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Urban vascular flora and ecologic characteristics of the Pendik District (Istanbul-Turkey)

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In this study, the results of unplanned urbanization and possible preventive measures, which could be taken to the Pendik district, Istanbul-Turkey, are presented. In addition, different kinds of urban habitats and some ecologic characteristics within the frontiers of Pendik are described. Native, exotic, and cultivated plant taxa were realized and all the greenery in the area was explored during different seasons. A total of 538 plant species were examined, exposing that 418 species were natural and 120 species were exotic and cultivated within the district. The most observed native plant taxa were in the Asteraceae family (64 species), while the most found exotic plant family was Rosaceae (18 species). The most observed archaeophyte and neophyte plants in these taxa, as well as, endemic, rare, endangered, medicinal, and poisonous species are also discussed. Furthermore, this study emphasizes how the necessity of having ecological studies has become common in urban areas, in Istanbul and throughout the world.

Key words: Urban flora, urban habitat, urban ecology, Pendik, Istanbul.

INTRODUCTION

Increasing levels of urbanization resulted by natural growth of the urban population and migration of the rural population towards cities (Altay et al., 2010a). Cities play a major role not only as providers of employment, shelter and services but also as centers of culture, learning and technological development and industrial centers for the processing of agricultural produce and manufacturing and portals to the rest of the world (UNCHS, 2001).

According to Wheeler (2002), the rise in the world's human population from 5.2 billion in 1990 to approximately 8 billion in 2025 will increase the living proportions in urban areas from 34% in 1960 to 44% in 1990 and to reach 60% by 2025. There is a strong positive link between National levels of human development and urbanization levels. Human impact has been recognized as the most important influence on the composition of the flora and vegetation during the last 5,000 years. As towns and cities are developed, rural

landscapes become destroyed or engulfed, thus in turn, new urban habitats are created (Shaltout and El-Sheikh, 2002; Wheeler, 2002; Sukopp, 2004). Urban lands are partly affected by dangerous chemicals such as; nitrogen oxides, sulphur dioxide, carbon monoxide, ozone and halogens and some heavy metals including; zinc, copper, cobalt, nickel, mercury, lead, cadmium and chromium (Ozcan et al., 2008; Demir et al., 2010; Sakar et al., 2010, 2011). Atmospheric pollution is also ameliorated by trees particularly since particulate material collects on leaves and fissures in the bark (Wheeler, 2002; Yasar et al., 2010) while some plants accumulate those harmful substances, without showing any symptoms, many of them are being influenced and therefore, the toxicity reflects negatively most flora and vegetation.

Istanbul, as Turkey's largest city and commercial capital, has always been positioned as a "world city", as much by its geo-economic location at the crossroads between Europe and the Middle East, as by its spectacular setting, straddling the wooded hillsides on both sides of the Bosphorus (UNCHS, 2001; Tugal, 2008; Altay et al., 2010a; Demir et al., 2010). It has in consequence been the destination of a continuous

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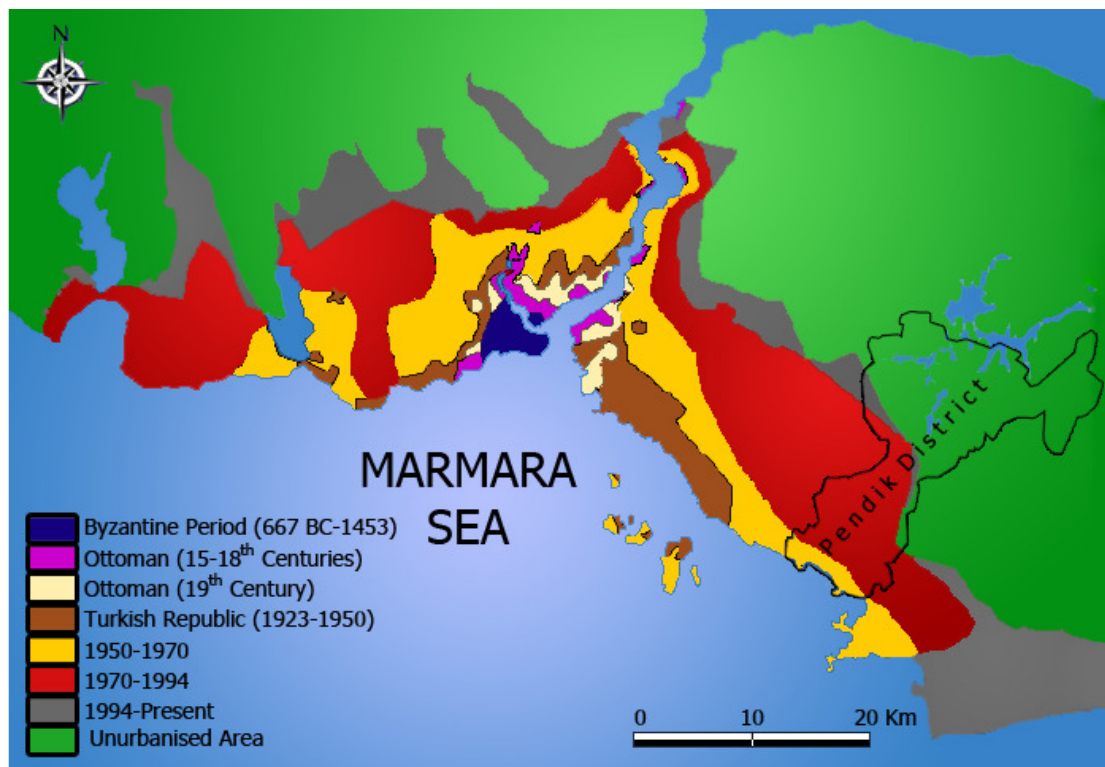


Figure 1. The physical growth of Istanbul in its history and the Pendik District (study area) (modified from Karakuyu, 2006).

Table 1. The demographic data of Istanbul (from 1901 to 2010) (Karpas, 1985; Tugal, 2008; Tuikapp, 2010).

Year	Population
1901	1,159,000
1914-1916	1,600,000
1927	806,863
1940	991,237
1950	1,166,477
1960	1,882,092
1970	3,019,032
1980	4,741,890
1985	5,842,985
1990	7,309,190
1997	9,198,809
2000	10,072,447
2010	12,915,158

National migration for decades, which can be seen in Figure 1. Istanbul's annual urbanization rates since 1950 have persistently exceeded 3%, with a peak of 5.12% annually during the 1970 to 1975 period, making Istanbul the most rapid growing city in Europe (UNCHS, 2005). Today, its population exceeds 12, 915, 158 (6, 498, 997 men, 6, 416, 161 women) and a rate of 3.45% (Table 1) mostly accounting for the countryside migration is

spontaneous, without significant control by local or regional authorities, while there is also no serious metropolitan development plan. At present, more than half of the population of Istanbul lives in slums (UNCHS, 2005).

In this particular study, the Pendik district was carried out as a model with its fast development and urbanization in Istanbul to exhibit the negative effects of urbanization on natural environment. Furthermore, native (indigenous), exotic and cultivated plants, which existed in these urban habitats are mentioned. The most observed archaeophyte and neophyte plants in these taxa, endemic, rare and endangered plant species and their habitats are given in Appendix 1 to 2. It is also pointed out the negative effects of unplanned urbanization and industrialization, which have been made without observing ecologic necessities on natural and the precautions on these subjects.

General information

Location

The Pendik district is located on the Anatolian (Asia) side of Istanbul 40°52'39 N, 29°15'05 E, on the north coast of the Marmara Sea. Total land area is 203 km², which includes some countryside areas inland (Figure 1). Neighboring districts are Sancaktepe, Sultanbeyli and

Table 2. The demographic data of the Pendik District (from 1927 to 2009). (Governorship, 2010; Municipality, 2010; Tuikapp, 2010).

Years	Population
1927	2,000
1940	4,172
1950	7,910
1960	13,963
1970	27,419
1980	48,219
1990	295,651
1997	344,064
2000	389,000
2010	520,486

Kartal to the west, Çekmeköy to the north-west, Şile to the north, Tuzla to the east. Additionally, Kocaeli City locates to the east and Marmara Sea to the south. Ömerli Dam Lake constitutes a border with Pendik and Sancaktepe, Çekmeköy and Şile Districts (Governorship, 2010).

