

New Contributions to the Flora of Beytepe Campus (Ankara) and Floristic Comparison with Neighboring Floras and Other Campus Floras

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Abstract

Flora of Beytepe Campus of Hacettepe University was published in 1994 with the specimens collected in 1975-1977. In this research, 79 different species were included and thus total species number of the campus increased to 510. The phytogeographical spectrum of the species with the last collections is as follows: Irano-Turanian elements 134 (26%), Euro-Siberian elements 24 (4.7 %) and Mediterranean elements 21 (4.1%). Similarities between the taxa of Beytepe and those of 6 other studies performed near our study area were compared using clustering analysis. At the same time, 79 new species for the flora of Beytepe was given and threatened category was evaluated.

Key Words: Ankara, Beytepe, flora, university campus

INTRODUCTION

There are 99 universities in Turkey, 68 of these are State Universities and 31 are Foundation Universities. Some of these universities have a campus area in city center or outside of the city center. These campuses represent the floristic properties of their environments which mostly depending on their size. Campuses are genetically reserve areas for floristic diversity because of construction activities in the cities. Flora of Beytepe Campus is the first campus research in Turkey in 1975. So far, 13 University campus floras have been investigated. These researches are; Hacettepe-Beytepe (Erik, 1994), Middle East Technical

University (METU) (Bilge, 2001), Balıkesir-Çağış (Sanön & Özen, 2001), Akdeniz (Ünal, 1998), Osman Gazi-Meşelik (Ocak & Türe, 2001), İzzet Baysal (Turgut, 1996), Karadeniz Teknik (Coşkunçelebi, 1995), Ondokuz Mayıs (Kılıç & Özen, 1988), Celal Bayar (Uğurlu, 1997), Uludağ (Tarımcılar & Kaynak, 1994), Mersin (İspirgil, 1996), Cumhuriyet (Çelik & Yıldız, 1988) ve Çukurova (Türkmen, 1987). Because of both facility of arrival and working situation, these areas were though as a subject of master thesis for educational purpose, especially for young botanists. Although campus areas are well protected, but these areas will be exposed to development pressure in the future. Natural area in campuses are getting smaller and cultivated plants substitute natural flora because of afforesting and landscape planning activities are gradually increasing.

For this reason, it's important to record floristic

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compositions as soon as the natural flora was being destroyed. For example Beytepe campus, constructed in 1973-1974, entirely had a steppe composition but today because of the reasons mentioned, it's now mostly occupied with forest and buildings. Also, construction activities are still continuing. The same situation can be observed in METU campus. For this reason it is important to have a floristic list and observe the change.

With this research it was also intended to make contributions to the flora of Beytepe campus and at the same time to make a data base of the plant diversity in campus areas of Turkey. Thus, this study will be a reference to the researchers that are interested in this subject.

MATERIALS AND METHODS

The materials of this study are 79 vascular plant specimens, collected from Beytepe and its environment between the years at 1995 and 2003. At least one sample for each taxon is deposited at HUB. Specimens were identified basically using the Flora of Turkey (Davis, 1965-1985, Davis et al., 1988; Güner et al., 2000), different Floras (Boissier, 1867-1888; Rechinger et al., 1965-1977; Heywood & Tutin, 1964-1980; Zohary, 1966-1986; Komarov & Shishkin, 1933-1964; Evan & Townsend, 1966-1968; Meikle, 1977-1985; Pignatti, 1982) and revision (Dönmez, 2000). In floristic list, whether the plant is endemic, which phytogeographical region and threatened categories it belongs to, are mentioned at the end. Cultivated plants are given as a separate list. Since all plants were collected from Ankara, Hacettepe University Beytepe campus area as in the previous paper (Erik, 1994), this information was not repeated. Author abbreviations follow Brummitt and Powell (1992). Threatened categories are proposed for endemic and some non-endemic taxa according to IUCN risk categories

(IUCN, 2001 and Ekim et al., 2000). The results were compared with the neighbouring floras (Yağcı, 1994; Soydemir, 1998; Asker, 1999; Altınözlü & Vural, 2000; Bilge, 2001) and other campus floras (Türkmen, 1987; Kılınc & Özen, 1988; Tarımcılar & Kaynak, 1994, 1995; Coşkunçelebi, 1995; Turgut, 1996; İspirgil, 1996; Uğurlu, 1997; Sanön & Özen, 2001; Ocak & Türe, 2001; Ünal, 1998; Bilge, 2001). Similarities between the taxa from Beytepe and other studies were compared using clustering analysis. The NTSYS program (Rohlf, 2000) for clustering and ordination analysis was used. The abbreviations used in the text and the floristic list are as follows: Ir.-Tur.: Irano-Turanian; Medit.: Mediterranean; E. Medit.: East Mediterranean; E. Medit. (mt.): East Mediterranean (mount); Euro-Sib.: Euro-Siberian; En.: Endemic; CR: Critically Endangered; VU: Vulnerable; EN: Endangered; LC: Least concern; B. Mutlu: Birol Mutlu; S. Erik: Sadık Erik; ŞY: Şinasi Yıldırımılı; HUB: Hacettepe University Department of Biology Herbarium in Ankara.

