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AMASYA ÜNİVERSİTESİ YERLEŞKELERİNDE PEYZAJ BİTKİ VERİ TABANININ OLUŞTURULMASI ÜZERİNE BİR ÇALIŞMA

(A STUDY ON CREATING A LANDSCAPE PLANT DATABASE AT AMASYA UNIVERSITY CAMPUSES)

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ÖZET

Üniversiteler, yalnızca eğitim-öğretim yapılan kurumlar değil, kentlerin sosyo-kültürel, ekonomik ve ekolojik gelişimine katkı sağlayan önemli kentsel odaklardır. Bu kurumların mekânsal yapısı, barınma, dinlenme, yeme-içme ve rekreasyon gibi farklı işlevleri bir araya getiren açık, yarı açık ve kapalı alanların bütüncül planlamasını gerektirir. Bu yaklaşımın temel bileşenlerinden biri bitkisel tasarımdır. Bitkiler, kampüslerde yalnızca estetik değil, aynı zamanda mikroklimayı düzenleme, biyolojik çeşitliliği destekleme, psikolojik iyileşmeyi teşvik etme ve sürdürülebilir çevreler oluşturma açısından önemli rol oynar. Bu çalışmada, Amasya Üniversitesi yerleşkelerindeki bitki türleri belirlenmiş ve veriler ArcGIS 10.8 ile işlenerek dijital bir bitki veri tabanı oluşturulmuştur. Bu veri tabanı, mevcut bitkisel çeşitliliğin izlenebilirliğini artırmakta ve gelecekteki peyzaj tasarımı, yönetimi ve planlama çalışmalarına bilimsel temel sağlamaktadır. Ayrıca uzun vadede, peyzaj yönetimi, bitkisel bakım ve ekolojik farkındalık çalışmalarına da katkı sağlaması hedeflenmektedir.

Anahtar Kelimeler: Peyzaj Bitki Veri Tabanı, Sürdürülebilir Kampüs Planlaması, Amasya Üniversitesi Yerleşkeleri

ABSTRACT

Universities are not only educational institutions, but also important urban centers contributing to social, cultural, economic, and ecological development. Their spatial structure requires holistic planning of open, semi-open, and enclosed spaces that combine functions such as accommodation, relaxation, dining, and recreation. Botanical design is a key component of this approach. Plants on campuses serve not only aesthetic purposes, but also regulate microclimate, support biodiversity, promote psychological healing, and create sustainable environments. This study identifies plant species on Amasya University campuses and processes the data in ArcGIS 10.8 to create a digital plant database. The database enhances traceability of campus plant diversity and provides a scientific basis for future landscape design, management, and planning. In the long term, it is also expected to support landscape management, plant maintenance, and ecological awareness initiatives.

Keywords: Landscape Plant Database, Sustainable Campus Planning, Amasya University Campuses

1. INTRODUCTION

Urban green spaces are recognized as fundamental elements not only for enhancing the well-being of cities but also for providing a wide array of ecosystem services (ES). These services include supporting biodiversity, regulating the microclimate, reducing air and noise pollution, providing recreational opportunities, and promoting psychological well-being (Colding & Barthel, 2017; Gerçek & Güven, 2017). In this context, urban green spaces play a critical role in establishing liveable and sustainable cities. The importance of these areas has become increasingly apparent in recent years due to growing environmental challenges, such as intensifying air pollution, climate change, water degradation, and noise impacts. Within this framework, university campuses constitute an important component of urban green infrastructure. They contribute significantly to the provision of ecosystem services and the sustainable development of cities through their integrated socio-cultural, economic, and ecological functions (Sarı & Karaşah, 2023).

University campuses are multifunctional spatial units that serve beyond mere educational purposes. They function as combined spaces for various activities, including accommodation, passive recreation, social interaction, and dining (Kahvecioğlu & Sağlık, 2025). Given these characteristics, campuses can be defined as complex structures integrating open, semi-open, and enclosed spaces. Ensuring spatial continuity and functional integrity between these diverse areas necessitates a holistic landscape design approach to facilitate ease of access and user circulation (Pouya et al., 2019). As integral components of the urban landscape, university campuses often possess a rich floristic structure due to the numerous plant species they host. Plants are a powerful landscape element on campuses, offering considerable aesthetic and visual value. Crucially, they also provide spatial, functional, social, economic, and paramount ecological contributions (Ardıçoğlu et al., 2024). To fully capitalize on these diverse functions, the species selection, location, and inherent characteristics of the plants are of utmost importance. The successful assessment and application of these characteristics to the site depend entirely on the quality and precision of the plant design (Açıksöz et al., 2014). The correct and balanced application of botanical design on university campuses directly enhances spatial quality and makes a significant contribution to social integration. Shaded areas, particularly those formed by mature trees, offer thermally comfortable spaces for activities such as sitting, walking, and passive relaxation during the summer months, thereby enriching the user experience and adding aesthetic amenity (Kahvecioğlu & Sağlık, 2025). Furthermore, plant design is an effective element for forming spatial identity, as well as fulfilling guidance and demarcation functions. Consequently, trees and other botanical elements affirm the importance of botanical design in university campuses through their ecological functions and their essential role in creating sustainable, livable spaces (Sarı & Karaşah, 2018; Ersoy & Tanyaloğlu, 2023).

