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CONTENTS

ORIGINAL PAPERS

SHORT COMMUNICATION

A COMPARATIVE STUDY OF PUBLIC GREEN SPACES IN THE CHANGING URBAN TEXTURE IN TERMS OF PREFERENCES FOR ORNAMENTAL PLANTS AND VISUAL QUALITY: THE CASE OF BARTIN (TURKEY)

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ABSTRACT

The purpose of the present study is to identify the distribution of plant species in the urban public green spaces (UPGS's) of the urbanized area of Bartin, Turkey, and relate the make up of the vegetation to how residents perceive the open spaces both visually and in terms of green space sustainability. The study was conducted in 41 sampled areas in 18 green spaces. These UPGS's were in both old and new urban areas, and were distributed throughout the urbanized area of Bartin. The survey found there were 193 plant species from 59 families in the 41 sampled areas.

Based on this survey the present comparative study of UPGS's in both older areas and newer development in Bartın (a) presents the plant species as well as their distribution by family and origin, (b) makes correlations between the socio-demographics of survey participants and their definitions of urban UPGS's, (c) evaluates the sustainability of the UPGS's (on the basis of their aesthetic, ecological, and functional properties), and (d) assesses the visual quality of the UPGSs.

A questionnaire was given to 350 participants, and the findings were assessed via a correlation analysis. The findings suggested, with a reliability level of 95%, a statistically significant correlation between the socio-demographics of the participants and their preferences in the changing urban texture ($p<0.05$). It was determined that whereas users find UPGSs in older urban areas to be more beautiful, traditional and attractive than new parks and gardens in recently developed development ($r=0,133^{*}$) while it was also determined that the plant texture is richer and has sufficient greenery ($r=,176^{**}$) in older urban areas. The Bartin public found the gardens of religious buildings in older areas to be more ecological with a score of 3.05 whereas the gardens of public buildings in modern developments were found to be more functional with a score of 3.7 and that park areas with old urban texture characteristics and cemetery areas with new urban texture characteristics were found to be more ecological both with scores of 3.5. When the semantic differential method results are evaluated, it was determined that all expert groups found cemetery areas with both new and old urban texture characteristics to be accessible with a ratio of 32 % and traditional with a ratio of 29 %.

UPGSs are an essential component of urban green space planning. Therefore, the present paper provides significant data for further studies on planning, designing and managing UPGSs. More specifically, the sustainability of the vegetation in the UPGSs included in the study is essential for urban ecology and urban planning. The paper concludes with recommendations for development of urban biodiversity, quality of human life, and sustainability of the urban landscape in public open spaces in a city, which is growing at a remarkable rate.

KEYWORDS: Bartin, urban public green spaces, urban ecology, visual quality, urban landscape, urban ecosystem.

1. INTRODUCTION

1.1 The Use of Ornamental Plants in Landscape

The United Nations [1] forecasts that more than two thirds of the world population will be living in urban areas by 2030 [2]. Turkey is no exception in this respect, for there has been a similar trend of movement from rural to urban areas in recent years [3, 4]. The trend has led to strains on urban and biological environments [3]. Vegetation in urban environments loses its natural features and reflects human preferences in relation to urban infrastructure [4].

A review of literature suggests that there are many studies on preferences for ornamental plants and visual quality world-wide; these studies include, but are not limited to, Richards et al. [5] in the USA, Tsiotsiou and Christodoulakis [6] in Greece, Pauleit and Duhme [7] in Germany, Muthulingam and Thangavel [8] in India, Thai-

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utsa et al. [9] in Thailand, and Yaltirik et al. [10], Kelkit [11], Oguz [12], Yilmaz and Irmak [13], Esbah [14], Mansuroglu et al. [3], Acar et al. [4], Saribas et al. [15], Acar and Sakici [16], Arslan and Baris [17] and Bekci et al. [18] in Turkey.

Urban biodiversity can be maintained by an integrated urban management system, coupled with urban ecological planning. In this respect, the European Landscape Convention of 2000, ratified by Turkey in 2003, is significant in that it provides opportunities for urban planning and management. It is one of the tasks specified by the Convention that quality standards for all landscapes should be introduced into town planning, and that they should be used as strategic tools for complex developments [3].

Deloya [19] reports that urban green space, both public and private, and characterized by vegetated areas, such as parks or forest stands, or street-lining trees, forms the basis not only for a healthy population but for a resilient economy as well. In consequence, the World Health Organization strongly recommends that there should be at least 9m^2 of urban green space per capita, so that many adverse environmental effects in urban areas can be reduced, and other benefits can be offered [9].

Recently, there has been a focus on the reassessment of the factors that contribute to a sustainable urban environment as a result of social, economic and environmental considerations. Green space is increasingly regarded as an indispensable part of urban settlements for the benefit of both inhabitants and wildlife. All these factors suggest that it is necessary to specify a research framework within which multi-disciplinary and inter-disciplinary research on urban green spaces can be conducted [20].

Urban green spaces are a significant natural and cultural resource in cities. They offer a range of environmental, social and economic benefits; they play pivotal roles in sustainable urban development and urban ecology [21-24]. City inhabitants are positively affected by urban green spaces in various ways. Such spaces enhance environmental conditions in a city by removing pollution, diminishing noise, and regulating temperature (e.g. [25-28]). In addition, they can also be used as physical recreation areas [29, 30], and they are beneficial for human health [30]. Urban green spaces have considerable natural amenities (with a range of aesthetic and psychological benefits); they also contribute to the livability and sustainability of cities and the welfare of their inhabitants [20; 31-37].

There are some crucial planning considerations for public urban green spaces, and these considerations determine how well public urban green spaces can contribute to the quality of the urban environment. They can be listed as follows:

- the total area of open space accessible to inhabitants,
- the division of the total open space into individual parcels,
- the distribution of open spaces in the center relative to those in the outskirts of the city, and
- the size of the individual areas of open space and their location in reference to residential areas.

There are also particular planning details relating to open space, specifically: the facilities, proportion of vegetation cover of the ground, ease of access to the area, location on internal pathways, and so forth [38].

It is becoming more and more important to take human needs and preferences into account during the design of urban green spaces; thus optimizing the benefits for users and the local population [2].

1.2 Visual Quality

Landscape visual quality is a product resulting from the process by which various visible characteristics of the landscape interact with certain psychological (perceptual, cognitive, and emotional) processes in the human observer [39]. In other words, the visual quality is a product of significant interplay between humans and nature [40]. Visual elements provide both aesthetic values and a balance in the mutual relationships among cultural, economic, and biological values [41, 42].

Theories of landscape preference are mostly divided into two, namely evolutionary theories and cultural preference theories [43]. The former assumes that all humans have the same pattern of preference judgments because of a common evolutionary background [44, 45] and landscape elements and structures are instantly regarded as visually beautiful as long as they comply with this pattern. The latter, on the other hand, are focused more on preferences that are based on perceptions of functions of the landscape, like their productive or ecological functions [43], and argue that preferences are heavily influenced by characteristics of respondents such as age, gender, and educational status (e.g. [46-48]).

According to Bulut and Yilmaz [41] it is visual quality that should be regarded as the predominant feature of landscapes, for it directly influences the landscape preferences of inhabitants. In consequence, landscape management and planning should take public preferences into account in order to ensure that proposed projects will be accepted by the public [49]. The observer relies on his/her thoughts, feelings and emotions to experience landscapes [50-51]. Thus, the beauty of landscapes is based not only on the object being observed, but also on the observer's own previous cultural background [52, 53].

It has been reported in various studies that there is a strong correlation between preference judgments based on photographs and corresponding responses based on direct experience of the represented locations (e.g. [54-57]). This is one of the reasons why photographs were used in the present study [42].

In recent years, a number of studies have been conducted on visual perceptions of and preferences for landscape (e.g. Acar and Sakici [16]; Bulut and Yilmaz [41]; Acar and Guneroglu Ayhan [58]; Cakci and Celem [59]; Eroglu and Acar [60]; Yao et al. [42]; Bekci et al. [61]).

On the basis of the survey and questionnaire of UPGS's in the changing urban structure of Bartin (i.e. the UPGS's with the characteristics of either old or new urban development). The present comparative study attempts to present:

(a) the plant species as well as their distribution by family and origin,

(b) the correlations between the socio-demographics of participants and their appreciation of the UPGS's in the changing urban texture,

(c) an evaluation of the sustainability of the UPGS's (their aesthetic, ecological, and functional properties), and

(d) an assessment of the visual quality of the UPGS's.

