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Research article

Floristic and ecological characteristics of biotopes in Bayrampaşa District (İstanbul)

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Abstract

In this study, the biotope types and their floristic compositions of Bayrampaşa, one of the rapidly developing and increasingly populated districts of İstanbul, were investigated. The characteristics of biotopes and an inventory of the natural and exotic taxa they contain were created, and also the ecological characteristics of the biotopes were included. Biotopes in the district were visited in different seasons of the year, and plant samples were collected in accordance with herbarium techniques, then dried and identified. The list of exotic taxa was taken from the Bayrampaşa Directorate of District Parks and Gardens. In addition, soil samples were taken and chemical analyses were made. The main biotopes identified in the district are; parks, gardens of public buildings, industrial areas, railways, roadsides and abandoned lands. Out of a total of 236 taxa identified in these biotopes, 121 of them were natural and 115 were exotic. *Asteraceae*/*Compositae* came to the fore with the number of natural taxa it contains and *Rosaceae* with the number of exotic taxa it contains. As a result of the study, the importance of urban ecological studies in such regions was emphasized by drawing attention to biotopes that are under pressure with rapid urbanization, especially in rapidly developing cities.

Keywords: *Bayrampaşa; biotope types; ecological planning; urban ecology; urban flora*

1. Introduction

Scientists who investigated living creatures and their interactions with their environment looked for answers in forests, tropics, and uninhabited islands, which are isolated biotopes from human communities, and thought that the fauna and flora of cities were not regular due to the human factor (Altan, 1997). However, cities can have surprising richness in terms of ecological diversity when compared with wild habitats of similar sizes. In fact, many studies have shown that cities have a richer and more diverse flora than the surrounding rural areas. (Sukopp and Werner, 1983; Pyšek and Pyšek, 1990; Kühn, et al., 2004). When the reason for this rich biodiversity was investigated, it was revealed that this was the result of high habitat diversity (Gilbert, 2012). As urban biodiversity is understood, research interest in cities has increased and urban ecology has gained a serious momentum in recent years (Sukopp, 2002). Urban ecology is a sub-branch of ecology and its main purpose is to reveal and examine the direct or indirect effects of cities and urbanization on the natural environment (Gilbert, 1989).

Today, more than 56% of the world's population lives in cities, and for the first time in 2007, the world urban population exceeded the rural population (The World Bank, 2019). With the increasing population and expanding cities, a large part of the environmental problems have been transferred to the cities, and it has become important to protect natural areas in cities and making them sustainable at the same time. Cities are the most differentiated ecosystems of the earth and resemble large laboratories allowing investigations by containing many ecological factors (Collins et al., 2000). There are remarkable differences in urbanization levels of developing and developed economies. While developed countries have completed their infrastructures, solved their urbanization problems and controlled the urban population, the situation in developing economies is the opposite and today more than 2/3 of the population in these countries live in cities. 30 of the 60 cities with a population of over 5 million

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in the world are in the developing Asian countries (United Nations, 2018).

Urban ecosystems can be damaged by floods, storms and other heavy weather events as well as human activities, rapid urbanization and similar factors. However, natural habitats can also be damaged by urbanization and face the risk of extinction, which consequently, brings great risks to wildlife (Sahin, 2002). Protecting and improving the ecological and visual values of cities, ensuring the continuity of green spaces in the city and protecting the natural balance may be possible with a plan (Ozay, 2014). In this direction, the first conservation method that comes to mind is to protect natural treasures such as water, vegetation and soil from possible damage and then to increase and develop green areas. Initially, it is necessary to determine the biotopes that have an important place in the urban ecosystem and to reveal the ecological and floristic characteristics of these biotopes to achieve the aforementioned goal (Altay et al., 2010).

A few studies examining the ecological and floristic properties of the major biotope types in İstanbul can be mentioned. Among these, studies that examine the amount of green areas in central districts of İstanbul (Aksoy, 2001) and examining seasonal flowers and bulbous plant practices in public green spaces in İstanbul (Onat, 2012) can be cited. In addition, studies that examine the urban ecology and floristic characteristics of İstanbul districts include Eminönü and Fatih (Sahin, 2002), Kadıköy (Osma et al., 2010), Kartal (Altay et al., 2010), Pendik (Eskin et al., 2012), Üsküdar (Mutlu, 2004), Ümraniye (Borekci, 2008), Sarıyer (Gullu, 2009), Beşiktaş (Kabaalioglu, 2013) and Zeytinburnu (Yapar, 2013). Two recent studies in the neighboring city of Kocaeli also reveals floristic characteristics of railways (Altay et al., 2015) and other urban transport areas along with the hemeroby degrees (Beyhan et al., 2020).