History

According to ancient records, the Ancient Macedonians lived in the area over 5,000 years ago; it became a Roman settlement in 753 BCE, and through conquests became even more culturally universal. The town was taken over by the Seljuk Turks in 1080, and recaptured by the Byzantines in 1086. Pendik became to the dominance of the Ottomans after the Aydos Castle has been conquered in the reign of Orhan Bey in the year 1328. During the attacks towards the East at the reign of Yıldırım Bayezid, the Anatolian Region of Istanbul has been taken by the Byzantium a few times and Pendik changed holder. After the conquest of Istanbul by Fatih Sultan Mehmet (Mehmet the Conqueror), Pendik became dominant under Ottoman Empire and will remain so until the 20th century (Governorship, 2010).

Population

The population of Pendik increased rapidly over the last three decades. While in 1927, the population was around 2,000 it reached 48,219 in 1980. After 1980, the population increased faster and according to the 2010 data, the population is now 520,486 (262,859 men-257,627 women) (Tuikapp, 2010; Governorship, 2010). The Demographic data from 1927 to 2009 is given in Table 2. Until the 1970s Pendik was a rural area, far from the city (Figure 2). Today Pendik is a crowded mix of working class housing (especially towards the E5 motorway) with more expensive apartments with sea views along the coast (Governorship, 2010; Municipality, 2010).

Economy

Pendik was always a retreat from the city and by the 20th century was peppered with holiday and weekend homes of Istanbul's wealthy. The Ömerli Dam constructed in the year 1975, and the Pendik District became one of the most important energy resources of Istanbul. In the Great Nazım Plan, which was approved in the year 1980, aimed at the regulation of industry in Istanbul and which was prepared with a scale of 1/50.000, Pendik and Kurtköy was given a place with a total area of 400h. The Pendik Dockyard and Heavy Industrial Plants have played a great role in the development of Pendik with the population it attracts, besides its contribution to the economy of the county since the year 1982. According to 2009 data, there are 5,658 large and small business firms in the Pendik District and 2,022 of them are showing activity in production sectors while 1,242 of them are building societies. In addition to the Ömerli Dam, Sabiha Gökçen Airport and Formula 1 Area (Istanbul Park), affects the economy of Pendik positively. Today, Pendik is one of the most important industrial areas of Istanbul and it is projected to be a major urban and industrial area in the future (Yasar and Ozyigit, 2009; Municipality, 2010).

Topography

Pendik has a rough terrain and the land area turns into the hills (Ballica, Agılbayırı and Karabayır Hills) through the north side, while it is flat at the seacoasts. There are three brooks (Riva, Ballica and Büyükdere) and there is a big dam (Ömerli) in the district (Yasar and Ozyigit, 2009; Municipality, 2010).

Geology

There were epirogenic movements until the end of Paleozoic era, and then the research area was in active tectonic influences from end of the Paleozoic to end of upper Miocene eras in the research area. The layers turned into curved, broken or partially pressed structures as a result of the tectonic effects. The directions of the layers are Southwest-Northeast. Gradients are in northwest and southwest dimensions and between 14 and 60°. The Paleozoic older units are generally younger from north to south (Altay et al., 2010a).

Soil

The most part of the study area consisted of brownish forest soil without lime, which is generally formed under forests, and the remaining parts are alluvial soil, and brownish soil without lime. Furthermore, the seacoast has

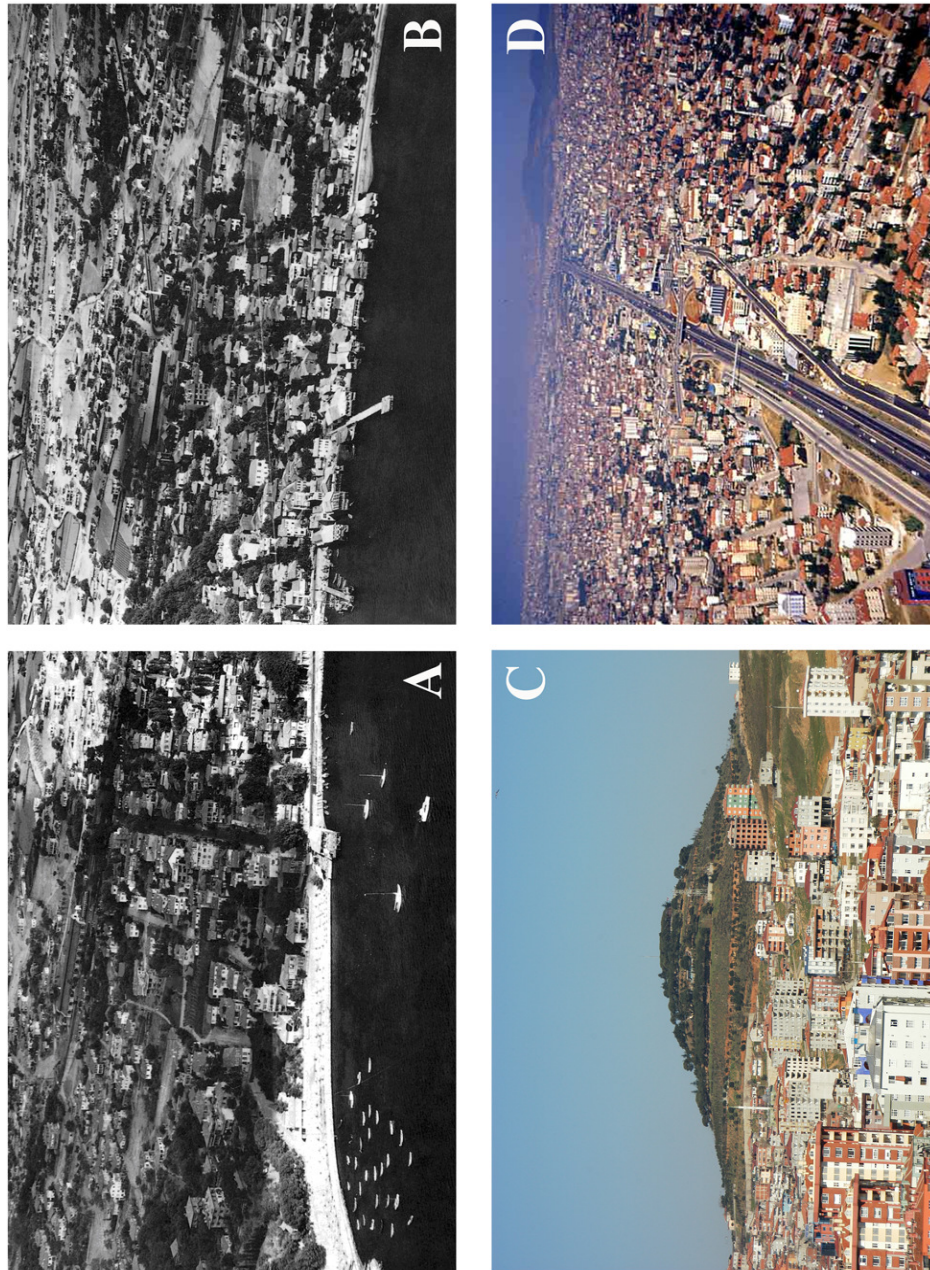


Figure 2. The fast urbanization in the Pendik district. A: 1950s; B: 1970s; C: 1990s and D: 2010s.

partially sandy and clay soils, and there are limestone and quartz on the Hills (Yasar and Ozyigit, 2009; Municipality, 2010).

Climate

The climate of this research area is a typical four-season continental climate of the Mediterranean Region. The Mediterranean character is associated with the annual distribution of precipitation, being high during the winter

months and having a drought period of 3 or 4 months in summer (Figure 3) (Altay et al., 2010a).

