

An investigation on the floristic characteristics of the Boztepe Protected Forest Area (Unye-Ordu)

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Abstract

In this study, the vascular flora of the Boztepe Protected Forest Area (Unye-Ordu) which is located in the central part of the Black Sea Region was investigated in 1995-1996 and 2000-2001. As a result of the plant collections during the two periods a detailed floristic analysis of 355 different taxa belonging to 230 genera and 78 families was found. Distribution of the taxa according to the phytogeographical regions are follows: 38.62% Euro-Siberian, 5.30% Mediterranean, 3.09% Irano-Turanian, and 48.70% pluriregionals. The endemism rate is 1.41%.

Keywords: Flora, Turkey, Unye.

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INTRODUCTION

The study area was declared as A Protected Forest Area by The Directorate of Forestry in 1957 and plantation studies were carried out. In plantation studies many native and exotic species were used: *Pinus sylvestris* L. var. *hamata* Steven, *Pinus nigra* J. F. Arnold subsp. *pallasiana* (Lamb.) Holmboe var. *caramanica* (Loudon) Rehder, *Pinus maritima* Lam., *Pinus radiata* D. Don, *Pinus pendula* Griff., *Abies nordmanniana* (Stev.) Spach subsp. *nordmanniana*, *Cedrus libani* A. Rich., *Picea orientalis* (L.) Link (Pinaceae), *Cupressus japonica* L.f. (Cupressaceae), and *Cryptomeria japonica* D. Don (Taxodiaceae) (Osmanoglu and Sen 1975). Plantation studies were carried out in a minor part of the study area, so that the natural floristic structure of the study area was not remarkably affected by the plantation studies. This area quite well represents the regional flora and no special floristic study was conducted in The Boztepe Protected Forest Area, except for some plant collections (Davis 1965-1985). We believe that this study will contribute to the Flora of Turkey and be a good source for future studies.

MATERIAL AND METHODS

Plant specimens were collected weekly from March to November in 1995-1996 and 2000-2001. Plant specimens were identified with the help of Davis (1965-1985), Davis et al. (1988), and Guner et al. (2000). The plant specimens were checked and kept at The Herbarium of The University of Ondokuz Mayıs, Faculty of Arts and Sciences (OMUB).

The list of taxa was arranged according to The Flora of Turkey (Davis 1965-1985), after the species name, locality, habitat properties, altitude, collection date, collection number, phytogeographic region and endemism were identified and recorded. The Floristic region and endemism of the species were determined according to The Flora of Turkey. Threatened categories were proposed for the endemic taxa according to Ekim et al. (2000). Author abbreviations of plant names are given according to Brummitt and Powell (1998). For exotic species "*" sign was used.

Topographical, geological and soil properties were obtained from Osmanoglu and

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Kumas (1980) and Osmanoglu and Sen (1975).

The climatic diagram of the study area was drawn according to the Walter (1956) method and by using the data of the Unye meteorological station. The climate of the study area was evaluated by the precipitation formula of Erinc (1965) ($im = P/Tom$; im : precipitation affect, P : Mean annual precipitation; Tom : Mean annual maximum temperature) and for the determination of the arid period the Emberger (1952) formula ($S = PE/M$; S : Aridity indice PE : Summer precipitation, M : maximum mean temperature of the hottest month) was used.

RESULTS

General properties of study area

The study area covers a 828.5 ha and is located between Ordu-Unye in the A6 square (Davis 1965-1985). Fig.1 between the towns of Ordu-Unye. It lies between the latitudes $41^{\circ} 03' 12''$ - $41^{\circ} 06' 18''$ N and the longitudes $37^{\circ} 20' 08''$ - $37^{\circ} 22' 00''$ E. The eastern part of the study area is bordered by the Golcegiz (Unye) village road. The western and northern parts of the study area are surrounded by the Ceviz river and Unye-Ordu highway respectively, while the southern part is bordered by the Golcegiz village.

The main hills and streams of the study area are the Asarkaya Hill (320 m), Bakacak Hill (381 m), Bardakci Hill (384 m), Kovankaya Hill (368 m), Ceviz River, Zindan River, and Incelik River, respectively (Fig. 1).

The geological structure of the study area consists of sedimentary rocks which have a high clay content belonging to the Upper Cretaceous Third Era and volcanic rocks (Osmanoglu and Kumas 1980). The study area includes shallow (12-30 cm) Grey-Brown Podsollic soils which are rich in clay minerals characterized by humid regions (Osmanoglu and Sen 1975).

The precipitation regime is A. W. Su. Sp and belongs to the Oceanic Coastal Type 1 region (Akman 1990). The aridity index was found as 9.7 and the study area does not belonging to the Mediterranean bioclimatic layer (Emberger 1952). Additionally

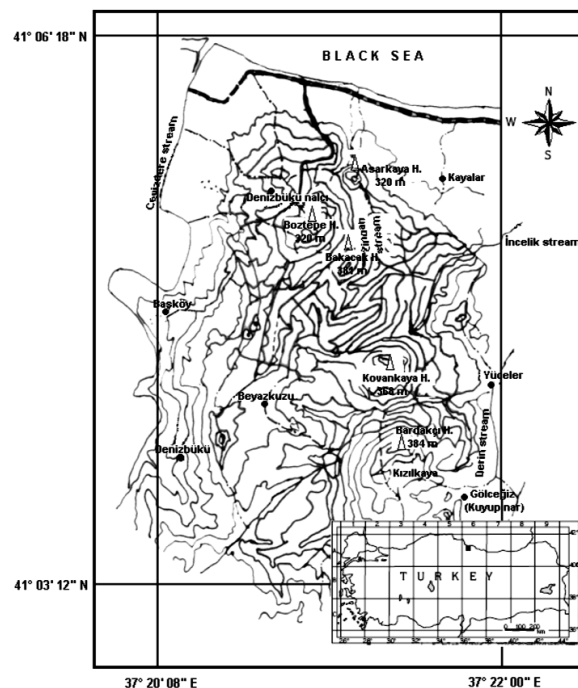


Fig. 1. Topographical map of study area.

precipitation effectiveness was found as $im = 67.96$ and belongs to the very humid type region (Erinc 1965) (Table 1).

The mean annual temperature is 14.5°C in Unye. The mean annual temperature is not below 0°C during the annual cycle. The maximum mean annual temperature is found in August (23.9°C), while the lowest mean annual temperature is found in January (6.3°C). Mean minimum temperature in February is found as 4.6°C . No arid period was observed in the study area according to the Walter (1956) method (Fig. 2). The most widespread communities in the study area are macchie (dominated *Arbutus unedo* L.), forest (dominated *Castanea sativa* Mill., *Quercus hartwissiana* Steven and *Populus tremula* L.) and stream (dominated *Alnus glutinosa* (L.) Gaertner subsp. *barbata* (C. A. Meyer) Yalt.).

Flora list of study area

The abbreviations used in the text and in the floristic list are as follows: Cosm.: Cosmopolitan; E: East; el.: element; Euro-Sib.: Euro-Siberian; Eux.: Euxinien; Hyr.-Eux.: Hyrcano-Euxinien; Ir.-Tur.: Irano-Turanian; Medit.: Mediterranean; mt: mountain; LR: Lower risk; lc: least concern; cd: conservation dependent, and H.K: Hasan Korkmaz.

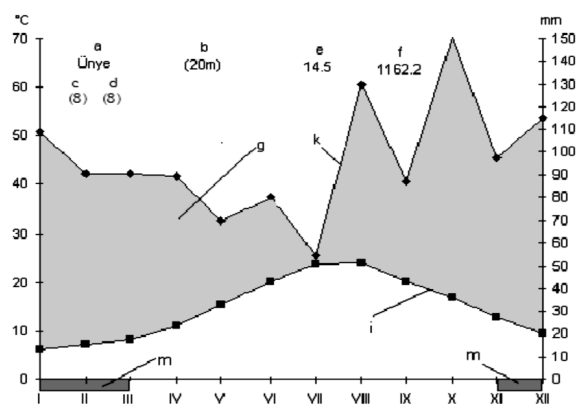


Fig. 2. Ombrothermic diagram of the study area. a. name of meteorological station, b. altitude of meteorological station (m), c. duration of temperature measurement, d. duration of rain measurement, e. annual average of temperature, f. annual average of rain, g. rainy period, i. temperature curve, k. raining curve, m. probable freezing months.