Bayrampaşa, which is one of the central and major districts of İstanbul, has experienced a rapid population growth in recent years and natural areas have been damaged and eventually different biotopes have appeared (Anonymous, 2015). A study similar to that of the abovementioned studies has not been conducted for Bayrampaşa District, and for this reason this study is aimed to reveal the district's floristic and ecological features. Thusly, it is intended to draw attention to the negative consequences of unplanned urbanization and industrialization on urban ecology and to create awareness in order to take necessary measures.

2. Materials and methods

2.1. General information of study area

2.1.1. Location

Bayrampaşa, located at 41° 01' north and 28° 55' east coordinates, is neighboring Gaziosmanpaşa District to the North, Eyüp District to the East, Zeytinburnu District to the South and Esenler District to the West. The district is located on Thrace lands, the European side of İstanbul (Fig. 1).

2.1.2. Population and demographics

As of 2020, Bayrampaşa District with a total population of 274,735 has a surface area of 9.61 km^2 and a population density of 28,588 people/km^2 (Table 1). The proportion of females and males in the population is 50.37% and 49.63% respectively. Since the district is centrally located in terms of culture, shopping, education and transportation, the active population can reach and even surpass 1 million during the day. In the 1970s, the agriculture-dominated district economy is now dominated by industry and trade. The Bosnian population, which increased as a result of immigration from Yugoslavia in the 1960s, forms the basis of the socio-cultural structure of the district (Endeksa, 2020).

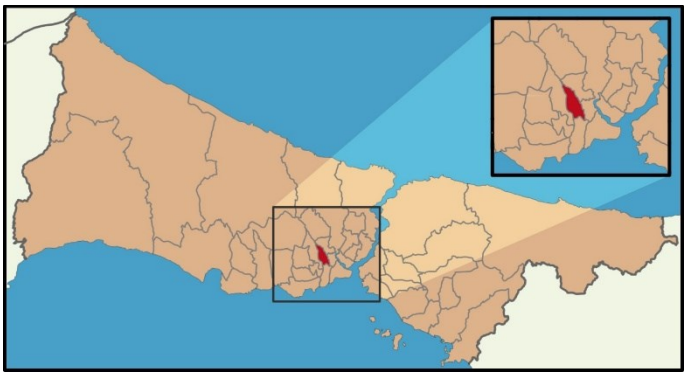

Fig. 1. Location of Bayrampaşa District within İstanbul (Anonymous, 2009).

Neighborhood	Population
Yıldırım	53315
Kartaltepe	44022
Muratpaşa	34105
Altıntepsi	28674
Kocatepe	21549
Cevatpaşa	19243
Yenidoğan	18675
Terazidere	15791
Orta	15255

Table 1
Population of Bayrampaşa neighborhoods in descending order (Endeksa, 2020).

2.1.3. History

During the conquest of İstanbul in 1453, the district, which served as a headquarters and rallying center, gained importance in the defense of the region with the barracks, shelters and hospitals being built subsequently. Immigration from Balkan countries as a result of Ottoman Empire losing its power in the region, significantly increased the population of the district. With subsequent immigration from Yugoslavia in the 1950s and 1960s, the current sociocultural structure of the district has been shaped. The reason why Bayrampaşa is a popular destination as a residential area for the immigrants is the number factories built in those years.

The name of the district comes from Bayram Pasha, one of the grand viziers of Sultan Murad the 4th. Maltepe Military Hospital built in 1827 and Ferhat Pasha Farm, which was established at the end of the 19th century, are among important historical heritage in the region. Unfortunately, there are not many traces left from the aqueducts and water scales in Bayrampaşa that were built during the reign of Sultan Süleyman the Magnificent (Bayrampasa Bld., 2020).

2.1.4. Topography and geology

When we look at the general topographical features, İstanbul is in the form of an eroded plateau extending along Kocaeli and Çatalca Peninsulas (Fig. 2 and 3). (IBB, 2007, 2020). The research area is located in Çatalca or Trakya peneplain in the European side of İstanbul Province.

Fig. 2. Topographic map of İstanbul showing mainly the European side with Black Sea on the top (IBB, 2007).

Fig. 3. Lidar (Light Detection and Ranging) imaging of a large part of İstanbul city center, including Bayrampaşa District, comprising the historic peninsula, Bosphorus strait in the middle and Golden-Horn (IBB, 2020).