2. MATERIALS AND METHODS

2.1 Sampled Areas

Bartin is located in the western part of the Black Sea region, Turkey (at longitude 32°22' E and latitude 41°40' N). Bartin is bordered by Zonguldak to the west, Kastamonu to the east, Karabük to the south, and the Black Sea, with its 59-km coastline, to the north. The city has a total area of 214.300 ha. The city has a total population of 187291 [62], whereas the city center is populated by 54555 people [63]. The central district has a total area of 1151 km², and is characterized by an average altitude of 25 m. Associated with cool summers and warm/wet winters; the typical Black Sea climate is prevalent in the city. The highest and lowest temperatures ever recorded are 42.8 ºC in July and -18.6 ºC in February respectively. The average yearly temperature is 12.5 ºC. The heaviest rainfall takes place during the months of October, November and December whereas the lowest occurs in May. The average rainfall is 1030 mm. The average annual relative humidity is 78% [64]. The city is located in Euxine, a sub-region of the Euro-Siberian region [65].

The city is 12 km inland in relation to the Black Sea. One of the rare navigable natural waterways in Turkey, the Bartin River runs through the city and connects the city center to the Black Sea [66-67]. The two tributaries of the Bartin River, namely the Kocanaz Stream and Kocacay Stream, meet at Cape Gazhane and surround the city center of Bartin (Demirciler, Kemerkopru, Kirtepe, Koyortasi and Okulak neighborhoods), which looks like a peninsula. Part of the city center is designated as a Natural Site Area and as an Urban Site Area and Semi-Urban Site Area. Furthermore, the banks of the Bartın River is a Natural Site Area (first grade) and has registered examples of Ottoman civil architecture (Bartin houses) (i.e. under conservation listing and protection) [66].

After Bartin became a province in 1991, the increasing demand for housing could not be met, especially in the city center and the surrounding area. In consequence, historic civil buildings in the city center, including wooden houses, have been replaced by four or five-storey concrete buildings, leading to a decrease in the house-garden ratio. And there has been the growth of new development areas outside the city center. In today's Bartın, the neighborhoods marked by the densest housing with the characteristics of old urban texture can be listed as follows in order of decreasing importance: Kirtepe, Koyortasi and Ortamahalle. In the new urban texture, on the other hand, housing shows less density in Orduyeri, Tuna and Golbucagi neighborhoods. Karakoy, Aladag and Cayduzu neighborhoods are also characterized by lower density housing [66].

An assessment of the changing urban texture in today's Bartin suggests that there are no clear boundaries that decisively distinguish the old urban from the new. This is an indication that Bartin has not been able to maintain its historical cultural inheritance and historical artifacts have either been ruined or completely removed from the city landscape. Therefore, there are a limited number of public green spaces in the urban texture of today's Bartin, and some of these were chosen as sample areas for the present study. The study was conducted on 18 different UPGSs within the boundaries of the city of Bartin, including schools, cemeteries, public buildings, hospitals, parks, houses, religious structures, under-utilized spaces, highways, and vegetated areas in the river corridor. The geographical location, characteristics of the sampled areas, and images from the sampled areas are presented in Fig. 1, Table 1 and Fig. 2. respectively. Structures that were aged 25 and above were determined as "old texture" (25<-) whereas those that were aged 25 and below were determined as "new texture" (->25).

2.2. Data Collection and Evaluation

Data collection and evaluation was carried out in four main stages.

Stage I: Collection and Identification of the Plants in the Sampled Areas

The plants were recorded using a Plant Inventory Form. This form drew heavily on the studies by Acar et al. [4], Bekci et al. [18], Var et al. [70], Cengiz et al. [71], Acar et al. [72], and Bekci and Taskan [73]. The form was filled in on the basis of field surveys, on-the-spot observation, photography, and specimen collection. The specimens that could not be identified initially were identified through herbarium and relevant literature [10; 17; 74-75]. Evaluation of the data was made by use of an inventory form for plant species that were included in the top 10% (15 with the characteristics of the old texture and 13 with the characteristics of the new texture) of all the plant species identified in the UPGSs in reference to the frequency at which they existed. The families of all the plants were also evaluated. Since under-utilized spaces, highways and the river corridor were homogenous in terms of their characteristics of the old and new urban texture; they were excluded from the analyses of environmental sustainability and visual quality. A plant inventory was carried out for these three types of areas.

Stage II: Survey Forms

The survey forms were administered to a total of 350 residents in Bartin - 50 members of the academic staff, 100 members of the public staff, 100 ordinary people, and 100 students of landscape architecture. The results of the survey forms (identification of public gardens, planting designs that users preferred in public gardens and prominent factors in planting designs) and the tables on the lists of plants were evaluated in reference to the preferences of the users. As for the statistical assessment of the data, Spearman's correlation (r) and levels of significance were determined through an analysis of the correlation between

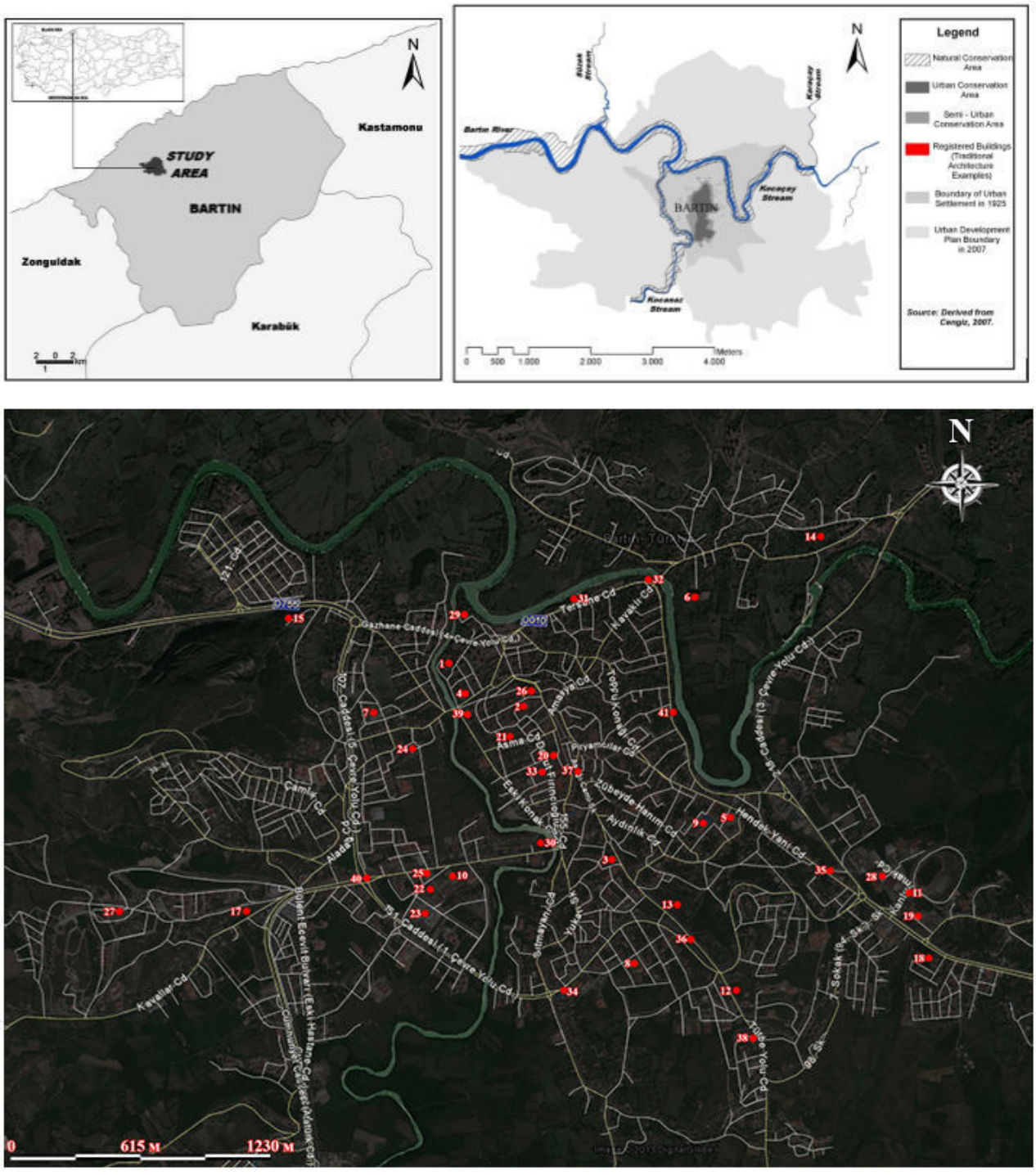


FIGURE 1 - The Sampled Areas (developed by Cengiz [66-68]).