RESULTS AND DISCUSSION

In this investigation plants were collected in various vegetation periods between 1995-2003. Seventy seven species, 1 subspecies and 1 variety belonging to 21 genera and 2 family were added to the previous list (Table 1). Four of these species were recorded as new for the square B4 (Mutlu and Erik, 1999). As a result of all investigations performed so far, a total of 510 taxa belonging to 504 species, 264 genera and 57 families are present in Flora of Beytepe campus. As a result of cultivation activities 58 new species were introduced to flora and the total number of cultivated plants is increased to 125. The phytogeographical elements of the new added taxa are: Ir-Tur 14, Euro-Sib. 3 and Medit. 6 species. Total phytogeographical spectrum of the campus is as follows: Ir-Tur 134

Table 1. Floristic research results in Beytepe.

	Erik, 1994		Addition	Total	
Family	55		2	57	
Genera	243		21	264	
Species	428		77	502	
Subspecies	3		1	4	
Variety	1		1	2	
Taxa	431		79	510	
Culture species	67		58	145	
Ir.-Tur. element	123	(28.53%)	11	134	(26%)
Euro-Sib. element	22	(5.10%)	2	24	(4.7%)
Medit. element	16	(3.48%)	5	21	(4.1%)
Multi-regional elements or those of unknown phytogeographic region	266	(61.71%)	40	331	(% 65)
Endemizm	61	(14.28%)	4	65	
VU	1		-	1	
LC	60		4	59	

species, Euro-Sib. 24 species, Medit. 21 species. *Eryngium bithynicum* Boiss., *Causinia stapfiana* Freyn & Sint., *Astragalus guttatus* Banks & Sol. and *Crucianella disticha* Boiss. are the ones added recently are endemic to Turkey. With the new added 4 endemic taxa, the total endemic taxa number is increased to 65. One of these endemic taxa was evaluated as VU and 64 of them were evaluated as LC (Ekim et al., 2000; IUCN, 2001).

Some species epithets were corrected as follows: *Eryngium bithynicum* (S. Erik 5190); *Alyssum strigosum* ssp. *strigosum* (S. Erik 1448); *Aegilops markgrafii* (S. Erik 1463); *Echinocloa crus-galli* (S. Erik 4061).

Campus flora is compared with 6 other floras, which closely located and have similar habitats in means of various parameters (Table 2). The floristic

research areas are: Flora of Ankara City (Akaydın ve Erik, 2002); Flora of METU Campus, (Bilge, 2002); Flora of Bayındır Dam and Environments (Soydemir, 1997); Flora of İmrahor Valley (Ankara) (Altınözlü ve Vural, 2000); Taşpınar-İncek-Tuluntaş (Ankara) Steppe Formations (Yağcı, 1994) and Flora of Mamak Kayaş Protected Area (Asker, 1999).

Within compared research areas, Flora of Ankara City is the first and Flora of Beytepe campus is the second in means of the highest taxa number. Flora of Mamak-Kayaş is the one with lowest taxa number. In contrast to geographical closeness of METU, Taşpınar and Beytepe, METU has 14 species, Taşlıca has 25 species and Beytepe has 59 species which are not present in other compared areas.

Table 2. Comparisons of floristic studies (related literatures are given below).

	1	2	3	4	5	6	7
	Bey.	Ank.	Ort.	Bay.	İmr.	Taş.	Mam.
Area size (km ²)	12	140	50	4	15	30	4,5
Taxa number	510	1145	447	440	322	264	141
Number of species lacking in other areas	59	424	14	39	20	25	7
Number of endemic species	61 (12%)	175 (15%)	48 (10%)	48 (10%)	30 (9%)	54 (20%)	16 (11%)
Number of endemic species lacking in other areas	5	69	2	3	-	3	3
Ir.-Tur. elements	137 (27%)	321 (28%)	110 (24%)	89 (20%)	67 (21%)	94 (35%)	36 (25%)
Euro-Sib. elements	31(6 %)	70 (6%)	28 (6%)	30 (6%)	20 (6%)	6 (2%)	5 (3%)
Medit. elements	18 (3%)	92 (8%)	36 (8%)	25 (5%)	17 (5%)	13 (5%)	8 (5%)

Abbreviations:

Bey.: Flora of Beytepe Campus (Ankara), (Erik, 1994) and Addition to the Flora of Beytepe Campus

Ank.: Flora of Ankara City (Akaydın & Erik, 2002)

Ort.: Flora of Middle East Technical University Campus (Ankara), (Bilge, 2001).

Bay.: Bayındır Barajı Çevresinin Florası (Ankara), (Soydemir, 1997)

İmr.: İmrahor (Ankara) Vadisi Florası, (Altınözlü & Vural, 2000).

Taş.: Taşpınar, İncek, Tuluntaş (Ankara) Köyleri Arasında Yayılış Gösteren Step Formasyonlarının Floristik Yönden Araştırılması, (Yağcı, 1994).

Mam.: Mamak-Kayaş Arasındaki Korunmuş Ağaçlandırma Alanı Florası, (Asker, 1999).

Due to endemic taxa, Ankara City Flora is the first with 175 species and Mamak-Kayaş is the last with 16 species. Ankara City Flora has 69 species which are not present in other areas and Flora of İmrahor has no different endemic species from other areas. The endemic species which don't occur in the compared areas are: *Onosma lycaonicum* Hub.-Mor., *Barbarea trichopoda* Hauskn. ex Bornm., *Astragalus macroscepus* Boiss., *Erodium absinthoides* L. Herit. ssp. *absinthoides* and *Verbascum vulcanicum* Boiss. & Heldr. var. *viridans* Hub.-Mor.

