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RESEARCH ARTICLE

Analysis of Urban Vegetation in terms of Smellscape: The Kastamonu City

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ABSTRACT

The sense of smell is increasingly gaining importance as an element that enhances the user experience in urban open and green spaces. In this context, smellscape is not merely a visually based design approach; it supports the multisensory interaction individuals establish with space and enhances spatial memory. This study used qualitative data collection methods to examine the landscape effects of scented plants in the city center of Kastamonu. Literature review and field observation methods were used to investigate the smellscape components in the city, the scent diffusion of these components across seasonal cycles, and their spatial distribution. The primary objective of this study is to reveal the smellscape characteristics of existing plant species in Kastamonu's city center. To evaluate Kastamonu's existing landscape potential, this study emphasizes that scented plants should be integrated into landscape design processes with a user-centered approach that considers seasonal continuity and is based on sensory experience.

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1. Introduction

For many years, the discipline of landscape architecture has evaluated spaces primarily through visual perception; senses such as smell have remained in the background in the design process. However, with the development of environmental psychology, experience-based design, and multi-sensory space approaches in recent years, it has been seen that the understanding of space based solely on vision is insufficient, and senses such as smell, sound, and touch also have an essential place in environmental experience (Aytatlı & Kuzulugil, 2025; Drobnick, 2024; Porteous, 1985). In this context, smell plays a strong role in strengthening the emotional bond that individuals establish with a place, at various levels such as wayfinding, sense of belonging to a place, and psychological interaction (Ayan Çeven & Belkayalı, 2019, 2021; Ayan Çeven & Belkayali, 2023; Belkayali & Ayan, 2017; Henshaw, 2013; Oleszkiewicz et al., 2021; Qin & Xuan, 2023). While the concept of olfactory landscape encompasses the source, distribution form, perception process, and effects of environmental odors on the user, it is also related to seasonal cycles, environmental conditions, cultural memory, and traditional landscape elements (Ayan Çeven & Belkayali, 2023; Aytatlı & Kuzulugil, 2025).

Environmental factors such as increasing building density, climate change, and air pollution, along with urbanization, lead to the loss of natural olfactory resources, leading to the erasure of traditional olfactory traces (Huang & Yuan, 2024; Xiao et al., 2017). Consciously integrating the sense of smell into design strengthens urban identity and contributes to cognitive processes such as wayfinding, psychological relaxation, and spatial belonging (M. He et al., 2022; Lygum & Xiao, 2025;

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Song & Wu, 2022; Xiao et al., 2017). Therefore, the need for multi-sensory landscape strategies that include the sense of smell in creating sustainable and livable cities is increasing (Hao et al., 2025; J. He et al., 2022). Olfactory landscapes in urban environments emerge in two types due to natural and human intervention (Bentley et al., 2023). Plants, one of the natural landscape elements, are one of the most critical components of the olfactory landscape. Trees and other plant species often emit attractive and invigorating scents (Lewis, 1996). Urban vegetation provides city dwellers with multiple ecosystem services, providing multisensory experiences and interactions, and benefiting human health. Compared to visual interaction, the olfactory experience of urban vegetation has been less studied and undervalued (Wang et al., 2025). Urban spaces integrated with aromatic plants enrich the user experience by providing aesthetic and functional contributions (Xiong et al., 2023; Zhang et al., 2023). Despite the nature-based approach taken in urban spaces (Egerer et al., 2024), visually oriented designs have been prioritized, and important sensory cues such as olfaction have often been overlooked (Wang et al., 2025).