TABLE 1 -The Characteristics of the sampled areas.

Structural Type	Coordinates	Total Areas (%)	Intensity of Use and Management Level
School Gardens			
1.Istiklal Primary School *(O)*	N 41°,38',11" E 032°,19',53"	% 48	The old schools included in the study are located in the city center whereas the newer ones are located away from the city center. The older schools have smaller gardens compared to newer ones, but they reflect the characteristics of the city in a better way in terms of their architectural structure. Moderate green spaces in the gardens of the older schools have been replaced by large paved grounds in the newer schools.
2.Cumhuriyet Primary School *(O)*	N 41°,38',06" E 032°,20',05"	% 57	
3.Ataturk Primary School *(O)*	N 41°,37',42" E 032°,20',25"	% 47	
4.Bartin Anatolian High School *(O)*	N 41°,38',08" E 032°,19',54"	% 59	
5.Inonu Primary School *(O)*	N 41°,37',52.1" E 032°,20',51.4"	% 74	
6.Fatih Primary School (N)	N 41°,38',23" E 032°,20',42"	% 40	
7.Koksal Toptan High School *(N)*	N 41°,38',07.5" E 032°,19',35.8"	% 71	
8.Gazi Primary School *(N)*	N 41°,37',27" E 032°,20',28"	% 67	
9.Hendekyani Primary School *(N)*	N 41°,37',44" E 032°,20',39"	% 49	
10. Industrial Vocational High School *(N)*	N 41°,37',43.3" E 032°,19',52"	% 60	
11. Commercial High School *(N)*	N 41°,37',43" E 032°,21',23"	% 49	
Cemetery Gardens			Despite not being used as recreational areas, cemeteries are among the significant components of urban green space. The gardens of old cemeteries are included in the city center only because the city has expanded further over the years and they have become landmarks with their historical arcades and grave stones.
12. Ebuderda Tomb&Cemetery*(O)*	N 41°,37',24.8" E 032°,20',49.9"	% 92	
13. Halatciyamasi Cemetery *(O)*	N 41°,37',31.1" E 032°,20',44.7"	% 99,9	
14. Orduyeri Cemetery *(O)*	N 41°,38',32.6" E 032°,21',10.5"	% 99,7	
15. Golbucagi Cemetery *(N)*	N 41°,38',20.0" E 032°,19',17"	% 98.9	
16. Agdaci Cemetery *(N)*	N 41°,36',50.00" E032°,20',58.7"	% 99.9	
17. Aladag Cemetery *(N)*	N 41°,37',36.9" E 032°,19',12.9"	% 99,6	
Gardens of Public Buildings			These are areas characterized by the greatest number of users. Public institutions formerly in the city center have been moved to the outskirts of the city center. Therefore, the gardens of the public buildings outside the city center have more spacious areas.
18. The Provincial Directorate of Environment and Forestry *(O)*	N 41°,37',30.3" E 032°,21',32.9"	% 89	
19. The Directorate of Highways *(O)*	N 41°,37',33.6" E 032°,21',27.8"	% 88	
20. The Revenue Office *(O)*	N 41°,37',37" E 032°,19',46"	% 50	
21. The Former Directorate of Culture *(O)*	N 41°,37',59" E 032°,20',04"	% 56	
22. The Municipality of Bartin*(N)*	N 41°,37',40.00" E 32°,19',48.0"	% 78	
23. The Governorship of Bartin*(N)*	N 41°,37',36.9" E 32°,19',47.2"	% 88	
24. The Provincial Directorate of Agriculture *(N)*	N 41°,38',01.6" E 032°,19',46.5"	% 83	
25. The Regional Directorate of Meteorology *(N)*	N 41°,37',33.4" E 032°,21',26.9"	% 56	
Hospital Gardens			These are essential for the mental health of patients. Intensive vegetation in the gardens of old hospitals has been replaced by spacious spaces in the gardens of new hospitals.
26. The Provincial Directorate of Health *(O)*	N 41°,38',06" E 032°,20',08"	% 55	
27. The Maternity and Dental Hospital *(N)*	N 41°,37',38.00" E032°,18',46.2"	% 80	
28. The New State Hospital *(N)*	N 41°,37',44.4" E 032°,21',19.7"	% 85	
Park Areas			These are where people are most commonly involved in recreational activities. The parks included in the study are located at different parts of the city and serve their users in different ways [69]. Old park areas have renewed their traditional texture providing an opportunity for various recreational activities.
29. Gazhane Park *(O)*	N 41°,38',22.3" E 032°,19',57.0"	% 98	
30. Kemerkopru Community Facilities Park *(O)*	N 41°,37',46" E 032°,20',10.6"	% 83	
31. Yali Boyu Park *(O)*	N 41°,38',19" E 032°,20',18"	% 97	
32. Orduyeri Tea House *(O)*	N 41°,37',30.8" E 032°,20',19.9"	% 92	
33. Cumhuriyet Square *(N)*	N 41°,37',51.3" E 032°,21',12.1"	% 85	
34. Special Provincial Administration Park *(N)*	N 41°,37',22" E 032°,20',12"	% 90	
35. State Hospital Park *(N)*	N 41°,37',58.2" E 032°,20',12.3"	% 93	
36. Halatciyamasi Park *(N)*	N 41°,37',31" E 032°,20',38"	% 98	
Religious Structures			
37. The Sadirvan Mosque *(O)*	N 41°,37',44" E 032°,20',20"	% 22	These are where users can worship and enjoy peace.
38. The Imam Hatip Mosque *(N)*	N 41°,37',14" E 032°,20',54"	% 72	
Under-Utilized Space			
39. *(near Hendekyani, opposite Semt Pazari)*	N 41°,37',49" E 032°,20',53"	% 67	These are unused areas commonly found in the city center.
Highways			
40. *(The peripheral road refuge in the location of the Governorship)*	N 41°,37',25" E 032°,19',52"	-	Although they surround the city, they do not connect with it.
The River Corridor			
41. *(in the location of Kanliirmak)*	N 41°,37',48" E 032°,20',31"	-	It reflects the historical identity of the city and represents the main backbone of urban outdoor and green space system. The Bartin River is under natural preservation and considered to be a Natural Site Area (first grade) [66-67].

* ***(O):*** Old urban texture,
** ***(N):*** New urban texture.

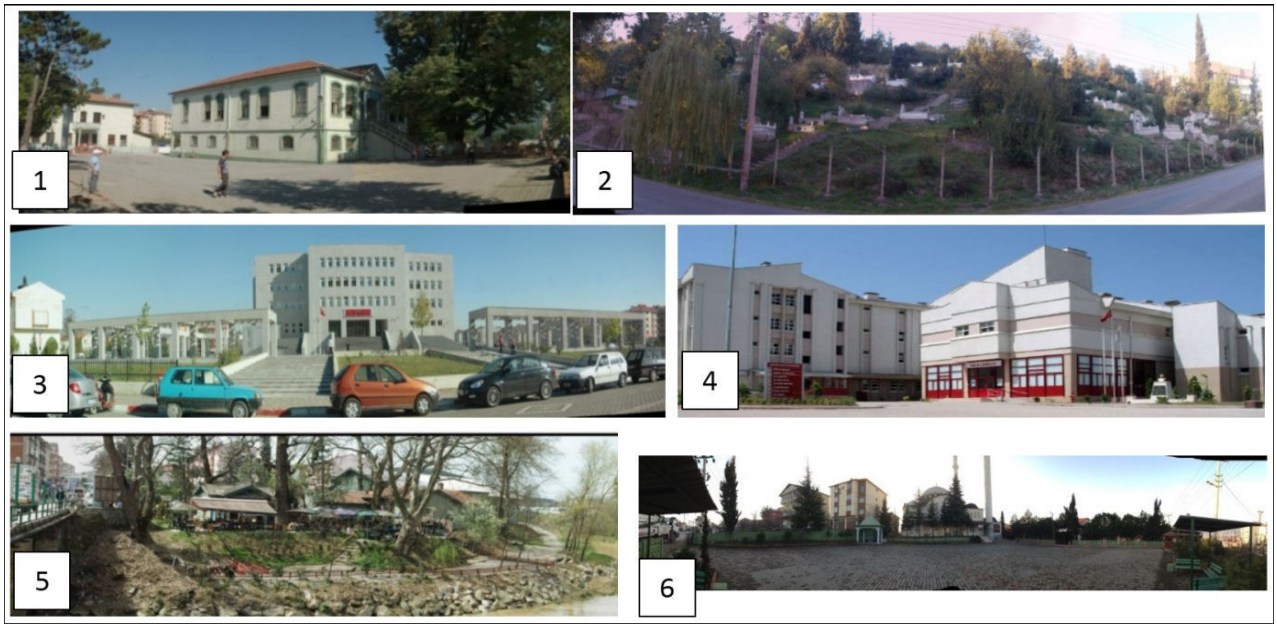


FIGURE 2 - Images from the sampled areas (1) Istiklal Primary School, (2) Aladag Cemetery,(3) The Governorship of Bartin, (4) The Bartin State Hospital, (5) Kemerkopru Community Facilities, and (6) Ebuderda Tomb.

the socio-demographics of the users and public gardens. The analyses were evaluated via SPSS (Statistical Package for Social Sciences) 16.01. In addition, some of the data obtained from the survey forms were assessed by percentage analysis and presented in tables and graphs.