The continental climatic element is attributed to the high amplitude of annual temperature that exceeds 40°C. January and February are the coldest months (mean low -3.2°C) while July and August are the warmest (mean high 28.5°C). Information about the climate was derived from the meteorological station of Göztepe-Kadıköy, which is sited near the study area. Precipitation mostly occurs in winter and for the period 1963 to 2004, the mean annual temperature and the mean annual

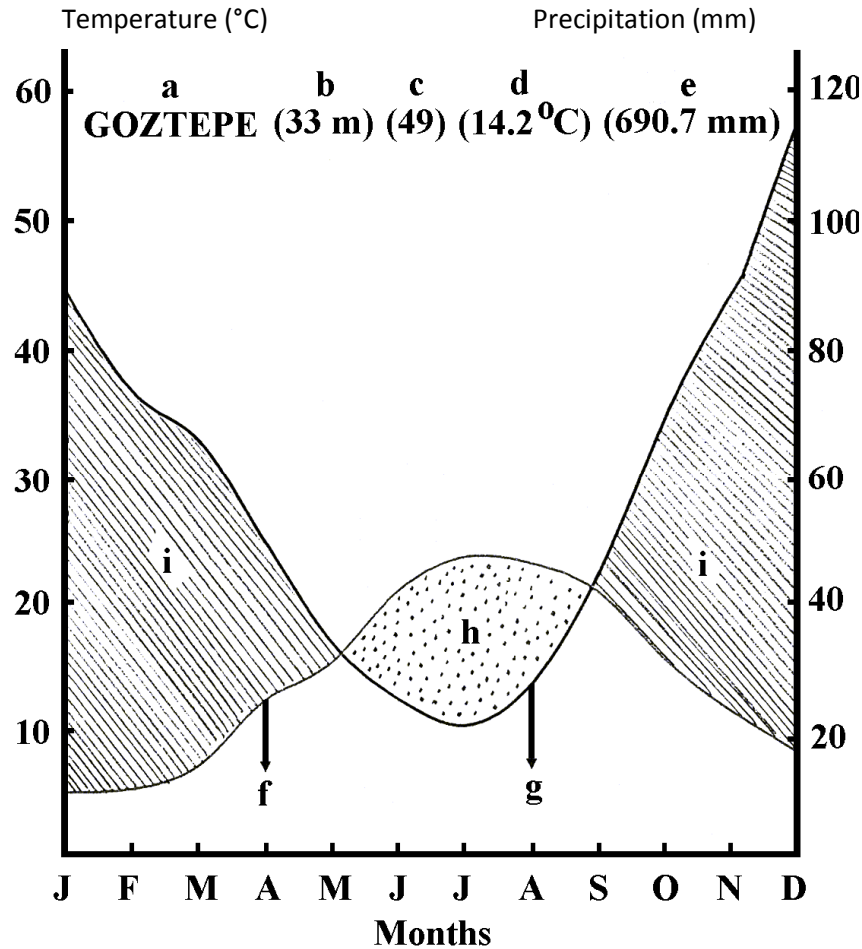


Figure 3. Ombrothermic diagram of the research area a: Name of the meteorological station; b: altitude of the meteorological station; c: meteorological observation time (year); d: average temperature (annual); e: average precipitation (annual); f: temperature curve; g: precipitation curve; h: drought period; i: precipitated period (Altay et al., 2010a).

precipitation were 14.2°C and 690.7 mm, respectively (DMI, 2010). Extreme winter temperature (<0°C) is usual in the area and the late frost danger is generally present. In relation to the Mediterranean bioclimatic divisions, the area belongs to the humid zone with cold winter (Yasar and Ozyigit, 2009; Altay et al., 2010a; DMI, 2010).

MATERIALS AND METHODS

The plant samples collected in the Pendik District are the materials of this study. The inventory of the flora was conducted from March to July between the years 2003 to 2009. The grasslands, rocky sites, shrub lands and forests were also inventoried each year. Two extra visits at the study area; once early in spring and a second, late in autumn each year, contributed to the identification of early and late growing species. The plant specimens were identified by using "Flora of Turkey and the East Aegean Islands" (Davis 1965-1985; Davis et al., 1988; Guner et al., 2000) and preserved in MÜFE (Marmara University, Sciences and Arts Faculty) herbarium.

The flora is listed in Appendix 1 to 2 and the floristic list is arranged in alphabetical order as family, genera and species. Life forms [phanerophytes (Ph); chaemaphytes (Ch); hemicyptophytes (H); therophytes (Th); geophytes (G)] were determined according to Raunkiaer system (Raunkiaer, 1934). Phytogeographical origins [Euro-Siberian (Euro.-Sib.), Irano-Turanian (Ir.-Tur.), Mediterranean (Medit.), East Mediterranean (E. Medit.)] are noted with the scientific names of collected species. In addition, the most observed archaeophyte and neophyte plants in these taxa are given Appendix 1 to 2.

In this study, distribution of taxa (widespread or cosmopolitan), exotic and cultivated plants, endemic, rare, endangered, medicinal and poisonous species and are also given in Appendix 1-2 (Bailey, 1949; Mataraci, 2004; Yucel, 2005). The categories and criteria of the rare and endangered species were mentioned according to "Red Data List" of International Union for the Conservation of Nature and Natural Resources (IUCN, 2010) and "Red Data Book of Turkish Plants" (Ekim et al., 2000).

Poisonous and medicinal plants of both native and exotic taxa, which were collected in the Pendik District was mentioned as marking (*) for poisonous and (**) for medicinal in Appendix 1 to 2. The poisonous plants were arranged according to Secmen and

Leblebici (1987), Baytop (1989) and Ozturk et al. (2008), while the medicinal plants were arranged according to Baytop (1984) and Baytop and Kadioglu (2002).

RESULTS

In this research, a total of 538 vascular plant taxa were fixed in the research area. Among them, 418 native species were belonged to 276 genera and 76 families, and 120 exotic and cultivated species were belonged to 101 genera and 56 families (Appendix 1 to 2). It was determined that 331 native species (79.19%) were belonged to dicots while 80 native species (19.14%) to monocots. Four native species (0.96%) were belonged to Pteridophyta and three native species (0.71%) to gymnospermae.

The following families were represented by the largest number of native species respectively and are as follows: Asteraceae (64 species, 15.31%), Fabaceae (43 species, 10.29%) and Poaceae (38 species, 9.09%). Literature indicates that Asteraceae family members have the highest number of taxa in the flora of Turkey and most parts of the Central Europe and Asia (Davis, 1965, 1985; Shaltout and El-Sheikh, 2002; Antipina, 2003; Amanatidou, 2005; Yarci et al., 2007; Maxwell, 2009; Altay et al., 2010a; Osmar et al., 2010). The most common genera were *Trifolium* (13 species 3.11%), *Ranunculus* (8 species 1.91%), *Crepis*, *Euphorbia* and *Juncus* (6 species 1.44%). The determinations of life forms showed that the largest groups were therophytes (43.78%) and hemicryptophytes (27.99%) for native plants. The percentages of other life forms were as follows: geophytes (14.11%), phanerophytes (9.81%), chamaephytes (3.11%) and helophytes (1.2%). As it is known, therophytes and hemicryptophytes are widespread where Mediterranean climate is predominant (Akman and Ketenoglu, 1987; Altay et al., 2010a; Osmar et al., 2010).

The most common phytogeographical elements were found as Medit. El. (52 species, 12.44%), Euro-Sib. El. (47 species 11.24%) and E. Medit. El. (14 species, 3.35%) for native plants in the Pendik district. This can be attributed to the fact that the research area is mostly affected by the Mediterranean climate. It is known that the Northern side of Istanbul is partly affected by the oceanic climate and this situation can be as a result of the growing plant taxa belonging to Euro-Sib. El. in the Pendik district (Altay et al., 2010a). In the study area, nine species (2.15%) were cosmopolitan and eighty-nine species (21.29%) were widespread. It was also observed that eight taxa were endemic (1.91%).

