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RESEARCH ARTICLE

WOODY PLANT VARIETY IN PARKS AND GARDENS OF TAŞKÖPRÜ (KASTAMONU) DISTRICT AND EVALUATION OF LOCAL COMPLIANCE

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ABSTRACT

In this study; woody plant taxa in parks and gardens of Kastamonu province Taşköprü district were determined and the ecological conformity of the species was evaluated. Considering the climatic characteristics of the region, suggestions have been made for woody taxa which are resistant to air pollution and have good visual quality within the region's natural taxa.

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INTRODUCTION

Urban spaces, which are considered to be the beginning of civilization, emerge as a form of life and space where people reveal their instinct for a social life or tendency to socialize. They determine the character of a city, architectural structures, parks and gardens, and their relations with each other and integrity (Gül and Küçük, 2001). It is also known that open green areas improve urban living conditions in addition to balancing the human-nature relation in cities. Thus, such areas in cities are considered as an indicator of civilization and quality of life. Parks have an important place within open green areas since they distance cities from their concrete pile states and give them a more organic character. In addition to contributing to the efficient use of land, parks play a social role. Parks and gardens, which emerge as places where people share in many ways, social needs are met, are focal points that revitalize the city in a socio-cultural sense and contribute to the urban life. They also have environmental benefits such as clearing the air and water, shielding the wind and noise, and balancing the microclimate (Yiğit *et al*., 2014; Chiesura, 2004). In the arrangement of parks, in addition to the physical characteristics such as population potential, topography, and soil properties of the place where they are located, ecological requirements such as climate and vegetation should be taken into consideration. Distancing from the artificiality of the city is possible by taking into consideration the socioeconomic structure of the city and developing the green areas.

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In the study conducted in 2007, Emür emphasized that green areas are important in terms of exhibiting the "quality" side of the urban life, having both ecological and social impact on the quality of urban life, as well as associating the "green" concept with naturalness. In this sense, parks and gardens should be considered as a part of nature, sociocultural needs should be taken into account when these are adapted to the urban life, and species suitable for the natural biodiversity of the region should be preferred. In the study, woody taxa in the parks and gardens of Taşköprü district in Kastamonu province in the Western Black Sea Region were examined. Firstly, species determinations of the taxa in question were made, general ecological characteristics of the tree species were determined, and it was evaluated whether they were suitable for the region in ecological terms and necessary suggestions were made in the light of these evaluations.

MATERIALS AND METHODS

Within the scope of the study, woody species used in parks and gardens in the center of Taşköprü district of Kastamonu province were determined. Evaluations were made in terms of their ecological characteristics such as how many of these species were used, their form structures, light requirements, temperature, and soil requirements. Information on plant species was obtained from Kastamonu Taşköprü Municipality and investigated on site.

Introduction of Research Area

Taşköprü district is located in the Western Black Sea region, within the borders of Kastamonu province, and in the north-

east of the province center. In addition to being an old settlement with a district status gained in 1868, it has an important place when it is evaluated from the population, surface area, and socioeconomic aspects. It is the second largest district of Kastamonu after the central district with a surface area of 1811 km^2 (Ünal, 2013). Upon examining the population change of the district between 1965 and 2015, it is observed that there is a serious decrease with the emigration. In the district center, unlike the district in general, the population increased by more than 2 times in the last 50 years (URL-1), (Figure 1).

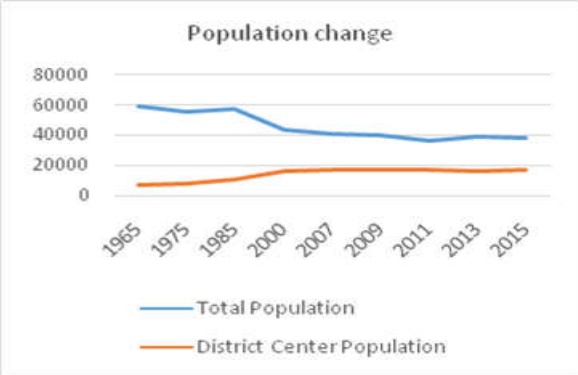

Figure 1. Population change in Taşköprü district in general and in the district center between 1965 and 2015

Taşköprü district is located in the Euro-Siberian (Euxine province) floristic region and it is in the A4 square according to the Turkish grid system. The district is located in a transition zone between the Black Sea and Central Anatolia considering the geographical location.