In all compared areas Ir.-Tur. phytogeographic region elements have the highest number. Ankara, METU, Taşpınar and Mamak have higher rate of Medit. elements than Euro-Sib. elements, though Beytepe, Bayındır and İmrahor have higher Euro-Sib. element rate than Medit. elements.

In Table 3, the comparison of similar and dissimilar taxa were given. According to this table, the most similar research area to Beytepe is Ankara City Flora with 414 taxa and the less similar is Mamak with 82 species. In means of dissimilarity of Beytepe and other reserach areas , Ankara City Flora is the first with 817 taxa and METU is the last with 352 taxa. The most dissimilarity occurs between Ankara and Mamak with 1049 taxa. Mamak and Taşpınar are the less similar areas with 65 taxa.

In Table 4, the comparison of repeated taxa numbers are given. According to this table totally 23 taxa, 1 endemic (*Veronica multifida* L.), and 22 non-endemic taxa are present in all compared areas. 587 taxa including 83 endemic taxa is only present in 1 area. Total number of species.in all areas is 1384.

Table 3. The comparison of similar and dissimilar taxa.

		DISSIMILAR TAXA						
		Bey.	İmr.	Ank.	Bay.	Mam.	Taş.	Ort.
SIMILAR TAXA	Bey.		422	817	446	468	462	352
	İmr.	194		877	382	312	384	318
	Ank.	414	290		839	1049	961	701
	Bay.	247	185	373		384	446	338
	Mam.	82	67	115	95		268	312
	Taş.	150	92	224	129	65		466
	Ort.	233	157	382	211	71	118	

Table 4. The comparison of repeated taxa numbers.

Repetitions	Number of endemic species	Number of non-endemic species	Total species number
7	1	22	23
6	6	42	48
5	9	92	101
4	20	113	133
3	23	182	205
2	46	241	287
1	83	504	587
		TOTAL	1384

Clustering analyse based on similarity ratios is given in Figure 1. Beytepe is most similar to Ankara City Flora. Floras of Beytepe, Ankara, Bayındır, METU and İmrahor are clustered together with 0.47 similarity value. Taşpınar and Mamak differentiated from this group with the values 0.37 and 0.33 respectively.

In means of total taxa number, Flora of Ankara City has the highest number. This may be a cause of its bigger surface area and habitat variation. Another striking point is that the Flora of Beytepe campus has 50% of Ankara City Flora taxa, only occupies 14.4% of the surface area. Thus there is no correlation within area size and species number for this case. Also METU campus is larger than Beytepe and has lower number of species. Taşlıca and İmrahor has lower species number than Bayındır. Bayındır and Mamak have equal surface size and Bayındır has more taxa. As a consequent, taxa number is not directly correlated to surface size and more related to habitat and topographical variations. METU campus flora is the third with 447 taxa, in means of total taxa number. This area is mostly covered with forest because of plantation activities, therefore steppe plants can not be conserved. Conserved steppe has more species than not conserved areas, this can easily be recognised by comparing İmrahor and Taşpınar with Beytepe. These two areas have 322 and 264 species respectively, have larger surface sizes than