Wang et al. (2025), in their review of the literature, evaluated the role of plants in the olfactory landscape under four main headings: richness (diversity of plant odors emitted by urban vegetation and perceptible to humans), diffusion (concentration and spread of plant odor), and structure (spatial distribution, density, and accessibility of the plant olfactory landscape). They also emphasized the need for plants to be included in olfactory landscapes within the context of health-friendly species selection, within the context of the cultural traditions, and with principles of equitable access, considering different demographic groups. Song and Wu (2022) found that in urban environments, *Magnolia* and tree peony exhibit a woody and slightly medicinal odor, lilac emits a strong hyacinth-like odor, *Osmanthus* has a pungent sweet odor, and winter peony has a fresh sweet odor. The study, which yielded the highest evaluation value for *Osmanthus*, found that odor concentration and diffusion were related to plant density, tree height, receptor location, and spatial spacing.

The study aims to evaluate the plant species in Kastamonu's city center within the context of olfactory landscapes. The study examines the use of scented plants in the city, their spatial placement, and seasonal changes. The study examines not only the visual aspects of scented plants but also their functions in environmental psychology and sociocultural contexts. It also explores how integrating scented plants into urban landscapes enriches user experience and contributes to forming spatial belonging and urban identity. Finally, the impact of environmental factors on olfactory landscapes in cities is analyzed, aiming to offer strategic recommendations for creating healthier, more sensory, and user-centered living spaces by incorporating olfactory design.

2. Materials and Methods

This study was conducted in the provincial center of Kastamonu, located in the Black Sea Region of Türkiye (Figure 1). Kastamonu boasts a rich natural landscape with its mountainous topography and historical texture. The city center contains 21 parks, 127 playgrounds, and 28 sports complexes, totaling 97,478 m² of active green space (Öztürk & Özdemir, 2013). The amount of active green space per capita in the city, at 1.04 m², is well below the legal criterion of 10 m²/person, and the proportion of active green space in the city center is approximately 3% (Öztürk & Özdemir, 2013). Scented plants are used in parks, street plantings, and landscaping in areas such as Sinanbey Park, Cumhuriyet Square, Kışla Park, Cevizli Park, İstiklal Yolu Park, Harikalar Diyarı Park, and Turhan Topçuoğlu Park. However, there is a lack of in-depth systematic studies examining the scent properties of these plants.

The research examined various public, open, and green spaces in the city center. These areas include parks, median strips, roadsides, and recreational areas.

This study used qualitative data collection methods to examine the landscape effects of scented plants in the Kastamonu city center. In the first phase of the study, national and international literature on scented landscaping, the role of plant scents in landscape architecture, healing landscapes, and nature-based therapy approaches was reviewed. In this context, a comprehensive literature review, including previous academic studies, theses, and books, was conducted on the role of scented plants in landscape design and their effects on urban spaces. Open green spaces included in the Kastamonu zoning plan were also identified, and satellite maps were examined. In this phase, the vegetative zones obtained from the maps were scanned (Figure 2). In the study, observation-based studies were conducted in the city center. Walks were carried out, and as a result of the walks, plants with scent properties and their locations were mapped by the researchers based on the literature.

Following this desk-based study, plant species with scent properties were identified in the city center based on on-site observations. In this context, the olfactory landscape components of the city were identified using literature review and field observation methods (Bozkurt, 2021) in conjunction with other methods. These components were evaluated using criteria such as seasonality, spatial location, and odor perception, adapted from Wang et al. (2025). Scented plants observed during field observations were evaluated according to the following criteria:

Seasonality: It was assessed how the plants' scents varied seasonally and how seasonal influences shaped their distribution.

Spatial Location: It was evaluated the location of scented plants in residential areas and their distribution in different regions within the city. These criteria included the plants' impact on environmental conditions and users.

Odor Perception: It was also examined the perception of scents emitted from scented plants. Some plants naturally emit scents through wind or heat, while others only emit scents through physical contact (e.g., touching or crushing their leaves). These differences are essential in determining how and to what extent the olfactory experience is felt in the space.