The Küre Mountains, extending in the north of the district with an elevation of approximately 2000 m, separate the sea from the interior and constitute an obstacle for the effect of the sea to reach the interior. On the other side, the Ilgaz Mountains extending in the south of the region slow down the transition of the Central Anatolian weather conditions to the region. Therefore, a transition climate with a characteristic between the Black Sea climate and the continental climate is dominant in the region (Çetinkaya, 1997). According to the climatic data of the Directorate General of Meteorology between 1965 and 2015, the highest temperature is 27.8-28°C in July-August, while the lowest average temperature is -4.3°C in January (URL-2). According to Emberger (1952), upon evaluating the climatic data, it was determined that the region has a semi-continental precipitation regime type. In this precipitation regime, the maximum precipitation is observed in the spring season, while the minimum precipitation is observed in autumn and winter seasons. In terms of the ecological characteristics of plants, soil factor also plays an important role following the climate. The study area in the Gökırmak valley has alluvial soils at the valley bottoms formed by the rivers. With the increase in elevation, brown forest soils with high lime content are generally observed (Çetinkaya, 1997).

RESULTS

As a result of the investigations and evaluations performed in the parks and gardens, 39 species and 53 taxa belonging to 22 families were determined. In the study area, a total of 50.070 plants, with the predomination of species such as *Buxus sempervirens* L. "Nana", *Ligustrum japonicum* Thunb., *Berberis thunbergii* DC., *Juniperus horizontalis* Moench,

Table 1. Woody plant taxa in the parks and gardens of Taşköprü district

Taxa	Family	Fast growing	Light taxa	Shade tolerant taxa	Amount of taxa
Abies nordmanniana (Stev.) Spach subsp. equi-trojani (Asc. & Sint. ex Boiss.) Coode & Cullen	Pinaceae	X		X	40
Acer platanoides L.	Aceraceae	X	X		150
Acer saccharum L.	Aceraceae	X	X		40
Aesculus hippocastanum L.	Sapindaceae	X	X		30
Aesculus x carnea Hayne	Sapindaceae				2
Albizia julibrissin Durazz.	Fabaceae				5
Berberis thunbergii DC.	Berberidaceae		X		5000
Buddleja davidii Franch	Scrophulariaceae				20
Buxus sempervirens L. cv. "Nana"	Buxaceae			X	10000
Buxus sempervirens L.	Buxaceae			X	100
Catalpa bignonioides Walter	Bignoniaceae	X			180
Cedrus atlantica (Endl.) Manetti ex Carrière	Pinaceae	X	X		30
Cedrus atlantica (Endl.) Manetti ex Carrière cv."Glauca Pendula"	Pinaceae		X		20
Cedrus deodara (Roxb.) G.Don	Pinaceae		X		10
Cedrus libani A.Rich.	Pinaceae		X		20
Cercis siliquastrum L.	Fabaceae	X	X		60
Chamaecyparis lawsoniana (A.Murray) Parl.	Cupressaceae	X		X	100
Cotinus coggygria Scop	Anacardiaceae				10
Cotoneaster horizontalis Decne.	Rosaceae			X	4000
Cotoneaster microphyllus Wall. ex Lindl.	Rosaceae			X	2000
Cupressus arizonica Greene	Cupressaceae	X			300
Cupressus macrocarpa Hartw.	Cupressaceae	X			100
Cupressus sempervirens L.	Cupressaceae	X			3000
Cupressus leylandii A. B. Jacks. & Dallim	Cupressaceae	X			300
Elaeagnus angustifolia L.	Elaeagnaceae	X	X	X	30
Euonymus japonicus Thunb. cv."Variegata"	Celastraceae			X	1000
Euonymus japonicus Thunb.	Celastraceae			X	1000
Forsythia x intermedia Zab.	Oleaceae			X	1000
Fraxinus excelsior L.	Oleaceae	X		X	30
Hibiscus syriacus L.	Malvaceae		X		50
Juniperus horizontalis Moench	Cupressaceae		X	X	5000
Lagerstroemia indica (L.) Pers.	Lythraceae				30
Ligustrum japonicum Thunb.	Oleaceae			X	10000