Table 1. Some climatic data of the Ünye meteorological station.

Climatic Data	
Altitude	20 m
Mean annual precipitation (P)	1162 mm
Mean annual temperature (T)	14.5 °C
Mean maximum for the hottest month (M)	26.9 °C
Mean minimum for the coldest month (m)	4.3 °C
Summer rainfall (PE)	263.5 mm
Index of xericity (S = PE/M)	9.7 (Unmediterranean)
Precipitation regime	autumn-winter-summer-spring
Affecting of precipitation (I _m = P/T _m)	67.9 (very damp)
Climate type	Marine first type of oceanic climate

PTERIDOPHYTA

Equisetaceae

Equisetum hyemale L.

Incelik stream environs, 350 m, 04.05.1996, H.K 4791.

E. arvense L.

Around fire observation tower, on roadside, 250 m, 24.05.1996, H.K 5064.

Osmundaceae

Osmunda regalis L.

Zindan stream environs, 350-400 m, 13.06.1995, H.K 4146.

Hypolepidaceae

Pteridium aquilinum (L.) Kuhn

Kuyupinar village, Bardakci hill, 400 m, 19.05.1995, H.K 3985.

Aspleniaceae

Asplenium adiantum-nigrum L.

Kuyupinar village, on rocks, 150m, 18.07.2000, H.K 4254.

Phyllitis scolopendrium (L.) Newman

Asarkaya environs, under forest, 350 m, 13.06.1995, H.K 4148.

Aspidiaceae

Dryopteris filix-mas (L.) Schott

Baskoy village, under forest, 400 m, 02.06.2001, H.K 4076.

Polypodiaceae

Polypodium vulgare L. subsp. *vulgare*

Yuceler village, on moist soil, 350 m, 18.03.2000, H.K 3887.

P. australe Fée

Yuceler village, under forest, on humus soil, 350 m, 18.09.2000, H.K 3851.

SPERMATOPHYTA

GYMNOSPERMAE

Pinaceae

**Abies nordmanniana* (Stev.) Spach subsp. *nordmanniana*

Baskoy village, Denizbuku district, 350 m, 02.05.2001, H.K 6109, Eux. el.

**Picea orientalis* (L.) Link

Yunus Emre forest, 150 m, 28.01.2000, H.K 4557.

**Cedrus libani* A. Rich

Yuceler village, southern slopes, 250 m, 04.07.1996, H.K 4210, Medit. el.

**Pinus nigra* J. F. Arnold subsp. *pallasiana* (Lamb.) Holmboe var. *caramanica* (Loudon) Rehder

Fire observation tower environs, 250 m, 24.05.2001, H.K 5109.

**P. sylvestris* L. var. *hamata* Steven

Fire observation tower environs, 250 m, 24.05.2000, H.K 5107, Euro-Sib. el.

**P. maritima* Lam.

Yunus Emre Forest environs, 150 m, 06.10.1996, H.K 6392.

**P. radiata* D. Don

Kuyupinar village, Bardakci hill, 350-400 m, 19.05.1995, H.K 3994.

**P. pendula* Griff

Kuyupinar village, 350-400 m, 19.05.1995, H.K 4004.

Taxaceae

Taxus baccata L.

Incelik stream environs, 350-400 m, 08.04.2000, H.K 3888

Cupressaceae

**Cupressus japonica* L. f.

Kuyupinar village, Bardakci hill, 350 m, 04.07.1995, H.K 4633 .

Taxodiaceae

**Cryptomeria japonica* D. Don

Fire observation tower environs, 250 m,

- 24.05.1996, H.K 5114.
ANGIOSPERMAE
DICOTYLEDONEAE
Ranunculaceae
Helleborus orientalis Lam.
Toptepe forest, clearings, 250 m,
08.04.2000, H.K 3900, Eux. el.
Clematis vitalba L.
Incelik stream environs, 100 m,
30.08.2001, H.K 4462.
Ranunculus brutius Ten.
Kuyupinar village, on roadside, 300 m,
13.04.2000, H.K, 4697, Euro-Sib. el.
R. marginatus d'Urv. var. *trachycarpus*
(Fisch & Mey) Azn.
Yuceler village, on roadside, 300 m,
02.06.2001, H.K 4068.
R. ficaria L. subsp. *bulbifera* (Marsden-
Jones) Lawelreé
Kuyupinar village, Incelik stream environs,
200 m, 18.02.2000, H.K 4570.
Berberidaceae
Epimedium pubigerum (DC.) Moren &
Decaisne
Kuyupinar village, 250 m, 19.05.1995,
H.K 4675, Eux. el.
Papaveraceae
Chelidonium majus L.
Kovankaya hill, 250 m, 22.04.2000, H.K
3930, Euro-Sib. el.
Cruciferae (Brassicaceae)
Lepidium ruderale L.
Yuceler village, southern slopes, on
roadside, 200 m, 04.07.2001, H.K 3935.
Nasturtium officinale R. Br.
Kovankaya hill environs, on swamp, 250
m, 22.04.2001, H.K 3935.
Cardamine quinquefolia (M. Bieb.)
Schmalh.
Toptepe forest, 350 m, 18.03.2001, H.K
3864, Euro-Sib. el.
C. tenera J.F.Gmel
Kovankaya hill, 350 m, 22.04.2001, H.K
3916, Hyr.-Eux. el.
C. uliginosa M. Bieb.
Incelik stream environs, 200 m,
04.07.2000, H.K 4186.
C. hirsuta L.
Toptepe forest, on humus soil, 350 m,
18.03.2001, H.K 3852, Cosmp.
Alliaria petiolata (M. Bieb.) Cavara &
Grande
Incelik stream environs, 350 m,
04.05.2001, H.K 4805.
Sisymbrium officinale (L.) Scop.
Asarkaya environs, stream side, 100 m,
30.09.2001, H.K 4536.
Cistaceae
Cistus creticus L.
Kuyupinar village, Bardakci hill, 350 m,
19.05.2000, H.K 3992, Omni-Medit. el.
C. salviifolius L.
Yunus Emre forest, northern slopes, 150
m, 06.10.2000, H.K 5115.
Violaceae
Viola odorata L.
Incelik stream environs, 150 m,
18.07.2000, H.K 4263.
V. sieheana Becker
Incelik stream environs, 100 m,
04.08.2000, H.K 4383.
Caryophyllaceae
Lepyrodiclis holosteoides (C. A. Mey.) Fenzl
ex Fisch. & Mey.
Kuyupinar village, on field side, 450 m,
30.03.1996, H.K 4633.
Stellaria media (L.) Vill. subsp. *media*
Yunus Emre forest, clearings, 350 m,
18.03.2001, H.K 3869.
Myosoton aquaticum (L.) Moench
Asarkaya environs, 300 m, 30.09.2000,
H.K 4508, Euro-Sib. el.
Cerastium glomeratum Thuill.
Baskoy village, on roadside, 300 m,
02.06.2001, H.K 4067, Cosm.
Petrorhagia saxifraga (L.) Link
Ceviz stream environs, on rocky, 400 m,
25.07.2001, H.K 4339, Euro-Sib. el.
Silene spergulifolia (Desf.) M. Bieb.
Baskoy village, on rocky, 300 m,
02.06.2001, H.K 4087, Ir.-Tur. el.
S. vulgaris (Moench) Garcher var. *vulgaris*
Kuyupinar village, on forest, 300 m,
08.03.1995, H.K 4878.
S. alba (Mill.) Krause subsp. *divaricata*
(Reichb.) Walters
Fire observation tower environs, on
roadside, 250 m, 24.05.2001, H.K 5112.
S. dichotoma Ehrh. subsp. *euxina* Rupr.
Baskoy village, under shurb, 300-400 m
02.06.1995, H.K 4066, Eux. el.
S. gallica L.