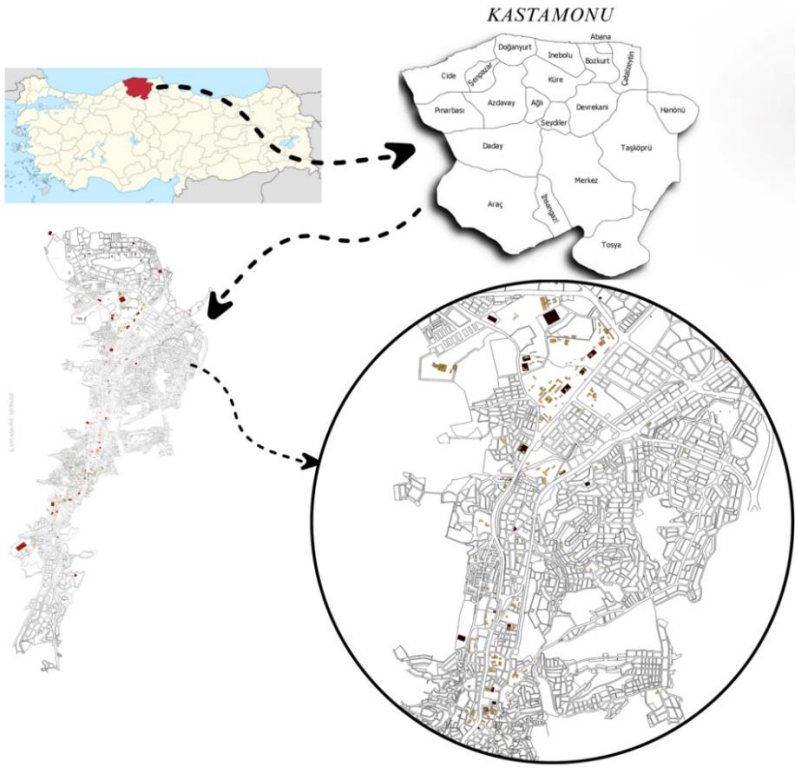

Figure 1. Study area location map.

Figure 2. Vegetal zones map.

3. Results

A general overview of the scented plant species used in urban areas is presented in Table 1. Thirteen different plant species were identified in the study area, all of which were included due to their distinct scent characteristics. These plants vary in their aromatic qualities. For example, mint, thyme, and rosemary are noted for their pungent, spicy scents, while roses, jasmine, and lilies are more prominent for their sweet and floral aromas. Considering the flowering periods, the months when scents are most intense in urban areas are determined to be May,

June, and July. These periods stand out when visual landscape elements and scent-based sensory experiences reach their highest levels.

Table 1. Fragrant plants found in Kastamonu city.

Plant Name	Latin Name	Flowering Period	Fragrance Properties	Usage Areas
Honeysuckle	*Lonicera japonica*	May - September	Intense floral scent (Song & Wu, 2022; Xiao et al., 2017)	Gardens, walls, natural landscaping
Lavender	*Lavandula angustifolia*	June - August	Strong aromatic scent (Lygum & Xiao, 2025; Song & Wu, 2022)	Landscaping, parks
Rose	*Rosa* spp.	May - July	Strong floral scent (Sakıcı, 2014; Song & Wu, 2022)	Gardens, park areas, walking paths
Linden	*Tilia tomentosa*	June - July	Sweet floral scent (Sakıcı, 2014; Song & Wu, 2022)	Afforestation areas, park roads
Jasmine	*Jasminum officinale*	May - July	Sweet and intense scent (Song & Wu, 2022; Xiao et al., 2017)	Gardens, walls, recreation areas
Mint	*Mentha* spp.	June - October	Fresh, pungent scent (Eroğlu et al., 2005; Song & Wu, 2022)	Parks, gardens
Thyme	*Thymus vulgaris*	May - July	Strong aromatic scent (Song & Wu, 2022; Xiao et al., 2017)	Landscaping, natural areas, scented gardens
Rosemary	*Rosmarinus officinalis*	April - July	Spicy and intense scent (Lygum & Xiao, 2025; Song & Wu, 2022)	Landscaping, scented area designs
Acacia	*Robinia pseudoacacia*	May - June	Sweet floral scent (Bozkurt, 2021; Song & Wu, 2022)	Roadsides, park visual areas
Lilac	*Syringa vulgaris*	May - June	Strong and pleasant odor (Song & Wu, 2022; Xiao et al., 2017)	City landscaping, gardens, aesthetic areas
Iris	*Iris germanica*	April - June	Slightly sweet and earthy odor (Sakıcı, 2014)	Aesthetic gardens, walking paths, colorful landscape areas
Lily	*Lilium candidum*	June - July	Intense and heady odor (Song & Wu, 2022; Xiao et al., 2017)	Gardens, monumental landscapes, showy plant compositions
Oleaster	*Elaeagnus angustifolia*	May - June	Sweet and intense odor (Bozkurt, 2021; Song & Wu, 2022)	Rural landscapes, roadsides, natural green areas