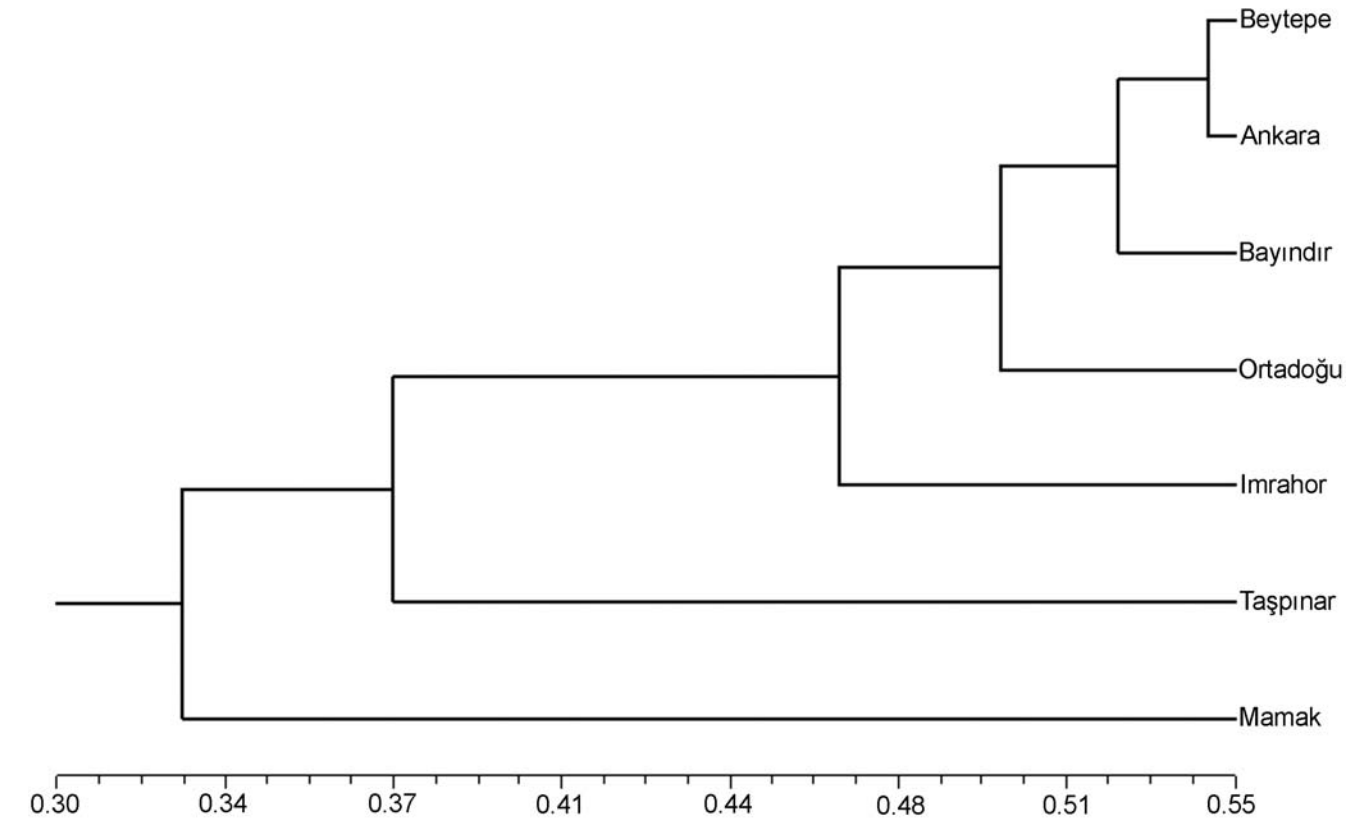


Figure 1. Taxon similarities between Beytepe and other locations.

Beytepe. Mamak-Kayaş has 141 taxa and the effect of afforesting can easily be understood with the help of these data.

The increase of endemic taxa number is related to the total taxa number (Figure 2). However Taşpınar has relatively less taxa but has more endemic taxa. This area has an altitude of 300-400 m and differentiated from other research areas with its stony surface structure. The endemic taxa of Taşpınar mostly belong to Fabaceae, which is a dominant family in Irano Turanian regions. The endemism rate of this area is the highest, 20%, because of the low total taxa number. In all other compared areas endemism rate is directly proportional to the total taxa number.

Ankara City Flora has the highest number of Ir-Tur elements with 321 species. Then comes Beytepe with 137 species, and METU with 110 species. Since Flora of Ankara was investigated on a 120 km² area, it includes more central Anatolian steppe and for this reason Ir-Tur elements' number

increases. In general, Ir-Tur elements number is higher than the remaining two phytogeographical elements in all compared areas (Figure 2). This is because all compared areas are located in Irano Turanian phytogeographic region. Therefore it can be recognised that the surface area size is directly proportional with Ir-Tur element number. In phytogeographical elements distribution graphic (Figure 2), Ankara City Flora has the highest picks because of higher taxa numbers.

Ankara, METU, Taşpınar and Mamak have more species of Mediterranean than Euro-Sibereans, because they consist very constricted habitat types that are suitable for Euro-Sib. elements. The highest number of Euro-Sib. Elements occur in Flora of Ankara City with 70 species. Because this area involves humid microclimatic areas such as Hacıkadın, Dikmen and İncesu, that are suitable for Euro-Sib. elements, and has the largest surface size. Beytepe has the same property because it involves Maslak and Oflaz valleys. Therefore Beytepe is the second to have the greatest number

