Introduction

The Natural Conservation Area in Yumurtalik 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 Yumurtalik 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 İncebucak.

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

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Abstract: This study includes the natural and cultivated plants in the Natural Conservation Area in Yumurtalik 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 Hircano-Euxine element. The other 172 taxa (77.1%) are either cosmopolitan or in the category of undetermined phytogeographical regions.

Key Words: Flora, Adana, Karataş, Yumurtalik Lagoon.

Adana, Yumurtalik Lagünü Tabiatı Koruma Alanı Florası (Türkiye)

Özet: Bu araştırmada, Yumurtalik 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’si 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’ı (%2.6) İran-Turan, 5’i (%2.2) Avrupa-Sibiry, 1’i (%0.4) Hircano-Euxine, 172 (%77.1) tür ise kozmopolit veya fitotografik bölgesi belirsizler kategorisinde yer almaktadır.

Anahtar Sözcükler: Flora, Adana, Karataş, Yumurtalik Lagünü.

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 Yumurtalik Lagoon, a report titled “Ceyhan–Karataş–Yumurtalik–Osmaniye-Kadıırı 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.
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. Altınözü, 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
var.: variety
LC: Least concern
NT: Near threatened
VU: Vulnerable
EN: Endangered
CR: Critically endangered

Figure 2. Map of the research area.
Results

Principal vegetation types

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

1. 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.

Figure 3. Vegetation map of the Natural Conservation Area in Adana-Yumurtalik Lagoon.
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) Turrill. 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 2nd 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 praetarum Coode & Cullen, Aeluropus litoralis, Dorycnium hirsutum (L.) Ser., Saccharum ravennae (L.) Murray, Asparagus acutifolius L., Piptatherum miliaceum (L.) Cass. ssp. thomasii (Duby) Freitag and Thymelaeae 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 peplus L. are rarely found. Perennial plants are widely dispersed in this zone, the major species of which are Pancratimum maritimum L., Convolvulus Ianatus Vahl, Ipomoea stolonifera (Cyr.) J.F. Gmel., Sporobolus virginicus (L.) Kunth, Inula viscosa (L.) Aiton, Salsola kali, Helianthemum stipulatum, Cakile maritima, Cyperus capitatus, Euphorbia peplus L. and Euphorbia paralias L. peplus, 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, Euphorbia capitatus, Euphorbia paralias L. peplus, Medicago marina L., Prospis 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.

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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 Brotn., Plantago coronopus L. ssp. coronopus, Verbascum sinuatum var. sinuatum, Inula viscosa, Pragmites australis (Cav.) Trin. ex Steud., Juncus acutus L., Juncus bufonius L., Phylla nodiflora (L.) Greene, Lythrum salicaria L. and Pulicaria sicula (L.) Morin.

THE FLORISTIC LIST

DIVISIO: SPERMATOPHYTA

SUBDIVISIO: GYMNOSPERMAE

1- PINACEAE

Pinus brutia Ten.

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

“LC”.

P. halepensis Mill.

Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınoğlu 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 brutia.

2- CUPRESSACEAE

Cupressus sempervirens L.

Çamlık Dalyan, 1 m, dune, 11.x.1994, Altınoğlu 1894.

“LC”.

3- EPHEDRACEAE

Ephedra canylopođa C.A. Meyer

Torlu, 1 m, dune, 04.vi.1998, Altınoğlu 2473.

“LC”.

Nerium oleander L., Osyris alba, Calicotome villosa (Poir) Link and Helianthemum stipulatum. These plants surround the hills behind the dunes.
4- RANUNCULACEAE
Clematis flammula L.
Çamlık Dalyan, 2 m, macchie, 04.vi.1998, Altınozlu 2517.
“LC”.

5- PAPAVERACEAE
Papaver gracile Boiss.
“LC”.

6- BRASSICACEAE
Alyssum dasycarpum Steph. ex Willd.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınozlu 2050.
“LC”.

Cakile maritima Scop.
Torluk, 1 m, dune, 18.iv.1998, Altınozlu 2015.
“LC”.

Capsella bursa-pastoris (L.) Medik.
“LC”.

Hiernschfeldia incana (L.) Lag.-Foss.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınozlu 2072.
“LC”.

Raphanus raphanistrum L.
“LC”.