The most common native plant species were *Calendula arvensis* L. (Asteraceae), *Stellaria media* (L.) Vill. subsp. *media* (Caryophyllaceae) and *Erodium cicutarium* (L.) L'Hérit subsp. *cutarium* (Geraniaceae) in early spring, especially in March and April, *Sinapis arvensis* L. and *Rapistrum rugosum* (L.) All. (Brassicaceae) from April to

the beginning of June, *Chenopodium album* L. (Chenopodiaceae), *Lolium perenne* L., *Cynodon dactylon* (L.) Pers var. *dactylon* (Poaceae) in the entire summer. Additionally, *Parietaria judaica* L. (Urticaceae) which has a wide distribution in Istanbul was collected from walls (Altay et al., 2010b). Among the collected taxa, eight of them were endemic (all of them endangered) and five of them were rare species. Additionally, 97 of the collected plant taxa were poisonous (75 natural, 22 exotic and cultivated) and 118 of them were medicinal (93 natural, 25 of exotic and cultivated). In the research area, three taxa were found within the Bern Convention (The Convention on the Conservation of European Wildlife and Natural Habitats), which was signed in Switzerland in 1979 and became effective on 1st June 1982 were *Trifolium pachycalyx* Zoh. (Fabaceae), *Onosma proponticum* Aznav. (Boraginaceae) and *Colchicum micranthum* Boiss. (Liliaceae) (Bern, 1979; Ozhatay et al., 2003).

DISCUSSION

Despite Pendik being a fast-developing and urbanized district, present study show that it has a great number of rich plant taxa (Appendix 1 to 2). In addition to the effects of Mediterranean climate, temperature range (four-season climate), water availability (rain regime, many seasonal brooks and the Marmara Sea) and topographic differences (from sea level to the Aydos Hill) seem to be related with the rich plant diversity. The morphological and physiological adaptation ability of the plants, the livestock preferences and various stress factors also resulted to high niche differentiation among the plant species and thus to a high floristic diversity in urban ecosystems (Amanatidou, 2005; Altay et al., 2010a). Furthermore, wild-growing plant species (crop and garden weeds) and spontaneously occurring ornamental plants escaped from original cultivations, contribute the richness of plant species as well (Zerbe et al., 2003; Altay et al., 2010a).

Although, the flora could be rich in urban habitats, fast growing urbanization can cause problems to the survival of some species. In the Pendik District, while *Centaurea hermanni* F. Hermann (Asteraceae), *Lemna minor* L. (Lemnaceae), *Cephalanthera longifolia* (L.) Fritsch, *Neotinea masculata* (Desf.) Stearn, *Orchis papilionacea* L., *Orchis laxiflora* Lam., *Orchis tridentate* Scop. subsp. *lactea* (Poir.) Rouy (Orchidaceae) were present in 1960's, most of them can not be observed today (Baytop, 1962). Furthermore, *Crocus pestalozzae* Boiss. (Iridaceae), *Colchicum micranthum* Boiss. (Liliaceae), *Iris sintenisii* Janka (Iridaceae), *Verbascum bugulifolium* Lam. (Scrophulariaceae), *Sternbergia lutea* (L.) Ker-Gawl. ex Sprengel, *Galanthus gracilis* Celak. (Amaryllidaceae), *Typha latifolia* L. (Typhaceae), *Phragmites australis* (Cav.) Trin. ex Steudel (Poaceae) and *Juncus* spp.

(Juncaceae) are decreasing rapidly. However, alteration of the natural barrier-beach and water level regulation caused a dramatic decrease in wetland vegetation and wildlife diversity in the Pendik district as well. Additionally, the Pendik District has a larger area when compared to many other districts of Istanbul City and the cities enlargement is mostly occurring after 2000s in this district, especially in the Kurtköy side (Figures 1 to 2). Many buildings; hospitals, schools and public shopping centers for example, built in the district and affect negatively toward the natural flora.

In the study area, an increase of non-native plants, ruderals, cultivated and annuals were observed. With an increasing number of inhabitants, increasing trade and traffic causes the proportion of non-native species in the urban flora to increase (Pysek, 1998; Garcia-de-Lomas et al., 2010; Altay et al., 2010a). The species, which are directly or indirectly imported to an area through human activity, sometimes cover more frequently than native plants (Zerbe et al., 2003; Altay et al., 2010a). The plants below are good samples for this situation; *Hyacinthus orientalis*, *Tulipa species* (Liliaceae), *Cydonia oblonga*, *Eriobotrya japonica*, *Prunus avium*, *P. cerasus*, *P. domestica*, *P. persica*, *Pyrus communis* (Rosaceae), *Acer negundo* (Aceraceae), *Robinia pseudoacacia* (Fabaceae), *Celtis australis* (Ulmaceae), *Platanus orientalis* (Platanaceae) and *Juglans regia* (Juglandaceae) in the Pendik District. Kowarik (1992) stated that the most frequent non-native species on wasteland, built up areas, green spaces, forests and wetlands of Berlin, Germany were *Robinia pseudoacacia*, *Acer negundo* and *Prunus serotina*. These trees were introduced to Europe from North America in the 18th and 19th century and spread over a wide range of areas and habitats inside and outside of the settlements (Zerbe et al., 2003; Kowarik, 1992).

Like many other fast developing metropolitans, most parts of Istanbul and the Pendik district are under both positive and negative effects of civilization. In the study area, Ömerli Dam, Sabiha Gökçen Airport and Formula 1 Area (Istanbul Park) affected the flora and vegetation in negative ways, especially some endemic plants such as *Lathyrus undulatus*, *Trifolium pachycalyx*, *Senecio castagneanus*, *Onosma proponticum* and *Crocus pestalozzae* are decreased as the result of these projects.

In many cities, plantation with exotic and non-native plants negatively changes the natural habitats. In general, immigrants bring seeds from their previous habitats and after sowing them and plantation of plants, the flora becomes richer, but neutrality looses (Altay et al., 2010a). The following plant taxa can be given as good samples of this situation; *Thuja orientalis*, *Chamaerops excelsa*, *Chamaecyparis lawsoniana*, *Agave americana*, *Eucalyptus camaldulensis*, *Lantana camara* "Aulanche", *Diospyros lotus* and *Opuntia ficus-indica*. Furthermore, in the inner sides of the city, temporary wastelands can provide space for a large

number of species and communities such as *Phragmites australis* and *Thypha latifolia*. (Altay et al., 2010a; Osma et al., 2010). In some cases this situation can be reversed. Sometimes immigrants consume and reduce some plants for ethnobotanically uses, as a result of their conventions in previous habitats. It is known that *Erica* spp. has usage in traditional broom making and in the Pendik District; some immigrants reduced these species for this aim. Moreover, illegal tree cuttings by some villagers who are in lower economical levels reduced *Pinus sylvestris* trees in Aydos Forest, in the Pendik District. In addition, Aydos Forest is a desirable place with its clean and fresh air, closeness of the city center and the view of Marmara Sea and Princess Islands, also shows a result of illegal forest cuttings, while fires for building construction are also affecting the natural habitat.

As it is mentioned by Ausden (2007), management of urban green spaces usually places a higher value on recreational and educational needs and community involvement. Habitats in urban areas have also rarely been subject to long periods of traditional management. Most practical differences in management between habitats in urban areas, gardens, and backyards and those in the wider countryside are due to their small size, requiring them to be managed more intensively to maintain their interest, and the impracticality of using grazing or burning to arrest succession.

The main techniques for managing habitats in urban spaces, gardens, and backyards or wildlife are:

1. Minimizing or avoiding harmful gardening practices, especially pesticide use;
2. Planting flowers, shrubs, and trees that provide good wildlife habitat;
3. Creating features that provide good habitat for wildlife such as ponds, marshy areas, wildflower meadows, and piles of logs and other plant material.

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APPENDIX 1: LIST OF NATURAL PLANTS**PTERIDOPHYTA****Equisetaceae**

Equisetum ramosissimum Desf. (*), G, widespread

Hypolepidaceae

Pteridium aquilinum (L.) Kuhn (*), G

Ophioglossaceae

Ophioglossum lusitanicum L. G

Polypodiaceae

Polypodium vulgare L. subsp. *vulgare* (**), G

SPERMATOPHYTA/GYMNOSPERMAE**Pinaceae**

Pinus sylvestris L Ph, Euro-Sib. El.