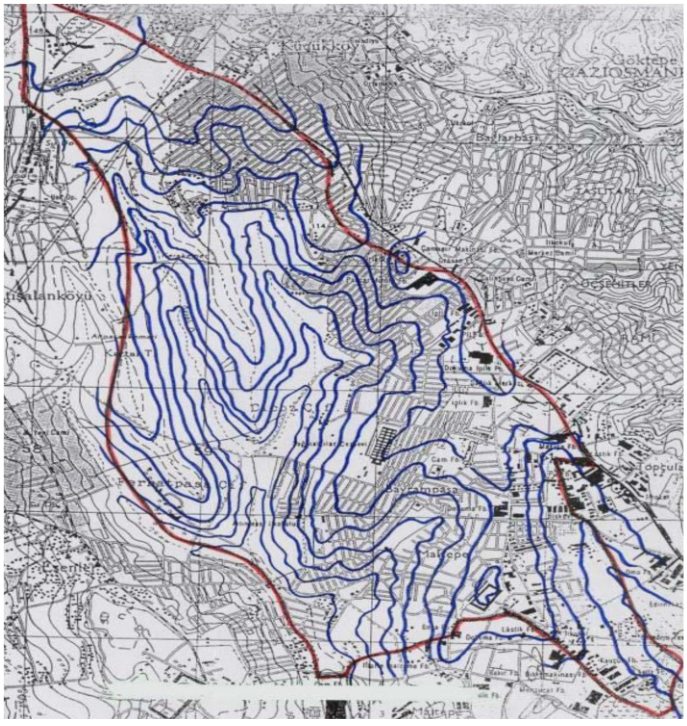

Fig. 4. Topography of Bayrampaşa District (Karabas, 2010).

This peneplain contains river valleys with broad bases, except for a few hills exceeding 200 meters on the Büyükçekmece -Karaköy line from the Bosphorus. When we look at the topography of Bayrampaşa District, we observed an altitude of up to 145 m from sea level and decreasing towards the South. This altitude goes down to 30 m in the Northwest (Fig. 5) (Anonymous, 2015).

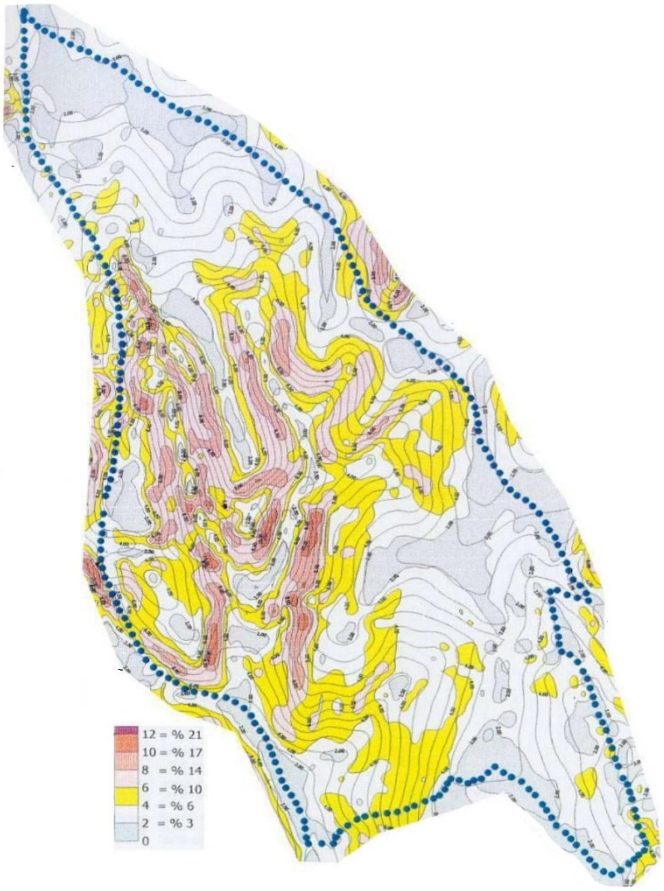

Fig. 5. The gradient map of Bayrampaşa District (Karabas, 2010).

The settlements in the district are generally established on a land with a slope of 0-15% and there are very few settlements on the land with a slope of more than 20% (Fig. 6) (Karabas, 2010).

2.1.5. Soil properties

There are lime-free brown forest and brown forest soils around Bayrampaşa District. These shallow soils contain A and C horizons. Below them is the D horizon, which is the bedrock. The B horizon, known as the accumulation zone, is not generally seen around Bayrampaşa. Some problems such as stony and rocky soils of the district and high erosion limit agricultural activities (Ozay, 2014).

2.1.6. Climatological properties

The province of İstanbul, which is geographically a transitional area, displays a complex structure in terms of climate. Generally, the city's climate is a combination of oceanic climate, Mediterranean climate and continental climate. A large part of the city has a mild version of the Mediterranean climate and generally has hot and dry summers (Yildizci, 1978). High relative humidity is observed in the district due to its proximity to the sea. According to the data we have obtained, the hottest months

are July (23.2 ºC) and August (23.1 ºC), the coldest months are January (5.1 ºC) and February (5.5 ºC). Average temperature is 13.8 ºC annually. The lowest and highest temperature values are seen in January (-12.6 ºC) and August (38.5 ºC) (Anonymous, 2011). Severe winds with an average speed of 2.9-4.2 m/s are seen in the district on 71 days of the year. In the district, 28.3% (181.4 mm) of the annual precipitation falls in autumn, 21.4% (136.5 mm) in spring and 39.5% (252.2 mm) in winter. Annual relative humidity average is 75%. The vegetation months are the 8 months between April and November with an average temperature of +10.0 ºC or higher temperatures. The amount of precipitation falling within the vegetation period is 293 mm (Anonymous, 2011).

