

EDIBLE ORNAMENTAL PLANTS USED IN LANDSCAPING AREAS: THE CASE OF ÇANAKKALE CITY CENTER

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Abstract

Open green spaces are the areas where the city, people and other living things breathe. Some plants used in these areas have both aesthetic and food features. These plants called edible ornamental plants can yield food products such as leaves, flowers and fruits suitable for consumption in urban areas without a commercial income. In this study, it was aimed to determine the potential of edible ornamental plants in the sample of Çanakkale City Center. The research was conducted in 15 streets, 4 parks and 31 schools in Çanakkale City Center. Plant species and numbers in the study area were determined on site. According to the analyses, a total of 60 families, 123 genera, 166 species, 53 edible species and 29220 plants were identified in the study area. 44.39% of the plants were located in parks, 43.34% in streets and 12.28% in schools. The rate of edible species was determined as 37.38% in streets, 38.02% in parks and 35.09% in schools. The edible plant rate was 25.02% and the edible species rate was 32.12%.

Key words: edible ornamental plants, edible flowers, edible landscape, open green spaces, city center.

INTRODUCTION

After the industrial revolution, urbanization increased with industrialization in Turkey in the 1950s (Ozel & Cakmakyapan, 2015). The developments in the field of the industry have increased the diversity and use of agricultural tools and machines, but have led to less use of man power in agricultural production activities. Many people with decrescent employment opportunities in rural areas have migrated intensively to the large cities with hopes of finding work and a better quality of life. Increasing urban population and industrialization have led to rapid concretion and urbanization of open spaces. Rapid urbanization has led to an increase in workplace and housing construction, an increase in hard impermeable surfaces in urban areas, the formation of urban heat islands and a decrease in open green spaces (Sun et al. 2017; Irmak et al., 2020). Open green spaces are the areas where the citizens rest, socialize, relieve their stress and do many activities in the busy city life. These areas are also places where urban people meet their longing for nature. The urban people find the opportunity to recognize many different

plants in these areas, to see, smell and touch their different parts such as flowers and fruits more closely. Even the urban people have the chance to pick the flowers and fruits of some plants from their branches and consume them fresh. Plants in landscape design have aesthetic and beautiful appearances, as well as some of them have the characteristics of being edible and consumed as food. In landscape designs, the use of plants with flavor, food and ornamental plant functions is called “Edible Landscape”. The plants used in the landscape design is referred to as edible ornamental plants (Celik, 2017; Fetouh, 2018; Sevik et al., 2020). Fruit trees, mulberry bushes, vegetables, herbs, edible flowers and ornamental plants are included in edible landscaping. These plants have both aesthetic and food properties (Celik, 2017; Fetouh, 2018; Salbitano et al., 2019).

Plants with edible flower are *Borago officinalis*, *Allium schoenoprasum*, *Calendula officinalis*, *Citrus* sp., *Chamaemelum nobile*, *Dianthus caryophyllus*, *Gladiolus* sp., *Fuchsia x hybrida*, *Hemerocallis* sp., *Helianthus annuus*, *Impatiens wallerana*, *Lavandula angustifolia*, *Jasminum officinale*, *Yucca filamentosa*, *Lonicera japonica*, *Monarda didyma*, *Malus* sp., *Musa*

paradisiaca, *Pelargonium* sp., *Paeonia lactiflora*, *Phlox paniculata*, *Rosa* sp., *Primula vulgaris*, *Rosemarinus officinalis*, *Syringa vulgaris*, *Sambucus* sp., *Tagetes* sp., *Tropaeolum majus*, *Tilia* sp., *Viola* sp. and *Tulipa* sp. species (Saygılı & Sirin, 2010).

Plants with edible fruit are *Arbutus unedo*, *Rosa canina*, *Crateagus monogyna*, *Corylus avellana*, *Citrus sinensis*, *Crateagus monogyna*, *Diospyros kaki*, *Laurocerasus officinalis*, *Sorbus torminalis*, *Pyrus communis*, *Ficus caria*, *Mespilus germanica*, *Olea europaea*, *Vaccinium arctostophylos*, *Prunus persica*, *Cornus mas*, *Crataegus orientalis*, *Celtis australis*, *Prunus domestica*, *Diospyros kaki*, *Laurocerasus officinalis*, *Morus nigra*, *Hippophae rhamnoides*, *Mespilus germanica*, *Prunus armenicana*, *Prunus avium*, *Prunus divaricata*, *Pyracantha coccinea*, *Punica granatum*, *Rhus coriaria*, *Ribes orientale*, *Vaccinium myrtillus*, *Tilia rubra*, *Sorbus aucuparia*, *Vitis vinifera* and *Viburnum opulus* species (Bekci et al., 2010; Creasy, 2010; Sari, 2016).