3.1. Seasonality

The scent release of fragrant plants varies throughout the year depending on their blooming season. *Lonicera japonica* (honeysuckle) blooms between May and September, with the scent intensity increasing particularly in the evening. *Lavandula angustifolia* (lavender) blooms between June and August and emits a more intense scent in the morning. *Rosa* spp. (rose) exhibits intense scent release during the summer months of May and July. *Tilia tomentosa* (linden) stands out with its sweet floral scent between June and July. *Jasminum officinale* (jasmine) emits a strong scent between May and July, between late spring and early summer. *Mentha* spp. (mint) It is perceived with its fresh and pungent aroma between June and October, while *Thymus vulgaris* (thyme) is noted for its aromatic properties between May and July. *Rosmarinus officinalis* (rosemary) is characterized by its intense, spicy scent between April and July, while *Laurus nobilis* (bay laurel) emits subtle scents in late spring and early summer. Seasonal transitions cause the scent intensity of these species to increase or decrease, allowing for diverse sensory experiences throughout the year.

Table 2. Seasonal scent distribution of scented plants found in Kastamonu.

Plant Name	Plant Name	April	May	June	July	August	September	October
Honeysuckle	*Lonicera japonica*		✓	✓	✓	✓	✓	
Lavender	*Lavandula angustifolia*			✓	✓	✓		
Rose	*Rosa* spp.		✓	✓	✓			
Linden	*Tilia tomentosa*			✓	✓			
Jasmine	*Jasminum officinale*		✓	✓	✓			
Mint	*Mentha* spp.			✓	✓	✓	✓	✓

Table 2. (continued)

Plant Name	Plant Name	April	May	June	July	August	September	October
Thyme	*Thymus vulgaris*		✓	✓	✓			
Rosemary	*Rosmarinus officinalis*	✓	✓	✓	✓			
Acacia	*Robinia pseudoacacia*		✓	✓				
Lilac	*Syringa vulgaris*		✓	✓				
Iris	*Iris germanica*	✓	✓	✓				
Lily	*Lilium candidum*			✓	✓			
Oleaster	*Elaeagnus angustifolia*		✓	✓				

3.2. Spatial Placement

The spatial placement of scented plants plays a significant role in the emotional and cognitive connections users form with the space. During the fieldwork, it was determined that scented species were not widely used in the parks studied. It was observed that there were no specific design criteria for the spatial placement of fragrant plants, and most scented species were located on the walls of residential gardens. *Rosa* (rose) and *Lavandula* (Figure 3a) were used in central reservations. In contrast, *Tilia tomentosa* (Figure 3b) was used in small numbers along streams and parks, and *Lonicera japonica* was used as a boundary element in residential gardens (Figure 3c).

