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RESEARCH ARTICLE

Determination of Plants Identified with Still Waterscape (Lake/Pond)

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ABSTRACT

The symbolic meanings of plants and their psychological benefits to people is a neglected issue. With the help of this study, it is tried to determine which plants can be identified with still waterscapes. In addition, it is revealed which sizes and characteristic properties of plants are identified with still waterscape. Thus, it will be revealed that plant-space identification and plants can be evaluated as an element that strengthens the meaning of spaces. In order to reveal the plant-space identification, a survey was conducted on a total of 500 people, including 100 primary school students, 100 secondary school students, 100 high school students, 100 university students and 100 university graduates. As a result of the study, it was determined that *Salix*, *Populus*, *Papaver*, *Pinus*, and *Cupressus* plant species were identified with still waterscape, respectively. In addition, it was revealed that trees were most preferred in terms of size and broad-leaved trees were most preferred in terms of characteristic properties for still waterscape. In addition, it was determined whether education levels and gender differences have any effect on plant-space identification. As a result of Chi-square analyses, it was determined that education level was effective in preference distribution and gender difference was not effective. As a result of the study, it was emphasized that plants can be used as effective indicators to identify places.

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1. Introduction

The renewal movement in cities has led to the differentiation of the cultural structure of cities and the inability to protect urban values (Doğan et al., 2018; Rowe et al., 1993). Urban open-green areas have an important place in improving urban living conditions (Tolunay et al., 2019). The change in these areas over time causes changes in the presence of plants in these areas (Başaran et al., 2020; Tırnakçı & Aklıbaşında, 2018). This situation causes an alienation between people and space. It is important to meet the emotional needs of people in space design and to provide a continuity where their past and memories will exist (Bahadır, 2014). When designing urban open spaces, the spatial features and activities that took place in that area in the past should be evaluated and reflected in the design (Doğan et al., 2018). Thus, people's sense of belonging to the space can be increased and their ties with the past can be enhanced (Bahadır, 2014; Ulu & Karakoç, 2004).

Spaces have their own emotions, characteristics and identities. It is the spatial elements and components that make up that space (Doğan et al., 2018; Özen & Sürül, 2002). The combination of both natural and structural elements creates the first image of the spaces and this image is never erased from our minds (Tırnakçı & Aklıbaşında, 2018). This is the

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projection and associations of the place on us. After that, the symbol of that place forms a whole with that place. If the symbol of a place comes to mind when we think of that place, we will also think of that place when we see the symbol. Plants are the most important of the elements and components that make up spaces. Plants gain meaning as a result of their effects on people. This situation causes plants to gain symbolic meanings.

Plants constitute the living structure of open-green areas (Tyson, 1998). It is very important that the plant material, which has important effects in bringing people closer to nature, is selected correctly and used in the right place (Sakıcı et al., 2013). Well-known and recognized plants are known to stimulate perception and mental stimulation on people and thus the ability of plants to revive the past emerges (Elings, 2006). As a result of the effects of plants on individuals, individuals attribute a meaning to them and this leads to the creation of symbolic meanings of plants. The symbolic meaning leads the person to think and creates a positive or negative effect on the person (Ozbilen & Kalın, 2001). Plants have a very important function in defining and emphasizing our physical environment (Sakıcı & Pişkin, 2019). The symbolic meanings of plants and their psychological benefits to people is an issue that most of the society ignores. However, plants have been used throughout history with their symbolic meanings and some plants have been identified with some places.

One of the most important features of the components and elements of the space is to convey the meaning of the space to the user (Doğan et al., 2018; Özgeriş, 2018). It was decided to conduct this study to reveal that plants, which can express many concepts, can be considered as elements that strengthen the meaning of spaces. With the help of this study, it was tried to reveal that when plants are used in still waterscape, plant preferences should be made depending on the characteristics of the place, so that they can stimulate the mind and revive the past, and that the identity of the place can be protected in terms of plants with suitable plant preferences. Within the scope of the study, it was tried to determine which plants are identified with still waterscape consisting of lakes or ponds.

2. Materials and Methods

In order to determine the plants identified with still waterscape, 28 plant species that are most commonly known by the public and frequently encountered in their surroundings were used. These 28 plant species were divided into five groups in terms of size and nine groups in terms of characteristic properties. The distribution of plants according to these groups is shown in Table 1. Although it is difficult to perceive and reveal the plant-space interaction in humans, empirical studies can provide data for the purpose. In order to reveal the plant-space identification, a questionnaire study was used to determine which of these 28 plants are identified with still waterscape. The respondents were asked which three of these 28 plants they identified with still waterscape. A visualization with the names and images of the plants was used in the questionnaire. Since it is thought that the level of education is an important factor in plant-space identification, the survey was applied to groups with different levels of education. Within the scope of the study, five categories were determined as primary school, secondary school, high school, university students and university graduates, and a total of 100 people for each category and 500 people in total were surveyed. In addition, in order to determine the effect of gender on plant-space identification, it was ensured that the gender distribution of the groups in different categories was as balanced as possible.

