

1-1-2004

## Flora of the Natural Conservation Area in Adana-Yumurtalık Lagoon (Turkey)

HAŞİM ALTINÖZLÜ

Follow this and additional works at: <https://journals.tubitak.gov.tr/botany>



Part of the [Botany Commons](#)

---

### Recommended Citation

ALTINÖZLÜ, HAŞİM (2004) "Flora of the Natural Conservation Area in Adana-Yumurtalık Lagoon (Turkey)," *Turkish Journal of Botany*. Vol. 28: No. 5, Article 4. Available at: <https://journals.tubitak.gov.tr/botany/vol28/iss5/4>

This Article is brought to you for free and open access by TÜBİTAK Academic Journals. It has been accepted for inclusion in Turkish Journal of Botany by an authorized editor of TÜBİTAK Academic Journals. For more information, please contact [academic.publications@tubitak.gov.tr](mailto:academic.publications@tubitak.gov.tr).

# Flora of the Natural Conservation Area in Adana-Yumurtalık Lagoon (Turkey)

Haşim ALTINÖZLÜ

Hacettepe University, Science Faculty, Biology Department, Beytepe Campus, 06532, Ankara - TURKEY

Received: 02.12.2002

Accepted: 05.05.2004

**Abstract:** This study includes the natural and cultivated plants in the Natural Conservation Area in Yumurtalık Lagoon. In an evaluation of 450 herbarium specimens collected from this area in 1997 and 1998, a total of 186 genera and 234 species belonging to 65 families were identified: 223 of the 234 species are natural and 11 are cultivated. Three of the 234 taxa are endemics (1.3%), 26 taxa (11.6%) are Mediterranean elements, 13 taxa (5.8%) are East Mediterranean elements, 6 taxa (2.6%) are Irano-Turanian elements, 5 taxa (2.2%) are Euro-Siberian elements, and 1 taxon (0.4%) is a Hyrcano-Euxine element. The other 172 taxa (77.1%) are either cosmopolitan or in the category of undetermined phytogeographical regions.

**Key Words:** Flora, Adana, Karataş, Yumurtalık Lagoon.

## Adana, Yumurtalık Lagünü Tabiatı Koruma Alanı Florası (Türkiye)

**Özet:** Bu araştırma, Yumurtalık Lagünü Tabiatı Koruma Alanının doğal ve kültür bitkilerini içerir. 1997-1998 yılları arasında toplanan 450 bitki örneğinin değerlendirilmesi sonucunda 65 familyaya ait 186 cins, 234 tür tespit edilmiştir. Tespit edilen 234 türün 223'ü doğal, 11'i kültür bitkisidir. Endemizm oranı çok düşük olup, 3 tür (%1.3) endemiktir. Tespit edilen türlerin 26'sı (%11.6) Akdeniz, 13'ü (%5.8) Doğu Akdeniz, 6'sı (%2.6) İran-Turan, 5'i (%2.2) Avrupa-Sibirya, 1'i (%0.4) Hyrcano-Euxine, 172 (%77.1) tür ise kozmopolit veya fitocoğrafik bölgesi belirsizler kategorisinde yer almaktadır.

**Anahtar Sözcükler:** Flora, Adana, Karataş, Yumurtalık Lagünü.

## Introduction

The Natural Conservation Area in Yumurtalık Lagoon was chosen because it has not been investigated floristically before.

The Natural Conservation Area is located within the borders of the Eastern Mediterranean Region, Adana and the Yumurtalık district. It is about 16,430 ha in size, and is located at 36° 37'-36° 45" 17' N, 35° 33" 11'-35° 44" 20' E.

The Natural Conservation Area is located among the Taurus and Amanos mountain chains, which lie in a north-south direction on the Çukurova Delta, which is one of the largest alluvial areas in Turkey, located on the Ceyhan River, from which it runs into the Mediterranean Sea.

The border of the Natural Conservation Area follows the eastern bank of the river from the point where the Ceyhan River flows into the Mediterranean to Incebucağ.

It runs from there to the sea, consisting of Halep pine (*Pinus halepensis* Mill.) groves following the sand dune border of the delta northwards. The Mediterranean is to the south of this area.

## Geology

For geological information concerning the Natural Conservation Area of Yumurtalık Lagoon, a report titled "Ceyhan-Karataş-Yumurtalık-Osmaniye-Haruniye-Kadirli dolayının jeolojik raporu (1991)" and the 1/25,000 maps included in it were used. Geological formations in the study area, from oldest to youngest age are Karataş, sand dune, and sandy shores.

The Karataş formation is flysch, an ordering of sandstone, sandy limestone, marl, limestone and conglomerate.

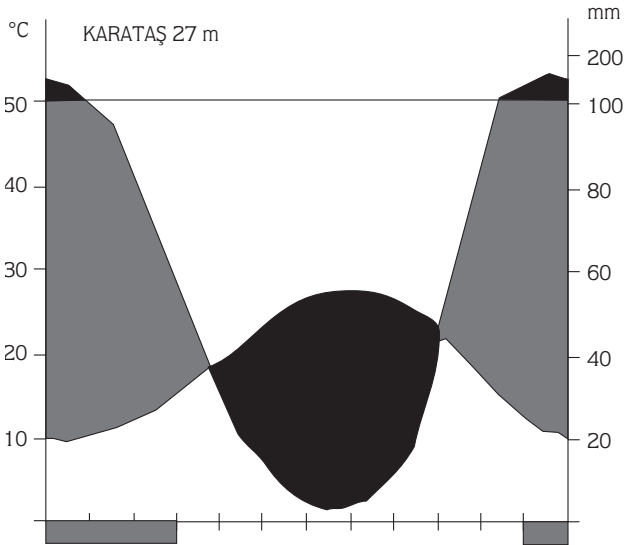


Figure 1. Climate patterns in Karataş.

The Kızıltepe formation has a structured formation with conglomerate and contains limestone in the lower parts, with thick lengths of sandy stone and marl in the upper parts.

The alluvion consists of clay, sand, gravel and occasionally marshy areas and is formed with the accumulation of materials poured into the delta by the Ceyhan River. Sand dunes and shores are the youngest in age, and their boundaries are frequently changed by the wind. Sand dunes, the shore and the shore line start from the coast and extend to the interior parts of the area, and the area as a whole is called the sandy shore. It is 0 to 250 m in width and 0 to 2 m in height. The sand accumulations in the interior parts of the area are called dunes.

### Climate

The typical Mediterranean climate is dominant in the region outside the Taurus Mountains in Adana province. The typical climate of the Mediterranean region is characterised by hot and dry summers and cool and rainy winters. The temperature decreases gradually and the rain increases towards the upper parts of the mountains. This characteristic is observed clearly at 700-800 m. The temperature on the plain rarely falls below 0 °C. The annual average precipitation rate is 769.9 mm. The climatic data for this area are based on observations made by the General Directorate of Meteorology in 1991

between 1964 and 1990 for the Yumurtalık Meteorology Station. The average maximum and minimum temperatures were 27.36 °C and 10 °C, in August and May, respectively (General Directorate of Meteorology, 1991).

### Materials and methods

A total of 450 plant specimens were collected in 1997 and 1998. The identification of the collected plants was carried out with the aid of fundamental reference works such as the Flora of Turkey and the East Aegean Islands (Davis, 1965-1988; Davis et al., 1988; Güner et al., 2000), Flora Palaestina (Zohary, 1966-1986) and Flora Europaea (Tutin et al., 1968), as well as of the Hacettepe University Herbarium (HUB) and the Gazi University Herbarium. Undefined plant species were identified by taxonomic specialists. The IUCN categories of the species collected from this area were evaluated in consideration of recent changes in Turkey's Rare and Endemic Plants Under Risk (IUCN, 2001) and IUCN Red List Categories. The 232 species collected are now stored in the Hacettepe University Herbarium (HUB) and Gazi University Herbarium (GAZI). Families, genera and species are arranged alphabetically within the 4 major taxonomic units, *Gymnospermae*, *Dicotyledones* and *Monocotyledones*. Families in the floristic list are given in the evolutionary order of the Flora of Turkey, and genera and species are listed alphabetically. Family name, species name and the author(s) who named the relevant species, the name of the district, plant habitat, altitude, collector number given by H. Altınözlü, IUCN Red List Categories, endemism, the phytogeographic element and explanatory notes on the species (if any) are also given in the list.

