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Functional Evaluation of Ornamental Plants: A Case Study from Zonguldak Bülent Ecevit University Farabi Campus

Üniversite Yerleşkesindeki Süs Bitkilerinin Fonksiyonel Değerlendirilmesi: Zonguldak Bülent Ecevit Üniversitesi Farabi Kampüsü

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ABSTRACT:

This study was conducted to determine the species diversity and functional usage status of ornamental plants used within the borders of Zonguldak Bülent Ecevit University Farabi Campus. The research covers open and semi-open areas throughout the campus, and field studies were carried out between April and June 2024. Within the scope of the study, each plant species was examined in terms of criteria such as scientific and Turkish name, life form, leaf shedding status and purpose of use in landscape. The findings revealed that the plants commonly used on campus were generally preferred for aesthetic purposes but were also used for functional purposes such as shading, windbreaking, orientation and demarcation. Many taxa in the forms of trees, shrubs, bushes, and vines were identified in the campus area; it was observed that shrub species were predominant and native species were used more limitedly than exotic species. Ornamental plants in the campus increase spatial quality and contribute positively to the physical, psychological, and social well-being of the users. However, some species (such as *Cercis siliquastrum* L. and *Lagerstroemia indica* L.) has been found to have limited adaptation to regional climatic conditions and caution has been recommended in the use of these species. As a result, this research has provided scientific data for landscape planning and applications at the campus scale and has offered suggestions for sustainable green space management.

Keywords: ***Campus, Ornamental Plants, BEUN, Tree, University***

ÖZ:

Bu çalışma, Zonguldak Bülent Ecevit Üniversitesi Farabi Yerleşkesi sınırları içerisinde kullanılan süs bitkilerinin tür çeşitliliğini ve fonksiyonel kullanım durumlarını belirlemek amacıyla yürütülmüştür. Araştırma, kampüs genelindeki açık ve yarı açık alanları kapsamakta olup saha çalışmaları 2024 yılı nisan-haziran ayları arasında gerçekleştirilmiştir. Çalışma kapsamında her bir bitki türü; bilimsel ve Türkçe adı, yaşam formu, yaprak dökme durumu ve peyzajda kullanım amacı gibi kriterler doğrultusunda incelenmiştir. Elde edilen bulgular, kampüste yaygın olarak kullanılan bitkilerin genellikle estetik amaçlı tercih edildiğini, bununla birlikte gölgeleme, rüzgâr perdeleme, yönlendirme ve sınırlandırma gibi işlevsel amaçlarla da kullanıldığını ortaya koymuştur. Kampüs alanında ağaç, ağaççık, çalı ve sarılıcı formlarında çok sayıda takson tespit edilmiş; çalı formundaki türlerin ağırlıkta olduğu ve yerli türlerin egzotik türlere göre daha sınırlı kullanıldığı gözlemlenmiştir. Yerleşkedeki süs bitkileri, mekânsal kaliteyi artırmakta ve kullanıcıların fiziksel, psikolojik ve sosyal refahına olumlu katkı sağlamaktadır. Bununla birlikte bazı türlerin (örneğin Cercis siliquastrum L. ve Lagerstroemia indica L.) bölge iklim koşullarına adaptasyonunun sınırlı olduğu tespit edilmiş ve bu türlerin kullanımında dikkatli olunması önerilmiştir. Sonuç olarak, bu araştırma kampüs ölçeğinde peyzaj planlama ve uygulamalarına yönelik bilimsel veri sağlamış ve sürdürülebilir yeşil alan yönetimi için öneriler sunmuştur.

Anahtar Kelimeler: Kampüs, Süs Bitkileri, BEUN, Ağaç, Üniversite.

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1. INTRODUCTION

The homeland or gene center of most plant species in the world is Anatolia. Therefore, Turkey has an extremely rich flora due to this geographical location. Most plants found in the natural flora of Anatolia are used as highly valuable ornamental plants in many countries in Europe and America. The beginning of ornamental plant production in Türkiye, which has many ornamental plants that can be used in landscape areas in its natural flora, dates back to the 1940s. Flower production, which first started around Istanbul and on the Islands, developed in Yalova in the following years (Tik and Kaya 2025).