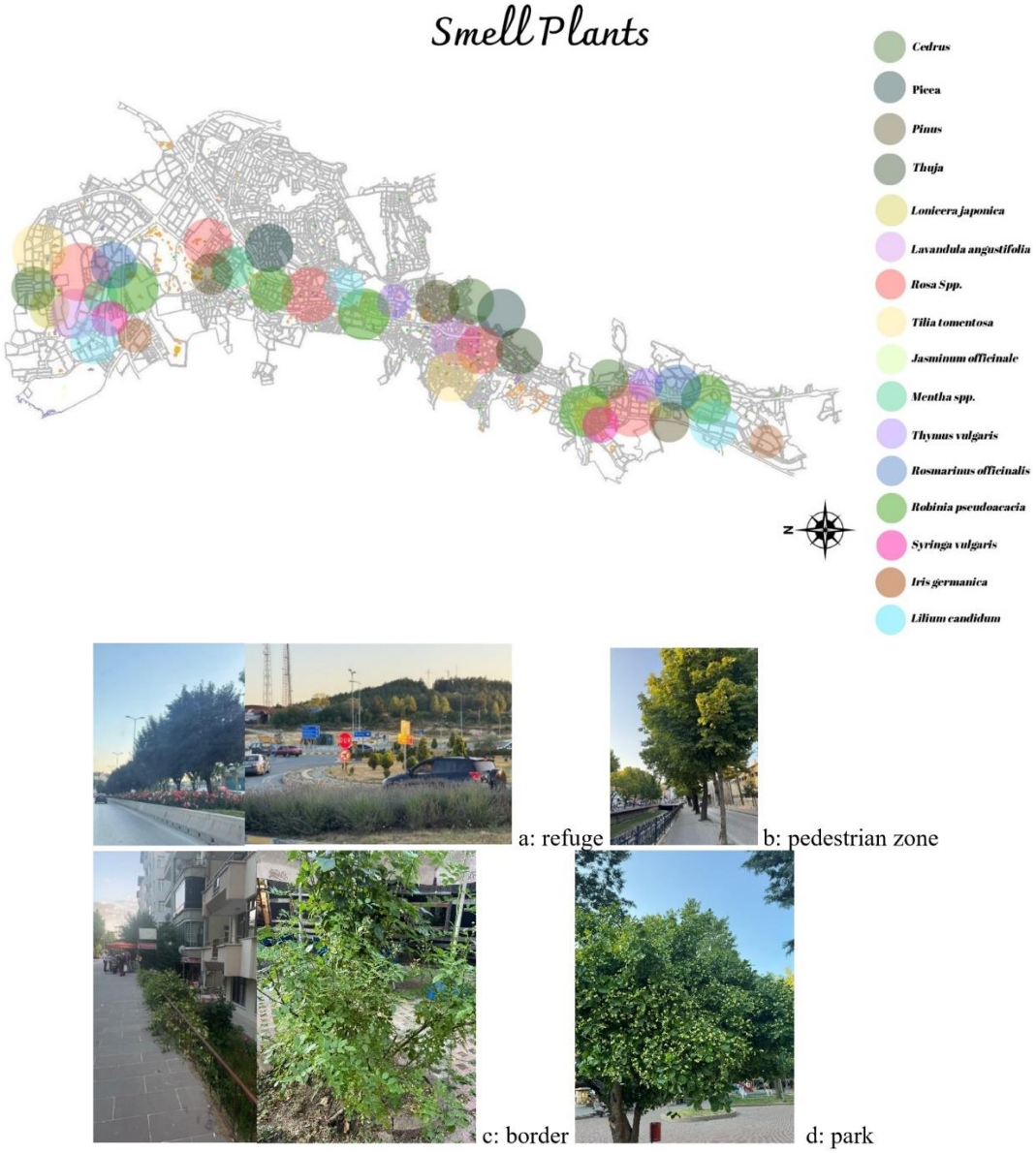

Figure 3. Spatial distribution map of plants.

3.3. Odor Perception

This study evaluated odor perception based on direct exposure to odor or perception through contact. The odor perception was determined to be the perception of odor by contact with the leaves of the plant species listed in Table 1, depending on their flowering period. When examining plant species in terms of odor perception through contact, it was determined that the odors of coniferous plant species, such as *Cedrus, Picea, Pinus,* and *Thuja*, were detected after contact with their leaves. In this context, it was determined that these species are frequently used in parks and median strips in the Kastamonu city center.