The vegetation map in Figure 3 is based mainly on our own observation and additionally on a rough zone delimitation by the local Forest Service.

### The following abbreviations are used in the text:

E:	East
Euro-Sib.:	Euro-Siberian
Ir.-Tur.:	Irano-Turanian
Medit.:	Mediterranean
m:	metre
ssp.:	subspecies

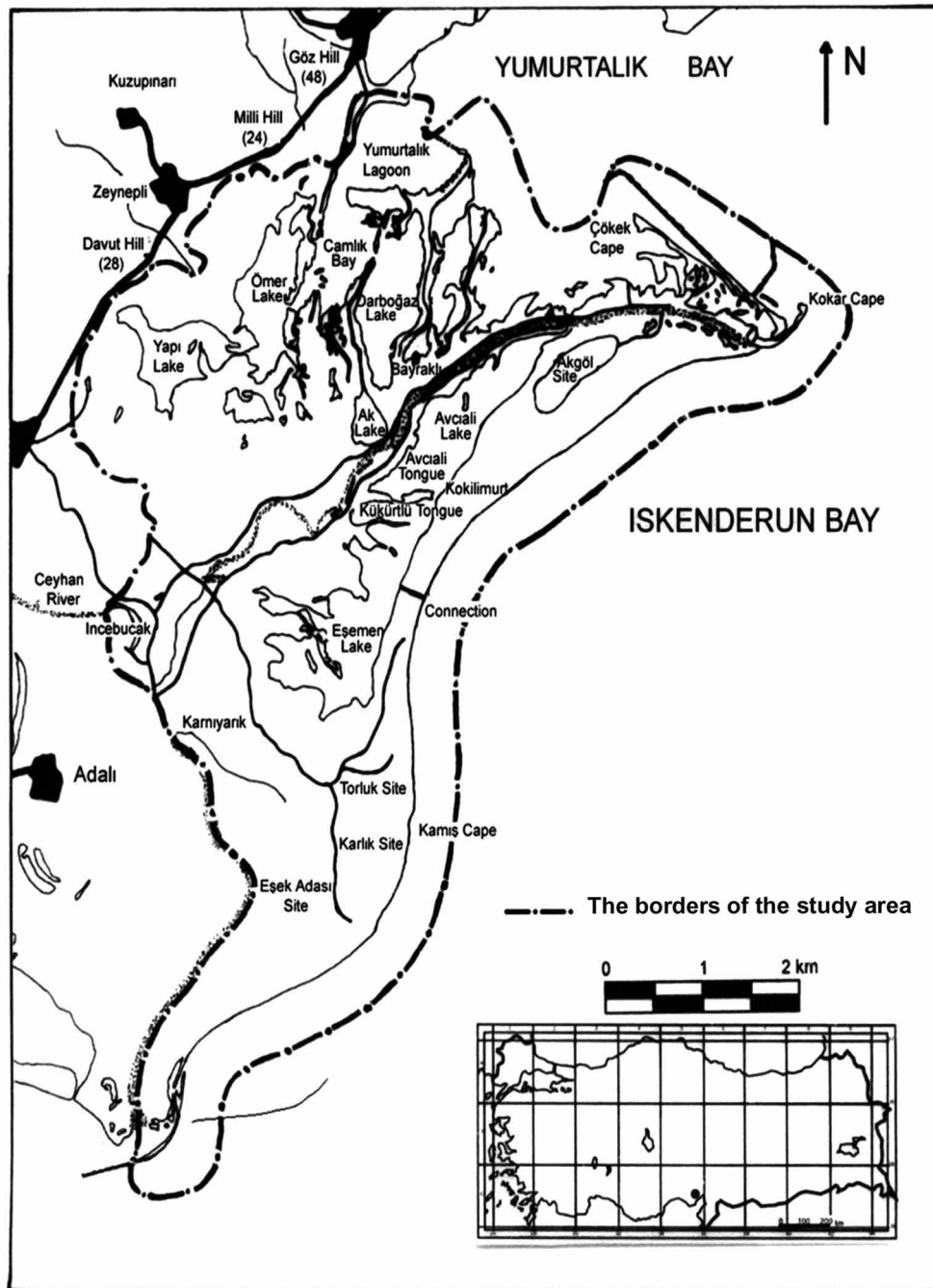


Figure 2. Map of the research area.

var.: variety  
 LC: Least concern  
 NT: Near threatened

VU: Vulnerable  
 EN: Endangered  
 CR: Critically endangered

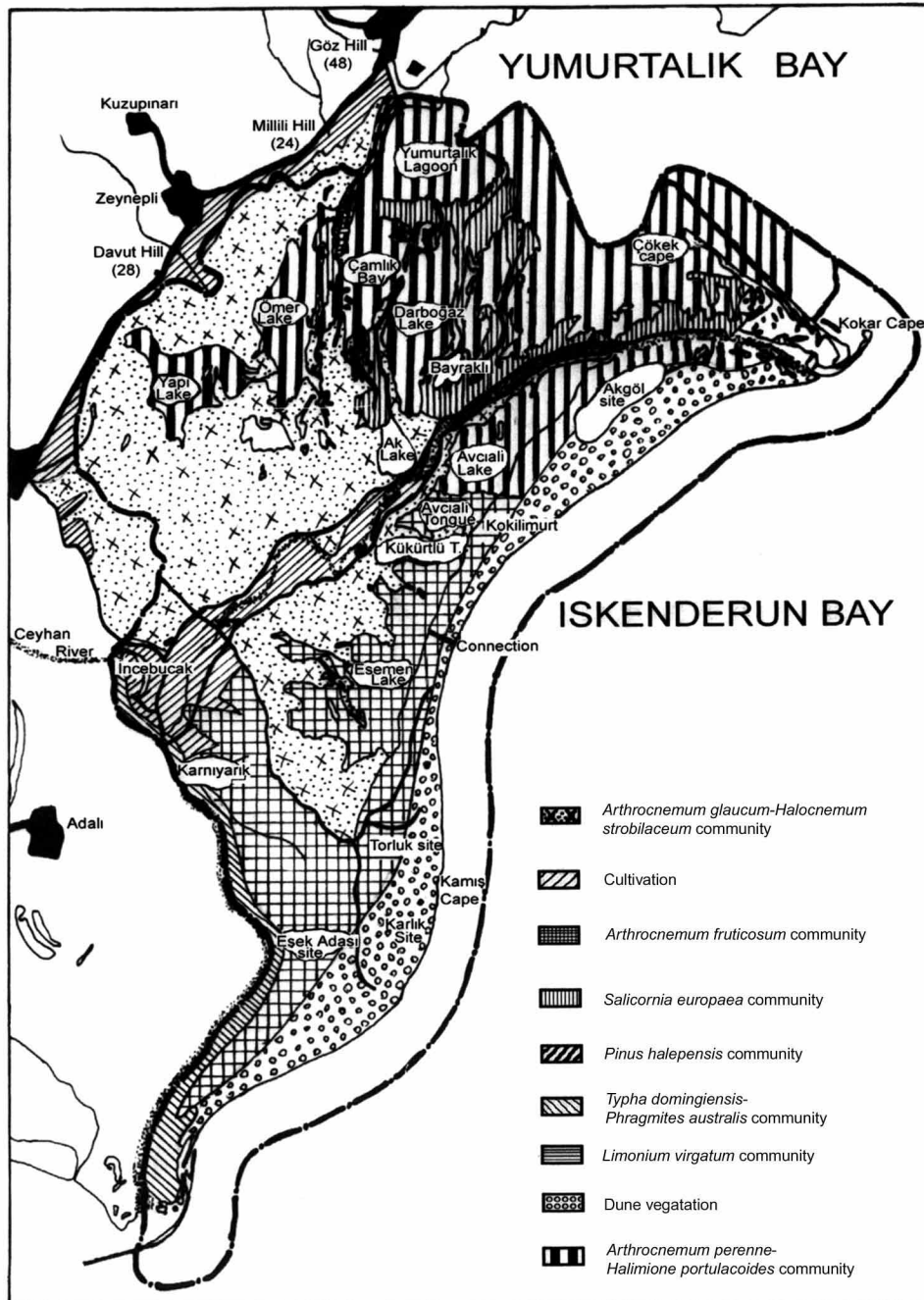


Figure 3. Vegetation map of the Natural Conservation Area in Adana-Yumurtalık Lagoon.