Cupressaceae

Cupressus sempervirens L. (**), Ph
Juniperus oxycedrus L. subsp. *oxycedrus* (**), Ph,
widespread

SPERMATOPHYTA /ANGIOSPERMAE**Dicotyledoneae:****Ranunculaceae**

Anemone coronaria L. (*), G, Medit. El.
Clematis vitalba L. Ph
Nigella damascena L. (**), Th
Ranunculus constantinopolitanus (DC.) d'Urv. (*), H,
widespread
R. ficaria L. subsp. *calthifolius* (Reichb.) Arc. (*), (**), G
R. marginatus d'Urv. var. *trachycarpus* (Fisch. & Mey.)
Azn. (*), Th
R. marginatus d'Urv. var. *marginatus* (*), Th
R. muricatus L. (*), Th
R. ophioglossifolius Vill. (*), Th
R. paludosus Poir. (*), G
R. repens L. H, widespread

Papaveraceae

Chelidonium majus L. (*), H, Euro-Sib. El.
Fumaria officinalis L. (*), (**), Th, Archaeophyte
Glaucium flavum Crantz (**), H, widespread
Papaver dubium L. Th, Archaeophyte
P. rhoeas L. (**), Th, widespread, Archaeophyte

Brassicaceae

Alyssum minus (L.) Rothm. var. *minus* Th, widespread
Arabidopsis thaliana (L.) Heynhold Th
Calepina irregularis (Asso) Thellung Th
Capsella bursa-pastoris (L.) Medik. Th, cosmopolitan,
Archaeophyte
Cardaria draba (L.) Desv. subsp. *draba* H, widespread
Diplotaxis tenuifolia (L.) DC. (*), H
Erophila verna (L.) Chevall. Th
Lepidium graminifolium L. H
Neslia apiculata Fisch. Th, widespread
Raphanus raphanistrum L. (**), Th, Archaeophyte
Rapistrum rugosum (L.) All. Th, Neophyte
Sinapis arvensis L. Th, widespread, Archaeophyte
Sisymbrium irio L. Th
S. officinale (L.) Scop. (*), Th, widespread, Archaeophyte
Teesdalia coronopifolia (Berg.) Thellung Th, Medit. El.
Thlaspi perfoliatum L. Th, widespread

Resedaceae

Reseda lutea L. var. *lutea* Th, widespread

Cistaceae

Cistus creticus L. (**), Ch, Medit. El.
C. salviifolius L. Ch

Violaceae

Viola kitaibeliana Roem. & Schult. Th
V. sieheana Becker Th

Polygalaceae

Polygala vulgaris L. (**), H, Euro-Sib. El.

Portulacaceae

Portulaca oleracea L. Th

Illecebraceae

Scleranthus perennis L. H

Caryophyllaceae

Cerastium anomalum Waldst. & Kit. Th
C. dubium (Bast.) O.Schwarz Th
C. diffusum Pers. subsp. *diffusum* Th
C. glomeratum Thuill. Th, cosmopolitan
C. gracile Duf. Th
Dianthus leptopetalus Willd. H
Moenchia mantica (L.) Bartl. subsp. *mantica* Th
Petrorhagia prolifera (L.) Ball. & Heywood Th
Polycarpon tetraphyllum (L.) L. Th
Sagina maritima Don Th
Silene vulgaris (Moench) Garcke var. *vulgaris* (**), H
S. nocturna L. Th, Medit. El.
Spergularia rubra (L.) J. & C. Presl Th, widespread
Stellaria holostea L. H, Euro-Sib. El.
S. media (L.) Vill. subsp. *media* (**), Th
S. media (L.) Vill. subsp. *pallida* (Dumort.) Aschers. & Graebn. (**), Th
Telephium imperati L. subsp. *orientale* (Boiss.) Nyman H

Polygonaceae

Polygonum arenastrum Bor. Th
P. aviculare L. (**), Th, cosmopolitan
P. equisetiforme Sibth. & Sm. H
P. lapathifolium L. Th
Rumex acetosella L. (*), (**), H, cosmopolitan
R. crispus L. (*), (**), H
R. pulcher L. H

Chenopodiaceae

Atriplex hastata L. Th
Chenopodium album L. subsp. *album* var. *album* Th
C. botrys L. Th
Salsola ruthenica L. Th

Amaranthaceae

Amaranthus albus L. Th, Neophyte
A. blitoides S. Wats. Th, Neophyte
A. deflexus L. H, Neophyte
A. graecizans L. subsp. *sylvestris* (Vill.) Aschers & Schweinf. (**), Th
A. retroflexus L. (*), Th, Neophyte

Hypericaceae

Hypericum calycinum L. (*), Ch
H. cerastoides (Spach) Robson (*), Ch
H. perforatum L. (*), (**), H

Malvaceae

Alcea pallida Waldst. and Kit. H
Lavatera punctata All. Th
Malva neglecta Wallr. Th, Archaeophyte
M. nicaeensis All. Th
M. sylvestris L. (**), H, Archaeophyte

Linaceae

Linum bienne Miller (*), Th, Medit. El.
L. corymbulosum Reichb. Th, Medit. El.
L. trigynum L. (*), Th, Medit. El.

Geraniaceae

Erodium ciconium (L.) L'Herit. Th
E. cicutarium (L.) L'Hérit subsp. *cutarium* Th, Archaeophyte
E. malacoides (L.) L'Herit. Th, Medit. El.
Geranium dissectum L. Th, Archaeophyte
G. molle L. subsp. *molle* Th, Archaeophyte
G. pyrenaicum Burm. fil. H
G. robertianum L. Th
G. sanguineum L. G, Euro-Sib. El.

Oxalidaceae

Oxalis corniculata L. Th, cosmopolitan, Neophyte

Zygophyllaceae

Tribulus terrestris L. (*), (**), Th

Simaroubaceae

Ailanthus altissima (Miller) Swingle (*), Ph, Neophyte

Rhamnaceae

Paliurus spina-christi Miller (**), Ph

Anacardiaceae

Pistacia atlantica Desf. (**), Ph
P. terebinthus L. subsp. *terebinthus* (**), Ph

Fabaceae

Calicotome villosa (Poiret) Link. Ph, Medit. El.

Cercis siliquastrum L. var. *siliquastrum* Ph
Genista tinctoria L. (*), (**), Ph, Euro-Sib. El.
Dorycnium pentaphyllum Scop. subsp. *herbaceum* (Vill.) Rouy H
Hippocrepis unisiliquosa L. Th
Hymenocarpus circinnatus (L.) Savi Th, Medit. El.
Lathyrus digitatus (Bieb.) Fiori H, E. Medit. El.
L. undulatus Boiss. Endemic (VU), H.
Lotus corniculatus L. var. *corniculatus* (*), H, widespread
L. corniculatus L. var. *tenuifolius* L. H, widespread
Lupinus varius L. Th, Medit. El.
Medicago lupulina L. Th, widespread
M. orbicularis (L.) Bart. Th
M. polymorpha L. var. *vulgaris* (Benth.) Shinnars Th, widespread
M. sativa L. H
Melilotus alba Desr. (*), Th, widespread
M. officinalis (L.) Desr. (*), Th, widespread, Archaeophyte
Onobrychis caput-galli (L.) Lam. Th, widespread, Medit. El.
O. oxydonta Boiss. H, widespread
Ononis spinosa L. subsp. *leiosperma* (Boiss.) Sirj. (**), H, widespread
Ornithopus compressus L. Th, Medit. El.
Psoralea bituminosa L. H, Medit. El.
Robinia pseudoacacia L. (*), (**), Ph, Neophyte
Scorpiurus muricatus L. Th
Spartium junceum L. (*), (**), Ph, Medit. El.
Teline monspessulana (L.) C. Koch. Ph, Medit. El.
Trifolium angustifolium L. var. *angustifolium* Th
T. campestre Schreb. Th, widespread
T. constantinopolitanum Ser. Th, widespread
T. dubium Sibth. Th
T. nigrescens Viv. subsp. *petrisavii* (Clem.) Holmboe Th, widespread
T. pachycalyx Zoh. Endemic (DD), Th
T. pratense L. H
T. resupinatum L. var. *resupinatum* Th
T. scabrum L. Th, widespread
T. stellatum L. var. *stellatum* Th
T. subterraneum L. Th
T. tomentosum L. var. *tomentosum* Th
T. uniflorum L. G
Vicia bithynica (L.) L. Th
V. cracca L. subsp. *cracca* H, Euro-Sib. El.
V. hybrida L. Th, widespread
V. sativa L. subsp. *nigra* (L.) Ehrh. var. *segetalis* (Thuill) Ser. (*), Th