There are some advantages of using edible plant species in landscape design such as increasing the contact of the citizens with nature, supporting wildlife and sustainability, contributing to the dissemination of local products, providing the opportunity to consume plant products fresh from the branch, sharing and contributing to communication between people (Celik, 2017; Olgun et al., 2018). Some of the edible ornamental plants can be found in existing parks, roads, school gardens, coastal areas, gardens of public buildings, private workplaces, roof gardens and home gardens (Russo et al., 2017; Nadal et al., 2018).

This study was carried out to determine the potential of edible ornamental plants in the sample of Çanakkale City Center.

MATERIALS AND METHODS

Çanakkale province is located in the northwest of Turkey, between 40° 03' and 40° 18' north latitudes and 26° 34' and 26° 47' east longitudes. Çanakkale is one of the provinces on the continents of both Europe and Asia. The City Center is located in the Asian continent (Ministry of Culture and Tourism, 2021). This study was carried out in public spaces in

Çanakkale City Center (Figure 1) between 2017-2018. The streets, parks, and all public school gardens, except the university, which had been heavily preferred by city center users, were determined as the study areas. With on-site investigations, plant species and numbers were determined in 15 streets (Figure 2), 31 school gardens (Figure 3), and 4 parks (Figure 4) in Çanakkale City Center. The families and genera of edible ornamental species were determined according to the literature. The plant density (piece/100 m or piece/100 m²) and edible species ratio (%) encountered on the streets, schools and parks were calculated in MS Office 2016 Excel software and graphs and tables were made.

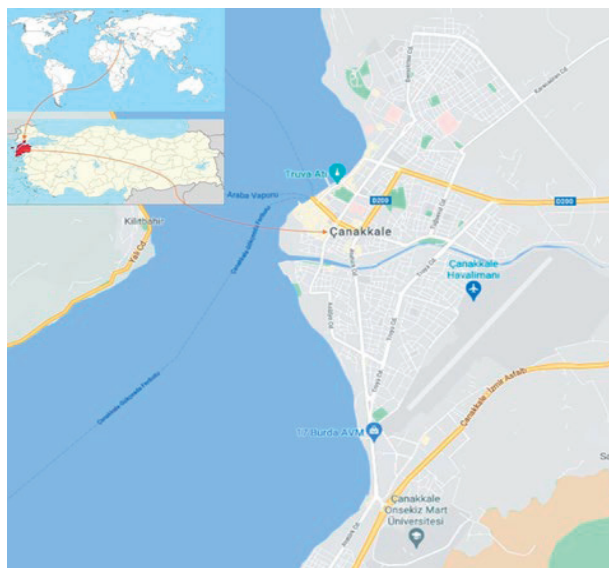


Figure 1. The research area (modified from Google Maps and Wikipedia, 2021)



Figure 2. Streets in the research area (modified from Google Maps, 2021)



Figure 3. Schools in the research area (modified from Google Maps, 2021)

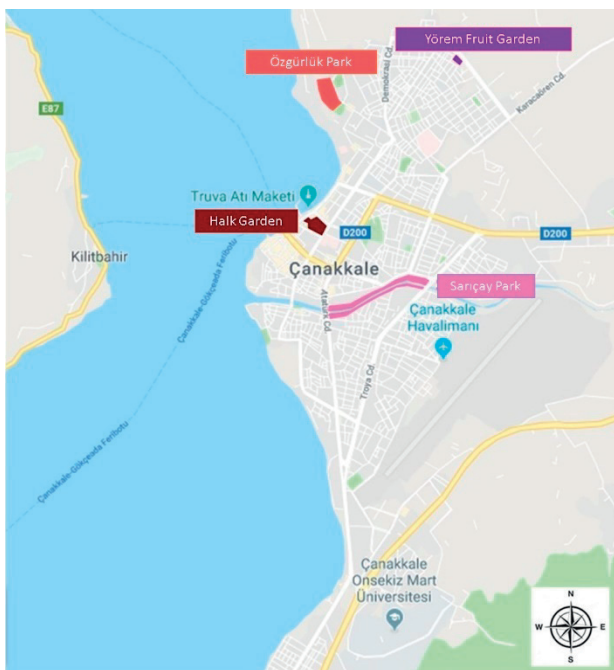


Figure 4. Parks in the research area (modified from Google Maps, 2021)