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Magnolia soulangeana Soul.	Magnoliaceae				20
Malus floribunda Siebold ex Van Houtte	Rosaceae				40
Morus alba "Pendula" L.	Moraceae	X	X		10
Picea abies (L.) H.Karst.	Pinaceae		X	X	100
Picea pungens Engelm.	Pinaceae		X	X	60
Picea pungens Engelm. cv. "Nana"	Pinaceae		X	X	20
Pinus nigra J.F.Arnold	Pinaceae	X	X		500
Pinus sylvestris L.	Pinaceae		X		100
Platanus orientalis L.	Platanaceae	X	X		100
Prunus cerasifera Ehrh. "Atropurpurea"	Rosaceae	X			300
Prunus serrulata Lindl. cv. "Kanzan"	Rosaceae	X			50
Pyracantha coccinea M.Roem	Rosaceae	X		X	5000
Quercus ilex L.	Fagaceae		X		2
Robinia hispida L.	Fabaceae		X		50
Robinia pseudoacacia L.	Fabaceae	X	X		300
Rosa sp. "Baston gül"	Rosaceae		X		200
Salix babylonica L.	Salicaceae	X	X		15
Spiraea bumalda Burv.	Rosaceae				20
Syringa vulgaris L.	Oleaceae			X	50
Thuja occidentalis L.	Cupressaceae		X		300
Thuja orientalis L. "Aurea"	Cupressaceae		X		100
Thuja orientalis L.	Cupressaceae		X		200
Thuja orientalis L. "Pyramidallis"	Cupressaceae		X		200
Tilia tomentosa Moench	Malvaceae				50
Viburnum opulus L.	Adoxaceae			X	20
Viburnum tinus L.	Adoxaceae			X	20

Table 2. The soil requirements of the plant taxa used in the parks and gardens of Taşköprü district