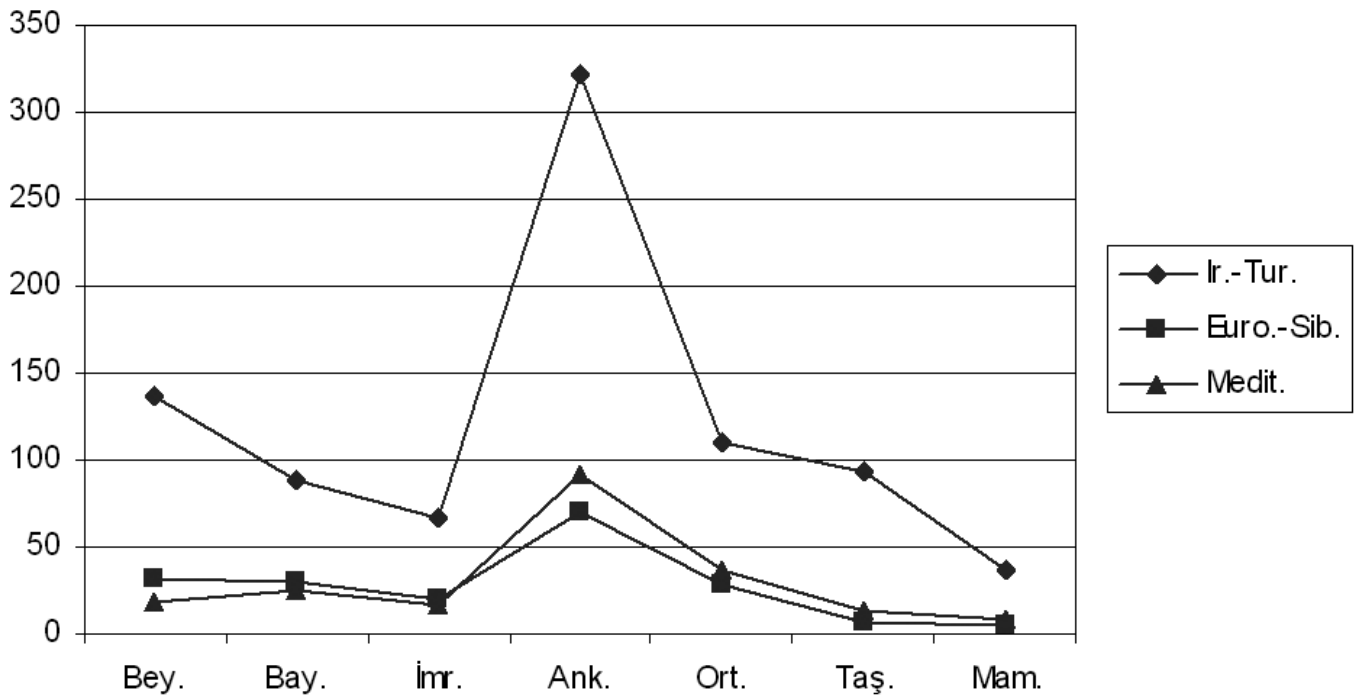


Figure 2. Comparison with phytogeographic regions (abbreviations are given below in Table 2).

of Euro-Sib. Elements. The third area is Bayındır dam; this area consists of water reserve area and located on higher altitudes thus it's also suitable for Euro-Sib. elements. The last two researches don't have such habitats so Euro-Sib. elements are rather low. First 5 research areas have 6 % of Euro-Sib. elements so these are equally effected by Euro-Siberian climate.

In means of having Medit. elements, Flora of Ankara City is the first with 92 species. Because this research area has different habitat types and generally it has a close basin structure, that supplies a suitable condition for Mediterranean elements. Therefore Medit. elements have the highest number after Ir-Tur. elements in this area. The second area that has the highest number of Medit. elements, is METU campus. METU campus has more or less the same location with Beytepe, however it has double the number of Medit. species. This situation can be a cause of its closeness to city center therefore the presence of warmer climatic and the large microclimatic areas. The reduction of Medit. elements may be a cause of the higher altitude,

being away from the center and the presence of large microclimate areas as can be seen in Taşpınar.

Ankara City Flora is more in the center when compared with other areas. It can be said that; the more the distance from center, the less the similar taxa number. Besides this, taxon similarities also change due to plantation and construction activities. The most similar area to Ankara City Flora is Beytepe campus (Figure 1). Despite Flora of Ankara City involves some parts of METU and İmrahor, it is more dissimilar to these areas than Beytepe. This is because of the plantation and construction activities on these areas. The most dissimilar areas in means of taxon similarity are Mamak and Taşpınar in all compared research areas (Figure 1). These two are the most distant areas from Ankara City Flora.

When campus Floras are compared in means of endemic species, the leader is Cumhuriyet University Campus, with 68 species. This is a result of its closeness to Anatolian diagonal that has the highest endemism rate in Turkey (Davis, 1971). The

second campus is Beytepe with 65 species. The campus areas have no endemic species (Table 5).
most striking point is that 19 Mayıs and Mersin

Table 5. Comparisons of the other university floras (abbreviations are given below).

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Bey.	Ort.	Cum.	Osm.	Ond.	Kar.	İze.	Ulu.	Akd.	Çuk.	Mer.	Cel.	Bal.
Area size (km ²)													
Family	56	72	-	53	67	50	70	56	-	67	30	62	62
Genera	263	251	-	228	230	146	268	217	-	265	66	209	206
Species*	504	463	-	337	381	192	437	252	418	415	75	315	246
Subspecies	4	-	-	-	-	-	6	71	-	-	-	-	-
Variety	2	-	-	6	1	-	4	33	-	-	-	-	-
Taxa*	510	463	403	343	382	192	447	356	418	415	75	315	246
Culture species	84	21	-	3	-	-	30	-	18	-	-	-	21
Endemic species	65	48	68	32	-	1	19	9	30	20	-	10	1
Ir.-Tur. elements	134	110	140	63	5	7	19	4	12	11	-	7	8
Euro-Sib. elements	24	28	24	17	65	47	110	39	7	7	-	15	22
Medit. elements	21	36	24	22	57	18	45	78	188	109	-	112	53
Multi-regional elements	331	289	215	241	255	120	273	235	211	288	-	181	163

Abbreviations:

Bey. : Flora of Beytepe Campus (Ankara), (Erik, 1994) and Addition to the Flora of Beytepe Campus (Ankara)

Ort.: Flora of Middle East Technical University Campus (Ankara), (Bilge, 2001).

Cum.:Cumhuriyet Üniversitesi Kampüs Alanının Florası (Sivas), (Çelik & Yıldız, 1988).

Osm.: The Flora of the Meşelik Campus of the Osmangazi University (Eskişehir-Turkey), (Ocak & Türe, 2001).

Ond.: Samsun Ondokuz Mayıs Üniversitesi Kampüs Alanı ve Çevresinin Florası, (Kılınç & Özen, 1988).

Kar.: Karadeniz Teknik Üniversitesi, Kampüsünün Doğal Çiçekli Bitkileri, (Coşkunçelebi, 1995).

İze.: Flora of Abant İzzet Baysal University İzzet Baysal Campus, (Turgut, 1996).