7- CAPPARACEAE
Capparis spinosa L. var. spinosa
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınozlu 2537.
“LC”.

8- CISTACEAE
Cistus salvifolius L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınozlu 2078.
“LC”.

Fumana thymiifolia (L.) Verl. var. thymiifolia
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınozlu 2055.
“LC”.

Helianthemum stipulatum (Forssk.) C.Chr.
“VU”.

9- CARYOPHYLLACEAE
Dianthus zonatus Fenzl var. zonatus
Kaldırın winter quarters, 1 m, salty marsh areas, 20.ix.1997, Altınozlu 1910, between Torluk and Bağlanti-Kokilimurt, 1 m, dune, 11.x.1997, Altınozlu 1946.
“EN”.

Endemic.

In the study area the Polygonum praetormum 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 praetormum species should be changed to VU.

Rumex conglomeratus Murray
Çamlık Dalyan, 1 m, dry stream, 04.vi.1998, Altınozlu 2506.
“LC”.

10- ILLECEBRACEAE
Paronychia argentea Lam. var. argentea
Çamlık Dalyan, 1 m, P. halepensis forest, dune, 19.iv.1998, Altınozlu 2047.
“LC”.

11- Polygonaceae
Polygonum praetormum Coode & Cullen
Kaldırın winter quarters, 1 m, salty marsh areas, 20.ix.1997, Altınozlu 1910, between Torluk and Bağlanti-Kokilimurt, 1 m, dune, 11.x.1997, Altınozlu 1946.
“LC”.

12- CHENOPODIACEAE
Arthrocnemum fruticosum (L.) Moq.
Kaldırın winter quarters, 2 m, salty marsh areas, 11.x.1997, Altınozlu 1925.
“LC”.

Arthrocnemum fruticosum (L.) Moq.
Kaldırın winter quarters, 2 m, salty marsh areas, 11.x.1997, Altınozlu 1925.
**14- HYPERICACEAE**

Hypericum triquetrifolium Turra
Kaldirım winter quarters, 1 m, salty area, 20.ix.1997, Altınzőlüz 1909.

“LC”.

15- MALVACEAE

Gossypium herbaceum L.

Malva sylvestris L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınzőlüz, 2524.

“LC”.

16- LINACEAE

Linum strictum L. var. spicatum Pers.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınzőlüz 2526.

“LC”.

17- GERANIACEAE

Erodium cicutarium (L.) L'Hér. ssp. cicutarium

“LC”.

18- ZYGOPHYLLACEAE

Tribulus terrestris L.
Çamlık Dalyan, 1 m, dune, 11.x.1997, Altınzőlüz 1935.

“LC”.

Zygophyllum album L.
Between Torluk and Bağlanti-Kokilimurt, 1 m, dune, 11.x.1997, Altınzőlüz 1934.

“LC”.

19- VITACEAE

Vitis sylvestris Gmelin
Çamlık Dalyan, 1 m, dune, 04.iv.1998, Altınzőlüz 2477.

Cultivated.

20- RHAMNACEAE

Rhamnus oleoides L. ssp. graecus (Boiss. & Reuthe) Holmboe
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınzőlüz 2071.

“LC”.

21- ANACARDIACEAE

Pistacia terebinthus L. ssp. palaestina (Boiss.) Engl.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınzoek 2063.

“LC”.

22- FABACEAE

Acacia farnesiana (L.) Willd.-
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınzoek 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 pseudolhagi (M.Bieb.) Desv. Torluk, 1 m, dune, 04.vi.1998, Altınzoek 2539.

“LC”.

Ir.-Tur.

Anthyllis tetraphylla L.

“LC”.

Calicotome villosa (Poir.) Link Torluk, 1 m, dune, 04.vi.1998, Altınзоölüz 2460.

“LC”.

Coronilla cretica L.
Çamlık Dalyan, 1 m, macchie, 19.iv.1998, Altınзоölüz 2474.

“LC”.

Ceratonia siliqua L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınzoek 2480.

“LC”.

498
Dorycnium hirsutum (L.) Ser.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2058.

Glycyrrhiza glabra L. var. glandulifera (Walst. & Kit Tan) Boiss.
Torluk, 2 m, dune, 18.iv.1998, Altınözü 2540.

Hippocrepis multisiliquosa L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2092.