2.1.7. Status of green areas and parks

There are many green areas and parks arranged for public use in the district. Many parks have basketball courts, children's playgrounds, volleyball courts and other sports fields. Istanbulites preferred to go to recreation areas and gardens until the mid-19th century (Osma et al., 2010). Today, there are 70 parks and children's playgrounds, 36 median-strips, 15 basketball courts and 28 ornamental pools in Bayrampaşa District. The amount of green space in the district, which was 124,687 m^2 in 1994, has been increased to 572,133 m^2 today as a result of the efforts and works carried out by the Parks and Gardens Directorate. While the amount of green area per person in Bayrampaşa District was 0.75 m^2 in 1994, today this value has been increased to 4.05 m^2. There is an 849% increase in the amount of green areas in the district as a result of intensive work (Anonymous, 2015). List of green areas, parks and playgrounds of the district are given in Appendix 1.

2.1.8. Natural vegetation, exotic plants and plant diversity

The dominant vegetation of the region is maquis and pseudomaquis, which in time, replaced the oak and chestnut forests that were destroyed as a result of urbanization (Avci, 2008). Since the northern parts of İstanbul are colder than the south, the number of species is fewer in these regions (Yaltirik and Uluocak, 1973). The most important of the families that make up the natural vegetation of the biotopes in the study area are *Asteraceae*/*Compositae* comprising 13.18% of all the species followed by *Leguminosae*/*Fabaceae* family with 10.85%, *Poaceae*/*Gramineae* with 10.08% *Brassicaceae/Cruciferae* family with 5.4%, *Rosaceae* family with 3.1%, *Lamiaceae*/*Labiatae* family with 2.32% and other families totaling the remaining 52.71%.

While significant changes have been observed in native plant species due to human factors in the living areas of the city, it is known that many exotic plant species that are not naturally found in the city have moved to this environment. For various reasons, some grown trees were removed from their original places and planted in different areas (Ozay, 2014). Although they do not have a natural distribution area in İstanbul, cypress trees are widely spread and have an important place in the geographical view of the city. Cypresses attracted attention not only because of the precious wood, but also because of its appearance that appeal to the people (Yaltirik et al., 1997). There are many cypress trees in Bayrampaşa District, especially Bayrampaşa City Park. Persian silk tree (*Albizzia julibrissin* Durazz.), magnolia (*Magnolia grandiflora* L.), Chinese wisteria (*Wisteria sinensis* DC.), horse chestnut (*Aesculus hippocastanum* L.) and palm (*Washingtonia robusta* H.Wendl.) are just some of the exotic trees located in Bayrampaşa District of İstanbul. Although there is no natural distribution area in İstanbul, one of the species that has been transported to Europe from İstanbul is the Persian silk tree. The seeds of Persian silk tree, whose scientific name is *A. julibrissin*, were transported from İstanbul to Florence by an Italian named Filippo Degli Albizzi in 1745. Scientific definition of this plant was made by botanists in 1787 (Ozay, 2014). Among the exotic species brought to İstanbul more recently are *Ginkgo* and *Robinia* species, red flowered horse chestnut, American sweetgum tree, magnolia and cypress species (Yaltirik et al., 1997).

The species that stands out as an invasive species in the city is *Acer negundo* L., known as the ash-leaf maple which has a natural distribution area in North and Central America. Among the maple species, *A. negundo* has been reported to have the most allergenic pollens (Medrzycki, 2007). *A. negundo*, having a rapid growing nature, was planted on parks, gardens and roadsides in Europe during the 17th century.

With around 2500 vascular plant species, İstanbul has a richer diversity than the Netherlands (1600 species) which has a land area 8 times larger than İstanbul, and the UK (1850 taxon) which is 47 times larger than İstanbul, whereas having almost the same level of plant diversity with Poland, which is 60 times larger. In addition, there are 23 species endemic to İstanbul flora and 40 species endemic to Turkey flora in İstanbul (Ozhatay and Keskin, 2007). 112 Important Plant Areas in Turkey is determined (Ozhatay et al., 2005) and 5 of them are located on the European side of İstanbul (Ozay, 2014). However, our study area Bayrampaşa District, does not contain any important plant areas.

2.1.9. Biotopes

The regions selected as inspection areas for our study from the biotope types within Bayrampaşa District (Table 2).

Table 2
Biotope types and inspection areas in the study area.