Stage III: Evaluation of Environmental Sustainability of Sampled Areas

This stage consisted of two sub-stages. The first included 12 areas with characteristics of the old and new urban texture in six different types of UPGS's (schools, cemeteries, public buildings, hospitals, parks, and religious structures). An attempt was made to take into account the development plans by the Municipality of Bartin and the photographs taken during field surveys (photographs taken with Canon IXUS 55 digital camera between August and November, 2012). In the second stage, a total of 20 people from four different types of users (five people for each of the following categories: academic staff, public staff, ordinary people, and postgraduate/doctorate students of landscape architecture) were asked to assess a total of 48 photographs for the 12 areas with the characteristics of the old and new urban design in six different types of UPGS's in reference to Voordt's [76] and Cengiz et al. [69] standards for space quality, namely ecological (such as adequate greenness and diversity), aesthetic (i.e. beautiful and attractive) and functional (such as comfortable and relaxing) considerations (Figure 5). The environmental sustainability of the UPGS's, expressed in terms of three indicators (ecological, aesthetic, and functional properties) were rated by specialists on a scale ranging from zero to five. The ratings were calculated out of a total of 20 points. The forms designed for learned opinion were filled by the raters during face-to-face interviews. The form took 12 minutes in total to complete, two minutes for each area.

Stage IV: Evaluation of the Visual Quality of the UPGSs

Another survey form (Semantic preferences survey forms) was administered to the participants so that they could assess the 48 photographs obtained in the preceding stage in terms of their visual quality. The survey forms were evaluated in accordance with Osgood's [77] Semantic Differential Scale. The reason for using the scale was to reveal how the participants viewed the interaction among semantic properties, landscape elements, and space [61; 78].

The forms were administered to a total of 350 people-100 students of landscape architecture, 100 ordinary people, 100 public staff (from the Governorship or from the Provincial Directorates of Forestry, Highways, Public Works, Agriculture, and State Hydraulic Works), and 50 academic staff from Bartin University (especially from the departments of landscape architecture, forest engineering, and forest industry engineering) (Fig. 6).

A total of 16 pairs of dichotomous adjectives were specified for the assessment. These were as follows: Beautiful-Ugly, Interesting- Boring, Attractive-Tasteless, Traditional-Strange, Neat-Disordered, Symmetrical- Unsymmetrical, Relaxing-Tiring, Comfortable-Uncomfortable, Safe-Unsafe, Accessible-Inaccessible, Practical- Impractical, Spacious- Cramped, Natural-Artificial, Diverse- Monotonous, Rich in terms of species-Poor in terms of species, and Adequately green-Inadequately green.

1) Beautiful: the individual liking the space they are in very much;
2) Interesting: the individual finding the spatial design to be diverting and attract their attention;

3) Traditional: the space having a traditional, historical, nostalgic and mystic ambiance;
4) Neat: the space having only basic properties;
5) Symmetrical: the symmetrical use of the objects (artificial-floral), i.e with similar parts facing each other or around an axis;
6) Relaxing: the space providing the opportunity to the individual to move comfortably;
7) Safe: the individual feeling secure inside the space;
8) Accessible: the space being easy to reach or enter;
9) Practical: the space being practical for the user;
10) Spacious: the individual feeling free inside the space;
11) Natural: the space being perceived to be derived from nature-not created by mankind;
12) Diverse: the use of various plants, rich in terms of species.

The respondents were requested to rate the photographs by assigning one of the following points to each pair of dichotomous adjectives: 3, 2, 1, 0, -1, -2, and -3. When the data were computerized, these points were replaced by 7, 6, 5, 4, 3, 2, and 1 in order to make the process easier [58; 60-61]. The survey form took the respondents 24 minutes in total to complete, two minutes for each area.

3. RESULTS

3.1. Plant species and their distribution by family and origin

3.1.1. General distribution of plant species in old and new PGS's by plant family and origin

The 193 plant species recorded in the 41 sampled areas belonged to 59 families. In order of frequency, the first three family groups were as follows: *Rosacea* (24 taxa), *Pinacea* (16 taxa), and *Cupressaceae* (14 taxa) (Fig. 3.). A total of 147 species were recorded in the PGS's with old urban texture (OUT_PGS) while there were 125 species in the PGS's with the characteristics of the new urban texture (NUT_PGS).

The percentages for the geographical origins of the plant species were as follows: North-American origin 15.22%, European and Western Asian origins, 13.7%, and Turkish origins 11.16%. The other origin groups and their percentages were as follows: Mediterranean (9.6%), European (9.6%), Chinese (8.1%), Asian (7.6%), Japanese (5.07%), Japanese and Chinese (4.06%), Hybrid (2.53%), Iranian (1.01%), Eastern Asian (1.01%), Australian (1.01%), and African (1.01%). The overall status of the origins suggested that the ratio of exotic species was 88.84%.

3.1.2. The distribution of plant species in the PGSs with the characteristics of the old and new urban texture by parameters

Tables 2 and 3 present the plant species recorded within the scope of the study and their distribution by the parameters. Having the highest value in the general distribution, *Robinia pseudoacacia* (99.33%) was encountered in all of the OUT_PGS's. Although *Pinus nigra* (99.30%), *Rosa floribunda* (97,77%) and *Thuja orientalis* (97.52%) were among the most commonly encountered species in the OUT_PGS's, they did not exist in at least three of the sampled areas. The number of species least recorded was 132 by general classification. Some of them were *Araucaria araucana*, *Paulownia tomentosa*, and *Cedrus deodora pendula*, each of which was found (0.62%) in only one of the sampled areas.

Two species included in the top 10% of the NUT_PGSs, *Rosa floribunda* existed in all the areas with the highest percentage (82.14%) and *Prunus cerasifera* was found in all the areas with the lowest percentage (22.22%). They were followed by *Fraxinus excelsior (*53.57%), *Thuja orientalis* (75%), and *Yucca flamentosa* (48.88%). The number of

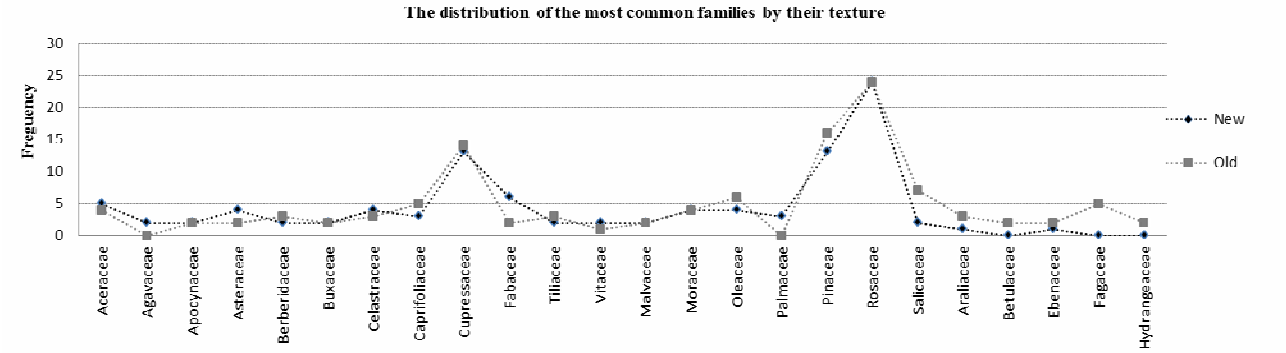


FIGURE 3 - The distribution of the plant species in the PGS's with the characteristics of the old and new urban texture by family.
(The other families excluded from the table: *Amaranthaceae, Araliaceae, Araucariaceae, Arecaceae, Bignoniaceae, Cannaceae, Casuarinaceae, Cornaceae, Corylaceae, Ericaceae, Hippocastanaceae, Iridaceae, Juglandaceae, Labiateae, Lequminosae, Lamiaceae, Lauraceae, Lythraceae, Magnoliaceae, Musaceae, Myrtaceae, Nyctaginaceae, Pittosporaceae, Saxifragaceae, Simaroubaceae, Taxaceae, Taxodiaceae, Ulmaceae, Anacardiaceae, Eleagnaceae, Paulowniaceae, Tamaricaceae).*

TABLE 2 - The plant species found in the OUT_PGSs of Bartin and percentages by each parameter (including only those with a 10% or a higher percentage by the general classification).