Rosaceae

Agrimonia eupatoria L. G, widespread
Crataegus monogyna Jacq. subsp. *monogyna* (**), Ph
Geum urbanum L. (**), H, widespread
Mespilus germanica L. (**), Ph, Archaeophyte
Potentilla reptans L. H, widespread
P. inclinata Vill. H

Prunus spinosa L. subsp. *dasyphylla* (Schur) Domin (*), (**), Ph, Euro-Sib. El.
Rosa canina L. (**), Ph
Rubus canescens DC. var. *canescens* Ch, widespread
R. canescens DC. var. *glabratus* (Godron) Davis & Meikle Ch, widespread, Euro-Sib. El.
Sanguisorba minor Scop. H
Sarcopoterium spinosum (L.) Spach (**), Ch, E. Medit. El.

Lythraceae

Lythrum salicaria L. H, widespread, Euro-Sib. El.

Onagraceae

Epilobium angustifolium L. H, widespread

Cucurbitaceae

Ecballium elaterium (L.) A. Rich. (*), (**), H, Medit. El., Neophyte

Crassulaceae

Sedum hispanicum L. var. *hispanicum* Ch

Apiaceae

Ammi visnaga (L.) Lam. (**), Th
Berula erecta (Huds.) Coville H
Bupleurum tenuissimum L. Th
Conium maculatum L. (*), Th
Daucus guttatus Sm. Th
Eryngium campestre L. var. *virens* Link (**), H, widespread
Ferulago confusa Velen. H, Euro-Sib. El.
Foeniculum vulgare Miller (**), H
Scandix pecten-veneris L. Th, widespread, Archaeophyte
Tordylium apulum L. Th, Medit. El.
Torilis nodosa (L.) Gaertner Th

Araliaceae

Hedera helix L. (*), (**), Ph

Cornaceae

Cornus mas L. (**), Ph

Caprifoliaceae

Sambucus ebulus L. (*), (**), H, Euro-Sib. El.

Valerianaceae

Centranthus ruber (L.) DC. (**), G, Neophyte

Dipsacaceae

Knautia orientalis L. Th, E. Medit. El.

Scabiosa columbaria L. subsp. *columbaria* var. *columbaria* H

S. columbaria L. subsp. *ochroleuca* (L.) Celak. var. *ochroleuca* (L.) Coulter H

Asteraceae

Achillea millefolium L. subsp. *millefolium* (*), (**), H

Anthemis cf. *chia* L. (**), Th

A. cretica L. subsp. *tenuiloba* (DC.) Grierson H

A. tinctoria L. var. *tinctoria* H, widespread

Bellis perennis L. (*), H, Euro-Sib. El.

Calendula arvensis L. Th

Carduus nutans L. subsp. *leiophyllus* (Petr.) Stoj. & Stef. H

Carduus pycnocephalus L. Th

Carlina corymbosa L. H, Medit. El.

Carthamus lanatus L. (**), Th, widespread

Centaurea diffusa Lam. Th, widespread, Medit. El.

C. iberica Trev. ex Sprengel Th, widespread

C. solstitialis L. subsp. *solstitialis* (*), Th, widespread

C. virgata Lam. H

Chondrilla juncea L. var. *juncea* (**), H, widespread

Chrysanthemum segetum L. Th

Cichorium intybus L. (**), H, widespread

Cirsium creticum (Lam.) d'Urv. subsp. *creticum* H, E. Medit. El.

C. polycephalum DC. Endemic (CR), H

Cirsium vulgare (Savi) Ten H

Conyza canadensis (L.) Cronquist Th, Neophyte

Crepis foetida L. Th

C. sancta (L.) Babcock Th, widespread

C. micrantha Czer. Th, widespread

C. neglecta L. Th

C. vesicaria L. Th, Medit. El.

C. zacintha (L.) Babcock Th, Medit. El.

Crinitaria linosyris (L.) Less. H, Euro-Sib. El.

Crupina crupinastrum (Moris) Vis. Th, widespread

Doronicum orientale Hoffm. G

Echinops ritro L. H

Erigeron acer L. subsp. *pycnotrichus* (Vierh.) Grierson H

Filago vulgaris Lam. Th

Helminthotheca echioides (L.) Holub Th

Hypochoeris glabra L. Th

Inula aschersoniana Janka H

I. oculus-christi L. (*), G

I. salicina L. G, widespread

I. viscosa (L.) Aiton (*), (**), H, Medit. El.

Lactuca saligna L. (*), Th

L. serriola L. H, widespread, Euro-Sib. El.

Lapsana communis L. Th

Leontodon tuberosus L. G, Medit. El.

Matricaria chamomilla L. (**), Th

Pallenis spinosa (L.) Cass. Th

Picnomon acarna (L.) Cass. Th, widespread, Medit. El.

Picris hieracioides L. Th, Euro-Sib. El.

Scariola viminea (L.) F. W. Schmiat H, widespread

Scolymus hispanicus L. (**), H, Medit. El.

Scorzonera cana (C.A. Mayer) Hoffm. var. *cana* H, widespread

Senecio castagneanus DC. H, E. Medit. El., Endemic (LR (Ic))

S. vulgaris L. (*), (**), Th, Archaeophyte

Silybum marianum (L.) Gaertner (**), H, Medit. El.

Sonchus asper (L.) Hill subsp. *glaucescens* (Jordan) Ball Th, widespread

S. oleraceus L. Th

Taraxacum gracilens Dahlst. Ch, Rare (DD)

T. hyberniforme van Soest Ch

T. officinale Weber (**), Ch

Tolpis virgata (Desf.) Bertol. H, Medit. El.

Tragopogon longirostris Bisch. ex Schultz var. *longinostris* H

Tussilago farfara L. (**), G, widespread, Euro-Sib. El.

Urospermum picroides (L.) F.W. Schmidt Th, Medit. El.

Xanthium spinosum L. (**), Th, Neophyte

X. strumarium L. subsp. *cavanillesii* (Scouw) D. Löve &

P. Dansereau (*), (**), Th

Ericaceae

Arbutus unedo L. (**), Ph

Calluna vulgaris (L.) Hull (**), Ph, Euro-Sib. El.

Erica arborea L. Ph

E. manipuliflora Salisb. Ph

Primulaceae

Anagallis arvensis L. var. *arvensis* (*), Th, Archaeophyte

A. arvensis L. var. *caerulea* (L.) Gouan (*), Th

Primula vulgaris Huds. subsp. *sibthorpii* (Hoffmanns.) W.

W. Sm. & Forrest (*), H, Euro-Sib. El.

Oleaceae

Olea europaea L. var. *sylvestris* (Miller) Lehr. (**), Ph

Phillyrea latifolia L. Ph, Medit. El.

Apocynaceae

Nerium oleander L. (*), (**), Ph, Medit. El.

Asclepiadaceae

Cionura erecta (L.) Griseb. (*), Th, widespread, E. Medit. El.

Convolvulaceae

Calystegia sepium (L.) R. Br. G
Convolvulus arvensis L. (**), H, Archaeophyte
C. cantabrica L. H

Boraginaceae

Anchusa azurea Miller var. *azurea* H
Borago officinalis L. (**), Th
Echium italicum L. (*), H
E. plantagineum L. (*), Th
E. vulgare L. (*), H, Archaeophyte
Heliotropium europaeum L. (*), Th
Myosotis ramosissima Rochel ex Schultes Th
M. sicula Guss. Th
Onosma proponticum Aznav. H, Endemic (EN), E. Medit. El.
Trachystemon orientalis (L.) G. Don (**), G, Euxine El.