Türler Taxa	Arid, dry and sandy soils	Heavy clay soils	Plants grown on marl	Sali ne soils	Humid and wet soils	Acid soils or marl	Species resistant to polluted air	Soil acidity (pH)
Abies nordmanniana subsp. equi-trojani[2]		X			X	X		4-6.5
Acer platanoides [1, 2]		X	X				X	6.5-7.5
Acer saccharinum [1]		X			X		X	6.5-7.5
Aesculus hippocastanum [2]							X	6-7
Aesculus x *carnea*							X	
Albizia julibrissin [4]	X							
Berberis thunbergii [2]	X	X		X		X	X	
Buddleja davidii [3]			X	X			X	
Buxus sempervirens cv."Nana"			X				X	
Buxus sempervirens			X				X	6.5-7.5
Catalpa bignonioides [1, 3]	X						X	6.5-7.5
Cedrus atlantica	X		X					
Cedrus atlantica cv."Glauca Pendula"	X		X					
Cedrus deodara	X							
Cedrus libani	X		X					
Cercis siliquastrum [3]	X		X					6.5-7.5
Chamaecyparis lawsoniana [2]		X	X		X			4-7.5
Cotinus coggygria		X						
Cotoneaster horizontalis	X		X	X			X	
Cotoneaster microphyllus	X		X	X			X	
Cupressus arizonica			X					
Cupressus macrocarpa [1]	X		X	X				
Cupressus sempervirens [3]	X		X	X				
Cupressus leylandii								
Elaeagnus angustifolia [1, 2]	X			X			X	
Euonymus japonica cv. "Variegata"[2]		X	X				X	
Euonymus japonicus [2]		X	X				X	
Forsythia x intermedia		X	X	X			X	
Fraxinus excelsior [2]		X	X	X	X		X	6-7.5
Hibiscus syriacus [3]			X	X				
Juniperus horizontalis [2]	X	X	X	X				6.5-7.5
Lagerstroemia indica	X							
Ligustrum japonicum			X	X			X	
Magnolia soulengiana						X	X	4-7
Malus floribunda [2]	X	X		X			X	6.5-7.5
Morus alba cv."Pendula"	X		X				X	6.5-7.5
Picea abies [1, 2]					X	X		4-6.5
Picea pungens [2]					X	X		6-6.5
Picea pungens cv. "Nana" [2]					X	X		
Pinus nigra [1, 2]	X		X	X			X	4-6.5
Pinus sylvestris [2]								4-6.5
Platanus orientalis							X	6.5-7.5
Prunus cerasifera cv. "Atropurpurea" [1]		X	X				X	
Prunus serrulata cv. "Kanzan" [1]		X	X				X	

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Pyracantha coccinea	X	X	X				X	
Quercus ilex [1]		X	X	X			X	
Robinia hispida[1]	X		X				X	
Robinia pseudoacacia [1, 2]	X		X	X			X	5-7.5
Rosa sp. "Baston gül"[2]		X		X			X	
Salix babylonica [1, 2]		X		X	X	X	X	6.5-7.5
Spiraea bumalda [2]			X	X			X	
Syringa vulgaris [2]							X	
Thuja occidentalis [2]		X	X		X			6.5-7.5
Thuja orientalis cv. "Aurea" [2]		X			X			6.5-7.5
Thuja orientalis [2]		X			X			6.5-7.5
Thuja orientalis cv."Pyramidallis" [2]		X			X			6.5-7.5
Tilia tomentosa [2]		X					X	6.5-7.5
Viburnum opulus [2]		X		X	X	X	X	
Viburnum tinus		X		X		X	X	

[1]Wind resistant, [2]Resistant to continental climate conditions, [3]Requires protection under continental climate conditions,
[4]Can grow in hot climate condition

Pyracantha coccinea M. Roem, *Cotoneaster horizontalis* Decne., *Cupressus sempervirens* L., *Cotoneaster microphyllus* Wall. ex Lindl., *Euonymus japonicus* Thunb., *Forsythia x intermedia* Zabel, were determined to be used. The species used in park areas were mostly broad-leaved species, and 16 different coniferous species were also determined. Furthermore, it was determined that all of the used broad-leaved species except for *Quercus ilex* L., which is in the group of evergreen oaks, were deciduous taxa. Upon evaluating the plant taxa used according to their families, evergreen Pinaceae and Cupressaceae families and the Rosaceae family, which has spectacular flowers, are placed on the top, respectively, in terms of the species diversity (Table 1). The plant species used in the parks and gardens of Taşköprü district, together with their family names and information on how many of them used are given in Table 1. According to the data in Table 1, it is observed that the plant species used in the parks and gardens of Taşköprü district are generally fast-growing species and that tall trees with the majority of individuals in the shrub form are also preferred. There are shade-resistant individuals in addition to trees with the high light requirement in the park areas examined. The soil requirements and suitability to the climate conditions of the plant species used in the parks and gardens of Taşköprü district are given in Table 2 according to Ürgenç (1992). Approximately half of the tree species used in the area are individuals resistant to the wind and cold climate conditions. *Acer platanoides, Elaeagnus angustifolia, Pinus nigra,* among the species naturally found in our country, and *Picea abies, Salix babylonica,* and *Robinia pseudoacacia,* among the exotic species, are species that are resistant to both the wind and cold weather conditions.