According to Açıkay (2015), the appropriate plant type and its optimal placement are among the most critical factors in successful botanical design. Selecting a species suitable for a given space is essential for ensuring its ability to adapt to the environmental conditions and flourish. Similarly, the plant's precise location is critical in determining its sunlight requirements and the functional role it is expected to perform within the design (Akbaş, 2024). Within the context of university campuses as part of the broader urban landscape, horticultural design is recognized as a fundamental component of landscape design, playing a decisive role in ensuring socio-cultural, economic, ecological, and spatial sustainability (Günaydın et al., 2025; Ulus et al., 2025).

This study focuses on creating a comprehensive, digital plant database based on field-collected data. The methodology involved on-site observations across the campuses, detailed photographic and video documentation, and the establishment of a precise plant inventory using

current plan maps. This rich dataset was subsequently processed using ArcGIS 10.8 software to construct the digital plant database. The resulting database significantly improves the traceability and management of plant diversity on the campuses and provides a scientific basis for future landscape design, maintenance, and planning studies. Advocates of sustainability argue that the created plant database can be utilized for both sustainable campuses planning strategies and as applied teaching material in educational and training programs. Moreover, the long-term objective is for this database to serve as the foundational resource for landscape management, plant maintenance planning, and ecological awareness initiatives.

2. MATERIAL AND METHODS

The scope of this research is the campuses of Amasya University, with the primary objective of creating a comprehensive landscape plant database utilizing field-collected data. The study area is situated within the boundaries of Amasya Province, Türkiye, and encompasses all operational campuses of Amasya University. Amasya University, established on March 17, 2006, is structured into multiple campus locations:

Central Campuses (Amasya Central District):
- Hakimiyet Campus
- Yeşilırmak Campus
- İpekköy Campus
- Faculty of Medicine Campus

District Campuses (Amasya Province):
- Merzifon Campus and Merzifon Vocational School Campus (Merzifon District)
- Gümüşhacıköy Hasan Duman Vocational School Campus (Gümüşhacıköy District)
- Suluova Vocational School Campus (Suluova District)
- Taşova Yüksel Akın Vocational School Campus (Taşova District)

The Hakimiyet Campus, located in Amasya's Central District, covers a total area of 58,003.70 m^2. Within this central campus, the total green area constitutes 45,299.70 m^2, highlighting the substantial area dedicated to landscape elements (Figure 1).

Figure 1. Hâkimiyet Campus boundaries

In addition to the Hakimiyet Campus, the Yeşilırmak Campus is also located within the boundaries of Amasya's Central District. This campus covers a significantly larger total area of 206,458 m^2. Notably, the area designated as green spaces within the Yeşilırmak Campus is 179,854 m^2, indicating that a substantial portion of the campus landscape is managed for green infrastructure (Figure 2).

Figure 2. Yeşilırmak Campus boundaries

Faculty of Medicine Campus is located within the boundaries of Amasya's central district and covers an area of 17,372.20 m^2. The total area of green spaces on the campus has been calculated to be 11,923.20 m^2 (Figure 3).

Figure 3. Faculty of Medicine Campus boundaries

İpekköy Campus lies within the boundaries of Amasya's central district and covers a total area of 42,597.73 m^2. Green areas within the campus cover 35,345.73 m^2 (Figure 4).

Figure 4. İpekköy Campus boundaries

Merzifon Vocational School Campus is located within the Merzifon district of Amasya, covering an area of 6,637.09 m^2. Green areas cover 5,029.09 m^2 of the campus (Figure 5).

Figure 5. Merzifon Vocational School Campus boundaries

Merzifon Campus is located in the Merzifon district of Amasya and covers an area of 33,885.50 m^2. Green spaces within the campus cover a total area of 31,408.50 m^2 (Figure 6).

Figure 6. Merzifon Campus boundaries

Gümüşhacıköy Hasan Duman Vocational School Campus is located within the Gümüşhacıköy district of Amasya, covering an area of 2,797.58 m^2. Green areas cover 1,669.58 m^2 of the campus (Figure 7).

Figure 7. Gümüşhacıköy Hasan Duman Vocational School Campus boundaries

Taşova Yüksel Akın Vocational School Campus is located in the Central District of Amasya and covers an area of 28,784.70 m^2. The total area of green spaces on the campus is 26,468.70 m^2 (Figure 8).

Figure 8. Taşova Yüksel Akın Vocational School Campus boundaries

Suluova Vocational School Campus is located within the Suluova district of Amasya, covering an area of 17,116.60 m^2. Green areas within the campus cover 14,294.60 m^2 (Figure 9).