Solanaceae

Datura stramonium L. (*), (**), Th, cosmopolitan, Neophyte
Solanum dulcamara L. (*), (**), H, widespread, Euro-Sib. El.
S. nigrum L. subsp. *nigrum* (*), (**), Th, cosmopolitan, Archaeophyte

Gentianaceae

Blackstonia perfoliata (L.) Hudson Th
Centaureum erythraea Rafn. H
C. maritimum (L.) Fritsch Th, Medit. El.
Cicendia filiformis (L.) Delarbre Th, Medit. El.

Scrophulariaceae

Antirrhinum majus L. subsp. *majus* H
Bellardia trixago (L.) All. Th
Cymbalaria muralis Gaertner Rare (VU), Th
Kickxia spuria (L.) Dumort subsp. *integrifolia* (Brot.) Fernandes Th

Linaria genistifolia (L.) Miller H
Parentucellia latifolia (L.) Caruel subsp. *latifolia* Th
Verbascum bugulifolium Lam. H, Euro-Sib. El.
V. lasianthum Boiss. ex Bentham H, widespread
Veronica chamaedrys L. H, Euro-Sib. El.
V. cymbalaria Bodard Th, Medit. El.
V. hederifolia L. Th, widespread
V. persica Poiret Th, Neophyte
V. polita Fries Th, widespread

Verbenaceae

Verbena officinalis L. H, widespread

Lamiaceae

Ballota nigra L. subsp. *anatolica* P. H. Davis Endemic (LR), H, Ir.-Tur. El.
Calamintha nepeta (L.) Savi subsp. *glandulosa* (Req.) P.W. Ball. H
Lamium amplexicaule L. Th, widespread, Euro-Sib. El., Archaeophyte
L. purpureum L. var. *purpureum* Th, Euro-Sib. El., Archaeophyte
Lavandula stoechas L. subsp. *stoechas* (**), Ph, Medit. El.
Mentha longifolia (L.) Hudson subsp. *typhoides* (Brig.) Harley var. *typhoides* H, widespread
M. pulegium L. (**), H
Origanum vulgare L. (**), H
Prunella laciniata (L.) L. H, Euro-Sib. El.
P. vulgaris L. H, widespread, Euro-Sib. El.
Salvia verbenaca L. Ch
Sideritis montana L. subsp. *montana* Th, widespread, Medit. El.
Stachys arvensis (L.) L. Th
S. byzantina C. Koch H, Euro-Sib. El.
Teucrium chamaedrys L. (*), (**), G
Thymus longicaulis C. Presl subsp. *longicaulis* var. *longicaulis* (**), Ch

Plantaginaceae

Plantago coronopus L. subsp. *coronopus* Th, Euro-Sib. El.
P. lagopus L. Th, Medit. El.
P. lanceolata L. (**), H
P. major L. subsp. *intermedia* (Gilib.) Lange (**), H, widespread

Elaeagnaceae

Elaeagnus angustifolia L. (**), Ph, widespread

Lauraceae

Laurus nobilis L. (**), Ph, Medit. El.

Santalaceae

Osyris alba L. H, Medit. El.

Aristolochiaceae

Aristolochia clematitis L. (**), G, Euro-Sib. El.

Euphorbiaceae

Euphorbia exigua L. var. *exigua* Th
E. helioscopia L. (*), (**), Th, Archaeophyte
E. peplus L. var. *peplus* (*), Th
E. peplus L. var. *minima* DC. (*), Th
E. segeriana Necker subsp. *niciciana* (Borbas ex Novak) Rech. fil. (*), H
E. amygdaloides L. var. *amygdaloides* (*), (**), G, Euro-Sib. El.
Mercurialis annua L. (*), Th

Urticaceae

Parietaria judaica L. (**), H, widespread, Neophyte
Urtica dioica L. (**), H
U. pilulifera L. (*), Th, Medit. El., Neophyte

Platanaceae

Platanus orientalis L. (**), Ph, widespread

Fagaceae

Quercus cerris L. var. *cerris* (*), Ph
Q. petraea (Mattuschka) Liebl. subsp. *iberica* (Steven ex Bieb.) Krassiln. Ph
Q. coccifera L. (*), (**), Ph, Medit. El.
Q. pubescens Willd. (*), Ph

Corylaceae

Carpinus betulus L. Ph, Euro-Sib. El.

Salicaceae

Populus alba L. Ph, Euro-Sib. El.
P. tremula L. (**), Ph, widespread, Euro-Sib. El.

Salix alba L. (**), Ph, widespread, Euro-Sib. El.

Rubiaceae

Cruciata laevipes Opiz H, Euro-Sib. El.
Galium aparine L. Th
Rubia tinctorum L. (*), (**), H, widespread, Ir.-Tur. El.
Sherardia arvensis L. Th

Monocotyledoneae:**Alismataceae**

Alisma lanceolatum With. H, widespread

Sparganiaceae

Sparganium erectum L. subsp. *neglectum* (Beeby) K. Richter H, Euro-Sib. El.

Liliaceae

Asparagus acutifolius L. (**), H, Medit. El.
Allium guttatum Steven subsp. *guttatum* G
A. neapolitanum Cyr. G, Medit. El.
A. paniculatum L. subsp. *paniculatum* G, Medit. El.
A. scorodoprasum L. subsp. *rotundum* (L.) Stearn G, widespread, Medit. El.
Asphodelus aestivus Brot. (**), G, Medit. El.
A. fistulosus L. G, Medit. El.
Colchicum lingulanthum Boiss. & Spruner ex Boiss. (*), G, E. Medit. El.
C. micranthum Boiss. (*), Endemic (EN), G.
Gagea bohemica (Zauschn.) Schultes & Schultes fil. G
Muscari comosum (L.) Miller G, widespread
M. neglectum Guss. G, widespread
Ruscus aculeatus L. var. *angustifolius* Boiss. (*), (**), G
Ornithogalum sigmoideum Freyn et Sint. (*), G, Euro-Sib. El.
O. umbellatum L. (**), G
Scilla autumnalis L. G, Medit. El.
Smilax excelsa L. (**), Ph

Amaryllidaceae

Galanthus gracilis Celak (*), G, E. Medit. El.
Sternbergia lutea (L.) Ker-Gawl. ex Sprengel (*), G, widespread

Iridaceae

Crocus biflorus Miller subsp. *biflorus* G, E. Medit. El.

C. pestalozzae Boiss. Endemic (VU), G, E. Medit. El.
Iris sintenisii Janka G, Euro-Sib. El.
I. suaveolens Boiss. & Reuter G, E. Medit. El.
Romulea columnae Seb. & Mauri subsp. *columnae* G,
 Medit. El.

Orchidaceae

Orchis mascula (L.) L. subsp. *pinetorum* (Boiss. &
 Kotschy) G. Camus G, widespread, E. Medit. El.
Serapias politisii Renz. G
S. vomeracea (Burnm.fil.) Brig. subsp. *orientalis* Greuter
 G, E. Medit. El.
Spiranthes spiralis (L.) Chevall. G

Dioscoreaceae

Tamus communis L. (*), (**), Ph

Typhaceae

Typha latifolia L. He

Juncaceae

Juncus articulatus L. G, Widespread, Euro-Sib. El.
J. conglomeratus L. He
J. effusus L. He, cosmopolitan
J. heldreichianus Marsson ex Parl. G
J. inflexus L. He, Widespread
J. striatus Schousboe ex Meyer G
Luzula multiflora (Ehrh. ex Retz.) Lej. H, widespread,
 Euro-Sib. El.