RESULTS AND DISCUSSIONS

A total of 60 families, 123 genera, 166 species, and a total of 29220 plants were identified in Çanakkale City Center study areas. 12663 of these plants were determined on the street, 12970 in parks and 3587 in schools. The rate of edible plants in the study area was 25.02% and the rate of edible species was found to be 32.12%. In the study area, the highest edible

plant rate was found on the streets, and the lowest edible plant rate was found in the parks (Figure 5). Despite the low rate of edible plants, the highest rate of edible species was obtained in the parks. This showed that edible plant species were less in the area in terms of plant numbers.

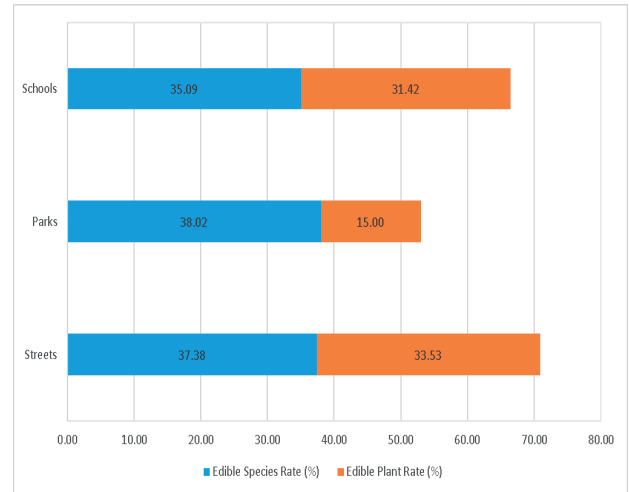


Figure 5. Edible species and plant ratio according to the study areas

Rosaceae family was the family with the highest number of plants in the study area. This family was represented in the area with 15 genera and 22 species. The edible species rate of this family in the area was 77.27%. After *Rosaceae* family, *Fabaceae* family ranked second with 10 genera, 13 species, and 3 edible plant species. 12 families with 100% edible species ratio were identified (Table 1). Demircioğlu Street (197 pieces/100 m) had the highest density among the streets of Çanakkale City Center. The street with the least plant density was Plaj Street (1 piece/100 m). Among the streets, the street with the highest edible species ratio was 100. Yıl Street (Figure 6). Troya Street and Atatürk Street were the streets with the highest values in terms of family, genera, species, edible species and plant numbers. Only two plant species were identified in Plaj Street which had no edible species (Table 2).

Among the schools studied in Çanakkale City Center; the highest plant density was in Merkez Çanakkale Anadolu High School; the highest rate of edible species was found in Akçansa Güzel Sanatlar High School (Figure 7). 290 plants in Akçansa Güzel Sanatlar High School and 750 plants in Merkez Çanakkale Anadolu High School were identified. The highest number of edible species was determined in

Merkez Mehmet Akif Ersoy Mesleki ve Teknik Anadolu High School and Çanakkale Mesleki ve Teknik Anadolu High School (Table 3). Ömer Mart Secondary School and Çanakkale Mesleki ve Teknik Anadolu High School were the schools with the highest.