Hymenocarpus cinnamnatus (L.) Savi
Çamlık Dalyan, 1 m, macchie, 19.iv.1998, Altınözü 2091.

Lathyrus annuus L.

Lotus corniculatus L. var. corniculatus
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2475.

L. halophilus Boiss. & Spruner var. halophilus
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2064.

Medicago coronata (L.) Bartal.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2091.

M. marina L.
Old Ceyhan influx, 1 m, dune, 19.iv.1998, Altınözü 2038.

M. minima (L.) Bartal. var. minima

Melilotus indica (L.) All.
Surrounding Eşmen Lake, 2 m, meadow, 19.iv.1998, Altınözü 2030A.

Mel. messanensis (L.) All.
Surrounding Eşmen Lake, 2 m, meadow, 19.iv.1998, Altınözü 2030B.

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.

Med. oficinalis (L.) Desr.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2075.

Trifolium campestre Schreibers
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2045.

T. repens L. var. repens
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2056.

Trigonella cylindracea Desv.
Çamlık Dalyan, 1 m, dune, 18.iv.1998, Altınözü 2046.

Trig. monspeliaca L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2034.

Trig. spicata Sibth. & Sm.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2487.

Vicia cracca L. ssp. stenophylla Velen.

V. lathyroides L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2085.
**27- APIACEAE**

*Bupleurum orientale* Snogerup

Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, Altınözü 1896.

“LC”.

*Caucalis platycarpos* L.

Old Çeyhan influx, 1 m, 18.iv.1998, Altınözü 2039.

“LC”.

*Dacus brevipes* Ten.

Çamlık Dalyan, 1 m, 04.vi.1998, Altınözü 2496A.

“LC”.

*Eryngium falcatum* D.Delaroche

Çamlık Dalyan, 1 m, 04.vi.1998, Altınözü 2496B.

“LC”.

*Tordylium syriacum* L.


“LC”.

**28- CAPRIFOLIACEAE**

*Lonicera etrusca* Santi var. *etrusca*

Torluk, 1 m, 04.vi.1998, Altınözü 2498.

“LC”.

*Med. ele.*

**29- DIPSACACEAE**

*Scabiosa rotata* M.Bieb.

Çamlık Dalyan, 1 m, 04.vi.1998, Altınözü 2532.

“LC”.

*Conyza bonariensis* (L.) Cronquist

Çamlık Dalyan, 1 m, 04.vi.1998, Altınözü 2482.

“LC”.

**30- ASTERACEAE**


“LC”.

*Euro-Sib.*

*Bidens tripartita* L.

Incebucak, 2 m, meadow, 11.x.1997, Altınözü 1950A.

“LC”.

*Centaurea callitrapa* L. ssp. *ciliaca* (Boiss. & Bal) Wagenitz

Kaldırım winter quarters, 1 m, salty area, 20.ix.1997, Altınözü 1907.

“LC”.

*Chrysanthemum coronarium* L.

Surrounding Avcýali Lake, 1 m, salty marsh areas, 18.iv.1998, Altınözü 2039A.

“LC”.

*Medit.*

*Cirsium alatum* (J.F.Gmel.) Bobrov ssp. *alatum*


“LC”.

*Ir.-Tur.*

*Conyza bonariensis* (L.) Cronquist

Çamlık Dalyan, 1 m, 04.vi.1998, Altınözü 2032.

“LC”.


Between Bağlantı and Kokilimurt, 1 m, dune, 03.11.1997, Altınözü 1967.

“LC”.
Eclipta prostrata (L.) L.
İncebucak, 2 m, meadow, 11.x.1997, Altınözülü 1950B.

“LC”.

Hedypnois cretica (L.) Dum. Cours.

“LC”.

Inula crithmoides L.
Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözülü 1961.

“LC”.

L. viscosa (L.) Alton
Between Bağlanti and Kokillimurt, 1 m, dune, 11.x.1997, Altınözülü 1943.

“LC”.

Lactuca serriola L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2498.

“LC”.

Pulicaria sicula (L.) Moris
Kaldırırm winter quarters, 1 m, salty marsh areas, 20.ix.1997, Altınözülü 1905.

“LC”.

Reichardia picroides (L.) Roth
Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altınözülü 2040.

“LC”.

Senecio vernalis Waldst. & Kit Tan

“LC”.