While there is only *Albizzia julibrissin* compatible with hot climate conditions, *Cercis siliquastrum* and *Cupressus sempervirens* among our natural species and *Buddleja davidii, Catalpa bignonioides,* and *Hibiscus syriacus,* among the unnatural species, need to be protected in cold climate conditions, but they are often preferred in parks and gardens because of their aesthetic qualities (Table 2). The majority of the species require soil values with the pH value between 6.5 and 7.5 Furthermore, many of them are individuals resistant to polluted air conditions. The soil requirements, determined by Ürgenç (1992), of the species used in the parks and gardens of Taşköprü district are shown in Table 2. Upon examining Table 2, it was determined that the majority of the species grow in arid, calcareous and sandy, heavy clay and calcareous soils. There are a few species that can survive in salty soils, damp and wet soils or acid soils. *Fraxinus excelsior, Berberis thunbergii, Juniperus horizontalis, Viburnum opulus* and *Salix babylonica* are broad tolerant individuals in terms of the soil requirements and are the leading ones among the preferable species for this region in terms of the ecological requirements. According to the findings of the study, it was determined that 49% of the taxa used in the parks and gardens of Taşköprü district in Kastamonu province do not exist naturally in our country.

Conclusion

Depending on the increasing population, cities are becoming concrete piles with each passing day, which increases the need for green areas of people and affects human health adversely both physiologically and psychologically. In this sense, parks are places where people can meet their need for daily recreation. In addition to being resting places for the urban people, parks also positively affect the city's climate and, at the same time, increase the aesthetic effect of the city with the multiple plants they contain. The species used in parks and gardens, which are an important element of the urban landscape, should be aesthetic as well as functional. Since the air of cities is dirtier when compared to natural green areas, it is beneficial to prefer species with high tolerance to air pollution and other harmful things. Moreover, the fact that the species used are long-lasting, fast-growing species and their characteristics such as the light requirement are other aspects to be evaluated. The changing temperature conditions between the day and night in the continental climate and the preference of durable natural species for dry seasons with low precipitation also provide advantages for water saving in addition to many benefits (Ertop, 2009). It was observed that generally natural species, as well as exotic ones, were used in the park areas of Taşköprü district. Deciduous species are dominant in the parks and gardens of the district. In addition to these taxa, the natural plant taxa of Kastamonu, which is located in the A4 square of the Turkish flora, suitable for the region's ecology, should be examined and species that can grow healthily and can look aesthetic as ornamental plants in the park area should be included. *As* needle-leaved species, particularly *Abies nordmanniana* ssp. *equi-trojani which is endemic and Cedrus libani* as well as *Cupressus sempervirens*, *Juniperus excelsa*, *Juniperus sabina*, *Pinus nigra, Pinus sylvestris*, and *Taxus baccata* species can be preferred since they are natural and suitable for the regional ecology. In addition to these, particularly the evergreen plants among our natural species such as *Laurocerasus officinalis, Buxus sempervirens, Nerium oleander, Ligustrum vulgare* and *Phillyrea latifolia*, which are not deciduous, and which can be benefited from due to their shadow characteristic in summers, and have a positive effect in terms of preventing noise, can be preferred. Additionally, deciduous species such as *Pterocarya pterocarpa, Acer*

campestre, Acer trautvetteri, Carpinus betulus, *Fagus orientalis, Populus tremula*, *Berberis vulgaris, Jasminum fruticans, Mespilus germanica, Rhus coriaria, Spiraea crenata, Vitex agnus-castus,* and *Myrtus communis* can also be preferred. Except for the species native in Turkey, exotic species, which have aesthetic visuality and are thought to conform to ecological conditions, such as *Liriodendron tulipifera* and *Magnolia grandiflora*, can also be used (Ürgenç, 1992).

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