- Fire observation tower environs, 250 m, 24.05.1996, H.K 5059.
Agrostemma githago L.
 Fire observation tower environs, on fields, 250 m, 24.05.2000, H.K 5087.
 Polygonaceae
Polygonum bistorta L. subsp. *carneum* (Koch) Coode & Cullen
 Incelik stream environs, 100 m, 04.08.2001, H.K 4433, Eux. (mt.) el.
P. cognatum C. F. W. Meissn.
 Incelik stream environs, clearings, 100 m, 30.08.2001, H.K 4474.
P. convolvulus L.
 Kuyupinar village, 300 m, 22.09.2000, H.K 4505.
Rumex crispus L.
 Baskoy village, 350 m, 02.06.2000, H.K 3999.
 Chenopodiaceae
Chenopodium murale L.
 Asarkaya environs, 300 m, 22.09.2001, H.K 4506, Cosmp.
 Amaranthaceae
Amaranthus lividus L.
 Incelik stream environs, 100 m, 04.08.95, H.K 4371.
 Phytolaccaceae
Phytolacca americana L.
 Yunus Emre forest, northern slopes, 150 m, 06.10.2001, H.K 6398.
 Guttiferae (Hypericaceae)
Hypericum androsaemum L.
 Toptepe forest, Bardakci hill, under forest, 350 m, 18.03.2001, H.K 3877, Euro-Sib. el.
H. montbrettii Spach
 Kuyupinar village, on damp soils, 350 m, 25.07.1996, H.K 5944.
H. bithynicum Boiss .
 Baskoy village, on roadside, 300 m, 02.06.1995, H.K 4080, Eux. el.
H. orientale L.
 Baskoy village, on rocky, 300 m, 02.06.2000, H.K 4096.
 Tiliaceae
Tilia rubra DC. subsp. *caucasica* (Rupr.) V. Engl.
 Baskoy village, 400 m, 25.07.2001, H.K 4332, Eux. el.
 Geraniaceae
Geranium purpureum Vill
 Yuceler village, 350 m, 25.07.2001, H.K 5960.
G. sylvaticum L.
 Kuyupinar village, on field side, 450 m 30.03.2001, H.K 4634, Euro-Sib. el.
G. cinereum Cav. subsp. *subcaulescens* (L'Herit ex DC.) Hayek var. *subcaulescens*
 Ceviz stream environs, 300 m, 13.04.1996, H.K 4705.
Erodium acaule (L.) Becherer & Thell.
 Ceviz stream environs, 300 m, 13.04.2000, H.K 4699, Medit. el.
 Linaceae
Linum flavum L. subsp. *flavum*
 Kovankaya hill environs, 350 m, 22.04.2000, H.K 3903, Euro-Sib. el.
L. trigynum L.
 Yuceler village, on roadside, 250 m, 04.07.2001, H.K 4201, Medit. el.
L. bienne Mill.
 Baskoy village, under shurb, 300 m, 02.06.2001, H.K 4071, Medit. el.
L. catharticum L.
 Baskoy village, on roadside, 400 m, 02.06.2001, H.K 4081, Euro-Sib. el.
 Balsaminaceae
Impatiens noli-tangere L.
 Incelik stream side, on damp soils, 100 m, 04.08.2001, H.K 4414, Euro-Sib. el.
 Rutaceae
Dictamnus albus L.
 Kuyupinar village, Bardakci hill, 350 m, 19.05.2001, H.K 5094.
 Aceraceae
Acer cappadocicum Gled. var. *cappadocicum*
 Kovankaya hill environs, 350 m, 22.04.1995, H.K 3913, Hyr.-Eux. el.
A. platanoides L.
 Fire observation tower environs, 250 m, 24.05.2001, H.K 5081, Euro-Sib. el.
 Staphyleaceae
Staphylea pinnata L.
 Incelik stream environs, 100 m, 30.08.1995, H.K 4360.
 Rhamnaceae
Frangula alnus Mill. subsp. *alnus*
 Kovankaya hill environs, 350 m, 22.04.2000, H.K 3909, Euro-Sib. el.
 Aquifoliaceae
Ilex colchica Proch.

- Toptepe forest, 350 m, 18.03.2001, H.K 3857, Eux. el.
Leguminosae (Fabaceae)
Chamaecytisus hirsutus (L.) Link
Kuyupinar village, 350 m, 25.07.2000, H.K 59554.
Genista tinctoria L.
Kuyupinar village, Bardakci hill, 350 m, 19.05.2001, H.K 3963, Euro-Sib. el.
Argyrobium bierbesteinii Ball
Baskoy village, on field side, 300 m, 02.06.2000, H.K 4094.
Astragalus glycyphyllos L. subsp. *glycyphyllos*
Kuyupinar village, 350 m, 10.07.2001, H.K 4222, Euro-Sib. el.
A. lineatus Lam var. *lineatus*
Fire observation tower environs, on roadside, 250 m, 24.05.1995, H.K 5097.
Psoralea bitumiosa L.
Baskoy village, clearings, 350 m, 02.06.2000, H.K 4030, Medit. el.
Vicia cassubica L.
Asarkaya environs, 350-400 m, 13.06.1995, H.K 4131, Euro-Sib. el.
V. crocea (Desf.) B. Fedtsch.
Baskoy village, under forest, 400 m, 02.06.2000, H.K 4113, Hyr.-Eux. el.
V. villosa Roth. subsp. *villosa*
Kuyupinar village, 350 m, 10.07.2001, H.K 4239.
V. sativa L. subsp. *sativa*
Kovankaya hill environs, 350 m, 22.04.2001, H.K 3931, Cosmp.
V. faba L.
Kuyupinar village environs, 350 m, 10.07.2001, H.K 4237.
Lens ervoides (Brign.) Grande
Baskoy village, on field side, 350 m, 02.06.2001, H.K 4103, Medit. el.
Lathyrus vernus (L.) Bernh.
Fire observation tower environs, under forest, 250 m, 24.05.2001, H.K 5096, Euro-Sib. el.
L. laxiflorus (Deflers) O. Kuntze subsp. *laxiflorus*
Fire observation tower environs, 250 m, 24.05.2000, H.K 5113.
Trifolium dubium Sibth.
Yuceler village, 350 m, 19.05.2001, H.K 3968.
T. fragiferum L. var. *fragiferum*
Baskoy village, on forest side, 350 m, 02.06.2000, H.K 4047.
T. pratense L. var. *pratense*
Kuyupinar village, Boz district, 250 m, 04.07.1995, H.K 4169.
T. medium L. var. *medium*
Yuceler village, on road side, 350 m, 02.05.1996, H.K 6100.
T. ochroleucum Huds.
Yuceler village, on roadside, 300 m, 04.07.2000, H.K 4198.
T. arvense L. var. *gracile* (Thuill.) DC.
Yuceler village, on clearings, 250 m, 04.07.1995, H.K 4214.
Medicago lupulina L.
Kuyupinar village, on clearings, 300 m, 22.09.2000, H.K 4398.
M. polymorpha L. var. *polymorpha*
Baskoy village, on clearings, 300 m, 02.06.2000, H.K 4090, Medit. el.
Dorycnium graecum (L.) Ser.
Toptepe forest, 350 m, 18.03.2001, H.K 3845, Eux. el.
D. pentaphyllum Scop. subsp. *herbaceum* (Vill.) Rouy
Kuyupinar village, Bardakci hill, 350 m, 19.05.2000, H.K 3945.
D. pentaphyllum Scop. subsp. *anatolicum* (Boiss.) Gams
Yuceler village, on roadside, 250 m, 04.07.2000, H.K 4160.
Lotus angustissimus L.
Incelik stream environs, 200 m, 04.07.2001, H.K 4189.
L. corniculatus L. var. *corniculatus*
Kuyupinar village, Bardakci hill, 350-400 m, 19.05.1995, H.K 3948, Euro-Sib. el.
L. corniculatus L. var. *tenuifolius* L.
Incelik stream environs, 100 m, 30.08.2001, H.K 4468.
Melilotus officinalis (L.) Desr.
Yuceler village, Beyaz Kuzu district, on clearings, 400 m, 05.07.1995, H.K 4306.
Rosaceae
Aruncus vulgaris Rafarin
Cevzidere stream environs, 400 m, 25.07.1995, H.K 4328.
Laurocerasus officinalis M. J. Roemer
Toptepe forest, 350 m, 18.03.2001, H.K 3858.

