticillata* L. subsp. *amasiaca* (Freyn , Bornm.) Bornm.	-	-	-	-	-	+	-
262	*Salvia virgata* Jacq.	-	-	-	-	-	+	-
263	*Sanguisorba minor* Scop. subsp. *balearica* (Bourg. ex Nyman) Muñoz Garm. , C.Navarro	-	+	-	-	-	+	-
264	*Scabiosa argenta* L.	+	-	-	-	+	+	+
265	*Scabiosa columbaria* L. subsp. *columbaria* var. *columbaria*	-	-	-	-	-	+	+
266	*Scandix pecten-veneris* L.	-	-	-	-	-	+	-
267	*Scolymus hispanicus* L. subsp. *hispanicus*	-	-	-	-	-	-	+
268	*Scrophularia canina* L. subsp. *bicolor* (Sm.) Greuter	-	-	-	-	-	+	-
269	*Securigera varia* (L.) Lassen	+	+	-	-	+	+	-
270	*Sedum pallidum* M.Bieb.	-	-	-	-	-	-	+
271	*Sedum urvillei* DC.	-	-	-	-	-	+	-
272	*Senecio vulgaris* L.	-	+	-	-	-	-	-
273	*Seseli tortuosum* L.	-	-	-	-	-	+	-
274	*Sherardia arvensis* L.	-	-	-	-	-	+	-
275	*Silene dichotoma* Ehrh. subsp. *racemosa* (Otth) Graebn.	-	-	-	-	-	+	-
276	*Silene italica* (L.) Pers. subsp. *italica*	-	-	-	-	-	+	-
277	*Silene latifolia* Poir. subsp. *alba*	-	-	-	-	-	+	-
278	*Sisymbrium loeselii* L.	-	-	-	-	-	+	-
279	*Sisymbrium officinale* (L.) Scop.	-	-	-	-	-	+	-
280	*Solanum americanum* Mill.	-	-	-	-	-	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
281	*Solanum dulcamara* L.	-	-	-	-	-	+	-
282	*Sonchus asper* (L.) Hill subsp. *glaucescens* (Jord.) Ball ex Ball	-	-	-	-	-	+	-
283	*Sorbus domestica* L.	-	-	-	-	-	+	-
284	*Sorbus torminalis* (L.) Crantz var. *torminalis*	-	-	-	-	-	+	-
285	*Sparganium erectum* L. subsp. *microcarpum* (Neuman) Domin	-	-	-	-	-	-	+
286	*Stachys annua* (L.) L. subsp. *annua* var. *annua*	-	-	-	-	-	+	-
287	*Stachys byzantina* K.Koch	-	+	-	-	-	+	-
288	*Stachys officinalis* (L.) Trevis. subsp. *haussknechtii* (Nyman) Greuter , Burdet	-	-	-	-	-	+	-
289	*Stellaria aquatica* (L.) Scop.	-	-	-	-	-	-	+
290	*Stellaria media* (L.) Vill.	-	-	-	+	-	-	-
291	*Taraxacum aznavourii* Soest	-	-	-	-	-	+	-
292	*Taraxacum buttleri* Soest	-	-	-	-	-	+	-
293	*Taraxacum macrolepium* Schischk.	-	-	-	-	-	+	-
294	*Taraxacum microcephaloides* Soest	-	-	-	-	-	+	-
295	*Teucrium chamaedrys* L. subsp. *chamaedrys*	-	-	-	-	-	+	-
296	*Teucrium polium* L. subsp. *polium*	-	-	+	-	-	+	-
297	*Thesium arvense* Horv.	-	-	-	-	-	+	-
298	*Thymus longicaulis* C.Presl subsp. *chaubardii* (Rchb.f.) Jalas	-	-	+	+	-	-	-
299	*Tragopogon dubius* Scop.	-	-	-	-	-	+	-
300	*Trifolium arvense* L. var. *arvense*	-	-	-	-	-	-	+