Table 1. Group distribution of the plants according to the characteristics properties and size.

Group Names	Plants	Characteristics Properties of Plants	Size of Plants
1. Group	*Picea, Pinus, Cupressus*	Conifers	TREES
2. Group	*Platanus, Salix, Tilia, Magnolia, Populus*	Broad-Leaf Trees	
3. Group	*Cercis, Lagerstroemia, Acacia, Nerium*	Small Flowering Trees	SMALL TREES
4. Group	*Olea, Elaeagnus,*	Small Gray-Colored Fruit Trees	
5. Group	*Round Robinia*	Commonly-Used Small Tige Trees	
6. Group	*Thuja, Buxus, Euonymus*	Shrubs Used as Live Fencing	SHRUBS
7. Group	*Rosa, Tamarix, Viburnum, Jasminum*	Flowering Shrubs	
8. Group	*Lonicera, Vitis, Bougainvillea*	Twining-Climbing Plants	CLIMBERS
9. Group	*Tulipa, Papaver, Viola*	Flowers	GROUNDCOVER

Frequency tables were used to determine which size groups and which characteristic properties were preferred for still waterscape. The effects of education level and gender differences on plant-space identification were determined with the Chi-square test. The Kruskal-Wallis Test was also used to compare the rankings of the characteristic properties of the plants.

3. Results

3.1. Demographic Characteristics of the Participants

The questionnaire was administered to 100 participants from five different educational levels: primary school, secondary school, high school, university students and university graduates, and the study was conducted with a total of 500 questionnaires. Of the participants, 299 were female and 201 were male. The gender distribution of the participants is shown in Table 2.

Table 2. Gender distribution according to the educational level of the participants.

Educational Level		**Primary School**	**Secondary School**	**High School**	**University**	**University Graduate**	**Total**
Gender	Female	46	44	88	59	62	299
	Male	54	56	12	41	38	201
Total		100	100	100	100	100	500

3.2. Results on the Identification of Plants with Still Waterscape

In order to reveal which plants are identified with still waterscape, the participants were asked to identify three plants from these 28 plants that they think are identified with still waterscapes. Since a total of 500 people participated in the survey, 1500 plant preferences (500 x 3) were made for these areas. In the evaluation, it was tried to reveal which plants are identified with still waterscape and which plant size groups and which characteristic property groups are preferred.

Table 3. Distribution of plant preferences for the still waterscape according to educational level.

Ranking	Plants	Primary School	Secondary School	High School	University	University Graduate	*p*	TOTAL
1	*Salix*	22	**26**	**28**	**20**	**37**	**0.000**	**133**
2	*Populus*	13	**36**	**25**	**17**	**32**		**123**
3	*Papaver*	**32**	21	**27**	**21**	15		**116**
4	*Pinus*	16	**27**	18	12	**32**		**105**
5	*Cupressus*	6	21	15	15	26		**83**
6	*Platanus*	16	14	10	9	24		73
7	*Rosa*	**24**	14	9	16	8		71
8	*Viola*	**23**	14	14	11	8		70
9	*Tamarix*	7	18	**25**	10	7		67
10	*Tulipa*	17	12	11	16	5		61
11	*Euonymus*	9	10	12	12	12		55
12	*Picea*	15	9	5	14	10		53
13	*Lagerstroemia*	10	8	10	12	11		51
14	*Cercis*	8	9	9	13	8		47
15	*Vites*	6	7	13	12	7		45
16	*Nerium*	12	7	9	6	6		40
17	*Lonicera*	18	5	5	7	4		39
18	*Jasminum*	4	7	10	7	9		37
19	*Viburnum*	2	8	3	15	8		36
20	*Tilia*	10	3	7	10	1		31
21	*Acacia*	4	3	3	7	11		28
22	*Bougainvillea*	7	4	4	7	5		27
23	*Buxus*	1	4	6	11	2		24
24	*Round Robinia*	5	3	7	4	3		22
25	*Magnolia*	5	4	5	5	2		21
26	*Elaeagnus*	5	2	6	4	2		19
27	*Thuja*	0	2	1	6	3		12
28	*Olea*	3	2	3	1	2		11