## Results

### Principal vegetation types

There are 3 different types of vegetation in the Yumurtalık Conservation Area:

Halophile marshy areas and arid places covering large areas, and sand reach the climax stage, *Pinus halepensis* forest vegetation which is rarely found in Turkey.

1. Halophile marsh places and arid vegetation



This type of vegetation covering a very large part of the area is found on the salt soils and salt marshy areas around Eşemen Lake, Yapı Lake, Ömer Lake, Darboğaz Lake and Çamlık Bay. Five different types of plants are noticeable considering the salt quantity and the groundwater.

A) The community in which *Arthrocnemum perenne* (Mill.) Maus and *Halimione portulacoides* (L.) Aellen are dominant.

This community consists of 5-50 cm tall herbaceous and semi-shrubby plants. The dominant species of this community are *Arthrocnemum perenne*, *Halimione portulacoides*, *Aeluropus litoralis* (Gouan) Parl., *Halocnemum strobilaceum* (Pall.) M.Bieb. *Arthrocnemum fruticosum* (L.) Moq., *Petrosimonia brachiata* (J.Pall.) Bunge and *Limonium angustifolium* (Tausch) Turriell. These species are located in salty flat areas, and the general coverage rate is between 70 and 80%. The soils in which this plant group grows are highly alkaline and have the characteristics of moderately salty soil.

B) The community in which *Arthrocnemum glaucum* (Deless.) M.Unger-Sternb and *Halocnemum strobilaceum* are dominant.

This plant group found in lakes Yapı and Eşemen consists of herbaceous and semi-shrubby plants 10-60 cm in height. The dominant plants of this group are *Arthrocnemum glaucum*, *Arthrocnemum fruticosum* and *Halocnemum strobilaceum*. Plants such as *Salsola soda* L. and *Salicornia europaea* L. are rarely found among the dominant plants. The coverage rate of Lake Eşemen is within an approximately 100 m wide zone. Behind this zone *Halocnemum strobilaceum* is found sometimes alone, and sometimes accompanied by *Halimione portulacoides*. This community is found only in the Seyhan, Göksu and Ceyhan deltas in Turkey.

C) The community in which *Arthrocnemum fruticosum* is dominant.

*Arthrocnemum fruticosum* is dominant and *Halimione portulacoides*, *Salsola soda*, *Aeluropus litoralis* and *Bolboschoenus maritimus* (L.) Palla. var. *maritimus* accompany this species. The coverage rate is up to 90%.

D) The community in which *Salicornia europaea* is dominant.

*Salicornia europaea* is dominant on a 100 m wide bank alongside lakes and canals when the groundwater

level is high. This species covers very large areas, with a coverage rate of up to 100% in some places. In regions with a low groundwater level, plants such as *Halocnemum strobilaceum* and *Halimione portulacoides*, which grow well in salty media, are found only very rarely.

E) *Aeluropus litoralis*, *Arthrocnemum fruticosum*, *Cressa cretica* L. and *Halimione portulacoides* accompany *Limonium virgatum* (Willd.) Fourr. in this community, which grows on slightly salty soils between a *Pinus halepensis* forest and *Salicornia europaea* communities along the bank of Çamlık Bay. In addition, *Tamarix smyrnensis* Bunge is found in shrub form on arid soils along the canals to the edges of roads.

## 2. *Pinus halepensis* vegetation

The *Pinus halepensis* vegetation in the Yumurtalık Conservation Area covers an approximately 59 ha wide area on a peninsula between Ömer Lake and Çamlık Bay. In the eastern part of the area, *Pinus brutia* Ten. forms communities with *Pinus halepensis* forests towards the west. This forest grows on sand dune hills on the shore and has an interesting floristic composition. *Pinus halepensis* forests are generally only found on the upper surface, sometimes accompanied by *Pinus brutia*, and typical Mediterranean macchie vegetation elements are found on the 2<sup>nd</sup> stratum, the major species of which are *Myrtus communis* L. ssp. *communis*, *Erica manipuliflora* Salisb., *Quercus coccifera* L., *Rhamnus oleoides* L. ssp. *graecus* (Boiss. & Reuthe) Holmboe, *Cistus salviifolius* L., *Vitex agnus-castus* L., *Olea europaea* L. var. *europaea* and *Pistacia terebinthus* L. ssp. *palaestina* (Boiss.) Engl. Herbaceous plants and shrubs are situated on the substratum, the major species of which are *Cyperus capitatus* Vandelli, *Helianthemum stipulatum* (Forssk.) C.Chr., *Verbascum sinuatum* L. var. *sinuatum*, *Bolboschoenus maritimus* var. *maritimus*, *Juncus inflexus* L., *Daphne sericea* Vahl, *Trigonella spicata* Sibth. & Sm., *Scilla autumnalis* L., *Osyris alba* L., *Polygonum praelongum* Coode & Cullen, *Aeluropus litoralis*, *Dorycnium hirsutum* (L.) Ser., *Saccharum ravennae* (L.) Murray, *Asparagus acutifolius* L., *Piptatherum miliaceum* (L.) Cass. ssp. *thomasii* (Duby) Freitag and *Thymelaea hirsuta* (L.) Endl.

## 3. Dune vegetation

The Ceyhan Delta has a long, wide coastal sand dune region. There is a remarkable relationship between the

geomorphology and the vegetation on the coastal dunes, active dunes, permanent dune hills, and wet dunes. The plants in the forest area behind the dunes are extremely diverse comprising a flora known as the dune arboretum. The most important factor influencing the plant species, distribution and coverage rate is the structure of the dunes. The variety of plant species (psamnophyte) varies according to the distance from the sea, the activity or the permanence of the dunes, the groundwater level and the structure of the dune.

#### A) Coastal dune vegetation

The coastal dunes of the area are floristically quite rich, forming populations within many psamnophyte plant areas. These plant populations change according to the distance from the sea, the permanence of the dunes, groundwater level and dune structure. Annual herbaceous plants are mainly found in this zone. The quantity of salt, which is not influenced by the constant effect of the waves, is greater than that in the interior parts. In this zone plants such as *Cakile maritima* Scop., *Salsola kali* L., *Xanthium strumarum* L. ssp. *cavanillesii* (Schouw) D.Löve & Danberau, *Zygophyllum album* L. and *Euphorbia peplis* L. are rarely found. Perennial plants are widely dispersed in this zone, the major species of which are *Pancratium maritimum* L., *Convolvulus lanatus* Vahl, *Ipomoea stolonifera* (Cyr.) J.F.Gmel., *Sporobolus virginicus* (L.) Kunth, *Inula viscosa* (L.) Aiton, *Salsola kali*, *Helianthemum stipulatum*, *Cakile maritima*, *Cyperus capitatus*, *Euphorbia paralias* L., *peplis*, *Medicago marina* L., *Prosopis farcta* (Banks & Sol.) J.F.Macbr., *Polygonum praelongum*, *Thymelaea hirsuta*, *Elymus elongatus* (Host) Runemark, *Saccharum ravennae*, *Trachomitum venetum* (L.) Woodson ssp. *sarmatiense* (Woodson) Avet., *Cionura erecta* (L.) Griseb., *Juncus rigidus* Desf., *Bolboschoenus maritimus* var. *maritimus*, *Artemisia scoparia* Waldst. & Kit Tan and *Echium parviflorum* Moench.