301	*Trifolium campestre* Schreb. subsp. *campestre* var. *campestre*	+	-	+	+	-	-	+
302	*Trifolium elongatum* Willd. **(endemic)**	-	-	+	+	-	+	-
303	*Trifolium hybridum* L. var. *hybridum*	-	-	-	-	-	-	+
304	*Trifolium incarnatum* L. var. *incarnatum*	-	-	-	-	-	+	-
305	*Trifolium pallidum* Waldst. , Kit.	-	+	-	-	-	-	-
306	*Trifolium physodes* M.Bieb. var. *physodes*	-	-	-	-	-	-	-
307	*Trifolium pratense* L. var. *pratense*	-	-	-	-	-	-	+
308	*Trifolium pratense* L. var. *sativum* Schreb.	+	-	-	-	-	-	-
309	*Trifolium repens* L. var. *repens*	-	-	-	-	-	-	+
310	*Trifolium resupinatum* L. var. *resupinatum*	-	-	-	+	-	-	-
311	*Tripleurospermum conoclinium* (Boiss. & Balansa) Hayek	-	-	-	-	-	+	-
312	*Tripleurospermum tenuifolium* (Kit.) Freyn ex Freyn	-	-	-	-	-	+	-
313	*Triticum aestivum* L.	-	+	-	-	-	-	-
314	*Turgenia latifolia* (L.) Hoffm.	-	-	-	-	-	+	-
315	*Tussilago farfara* L.	-	+	-	-	+	+	-

Supplementary Table 1. Continued.
Ek Çizelge 1. Devam.

No. Species No. Tür		1st	2st	3st	4st	5th	Campus road	Yumrukaya Village, West of dormitories
		2011-2014					1994-1995	
316	*Typha latifolia* L.	-	-	-	-	-	+	-
317	*Typha laxmannii* Lepech.	-	-	-	-	-	+	-
318	*Typha shuttleworthii* W.D.J.Koch , Sond.	-	-	-	-	-	-	+
319	*Urtica dioica* L. subsp. *dioica*	-	-	-	-	-	-	+
320	*Valerianella lasiocarpa* (Steven) Betcke	-	-	-	-	-	+	-
321	*Verbascum armenum* Boiss. , Kotshy var. *occidentale* Hub.-Mor.	-	-	-	-	-	+	-
322	*Verbascum lasianthum* Boiss. ex Benth.	-	-	-	-	-	+	-
323	*Verbascum phlomoides* L.	-	-	-	-	-	-	+
324	*Verbascum speciosum* Schrad.	-	-	-	-	-	+	-
325	*Verbena officinalis* L. var. *officinalis*	-	-	-	-	-	+	+
326	*Veronica anagallis-aquatica* L.	-	-	-	-	-	-	+
327	*Veronica arvensis* L.	-	-	-	-	-	-	+
328	*Veronica austriaca* L.	-	-	-	+	-	+	-
329	*Veronica chamaedrys* L.	-	-	+		-	+	-
330	*Veronica persica* Poir.	-	+	-	-	-	+	-
331	*Vicia narbonensis* L. var. *narbonensis*	-	-	-	-	-	+	-
332	*Vicia sativa* L. subsp. *nigra* (L.) Ehrh. var. *nigra*	-	-	-	-	-	+	-
333	*Vicia sativa* L. subsp. *nigra* (L.) Ehrh. var. *segetalis* (Thuill.) Ser. ex DC.	-	+	-	-	-	-	-
334	*Vicia villosa* Roth subsp. *eriocarpa* (Hausskn.) P.W.Ball	-	-	-	-	+	-	-
335	*Viola alba* Besser subsp. *alba*	-	-	-	-	-	+	-
336	*Viola arvensis* Murray	-	-	-	-	-	+	-
337	*Viola sieheana* W.Becker	+	-	+	-	+	+	-
338	*Xeranthemum annuum* L.	-	-	-	-	-	+	-
Total		41	38	29	23	22	261	66