It was determined that the plant preferences made by the participants for still waterscapes differed according to the level of education ($p<0.05$), with primary school students preferring *Papaver* (32%), *Rosa* (24%), and *Viola* (23%), and secondary school students preferring *Populus* (36%), *Pinus* (27%), and *Salix* (26%), high school students preferred *Salix* (28%), *Papaver* (27%), *Populus* (25%), and *Tamarix* (25%), university students preferred *Papaver* (21%), *Salix* (20%) and *Populus* (17%) and university graduates preferred *Salix* (37%), *Populus* (32%) and *Pinus* (32%). When the preferences are evaluated collectively without taking education level into account, the 5 most preferred plants for still waterscapes respectively are *Salix* (26.6%), *Populus* (24.6%), *Papaver* (23.2%), *Pinus* (21%) and *Cupressus* (16.6%) (Table 3).

When an evaluation was made according to the characteristic property groups of the plants, the plants preferred by the participants for still waterscape were evaluated under groups. As a result of the analysis, it was revealed that the characteristic property group preferred for still waterscape differed statistically in terms of education level ($p<0.05$). According to the results of the analysis, the most preferred groups for still waterscape were Group 9 (flowers, 24%) for primary school students, Group 2 (broad-leaved trees) for secondary school (27.7%), high school (25%), university (20.3%) students and university graduates (32%). Looking at the total values of the preferences, the most preferred characteristic groups were Group 2 (broadleaved trees) with 381 preferences, Group 9 (flowers) with 247 preferences and Group 1 (coniferous trees) with 241 preferences (Table 4). In the analysis based on gender difference, no statistical difference was found between the groups ($p>0.05$) and it was determined that the first preference of both females and males was Group 2 (broad-leaved trees) (Female: 37.7%; Male: 127 preferences) (Table 5).

Table 4. Distribution of preference for plant characteristic property groups for still waterscape, depending on education level.

Group	TOTAL		Educational Level										*P*
			Primary School		Secondary School		High School		University		University Graduate		
	n	%	n	%	n	%	n	%	n	%	n	%	
2.Group	**381**	**25.4**	66	22.0	**83**	**27.7**	**75**	**25.0**	**61**	**20.3**	**96**	**32.0**	
9.Group	**247**	**16.5**	**72**	**24.0**	47	15.7	52	17.3	48	16.0	28	9.3	
1.Group	**241**	**16.1**	37	12.3	57	19.0	38	12.7	41	13.7	68	22.7	
7.Group	211	14.1	37	12.3	47	15.7	47	15.7	48	16.0	32	10.7	
3.Group	166	11.1	34	11.3	27	9.0	31	10.3	38	12.7	36	12.0	**0.000**
8.Group	111	7.4	31	10.3	16	5.3	22	7.3	26	8.7	16	5.3	
6.Group	91	6.1	10	3.3	16	5.3	19	6.3	29	9.7	17	5.7	
4.Group	30	2.0	8	2.7	4	1.3	9	3.0	5	1.7	4	1.3	
5.Group	22	1.5	5	1.7	3	1.0	7	2.3	4	1.3	3	1.0	

Table 5. Distribution of preference of plant characteristic property groups for still waterscape, depending on gender.

Characteristics Properties of Plants Groups	Gender				*p*
	Female		Male		
	n	%	n	%	
Conifers (1.Group)	126	14.0	98	16.3	
Broad-Leaf Trees (2.Group)	**338**	**37.7**	**197**	**32.7**	
Small Flowering Trees (3.Group)	90	10.0	50	8.3	
Small Gray-Colored Fruit Trees (4.Group)	29	3.2	18	3.0	
Commonly-Used Small Tige Trees (5.Group)	16	1.8	9	1.5	*0.079*
Shrubs Used as Live Fencing (6.Group)	62	6.9	66	10.9	
Flowering Shrubs (7.Group)	88	9.8	56	9.3	
Twining-Climbing Plants (8.Group)	71	7.9	35	5.8	
Flowers (9.Group)	77	8.6	74	12.3	

When an evaluation was made according to the size groups of the plants, it was found that the distribution of preferences differed depending on the level of education ($p<0.05$) and that trees were preferred the most in all education levels (primary school: 34.3%, secondary school: 46.7%, high school: 37.7%, university: 34% and university graduates: 54.7%). When the total values of the preferences for the groups were analyzed, it was determined that trees (41.5%) and shrubs (20.1%) were mostly preferred (Table 6).

Table 6. Distribution of preference of plant size groups for still waterscape, according to education level.