Figure 9. Suluova Vocational School Campus boundaries

The primary aim of this study was to conduct a comprehensive inventory of the landscape plant species present across all campuses of Amasya University. The research focused on evaluating the collected data for the subsequent creation of a robust digital landscape plant database. During the research process, plant species data were systematically collected through intensive field observations and detailed records made on each campus. The resulting field data, including spatial and descriptive information, was then accurately transferred to a digital environment utilizing ArcGIS 10.8 software for spatial management and database construction.

3. FINDINGS AND DISCUSSION

The findings obtained from the detailed field studies conducted across all Amasya University campuses indicate a rich and diverse floristic structure in terms of woody vegetation. A total of 8,485 individual woody plants (trees, shrubs, and bushes) were identified and cataloged. These individuals belong to 36 distinct families and 108 different species. Of these, 4,347 were tree species, 120 were shrub species and 4,018 were bush species (Table 1).

	Family	**Total**		**Family**	**Total**			**Family**	**Total**
1.	Cupressaceae	2817	**13.**	Sapindaceae	49		**25.**	Bignoniaceae	5
2.	Pinaceae	2508	**14.**	Salicaceae	33		**26.**	Elaeagnaceae	4
3.	Rosaceae	1207	**15.**	Juglandaceae	32		**27.**	Ginkgoaceae	3
4.	Celastraceae	595	**16.**	Oleaceae	30		**28.**	Rhamnaceae	3
5.	Adoxaceae	264	**17.**	Moraceae	26		**29.**	Arecaceae	2
6.	Fabaceae	258	**18.**	Fagaceae	17		**30.**	Altingiaceae	1
7.	Buxaceae	132	**19.**	Lythraceae	13		**31.**	Cannabaceae	1
8.	Simaroubaceae	124	**20.**	Betulaceae	10		**32.**	Cycadaceae	1
9.	Malvaceae	116	**21.**	Lauraceae	9		**33.**	Myrtaceae	1
10.	Lamiaceae	92	**22.**	Pittosporaceae	7		**34.**	Paulowniaceae	1
11.	Platanaceae	58	**23.**	Caprifoliaceae	6		**35.**	Paeoniaceae	1
12.	Apocynaceae	52	**24.**	Ebenaceae	6		**36.**	Taxaceae	1

Table 1**.** Landscape plant inventory and diversity

When all Amasya University campus sites are evaluated collectively, the floristic structure shows a clear dominance by a few key families. The top ten most represented families, in order of individual count, are: Cupressaceae, Pinaceae, Rosaceae, Celastraceae, Fabaceae, Adoxaceae, Buxaceae, Simaroubaceae, Malvaceae, and Lamiaceae. The Cupressaceae family had the largest number of individuals 2,817, followed by the Pinaceae family 2,508, the Rosaceae family 1,207, the Celastraceae family 595, the Adoxaceae family 264, the Fabaceae family 258, the Buxaceae family 132, the Simaroubaceae family 124, the Malvaceae family 116 and the Lamiaceae family 92. These data clearly indicate that the Cupressaceae and Pinaceae families (coniferous species) hold the first two positions in terms of the number of individuals in the woody plant population on the campuses. This dominance is likely due to the inherent characteristics of these coniferous species, such as their evergreen nature, low maintenance requirements, and high resilience to urban conditions, which makes them highly preferred for intensive use in institutional landscapes. Conversely, the Rosaceae family, ranking third, suggests a balanced approach to design. Rosaceae species contribute significantly to the aesthetic and ecological diversity of the settlements through their ornamental value, strong flowering characteristics, fruit-bearing capabilities, and diverse growth forms (including trees, shrubs, and bushes).

In contrast to the dominant families, several families are represented by a minimal number of individuals, indicating a low species diversity rate in the campus landscape. These families include Ginkgoaceae, Rhamnaceae, Arecaceae, Altingiaceae, Cannabaceae, Cycadaceae, Myrtaceae, Paulowniaceae, Paeoniaceae, and Taxaceae (Table 2).

The representation figures illustrate this low diversity:

- Ginkgoaceae and Rhamnaceae were each represented by only three individuals.

- Arecaceae was represented by only two individuals.
- The remaining families (Altingiaceae, Cannabaceae, Cycadaceae, Myrtaceae, Paulowniaceae, Paeoniaceae, and Taxaceae) were each represented by a single individual.

These findings suggest that a significant concentration of woody plants is observed around certain preferred families (Cupressaceae and Pinaceae) within the Amasya University campuses. This situation reveals a tendency toward low floristic diversity in certain ornamental categories, potentially sacrificing the resilience and varied ecosystem services that a more balanced and diverse species palette could provide.