Outdoor ornamental plants are annual and perennial herbaceous plants, shrubs, leafy and coniferous trees, and vary in their cultivation according to the ecological characteristics of the location they are located in. These plants constitute indispensable living elements that have many uses in terms of aesthetics and functionality today. It is both incomplete and incorrect to describe the plants used in Landscape Architecture studies as ornamental plants only. However, in Landscape Architecture, plants are not only used for decoration due to their aesthetic properties, but also for functional purposes such as providing drainage in the soil, creating shade, controlling erosion and pollution, etc. in biological repair studies. Plants have great benefits in preventing noise, dust, gas, air, water and visual pollution, as well as providing recreational opportunities by contributing to environmental quality (Yılmaz and Zengin, 2003).

One of the most natural needs of humans is the desire to live in an aesthetic and natural space. The physical and aesthetic structures of plants can positively or negatively affect people's mental states. Factors that are important in creating this effect include the form, color, texture, arrangement and size of plants in the area of application. Today, dense construction and urbanization cause people's natural living spaces to shrink, thus negatively affecting people psychologically (Eroğlu et al., 2005; Tik and Kaya 2025).

Plants are living beings that form the basis of life in the ecosystem structure and are considered primary producers; therefore, all other organisms depend on them to survive. However, there are some plant species that are quite striking in terms of aesthetics and are grown solely for the purpose of beautifying the environment. These plants are called "ornamental plants" (Ochekwu et al., 2011). In urban green areas, there are many plant species of different sizes such as ground cover, shrub, shrub, tree, herbaceous and woody, deciduous or evergreen (Güneroğlu and Pektaş 2022).

According to Herbert (1976), the main reason why people allocate land for ornamental plants and spend money on their cultivation is that they increase the quality of life. Plants used for ornamental purposes can be in different forms such as potted plants, vines, shrubs, herbaceous plants and trees.

Vegetation can play an important role in urban life with its ecological, economic and social functions. However, a large part of plant communities is affected by processes such as landscape clearing and environmental destruction. In this context, the degradation of natural landscapes, the loss of native vegetation and the decrease in the quality of ecosystems, as well as the increase in cultivated and exotic plant species, are reaching unsustainable dimensions (Costa et al., 2017).

Participation in outdoor activities on campuses not only has positive effects on physical, mental and social health, but also increases one's self-confidence and respect, and leads to positive changes in personal skills, social behaviors, body and personality development and general behavior (Cengiz et al., 2018).

University campuses are located at the intersection of institutional identity, culture and academic life with a user profile consisting of academicians, students and administrative staff. In this context, the campus landscape design should allow activities such as eating and drinking, sitting, resting and watching as expected from urban open spaces. It should also be in accordance with the conceptual and spatial concept that constitutes the university campus (Yılmaz 2005). University campuses are small city models where academic life is carried out, education and training processes are carried out, and functions such as accommodation, resting, entertainment and transportation are

fulfilled (Bayramoğlu and Kurdoğlu 2018). These spaces create squares and gathering areas by sometimes using symbols such as a square, a statue, an ornamental pool or a clock tower to enrich the whole (Gökalp, 2025).

Studies similar to our study; The plants used in the landscape study of Iğdır University Şehit Bülent Yurtseven Campus were grouped as Gymnospermae and Angiospermae. Accordingly, 51 genera and 69 taxa of landscape plants belonging to 30 families were identified in the campus. In addition, trees and shrubs constituted the largest group with 54%, followed by shrubs with 40% and lianas with 6% (Tik and Kaya, 2025). The ornamental plants used in the existing green area of Zonguldak Bülent Ecevit University Çaycuma campus were determined and evaluated in terms of design (Akça and Gülgün Aslan, 2019). The ornamental plants of Mustafa Kemal University Tayfur Sökmen Campus (Hatay) were identified. These plants, consisting of 129 taxa, 107 of which are trees and shrubs and 22 of which are herbaceous. In addition, the Turkish and Latin names of these ornamental plants, the families they belong to and their homelands are specified (Altay, 2012). A literature study was conducted to compare the suitability of ornamental plants used in the Kırşehir Ahi Evran University campus to the campus design principles and to determine their adequacy (Gökalp, 2025). The purpose of this study is to determine the edible woody plant taxa found in the Kanuni Campus of Karadeniz Technical University and to investigate the importance of these taxa in landscape architecture. In the study, 46 different plant taxa belonging to 16 families were identified in the campus area (Güneroğlu and Pektaş 2022).