- Cerasus avium* (L.) Moench
Kuyupinar village, Kızılkaya district, 350 m, 10.07.2001, H.K 5956.
- Prunus domestica* L.
Yuceler village, on clearings, 400 m, 25.07.1995, H.K 4319.
- Rubus sanctus* Schreber
Kuyupinar village, 200 m, 18.07.2001, H.K 5956.
- R. discolor* Weihe & Nees
Baskoy village, 300 m, 02.06.1995, H.K 4055.
- R. hirtus* Waldst. & Kit.
Baskoy village, forest side, 370 m, 02.06.2000, H.K 4125, Euro-Sib. el.
- R. caucasius* L.
Yuceler village, Boz district, 250 m, 04.07.2001, H.K 4203, Eux. el.
- Potentilla crantzii* (Crantz) G. Beck ex Fritsch var. *crantzii*
Yuceler village, Boz district, 250 m, 04.07.2000, H.K 4210, Euro-Sib. el.
- Fragaria vesca* L.
Kuyupinar village, under forest, 350 m, 30.03.2001, H.K 4639.
- Geum urbanum* L.
Yunus Emre forest, on roadside, 100 m, 18.01.2001, H.K 4562, Euro-Sib. el.
- Sanguisorba minor* Scop. subsp. *minor*
Baskoy village, on forest side, 300 m, 02.06.2000, H.K 4123.
- Rosa canina* L.
Kuyupinar village, Bardakci hill, 300 m, 19.05.1995, H.K 3892, Hyr.-Eux. el.
- Pyracantha coccinea* M. J. Roemer
Incelik stream environs, 250 m, 04.07.2000, H.K 4185.
- Crataegus microphylla* C. Koch
Kuyupinar village, 300 m, 22.09.1995, H.K 4482, Hyr.-Eux. el.
- Pyrus communis* L. subsp. *communis*
Kuyupinar village, Bardakci hill, 350 m, 19.05.1995, H.K 3941.
- P. communis* L. subsp. *caucasica* (Fed.) Browicz
Baskoy village, 400 m, 02.06.1995, H.K 4008.
- Agrimonia eupatoria* L.
Kovankaya hill environs, 250 m, 22.04.2000, H.K 3923.
- Sorbus umbellata* (Desf.) Fritsch var. *umbellata*
Baskoy village, 350-400 m, 02.06.1995, H.K 4035.
- Lythraceae
Lythrum salicaria L.
Yuceler village, on clearings, 400 m, 25.07.1995, H.K 4340, Euro-Sib. el.
- L. hyssopifolia* L.
Fire observation tower environs, on swamp, 250 m, 24.05.2000, H.K 5110.
- Onagraceae
Circaea lutetiana L.
Yuceler village, Boz district, 250 m, 04.07.2000, H.K 4211.
- Epilobium parviflorum* Schreber
Incelik stream environs, 100 m, 04.08.1995, H.K 4552.
- E. tetragonum* L. subsp. *tetragonum*
Incelik stream environs, clearings, 400 m, 25.07.2000, H.K 4331.
- Crassulaceae
Sedum stoloniferum Gmelin
Baskoy village, on moist soil, 350 m, 02.06.2000, H.K 4024, Hyr.-Eux. el.
- S. pallidum* Bieb. var. *bithynicum* (Boiss.) Chamb.
Bardakci hill, 380 m, 19.05.1995, H.K 3976, Eux. el.
- Saxifragaceae
Saxifraga cymbalaria L. var. *cymbalaria*
Incelik stream environs, on damp rocks, 350 m, 04.05.2001, H.K 4801.
- Umbelliferae (Apiaceae)
Sanicula europaea L.
Toptepe forest, clearings, 350 m, 08.04.1995, H.K 3898, Euro-Sib. el.
- Chaerophyllum byzantinum* Boiss.
Kuyupinar village, 350 m, 25.07.1996, H.K 5958, Eux. el.
- C. aureum* L.
Incelik stream environs, on damp soils, 100 m, 04.08.2000, H.K 4412.
- Oenanthe silaifolia* Bieb.
Baskoy village, 400 m, 02.06.2000, H.K 4018.
- Scaligeria napiformis* (Sprengel) Grande
Baskoy village, on roadside, 350 m, 02.01.2001, H.K 6103, E. Medit. el.
- Prangos ferulacea* (L.) Lindley
Incelik stream environs, 100 m, 30.08.2001, H.K 4438.

- Laserpitium hispidum* M. Bieb.
Asarkaya environs, on roadside, 100 m, 30.09.1995, H.K 4540, Euro-Sib. el.
- Daucus carota* L. Grup A
Yuceler village, on forest side, 100 m, 30.08.2000, H.K 4018.
- Araliaceae
Hedera helix L.
Baskoy village, on woods, 350 m, 18.03.2000, H.K 3849.
- H. colchica* (C. Koch) C. Koch
Evliyakaya environs, on rocky, 350 m, 13.06.2000, H.K 4133, Eux. el.
- Cornaceae
Cornus sanguinea L. subsp. *australis*
Baskoy village, 300-400 m, 02.06.1995, H.K 4062, Euro-Sib. el.
- Caprifoliaceae
Sambucus ebulus L.
Incelik stream environs, 200 m, 04.07.2000, H.K 4183, Euro-Sib. el.
- S. nigra* L.
Kovankaya hill, 250 m, 22.04.1995, H.K 3926, Euro-Sib. el.
- Dipsacaceae
Dipsacus laciniatus L.
Incelik stream environs, 400 m, 04.08.1995, H.K 4417.
- D. pilosus* L.
Incelik stream environs, 150 m, 18.07.2000, H.K 4271, Euro-Sib. el.
- Scabiosa argentea* L.
Baskoy village, Beyazkuzu district, on clearings, 200 m, 25.07.2000, H.K 4293.
- Succisia pratensis* Moench
Kuyupinar village, 300 m, 22.09.1995, H.K 4485.
- Compositae (Asteraceae)
Telekia speciosa (Schreber) Baumg.
Ceviz stream environs, 400 m, 25.07.1995, H.K 4327, Euro-Sib. el.
- Inula orientalis* Lam.
Yuceler village, on roadside, 200 m, 04.07.1995, H.K 4193, Eux. (mt.) el.
- I. graveolens* (L.) Desf.
Asarkaya environs, on roadside, 100 m, 30.09.1995, H.K 4539, Medit. el.
- I. germanica* L.
Asarkaya environs, on clearings, 100 m, 30.09.1995, H.K 4550, Euro-Sib. el.
- Pulicaria dysenterica* (L.) Cass.
Ceviz stream environs, on clearings, 400 m, 25.07.2000, H.K 4335.
- Logfia gallica* (L.) Cosson Germ.
Baskoy village, on clearings, 400 m, 25.07.2000, H.K 4317.
- Bellis perennis* L.
Yuceler village, on clearings, 400 m, 08.04.1995, H.K 3901, Euro-Sib. el.
- Doronicum orientale* Hoffm.
Toptepe forest, on humus soil, 350 m, 18.03.1995, H.K 3842.
- Senecio mollis* Willd.
Baskoy village, on damp soils, 400 m, 25.07.2000, H.K 4311.
- S. vulgaris* L.
Incelik stream environs, 100 m, 04.08.2000, H.K 4403, Ir.-Tur. el.
- Tussilago farfara* L.
Toptepe forest, on roadside, 350 m, 18.03.1995, H.K 3861, Euro-Sib. el.
- Petasites albus* (L.) Gaertner
Incelik stream environs, 350 m, 04.05.1996, H.K 4811, Euro-Sib. el.
- Anthemis tinctoria* L. var. *tinctoria*
Kuyupinar village, Boz district, 250 m, 13.06.2000, H.K 4174.
- A. triumfettii* (L.) All.
Evliyakaya environs, on forest side, 350 m, 13.06.2000, H.K 4139.
- Achillea biserrata* M. Bieb.
Baskoy village, under forest, 400 m, 02.06.2000, H.K 4077, Eux. el.
- A. millefolium* L. subsp. *pamocia* (Scheele) Hayek
Kuyupinar village, Boz district, 250 m, 04.07.1995, H.K 4182, Euro-Sib. el.
- Tanacetum poteriifolium* (Ledeb.) Grierson
Kuyupinar village, Bardakci hill, 350 m, 19.05.1995, H.K 3990, Eux. el.
- T. parthenium* (L.) Schultz & Bieb.
Baskoy village, 400 m, 02.06.1995, H.K 4028.
- Cirsium vulgare* (Savi) Ten.
Yuceler village, on clearings, 400 m, 25.07.2000, H.K 4321.
- C. pseudopersonata* Boiss. & Bal. subsp. *pseudopersonata*
Kuyupinar village, Bardakci hill, 400 m, 19.05.2000, H.K 3959, End., Eux. el.
- Centaurea salicifolia* M. Bieb. ex Willd. subsp. *abbreviata* C. Koch