	Rosaceae	***Unit***			***Celastraceae***	***Unit***
1	*Pyracantha coccinea*	*646*		***1***	*Euonymus japonica 'Aurea'*	*581*
2	*Rosa sp.*	*117*		***2***	*Euonymus japonicus*	*10*
3	*Malus domestica*	*104*		***3***	*Euonymus japonica 'Bravo'*	*4*
4	*Photinia x fraseri 'Red Robin Nana'*	*91*			***Malvaceae***	
5	*Photinia x fraserii*	*74*		***1***	*Hibiscus syriacus*	*64*
6	*Prunus avium*	*39*		***2***	*Tilia platyphyllos*	*36*
7	*Prunus dulcis*	*37*		***3***	*Tilia tomentosa*	*16*
8	*Prunus cerasifera*	*34*			***Salicaceae***	
9	*Prunus persica*	*19*		***1***	*Salix babylonica*	*25*
10	*Pyrus communis*	*13*		***2***	*Populus alba*	*6*
11	*Prunus cerasus*	*8*		***3***	*Salix alba*	*2*
12	*Cydonia oblonga*	*5*			***Adoxaceae***	
13	*Photinia x fraserii 'Red Robin'*	*5*		***1***	*Viburnum lucidum*	*231*
14	*Prunus armeniaca*	*5*		***2***	*Viburnum opulus*	*24*
15	*Prunus cerasifera 'Atropurpurea'*	*3*		***3***	*Viburnum tinus*	*9*
16	*Spiraea vanhouttei*	*2*			***Platanaceae***	
17	*Laurocerasus officinalis*	*1*		***1***	*Platanus orientalis*	*57*
18	*Malus floribunda*	*1*		***2***	*Platanus occidentalis*	*1*
19	*Mespilus germanica*	*1*			***Fagaceae***	
20	*Prunus domestica*	*1*		***1***	*Quercus robur*	*15*

21	*Prunus serrulata*	*1*		***2***	*Quercus glauca*	*2*
	Pinaceae				***Lythraceae***	
1	*Pinus sylvestris*	*1757*		***1***	*Punica granatum*	*11*
2	*Pinus nigra*	*261*		***2***	*Lagerstroemia indica*	*2*
3	*Pinus brutia*	*192*			***Betulaceae***	
4	*Cedrus libani*	*176*		***1***	*Corylus avellana*	*7*
5	*Cedrus brevifolia*	*33*		***2***	*Corylus colurna*	*3*
6	*Pinus pinea*	*23*			***Caprifoliaceae***	
7	*Picea pungens*	*17*		***1***	*Abelia grandiflora*	*5*
8	*Abiyes nordmanniana*	*15*		***2***	*Lonicera caprifolium*	*1*
9	*Cedrus atlantica*	*13*			***Pittosporaceae***	
10	*Picea abies*	*10*		***1***	*Pittosporum tobira 'Nana'*	*6*
11	*Picea orientalis*	*9*		***2***	*Pittosporum tobira*	*1*
12	*Larix laricina*	*1*			***Simaroubaceae***	
13	*Pinus mugo*	*1*		***1***	*Ailanthus altissima*	*124*
	Cupressaceae				***Buxaceae***	
1	*Cupressus macrocarpa 'Goldcrest'*	*1391*		***1***	*Buxus sempervirens*	*132*
2	*Cupressus arizonica*	*392*			***Lamiaceae***	
3	*Thuja occidentalis*	*328*		***1***	*Lavandula angustifolia*	*92*
4	*Cupressocyparis leylandii*	*218*			***Apocynaceae***	
5	*Cupressus macrocarpa*	*191*		***1***	*Nerium oleander*	*52*
6	*Platycladus orientalis*	*174*			***Juglandaceae***	
7	*Cupressus sempervirens*	*62*		***1***	*Juglans regia*	*32*
8	*Juniperus horizontalis*	*29*			***Lauraceae***	
9	*Juniperus sabina*	*21*		***1***	*Laurus nobilis*	*9*
10	*Calocedrus decurrens*	*7*			***Ebenaceae***	

11	*Juniperus excelsa*	*4*		***1***	*Diospyros kaki*	*6*
	Oleaceae				***Bignoniaceae***	
1	*Oleae europaea*	*8*		***1***	*Catalpa bignonioides*	*5*
2	*Fraxinus excelsior*	*6*			***Elaeagnaceae***	
3	*Fraxinus pennsylvanica*	*6*		***1***	*Elaeagnus angustifolia*	*4*
4	*Ligustrum vulgare*	*4*			***Ginkgoaceae***	
5	*Syringa vulgaris*	*3*		***1***	*Gingko biloba*	*3*
6	*Ligustrum lucidum*	*2*			***Rhamnaceae***	
7	*Ligustrum japonicum*	*1*		***1***	*Ziziphus jujuba*	*3*
	Moraceae				***Arecaceae***	
1	*Morus alba*	*9*		***1***	*Chamaerops humilis*	*2*
2	*Morus nigra 'Pendula'*	*8*			***Cycadaceae***	
3	*Ficus carica*	*6*		***1***	*Cycas revoluta*	*1*
4	*Morus alba 'Pendula'*	*2*			***Paeoniaceae***	
5	*Morus nigra*	*1*		***1***	*Paeonia officinalis*	*1*
	Fabaceae				***Paulowniaceae***	
1	*Robinia pseudoacacia*	*122*		***1***	*Paulownia tomentosa*	*1*
2	*Robinia pseudoacacia 'Umbraculifera'*	*106*			***Myrtaceae***	
3	*Cercis siliquastrum*	*24*		***1***	*Myrtus communis*	*1*
4	*Albizia julibrissin*	*6*			***Cannabaceae***	
	Sapindaceae			***1***	*Celtis australis*	*1*
1	*Aesculus hippocastanum*	*22*			***Altingiaceae***	
2	*Acer platanoides*	*19*		***1***	*Liquidambar orientalis*	*1*
3	*Acer negundo*	*6*			***Taxaceae***	
4	*Acer platanoides 'Crimson King'*	*2*		***1***	*Taxus baccata*	*1*