4. Conclusion

This study focused on the spatial location, perception, and seasonal evaluation of scented plants within the olfactory landscape of Kastamonu's city center. Field observations, literature reviews, and spatial analyses revealed that various species of fragrant plants are present in Kastamonu's parks, street plantings, green spaces, and historical neighborhoods. However, it was understood that most of these plants were randomly placed and not planned by a specific scent-focused design strategy.

The study concluded that scented plants make significant visual and sensory contributions to the urban landscape, particularly oleaster, rose, lavender, jasmine, honeysuckle, thyme, and lily. These plants facilitate urban residents' emotional connection to the space, encourage them to choose specific areas, and encourage social interactions and relaxation. For example, the scent of roses is strongly felt along walking paths and park entrances, while plants like lavender and jasmine are preferred in quiet park areas. Species such as honeysuckle and thyme, on the other hand, are more commonly used along streets and in areas integrated with natural patterns. Depending on each plant's location and flowering season, these distributions create different environmental impacts.

The effects of scented plants are linked to seasonal changes. Specifically, scent intensity increased in summer and decreased in winter. This raises an essential question regarding the continuity of the olfactory landscape: Considering seasonal variation in the placement and selection of scented plants plays a critical role in ensuring a practical olfactory experience throughout the year. Furthermore, plant placement has a direct impact not only on aesthetics but also on users' psychological and social experiences. Scents shape the atmosphere of a space, strengthening users' emotional bonds with the environment.

Spatial analyses have revealed that areas with scented plants are preferred by users seeking social interaction, relaxation, and peace. Strategic placement of these plants can further enrich the environmental experience and increase user satisfaction. However, a more conscious approach to plant placement is also necessary. Billottet (2020), on the other hand, noted that topographically, odors remain at or above the ground, depending on their molecules, and found that heavy molecular odors are trapped in the deepest points of architecturally hollow spaces. In this context, it is believed that the desired odors should be perceived in close contact with the nose, and scented plants should be incorporated into spatial designs, such as on walls and next to seating.

Another striking finding of the study is that academic research on olfactory landscapes in Kastamonu is scarce, and existing studies mainly focus on historical texture and urban memory. This suggests that olfactory landscapes are insufficiently considered in urban planning and design processes and are often neglected. The lack of systematic data on scented plants also leads to shortcomings in implementation processes, failing to fully utilize the aesthetic and functional potential of the olfactory element in landscape design.

Future studies should more systematically address the potential of scented plants in landscape design and explore their contributions to urban life more comprehensively. This will allow for more consciously designed olfactory landscape strategies in cities and create multisensory spaces that enrich the user experience.

4.1. Strategic Placement of Scented Plants

The spatial placement of scented plants is a key factor shaping the user experience. These plants deepen the environmental expertise, adding sensory depth beyond visual aesthetics. In parks, walking paths, and areas with intense social interaction, it is recommended to choose strongly scented species such as rose, lavender and jasmine. These plants leave a lasting impression on spatial memory and contribute to social interaction and active use of open spaces. On the other hand, quiet and individual rest areas (e.g., meditation areas, around benches) should feature more subtly scented plants, such as bay laurel or thyme. This strategy ensures that plants maintain a calm atmosphere while simultaneously creating a natural aromatic atmosphere, allowing them to be used most effectively in the right areas, considering user behavior.

4.2. Plant Selection for Seasonal Changes

The seasonally variable scent release cycle of scented plants should be considered to ensure year-round olfactory continuity in the landscape. While they emit particularly intense scents in the summer, this effect diminishes significantly in the winter. To balance this, plants that emit scents in different seasons can be combined. For example, plants that emit dominant scents in the summer, such as lavender and rose, should be placed alongside plants that emit subtle scents in the winter, such as *Dianthus caryophyllus* (clove) or conifers. This strategy smooths seasonal transitions, ensuring a balanced landscape integrity in visual and olfactory aspects, and can provide the continuity of the olfactory landscape in urban areas.