- Incelik stream environs, on clearings, 100 m, 30.08.2000, H.K 4465, Eux. el.
C. iberica Trev. Ex Sprengel
 Kuyupinar village, Boz district, 250 m, 04.07.1995, H.K 4178.
Cichorium intybus L.
 Yuceler village, on roadside, 350 m, 13.06.1995, H.K 4161.
Pilosella officinarum C.H. & F.W. Schultz subsp. *micradenia* (N.P.) Sell & West
 Baskoy village, under shurb, 300 m, 02.06.1995, H.K 4069.
P. auriculoides (A.F.La'ng) Sell & West
 Asarkaya environs, clearings, 380 m, 13.06.2000, H.K 4143.
Prenanthes cacaliifolia (M. Bieb.) Beauverd
 Yuceler village, under forest, 100 m, 04.08.1995, H.K 4406, Eux. el.
Lactuca georgica Grossh.
 Kuyupinar village, 300 m, 22.09.1995, H.K 4484, Hyr.-Eux. el.
Mycelis muralis (L.) Dumort
 Baskoy village, on forest side, 300 m, 02.06.1995, H.K 4086, Euro-Sib. el.
Lapsana communis L. subsp. *intermedia* (M. Bieb.) Hayek
 Evliyakaya environs, on clearings, 320 m, 13.06.1995, H.K 4142.
Taraxacum macrolepium Schischkin
 Asarkaya environs, stream side, 300 m, 30.09.2000, H.K 4527.
T. laxum Hagl.
 Kuyupinar village, Bardakci hill, 400 m, 19.05.2000, H.K 3993.
Crepis paludosa (L.) Moench
 Incelik stream environs, on clearings, 100 m, 04.08.2000, H.K 4411, Euro-Sib. el.
C. macropus Boiss. & Heldr.
 Yuceler village, 250 m, 04.07.2000, H.K 4204, Ir.-Tur. El., End.
C. foetida L. subsp. *commutata* (Spreng.) Babcock
 Baskoy village, 350-400 m, 02.06.2000, H.K 4019.
C. sancta (L.) Babcock
 Incelik stream environs, 100 m, 26.07.2000, H.K 4378.
 Campanulaceae
Campanula rapunculoides L. subsp. *rapunculoides*
 Kuyupinar village, 300 m, 22.09.2000, H.K 4487, Euro-Sib. el.
C. rapunculoides L. subsp. *cordifolia* (C. Koch) Dombolt
 Fire observation tower environs, 100 m, 26.07.1995, H.K 4363.
C. macrochlamys Boiss. & Huet
 Incelik stream environs, 200 m, 04.07.2000, H.K 4188.
C. lingulata Waldst. & Kit .
 Kuyupinar village, 300 m, 22.09.2000, H.K 5179, Euro-Sib. el.
 Ericaceae
Rhododendron luteum Sweet
 Toptepe forest, 350 m, 18.03.2000, H.K 3879, Eux. el.
R. ponticum (L.) Schreber ex DC.
 Toptepe forest, 350 m, 18.03.2000, H.K 3871, Eux. el.
Erica arborea L.
 Toptepe forest, on clearings, 350 m, 18.03.2000, H.K 3856.
Calluna vulgaris (L.) Hull.
 Kuyupinar village, Boz district, 250 m, 04.07.2000, H.K 4166, Euro-Sib. el.
Arbutus unedo L.
 Toptepe forest, on clearings, 350 m, 18.03.2000, H.K 3855.
Vaccinium arctostaphylos L.
 Toptepe forest, under forest, 350-400 m, 08.04.2000, H.K 3881, Eux. el.
 Primulaceae
Primula vulgaris Hudson subsp. *vulgaris*
 Yuceler village, in Coryllus garden, 200 m, 18.02.2000, H.K 4571, Euro-Sib. el.
P. vulgaris subsp. *sibthorpii* (Hoffmans.) W.W. Sm. & Forrest.
 Toptepe forest, on clearings, 350 m, 18.03.2000, H.K 3876, Eux. el.
Cyclamen coum Mill. var. *coum*
 Yunus Emre forest, 100-150 m, 28.01.1996, H.K 4565.
Lysimachia vulgaris L.
 Yuceler village, on roadside, 250 m, 04.07.2000, H.K 4162.
L. verticillaris Sprengel
 Yuceler village, 250 m, 04.07.1995, H.K 4205, Hyr.-Eux. el.
Anagallis arvensis L. var. *arvensis*
 Baskoy village, 300 m, 02.06.1995, H.K 4164.
 Ebenaceae

- Diospyros lotus* L.
Fire observation tower environs, on roadside, 350 m, 19.05.2001, H.K 4041.
Oleaceae
Fraxinus angustifolia Vahl. subsp. *oxycarpa* (Bieb. ex Willd.) Franco
Kovankaya hill, 350 m, 22.04.2000, H.K, Euro-Sib. el.
Ligustrum vulgare L.
Toptepe forest, 350 m, 18.03.1995, H.K 3850, Euro-Sib. el.
Apocynaceae
Vinca herbacea Waldst. & Kit.
Kuyupinar village, 450 m, 30.03.2000, H.K 4655.
Asclepiadaceae
Periploca graeca L. var. *graeca*
Bardakci hill, 350 m, 19.05.1995, H.K 3349, E. Medit. el.
Vincetoxicum scandens Somm. & Lev.
Asarkaya environs, 100 m, 30.09.1995, H.K 4547.
Cionura erecta (L.) Griseb.
Incelik stream, 100 m, 30.08.1995, H.K 4436, E. Medit. el.
Gentianaceae
Blackstonia perfoliata (L.) Hudson subsp. *perfoliata*
Baskoy village, on roadside, 300 m, 02.06.2000, H.K 4085.
Centaureum erythraea Rafn subsp. *erythraea*
Baskoy village, Denizbuku district, on forest side, 250 m, 02.08.2001, H.K 6130, Euro-Sib. el.
Gentiana asclepiadea L.
Kuyupinar village, 300 m, 22.09.1995, H.K 4486, Euro-Sib. el.
Convolvulaceae
Convolvulus arvensis L.
Baskoy village, Denizbuku district, 250 m, 22.05.1996, H.K 5100, Cosmp.
Calystegia silvatica (Kit.) Griseb.
Baskoy village, under forest, 350 m, 02.06.2000, H.K 4049.
Boraginaceae
Lappula barbata (M. Bieb.) Gürke
Kuyupinar village, 350 m, 10.07.2000, H.K 4220, Ir.-Tur. el.
L. squarrosa (Retz) Dumort.
Kuyupinar village, Boz district, 250 m, 04.07.2000, H.K 4170.
Myosotis sylvatica Ehrh. ex Hoffm. subsp. *cyanea* Vestergren
Bardakci hill, under forest, 350 m, 19.05.2000, H.K 3980.
M. lithospermifolia (Willd.) Hornem.
Incelik stream environs, 350 m, 04.05.2001, H.K 4812.
M. sicula Guss.
Kuyupinar village, in *Coryllus* garden, 350 m, 30.03.1996, H.K 4643.
M. sparsiflora Mikan ex Pohl.
Boztepe forest, 250 m, 22.04.1995, H.K 3933, Euro-Sib. el.
M. propinqua Fisch & Mey. ex DC.
Incelik stream environs, 350 m, 04.05.1996, H.K 4800, Eux. el.
Cynoglossum officinale L.
Yuceler village, on clearings, 250 m, 22.04.2000, H.K 3932, Euro-Sib. el.
C. creticum Mill.
Baskoy village, Beyazkuzu district, on roadside, 250 m, 24.05.1996, H.K 5111.
Lithospermum officinale L.
Bardakci hill, 350 m, 19.05.2000, H.K 3971, Euro-Sib. el.
L. purpurocaeruleum L.
Kuyupinar village, 350 m, 10.07.2000, H.K 4247, Euro-Sib. el.
Echium vulgare L.
Baskoy village, clearings, 300 m, 02.06.2000, H.K 4079, Euro-Sib. el.
Trachystemon orientalis (L.) G. Don
Toptepe forest, 350 m, 18.03.2000, H.K 3862, Eux. el.
Brunnera macrophylla (Adams) Johnston
Kuyupinar village, under forest, 450 m, 30.03.2000, H.K 4649, Eux. el.
Solanaceae
Solanum nigrum L. subsp. *schultesii* (Opiz) Wessely
Asarkaya environs, 300 m, 30.09.2000, H.K 4511.
S. luteum Mill.
Baskoy village, on roadside, 350 m, 02.06.2000, H.K 4111.
S. dulcamara L.
Incelik stream environs, on clearings, 150 m, 18.07.1995, H.K 4289, Euro-Sib. el.
Physalis alkekengi L.
Kuyupinar village, Bardakci hill, 350-400