Biotope Type	Study Area
Parks (Recreational Areas)	Şehit Hüseyin Usluca Park, Şehit Cehar Dudayev Park, Nasrettin Hoca Park, Kıyı Sokak Park, İsmet Paşa Park, Sabri Akpınar Park, Cezaevi Yolu Park, Şehit Zafer Gürcan Işık Park, Alia İzzet Begoviç Park, Recep Tayyip Erdoğan Park, Çevre Park, Dr. Nihat Ergin Park, Avas Köyü Yolu Park, Kocatepe Metro Park, Bayrampaşa Şehir Park, Yıldırım Bayezit Park, Sevgi Park, Cumhuriyet Park, Dr. Sadık Ahmet Park, Sancak Park, Nermin Divoviç Park
Gardens of Government Buildings	Bayrampaşa State Hospital, Sabit Büyükbayrak Vocational and Technical Anatolian High School, Yıldırım Police Station
Industrial Zones	Bayrampaşa Industrial Zone
Railroad Stations	Kocatepe Metro Station, Sağmalcılar Metro Station
Roadsides	Trans European Motorway connections
Abandoned Lands	Land located across Bayrampaşa City Park, Land across Hidayet Türkoğlu Sports Complex, Land across Sabit Büyükbayrak Vocational and Technical Anatolian High School

2.2. Research methods

The research materials are the soil and plant samples collected from Bayrampaşa District along with the documents obtained from related institutions.

Plants growing in some biotope types in Bayrampaşa District are collected at vegetation period and dried by applying herbarium methods, and these collected plant samples were identified several sources but mainly by making use of "Flora of Turkey and the East Aegean Islands [Vol. 1-9 and Supp. Davis, P.H. (Ed) (1965-2001)] (Davis, 1965-1985)". Subsequently, the determination of the species was made definite by comparing the samples found in the Herbarium of Istanbul University Faculty of Science and the Marmara University Faculty of Arts and Sciences. The list of natural plants found in each biotope type is given in alphabetical order at the level of family, genus and species.

Lists of exotic species in biotope types examined in our study were obtained from Bayrampaşa Municipality Directorate of Parks and Gardens and rearranged in alphabetical order using the names from the books "Turkish Dictionary of Plant Names", (Baytop, 1997) and "Manual of Cultivated Plants", (Bailey, 1949). Photographs of the species that grow in the biotopes where our study was conducted (such as parks, road sides, industrial areas, railways, public buildings, abandoned lands) were also taken.

In addition, soil samples were taken from the studied biotope types. For this purpose, they were collected from a depth of about 10 cm with a stainless steel shovel and then labeled and packed into polyethylene bags. The analyses of soil samples were carried out in the Istanbul Municipality Parks and Gardens Directorate Quality Control Research and Development Laboratory in Anatolian side of İstanbul. In line with the reports received, it is understood that all analyses were made under 22 ± 4°C laboratory conditions. The methods used for each parameter in the analysis are presented in Table 3.

Table 3
Methods used in soil analyses.

Parameters	Analytical Method Used
Useful Potassium	TS 8341: 1990
Lime content	TS 8335 ISO 10693: 1996
Ph	Saturation mud
Useful Phosphorus	TS 8340: 1990
EC / Salt%	TS 8340: 1990
Soil Type	Bouyocus Hydrometry Method
Organic Matter	TS 8336: 1990
Ph	TS 8332 ISO 10390: 1995
Water Saturation	TS 8333: 1990

The theoretical data used in our study is obtained from İstanbul Metropolitan Municipality, Anatolian Side Parks and Garden Directorate Quality Control Research and Development Laboratory, İstanbul Metropolitan Municipality Parks Gardens and Green Areas Department European Side Parks and Gardens Directorate, Istanbul Metropolitan Municipality Map Directorate, Bayrampaşa Municipality Parks and Gardens Directorate, State Institute of Statistics İstanbul Regional Directorate, İstanbul Meteorology 1st Region Directorate, and also from the documents published on the official websites of the Directorates and the individuals working in these public institution as well as public and private libraries.

3. Results

The selected research areas from different types of biotopes were shown in Table 3. in materials and methods section of this article.

Biotope types chosen as study areas will be given under the related topics, separate lists of exotic and natural plant taxa determined in each biotope will be presented and additionally bioclimatic property data and soil analyses reports will be shared in Appendix 1.

A total of 6 biotopes were determined within the study area in Bayrampaşa District. A total of 236 taxa 121 of which is native and 115 exotic were identified. Total number of families within the study area was determined as 72. Ratios of native and exotic taxa in respect to the families were presented in Table 4.

Table 4
Distribution of families with the highest number of taxa in Bayrampaşa District.