Code	Plant Species	Schools	Cemeteries	Public Buildings	Hospitals	Parks	Religious Structures	Under-utilized Spaces	Highways	The River Corridor
1	*Robinia pseudoacacia*	15,73	52,97	9,02	1,24	37,77	37,77	98,30	23,07	99,33
54	*Pinus nigra*	57,89	59,4	99,30	7,45	11,11	-	-	35,16	-
7	*Rosa floribunda*	21,05	74,25	27,72	2,48	95,55	97,77	-	-	-
42	*Thuja orientalis*	10,52	97,52	65,2	-	4,44	-	-	2,19	-
13	*Juglans regia*	15,78	62,37	11,8	1,24	13,33	8,88	-	-	76,66
23	*Platanus orientalis*	36,84	4,95	-	1,24	75,55	-	1,69	-	36,66
75	*Ficus carica*	10,52	0,99	2,08	1,24	22,22	-	-	-	18,33
4	*Laurus nobilis*	52,63	1,98	-	-	11,11	26,66	-	-	-
19	*Prunus cerasifera*	94,73	0,99	1,38	0,62	15,55	2,22	-	-	20
81	*Evonymus japonica*	31,57	0,99	2,77	1,86	4,44	2,22	-	-	-
26	*Pinus pinea*	26,31	3,46	43,75	13,88	6,66	-	-	-	3,33
2	*Cupressus sempervirens*	10,52	40,09	1,38	-	2,22	6,66	-	-	-
11	*Nerium oleander*	-	4,95	4,16	-	17,77	13,33	69,99	47,25	-
87	*Salix alba*	-	-	-	-	80	-	8,47	-	58,33
5	*Abies bornmülleriana*	31,57	5,94	19,44	2,48	8,88	2,22	-	-	-
144	*Eriobotrya japonica*	-	2,97	2,76	-	6,66	-	-	-	-
139	*Mirabilis jalapa*	-	-	27,6	6,2	-	-	-	-	-
117	*Hydrangea macrophylla*	-	9,9	6,9	-	8,88	-	-	-	-
76	*Buxus sempervirens*	1,9	4,95	24,84	0,62	53,28	-	-	-	-
54	*Pinus nigra*	21,23	52,47	98,62	7,44	11,11			70,08	
34	*Prunus persica*	-	-	2,08	1,24	13,32	-	-	-	13,32
21	*Ailanthus altissima*	-	5,94	2,76	0,62	-	2,22	5,07	-	6,66
20	*Cydonia oblonga*	-	17,82	2,76	0,62	31,08	2,22	-	-	-
16	*Cornus mas*	-	12,88	2,76	-	-	2,22	1,69	-	-
15	*Picea orientalis*	-	3,96	1,38	-	8,88	-	2,22	-	-
3	*Tilia tomentosa*	5,26	2,47	6,25	-	15,55	4,44	98,31	23,07	98,34
6	*Yucca flamentosa*	15,78	-	1,38	-	15,55	20	-	-	-
14	*Morus alba*	0	0,46	0,69	-	11,11	2,22	-	-	-
8	*Pinus sylvestris*	-	7,42	5,55	-	-	2,22	1,69	-	3,33

TABLE 3 - The plant species found in the NUT_PGSs of Bartin and percentages by each parameter for (including only those with a 10% or a higher percentage by the general classification).

Code	Species	Schools	Cemeteries	Public Buildings	Hospitals	Parks	Religious Structures
7	*Rosa floribunda*	82,14	6,93	13,88	19,25	48,88	2,22
17	*Fraxinus excelsior*	53,57	25,24	1,38	0,62	-	-
26	*Pinus pinea*	-	-	10,41	99,3		4,44
54	*Pinus nigra*	96,4	19,8	8,33	-	-	-
42	*Thuja orientalis*	75	9,9	17,36	11,18	-	-
11	*Nerium oleander*	-	-	2,77	4,34	51,11	
6	*Yucca flamentosa*	-	2,47	5,47	1,86	48,88	-
76	*Buxus sempervirens*	-	4,95	-	44,72	15,55	-
37	*Cupressus arizonica pyramidalis*	35,71	-	6,94	-	-	-
117	*Hydrangea macrophylla*	35,71	-	-	-	4,44	-
168	*Pitosporum tobira* "Nana"	-	-	-	97,7		
28	*Rosmarinus officinalis*	-	-	62,5	-	-	-
19	*Prunus cerasifera*	3,57	2,47	2,77	1,24	22,22	2,22
1	*Robinia pseudoacacia*	25	0,46	0,69	-	-	6,66
2	*Cupressus sempervirens*	3,57	0,46	-	0,62	-	-
13	*Juglans regia*	3,57	0,99	1,38	4,34	-	-
15	*Picea orientalis*	3,57	-	-	1,86	-	-
100	*Cupressus arizonica*	3,57	6,93	-	3,72	-	-
22	*Salix babylonica*	21,42	1,98	-	2,48	-	-
23	*Platanus orientalis*	-	-	7,59	-	44,4	-
60	*Malus sylvestris*	7,14	19,8	44,32	1,24	-	-
14	*Morus alba*	3,57	-	-	1,24	-	-
8	*Pinus sylvestris*	28,57	-	2,77	-	-	-
51	*Cupressocyparis leylandii*	-	-	5,52	9,3	-	-
40	*Juniperus horizontalis 'Bar Harbor'*	29,7	-	11,04	-	-	-

species least recorded was 106 according to general classification. Some of them were *Calocedrus decurrens, Musa paradisiaca* and *Ageratum houstonianum*. The ratios of each were found to be 0.66%, only in one of the sampled areas.

3.2. The correlation between the socio-demographics of the participants and their definitions of the PGS's with old and new urban texture

The socio-demographics profiles of the users were taken into account during the evaluation of the plant species in the PGS's with the characteristics of the old and new urban texture in Bartin and during the assessment of their visual quality. The publicly accessible areas of the gardens of public buildings inside the urban landscape have significant effects on the users and are an important component of the urban public green space system. User profiles and the spatial properties of public gardens were evaluated in order to determine the effect of the variability in the socio-demographic properties of the users on user preferences and perceptions. Table 4 presents the results of the correlation analysis conducted in this respect. A total of 153 women (43.71%) and 197 men (56.28%) participated in the survey. The significant correlations among 1d, 1e and 1f in Table 4 (r=0.172**, r=0.136*, r=-0.138**) suggested that men had a higher educational status and a higher income level. In addition, most of the men were members of an academic staff. Similarly, the correlations among 1c, 1d, 1e, 1f and 2a (r=-0.131*, r=0.452**, r=0.408**, r=-0.459**, r=0.109*) indicated that the participants tended to be less literate with decreasing age. However, the younger they were, the more likely they were to be members of an academic staff. On the other hand, increasing age led to a corresponding increase in the rates of having masters or doctorate degrees, and higher income levels as well as in the rates of living in a detached house. Furthermore, the significant correlation between the educational status and 1d, 1e, 1f, 2a, 2b and 2c (r=0.383**, r=0.141**, r=-0,452**, r=-0.158**, r=0.133*, r=0.176**) suggested that higher educational status resulted in an increase in the participants' income levels, confirming that they were more likely to have jobs that could generate higher income. As for the preferences of the users, they mostly preferred the NUT_PGSs and would like to see these gardens embroidered with rich diversity. It can also be concluded from Table 4 that decreasing educational status was an indicator of being a student and preferring a flat. The significant correlations between the educational status and 1e, 1f and 2b (r=0.714**, r=-0.727**, r=-0,144**) were in parallel with the other findings. Another finding was that

TABLE 4 - The correlations between the socio-demographics of the users and the UPGSs.