- m, 19.05.2000, H.K 3962.
Datura stramonium L.
 Asarkaya environs, on roadside, 300 m, 30.09.1995, H.K 4529, Cosm.
 Scrophulariaceae
Verbascum ponticum (Boiss.) O. Kuntze
 Yuceler village, southern slopes, 250 m, 04.07.2000, H.K 4200, End., Eux. el.
V. phlomoieds L.
 Incelik stream environs, 200 m, 04.07.2000, H.K 4187, Euro-Sib. el.
V. thapsus L.
 Incelik stream environs, on clearings, 100 m, 04.08.2000, H.K 4392, Euro-Sib. el.
Scrophularia scopolii (Hoppe) Pers. var. *scopolii*
 Baskoy village, Beyazkuzu district, 350 m, 02.05.1996, H.K 6107.
S. libanotica Boiss. subsp. *libanotica* var. *pontica* R. Mill
 Asarkaya environs, 300 m, 30.09.2000, H.K 4509, End., Ir.-Tur. el.
Kickxia elatine (L.) Dumort. subsp. *crinita* (Mabille) Greuter
 Baskoy village, Beyazkuzu district, on roadside, 100 m, 30.08.1995, H.K 4443, Medit. el.
Digitalis ferruginea L. subsp. *ferruginea*
 Kuyupinar village, 350 m, 10.07.2000, H.K 4228, Euro-Sib. el.
Veronica serpyllifolia L.
 Baskoy village, on moist soil, 350 m, 02.06.1995, H.K 4022.
V. arvensis L.
 Incelik stream environs, 350 m, 04.05.1996, H.K 4812, Euro-Sib. el.
V. biloba Schreber
 Baskoy village, on roadside, 300 m, 02.06.1995, H.K 4102, Ir.-Tur. el.
V. persica Poir.
 Yunus Emre forest, on clearings, 150 m, 28.01.2001, H.K 4566.
V. anagallis-aquatica L.
 Asarkaya environs, on stream side, 300 m, 30.09.2000, H.K 4520, Cosm.
V. chamaedrys L.
 Baskoy village, on forest, 350-400 m, 02.06.1995, H.K 4006, Euro-Sib. el.
V. magna M. A. Fischer
 Incelik stream environs, 350 m, 04.05.1996, H.K 4802, Eux. el.
V. peduncularis Bieb.
 Incelik stream environs, 350 m, 04.05.1996, H.K 4808, Eux. el.
Euphrasia pectinata Ten.
 Kuyupinar village, Boz district, 250 m, 04.07.2000, H.K 4164, Euro-Sib. el.
Parentucellia viscosa (L.) Caruel
 Kuyupinar village, on clearings, 300 m, 22.09.2000, H.K 4775, Medit. el.
P. latifolia (L.) Caruel. subsp. *latifolia*
 Kovankaya hill environs, 350 m, 29.04.2000, H.K 3917, Medit. el.
Rhynchosorys elephas (L.) Griseb. subsp. *elephas*
 Incelik stream environs, 350 m, 04.05.1996, H.K 4787, Euro-Sib. el.
 Orobanchaceae
Orobanche minor Sm.
 Baskoy village, on moist soil, 350 m, 02.06.1995, H.K 4026.
O. lutea Baumg.
 Baskoy village, under shrub, 150 m, 02.06.2000, H.K 4121.
 Verbenaceae
Verbena officinalis L.
 Yuceler village, Boz district, 250 m, 04.07.2000, H.K 4212.
 Labiatae (Lamiaceae)
Ajuga reptans L.
 Toptepe forest, on clearings, 400 m, 08.04.1995, H.K 3896, Euro-Sib. el.
Teucrium chamaedrys L. subsp. *chamaedrys*
 Yuceler village, Boz district, 250 m, 04.07.2000, H.K 4213, Eux. el.
Lamium purpureum L. var. *purpureum*
 Yunus Emre forest, 150m, 28.01.1996, H.K 4555, Euro-Sib. el.
Wiedemannia orientalis Fisch. & Mey.
 Kuyupinar village, in *Coryllus* garden, 350 m, 30.03.1996, H.K 4646, End; Ir.-Tur. el.
Galeopsis ladanum L.
 Incelik stream environs, on moist soil, 100 m, 04.08.1995, H.K 4240, Euro-Sib. el.
Stachys germanica L. subsp. *bithynica* (Boiss.) Bhattacharjee
 Yuceler village, southern slopes, 200 m, 04.07.2000, H.K 4195, Euro-Sib. el.
S. sylvatica L.
 Kuyupinar village, Boz district, 250 m, 04.07.2000, H.K 4180, Euro-Sib. el.

- S. officinalis* (L.) Trevisan subsp. *balcanica* (P. W. Ball) Bhattacharjee
Incelik stream environs, 150 m, 18.07.2000, H.K 4267.
- Nepeta fisca* C.A.Meyer
Kuyupinar village environs, 300 m, 22.09.1995, H.K 4502, Ir.-Tur. el.
- N. italica* L.
Asarkaya environs, on clearings, 100 m, 30.09.2000, H.K 4548.
- Glechoma hederacea* L.
Incelik stream environs, 300 m, 30.09.1995, H.K 4524, Euro-Sib. el.
- Prunella vulgaris* L.
Baskoy village, 350m, 02.06.1995, H.K 4033, Euro-Sib. el.
- Origanum vulgare* L. subsp. *viride* (Boiss.) Hayek
Kuyupinar village, on roadside, 300 m, 22.09.2000, H.K 4480.
- Clinopodium vulgare* L. subsp. *vulgare*
Kuyupinar village, 350 m, 10.07.2000, H.K 4219.
- C. umbrosum* (M. Bieb.) C. Koch
Kuyupinar village environs, 350 m, 10.07.1995, H.K 4224, Hyr.-Eux. el.
- Mentha pulegium* L.
Kuyupinar village, Boz district, 350 m, 13.06.1995, H.K 4175.
- M. aquatica* L.
Incelik stream environs, 100 m, 04.08.1995, H.K 4432.
- M. longifolia* (L.) Hudson subsp. *longifolia*
Ceviz stream environs, on clearings, 400 m, 25.07.1995, H.K 4336, Eux. el.
- M. longifolia* (L.) Hudson subsp. *typhoides* (Briq.) Harley var. *typhoides*
Yuceler village, on roadside, 200 m, 04.07.1995, H.K 4197.
- Lycopus europaeus* L.
Incelik stream environs, on moist soil, 100m, 04.08.1995, H.K 4415, Euro-Sib. el.
- Salvia forskahlei* L.
Incelik stream environs, 250 m, 04.07.2000, H.K 4191, Eux. el.
- S. glutinosa* L.
Yunus Emre forest, northern slopes, 150 m, 06.10.2000, H.K 6383, Eux. el.
- S. verbenaca* L.
Kuyupinar village, 350 m, 10.07.2000, H.K 4225.
- Plantaginaceae
Plantago major L. subsp. *major*
Baskoy village, on roadside, 350 m, 02.06.1995, H.K 4126.
- P. bellardii* All.
Baskoy village, 350-400 m, 02.06.1995, H.K 4013, E. Medit. el.
- Thymelaceae
Daphne pontica L.
Toptepe forest, 300 m, 18.03.1995, H.K 4507, Eux. el.
- Aristolochiaceae
Aristolochia pontica Lam.
Yuceler village, stream side, 350 m, 04.05.2001, H.K 4789, Eux. el.
- Euphorbiaceae
Mercurialis annua L.
Asarkaya environs, on clearings, 300 m, 30.09.1995, H.K 4517.
- Euphorbia stricta* L.
Askarkaya environs, on roadside, 300 m, 30.09.1995, H.K 4530, Euro-Sib. el.
- E. amygdaloides* L. var. *amygdaloides*
Toptepe forest, on humus soil, 350 m, 18.03.2000, H.K3848 Euro-Sib. el.
- E. lathyris* L.
Kuyupinar village, in *Coryllus* garden, 450m, 30.03.2000, H.K 4647.
- Urticaceae
Urtica pilulifera L.
Kuyupinar village, 300 m, 22.09.1995, H.K 4501, Medit. el.
- U. dioica* L.
Kuyupinar village, Boz district, 250 m, 04.07.2000, H.K 4181, Euro-Sib. el.
- Parietaria lusitanica* L.
Baskoy village, on roadside, 300-400 m, 02.06.1995, H.K 4101, Medit. el.
- Moraceae
Ficus carica L. subsp. *carica*
Fire observation tower environs, 250 m, 24.05.1996, H.K 5066.
- Ulmaceae
Ulmus glabra Hudson
Fire observation tower environs, 400 m, 25.07.2000, H.K 4342, Euro-Sib. el.
- U. minor* Mill. subsp. *minor*
Yunus Emre forest, northern slopes, 150 m, 06.10.1996, H.K 6385.
- Fagaceae
Fagus orientalis Lipsky