Table 2. Families with limited representation and diverse concentration

The top 10 species with the highest numbers are Pinus *sylvestris* (Scots pine) in first place with 1,757, followed by Cupressus *macrocarpa* "Goldcrest" (Limoni Servi) in second place with 1,391, Pyracantha *coccinea* (Firethorn) in third place with 646, 4th place is Euonymus *japonica* "Aurea" (Japanese Spindle) with 581 specimens. In fifth place is Cupressus *arizonica* (Arizona Cypress) with 392 points, in sixth place is Thuja *occidentalis* (Western Arborvitae) with 328 points, in seventh place is Pinus *nigra* (Black Pine) with 261 points, Viburnum *lucidum* (Hairy Snowball) ranked 8th with 231 votes, Cupressocyparis *leylandii* (Hybrid Cypress) ranked 9th with 218 votes, and Pinus *brutia* (Red Pine) ranked last with 192 votes.

In terms of species diversity, the Rosaceae family has the highest number of species, at 21. The Pinaceae family ranks second with 13 species, the Cupressaceae family third with 11 species, the Oleaceae family fourth with seven species, and the Moraceae family fifth with five species. The Fabaceae family ranks sixth with four species, while the Sapindaceae, Celastraceae, Malvaceae, Salicaceae and Adoxaceae families are joint seventh with three species each. Eighth place is shared by the Platanaceae, Fagaceae, Lythraceae, Betulaceae, Caprifoliaceae and Pittosporaceae families, each of which has two species. The remaining families are represented by only one species.

The Rosaceae family, which is the most species-diverse in settlements, is a broad group that includes important species for fruit production and aesthetic purposes. Fruit species such as Cydonia *oblonga* (quince), Mespilus *germanica* (medlar), Prunus *armeniaca* (apricot), Prunus *cerasifera* (plum), Malus *domestica* (apple), Prunus *avium* (cherry), Prunus *persica* (peach), Prunus *cerasus* (sour cherry), Prunus *dulcis* (almond) and Pyrus *communis* (pear) play an important role in residential areas in terms of food production and landscape integrity. Additionally, species such as Spiraea *vanhouttei* (goat's beard), Pyracantha *coccinea* (firethorn) and Photinia × *fraseri* (flame bush) are popular in settlements due to their attractive appearance, compact structure and various morphological characteristics.

The Pinaceae family ranks second in terms of species diversity in settlements and stands out for its evergreen, hardy and low-maintenance characteristics. At the genus level, tall species such as Pinus *sylvestris* (Scots pine), Pinus *nigra* (black pine), Pinus *brutia* (red pine) and Pinus *pinea* (stone pine) are used to provide shade. Meanwhile, Cedrus *libani* (Lebanese cedar), Cedrus *brevifolia* (Cyprus cedar), Cedrus *atlantica* (Atlas cedar), Picea *pungens* (blue spruce) and Pinus *mugo* (mountain pine) are favoured for their colour, form and aesthetic qualities. Other species are used in settlements for their restrictive, guiding or other functional characteristics.

The Cupressaceae family, which is ranked third in terms of species diversity, has been used in various ways in residential landscapes thanks to its different morphological and functional characteristics. In residential areas, species such as Cupressus *macrocarpa* (Limoni cypress), Cupressus *macrocarpa* 'Goldcrest' (Limoni cypress), Cupressocyparis *leylandii* (hybrid cypress), Thuja *occidentalis* (western arborvitae) and Platycladus *orientalis* (eastern arborvitae) are popular choices for accent, boundary or hedge planting thanks to their ability to be pruned. Spreading forms of the family, such as Juniperus *sabina* (Sabine juniper) and Juniperus *horizontalis* (creeping juniper), have been evaluated for use as ground cover and accent plants due to their horizontal growth characteristics. Cupressus *arizonica* (Arizona cypress), with its silvery-blue foliage, is used in settlements for hedging, screening and providing windbreaks. Juniperus *excelsa* (Tall Juniper), with its broad crown and trunk, is used as a shade-providing accent plant in settlements, while Cupressus *sempervirens* (Cemetery Cypress), with its columnar form, is positioned as a windbreak and accent plant.