#### B) The vegetation of the permanent dune hills

On the permanent dunes there are many herbaceous plants with rhizomes and plants in shrub form preventing dune erosion. The major species are *Myrtus communis* L. ssp. *communis*, *Saccharum ravennae*, *Trachomitum venetum* ssp. *sarmatiense*, *Salvia viridis* L., *Cionura erecta*, *Vitex agnus-castus*, *Cyperus capitatus*, *Bolboschoenus maritimus* ssp. *maritimus*, *Thymelaea hirsuta*, *Rubus sanctus* Schreb., *Pistacia terebinthus* ssp. *palaestina*, *Rhamnus oleoides* ssp. *graecus*, *Glycyrrhiza glabra* L. var. *glandulifera* (Waldst. & Kit Tan) Boiss.,

*Nerium oleander* L., *Osyris alba*, *Calicotome villosa* (Poir.) Link and *Helianthemum stipulatum*. These plants surround the hills behind the dunes.

#### C) The wet dune vegetation behind the dunes

In the zone behind the dune hills, where the dunes and the salty marshy areas are located, plants requiring of sand and humidity are largely found. The major species are *Helianthemum stipulatum*, *Cynodon dactylon* (L.) Pers. var. *dactylon*, *Lagurus ovatus* L., *Salvia viridis*, *Asphodelus aestivus* Brot., *Plantago coronopus* L. ssp. *coronopus*, *Verbascum sinuatum* var. *sinuatum*, *Inula viscosa*, *Phragmites australis* (Cav.) Trin. ex Steud., *Juncus acutus* L., *Juncus bufonius* L., *Phylla nodiflora* (L.) Greene, *Lythrum salicaria* L. and *Pulicaria sicula* (L.) Moris.

### THE FLORISTIC LIST

#### DIVISIO: SPERMATOPHYTA

#### SUBDIVISIO: GYMNOSPERMAE

#### 1- PINACEAE

##### *Pinus brutia* Ten.

Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözlü 1955B.

“LC”.

##### *P. halepensis* Mill.

Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözlü 1955A.

“LC”.

*Pinus halepensis* species in Çamlık Dalyan and its surroundings do not constitute a pure forest; it is a mixed forest with constituents from *Pinus halepensis* and *Pinus burtia*.

#### 2- CUPRESSACEAE

##### *Cupressus sempervirens* L.

Çamlık Dalyan, 1 m, dune, 11.x.1997, Altınözlü 1894.

“LC”.

#### 3- EPHEDRACEAE

##### *Ephedra camylopoda* C.A.Meyer

Torluk, 1 m, dune, 04.vi.1998, Altınözlü 2473.

“LC”.

- SUBDIVISIO: ANGIOSPERMAE  
Classis: DICOTYLEDONAE
- 4- RANUNCULACEAE**  
*Clematis flammula* L.  
Çamlık Dalyan, 2 m, macchie, 04.vi.1998, **Altınözlü 2517**.  
“LC”.  
Medit.  
*Ranunculus muricatus* L.  
Surrounding Yapı Lake, 1 m, salty marsh, 19.iv.1998, **Altınözlü 2008**.  
“LC”.  
*R. scandinavicus* (Boiss.) P.H.Davis  
Surrounding Yapı Lake, 1 m, salty marsh, 19.iv.1998, **Altınözlü 2012**, surrounding Eşemen Lake, 1 m, salty marsh, 18.iv.1998, **Altınözlü 2028**.  
“NT”
- 5- PAPAVERACEAE**  
*Papaver gracile* Boiss.  
Surrounding Yapı Lake, 1 m, meadow, 18.iv.1998, **Altınözlü 2011**.  
“LC”.
- 6- BRASSICACEAE**  
*Alyssum dasycarpum* Steph. ex Willd.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2050**.  
“LC”.
- Cakile maritima* Scop.  
Torluk, 1 m, dune, 18.iv.1998, **Altınözlü 2015**.  
“LC”.
- Capsella bursa-pastoris* (L.) Medik.  
Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2021**.  
“LC”.
- Hierschfeldia incana* (L.) Lag.-Foss.  
Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2016**,  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2072**.  
“LC”.
- Raphanus raphanistrum* L.  
Surrounding Yapı Lake, 1 m, salt marshy, 19.iv.1998, **Altınözlü 2017**, Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2057**.  
“LC”.
- 7- CAPPARACEAE**  
*Capparis spinosa* L. var. *spinosa*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2537**.  
“LC”.
- 8- CISTACEAE**  
*Cistus salviifolius* L.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2078**.  
“LC”.
- Fumana thymiifolia* (L.) Verl. var. *thymiifolia*  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2055**.  
“LC”.
- Helianthemum stipulatum* (Forssk.) C.Ch.  
Between Torluk and Bağlantı-Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1940**, old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2000**, Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2053**.  
“VU”.
- 9- CARYOPHYLLACEAE**  
*Dianthus zonatus* Fenzl var. *zonatus*  
Kaldırım winter quarters, 1 m, salty area, 20.ix.1998, **Altınözlü 1908**, between Torluk, 1 m, dune, 11.x.1997, **Altınözlü 1945**.  
“LC”.
- Minuartia hybrida* (Vill.) Schischk. ssp. *turcica* McNeill  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2089**.  
“LC”.
- Polycarpon tetraphyllum* (L.) L.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2497**.  
“LC”.
- Silene colorata* Poir.  
Torluk, 1 m, dune, 18.iv.1998, **Altınözlü 1993**.  
“LC”.
- S. kotschyii* Boiss. var. *maritima* Boiss.  
Çamlık Dalyan, 1 m, dune, 12.x.1997, **Altınözlü 1957**.  
“LC”.
- Spergularia marina* (L.) Griseb.  
Surrounding Eşemen Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2032**.  
“LC”.
- Stellaria media* (L.) Vill ssp. *media*  
Surrounding Eşemen Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2033**.  
“LC”.
- 10- ILLECEBRACEAE**  
*Paronychia argentea* Lam. var. *argentea*  
Çamlık Dalyan, 1 m, P. halepensis forest, dune, 19.iv.1998, **Altınözlü 2047**.  
“LC”.
- 11- POLYGONACEAE**  
*Polygonum praelongum* Coode & Cullen  
Kaldırım winter quarters, 1 m, salty marsh areas, 20.ix.1997, **Altınözlü 1910**, between Torluk and Bağlantı-Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1946**.  
“EN”.  
Endemic.
- In the study area the *Polygonum praelongum* species population exists in abundance. We also detected this species along roadsides outside the study area. The population is especially widespread along the roadside from Adana to Ceyhan. I suggest that the EN risk category of the *Polygonum praelongum* species should be changed to VU.
- Rumex conglomeratus* Murray  
Çamlık Dalyan, 1 m, dry stream, 04.vi.1998, **Altınözlü 2506**.  
“LC”.
- 12- CHENOPODIACEAE**  
*Arthrocnemum fruticosum* (L.) Moq.  
Kaldırım winter quarters, 2 m, salty marsh areas, 11.x.1997, **Altınözlü 1925**.  
“LC”.
- A. glaucum* (Deless.) M.Unger-Sternb.  
Kaldırım winter quarters, 2 m, salty marsh areas, 11.x.1997, **Altınözlü 1930**.