Cyperaceae

Carex flacca Schreber subsp. *serrulata* (Biv.) Greuter G,
 Medit. El.
Eleocharis palustris (L.) Roemer & Schultes G,
 widespread
Isolepis cernua (Vahl) Roemer & Schultes Th

Poaceae

Aegilops geniculata Roth. Th, Medit. El.
Agrostis capillaris L. var. *capillaris* H
Aira caryophyllea L. Th, Euro-Sib. El.
Alopecurus myosuroides Hudson Th, Archaeophyte
Anthoxanthum odoratum L. H
Avena barbata Pott ex Link Th
A. sterilis L. subsp. *sterilis* Th
Brachypodium sylvaticum (Hudson) P. Beauv. H,

widespread, Euro-Sib. El.
Briza maxima L. Th
B. media L. G
Bromus hordeaceus L. subsp. *hordeaceus* Th,
 Archaeophyte
B. sterilis L. Th, widespread, Archaeophyte
Catabrosa aquatica (L.) P. Beauv. G, widespread
Catapodium rigidum (L.) C. E. Hubbard ex Dony Th
Chrysopogon gryllus (L.) Trin. subsp. *gryllus* H,
 widespread
Cynodon dactylon (L.) Pers var. *dactylon* (**), H,
 Archaeophyte
Cynosurus cristatus L. H, Euro-Sib. El.
C. echinatus L. Th, Medit. El.
Dactylis glomerata L. subsp. *hispanica* (Roth) Nyman H
Dasypyrum villosum (L.) Candargy Th, Medit. El.
Digitaria sanguinalis (L.) Scop. Th, Archaeophyte
Echinochloa crus-galli (L.) P. Beauv. Th, Archaeophyte
Holcus lanatus L. H, Euro-Sib. El.
Hordeum bulbosum L. G, widespread
H. murinum L. subsp. *leporinum* (Link) Arc. var.
leporinum Th
Lolium multiflorum Lam. Th, Neophyte
L. perenne L. H, Euro-Sib. El.
Melica ciliata L. subsp. *ciliata* G, widespread
M. uniflora Retz. G, Euro-Sib. El.
Panicum miliaceum L. Th, Archaeophyte
Paspalum paspalodes (Michx.) Scribner G
Phalaris aquatica L. H
Phragmites australis (Cav.) Trin. ex Steudel (**), He,
 widespread, Euro-Sib. El.
Poa annua L. Th, cosmopolitan
P. bulbosa L. G
Rostraria cristata (L.) Tzvelev Th
Setaria verticillata (L.) P. Beauv. Th
S. viridis (L.) P. Beauv. Th, widespread, Archaeophyte

APPENDIX 2: List of exotic and cultivated plants

Aceraceae

Acer negundo L. Neophyte
A. palmatum Thumb.
A. platanoides L.
A. pseudoplatanus L. (**), Rare (VU)

Agavaceae

Agave americana L.
A. americana L. "Marginata"
Yucca gloriosa L.

Aizoaceae

Carpobrotus acinaciformis Folia

Amaranthaceae

Amaranthus caudatus L.

Amaryllidaceae

Narcissus pseudonarcissus L. "Dutch Master" (*)

Apocynaceae

Vinca major L. (*)

Aquifoliaceae

Ilex aquifolium L. (*), Rare (VU)

Araliaceae

Fatsia japonica (Thunb.) Decne. & Planch.
Hedera colchica (C. Koch) C. Koch "Sulphur Heart" (*)
H. helix L. "Aureovariegata" (**)

Arecaceae

Chamaerops excelsa Thumb.
Phoenix canariensis Chabaud

Asteraceae

Aster amellus L.
Bellis perennis L. "Pompenette Red"
Calendula officinalis L. Neophyte
Chrysanthemum maximum Ramond
Cosmos bipinnatus Cav.
Santolina chamaecyparissus L.
Senecio cineraria DC.
Tagetes erecta L.

Berberidaceae

Berberis thunbergii (Koch) DC. var. *atropurpurea*
 Chenault

Bignoniaceae

Catalpa bignonioides Walt.
Campsis radicans (L.) Seem.

Brassicaceae

Brassica oleracea L. var. *acephala* DC.

Buddleiaceae

Buddleia davidii Franch.

Buxaceae

Buxus sempervirens L. (*), (**)
B. sempervirens L. "Aurea-variegata"

Cactaceae

Opuntia ficus-indica (L.) Mill.

Caprifoliaceae

Lonicera japonica Thunb.
Viburnum opulus L. "Sterile"
V. tinus L.

Celastraceae

Euonymus japonicus L. "Aureo-variegatus"

Convolvulaceae

Ipomea purpurea (L.) Roth
I. tricolor Cav.

Cupressaceae

Chamaecyparis lawsoniana (Murr.) Parl.
Cupressus arizonica Greene
Juniperus horizontalis Moench
Thuja occidentalis L. "Globosa"
T. orientalis L.

Ebenaceae

Diospyros kaki L.

Fabaceae

Acacia cyanophylla Lindl.
A. dealbata Link.
Albizia julibrissin (Willd.) Durazz. Rare (VU)
Caesalpinia gilliesii (Wall. ex Hook.) Wall. ex D. (*)
Cassia acutifolia Del.
Gleditsia triacanthos L.
Robinia hispida L.
R. pseudoacacia L. "Umbraculifera"

Sophora japonica L. var. *pendula* Loud. (*)
Wisteria sinensis (Sim.) DC. (*)

Geraniaceae

Pelargonium zonale (L.) L'Herit. ex Ait.

Hippocastanaceae

Aesculus hippocastanum L. (*), (**), Neophyte

Iridaceae

Iris germanica L. Neophyte

Juglandaceae

Juglans regia L. (**)

Lamiaceae

Rosmarinus officinalis L.

Liliaceae

Hyacinthus orientalis L. (*), (**)

Lythraceae

Lagerstroemia indica L.

Magnoliaceae

Magnolia grandiflora L.

Malvaceae

Hibiscus syriacus L.

Meliaceae

Melia azedarach L. (*)

Moraceae

Ficus carica L. (**)
Morus alba L. 'Pendula'
M. nigra L.

Myrtaceae

Eucalyptus camaldulensis Dehnh.

Nyctaginaceae

Mirabilis jalapa L. (*)

Oleaceae

Forsythia x intermedia Zabel
Fraxinus excelsior L. (**)
Ligustrum vulgare L. (*)
Jasminum fruticans L.
Syringa vulgaris L. Neophyte

Oxalidaceae

Oxalis floribunda Linn.

Passifloraceae

Passiflora coerulea L.

Pinaceae

Abies nordmanniana (Stev.) Spach (**)
Cedrus libani A. Richard
C. deodora (Roxb.) Loud.
C. atlantica (Endl.) Manetti ex Carrière "Glauca"
Picea orientalis (L.) Link.
Pinus pinea L. (**)

Pittosporaceae

Pittosporum tobira Ait.

Platanaceae

Platanus acerifolia (Ait.) Willd.

Portulacaceae

Portulaca grandiflora Hook.

Primulaceae

Primula vulgaris Huds.

Punicaceae

Punica granatum L. (**)

Rosaceae

Chaenomeles japonica (Thunb.) Lindl. ex Spach

Cotoneaster franchetii Boiss.

Cydonia oblonga Miller (**)

Eriobotrya japonica (Thunb.) Lindl. (**)

Fragaria vesca L. (**)

Kerria japonica (L.) DC. "Pleniflora"

Laurocerasus officinalis Roemer (*), (**)

Malus floribunda Sieb.

M. sylvestris Miller (**)

Persica vulgaris Miller (*), (**)

Prunus avium L. (*)

P. cerasus L. (*), (**)

P. divaricata Ledeb. subsp. *divaricata*

P. domestica L. (*), (**)

Pyracantha coccinea Roemer (**)

Pyrus communis L. (**)

Rosa damascena Miller (**)

R. multiflora Thumb.

Rutaceae

Citrus sinensis (L.) Osbeck

Salicaceae

Salix babylonica L.

Sapindaceae

Koelreuteria paniculata Laxm.

Saxifragaceae

Hydrangea macrophylla (Thumb.) Ser. (*)

Philadelphus coronarius L. Neophyte

Ulmaceae

Celtis australis L. (**)

Tamaricaceae

Tamarix parviflora DC.

Taxaceae

Taxus baccata L. (*)

Tiliaceae

Tilia tomentosa (DC.) Moench

Verbenaceae

Lantana camara L. "Aulanche" (*)

Vitex agnus-castus L. (**)

Violaceae

Viola x wittrockiana Gams.

Vitaceae

Parthenocissus quinquefolia (L.) Planch. (*), Neophyte

Vitis vinifera L. (**)