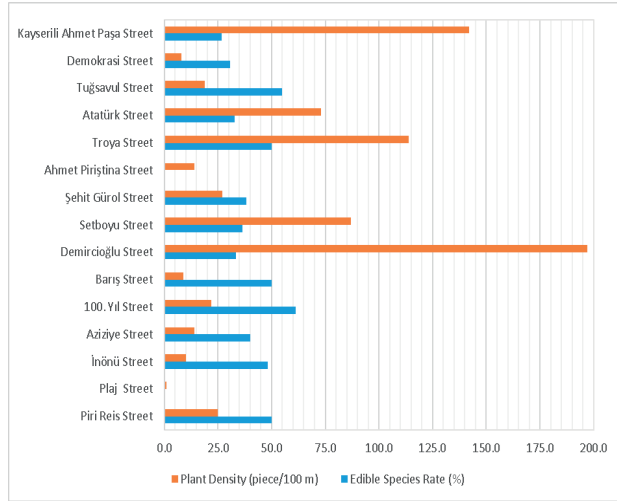


Figure 6. Plant density and edible species ratio on the streets

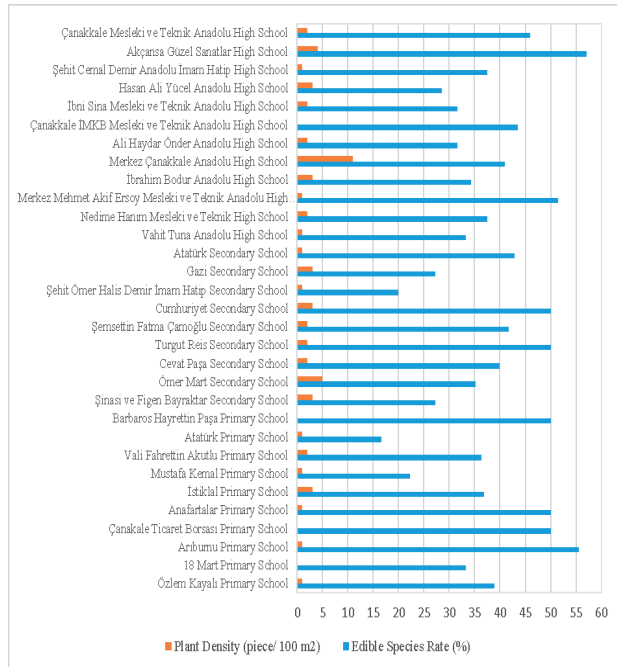


Figure 7. Edible species ratio on the schools

The highest plant density among the parks of Çanakkale City Center was in Halk Garden with 8427 plants; the highest rate of edible species

was found in Yörem Fruit Garden with 20 edible species (Figure 8). The highest number of edible species was determined in Halk Garden, and the lowest number of edible species was determined in Özgürlük Park (Table 4).

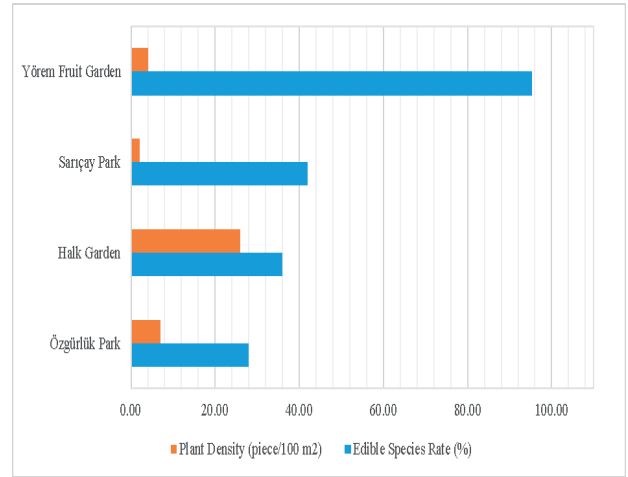


Figure 8. Edible species ratio on the parks

53 edible species were identified in Çanakkale City Center study area. These were *Amygdalus communis*, *Arbutus unedo*, *Berberis thunbergii* var. *atropurpurea*, *Castanea sativa*, *Celtis australis*, *Cerasus mahaleb*, *Citrus aurantium*, *Citrus limon*, *Citrus reticulata*, *Cydonia vulgaris*, *Diospyros kaki*, *Eleagnus angustifolia*, *Eriobotrya japonica*, *Euryops pectinatus*, *Ficus carica*, *Juglans regia*, *Laurus nobilis*, *Lavandula officinalis*, *Lonicera caprifolium*, *Mahonia aquifolium*, *Malus domestica*, *Malus floribunda*, *Mespilus germanica*, *Morus alba*, *Morus nigra pendula*, *Morus nigra*, *Myrtus communis*, *Olea europaea*, *Opuntia robusta*, *Passiflora caerulea*, *Pinus pinea*, *Prunus armenica*, *Prunus avium*, *Prunus cerasifera*, *Prunus domestica*, *Prunus laurocerasus*, *Prunus persica*, *Punica granatum*, *Pyracantha coccinea*, *Pyrus domestica*, *Rhamnus cathartica*, *Robinia pseudoacacia*, *Robinia pseudoacacia umbraculifera*, *Rosa spp.*, *Rosmarinus officinalis*, *Rubus idaeus*, *Salvia officinalis*, *Syringa vulgaris*, *Taxus baccata fastigiata*, *Tilia tomentosa*, *Vitis vinifera*, *Yucca filamentosa* and *Zizyphus vulgaris* edible plant species.