4.3. More Extensive Use of Scented Plants in Public Spaces

Using scented plants more frequently in public open spaces in city centers, especially in areas with high user density, such as parks, green spaces, walkways, and squares, is recommended. These plants enrich the spatial experience by providing visual aesthetics and a sensory experience. Scented plants should be strategically placed at park entrances, along walkways, or in areas with high social interaction. Plants such as rose and lavender, in particular, attract users in these spaces and strengthen their connection to the space. More widespread and planned use of scented plants in public spaces can encourage people to spend extended periods in these spaces, thereby increasing social interactions.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

Ayan Çeven, E., & Belkayalı, N. (2019). Mekân, bellek ve koku. *TMMOB*, *1*, 6-8. (In Turkish)

Ayan Çeven, E., & Belkayalı, N. (2021). Smellscapes: Imagining and remembering the city. In Ö. Demirel & E. Düzgüneş (Eds.), *Landscape research-I* (pp. 124-146). Livre De Lyon.

Ayan Çeven, E., & Belkayali, N. (2023). Experiencing urban smells when walking: Kastamonu city case. *International Journal of Urban and Regional Research*, *47*(2), 237-257. https://doi.org/10.1111/1468-2427.13145

Aytatlı, B., & Kuzulugil, A. C. (2025). Scentscapes in landscape design: Aesthetic and functional uses. In M. Özyavuz (Ed.), *Peyzaj mimarlığı konuları* (pp. 93-116). Yaz.

Belkayali, N., & Ayan, E. (2017). Effect of smell in historical environments. *New Trends and Issues Proceedings on Humanities and Social Sciences*, *4*(11), 297-306. https://doi.org/10.18844/prosoc.v4i11.2885

Bentley, P. R., Fisher, J. C., Dallimer, M., Fish, R. D., Austen, G. E., Irvine, K. N., & Davies, Z. G. (2023). Nature, smells, and human wellbeing. *Ambio*, *52*(1), 1-14. https://doi.org/10.1007/s13280-022-01760-w

Billottet, C. (2020). *Architecture nose: Towards multisensory architecture, an exploration of the sense of smell* (Doctoral dissertation, Delft University of Technology).

Bozkurt, S. G. (2021). Sivas' da doğal olarak yetişen bazı odunsu ve çalı türlerinin peyzaj mimarlığında kullanım olanaklarının belirlenmesi. *Eurasian Journal of Forest Science*, *9*(3), 79-91. https://doi.org/10.31195/ejejfs.969214 (In Turkish)

Drobnick, J. (2024). *The smell culture reader*. Taylor & Francis. https://doi.org/10.4324/9781003579540

Egerer, M., Annighöfer, P., Arzberger, S., Burger, S., Hecher, Y., Knill, V., Probst, B., & Suda, M. (2024). Urban oases: the social-ecological importance of small urban green spaces. *Ecosystems and People*, *20*(1), 2315991. https://doi.org/10.1080/26395916.2024.2315991

Eroğlu, E., Kesim, G. A., & Müderrisoğlu, H. (2005). Düzce kenti açık ve yeşil alanlarındaki bitkilerin tespiti ve bazı bitkisel tasarım ilkeleri yönünden değerlendirilmesi. *Journal of Agricultural Sciences*, *11*(03), 270-277. (In Turkish)

Hao, S., Qiao, Y., Sun, H., Jing, Q., & Jia, M. (2025). *Multisensory urban design: Healing effects of visual, auditory, and olfactory enhancements in street landscapes*. https://doi.org/10.2139/ssrn.5173818