Silybum marianum (L.) Gaertn.

“LC”.

Medit.

Toipis barbata (L.) Gaertn.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözülü 2048.

“LC”.

Medit.

Tripeurospermum conoclinium (Boiss. & Bal) Hayek
Surrounding Avci Lake, 1 m, salty marsh areas, 18.iv.1998, Altınözülü 2036.

“LC”.

Endemic.

Urospernum picroides (L.) F.W.Schmidt

“LC”.

Medit.

Xanthium strumarium L. ssp. cavanillesii (Schouw) D.Löve & Dans.
Between Bağlanti and Kokillimurt, 1 m, dune, 03.11.1997, Altınözülü 1966.

“LC”.

31- ERICACEAE

Erica manipuliflora Salisb.
Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözülü 1960.

“LC”.

32- PRIMULACEAE

Anagallis arvensis L. var. arvensis
Surrounding Eşemen Lake, 1 m, salty marsh areas, 18.iv.1998, Altınözülü 2026.

“LC”.

var. caerulea (L.) Gouan
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözülü 2068.

“LC”.

Lysimachia linum-stellatum L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözülü 2074.

“LC”.

Medit.

33- OLEACEAE

Fontanesia philirraeoides Labill. ssp. philirraeoides
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2480.

“LC”.

E. Medit.

Olea europaea L. var. europaea
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2536.

“LC”.

34- APOCYNACEAE

Nerium oleander L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2473.

“LC”.

Trachomitum venetum (L.)Woodson ssp. sarmatiense (Woodson) Avet.
Between Bağlanti and Kokillimurt, 1 m, dune, 11.x.1997, Altınözülü 1941.

“LC”.

35- ASCLEPIADACEAE

Cionura erecta (L.) Griseb.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2466.

“LC”.

E. Medit.

Cynanchum acutum L. ssp. acutum
Kaldırırm winter quarters, 1 m, salty marsh areas, 20.ix.1997, Altınözülü 1912.

“LC”.

36- GENTIANACEAE

Blackstonia perfoliataum (L) Huds. ssp. perfoliatum
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2527.

“LC”.

Centaurium pulchellum (Sw.) Druce
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözülü 2076.

“LC”.

37- CONVOLVULACEAE

Convolvulus lanatus Vahl
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözülü 2492.

“LC”.

Cressa cretica L.
Kaldırırm winter quarters, 1 m, salty area, 20.ix.1997, Altınözülü 1898.
Ipomoea stolonifera (Cyr.) J.F.Gmel.
Torluk, 1 m, dune, 04.vii.1998, Altınözü 2965A.

38- CUSCUTACEAE

Cuscuta paleastina Boiss. ssp. balansae (Yunck.) Plitm.
Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altınözü 2521.

39- BORAGINACEAE

Echium angustifolium Miller
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2492, Torluk, 1 m, dune, 04.vi.1998, Altınözü 2541.

39- BORAGINACEAE

E. parviflorum Moench

40- SOLANACEAE

Solanum alatum Moench

41- SCROPHULARIACEAE

Kickxia elatine (L.) Dumort. ssp. crinita (Mabille) Greuter
Kaldırım winter quarters, 1 m, dune, 20.ix.1997, Altınözü 1924.

42- VERBENACEAE

Phylica nodiflora (L.) Greene
Torluk, 1 m, dune, 20.ix.1997, Altınözü 2045.

43- LAMIACEAE

Lavandula stoechas L. ssp. stoechas
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2051.

44- PLUMBAGINACEAE

Limonium angustifolium (Tausch) Turrill
Eşemen Lake, 2 m, salty area, 20.ix.1997, Altınözü 1914.

45- PLANTAGINACEAE

Plantago afra L.

46- THYMELAEACEAE

Daphne sericea Vahl
Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözü 2090.

47- LAURACEAE

Laurus nobilis L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2476.

Veronica anagallis- aquatica L.

Ziziphora capitata L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2069.

Ir.-Tur.

44- PLUMBAGINACEAE

Limonium angustifolium (Tausch) Turrill
Eşemen Lake, 2 m, salty area, 20.ix.1997, Altınözü 1914.

45- PLANTAGINACEAE

Plantago afra L.

46- THYMELAEACEAE

Daphne sericea Vahl
Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözü 2090.