	Native Taxa	
Family	**Number of Taxa**	**Ratio (%)**
Asteraceae/Compositae	17	14.1
Brassicaceae/Cruciferae	7	5.79
Lamiaceae/Labiatae	3	2.48
Fabaceae/Leguminosae	14	11.57
Pinaceae	3	2.48
Poaceae/Gramineae	13	10.74
Rosaceae	4	3.31
Others	60	49.6
	Exotic Taxa	
Asteraceae/Compositae	3	2.61
Brassicaceae/Cruciferae	0	0
Lamiaceae/Labiatae	3	2.61
Fabaceae/Leguminosae	5	4.35
Pinaceae	8	7
Poaceae/Gramineae	3	2.61
Rosaceae	12	10.43
Others	81	70.43

Number of taxa found in each biotope type is presented in Table 5. Also the comparison of results from studies conducted in other districts of İstanbul is presented in Table 6. The natural taxa that belong to the biotopes that our study was carried out, and the number of different biotopes that these taxa were detected in, can be seen in Appendix 2.

Table 5
Number of taxa found in each biotope type in Bayrampaşa District

Biotope Type	Number of Natural Taxa
Parks and Recreational Areas	79
Gardens of Government Buildings	21
Industrial Zones	32
Railroads	39
Roadsides	62
Abandoned Lands	25

When the soil properties of biotope types in study area were investigated, almost every biotope has high usable phosphorus and usable potassium levels. Parameters with lower values however, were encountered in soils from abandoned lands biotopes.

Table 6
Comparison of result from our study and other studies [Eminönü (Sahin, 2002), Fatih (Sahin, 2002), Kadıköy (Osma et al., 2010), Çatalca (Genc, 2003), Üsküdar (Mutlu, 2004), Kartal (Altay et al., 2010), Ümraniye (Borekci, 2008), Beşiktaş (Kabaalioglu, 2013), Zeytinburnu (Yapar, 2013)] conducted in other districts of İstanbul.

	Family Name				
(%)	***Asteraceae***	***Poaceae***	***Fabaceae***	***Rosaceae***	***Lamiaceae***
Study Area	14.1	10.74	11.57	3.31	2.48
Eminönü	3	3	1	14	2
Fatih	3	3	1	14	2
Kadıköy	15.7	5.5	6.5	6	2.6
Çatalca	13.51	4.50	11.03	5.18	5.63
Üsküdar	7.6	7.6	13.9	5.8	3.13
Kartal	12	6	10	5.4	3.93
Ümraniye	12.08	9.58	12.08	4.58	5.83
Beşiktaş	12.72	10.58	9.09	5.09	2.90
Zeytinburnu	10.22	7.66	6.20	5.85	4.74

4. Discussion

The result of our study reveals *Asteraceae* as the family with the highest number of native taxa and *Rosaceae* as the family with the highest number of exotic taxa. It can be seen that these families are represented with the highest number of taxa in Flora of Turkey as well (Davis, 1965-1985).

It can be noticed that the number of native and exotic species are higher in Parks and Recreational area biotopes which is considered natural since the soil in these biotopes is richer in organic substances and water filtration characteristic of soil is better.

The ratio of the number of species in large families and the ratio of genera with the most taxa, from comparable floristic and ecological studies in İstanbul; Eminönü-Fatih (Sahin, 2002), Kadıköy (Osma et al., 2010), Üsküdar (Mutlu, 2004), Kartal (Altay et al., 2010), Ümraniye (Borekci, 2008), Beşiktaş (Kabaalioglu, 2013) and Zeytinburnu (Yapar, 2013) is similar. We are of the opinion that the reason for this is that the study regions are close to each other and have similar ecological factors.

A total of 873 exotic plants have been identified in 52 important parks, gardens and groves of İstanbul (Yaltirik et al., 1997). If we include the species found in other green areas to this figure, we can conclude that İstanbul has an extremely rich plant species diversity.

There are 79 natural taxa in 70 parks in Bayrampaşa District. The species diversity in the study is not comparable to İstanbul in terms of species richness used in vegetation. The main reason for this situation can be attributed to the soil structure. Investigation of afforestation in the city in Bayrampaşa District was carried out by Aksoy (2002). The plants of Bayrampaşa City Park were researched by Yeler (2004), and the open and green areas of Bayrampaşa District were investigated in terms of quality and quantity by Levend (2008). Thus, important scientific data were obtained for planting the parks and green areas of Bayrampaşa District. These studies have generally been plant centered or vegetation- oriented, and natural flora and soil characteristics have not been studied. This situation is also valid for the works carried out for other parks and green areas of İstanbul.

When some natural taxa determined in our study are evaluated on the basis of species; it is noteworthy that although some taxa are found in almost every biotope, some species are encountered only in certain biotope types. The main reason for this situation may be different ecological tolerances of taxa. While ecologically tolerant species (these are generally invasive taxa) are encountered in different biotope types, species with low ecological tolerance are generally found in a limited number of biotopes.