	1b	1c	1d	1e	1f	2a	2b	2c	2d
1.The socio-graphics of the users									
1a. Gender (1:women, 2:men)	,062	,034	,172**	,136*	-,138**	,074	-,036	-,035	-,090
1b. Age (1:18-20, 2:21-30, 3:31-40, 4:41-50, 5:51-60)		-,131*	,452**	,408**	-,459**	,109*	-,009	-,025	-,030
1c. Educational status (1:illiterate, 2:primary school, 3:high school, 4:university, 5:master's degree-doctorate)			,383**	,141**	-,452**	-,158**	,133*	,176**	,021
				,714**					
1d. Monthly income per capita (1: TL 500, 2: TL 500-750, 3: TL 750-1000 4: TL 1000-1500, 5: TL 1500-2500, 6: more than TL 2500)					-,727**	-,035	,144**	,051	,027
1e. Job (1:Unemployed, student, housewife, 2:retired, 3:worker, civil servant, 4: self-employed)					-,643**	,145**	,139**	,004	-,052
1f. User profile (1: academic staff, 2: public staff, 3:ordinary people, 4:students of landscape architecture)						-,075	-,096	,028	,010
2. Preference for the UPGSs							-,027	-,033	,076
2a. Type of residence (1:public housing, 2:flat, 3:housing estate, 4:detached house)								,022	,099
2b.Type of UPGSs (1:OUT_PGSs, 2: NUT_PGSs)									,205**
2c. Categories of planting designs in the UPGSs (1:the grass, 2:flowering plants, 3:plants with autumn colors, 4:mixed vegetation)									
2d. Mostly preferred styles of planting landscape in the UPGSs (1: natural plants in the OUT_PGSs, 2: exotic plants in the NUT_PGSs, 3: neglected OUT_PGSs 4: well-kept NUT_PGSs, 5: large NUT_PGSs, 6:all of the above)									-

**. Correlation significant at the level of 0.01 (2-tailed).
*. Correlation significant at the level of 0.05 (2-tailed).

the employed users were members of an academic or public staff (r=-0.643**), preferred housing estates or detached houses (r=0.145**) and liked the gardens of new public buildings (r=0.139**). Whereas the users of public buildings mostly preferred a type of vegetation rich in diversity, the types of planting designs that they mainly observed in the gardens of such buildings were as follows: natural plants in the OUT_PGS's (14.58%), exotic plants in the NUT_PGS's (11%), neglected OUT_PGS's (22%), well-kept gardens of new public buildings (16.28%), large NUT_' (8.85%), and all of the above (24%). The percentages confirmed the results of the correlation analysis.

In addition to the questions regarding the preferences of the users (academic staff, public staff, ordinary people, and students of landscape architecture) for the gardens of public buildings; one more question was addressed to them: "What are your desired properties in the planting designs of these UPGS's?". The first preferences of the users were as follows: aesthetic properties, with a ratio of 42%; functional properties, with a ratio of 21.72%; ecological properties with a ratio of 21.72%; and last, economic properties with a ratio of 10%. Their second preferences were quite similar: aesthetic properties with a ratio of 35.15%, functional properties with a ratio of 23.14%, ecological properties with a ratio of 19.71%, and economical properties with a ratio of 12%. Their third preferences were not as similar: ecological properties with a ratio of 40.58%, functional properties with a ratio of 26.85%, economical properties with a ratio of 18% and aesthetic properties with a ratio of 14.57%. Apparently, the users preferred aesthetic properties in planting design over functional, ecological and economical properties.

3.3. Sustainability of the UPGSs (aesthetic, functional, and ecological properties)

Fig. 5 presents an evaluation by informed opinion (public staff, postgraduate/doctorate students of Landscape Architecture, ordinary people, and academic staff) [79-81] of the school gardens, cemetery gardens, gardens of public buildings, hospital gardens, park areas, residential gardens, religious structures, under-utilized spaces, highways and the river corridor with the characteristics of either the old or new urban texture, in reference to Voordt's [76] three standards, namely aesthetic, functional, and ecological properties. The evaluations of the UPGS's were classified separately for each group or participant. Old and new texture UPGS's were classified by taking the aesthetic, functional and ecological score averages for each participant group.

According to the members of the public staff, the school gardens with the characteristics of the old urban texture (2.5 points) and the cemetery gardens with the

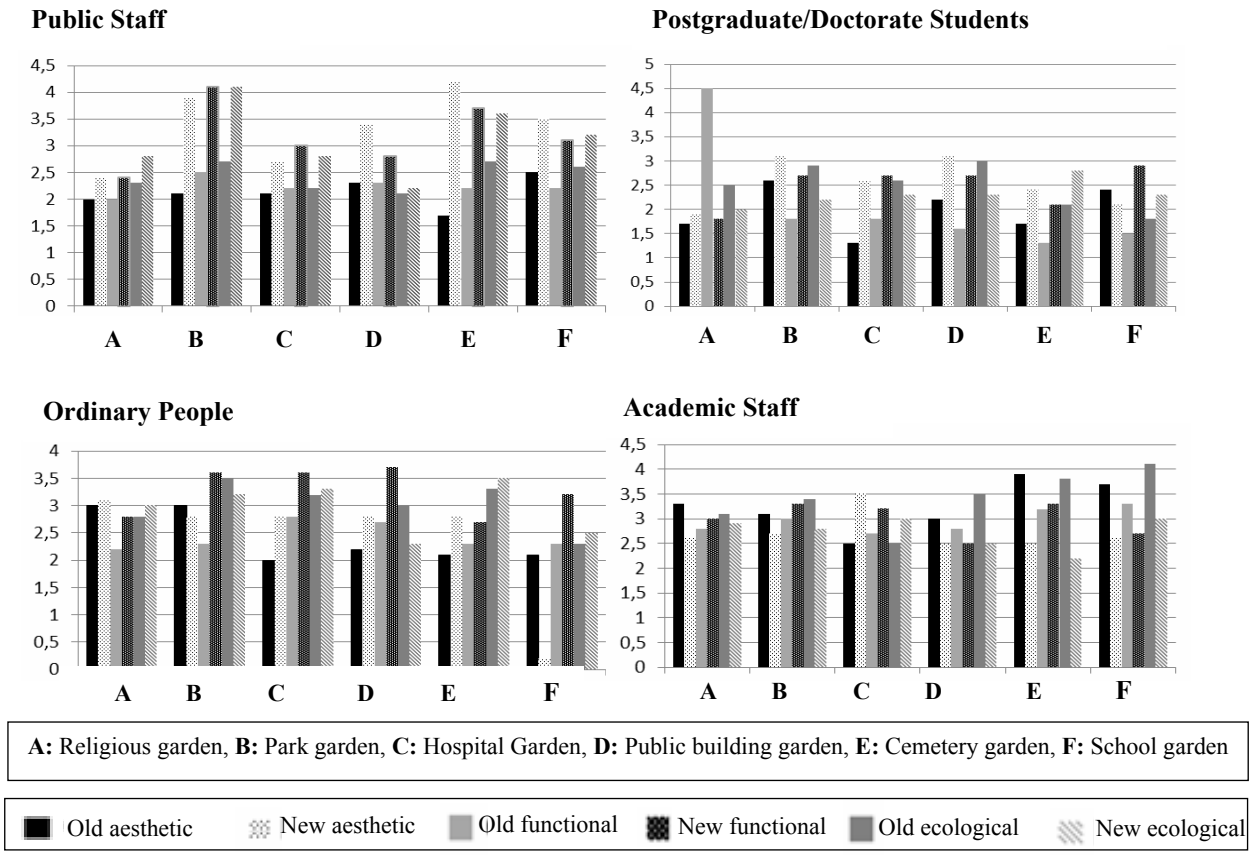


FIGURE 5 - Learned opinion on the sustainability of the sampled areas (aesthetic, functional, and ecological properties).

characteristics of the new urban texture (4.25 points) were aesthetically beautiful, the park areas with the characteristics of the old urban texture (2.5 points) and the park areas with the characteristics of the new urban texture (4.1 points) were functional, and the cemetery gardens-park areas with the characteristics of the old urban texture (2.7 points) and the park areas with the characteristics of the new urban texture (4.1 points) were ecological.

According to postgraduate/doctorate students of Landscape Architecture, the park areas with the characteristics of the old urban texture (2.6 points) and the gardens of public buildings/park areas with the characteristics of the new urban texture (3.1 points) were aesthetically beautiful, the gardens of religious structures with the characteristics of the old urban texture (5 points) and the school gardens with the characteristics of the new urban texture (2.9 points) were functional, and the older urban parks (2.8 points) were ecological.

According to the ordinary people, the gardens of religious structures with the characteristics of the old urban texture (3.05 points) and the gardens of religious structures with the characteristics of the new urban texture (3.1 points) were aesthetically beautiful, the hospital gardens with the characteristics of the old urban texture (2.8 points) and the gardens of public buildings with the characteristics of the new urban texture (3.7 points) were functional, and the park areas with the characteristics of the old urban texture (3.5 points) and the cemetery gardens with the characteristics of the new urban texture (3.5 points) were ecological.