47- LAURACEAE

Laurus nobilis L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2476.
48- SANTALACEAE
Osyris alba L.
Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altınözü 2041.
“LC”.
Medit.

49- EUPHORBIACEAE
Euphorbia hierosolymitana Boiss.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2067.
“LC”.
E. Medit.
E. paralias L.
Tornuk, 1 m, dune, 20.ix.1997, Altınözü 1917.
“LC”.
E. peplis L.
Between Bağlantı and Kokilmurt, 1 m, dune, 11.x.1997, Altınözü 1937.
“LC”.

50- MORACEAE
Ficus carica L. ssp. carica
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2483.
Cultivated.
Morus alba L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2495.
Cultivated.

51- ULMACEAE
Ulmus minor Mill. ssp. canescens (Melville) Browicz & Ziel.
Çamlık Dalyan, 1 m, dune, 07.vi.1998, Altınözü 2501.
“LC”.
E. Medit.

52- FAGACEAE
Quercus coccifera L.
Çamlık Dalyan, 1 m, macchie, 04.vi.1998, Altınözü 2535.
“LC”.
E. Medit.

53- SALICACEAE
Populus x canadiensis Moench
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2499.
Cultivated.
Salix alba L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2459.
“LC”.
Euro-Sib.

54- RUBIACEAE
Galium cassium Boiss.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2507.
“LC”.
E. Medit.
Valantia hispida L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2080.
“LC”.
E. Medit.

MONOCOTYLEDONES
55- POTAMOGETONACEAE
Potamogeton nodosus Poir.
Kaldırm winter quarters, 2 m, in water, 03.11.1997, Altınözü 1968.
“LC”.
P. pectinatus L.
Kaldırm winter quarters, 2 m, in water, 03.11.1997, Altınözü 1969B.
“LC”.

56- ARECACEAE
Phoenix canariensis Hort ex Chauv.
Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözü 1954.
Cultivated.

57- ARACEAE
Dracunculus vulgaris Schott
Surrounding Yapi Lake, 1 m, meadow, 19.iv.1998, Altınözü 2024.
“LC”.
E. Medit.

58- LILIACEAE
Agave americana L.
Zeynepli Village, 20 m, road side, 11.iv.1997, Altınözü 2471.
Cultivated.
Allium ampeloprasum L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2507.
“LC”.

A. cordiostemon Fisch. & F.C.Mey.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2465.
“LC”.
Ir.-Tur.
A. flavum L. ssp. tauricum (Besser ex Reichbe) Stearn var. tauricum
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2530.
“LC”.
Medit.
Asparagus acutifolius L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2461.
“LC”.
Medit.
As. officinalis L.
Kaldırm winter quarters, 1 m, salty area, 20.ix.1997, Altınözü 1897.
“LC”.
Asphodelus aestivus Brot.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 1998A.
“LC”.
Medit.
Ornithogalum narbonense L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 1997.
“LC”.
Scilla autumnalis L.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2097.
“LC”.
Medit.
Smilax aspera L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2077.
“LC”.

503
504

Urginea maritima (L.) Baker
Çamlık Dalyan, 1 m, dune, 12.x.1997, Altnözü 1955.
“LC”.
Medit.

59- AMARYLLIDACEAE

Pancratium maritimum L.
Torluk, 1 m, dune, 12.x.1997, Altnözü 1996.
“EN”.
Medit.

60- IRIDACEAE

Gladiolus italicus Mill.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2491.
“LC”.

61- ORCHIDACEAE

Orchis coriophora L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altnözü 2052.
“LC”.
Medit.

62- TYPHACEAE

Typha domingensis Pers.
Kaldırım winter quarters, 1 m, in water, 03.11.1997, Altnözü 1972.
“LC”.

63- JUNCACEAE

Juncus acutus L.

64- CYPERACEAE

Bolboschoenus maritimus (L.) Palla var. maritimus
“LC”.

Scirpoides holoschoenus (L.) Sojak
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2486.
“LC”.

65- POACEAE

Aeluropus litoralis (Gouan) Parl.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2495.
“LC”.

Avena barbata Pott ex Link ssp. barbata
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2489.
“LC”.

Briza maxima L.
Torluk, 1 m, dune, 04.vi.1998, Altnözü 2538.
“LC”.

Bromus tectorum L.
Torluk, 1 m, dune, 18.iv.1998, Altnözü 1983.
“LC”.