He, J., Hao, Z., Li, L., Ye, T., Sun, B., Wu, R., & Pei, N. (2022). Sniff the urban park: Unveiling odor features and landscape effect on smellscape in Guangzhou, China. *Urban Forestry & Urban Greening*, *78*, 127764. https://doi.org/10.1016/j.ufug.2022.127764

He, M., Wang, Y., Wang, W. J., & Xie, Z. (2022). Therapeutic plant landscape design of urban forest parks based on the Five Senses Theory: A case study of Stanley Park in Canada. *International Journal of Geoheritage and Parks*, *10*(1), 97-112. https://doi.org/10.1016/j.ijgeop.2022.02.004

Henshaw, V. (2013). *Urban smellscapes: Understanding and designing city smell environments*. Routledge.

Huang, Y., & Yuan, X. (2024). Smellscape as a healing factor in institutional gardens to enhance health and well-being for older people with dementia: A scoping review. *Journal of Clinical Nursing*, *33*(2), 454-468. https://doi.org/10.1111/jocn.16908

Lewis, C. A. (1996). *Green nature/human nature: the meaning of plants in our lives*. University of Illinois Press.

Lygum, V. L., & Xiao, J. (2025). Creating smellscapes with plants: A landscape architectural framework. *Urban Science*, *9*(3), 68. https://doi.org/10.3390/urbansci9030068

Oleszkiewicz, A., Abriat, A., Doelz, G., Azema, E., & Hummel, T. (2021). Beyond olfaction: Beneficial effects of olfactory training extend to aging-related cognitive decline. *Behavioral Neuroscience*, *135*(6), 732. https://doi.org/10.1037/bne0000478

Öztürk, S., & Özdemir, Z. (2013). Kentsel açık ve yeşil alanların yaşam kalitesine etkisi "Kastamonu Örneği". *Kastamonu University Journal of Forestry Faculty*, *13*(1), 109-116. (In Turkish)

Porteous, J. D. (1985). Smellscape. *Progress in Physical Geography*, *9*(3), 356-378. https://doi.org/10.1177/030913338500900303

Qin, Q., & Xuan, W. (2023). Multisource data–based urban odor mapping and construction of a scent-emotional system for public spaces. *Journal of Urban Planning and Development*, *149*(4), 05023040. https://doi.org/10.1061/JUPDDM.UPENG-4655

Sakıcı, Ç. (2014). Bitkilerin psikolojik katkıları. *Türk tarım Gıda Tarım ve Hayvancılık Bakanlığı Dergisi*, *216*, 38-43. (In Turkish)

Song, X., & Wu, Q. (2022). Study on smellscape perception and landscape application of fragrant plants. *Urban Forestry & Urban Greening*, *67*, 127429. https://doi.org/10.1016/j.ufug.2021.127429

Wang, C., Gao, B., Hao, Z., Li, L., Yang, L., Chen, W. Y., & Pei, N. (2025). Plant smellscape: A key avenue to connect nature and human well-being. *Urban Forestry & Urban Greening*, *107*, 128757. https://doi.org/10.1016/j.ufug.2025.128757

Xiao, J., Tait, M., & Kang, J. (2017). The design of urban smellscapes with fragrant plants and water features. In V. Henshaw, K. McLean, D. Medway, C. Perkins & G. Warnaby (Eds.), *Designing with smell: Practices, techniques and challenges* (pp. 83-95). Routledge. https://doi.org/10.4324/9781315666273

Xiong, X., Jin, H., Hu, W., Zeng, C., Huang, Q., Cui, X., Zhang, M., & Jin, Y. (2023). Benefits of *Jasminum polyanthum*'s natural aromas on human emotions and moods. *Urban Forestry & Urban Greening*, *86*, 128010. https://doi.org/10.1016/j.ufug.2023.128010

Zhang, X., Guo, J., Zhang, X., & Zhang, Q. (2023). Physiological effects of a garden plant smellscape from the perspective of perceptual interaction. *International Journal of Environmental Research and Public Health*, *20*(6), 5004. https://doi.org/10.3390/ijerph20065004