The hemeroby degrees of some of the biotopes in our area of study are compatible with the hemeroby degrees determined by Sukopp and Weiler (1988). If we evaluate our work area according to the hemeroby scale; we see that H0, H1, H2, H3, H4 and H8 degrees are not present. We can find H5 degree in ruderal areas, H6 degree in small meadows seen between the neighborhoods, H7 degree of hemeroby in lands used in agriculture, and H9 degree in train stations, in all highway arteries and garbage collection areas.

Acidic fertilizers should be preferred for fertilizing in parks. Since nutrient intake will be difficult in soils with pH between 7 and 8, the pH will be lowered with acidic fertilizers to facilitate the nutrient intake of the plants (Fageria & Zimmermann, 1998). The change of soil characteristics and pollution should be checked regularly by taking soil samples. Factors causing soil, water and air pollution should be determined and solutions should be developed. With the pollution map and inventories created, the localities and how to intervene these areas should be determined. Industrial environments should be afforested for natural air treatment and facilities should be established for the disposal of wastes. Bad weather, soil and water conditions reduces the biological diversity and cause disruption of the natural balance. This ultimately affects humans, who are the most important and topmost element of the pyramid of living beings.

Appendix 1

1. Natural Taxa Found in Biotopes of Bayrampaşa

1.1. Natural taxa found in parks and recreational lands biotopes

SPERMATOPHYTA

A. GYMNOSPERMAE

CUPRESSACEAE
Cupressus sempervirens L.
Juniperus communis L.

PINACEAE

Cedrus libani A. Rich
Pinus pinea L.
TAXACEAE
Taxus baccata L.

B. ANGIOSPERMAE
a. MAGNOLIOPSIDA / DICOTYLEDONEAE

APIACEAE / UMBELLIFERAE
Berula erecta (Huds.) Coville

APOCYNACEAE
Nerium oleander L.
Vinca major L.

ASTERACEAE / COMPOSITAE
Anthemis arvensis L.
Bellis perennis L.
Cichorium pumilum Jacq.
Cota altissima (L.) *J.Gay*
Erigeron canadensis L.
Matricaria chamomilla L.
Senecio leucanthemifolius subsp. *vernalis* (Waldst. & Kit.) Greuter
Sonchus oleraceus L.
Taraxacum campylodes G.E.Haglund

BORAGINACEAE
Anchusa azurea Miller
Echium plantagineum L.
E. vulgare L.
Heliotropium europaeum L.

BRASSICACEAE / CRUCIFERAE
Capsella bursa-pastoris (L.) Medik.
Descurainia sophia (L.) Webb Ex Prantl
Draba muralis L.
Raphanus raphanistrum L.

CARYOPHYLLACEAE
Stellaria media (L.) Vill.

CONVOLVULACEAE
Convolvulus arvensis L.

CUCURBITACEAE
Ecballium elaterium (L.) A. Rich.

ELAEAGNACEAE
Elaeagnus angustifolia L.

EUPHORBIACEAE
Euphorbia helioscopia L.

GERANIACEAE
Erodium gruinum (L.) L'Hér.
Geranium molle L.
G. rotundifolium L.

JUGLANDACEAE
Juglans regia L.

LAMIACEAE / LABIATAE
Ballota nigra L. subsp. *anatolica* P. H. Davis
Lamium purpureum L.
Mentha spicata L.

LAURACEAE
Laurus nobilis L.

LEGUMINOSAE / FABACEAE
Cercis siliquastrum L.
Gleditsia triacanthos L.
Lotus tenuis Waldst. & Kit.
Medicago polymorpha var. *vulgaris* (Benth.) Shinners
Melilotus indicus (L.) All.
M. officinalis (L.) Pall.
Robinia pseudoacacia L.
Trifolium campestre Schreb.
T. repens L. var. *repens* L.

MALVACEAE
Malva nicaeensis All.
M. sylvestris L.

MORACEAE
Ficus carica L. subsp. *carica* (All.) Schinz et Thell.
Morus alba L.

OLEACEAE
Jasminum fruticans L.
Ligustrum vulgare L.
Olea europaea L.

OXALIDACEAE
Oxalis articulata Savigny
O. corniculata L.

PLATANACEAE
Platanus orientalis L.

POLYGONACEAE
Rumex acetosella L.

PRIMULACEAE
Anagallis arvensis L.

RANUNCULACEAE
Helleborus orientalis Lam.
Ranunculus marginatus D'Urv.

ROSACEAE
Crataegus monogyna Jacq.
Prunus avium (L.) L.
Rosa canina L.
Rubus sanctus Schreb.

SALICACEAE
Salix alba L.

PLANTAGINACEAE
Cymbalaria muralis Gaertn., B. Mey. & Scherb.
Veronica cymbalaria Bodard
V. persica Poir.

TILIACEAE

Tilia argentea Desf. ex DC.
URTICACEAE
Urtica dioica L.

VIOLACEAE
Viola sieheana W.Becker

VITACEAE
Vitis vinifera L.

b. LILIOPSIDA / MONOCOTYLEDONEAE
ASPARAGACEAE
Muscari neglectum Guss. ex Ten.