Table 1. Plant status of Çanakkale City Center study areas by family

Family	Total Genera	Total Species	Total Edible Species	Edible Species Ratio (%)	Plant Number	Plant Ratio (%)
<i>Aceraceae</i>	3	3	-	-	476	1.629
<i>Agavaceae</i>	1	1	1	100.00	32	0.110
<i>Altingiaceae</i>	1	1	-	-	20	0.068
<i>Amaranthaceae</i>	1	1	-	-	12	0.041
<i>Amaryllidaceae</i>	1	1	-	-	13	0.044
<i>Anacardiaceae</i>	1	1	-	-	14	0.048
<i>Apocynaceae</i>	2	2	-	-	1000	3.422
<i>Aquifoliaceae</i>	1	1	-	-	10	0.034
<i>Araliaceae</i>	1	1	-	-	27	0.092
<i>Araucariaceae</i>	1	1	-	-	1	0.003
<i>Arecaceae</i>	2	2	-	-	39	0.133
<i>Asteraceae</i>	1	1	1	100.00	219	0.749
<i>Berberidaceae</i>	3	5	2	40.00	1453	4.973
<i>Betulaceae</i>	3	3	-	-	15	0.051
<i>Bignoniaceae</i>	2	2	-	-	126	0.431
<i>Buxaceae</i>	1	1	-	-	5	0.017
<i>Cactaceae</i>	1	1	1	100.00	1	0.003
<i>Caprifoliaceae</i>	3	4	1	25.00	144	0.493
<i>Celastraceae</i>	1	2	-	-	4906	16.790
<i>Cupressaceae</i>	5	12	-	-	1748	5.982
<i>Ebenaceae</i>	1	1	1	100.00	5	0.017
<i>Elaeagnaceae</i>	1	1	1	100.00	73	0.250
<i>Ericaceae</i>	1	2	1	50.00	3	0.010
<i>Fabaceae</i>	10	13	3	23.08	1194	4.086
<i>Hamamelidaceae</i>	1	1	-	-	87	0.298
<i>Hydrangeaceae</i>	2	1	-	-	2563	8.771
<i>Juglandaceae</i>	1	1	1	100.00	46	0.157
<i>Lamiaceae</i>	4	4	4	100.00	915	3.131
<i>Lythraceae</i>	1	1	-	-	156	0.534
<i>Magnoliaceae</i>	2	2	-	-	31	0.106
<i>Malvaceae</i>	1	1	-	-	66	0.226
<i>Meliaceae</i>	1	1	-	-	89	0.305
<i>Moraceae</i>	3	5	4	80.00	272	0.931
<i>Myrtaceae</i>	2	2	1	50.00	149	0.510
<i>Oleaceae</i>	6	11	2	18.18	3397	11.626
<i>Onagraceae</i>	1	1	-	-	96	0.329
<i>Palmaceae</i>	1	1	-	-	195	0.667
<i>Passifloraceae</i>	1	1	1	100.00	1	0.003
<i>Phormiaceae</i>	1	2	-	-	45	0.154
<i>Pinaceae</i>	4	10	1	10.00	895	3.063
<i>Pittosporaceae</i>	1	1	-	-	1548	5.298
<i>Platanaceae</i>	1	2	-	-	494	1.691
<i>Poaceae</i>	1	1	-	-	60	0.205
<i>Punicaceae</i>	1	1	1	100.00	109	0.373
<i>Rhannaceae</i>	2	2	2	100.00	12	0.041
<i>Rosaceae</i>	15	22	17	77.27	5384	18.426
<i>Rubiaceae</i>	1	1	-	-	56	0.192
<i>Rutaceae</i>	1	4	3	75.00	4	0.014
<i>Salicaceae</i>	2	5	-	-	51	0.175
<i>Sapindaceae</i>	2	2	-	-	3	0.010
<i>Scrophulariaceae</i>	3	3	-	-	462	1.581
<i>Simaroubaceae</i>	1	1	-	-	39	0.133
<i>Solanaceae</i>	1	1	-	-	7	0.024
<i>Tamaricaceae</i>	1	1	-	-	26	0.089
<i>Taxaceae</i>	1	1	1	100.00	22	0.075
<i>Theaceae</i>	1	1	-	-	22	0.075
<i>Tiliaceae</i>	1	2	2	100.00	175	0.554
<i>Ulmaceae</i>	2	2	1	50.00	147	0.503
<i>Verbenaceae</i>	2	2	-	-	6	0.021
<i>Vitaceae</i>	2	2	1	50.00	67	0.229

Table 2. Classification and number of plants in the study area according to the street