Size of Plants	Total		Education Level										*p*
			Primary School		Secondary School		High School		University		University Graduate		
	n	%	n	%	n	%	n	%	n	%	n	%	
Trees	**622**	**41.5**	**103**	**34.3**	**140**	**46.7**	**113**	**37.7**	**102**	**34.0**	**164**	**54.7**	***0.000***
Small Trees	218	14.5	47	15.7	34	11.3	47	15.7	47	15.7	43	14.3	
Shrubs	302	20.1	47	15.7	63	21.0	66	22.0	77	25.7	49	16.3	
Climbers	111	7.4	31	10.3	16	5.3	22	7.3	26	8.7	16	5.3	
Groundcover	247	16.5	72	24.0	47	15.7	52	17.3	48	16.0	28	9.3	

It was examined whether gender difference was effective in the preference of the size group and no significant difference was found as a result of the analysis ($p>0.05$). For still waterscape, the first preference of both females (41.6%) and males (41.3%) was the trees group (Table 7).

Table 7. Distribution of preference of plant size groups for still waterscape, according to gender.

Size of Plants	Gender				*p*
	Female		Male		
	n	%	n	%	
Trees	**373**	**41.6**	**249**	**41.3**	
Small Trees	135	15.1	83	13.8	
Shrubs	185	20.6	117	19.4	0.755
Climbers	64	7.1	47	7.8	
Groundcover	140	15.6	107	17.7	

4. Discussion and Conclusion

One of the most important functions of space components and elements is to convey the meaning of space to the user (Doğan et al., 2018). It was decided to conduct this study in order to reveal that plants can be evaluated as elements that reinforce the meaning of space thanks to their physical properties and meaning attributions. Plants have a very important function in defining and emphasizing our physical environment. It is a known fact that plants have many aesthetic and functional benefits to society and open green spaces (Elings, 2006). When selecting species in open green areas, attention should be paid to the ecological compatibility of the species with the city and the preservation of natural species diversity. However, this approach alone is not enough. Plants give meaning and value to the environment. It is necessary to pay attention to the plant-space relationship analysis in species selection. When choosing plants, it is also necessary to pay attention to social and cultural harmony, such as the historical background, identity and perceptual preferences of the users. The sustainability of the plants used starts with the right species selection. Identifying the species that have a high tendency to be used in a place and using these plants in these places will define and strengthen the identity of the place (Başer & Yıldızcı, 2011). It will help to give information about the space even when viewed from a distance.

Plants positively affect the perceptibility of spaces (Doğan et al., 2018; Ozbilen and Kalın, 2001). With the help of this study, it has been revealed that it is necessary to take into account the characteristics of the space while choosing plants in open green areas, so that it can revive the past by providing mental stimulation and that the identity of the space can be protected in terms of planting with appropriate plant species preferences. In addition, the study reveals the relationship of plants that are recognized and frequently used in our environment with still waterscapes and that the meaning of still waterscapes can be strengthened with plants.

It is known that plants have reminded some places in human memory from the past to the present (Sakıcı & Pişkin, 2019). Plants that are identified with both the historical and architectural features of spaces become part of human memory without being aware of it, and when that plant is seen, those spaces are remembered (Ozbilen & Kalın, 2001). Changes cause a decrease in the relationship and sense of belonging between people and places (Doğan et al., 2018). When selecting plant species for still waterscape, it is extremely important to choose plants that are identified with this area in terms of remote perception of the areas, revitalizing the past and renewing memories, meeting people's expectations from the place, developing a sense of belonging to the areas and developing feelings of recognition and familiarity with the areas. It is also important for the protection of place identity or

space identity (Ozbilen & Kalın, 2001). When making planting design in still waterscapes, it is important to take into account the characteristics of the area in order to create perceptible and understandable spaces. The use of plants identified with the space strengthens the meaning of the space (Nemutlu et al., 2013; Ozbilen & Kalın, 2001). Ozbilen and Kalın (2001) revealed in their study that different plants are identified with Trabzon's places with different characteristics. Sakıcı and Pişkin revealed the plant-space relationship in mosque areas in 2019 and plant-space relationship in historical places in 2022 (Sakıcı & Pişkin, 2019; Sakıcı & Piskin, 2022). These studies are the researches that clearly reveal the plant-space identification.

The study revealed that the most preferred plants for still waterscapes are *Salix*, *Populus*, *Papaver*, and *Pinus*, respectively. In the study, the plants were divided into 5 groups in terms of size, and it was revealed that trees were most preferred in terms of size for still waters. In the study, plants were divided into nine groups in terms of characteristic properties, and it was revealed that broad-leaved trees, flowers and coniferous trees were most preferred in terms of characteristic properties for still waterscape (Pişkin, 2020).

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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