- Kuyupinar village, Bardakci hill, 350 m, 19.05.2001, H.K, 3946, Euro-Sib. el.
Castanea sativa Mill.
Kuyupinar village, Bardakci hill, 350 m, 19.05.2001, H.K 3947, Euro-Sib. el.
Quercus hartwissiana Steven
Kuyupinar village, Bardakci hill, 350 m, 19.05.2001, H.K 3944.
- Coryllaceae
Carpinus betulus L.
Baskoy village, 400 m, 02.06.2000, H.K 4056, Euro-Sib. el.
Coryllus colurna L.
Kuyupinar village, Bardakci hill, 400 m, 19.05.2000, H.K 3955, Euro-Sib. el.
C. maxima Mill.
Baskoy village, Denizbuku district, 350 m, 02.08.1996, H.K 6127, Euro-Sib. el.
- Betulaceae
Alnus glutinosa (L.) Gaertner subsp. *barbata* (C. A. Meyer) Yalt.
Incelik stream environs, 150 m, 18.07.2000, H.K 4258, Euro-Sib. el.
- Salicaceae
Salix alba L.
Toptepe forest, 350 m, 18.03.1995, H.K 3844, Euro-Sib. el.
S. armenorossica A. Skv.
Baskoy village, Denizbuku district, 400 m, 02.06.2000, H.K 4012, Eux. el.
Populus tremula L.
Kovankaya hill, 350 m, 22.04.2000, H.K 3907, Euro-Sib. el.
- Rubiaceae
Galium rotundifolium L.
Baskoy environs, Denizbuku district, 350 m, 19.05.1995, H.K 4003, Euro-Sib. el.
G. verum L. subsp. *verum*
Incelik stream environs, 350 m, 04.05.2000, H.K 4786, Euro-Sib. el.
G. paschale Forsskål
Asarkaya environs, under forest, 350-400 m, 13.06.1995, H.K 4135.
Asperula arvensis L.
Incelik stream environs, 100 m, 04.08.2000, H.K 4396, Medit. el.
- MONOCOTYLEDONEAE
Alismataceae
Alisma plantago-aquatica L.
Incelik stream environs, on swamp, 100 m, 30.08.2000, H.K 4473, Euro-Sib. el.
- Araceae
Arum italicum Mill.
Asarkaya environs, 300 m, 30.09.1995, H.K 4519.
- Liliaceae
Smilax excelsa L.
Ceviz stream environs, under forest, 150 m, 19.05.1996, H.K 4333, Eux. el.
Ruscus aculeatus L. var. *angustifolius* Boiss.
Asarkaya environs, Kayalarsirtı district, 250 m, 21.7.1995, H.K 6408.
R. hypoglossum L.
Toptepe forest, under forest, 350 m, 18.03.2000, H.K 3843, Euro-Sib. el.
Allium decipiens Fischer ex Schultes & Schultes fil.
Kuyupinar village, 350 m, 25.07.1996, H.K 5942.
Ornithogalum orthophyllum Ten.
Kuyupinar village, in *Coryllus* garden, 350 m, 30.03.2001, H.K 4650.
Muscari neglectum Guss.
Toptepe forest, on clearings, 350-400 m, 08.04.2000, H.K 3893.
M. armeniacum Leichtlin ex Baker
Kuyupinar village, on field, 250 m, 30.03.2001, H.K 4630.
- Orchidaceae
Neottia nidus-avis (L.) L. C. Richards
Kuyupinar village, 350 m, 19.05.2000, H.K 3975, Euro-Sib. el.
Epipactis helleborine (L.) Crantz
Baskoy village, under forest, 400 m, 18.07.1995, H.K 4303.
Serapias vomeracea (Burm. fil.) Briq. subsp. *laxiflora* (Sòo) Gözl & Reinhard
Asarkaya environs, Kayalarsirtı district, 350 m, 02.06.2000, H.K 4115, E. Medit. el.
Spiranthes spiralis (L.) Chevall.
Kovankaya hill, on roadside, 100 m, 30.08.2000, H.K 4470, Medit. el.
Platanthera bifolia (L.) L.C.M. Richards
Bardakci hill, 300 m, 19.05.2000, H.K 3943, Euro-Sib. el.
Ophrys apifera Hudson.
Yunus Emre forest, on road side, 250 m, 24.05.1996, H.K 5065.
- Dioscoriaceae
Tamus communis L. subsp. *communis*
Fire observation tower environs, 250 m,

- 22.04.2000, H.K 5094.
Juncaceae
Juncus articulatus L.
Kuyupinar village, Bardakci hill, 350 m,
19.05.2000, H.K 3951, Euro-Sib. el.
Cyperaceae
Carex pendula Hudson
Asarkaya environs, Kayalarsirtı district,
300m, 08.04.1995, H.K 3899, Euro-Sib. el.
Gramineae (Poaceae)
Brachypodium sylvaticum (Hudson) P. Beauv.
Asarkaya environs, on clearings, 350 m,
13.06.2000, H.K 4154, Euro-Sib. el.
B. pinnatum (L.) P. Beauv.
Baskoy village, under forest, 350 m,
02.06.2000, H.K 4112, Euro-Sib. el.
Secale montanum Guss.
Baskoy village, Denizbuku district, 250 m,
02.08.2000, H.K 6118.
Hordeum murinum L. subsp. *murinum*
Fire observation tower environs, 250 m,
24.05.1996, H.K 5085.
H. violaceum Boiss. & Huet
Fire observation tower environs, on field
side, 250 m, 25.04.2001 H.K 5075, Ir.-Tur.
el.
Bromus japonicus Thunb. subsp. *japonicus*
Baskoy village, on field side, 300 m,
02.06.2000, H.K 4097.
B. diandrus Roth.
Yuceler village, clearings, 350 m,
02.06.2000, H.K 4107.
B. ramosus Hudson
Incelik stream environs, on roadside, 100
m, 04.08.1995, H.K 4419.
B. variegatus Bieb. subsp. *variegatus*
Kuyupinar village, 350m, 25.07.2001, H.K
5951, Ir.-Tur. el.
B. erectus Hudson
Incelik stream environs, on roadside, 100
m, 04.08.2000, H.K 4404.
Aira elegantissima Schur. subsp.
elegantissima
Kuyupinar village, Bardakci hill, 400 m,
19.05.1995, H.K 3979, Medit. el.
Holcus lanatus L.
Incelik stream environs, 100 m,
04.08.1995, H.K 4375, Euro-Sib. el.
Calamagrostis arundinacea (L.) Roth
Yuceler village, on roadside, 200 m,
04.07.1995, H.K 4192, Euro-Sib. el.
Festuca drymeja Mert. & C. Koch
Incelik stream environs, 150 m,
18.07.1995, H.K 4055, Euro-Sib. el.
Lolium perenne L.
Baskoy village, Denizbuku district, 350 m,
02.08.1996, H.K 6136, Euro-Sib. el.
L. rigidum Gaudin var. *rigidum*
Fire observation tower environs, 250 m,
04.05.2001, H.K 5083.
Vulpia bromoides (L.) S. F. Gray
Kuyupinar village, Bardakci hill 350 m,
19.05.1995, H.K 4007, Euro-Sib. el.
V. muralis (Kunth) Nees
Kuyupinar village, Bardakci hill, 350 m,
19.05.2000, H.K 3984, Medit. el.
Catapodium rigidum (L.) C. E. Hubbord ex
Dony subsp. *rigidum* var. *majus* (C. Precl.)
Laintz
Fire observation tower environs, 250 m,
24.05.2001, H.K 5076.
Poa pratensis L.
Incelik stream environs, 350 m,
04.05.2001, H.K 4795.
P. angustifolia L.
Asarkaya environs, on clearings, 400 m,
13.06.1995, H.K 4150.
Eremopoa sangarica (Schrenk.) Roshev.
Baskoy village, on roadside, 400 m,
02.06.1995, H.K 4053, Ir.-Tur. el.
Puccinellia festuciformis (Host) Parl.
Kuyupinar village, Boz district, 250 m,
04.07.1995, H.K 4177.
Cynosurus echinatus L.
Yuceler village, southern slopes, 200 m,
04.07.2000, H.K 4196, Medit. el.
Briza media L.
Fire observation tower environs, 250 m,
24.05.2001, H.K 5084.
Danthonia decumbens (L.) DC.
Baskoy village, clearings, 300 m,
02.06.1995, H.K 4070.
Cynodon dactylon (L.) Pers. var. *villosus*
Regel
Incelik stream environs, 150 m,
18.07.1995, H.K 4287.
Eragrostis collina Trin.
Yuceler village, southern slopes, 200 m,
04.07.1995, H.K 4194.
Oplismenus undulatifolius (Ard.) P. Beauv.
Asarkaya environs, on damp soils, 100 m,

30.09.2000, H.K 4543.