Street Name	Family	Genera	Species	Edible Species	Plant Number
Piri Reis Street	13	17	18	9	384
Plaj Street	1	1	2	-	3
İnönü Street	13	22	27	13	180
Aziziye Street	11	13	15	6	77
100. Yıl Street	12	16	18	11	137
Barış Street	8	9	10	5	62
Demircioğlu Street	19	24	24	8	2405
Setboyu Street	10	11	11	4	467
Şehit Gürol Street	16	18	21	8	320
Ahmet Piriştina Street	2	2	2	-	218
Troya Street	32	47	58	29	3327
Atatürk Street	31	45	58	19	3464
Tuğsavul Street	14	19	20	11	120
Demokrasi Street	11	13	13	4	88
Kaysirli Ahmet Paşa Street	29	34	41	11	1321

Table 3. Classification and number of plants in the study area according to the school

School Name	Family	Genera	Species	Edible Species	Plant Number
Özlem Kayalı Primary School	12	16	18	7	66
18 Mart Primary School	2	2	3	1	14
Arıburnu Primary School	9	9	9	5	35
Çanakale Ticaret Borsası Primary School	3	4	4	2	11
Anafartalar Primary School	6	6	6	3	22
İstiklal Primary School	14	16	19	7	84
Mustafa Kemal Primary School	8	9	9	2	37
Vali Fahrettin Akutlu Primary School	9	9	11	4	89
Atatürk Primary School	9	9	12	2	46
Barbaros Hayrettin Paşa Primary School	2	2	2	1	11
Şinasi ve Figen Bayraktar Secondary School	14	19	22	6	156
Ömer Mart Secondary School	18	33	37	13	235
Cevat Paşa Secondary School	9	13	15	6	155
Turgut Reis Secondary School	9	11	14	7	107
Şemsettin Fatma Çamoğlu Secondary School	6	10	12	5	78
Cumhuriyet Secondary School	15	20	22	11	177
Şehit Ömer Halis Demir İmam Hatip Secondary School	4	5	5	1	13
Gazi Secondary School	8	10	11	3	114
Atatürk Secondary School	6	6	7	3	43
Vahit Tuna Anadolu High School	12	15	15	5	129
Nedime Hanım Mesleki ve Teknik High School	8	8	8	3	114
Merkez Mehmet Akif Ersoy Mesleki ve Teknik Anadolu High School	19	28	33	17	87
İbrahim Bodur Anadolu High School	22	34	35	12	177
Merkez Çanakkale Anadolu High School	12	18	22	9	757
Ali Haydar Önder Anadolu High School	10	18	19	6	104
Çanakkale İMKB Mesleki ve Teknik Anadolu High School	15	21	23	10	79
İbni Sina Mesleki ve Teknik Anadolu High School	11	19	19	6	84
Hasan Ali Yücel Anadolu High School	12	13	14	4	114
Şehit Cemal Demir Anadolu İmam Hatip High School	7	7	8	3	24
Akçansa Güzel Sanatlar High School	15	19	21	12	290
Çanakkale Mesleki ve Teknik Anadolu High School	21	34	37	17	128

Table 4. Classification and number of plants in the study area according to the park

Park Name	Family	Genera	Species	Edible Species	Plant Number
Özgürlük Park	27	45	50	14	2677
Halk Garden	35	64	75	27	8427
Sarıçay Park	29	48	62	26	1692
Yörem Fruit Garden	10	18	21	20	176

CONCLUSIONS

It was observed that 32.12% of the plants in the study area were edible species, but the distribution of these species in the area was insufficient in terms of plant numbers. A higher rate of edible species was obtained in the parks within the study area. The edible species and plant density ratios varied according to the streets, parks and schools of Çanakkale City Center. Increasing edible plant species in landscape design will give the users the chance to know the plant species and consume the products of the species. Increasing edible plant species especially in school gardens will help children to recognize these plants and use them consciously. In order to raise awareness of the users, there should be signs about plant species, edible plant species, edible plant parts, collection processes and plant health in the area. Thus, the sustainability of edible landscape areas and plants will be ensured. In addition, it is risky to consume plants grown in city centers where traffic and pollution are intense. People should be informed about the risks of consuming these plants as food.

ACKNOWLEDGEMENTS

This article was produced from Zehra Gunes' master of science thesis titled "Edible ornamental plants used in landscaping areas: Çanakkale City Center example" in Landscaping Architecture, Graduate School of Natural and Applied Sciences (School of Graduate Studies), Çanakkale Onsekiz Mart University.

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