According to the members of academic staff from Bartin University (Faculty of Forestry), the cemetery gardens with the characteristics of the old urban texture (3.9 points) wereaesthetically beautiful, the school gardens with the characteristics of the old urban texture (3.3 points) and the cemetery gardens with the characteristics of the new urban texture (3.3 points) were functional, and the school gardens with the characteristics of the old urban texture (4.1 points) were ecological.

3.4. Visual Quality of Public Gardens

Fig. 6 presents an evaluation by informed opinion (public staff, students of Landscape Architecture, ordinary people, and academic staff from Bartin University) of the school gardens, cemetery gardens, gardens of public buildings, hospital gardens, park areas and religious structures with the characteristics of either the old or new urban texture in reference to Osgood's [77] Semantic Differentiation Scale [58; 61]. The evaluations of the UPGSs were interpreted separately for each group.

Considering the school gardens with pairs of dichotomous adjectives, the academic staff found

- the old school gardens beautiful (26%), traditional (40%), neat and accessible (24%), diverse (36%) and adequately green (26%)
- they regarded the new school gardens practical (24%), spacious (26%) and diverse (20%).

On the other hand, the public staff found

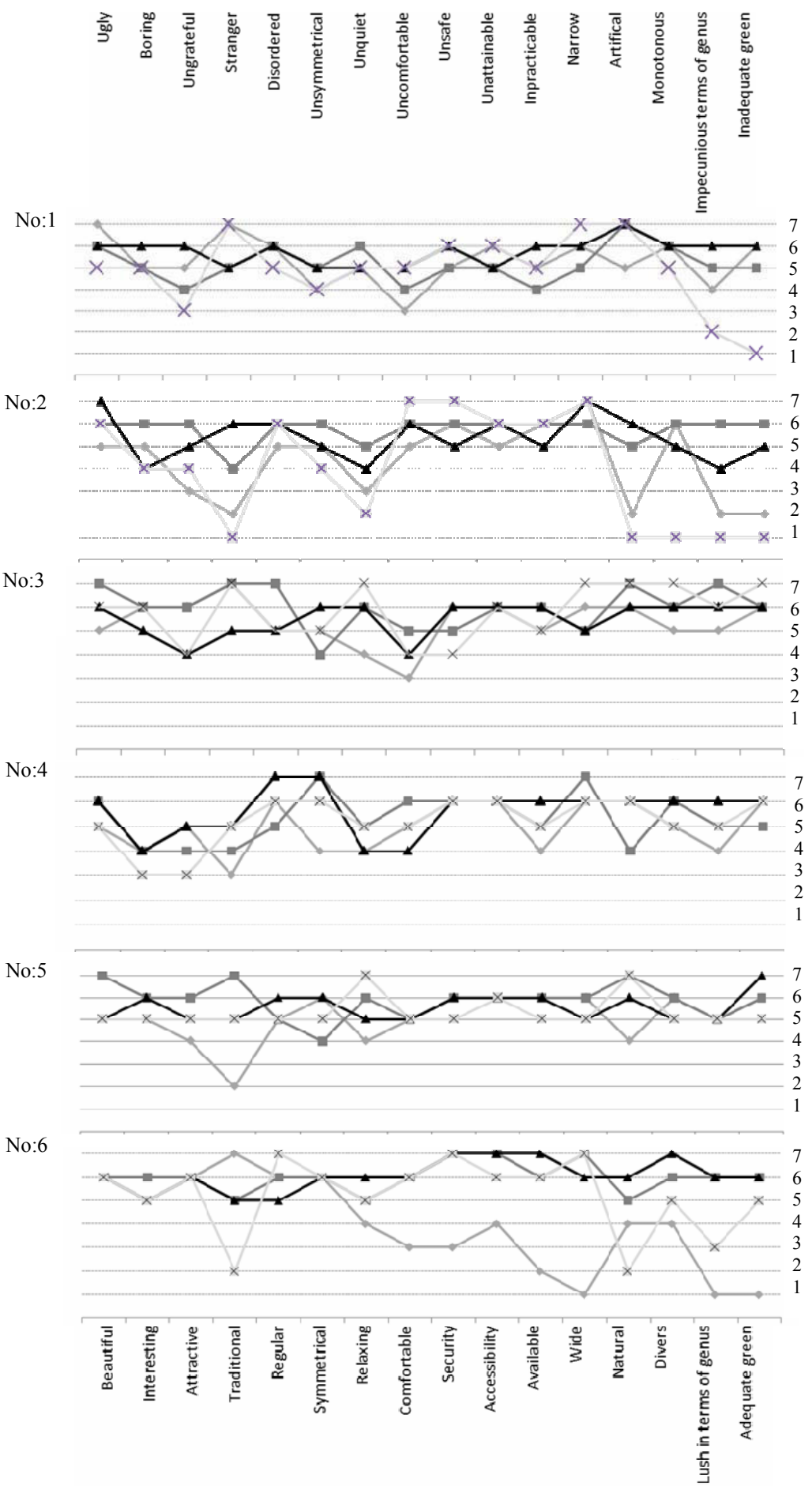
- the school gardens with the characteristics of the old urban texture symmetrical (52%), relaxing (44%), natural (46%) and diverse (50%)
- whereas they regarded the ones with the characteristics of the new urban texture interesting (30%), attractive (28%), accessible (39%), practical (35%) and adequately green (20%).

As for the cemetery gardens with the characteristics of the old and new urban texture, all the groups of participants found them accessible at a ratio of 32%. However, the cemetery gardens with only the characteristics of new urban texture were found safe by 28%. In addition, the cemetery gardens with the characteristics of the old urban texture were regarded by the public staff, students of Landscape Architecture and academic staff from Bartin University as traditional by 29% while the cemetery gardens with the characteristics of the new urban texture were defined as strange. On the other hand, the cemetery gardens with the characteristics of the old urban texture were regarded as attractive by the academic staff and public staff with a ratio of 28% while they were considered as tasteless by 24%. As for the cemetery gardens with the characteristics of the new urban texture, all participant groups found them to be tasteless, with a ratio of 26%.

As for the public buildings, all participant groups considered the gardens of public buildings with the characteristics of the old urban texture as practical with a ratio of 32% and accessible by 33%. The public gardens were regarded as traditional by 28% and symmetrical by 26%. In addition, the gardens of public buildings with the characteristics of the old urban texture were defined as adequately green, diverse, and rich in terms of species by 36%. Furthermore, they were regarded as beautiful by 26%, attractive by 27% and symmetrical by 23%. Except for the academic staff, all the groups of participants regarded them comfortable by 23%, safe by 27%, accessible by 30%, practical by 25%, and spacious by 21%. Whereas the academic staff and students of Landscape Architecture defined the planting design as monotonous, inadequately green and poor in terms of species, the ordinary people and public staff regarded the planting design as diverse, rich in species, and sufficiently green by 28%.

4. DISCUSSION AND CONCLUSIONS

The present study made an attempt to identify the plant species used in the UPGSs in Bartin acknowledged to have a huge impact on urban texture, their families/origins along with the values they could add to the users (ecological, functional, and aesthetic properties) as well as to determine how well they could contribute to the city and the surrounding environment. The study will hopefully serve as a model for further research on planning, designing, and managing the UPGSs in Bartin. This study gave an insight into exploring changing urban tex-


Ugly
Boring
Ungrateful
Stranger
Disordered
Unsymmetrical
Unquiet
Uncomfortable
Unsafe
Unattainable
Inpracticable
Narrow
Artifical
Monotonous
Impecunious terms of genus
Inadequate green
No:1
No:2
No:3
No:4
No:5
No:6
7
6
5
4
3
2
1
Beautiful
Interesting
Attractive
Traditional
Regular
Symmetrical
Relaxing
Comfortable
Security
Accessibility
Available
Wide
Natural
Divers
Lush in terms of genus
Adequate green