- "LC".  
**A. perenne** (Mill.) Maus  
 Kaldırım winter quarters, 2 m, salty marsh areas, 20.ix.1997, **Altınözlü** 1919.  
 "LC".  
**Halimione portulacoides** (L.) Aellen  
 Kaldırım winter quarters, 2 m, salty area, 20.ix.1997, **Altınözlü** 1902.  
 "LC".  
**Halocnemum strobilaceum** (J.Pall.) M.Bieb.  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1901.  
 "LC".  
**Petrosimonia brachiata** (J.Pall.) Bunge  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1899.  
 "LC".  
**Salicornia europaea** L.  
 Eşemen Lake, 2 m, salty marsh, 11.x.1997, **Altınözlü** 1933, surrounding Bayraklı Lake, 2 m, salty marsh, 11.x.1997, **Altınözlü**, 1947.  
 "LC".  
**Salsola kali** L.  
 Between Torluk and Bağlantı-Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü** 1935.  
 "LC".  
**S. soda** L.  
 Surrounding Bayraklı Lake, 2 m, salty marsh, 11.x.1997, **Altınözlü**, 1948, Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1913.  
 "LC".  
**Suaeda splendens** (Pourr.) Gren. & Godr.  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1895.  
 "LC".  
**13- TAMARICACEAE**  
**Tamarix smyrnensis** Bunge  
 Surrounding Eşemen Lake, 2 m, salty marsh, 18.iv.1998, **Altınözlü** 2031.  
 "LC".
- 14- HYPERICACEAE**  
**Hypericum triquetrifolium** Turra  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1909.  
 "LC".  
**15- MALVACEAE**  
**Gossypium herbaceum** L.  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü** 1911. Cultivated.  
**Malva sylvestris** L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü**, 2524.  
 "LC".  
**16- LINACEAE**  
**Linum strictum** L. var. **spicatum** Pers.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü** 2526.  
 "LC".  
**17- GERANIACEAE**  
**Erodium cicutarium** (L.) L'Hér. ssp. **cuticularium**  
 Çamlık Dalyan, 1 m, dune, 20.ix.1997, **Altınözlü** 1904.  
 "LC".  
**E. gruinum** (L.) L'Hér.  
 Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü** 1976.  
 "LC".  
**18- ZYGOPHYLLACEAE**  
**Tribulus terrestris** L.  
 Çamlık Dalyan, 2 m, dune, 04.vi.1998, **Altınözlü** 2508.  
 "LC".  
**Zygophyllum album** L.  
 Between Torluk and Bağlantı-Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü** 1934, old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü** 2042.  
 "VU".  
*Zygophyllum album* L. species, collected from the Natural Conservation Area, is only found by the Tarsus stream in C5 İçel, according to the floristic records. This taxon has a large population in Torluk in the Natural Conservation Area, and it prevents the moving of the dunes and wind erosion.
- 19- VITACEAE**  
**Vitis sylvestris** Gmelin  
 Çamlık Dalyan, 1 m, dune, 04.iv.1998, **Altınözlü** 2477.  
 Cultivated.  
**20- RHAMNACEAE**  
**Rhamnus oleoides** L. ssp. **graecus** (Boiss. & Reuthe) Holmboe  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü** 2071.  
 "LC".  
**21- ANACARDIACEAE**  
**Pistacia terebinthus** L. ssp. **palaestina** (Boiss.) Engl.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü** 2063.  
 "LC".  
**22- FABACEAE**  
**Acacia farnesiana** (L.) Willd.-  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü** 2505.  
*Acacia farnesiana* (L.) Willd., collected from the Natural Conservation Area, it was not found among the recorded species. It was collected from the area. It could possibly be a naturalised cultivated plant.  
**Alhagi pseudohagi** (M.Bieb.) Desv.  
 Torluk, 1 m, dune, 04.vi.1998, **Altınözlü** 2539.  
 "LC".  
 Ir.-Tur.  
**Anthyllis tetraphylla** L.  
 Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü** 1979.  
 "LC".  
**Calicotome villosa** (Poir.) Link  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü** 2460.  
 "LC".  
**Ceratonia siliqua** L.  
 Çamlık Dalyan, 1 m, dune, 04.iv.1998, **Altınözlü** 2474.  
 "LC".  
**Coronilla cretica** L.  
 Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü** 1982.

- "LC".  
*Dorycnium hirsutum* (L.) Ser.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2058.**
- "LC".  
*Glycyrrhiza glabra* L. var. *glandulifera* (Waldst. & Kit Tan) Boiss.  
 Torluk, 1 m, dune, 04.vi.1998, **Altınözlü 2540.**
- "LC".  
*Hippocrepis multisiliquosa* L.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2092.**
- "LC".  
*Hymenocarpus circinnatus* (L.) Savi  
 Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü 1981.**
- "LC".  
*Lathyrus annuus* L.  
 Surrounding Yapı Lake, 1 m, 19.iv.1998, **Altınözlü 2020.**
- "LC".  
*Lotus corniculatus* L. var. *corniculatus*  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2475.**
- "LC".  
*L. halophilus* Boiss. & Spruner var. *halophilus*  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2064.**
- "LC".  
*Medicago coronata* (L.) Bartal.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2091.**
- "LC".  
*M. marina* L.  
 Old Ceyhan influx, 1 m, dune, 19.iv.1998, **Altınözlü 2038.**
- "LC".  
*M. minima* (L.) Bartal. var. *minima*  
 Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2002.**
- "LC".  
*M. orbicularis* (L.) Bartal.  
 Surrounding Avcialı Lake, 2 m, salty marsh, 18.iv.1998, **Altınözlü 2035.**
- "LC".  
*M. polymorpha* L. var. *polymorpha*  
 Torluk, 2 m, dune, 18.iv.1998, **Altınözlü 1991.**
- "LC".  
*M. rigidula* (L.) All. var. *cinerascens* (Jord.) Rouy  
 Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2004,** Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2093.**
- "LC".  
*M. turbinata* (L.) All. var. *turbinata*  
 Surrounding Avcialı Lake, 2 m, salty marsh, 18.iv.1998, **Altınözlü 2037.**
- "LC".  
*Melilotus indica* (L.) All.  
 Surrounding Eşemen Lake, 2 m, meadow, 19.iv.1998, **Altınözlü 2030A.**
- "LC".  
*Mel. messanensis* (L.) All.  
 Surrounding Eşemen Lake, 2 m, meadow, 19.iv.1998, **Altınözlü 2030B.**
- "LC".  
 According to the flora records *Melilotus messanensis* (L.) All. is known from Istanbul and İzmir in salty areas, and it is not known in any other locality (Davis, 1969). These taxa are found in meadows.
- Mel. officinalis** (L.) Desr.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2075.**
- "LC".  
*Onobrychis caput-galli* (L.) Lam.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2515.**
- "LC".  
 Medit.  
*Ononis ornithopidioides* L.  
 Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 1998.**
- "LC".  
*O. pusilla* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2467.**
- "LC".  
*O. variegata* L.  
 Old Ceyhan influx, 1 m, dune, 19.iv.1998, **Altınözlü 2006.**
- "LC".  
*Prosopis farcta* (Banks & Sol.) J.F.Macbr.  
 Surrounding Eşemen Lake, 1 m, salty marsh area, 19.iv.1998, **Altınözlü 2513.**
- "LC".  
*Trifolium campestre* Schreibers  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2045.**
- "LC".  
*T. repens* L. var. *repens*  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2056.**
- "LC".  
*Trigonella cylindracea* Desv.  
 Çamlık Dalyan, 1 m, dune, 18.iv.1998, **Altınözlü 2046.**
- "VU".  
*Trig. monspeliaca* L.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2094.**
- "LC".  
*Trig. spicata* Sibth. & Sm.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2487.**
- "LC".  
 E. Medit.  
*Vicia cracca* L. ssp. *stenophylla* Velen.  
 Surrounding Yapı Lake, 1 m, dune, 19.iv.1998, **Altınözlü 2016.**
- "LC".  
*V. lathyroides* L.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2085.**
- "LC".  
*V. peregrina* L.  
 Surrounding Yapı Lake, 1 m, dune, 04.vi.1998, **Altınözlü 2073.**