The aim of this study is to examine the ornamental plants used in landscaping at Zonguldak Bülent Ecevit University Farabi campus.

2. MATERIAL-METHOD

Zonguldak is a province in the Western Black Sea Region, with a western and northern coast to the Black Sea. With a surface area of 3,309 km², it covers six per thousand of Turkey's land. The provincial lands, starting from the Black Sea coast, are surrounded by the Black Sea to the north, Bartın to the northeast, Karabük to the east, Bolu to the south, and Düzce to the west. Zonguldak has a very rugged terrain; 56% of the provincial area is covered with mountains, 31% with plateaus, and 13% with plains (URL-1, 2025).

Zonguldak, which has a climate with abundant rainfall, is quite rich in terms of surface water resources. Zonguldak province is under the influence of the temperate Black Sea climate. There is no dry season in Zonguldak, which is rainy and warm in every season. The most rainfall is seen in autumn and winter. In Zonguldak, where the annual rainfall average for 2021 is 1,226.6 mm, the rainiest month is January with 153.8 mm. Zonguldak is one of the provinces with the highest rainfall in Turkey in terms of the amount of rainfall in question. The wind is in the southeast (intersection) direction. The second most effective wind is in the northwest (west wind) direction. The lowest relative humidity rate in Zonguldak is 70% and the average relative humidity rate is 75% (URL 1, 2025; Siyavuş, 2025).

In fact, the fact that the land cover of Zonguldak, which is the third province of Turkey in terms of forest area, is covered with dense forests has restricted the settlement (Arca et al., 2011). Tuncel (2013) stated that there are many very green regions in Turkey, but in the mentioned regions, the dense greenery starts outside the city, while in Zonguldak the city itself is green. Due to the mentioned features, Zonguldak has a green city identity. While there are tree species such as oriental beech, hornbeam, alder, Anatolian chestnut, oak species, maple, lime, ash, lime, hazelnut, willow, and aspen in the region, species such as rhododendron, holly's tassel, laurel, fern and ivy dominate the understory formation (Siyavuş, 2025).

This study was conducted to determine the ornamental plants on a species basis within the borders of Zonguldak Bülent Ecevit University Farabi Campus (Fig 1). The material of the research consists of ornamental plants used in open and semi-open areas within the campus. The study area was determined to include sections with a dense user base such as faculty surroundings, walking paths, squares, parking areas, entrance areas and recreational areas.

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Figure 1. View from Zonguldak Bulent Ecevit University (Original)

This study is based on the determination of ornamental plants at the species level and the analysis of their functional uses in the landscape in the Zonguldak Bülent Ecevit University Farabi Campus, through field observations carried out between April and June 2024. While making this classification, Yazıcı and Ünsal, 2019 were used. As a result of the research, it was determined that aesthetic use was at the forefront in the campus area, shrub-formed species were dominant, and exotic taxa were used more widely than native species. The obtained data provide an important scientific basis for the development of sustainable landscape design and climate-compatible planting strategies.

3. RESULTS DISCUSSION

This study, which is aimed at evaluating the ornamental plants in the Zonguldak Bülent Ecevit Farabi Campus, was prepared by taking into account the existing planting design map of the campus. In this context, the plants in the campus were determined (Table 1).

In this study, the usage status of plants used in Zonguldak Bülent Ecevit University Farabi Campus was evaluated. When the plants in BEUN were examined, the most commonly used ornamental plants were Aesculus hippocastanum (Horse chestnut), Acer platanoides (Maple), Robinia pseudoacacia (white-flowered acacia), Platanus orientalis (Oriental plane tree), Robinia pseudoacacia (acacia), Laurus nobilis L. (Laurel), Pinus Nigra subsp. Pallasiana (Anatolian Black Pine).

The plants determined in the recreational area by field observation study are given in Table 1. The life form of the plants discussed in Table 1, their use for emphasis, guidance, limiting, functional features such as road tree, shading, wind screening, softening of the hard appearance, dust prevention, are given in BEUN. The functional features of the plants and their use in the field have been evaluated. When Table 1 is examined, it is seen that most of the plants are suitable for use.

When looked at in terms of size criteria, in addition to the presence of very tall trees in the area, trees and shrubs together form a plant composition.