Digitaria sanguinalis (L.) Scop.

Yunus Emre forest, northern slopes, 150 m, 06.10.1996, H.K 6405.

Paspalum thunbergii Kunth ex Steudel

İncelik stream environs, on roadside, 100 m, 04.08.1995, H.K 4405.

P. dilatatum Poir.

Yunus Emre forest, northern slopes, 150 m, 06.10.1996, H.K 6402.

DISCUSSION

The study area belongs to the Euxine Province of the Euro-Siberian phytogeographical region and, the A6 square according to the grid system (Davis 1965-1985). The vascular flora contains 355 species and infraspecific taxa belonging to 78 families and 230 genus with 287 of these belonging to a species category, while 58 taxa are subspecies and 10 taxa are a variety. There are 9 and 11 taxa belonging to Pteridophyta and Gymnospermae, respectively. The remaining taxa belong to Dicotyledoneae and Monocotyledoneae.

Phytogeographical distribution of vascular plant species in the study area is shown in Table 2.

The taxa of the study area, was categorised according to the phytogeographic regions, and is listed as follows: 26.19% Euro-Siberian, 10.42% Euxinien, 2.53% Hyrcano-Euxinien, 6.76% Mediterranean and 3.09% Irano-Turanian. Additionally 49.03% of the taxa are pluriregionals and 1.97% are cosmopolitan. The flora of the study area mainly consists of the Euro-Siberian elements. The ratio of Mediterranean and Irano-Turanian phytogeographical elements are comparatively low.

Likewise the study area is included in the Euxine province of the Euro-Siberian floristic region (Davis 1965-1985). Moreover, according to the climatic data the study area is under the effect of the Oceanic climate (Akman 1990). In addition to this, according to Emberger's aridity index ($S = 9.4$) and ombrothermic diagram based on the Walter (1956) method no dry period was observed in the study area. According to Erinc (1965)'s

precipitation effectiveness formula the study area is under the influence of a very humid climate (Table 1, Fig. 2). These findings are compatible with the phytogeographical distribution of the species in the study area and current literature.

The comparison of the phytogeographical distribution of the species in the study area and neighbouring areas (Kutbay et al. 1995, Karakaya and Kilinc 1996, Korkmaz and Engin 2001, Ozen and Kilinc 2002, Ozbucak et al. 2006) are shown in Table 2. Phytogeographical distribution of the species in the study area is very similar to Ozbucak et al. (2006)'s study due to the ecological similarity between the two regions.

The distribution of species and infraspecific taxa according to families in the study area and neighbouring areas is shown in Table 3.

Asteraceae (35), Poaceae (32) and Fabaceae (29) are the first three families which include the most taxa (Table 3). Lamiaceae (23), Rosaceae (19), Scrophulariaceae (19) and other families followed these families and this distribution is agrees with the Flora of Turkey (Davis 1965-1985, Davis et al. 1988, Guner et al. 2000)

According to the ranking of families which include the highest number of species number the results were similar to Karakaya (1996)'s study which has similar ecological properties with the current study. The families which has the highest number of genera were as follows; Asteraceae (22), Poaceae (21), Lamiaceae, Rosaceae and Fabaceae (13), Scrophulariaceae (8), Boraginaceae and Caryophyllaceae (7). These results were also agreed with the Flora of Turkey (Davis 1965-1985, Davis et al. 1988, Guner et al. 2000).

There were 5 endemic species found in the study area and the endemism rate was 1.41%. From the endemic species *Crepis macropus* (Asteraceae) LR (Ic), *Scrophularia libanotica* subsp. *libanotica* var. *pontica* (Scrophulariaceae) LR (Ic) and *Wiedemannia orientalis* (Lamiaceae) belonged to the LR (Ic) category and Irano-Turanian phytogeographical region and *Cirsium pseudopersonata* subsp. *pseudopersonata* (Asteraceae) belonged to the LR (Ic) category, while *Verbascum ponticum* (Scrophulariaceae)

Table 2. A comparative representation of the phytogeographical distribution of species and endemism rates (%) in the study area with some studies performed on nearby environs.

Study	Species number	Euro-Sib.	Eux.	Hyr.-Eux.	Ir.-Tur.	Medit.	Cosm.	Pluriregional	Endemism (%)
Present study	355	26.19	10.42	2.53	3.09	6.76	1.97	48.70	1.40
Ozbucak et al. (2006)	101	42.58	-	-	0.99	3.96	-	52.48	4.95
Karakaya (1996)	323	26.62	16.40	3.72	4.03	0.93	1.86	48.30	9.6
Korkmaz (2001)	1016	12.40	3.83	0.68	11.31	9.74	0.98	50.29	10.43
Kutbay (1995)	611	17.02	7.52	0.65	2.29	9.65	0.81	55.00	3.43
Ozen (2002)	306	28.43	-	-	4.9	12.4	-	55.23	4.29

belonged to the LR (cd) category and Euxine phytogeographical region. The main reason of low endemism rate in the study area is the study area is included in the Euxine province of the Euro-Siberian phytogeographical region

Table 3. A comparative representation of the rank of the major family by species number and rate (%) in the study area with some studies performed on nearby environs.

Family	Present Study	Ozbucak et al. (2006)	Karakaya (1996)	Korkmaz (2001)	Kutbay (1995)	Ozen (2002)
Compositae	35/9.85	13/12.87	37/11.46	108/10.62	71/11.62	20/6.53
Gramineae	32/9.01	-	36/11.15	67/6.59	42/6.82	15/4.90
Leguminosae	29/8.16	8/7.92	23/6.81	133/13.09	62/10.14	33/10.78
Labiatae	23/6.47	12/11.88	17/5.26	63/6.20	41/6.86	18/5.88
Scrophulariaceae	19/5.35	4/3.96	19/5.88	37/3.64	29/4.41	11/3.59
Rosaceae	19/5.35	7/6.93	25/7.74	39/3.84	24/4.09	21/6.86
Boraginaceae	14/3.94	-	-	33/3.25	19/3.10	9/2.90
Caryophyllaceae	11/3.09	-	16/4.95	43/4.23	16/2.61	8/2.61
Cruciferae	8/2.24	-	10/3.10	60/5.90	22/3.60	12/3.92

(Ekim 1993). In addition to this, the study area is located in the low montane part of the Black Sea Region which has the lowest endemism ratio.

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Boztepe (Unye-Ordu) Orman Koruma Alani'nin Floristik Ozellikleri Uzerine Bir Arastirma

Ozet

Bu calismada Orta Karadeniz Bolgesinde bulunan Boztepe (Unye-Ordu) Orman Koruma Alani'nin vaskuler florasi 1995-1996 ve 2000-2001 yillarinda arastirilmistir. Iki vejetasyon donemi boyunca ve haftalik periyotlarla yapilan ornek toplama calismalarindan sonra yapilan floristik analizler sonucu, 78 familya ve 230 cinse dahil 355 tur ve turalti takson tanimlanmistir. Turlerin fitocografik bolgelere gore dagilimi soyledir: Avrupa-Sibirya %38,62, Akdeniz %5,30 ve Iran-Turan %3,09 olup %48,70'i cok bolgelidir. Endemizm oranı %1,41'dir.

Anahtar Kelimeler: Flora, Turkiye, Unye.