- "LC".  
*V. sativa* L. ssp. *nigra* (L.) Ehrh. var. *nigra*  
 Surrounding Yapı Lake, 1 m, dune, 19.iv.1998, **Altınözlü 2014**.  
 "LC".  
**23- ROSACEAE**  
*Armeniaca vulgaris* Lam.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2504**.  
 Cultivated.  
*Crataegus microphylla* C.Koch  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2497**.  
 "LC".  
 Hyrcano-Euxine.  
*Rubus sanctus* Schreb.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2511**.  
 "LC".  
**24- MYRTACEAE**  
*Eucalyptus camaldulensis* Dehnh.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2478**.  
 Cultivated.  
*Myrtus communis* L. ssp. *communis*  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2469**.  
 "LC".  
**25- PUNICACEAE**  
*Punica granatum* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2481**.  
 Cultivated.  
**26- LYTHRACEAE**  
*Lythrum hyssopifolia* L.  
 Surrounding Eşemen Lake, 2 m, salty marsh areas, 18.iv.1998, **Altınözlü 2034**.  
 "LC".  
*L. salicaria* L.  
 Torluk, 1 m, dune, 20.ix.1997, **Altınözlü 1918**, between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1936**.  
 "LC".
- 27- APIACEAE**  
*Bupleurum orientale* Snogerup  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü 1896**.  
 "LC".  
*Caucalis platycarpus* L.  
 Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2039**.  
 "LC".  
*Dacus broteri* Ten.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2496A**.  
 "LC".  
*D. carota* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2496B**.  
 "LC".  
*Eryngium falcatum* D.Delaroche  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2502**.  
 "LC".  
*Tordylium syriacum* L.  
 Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2009**.  
 "LC".  
 E. Med.
- 28- CAPRIFOLIACEAE**  
*Lonicera etrusca* Santi var. *etrusca*  
 Torluk, 1 m, dune, 04.vi.1998, **Altınözlü 2498**.  
 "LC".  
 Med. ele.
- 29- DIPSACACEAE**  
*Scabiosa rotata* M.Bieb.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2532**.  
 "LC".  
 Ir. – Tur.
- 30- ASTERACEAE**  
*Aethorhiza bulbosa* (L.) Cass. ssp. *microcephala* Rech. fil.  
 Surrounding Eşemen Lake, 2 m, salty marsh areas, 18.iv.1998, **Altınözlü 2027**,  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2096**.  
 "LC".  
 E. Med.  
*Artemisia scoparia* Waldst. & Kit Tan  
 Between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1942**.  
 "LC".  
*Bellis perennis* L.  
 Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2018**.  
 "LC".  
 Euro-Sib.  
*Bidens tripartita* L.  
 Incebucağ, 2 m, meadow, 11.x.1997, **Altınözlü 1950A**.  
 "LC".  
*Centaurea callitrapa* L. ssp. *cilicica* (Boiss. & Bal) Wagenitz  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü 1907**.  
 "LC".  
 Endemic.  
*Chrysanthemum coronarium* L.  
 Surrounding Avciali Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2035A**.  
 "LC".  
 Medit.  
*Cirsium alatum* (J.F.Gmel.) Bobrov ssp. *alatum*  
 Surrounding Yapı Lake, 1 m, salty marsh areas, 19.iv.1998, **Altınözlü 2013**.  
 "LC".  
 Ir.-Tur.  
*Conyza bonariensis* (L.) Cronquist  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2482**.  
 "LC".  
*Echinops viscosus* DC. ssp. *bithynicus* (Boiss.) Rech. fil.  
 Between Bağlantı and Kokilimurt, 1 m, dune, 03.11.1997, **Altınözlü 1967**.  
 "LC".

- Eclipta prostrata* (L.) L.  
Incebucak, 2 m, meadow, 11.x.1997, **Altınözlü 1950B**.  
"LC".
- Hedypnois cretica* (L.) Dum. Cours.  
Çamlık Dalyan, 1 m, meadow, 19.iv.1998, **Altınözlü 1975**, Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2079**.  
"LC".  
Medit.
- Inula crithmoides* L.  
Çamlık Dalyan, 1 m, dune, 03.11.1997, **Altınözlü 1961**.  
"LC".
- I. viscosa* (L.) Aiton  
Between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1943**.  
"LC".
- Lactuca serriola* L.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2498**.  
"LC".
- Pulicaria sicula* (L.) Moris  
Kaldırım winter quarters, 1 m, salty marsh areas, 20.ix.1997, **Altınözlü 1905**.  
"LC".
- Reichardia picroides* (L.) Roth  
Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2040**.  
"LC".  
Medit.
- Senecio vernalis* Waldst. & Kit Tan  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2105**, Torluk, 1 m, dune, 18.iv.1998, **Altınözlü 1988**.  
"LC".  
Medit.
- Silybum marianum* (L.) Gaertn.  
Surrounding Yapı Lake, 1 m, salty marsh areas, 19.iv.1998, **Altınözlü 2022**.  
"LC".  
Medit.
- Tolpis barbata* (L.) Gaertn.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2048**.  
"LC".  
Medit.
- Tripleurospermum conoclinium* (Boiss. & Bal) Hayek  
Surrounding Avcıali Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2036**.  
"LC".  
Endemic.
- Urospermum picroides* (L.) F.W.Schmidt  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2086**, Surrounding Eşemen Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2029**.  
"LC".  
Medit.
- Xanthium strumarium* L. ssp. *cavanillesii* (Schouw) D.Löve & Dans.  
Between Bağlantı and Kokilimurt, 1 m, dune, 03.11.1997, **Altınözlü 1966**.  
"LC".
- 31- ERICACEAE**  
*Erica manipuliflora* Salisb.  
Çamlık Dalyan, 1 m, dune, 03.11.1997, **Altınözlü 1960**.  
"LC".
- 32- PRIMULACEAE**  
*Anagallis arvensis* L. var. *arvensis*  
Surrounding Eşemen Lake, 1 m, salty marsh areas, 18.iv.1998, **Altınözlü 2026**.  
"LC".  
var. *caerulea* (L.) Gouan  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2068**.  
"LC".
- Lysimachia linum-stellatum* L.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2074**.  
"LC".  
Medit.
- 33- OLEACEAE**  
*Fontanesia philliraeoides* Labill. ssp. *philliraeoides*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2480**.  
"LC".
- "LC".  
E. Medit.
- Olea europaea* L. var. *europaea*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2536**.  
"LC".
- 34- APOCYNACEAE**  
*Nerium oleander* L.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2473**.  
"LC".
- Trachomitum venetum* (L.) Woodson ssp. *sarmatiense* (Woodson) Avet.  
Between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1941**.  
"LC".
- 35- ASCLEPIADACEAE**  
*Cionura erecta* (L.) Griseb.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2466**.  
"LC".  
E. Medit.
- Cynanchum acutum* L. ssp. *acutum*  
Kaldırım winter quarters, 1 m, salty marsh areas, 20.ix.1997, **Altınözlü 1912**.  
"LC".
- 36- GENTIANACEAE**  
*Blackstonia perfoliatum* (L.) Huds. ssp. *perfoliatum*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2527**.  
"LC".
- Centaurium pulchellum* (Sw.) Druce  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2076**.  
"LC".
- 37- CONVULVULACEAE**  
*Convolvulus lanatus* Vahl  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2492**.  
"LC".
- Cressa cretica* L.  
Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü 1898**.