The olive tree (Olea *europaea*), belonging to the Oleaceae family which ranks fourth in terms of species diversity, stands out for its branching structure, trunk form and leaf morphology. Thanks

to these characteristics, it is often used as an accent plant in urban landscapes. Similarly, the Fraxinus *excelsior* (common ash) and Fraxinus *pennsylvanica* (green ash) species provide visual appeal with their changing leaf colours in autumn and offer shade with their broad crown structures, making them valuable both aesthetically and functionally in settlements. The evergreen Ligustrum *japonicum* (Japanese privet) is used as an accent plant thanks to its dense, year-round green foliage; the species Ligustrum *vulgare* (common privet), Ligustrum *lucidum* (shiny-leaved privet) and Syringa *vulgaris* (lilac) have been positioned as decorative elements in the settlement landscape, providing aesthetic value through their flowering characteristics and shrubby forms.

The Morus *alba* (white mulberry) and Morus *nigra* (black mulberry) species belong to the Moraceae family, which is the fifth most species-diverse family in settlements. They have been used to provide shade in settlements thanks to their fruit-bearing characteristics and broad crown structures. Furthermore, the weeping forms of the white and black mulberry trees, Morus *alba* 'Pendula' and Morus *nigra* 'Pendula', have been valued in settlements for their decorative and visual focal point characteristics, created by their weeping branch form and fruit production. The Ficus *carica* (fig) tree has also found its place in residential areas as an aesthetically prominent plant thanks to its leaf morphology and fruit characteristics.

The Fabaceae family is the sixth largest family of plants in terms of species number. Two species belonging to this family, Robinia *pseudoacacia* (Acacia) and Robinia *pseudoacacia* 'Umbraculifera' (Top Acacia), are aesthetically appealing due to the dense shade they provide, their leaf morphology, and their flowering characteristics. Studies in urban areas have shown that these species are typically planted in rows and are valued for their shade-providing function. In contrast, Cercis *siliquastrum* (the Judas tree) and Albizia *julibrissin* (the silk tree) are used in landscape design to create focal points due to their distinctive, showy flowers; they are also used in settlements as striking accent plants.

When examining species belonging to the families Sapindaceae, Celastraceae, Malvaceae, Salicaceae and Adoxaceae, which are tied for seventh place in terms of species diversity in settlements, the following tree species are present: Aesculus *hippocastanum* (white-flowered horse chestnut), Acer *platanoides* (sycamore maple), Acer *platanoides* 'Crimson King' (red maple), Acer *negundo* (box-leaved maple), Tilia *platyphyllos* (large-leaved linden), Tilia *tomentosa* (silver linden), Salix *babylonica* (weeping willow), Salix *alba* (white willow), Populus *alba* (white poplar) and Corylus *avellana* (common hazel) and Corylus *colurna* (Turkish hazel). Aesculus *hippocastanum* (white flowering horse chestnut) and Tilia *platyphyllos* (large-leaved linden) are favoured for creating shaded areas in urban environments thanks to their broad crown structures. Acer *platanoides* (Norway maple), Acer *platanoides* 'Crimson King' (red maple), Acer *negundo* (box-leaved maple) and Populus *alba* (white poplar) are used for both aesthetic and functional purposes, providing shade due to their leaf morphology. The Salix *alba* (white willow) and Salix *babylonica* (weeping willow) species attract attention with their spear-shaped leaves, and the weeping willow in particular has been valued as an aesthetic accent and focal plant in settlements thanks to its drooping form. Of the shrub-like plants, Euonymus *japonicus* (Spindle Tree), Euonymus *japonica* 'Aurea' (Golden Spindle Tree) and Euonymus *japonica* 'Bravo' (Silver Spindle Tree) are used as boundary plants, hedges and in group plantings. Hibiscus *syriacus* (Rose of Sharon) and Viburnum *opulus* (Guelder Rose) are valued for their showy flowers and are used for aesthetic purposes in residential areas. Viburnum *lucidum* (Shiny-leaved Snowball) and Viburnum *tinus* (Hairy-leaved Snowball) are favoured for use as border plants, hedges and group plantings due to their evergreen foliage, decorative form and low maintenance requirements.