Table 1. Evaluation of the Functional Ues of Plants in BEUN Farabi ampus

	Plants	Life form	Purpose of emphasis	(1) Road tree	(2) Shading	(3) Wind screening	(4) Softening the harsh appearance	5) Dust prevention	(6) Redirection	(7) Restrictive	Ways of use in BEUN
Gymnospermae	Cupressus Arizona Greene " Glauca "	A	S	*			*	*	*	*	1.6
	Cupressus macrocarpa	A	S	*			*	*	*	*	1.6
	Cuprocyparis leylandii	A	S, T	*	*	*	*	*	*	*	1,2, 7
	Thuja orientalis L. " Compacta Nana '	A	S				*		*		6
	Thuja orientalis L. ' Pyramidalis '	A	S	*		*			*	*	1
	Cedrus libani A. Rich . var . libani	A	S	*		*		*		*	1.7
	Pinus There is brutia .	A	G,S	*	*	*	*	*	*	*	1.6
	Pinus Nigra subsp. pallasiana	A	G,S	*	*	*	*	*	*	*	1.6
	Cycas revoluta Thumb.	Aa	S,T				*		*		4
	Juniperus horizontalis	C	G	*			*		*		1.4
	Thuja occidentalis smaragd	C	S	*	*		*	*	*	*	1.6
	Juniperus Sabina	C	G				*	*	*	*	6
Angiosperm	Washingtonia Robust H. Wendl.	A	S	*	*	*	*	*	*	*	1,2, 6
	Agave americana L.	Aa	G				*	*		*	4
	Yucca filamentosa L.	Aa	S			*	*	*	*	*	4
	Cortaderia celloana	C	S			*	*	*			4
	Viburnum tinus L.	Aa , C	G				*		*	*	6
	Nerium oleander L.	Aa , C	S	*	*		*		*	*	1
	Santolina chamaecyparissus L.	C	G				*	*			4
	Berberis thunbergii DC.	C	G				*		*	*	7
	Buxus sempervirens L.	C	G					*	*	*	6.7
	Euonymus fortunei	C	G				*		*		4.6
	Robinia pseudoacacia L.	A	S	*	*	*	*	*	*	*	1.2
	Robinia pseudoacacia L. " Umbraculifera "	A	S	*	*	*	*	*	*	*	1.2
	Laurus nobilis L.	A	S	*	*	*	*	*	*	*	1.2
	Rosmarinus officinalis L.	C	G					*	*		6
	Lavender Angustifolia	C	G					*	*	*	6.7

	Lagerstroemia indica L.	A	S	*	*	*	*	*	*		1.2
	Punica garnet L.	Aa	S	*	*	*	*	*	*	*	1,2, 4
	Hibiscus syriacus L.	C	G			*	*	*			4.5
	Tilia tomentosa Moench	A	S	*	*	*	*	*	*	*	1.2
	Morus nigra L. ' Pendula '	Aa	S		*						2
	Callistemon Citrinus	C, Aa	S	*			*		*		1
	Ligustrum japonicum Thumb.	C	G				*	*		*	4.7
	Olea europaea L. subsp. europaea	A	S	*	*	*		*			1.2
	Syringa vulgaris L.	C	S, G	*	*		*				1.2
	Gaura Lindheimer	C	S, G				*				4
	Platanus orientalis L.	A	S	*	*	*	*	*	*	*	1.2
	Pittosporum tobira	Aa, C	G				*		*	*	6.7
	Photinia × fraseri Dress	C, Aa	S				*	*	*	*	4.7
	Prunus cerasifera	A	S	*	*	*	*	*	*	*	1.2
	Pyracantha coccinea	C	S						*	*	7
	Rosa sp.	C	S, G				*	*	*	*	4.6
	Spirea vanhouttei Pal.	C	G				*		*		4
	Tamarix parviflora DC.	A	S	*	*	*	*				1.2
	Parthenocissus quinquefolia (L.) Planch.	Sa	T	*	*		*				2
	Aesculus Hippocastanum	A	S	*	*	*	*	*	*	*	1.2
	Aesculus × carnea	A	S	*	*	*	*	*	*	*	1.2
	Magnolia grandiflora	A	S	*	*	*	*		*		1.4
	Cotoneaster microphyllus	C	G					*	*	*	6.7
	Hydrangea macrophylla	C	S, G						*	*	6.7

A: Tree Aa: Small Tree C: Shrub Sa: Climber G: Group S: Solitary T: Group

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Figure 2. View of Ornamental Plants on Campus (Photograph taken by the author during fieldwork in May 2024)

Plants are elements that provide characteristic features, balance, develop, enrich and revitalize the places they are in with their aesthetic and functional qualities (Eroğlu et al., 2005). In this sense, ornamental plants used on campus contribute to the improvement of the environmental and life quality of people spending time at the university. Some of the existing ornamental plants at the university are shown in the pictures (Fig 2).