Ulu.: Uludağ Üniversitesi (Bursa) Kampüs Alanı Florası II, (Tarımcılar & Kaynak, 1994).

Akd.: Akdeniz Kampüsünün Bitki Sosyolojisi ve Ekolojisi Yönünden Bir Botanik Bahçesi Kurulması Amacına Yönelik Olarak İncelenmesi ve Haritalanması, (Ünal, 1998).

Çuk.: Çukurova Üniversitesi Kampus Alanının Doğal Bitkileri, Hayat Formları ve Habitatları, (Türkmen, 1987).

Mer.: Çevresel Etki Değerlendirme Çalışmalarına Esas Olmak Üzere Mersin Kampüs Alanının Bitkisel Çeşitliliğinin Tespiti, (İspirgil, 1996).

Cel.: Celal Bayar Üniversitesi (Manisa) Kampus Alanı Florası, (Uğurlu, 1997).

Bal.: Balıkesir Üniversitesi Çağış Kampüsü ve Çevresinin Florası , (Sanön & Özen, 2001).

*: exluding culture species.

-: not state in relevant referange and absent

Additional floristic list:

APIACEAE

Berula erecta (Huds.) Couille

Maslak valley, the inside of stream, 900 m, 13/7/2003, **B. Mutlu** 8645.

Eryngium bithynicum Boiss.

Around of campus area, 950 m, steppe, 10/8/1998, S. Erik 3919. En.-LC. Ir.-Tur.

This species was misidentificatied as *E. falcatum* in the first study (Erik, 1994).

Scandix australis L. subsp. **grandiflora** (L.) Thell.

Near the Beytepe grenhouse, 950 m, 5/6/1997, **B. Mutlu** 1865.

Torilis leptophylla (L.) Reichb.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1879.

ARALIACEAE

Hedera helix L.

Enter of Dining House, 1000 m, 20/8/2001, *ŞY 26928 (Yıldırımli, 2000). Maslak Valley, 940 m, 5/4/2003, **B. Mutlu**

Culture form of this species was firstly collected by Ş.Yıldırımli. Specimen of B. Mutlu is nature species in Beytepe campus.

ASTERACEAE

Bombycilaena erecta (L.) Smolj.

Near the Beytepe grenhouse, 950 m, 13/6/1997, **B. Mutlu** 1866.

Carduus nutans L.

Causinia stapfiana Freyn & Sint.

Maslak valley, 950 m, openness of *P. nigra* forest, 13/7/2003, **B. Mutlu** 8646. En.-LC. Ir.-Tur.

Cnicus benedictus L. subsp. **kotschy** Boiss.

Back of dormitory, 950 m, 4/7/1997, **B. Mutlu** 1928.

Cirsium vulgare (Savi) Ten.

Maslak Valley, 900 m, dere kenarı, 13/7/2003, **B. Mutlu** 8644.

Pilosella auriculoides (A.F.Lang) Sell & West

Road side, 950 m, 16/5/1997, **B. Mutlu** 1846.

Rhagadiolus angulosus (Jaub. & Spach) Kupicha

Road side, 950 m, 24/5/1997, **B. Mutlu** 1847. Ir.-Tur.

Siebera nana (DC.) Bornm.

Back of dormitory, 950 m, 27/5/1997, **B. Mutlu** 1852. Ir.-Tur.

Taraxacum microcephaloides van Soest

Back of dormitory, 900-1000 m, 19/10/1992, **Ş. Y** 15524 B. Mutlu, N. Yılmaz, M. Öztekin.

T. seratinum (Waldst.& Kit.) Poiret

Around of library, 950 m, 12/8/2003, **B. Mutlu** 8669.

BRASSICACEAE

Alyssum desertorum Stapf var. **prostratum** Dudley

Between Dormitory and White House, 950 m, 17/4/2003, **B. Mutlu** 8119.

A. strigosum Banks. & Sol. ssp. **strigosum**

Around of campus area, step, 29/4/1976. S. Erik 1448.

This species was misidentificated as *A. minus* (L.) Rothm. var. *micranthum* (Meyer) Dudley in first study (Erik, 1994)

B.Mutlu 8118.

Arabis nova Vill.

Maslak Valley, 950 m, 5/5/1997, **B. Mutlu** 1808.

Cardaria draba (L.) Desv. ssp. **chalepensis** (L.)

O.E.Schulz

Maslak Valley, stream side, 900 m, 13/7/2003, **B. Mutlu** 8643.

This subspecies is a new taxon in Beytepe campus flora.

Other subspecies collected from S. Erik in the same location.

Conringia planisiliqua Fisch. & Mey.

Back of student dining hall, side of student carpark, 950 m, 20/7/2003, **B. Mutlu** 8659. Ir.-Tur.

CARYOPHYLLACEAE

Arenaria serpyllifolia L.

Road side, 950 m, 16/5/1997, **B. Mutlu** 1820.

Holosteum umbellatum L. var. **glutinosum** (Bieb.) Gay

Back of student dining hall, side of student carpark, 950 m, 17/4/2003, **B. Mutlu** 8120.

This subspecies is a new taxon in Beytepe campus flora.

Minuartia hamata (Hauskn.) Mattf.

Back of dormitory, 950 m, 27/5/1997, **B. Mutlu** 1855.

Velezia rigida L.