Catapodium rigidum (L.) C.E.Hubb. ex Dony ssp. rigidum
Torluk, 1 m, dune, 18.iv.1998, Altnözü 1985, Old Ceyhan influx, 1 m, dune, 04.vi.1998, Altnözü 2001A.
“LC”.

Cynodon dactylon (L.) Pers. var. dactylon
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2484.
“LC”.

Elymus elongatus (Host) Runemark
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altnözü 2488.
“LC”.

Festuca valesiaca Schleih. ex Caudin
Old Ceyhan influx, 1 m, dune, 18.iv.1998, Altnözü 2001B.
“LC”.

Hordeum bulbosum L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altnözü 2494.
“LC”.
Hyparrhenia hirta (L.) Stapf
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2066.

“LC”.
Imperata cylindrica (L.) Raeusch.
Çamlık Dalyan, 1 m, dune, 18.iv.1998, Altınözü 2054.

“LC”.
Lagurus ovatus L.
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2081.

“LC”.
Medit.
Lolium rigidum Gaudin
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2516.

“LC”.
Parapholis incurva (L.) C.E.Hubb.
Surrounding Eşemen Lake, 1 m, salty marsh areas, 04.vi.1998, Altınözü 2546.

“LC”.
P. pycnantha (Hackel) C.E.Hubb.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2509.

“LC”.
Phragmites australis (Cav.) Trin. ex Steud.
Kaldırım winter quarters, 1 m, in water, 04.vi.1998, Altınözü 2544.

“LC”.
Euro-Sib.
Piptatherum miliaceum (L.) Cass. ssp. thomasii (Duby) Freitag
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2059.

“LC”.
Polypogon monspeliensis (L.) Desf.
Çamlık Dalyan, 1 m, dune, 04.vi.1998, Altınözü 2500.

“LC”.
Rostraria berthea (Boiss. & Bal) Holub
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2084.

“LC”.
Saccharum ravennae (L.) Murray
Çamlık Dalyan, 1 m, dune, 20.ix.1997, Altınözü 1916.

“LC”.
Sporobolus virginicus (L.) Kunth
Çamlık Dalyan, 1 m, dune, 03.11.1997, Altınözü 1963.

“LC”.
Themeda triandra Forssk.
Çamlık Dalyan, 1 m, meadow, 12.x.1997, Altınözü 1952.

“LC”.
Trachynia distachya (L.) Link
Çamlık Dalyan, 1 m, dune, 19.iv.1998, Altınözü 2468.

“LC”.
Tragus racemosus (L.) All.
Çamlık Dalyan, 1 m, dune, 12.x.1997, Altınözü 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 halophyte marshy places and arid areas, the members of this family cover nearly the whole of the research area.
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 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*.

### Table 1. The richest families in the research area.

<table>
<thead>
<tr>
<th>Family</th>
<th>Taxa Number</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabaceae</td>
<td>41</td>
<td>18.3</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>26</td>
<td>11.6</td>
</tr>
<tr>
<td>Poaceae</td>
<td>25</td>
<td>11.2</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>12</td>
<td>5.3</td>
</tr>
<tr>
<td>Chenopodiaceae</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>Others</td>
<td>109</td>
<td>48.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Floristic region</th>
<th>Taxa Number</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean</td>
<td>26</td>
<td>11.6</td>
</tr>
<tr>
<td>E. Mediterranean</td>
<td>13</td>
<td>5.8</td>
</tr>
<tr>
<td>Irano-Turanian</td>
<td>6</td>
<td>2.6</td>
</tr>
<tr>
<td>Euro-Siberian</td>
<td>5</td>
<td>2.2</td>
</tr>
<tr>
<td>Hyrcano-Euxine</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Unknown or Common</td>
<td>172</td>
<td>77.1</td>
</tr>
</tbody>
</table>

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

### Table 3. The IUCN categories of collected species.

<table>
<thead>
<tr>
<th>Red Data Categories</th>
<th>Species Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>218</td>
</tr>
<tr>
<td>NT</td>
<td>1</td>
</tr>
<tr>
<td>CR</td>
<td>1</td>
</tr>
<tr>
<td>VU</td>
<td>3</td>
</tr>
<tr>
<td>EN</td>
<td>2</td>
</tr>
</tbody>
</table>

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