The families represented by two species in the settlements are the Platanaceae, Fagaceae, Lythraceae, Betulaceae, Caprifoliaceae and Pittosporaceae. Of these, the Platanus *orientalis* (Eastern Plane Tree) and the Platanus *occidentalis* (Western Plane Tree) were selected as prominent trees due to their broad crown structures, branching patterns and shade-providing abilities. Corylus *colurna* (Turkish hazel), Quercus *robur* (English oak) and Quercus *glauca* (Japanese white oak) have specifically been used for shading purposes due to their leaf morphology and broad crown structures. Punica *granatum* (pomegranate) and Lagerstroemia *indica* (crape myrtle) are focal plants that provide visual impact during their flowering periods. Meanwhile, Corylus *avellana* (common hazel) creates a natural appearance with its multi-stemmed form and dense foliage. The shrubs Abelia *grandiflora* (abelia) and Lonicera *caprifolium* (honeysuckle) have been used for their flowering structures, as have Pittosporum *tobira* (star bush) and Pittosporum *tobira* 'nana' (dwarf star bush), which enhance the aesthetic appeal of the estate with their compact, dense structures.

The families containing only one species in the settlements are: Simaroubaceae, Buxaceae, Lamiaceae, Apocynaceae, Juglandaceae, Lauraceae, Ebenaceae, Bignoniaceae, Elaeagnaceae, Ginkgoaceae, Rhamnaceae, Arecaceae, Cycadaceae, Paeoniaceae, Paulowniaceae, Myrtaceae, Cannabaceae, Altingiaceae and Taxaceae. Tree species within this scope include Ailanthus *altissima* (Tree of Heaven), which is used for shade thanks to its broad crown structure, and Catalpa *bignonioides* (Catalpa) and Liquidambar *orientalis* (Anatolian Sweetgum), which are used for shade and aesthetic purposes thanks to their showy leaves. The Juglans *regia* (walnut tree) serves as both a shade tree and a food source thanks to its broad crown and edible fruit, while the Bay Laurus *nobilis* (Laurel Tree) adds aesthetic value to settlements with its dense, glossy foliage and evergreen form. Diospyros *kaki* (Persimmon), Celtis *australis* (Horse Chestnut), and Ziziphus *jujuba* (Jujube) are valued for their fruit-bearing characteristics and the colour display they exhibit in autumn. Elaeagnus *angustifolia* (silverberry) adds visual interest with its silvery-green foliage, while Ginkgo *biloba* (maidenhair tree) is both functional and aesthetically pleasing, with its unique leaf shape, broad crown structure and autumn colouration. Paulownia *tomentosa* (Paulownia) adds aesthetic appeal with its broad crown and showy flowers, while Taxus *baccata* (Yew) is used as an accent tree due to its evergreen nature, ease of pruning and ability to be shaped. Chamaerops *humilis* (dwarf palm) and Cycas *revoluta* (sago palm) are valued for their ornamental qualities, particularly their form and leaf structure. Among the shrub species, Buxus *sempervirens* (boxwood) is used as a boundary plant thanks to its dense structure, while Lavandula *angustifolia* (lavender) is preferred for aesthetic purposes in group plantings thanks to its purple flowers, aromatic scent and shrubby form. Nerium *oleander* (oleander) contributes aesthetically with its showy flowers and evergreen characteristics, while Myrtus *communis* (myrtle) creates visual richness with its small leaves and flowers. Finally, Paeonia *officinalis* (peony) has been evaluated for aesthetic purposes in the settlement thanks to its decorative form and flower structure.

4. CONCLUSİON AND RECOMMENDATİONS

This study, which was conducted on the all campuses of Amasya University, revealed that plant diversity is high and that this diversity has significant aesthetic, ecological, economic and socio-cultural potential. Data obtained from the campuses was transferred to a digital environment to create a comprehensive plant database. This database can be used for ecological planning, sustainable management, and landscape design on the campuses. It can also serve as educational material in relevant university departments. Furthermore, the database enables the systematic monitoring and analysis of existing flora and facilitates ecology-based decision-making in planning studies. The study concluded that the diversity of species identified provides visual

variety in the settlement landscape through its different forms, textures and colours, offering visual richness from an aesthetic perspective while also making significant contributions in terms of ecosystem services.

Studies indicate that the Pinaceae, Cupressaceae and Rosaceae families occupy the top three positions in terms of species number and diversity on Amasya University campuses. These families comprise approximately 77% of the total species on campus, with a combined total of 6,532 species. Thanks to their evergreen structure, Pinaceae and Cupressaceae species provide year-round green continuity on campuses, thereby increasing their carbon sequestration capacity and playing an important role in regulatory ecosystem services. Conversely, fruit-bearing Rosaceae species contribute to the landscape both aesthetically and functionally, providing ecosystem services such as provisioning and support (Çoban and Yücel, 2018; Tülek and Ersoy Mirici, 2019).