- "LC".  
*Ipomoea stolonifera* (Cyr.) J.F.Gmel.  
Torluk, 1 m, dune, 04.vii.1998, **Altınözlü 2865A**.  
"LC".  
**38- CUSCUTACEAE**  
*Cuscuta paleastina* Boiss. ssp. *balansae* (Yunck.) Plitm.  
Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2521**.  
"LC".  
**39- BORAGINACEAE**  
*Echium angustifolium* Miller  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2492**, Torluk, 1 m, dune, 04.vi.1998, **Altınözlü 2541**.  
"LC".  
*E. parviflorum* Moench  
Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2019**.  
"LC".  
Medit.  
*Heliotropium ovalifolium* Forssk.  
Kaldırım winter quarters, 1 m, dune, 20.ix.1997, **Altınözlü 1924**.  
"CR".  
*Heliotropium ovalifolium* Forssk. A new record for the Flora of Turkey and samples of the species were collected during this study (Duman & Şağban, 2000).  
**40- SOLANACEAE**  
*Solanum alatum* Moench  
Torluk, 1 m, dune, 18.iv.1998, **Altınözlü 1994**.  
"LC".  
**41- SCROPHULARIACEAE**  
*Kickxia elatine* (L.) Dumort. ssp. *crinita* (Mabille) Greuter  
Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü 1923**.  
"LC".  
*Verbascum sinuatum* L. var. *sinuatum*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2490**.  
"LC".  
*Veronica anagallis-aquatica* L.  
Surrounding Yapı Lake, 1 m, salty marsh areas, 19.iv.1998, **Altınözlü 2023**.  
"LC".  
**42- VERBENACEAE**  
*Phylla nodiflora* (L.) Greene  
Torluk, 1 m, dune, 20.ix.1997, **Altınözlü 2045**.  
"LC".  
*Vitex agnus-castus* L.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2470**.  
"LC".  
**43- LAMIACEAE**  
*Lavandula stoechas* L. ssp. *stoechas*  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2051**.  
"LC".  
Medit.  
*Mentha aquatica* L.  
Torluk, 1 m, in water, 19.iv.1998, **Altınözlü 1984**.  
"LC".  
*Prasium majus* L.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2082**.  
"LC".  
Medit.  
*Salvia verbenaca* L.  
Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü 1980**.  
"LC".  
Medit.  
*S. viridis* L.  
Çamlık Dalyan, 1 m, macchie, 19.iv.1998, **Altınözlü 1978**.  
"LC".  
*Thymbra spicata* L. var. *spicata*  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2485**.  
"LC".  
E. Medit.  
*Ziziphora capitata* L.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2069**.  
"LC".  
Ir.-Tur.  
**44- PLUMBAGINACEAE**  
*Limonium angustifolium* (Tausch) Turrrill  
Eşemen Lake, 2 m, salty area, 20.ix.1997, **Altınözlü 1914**.  
"LC".  
*L. virgatum* (Willd.) Fourr.  
Çamlık Dalyan, 1 m, dune, 12.x.1997, **Altınözlü 1959**.  
"LC".  
**45- PLANTAGINACEAE**  
*Plantago afra* L.  
Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2010**.  
"LC".  
*P. coronopus* L. ssp. *coronopus*  
Çamlık Dalyan, 1 m, dune, 03.11.1997, **Altınözlü 2090**.  
"LC".  
Euro-Sib.  
*P. lanceolata* L.  
Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2007**.  
"LC".  
**46- THYMELAEACEAE**  
*Daphne sericea* Vahl  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2476**.  
"LC".  
E. Medit.  
*Thymelaea hirsuta* (L.) Endl.  
Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2060**.  
"LC".  
Medit.  
**47- LAURACEAE**  
*Laurus nobilis* L.  
Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2534**.  
"LC".  
Medit.



- 48- SANTALACEAE  
*Osyris alba* L.  
 Old Ceyhan influx, 1 m, dune, 18.iv.1998, **Altınözlü 2041**.  
 "LC".  
 E. Medit.
- 49- EUPHORBIACEAE  
*Euphorbia hierosolymitana* Boiss.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2067**.  
 "LC".  
 E. Medit.
- E. paralias* L.  
 Torluk, 1 m, dune, 20.ix.1997, **Altınözlü 1917**.  
 "LC".
- E. peplis* L.  
 Between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, **Altınözlü 1937**.  
 "LC".
- 50- MORACEAE  
*Ficus carica* L. ssp. *carica*  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2483**.  
 Cultivated.
- Morus alba* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2495**.  
 Cultivated.
- 51- ULMACEAE  
*Ulmus minor* Mill. ssp. *canescens* (Melville) Browicz & Ziel.  
 Çamlık Dalyan, 1 m, dune, 07.vi.1998, **Altınözlü 2501**.  
 "LC".  
 E. Medit.
- 52- FAGACEAE  
*Quercus coccifera* L.  
 Çamlık Dalyan, 1 m, macchie, 04.vi.1998, **Altınözlü 2535**.  
 "LC".
- 53- SALICACEAE  
*Populus x canadensis* Moench  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2499**.  
 Cultivated.
- Salix alba* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2459**.  
 "LC".  
 Euro-Sib.
- 54- RUBIACEAE  
*Galium cassium* Boiss.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2507**.  
 "LC".  
 E. Medit.
- Valantia hispida* L.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2080**.  
 "LC".  
 E. Medit.
- MONOCOTYLEDONES
- 55- POTAMOGETONACEAE  
*Potamogeton nodosus* Poir.  
 Kaldırım winter quarters, 2 m, in water, 03.11.1997, **Altınözlü 1968**.  
 "LC".
- P. pectinatus* L.  
 Kaldırım winter quarters, 2 m, in water, 03.11.1997, **Altınözlü 1969B**.  
 "LC".
- 56- ARECACEAE  
*Phoenix canariensis* Hort ex Chauv.  
 Çamlık Dalyan, 1 m, dune, 12.x.1997, **Altınözlü 1954**.  
 Cultivated.
- 57- ARACEAE  
*Dracunculus vulgaris* Schott  
 Surrounding Yapı Lake, 1 m, meadow, 19.iv.1998, **Altınözlü 2024**.  
 "LC".  
 E. Medit.
- 58- LILIACEAE  
*Agave americana* L.  
 Zeynepli Village, 20 m, road side, 11.iv.1997, **Altınözlü 2471**.  
 Cultivated.
- Allium ampeloprasum* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2507**.  
 "LC".  
 E. Medit.
- A. cordiostemon* Fisch. & F.C.Mey.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2465**.  
 "LC".  
 Ir.-Tur.
- A. flavum* L. ssp. *tauricum* (Besser ex Reichbe) Stearn var. *tauricum*  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2530**.  
 "LC".  
 E. Medit.
- Asparagus acutifolius* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2461**.  
 "LC".  
 E. Medit.
- As. officinalis* L.  
 Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, **Altınözlü 1897**.  
 "LC".
- Asphodelus aestivus* Brot.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 1998A**.  
 "LC".  
 E. Medit.
- Ornithogalum narbonense* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 2097**.  
 "LC".  
 E. Medit.
- Scilla autumnalis* L.  
 Çamlık Dalyan, 1 m, dune, 04.vi.1998, **Altınözlü 1953**.  
 "LC".
- Smilax aspera* L.  
 Çamlık Dalyan, 1 m, dune, 19.iv.1998, **Altınözlü 2077**.  
 "LC".

Urginea maritima (L.) Baker	"LC".	"LC".
Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözlü 1955.	J. bufonius L.	Scirpoides holoschoenus (L.) Soják
"LC".	Torluk, 1 m, dune, 18.iv.1998, Altınözlü 1989.	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2486.
Medit.	"LC".	"LC".
<b>59- AMARYLLIDACEAE</b>	J. inflexus L.	<b>65- POACEAE</b>
Pancreatium maritimum L.	Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözlü 1964.	Aeluropus litoralis (Gouan) Parl.
Torluk, 1 m, dune, 12.x.1997, Altınözlü 1956.	"LC".	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2495.
"EN".	J. littoralis C.A.Mey.	"LC".
Medit.	Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2062.	Avena barbata Pott ex Link ssp. barbata
<b>60- IRIDACEAE</b>	"LC".	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2489.
Gladiolus italicus Mill.	J. rigidus Desf.	"LC".
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2491.	Between Bağlantı and Kokilimurt, 1 m, dune, 11.x.1997, Altınözlü 1944.	Briza maxima L.
"LC".	"LC".	Torluk, 1 m, dune, 04.vi.1998, Altınözlü 2538.
<b>61- ORCHIDACEAE</b>	<b>64- CYPERACEAE</b>	"LC".
Orchis coriophora L.	Bolboschoenus maritimus (L.) Palla var. maritimus	Bromus tectorum L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2052.	Torluk, 1 m, dune, 18.iv.1998, Altınözlü 1986.	Torluk, 1 m, dune, 18.iv.1998, Altınözlü 1983.
"LC".	"LC".	"LC".
O. laxiflora L.	Carex diluta M.Bieb.	Catapodium rigidum (L.) C.E.Hubb. ex Dony ssp. rigidum var. rigidum
Torluk, 2 m, dune, 18.iv.1998, Altınözlü 1990.	Çamlık Dalyan, 1 m, dune, 18.iv.1998, Altınözlü 2049.	Torluk, 1 m, dune, 18.iv.1998, Altınözlü 1985, Old Ceyhan influx, 1 m, dune, 04.vi.1998, Altınözlü 2001A.
"LC".	"LC".	"LC"
Medit.	Ir.-Tur.	Cynodon dactylon (L.) Pers. var. dactylon
Serapias parviflora Parl.	C. muricata L.	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2484.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2043.	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2461.	"LC".
"LC".	"LC".	Elymus elongatus (Host) Runemark
Medit.	Euro-Sib.	Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2488.
Spiranthes spiralis (L.) Chevall.	Cyperus capitatus Vand.	"LC".
Çamlık Dalyan, 1 m, dune, 12.x.1998, Altınözlü 1956.	Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altınözlü 1999.	Festuca valesiaca Schleich. ex Gaudin
"LC".	"LC".	Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altınözlü 2001B.
<b>62- TYPHACEAE</b>	Cy. rotundus L.	"LC".
Typha domingensis Pers.	Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, Altınözlü 1903.	Hordeum bulbosum L.
Kaldırım winter quarters, 1 m, in water, 03.11.1997, Altınözlü 1972.	"LC".	Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2494.
"LC".	Juncellus laevigatus (L.) C.B.Clarke	
<b>63- JUNCACEAE</b>	Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözlü 1965.	
Juncus acutus L.		
Torluk, 1 m, dune, 18.iv.1998, Altınözlü 1987.		