Back of dormitory, 950 m, 5/6/1997, **B. Mutlu** 1870.

CYPERACEAE

Bolboschoenus maritimus (L.) Palla var. **maritimus**

Maslak Valley, stream side, 900 m, 14/7/2003, **B. Mutlu** 8664.

Carex hirta L.

Maslak Valley, 900 m, dere kenarı, 13/7/2003, **B. Mutlu** 8641. Euro.-Sib.

Cyperus longus L.

Maslak Valley, 900 m, dere kenarı, 13/7/2003, **B. Mutlu** 8638.

DIPSACACEAE

Pteroccephalus plumosus (L.) Coulter

Back of dormitory, 950 m, 4/7/1997, **B. Mutlu** 1919.

Scabiosa argentea L.

B. Mutlu

EUPHORBIACEAE

Euphorbia ledebouri Boiss.

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1878.

E. peplus L. var. **peplus**

Front of Computer Engineering, 950 m, 10/10/1996, **B. Mutlu** 1803.

This species published as a new record for B4 square. (Mutlu & Erik, 1999).

E. falcata L. subsp. **falcata** var. **falcata**

Back of dormitory, 950 m, 30/7/1996, **B. Mutlu** 1747.

FABACEAE

Astragalus guttatus Banks & Sol.

Road side, 950 m, 24/5/1997, **B. Mutlu** 1845. Ir.-Tur.

A. gymnolobus Fischer

Back of dormitory, 950 m, 30/5/1995, **B. Mutlu** 1648. En.-LC. Ir.-Tur.

Lathyrus hirsutus L.

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1875.

This species published as a new record for B4 square. (Mutlu & Erik, 1999).

L. aphaca L. var. **biflorus** Post.

Road side, 950 m, 16/5/1997, **B. Mutlu** 1844.

Lens orientalis (Boiss.) Hand.-Mazz.

Back of dormitory, 950 m, 2/6/1997, **B. Mutlu** 1856.

Melilotus alba Desr.

Near the Geology Engineering, 950 m, 25/6/1997, **B. Mutlu** 1891.

Medicago lupulina L.

Around of Library, 950 m, 25/6/1997, **B. Mutlu** 1888.

M. minima (L.) Bart. var. **minima**

Road side, 950 m, 21/5/1997, **B. Mutlu** 1819.

Medicago orbicularis (L.) Bart.

Front of Yıldız lecture room, 950 m, 29/8/1997, **B. Mutlu** 1840.

M. rigidula (L.) All. var. **rigidula**

Road side, 950 m, 24/5/1997, **B. Mutlu** 1842.

M. radiata L.

Near the Beytepe greenhouse, 950 m, 5/6/1997, **B. Mutlu** 1862. Ir.-Tur.

Trifolium arvense L. var. **arvense**

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1874

T. sylvaticum Gerarad ex Lois.

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1877.

T. campestre Schreb.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1880.

T. lucanicum Gasp.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1883.
Medit.

T. hirtum All.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1885.
Medit.

Trigonella spicata Sibth. & Sm.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1884. E.
Medit.

This species published as a new record for B4 square.
(Mutlu & Erik, 1999).

T. monspelica L.

Near the Beytepe greenhouse, 950 m, 5/6/1997, **B. Mutlu**
1864. Medit.

T. brachycarpa (Fisch.) Moris

Road side, 950 m, 24/5/1997, **B. Mutlu** 1843. Ir.-Tur.

T. velutina Boiss.

Back of dormitory, 950 m, 27/5/1997, **B. Mutlu** 1854. Ir.-
Tur.

Vicia narbonensis L. var. **narbonensis**

Back of Physics Department, 950 m, 4/5/1995, **B. Mutlu**
1293.

V. ervilia (L.) Willd.

Road side, 950 m, 16/5/1997, **B. Mutlu** 1822.

ILLACEBRACEAE

Herniaria incana Lam.

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1886.

LAMIACEAE

Lamium amplexicaule L.

Near the dining hall, 950 m, 28/4/1997, **B. Mutlu** 1807.
Euro.-Sib.

LINACEAE

Linum nodiflorum L.

Back of dormitory, 950 m, 13/6/1996, **B. Mutlu** 1655.
Medit.

OROBANCHACEAE

Orobanche minor Sm.

Back of dormitory, 950 m, 20/6/1996, **B. Mutlu** 1656.

POACEAE

Aegilops cylindrica Host

Front of Yıldız amfi, 950 m, 29/8/1997, **B. Mutlu** 1850.
Ir.-Tur.

A. markgrafii (Greuter) Hammer

Around of campus area, 950 m, step, 4/7/1976, S. Erik
1463. Medit.

This species was misidentified as *A. caudata* L. in first
study (Erik, 1994)

Echinaria capitata (L.) Desf.

Between Dormitory and White House, 950 m, 20/7/2003,
B. Mutlu 8658.

Echinochloa crus-galli (L.) P. Beauv.

step, 20/9/1989, S. Erik 4061.

This species was misidentified as *Setaria verticillata*
(L.) P. Beauv var. *verticillata* in first study (Erik, 1994).

Gaudinopsis macra (Bieb.) Eig. subsp. **macra**

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1873. Ir.-
Tur.

Koeleria cristata (L.) Pers.

Maslak Valley, 950 m, P. nigra açıklığı, 13/7/2003, **B.**
Mutlu 8648.