The basic principles shaping the campus landscape design can be expressed as protecting and integrating the components of the natural environment, providing high spatial quality to the individuals using the space and creating visually strong aesthetic areas. The design of active and passive use areas where campus users can perform various activities such as walking, continuing their education activities in the open area, doing sports, wandering around, studying, watching the scenery, resting and having fun should be addressed in line with these principles (Yılmaz 2015; Gökalp 2025).

4. CONCLUSION

Zonguldak Bülent Ecevit University Farabi Campus, it was observed that planned planting studies were carried out and that the plant diversity and the amount of green space increased over time. In addition, the landscape application data obtained in the campus area through this research contributed to the creation of a scientific infrastructure for the implementation of similar studies throughout the region. Sakıcı et al., in a study they conducted in 2013, particularly stated that the use of these species in design is very important because they always exhibit a beautiful appearance in summer and winter.

The taxa identified in the settlement are divided into four groups as tree, shrub, bush and vine. The development of some plants is very slow in Zonguldak conditions compared to the literature, especially Cercis, which shows slow development as a result of 15 years of observations. siliquastrum L. and Lagerstroemia indica L. species have been found to be unable to achieve the desired landscape quality. It has been recommended that caution be exercised in the use of these species in similar conditions.

By using different types of plant materials, horizontal or vertical planes can be created to create different areas on campus or to screen off uninteresting areas. In addition, plant material can be used in areas for complementary, guiding, integrative, emphasis purposes, to soften the sharpness of the space resulting from structural forms, for promotional purposes or for visual purposes (Booth 1990; Tik and Kaya 2025). When the uses of plants on campus are examined, it is seen that they are planted within the scope of a design and planning and therefore comply with these criteria. It should not be forgotten that these arrangements that can be made will also be important in terms of protecting the biological diversity of the relevant areas.

As a result of the field studies, it was determined that ornamental plants belonging to various taxa were used within the campus. It was determined that shrub-formed species were predominant among these plants, and that native species were more limited compared to exotic species. In addition, it was observed that ornamental plants were mostly preferred for visual aesthetic purposes, while functional uses remained in the background.

The species determined as a result of field studies were evaluated thematically in terms of frequency of use, functional contribution and role in the landscape. It was determined that shrub-formed plants were widely used throughout the campus. This situation was also revealed in a similar way in the study conducted by Akça and Aslan (2019) on Çaycuma Campus. The most preferred species include tree species such as Aesculus hippocastanum, Platanus orientalis, Robinia pseudoacacia and Laurus nobilis, and these plants provide both aesthetic and functional (shading, road afforestation, etc.) contributions.

However, it was observed that some species such as Cercis siliquastrum and Lagerstroemia indica have low functional adequacy due to their inability to adapt sufficiently to climatic conditions. This situation coincides with the Iğdır University study of Tik and Kaya (2025) and once again reveals the necessity of making appropriate plant selection in line with local ecological conditions.

The number of university campuses in our country is quite high, and with the greening works carried out in these areas, they constitute the most important open-green areas of the cities, together with almost other large public institutions. However, it is difficult to say that the number of studies to make university campuses resistant to climate is sufficient.

The following recommendations were developed based on the results:

It was stated that some species exhibited limited performance in campus conditions. This situation was reported only based on observation; in future studies, the developmental performance of these species should be examined with the support of scientific criteria.

It is recommended that species in campus planting be evaluated not only according to their aesthetic but also ecological and functional contributions; and that uses such as shading, windbreaking and orientation should be expanded in a more planned manner.

The study findings revealed that native species were less represented than exotic species. In order to protect biodiversity and support ecosystem services, native plant taxa should be integrated more into the campus green space design.

Using species by clustering in different functional groups (e.g. shade providers, visual accents, pedestrian guidance plants) will create spatial awareness and ease of use for campus users.

Creating species combinations that provide visual and ecological contributions not only in spring and summer but also in all periods of the year is important for a sustainable campus landscape.

ETHICAL STANDARDS:

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