“LC”.

*Hyparhenia hirta* (L.) Stapf

Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2066.

“LC”.

*Imperata cylindrica* (L.) Raeusch.

Çamlık Dalyan, 1 m, dune, 18.iv.1998, Altınözlü 2054.

“LC”.

*Lagurus ovatus* L.

Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2081.

“LC”.

Medit.

*Lolium rigidum* Gaudin

Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2516.

“LC”.

*Parapholis incurva* (L.) C.E.Hubb.

Surrounding Eşemen Lake, 1 m, salty marsh areas, 04.vi.1998, Altınözlü 2546.

“LC”.

*P. pycnantha* (Hackel) C.E.Hubb.

Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2509.

“LC”.

*Phragmites australis* (Cav.) Trin. ex Steud.

Kaldırım winter quarters, 1 m, in water, 04.vi.1998, Altınözlü 2544.

“LC”.

Euro-Sib.

*Piptatherum miliaceum* (L.) Cass. ssp. *thomasii* (Duby) Freitag

Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2059.

“LC”.

*Polypogon monspeliensis* (L.) Desf.

Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözlü 2500.

“LC”.

*Rostraria berthea* (Boiss. & Bal) Holub

Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2084.

“LC”.

*Saccharum ravennae* (L.) Murray

Çamlık Dalyan, 1 m, dune, 20.ix.1997, Altınözlü 1916.

“LC”.

*Sporobolus virginicus* (L.) Kunth

Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözlü 1963.

“LC”.

*Themeda triandra* Forssk.

Çamlık Dalyan, 1 m, meadow, 12.x.1997, Altınözlü 1952.

“LC”.

*Trachynia distachya* (L.) Link

Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözlü 2468.

“LC”.

*Tragus racemosus* (L.) All.

Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözlü 1958.

“LC”.

## Discussion

A total of 186 genera and 253 taxa belonging to 65 families were determined in the study area. Two varieties belonging to *Anagallis arvensis* species were determined. The families with the most dominant species are *Fabaceae*, 41 (18.4%), *Asteraceae*, 26 (11.7%), *Poaceae*, 25 (11.2%), *Liliaceae*, 12 (5.4%) and *Chenopodiaceae*, 10 (4.5%). The number of taxa of the other families is less than 10. Although the *Fabaceae* are the largest family with 41 species in the Natural Conservation Area, this population is not common in the area. Although *Chenopodiaceae* the is represented with 10 species as many parts of the research area are halophile marshy places and arid areas, the members of this family cover nearly the whole of the research area.

Table 1. The richest families in the research area.

Family	Taxa Number	Rate (%)
Fabaceae	41	18.3
Asteraceae	26	11.6
Poaceae	25	11.2
Liliaceae	12	5.3
Chenopodiaceae	10	4.4
Others	109	48.8

Table 2. The floristic region distribution and rate of species identified in the research area.

Floristic region	Taxa Number	Rate (%)
Mediterranean	26	11.6
E. Mediterranean	13	5.8
Irano-Turanian	6	2.6
Euro-Siberian	5	2.2
Hircano-Euxine	1	0.4
Unknown or Common	172	77.1

The distribution of the taxa of species and the subspecies identified in the research area is shown in Table 1, according to the floristic regions, their numbers, and the

## References

- Brummitt RK & Powell CE (1992). *Authors of Plant Names*. Kew: Royal Botanic Gardens.
- Davis PH (ed.) (1965-1985). *Flora of Turkey and the East Aegean Islands* vol. 1-9. Edinburgh: Edinburgh Univ. Press.
- Davis PH, Mill RR & Tan K (eds) (1988). *Flora of Turkey and the East Aegean Islands (Supplement)*. vol. x. Edinburgh: Edinburgh Univ. Press.
- Donner J (1990). Distribution maps to P.H. Davis, Flora of Turkey, vol. 1-X. *Linzer Biol Beitr* 22: 381-515.
- Duman H & Şağban H (2000). A New Record (*Heliotropium ovalifolium* Forssk.) from Southern Turkey. *Türk J Bot* 24: 207-208.
- Ekim T, Koyuncu M, Vural M, Duman H, Aytaç Z & Adıgüzel N (2000). *Türkiye Bitkileri Kırmızı Kitabı (Red Data Book of Turkish Plants)* Türkiye Tabiatını Koruma Derneği ve Van Yüzüncü Yıl Üniv Yay.
- IUCN Species Survival Commission (2001). IUCN Red List Categories, approved by the 51st meeting of the IUCN Council. Gland, Switzerland.

Table 3. The IUCN categories of collected species.

Red Data Categories	Species Number
LC	218
NT	1
CR	1
VU	3
EN	2

levels in terms of the whole flora. As can be seen in Table 2, the floristic region elements in the Mediterranean are greater than those in the other regions. The reason for this is the dominance of Mediterranean climatic characteristics in the research area. In Table 3, the IUCN categories of the collected plants are also given.

A plant specimen of the genus *Echinops* of the family *Asteraceae* collected in the Natural Conservation Area in Yumurtalık shows differences from the *Echinops* species described in the Flora of Turkey. It is suggested that this specimen may be a new record, or a new species for the flora of Turkey.

## Acknowledgements

I would like to thank Dr. Hayri Duman for helping to determine the species belonging to the families *Chenopodiaceae* and *Poaceae*.

- Tutin G, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM & Webb DA (1968). *Flora Europaea* 2: 84-85. Cambridge: Cambridge Univ. Press.
- Türkiye Jeoloji Haritası (1992). Adana paftası 1/500.000. Ankara.
- Tarım Köy İşleri Bakanlığı (1982). *Adana İli Arazi Varlığı* – Ankara: Köy Hizmetleri Genel Müdürlüğü – Personel ve Eğitim Dairesi Başkanlığı, Baskı İşleri Şubesi Müdürlüğü.
- TC Başbakanlık Meteoroloji İşleri Genel Müdürlüğü (1991). *Adana İli iklimsel verileri*, Ankara.
- TC Başbakanlık MTA Genel Müdürlüğü (1991). *Ceyhan-Karataş-Yumurtalık-Osmaniye-Haruniye-Kadirli dolayının Jeolojik Raporu*, Ankara: M.T.A. Genel Müdürlüğü – Personel ve Eğitim Dairesi Başkanlığı, Baskı İşleri Şubesi Müdürlüğü.
- Zohary M (ed.) (1966-1986). *Flora Palaestina* vol. 1-4, Jerusalem: Academic Press, Israel.