Trachynia distachya (L.) Link

Eastern side of dormitory, 950 m, 13/6/1997, **B. Mutlu**
1651.

Triticum baeoticum Boiss. subsp. **baeoticum**

Eastern side of dormitory, 950 m, 14/6/1997, **B. Mutlu**
1652.

Vulpia ciliata Dumort. subsp. **ciliata**

Road side, 950 m, 16/5/1997, **B. Mutlu** 1821.

PORTULACACEAE

Portulaca oleracea L.

Front of Yıldız amfi, 950 m, 29/8/1997, **B. Mutlu** 1930.

POLYGONACEAE

Rumex pulcher L.

Back of student dining hall, 950m, 6/10/1995, **B. Mutlu** 1613.

ROSACEAE

Amygdalus orientalis Miller

Between Dormitory and White House, 950 m, 17/4/2003, **B. Mutlu** 8111. Ir.-Tur.

RUBIACEAE

Crucianella disticha Boiss.

Back of dormitory, 950 m, 9/6/1997, **B. Mutlu** 1872. En.-LC. Ir.-Tur.

Galium floribundum Sm. subsp. **floribundum**

Back of dormitory, 950 m, 13/6/1997, **B. Mutlu** 1871.

G. spurium L. subsp. **spurium**

Road side, 950 m, 24/5/1997, **B. Mutlu** 1841. Euro.-Sib. This species published as a new record for B4 square. (Mutlu & Erik, 1999).

G. tricornutum Dandy

Back of dormitory, 950 m, 27/5/1997, **B. Mutlu** 1851. Medit.

SCROPHULARIACEAE

Linaria simplex (Willd.) DC.

Maslak Valley, 950 m, 5/6/1997, **B. Mutlu** 1811.

Veronica praecox All.

Between Dormitory and White House, 950 m, 17/4/2003, **B. Mutlu** 8115.

ULMACEAE

Ulmus glabra Hudson

B. Mutlu 8128.

URTICACEAE

Urtica dioica

Between Dormitory and White House, near canal, 950 m, **B. Mutlu** 8661.

VALERIANACEAE

Valerianella vesicaria (L.) Moench.

Front of Yıldız lecture room, 950 m, 5/6/1997, **B. Mutlu** 1867.

CULTIVATED SPECIES:

ACERACEAE

Acer negundo L.

APOCYNACEAE

Vinca major L.

AQUIFOLIACEAE

Ilex aquifolium L.

ASTERACEAE

Chrysanthemum coccineum Willd.

Dahlia variabilis Hert.

Gaillardia aristata Pursh

BRASSICACEAE

Brassica oleracea L. var. **acephala** DC

Cheiranthus cheiri L.

BERBERIDACEAE

Berberis cretica L.

B. thunbergii DC cv. **atropurpurea**

Mahonia aquifolium Nutt.

BETULACEAE

Betula papyrifera March

BIGNONIACEAE

Catalpa bignonioides Walt.

BUDDLEJACEAE

Buddleia davidii Franch.

CAPRIFOLIACEAE

Lonicera periclymenum L.

Symphoricarpos albus Blake

Viburnum lantana L.

CARYOPHYLLACEAE

Cerastium chlorifolium Fisch. & Mey. Det: Ş. Yıldırım

CELESTRACEAE

Euonymus fortunei (Turcz.) Hand.-Mazz.

CUCURBITACEAE

Ecbalium elaterium (L.) A. RICH.

CUPRESSACEAE

Cupressus arizonica Greene

Juniperus sabina L.

FABACEAE

Laburnum anagyroides Medik.

Sophora japonica L.

FAGACEAE

Quercus ithaburensis Decne. ssp. *macrolepis*
(Kotschy) Hedge & Yalt.

Quercus pubescens Willd.

HIPPOCASTANACEAE

Aesculus hippocastanum L.

LAMIACEAE

Ocimum basilicum L.

LILIACEAE

Yucca gloriosa L.

MORACEAE

Morus alba L. cv. *pendula*

Maclura pomifera (Raf.) Shneid.

OLEACEAE

Forsythia x intermedia Zab.

Fraxinus angustifolia L.

Ligustrum vulgare L.

PINACEAE

Pinus strobus L.

Cedrus libani A. Richb.

Picea abies (L.) Karst.

Picea pungens Engelm.

PLATANACEAE

Platanus orientalis L.

POACEAE

Phragmites australis (Cav.) Trin. ex Steud.

ROSACEAE

Amygdalus communis L.

Malus purpurea (Barbier) Rehd.

Rosa canina L.

Chaenomeles speciosa (Sweet) Nakai

Cotoneaster horizontalis Decne

Prunus ceracifera Ehrh.

Pyracantha coccinea Roemer

Spirea x vonhoerttei Zabel

Armeniaca vulgaris Lam.

Crataegus oxyacantha L.

SALICACEAE

Populus alba L.

SAPINDACEAE

Koelruteria paniculata Laxm.

SAXIFRAGACEAE

Phliladelphus coronarius L.

SCROPHULARIACEAE

Anthirrhinum majus L. subsp. *majus*

SOLANACEAE

Datura metel L.

TAMARICACEAE

Tamarix gallica L.

TAXACEAE

Taxus baccata L.

VITACEAE

Parthenocissus quinquefolia Graben

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