POACEAE / GRAMINEAE
Dactylis glomerata L.
Hordeum murinum L.
Lagurus ovatus L.
Phalaris minor Retz.
Setaria italica (L.) P. Beauv.

Appendix 2

1. Taxa that can be found in multiple biotopes

Hordeum murinum L. (*Poaceae/Gramineae*) 6 biotopes
Lamium purpureum L. (*Lamiaceae/Labiatae*) 5 biotopes
Cupressus sempervirens L. (*Cupressaceae*) 5 biotopes
Bellis perennis L. (*Asteraceae/Compositae*) 4 biotopes
Capsella bursa-pastoris (L.) Medik. (*Brassicaceae/Cruciferae*) 4 biotopes
Sinapis arvensis L. (*Brassicaceae/Cruciferae*) 4 biotopes
Convolvulus arvensis L. (*Convolvulaceae*) 4 biotopes
Euphorbia helioscopia L. (*Euphorbiaceae)* 4 biotopes
Malva sylvestris L. (*Malvaceae*) 4 biotopes
Rumex acetosella L. (*Polygonaceae*) 4 biotopes
Ranunculus marginatus D'Urv. (*Ranunculaceae*) 4 biotopes
Veronica persica Poir. (*Plantaginaceae)* 4 biotopes
Festuca heterophylla Lam. (*Poaceae/Gramineae)* 4 biotopes
Juniperus communis L. (*Cupressaceae*) 3 biotopes
Cedrus libani A. Rich (*Pinaceae*) 3 biotopes
Nerium oleander L. (*Apocynaceae*) 3 biotopes
Carduus pycnocephalus L. (*Asteraceae/Compositae*) 3 biotopes
Dittrichia viscosa (L.) *Greuter* (*Asteraceae/Compositae*) 3 biotopes
Raphanus raphanistrum L. (*Brassicaceae/Cruciferae*) 3 biotopes
Elaeagnus angustifolia L. (*Elaeagnaceae*) 3 biotopes
Lotus tenuis Waldst. & Kit. (*Leguminosae/Fabaceae*) 3 biotopes
Muscari neglectum Guss (*Asparagaceae*) 3 biotopes
Dactylis glomerata L. (*Poaceae/Gramineae*) 3 biotopes
Echinochloa cruss-galli (L.) P. Beauv. (*Poaceae/Gramineae*) 3 biotopes
Poa annua L. (*Poaceae/Gramineae*) 3 biotopes
Setaria viridis (L.) P. Beauv. (*Poaceae/Gramineae*) 3 biotopes
Pinus nigra J. F. subsp. *pallasiana* (Lamb.) Holmboe (*Pinaceae*) 3 biotopes
Pinus pinea L. (*Pinaceae*) 3 biotopes

2. Taxa found in only one type of biotope

Ammi visnaga (L.) Lam. (*Apiaceae/Umbelliferae*)
Berula erecta (Huds.) Coville (*Apiaceae/Umbelliferae*)
Daucus carota L. (*Apiaceae/Umbelliferae)*
Vinca major L. subsp. *major* (*Apocynaceae*)
Cardamine hirsuta L. (*Brassicaceae/Cruciferae*)
Descurainia sophia (L.) Webb Ex Prantl (*Brassicaceae/Cruciferae*)
Draba muralis L. (*Brassicaceae/Cruciferae*)
Stellaria media (L.) Vill. (*Caryophyllaceae*)
Chenopodium album L. (*Chenopodiaceae*)
Centaurium erythraea Rafn. (*Gentianaceae*)
Geranium molle L. (*Geraniaceae*)
Geranium rotundifolium L. (*Geraniaceae*)
Juglans regia L. (*Juglandaceae*)
Lythrum salicaria L. (*Lythraceae*)
Jasminum fruticans L. (*Oleaceae*)
Olea europaea L. (*Oleaceae*)
Oxalis articulata Savigny (*Oxalidaceae*)
Ranunculus arvensis L. (*Ranunculaceae*)
Prunus avium (L.) L. (*Rosaceae*)
Rosa canina L. (*Rosaceae*)
Rubus sanctus Schreber (*Rosaceae*)
Populus alba L. (*Salicaceae*)
Veronica cymbalaria Bodard (*Scrophulariaceae*)
Solanum angustifolium Mill. (*Solanaceae*)
Tilia argentea Desf. ex DC. (*Tiliaceae*)
Verbena officinalis L. (*Verbenaceae*)
Viola sieheana Becker (*Violaceae*)
Vitis vinifera L. (*Vitaceae*)
Cyperus longus L. (*Cyperaceae*)
Lagurus ovatus L. (*Poaceae/Gramineae*)
Panicum miliaceum L. (*Poaceae/Gramineae*)

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