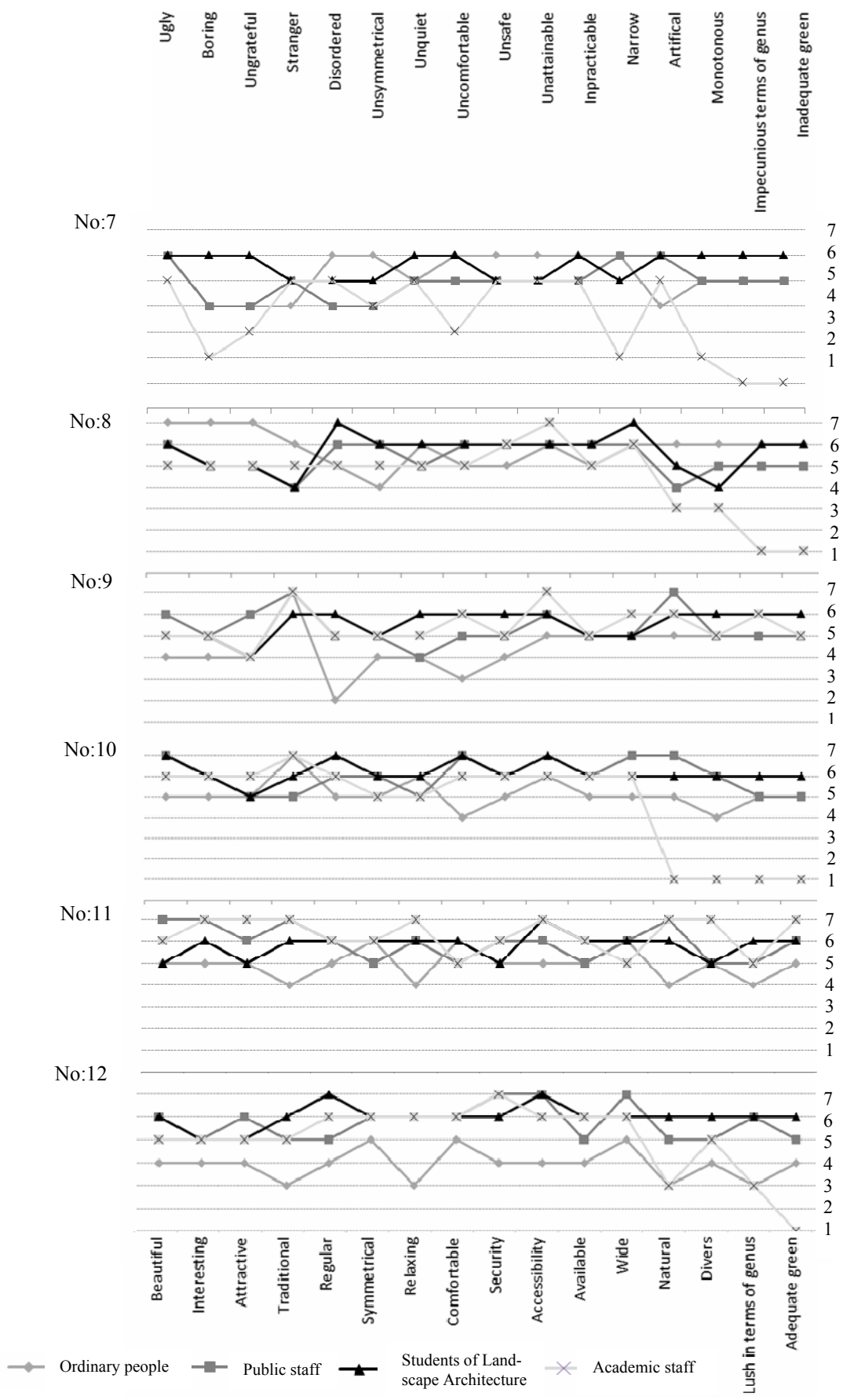


FIGURE 6 - Semantic differential values for the visual quality of the UPGSs.

ture with urbanization in relation to the vegetation structure of UPGSs. This study could be a useful reference for application in other developing countries with similar processes of urbanization.

An attempt was made in the study to identify the status of outdoor woody ornamental plants in the UPGSs, as a component of urban biodiversity. Biodiversity and its maintenance are essential components of sustainable urban landscapes. In this way, the present study is similar to those of Oguz [12] and Mansuroglu et al. [3].

The richness and diversity of species are closely intertwined with new urban development areas. It is found that the vegetation structure has shifted from traditional urban settlement flora to ornamental purposes [4]. In tandem with urban expansion, the preference has shifted from natural plants to species of a foreign origin in outdoor ornamental plants for new settlement areas. Similarly, it was observed in the present study that natural species were commonly used in the old urban texture of Bartin whereas exotic species were prevalent in the new urban texture of the city. This shift could result in a loss of local identity in UPGSs. The present study's findings are supported by those of Esbah [14], Bekci et al. [18], and Sogut and Bozdogan [82].

The findings suggested that there were 193 plant species in the UPGS's in the 41 sampled areas and they belonged to 59 families. A comparison between the PGS's with the characteristics of the old and new urban texture in terms of the five most commonly preferred plants indicated that *Rosa floribunda* was common to both groups. The other four species for the PGS's with the characteristics of the old urban texture were *Robinia pseudoacacia, Pinus nigra, Thuja orientalis, Juglans regia* whereas the ones for the PGS's with the characteristics of the new urban texture were *Fraxinus excelsior, Pinus pinea, Pinus nigra, Thuja orientalis*. These findings prove that pleasing plants were used for these areas. In addition, the *Rosacea* family was most commonly preferred for both the old and new urban texture (as also the case in the study of Bekci et al. [18]). It is vital that urban texture should include native and naturalized plants, for they contribute to the identity of a city. The findings revealed by the present study suggest that *Rosa* sp. was the "Characteristic Plant" for Bartin.

In addition, the first five plants in the study by Bekci et al. [18], namely *Ficus carica, Prunus domestica, Rosa floribunda, Juglans regia, Corylus avellana* were found to be preferred by the users because of the benefits they could offer. In this respect, plants in residential gardens are of a similar character to those in public gardens.

The socio-demographic properties of the users of the spaces were taken into consideration when evaluating the visual quality as well as the types of plants used in the UPGSs with both old and new urban texture characteristics. The correlation analysis carried out for this purpose confirmed that the UPGS's with old urban texture characteristics were found to be more traditional and attractive ($r=0,133^{*}$) in comparison with those having new urban texture characteristics. It was also determined that the former had sufficient green in terms of floral texture ($r=0.176^{**}$). As for the sustainability of the UPGS's in Bartin, the present study revealed that the academic staff from Bartin University (Faculty of Forestry) regarded the old cemeteries as aesthetically beautiful whereas the support staff, postgraduate/doctorate students and ordinary people in Bartin preferred the cemeteries, public buildings and religious structures that had the characteristics of the new urban texture, in terms of aesthetic beauty. The difference between the academic staff and the other groups of participants might have resulted from the former group attaching more importance to the contributions of biological diversity in the cemeteries than to urban ecology, while the postgraduate/doctorate students of landscape architecture, ordinary people and public staff focused more on the PGS's with the characteristics of the new urban texture because those spaces were closer to the city center and those groups used them more frequently.

As for the functionality of the UPGS's, only the postgraduate/doctorate students preferred the gardens of old religious structures, whereas the other three groups of participants reported their preference for park areas, gardens of public buildings and cemeteries with the characteristics of the new urban texture.

In regard to the ecological properties of the UPGS's, the favorite areas were school gardens and parks with the characteristics of the old urban texture, and the cemeteries with the characteristics of the new urban texture.

There were differences among the groups of participants (public staff, postgraduate/doctorate students of landscape architecture, ordinary people, and academic staff) in their views of the sampled areas in regard to their functional, ecological, and aesthetic properties. In brief, the postgraduate/doctorate students and academic staff favored the UPGS's with the characteristics of the old urban texture in their evaluation of the sampled areas in regard to their functional, ecological, and aesthetic properties.

According to the results obtained from the semantic differential scale, which were used to identify the visual quality of the UPGS's, all the groups of participants rated the cemeteries with the characteristics of the old and new urban texture as accessible (32%) and traditional (29%).

In addition, the cemetery gardens, school gardens and gardens of religious structures that had the characteristics of the new urban texture were defined as boring, tasteless and disordered by all the groups of participants. The participants' views of the cemetery gardens, school gardens and park areas with the characteristics of the old urban texture were in parallel with the findings on the sustainability of the UPGS's. It is recommended that these ecological areas should be restored within the ambit of landscape practices.

The present study concludes that users attach more importance to aesthetic concerns than to other concerns in their preferences for ornamental plants in UPGS's. Ecological concerns are often neglected, and the tendency has been to shift from natural vegetation to exotic plant species. This leads to the propagation of the same plant species as part of efforts to ensure the sustainability of urban biodiversity. If similar landscape practices continue to be implemented, it is highly likely that they will have a negative influence on species diversity in urban ecology.

The authors have declared no conflict of interest.

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