Examining species from other families, such as Olea *europaea* (olive), Morus *alba* (white mulberry), Morus *nigra* (black mulberry) and their 'Pendula' cultivars, Ficus *carica* (fig), Corylus *colurna* (Turkish hazelnut), Corylus *avellana* (common hazelnut), Diospyros *kaki* (persimmon), Celtis *australis* (horse chestnut), Ziziphus *jujuba* (jujube) and Juglans *regia* (walnut), it is clear that they have found their place in settlements not only because of their fruit-bearing characteristics, but also because of their colour, form and flowering properties. These species stand out not only for their role in food production, but also for their aesthetic and ecological contributions. They play a critical role in ecosystem services, particularly in terms of provisioning and supporting services (Akkurt & Akten, 2021). Ligustrum *japonicum* (Japanese Privet), Ligustrum *lucidum* (Shiny-leaved Privet), Euonymus *japonicus* (Spindle Tree), Euonymus *japonicus* 'Aurea' (Golden Spindle Tree), Euonymus *japonicus* 'Bravo' (Silver Spindle Tree), Viburnum *lucidum* (Shiny-leaved Snowball), Viburnum *tinus* (Leafy Snowball), Pittosporum *tobira* (Star Bush), Pittosporum *tobira* "Nana" (Dwarf Star Bush), Laurus *nobilis* (Bay Laurel), Buxus *sempervirens* (Boxwood), Nerium *oleander* (Oleander), Chamaerops *humilis* (Dwarf Palm), Cycas *revoluta* (Sago Palm) and Myrtus *communis* (Myrtle) stand out in residential areas due to their evergreen characteristics. These species contribute to continuous carbon sequestration by remaining green throughout the year; they also support ecological balance with their morphological and physiological characteristics. They make significant contributions to preserving aesthetic continuity in settlements, ensuring spatial integrity, and strengthening regulatory ecosystem services (Tırnakçı, 2021). In addition, the following species play an important role in regulating the microclimate in settlements due to their broad crown structures, leaf morphologies and shading capabilities: Robinia *pseudoacacia* (Acacia); Robinia *pseudoacacia* 'Umbraculifera' (Umbrella Acacia); Fraxinus *excelsior* (Common Ash); Fraxinus *pennsylvanica* (Green Ash); Aesculus *hippocastanum* (White-flowered Horse Chestnut); Tilia *platyphyllos* (Large-leaved Linden); Platanus *orientalis* (Eastern Plane Tree); Platanus *occidentalis* (Western Plane Tree); Quercus *robur* (English Oak); Quercus *glauca* (Japanese Oak); Ailanthus *altissima* (Tree of Heaven); Catalpa *bignonioides* (Catalpa); Liquidambar *orientalis* (Anatolian Sweetgum); and Ginkgo *biloba* (Maidenhair Tree). These species are therefore evaluated in terms of their provision of regulatory ecosystem services (Yılmaz Kaya & Uzun, 2019). Finally, the following species add aesthetic value to settlements with their magnificent flowering characteristics: Cercis *siliquastrum* (Judas tree), Albizia *julibrissin* (silk tree), Hibiscus *syriacus* (rose of Sharon), Viburnum *opulus* (guelder rose), Punica *granatum* (pomegranate), Lagerstroemia *indica* (crape myrtle), Abelia *grandiflora* (abelia), Lonicera *caprifolium* (honeysuckle), Paulownia *tomentosa* (paulownia), Lavandula *angustifolia* (lavender), Nerium *oleander* (oleander) and Paeonia *officinalis* (peony). These species create visual richness in settlements, strengthening users' interaction with the environment. They contribute to

psychological relaxation and recreational value, as well as the formation of spatial identity. Given these characteristics, they occupy an important place within the scope of cultural ecosystem services in settlements (Baylan, 2025).

This study, conducted on the campuses of Amasya University, determined that existing plant species contribute to the urban ecosystem in various ways. Fruit-bearing and evergreen species, in particular, play an important role in terms of ecosystem services, such as carbon sequestration, microclimate regulation, and aesthetic value (Sâri et al., 2020). However, the high density of coniferous plant species, the low representation of other species and the limited number of specimens of some species suggest that plant diversity is concentrated in a few species. This may pose a risk of increased disease and pest populations in the long term, as well as limiting the contributions that settlements can make to the urban ecosystem (Selim et al., 2015). In this context, increasing biodiversity and balancing the distribution among species is recommended. While increasing diversity in the settlement landscape, the number of species should remain similar, thereby enhancing ecological resilience, as well as aesthetic and functional value. To this end, landscape planning, management and plant arrangement studies can be conducted to ensure the sustainability of ecosystem services and the long-term conservation of plant diversity in settlements (Demir, 2013).

In conclusion, the plant database created in this study, which was conducted across all Amasya University campuses, is an important scientific resource. It digitally documents the campuses' botanical diversity and informs planning and management decisions. It has been designed to play an active role in the university's sustainable landscape planning and management processes. In the long term, the database will contribute to the planning of initiatives to protect, diversify and remediate deficiencies in the plant landscapes of Amasya University's campuses. It will facilitate the development of campus landscapes that are not only aesthetically pleasing, but also environmentally responsible and ecologically sustainable. Furthermore, the database can be used as educational material in relevant university departments. In this context, this study, which reveals the plant inventory of the campuses, can serve the education and training processes and be evaluated as an active tool in conservation, planning and management decisions.

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