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Review Article

A walk through Andalusian Gardens

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Abstract| Andalusia, located in the southern region of Spain, boasts a rich historical heritage shaped by centuries of Islamic rule. Between 711 and 1492 AD, the Muslim presence in the Iberian Peninsula not only transformed the region's political landscape but also left a lasting impact on its architectural and landscape traditions. The gardens of Andalusia, profoundly influenced by Islamic civilization and Persian architectural and garden styles, exemplify this legacy. The Persian garden tradition significantly shaped the design of Andalusian gardens, evident in prominent examples such as the Alhambra in Granada, the Alcázar in Seville, and Medina Al-Zahra in Córdoba. These spaces harmoniously integrate the beauty of architecture, nature, and spirituality. This study seeks to answer the question: What is the landscape architecture model of the gardens of Islamic civilization in Andalusia? This study adopts a qualitative approach to analyze the landscape architecture of these gardens through historical records, thematic written, and visual documents. Moreover, the current states of gardens were assessed using aerial and satellite imagery from Google Maps, complemented by virtual garden visits. Primary sources, including architectural descriptions and historical reports, provided insights into the design principles of Andalusian gardens. Virtual visits, photographs, and aerial and satellite imagery were used to evaluate their key design elements. This study endeavors to articulate the general characteristics of these gardens through phenomenological analysis, ultimately presenting a model of their landscape architecture.

Keywords| *Andalusia, Garden, Islamic civilization, Persian Garden, Model.*

Introduction| Andalusia, situated in the southwestern region of Spain, is geographically and politically defined by the provinces of Almería, Málaga, Cádiz, Seville, Córdoba, Jaén, and Granada. Historically and economically, the most significant area of Andalusia is the fertile valley of Wadi al-Kebir, which encompasses the cities of Córdoba, Seville, and Cádiz. The term "Andalusia" originates from the Arabic adaptation of the Visigothic name for the former Roman province of Baetica. The Visigoths referred to the region as "Ianda hiatus" (meaning "a lot of lands"), which, in Arabic, became "al-Andalus" (Bednorz & Barrucand, 1992). The arrival of Islam in Spain during the early 8th century (Ruggles, 2008) marked a transformation of the region's landscape (Nazeri, 2017). Between 711 and 1492 AD, the Muslim presence in the Iberian Peninsula not only changed the political landscape but also left an enduring influence on the region's architectural and landscaping traditions. Among the most significant contributions of Islamic civilization to Andalusia are its gardens, which embody the principles of Persian garden design. Andalusian gardens reflect a remarkable synthesis of architectural and landscape traditions shaped by centuries of Islamic rule (Bednorz & Barrucand, 1992; Ruggles, 2008). Notable examples, including the Alhambra in Granada, the Alcázar in Seville, and Medina Al-Zahra in Córdoba, illustrate this fusion. These gardens prominently feature elements of Chaharbagh, the Persian garden design, which emphasizes symmetrical organization, water management, and geometric precision. This tradition became a primary source of inspiration for Islamic gardens

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across the Middle East and Spain (Turner, 2005). Scholars have noted that Andalusian gardens often incorporate flowing water, intricate geometric patterns, and a strong connection to the surrounding environment—all hallmarks of Persian garden influence (Petruccioli, 1994; Ruggles, 2008; Soltani, 2012). The concept of the Chaharbagh, derived from Persian traditions, became a defining feature of Andalusian garden design (Gothein et al., 1928). This approach, which centers on a water feature surrounded by four quadrants, was adapted to suit the distinct climatic and cultural conditions of Andalusia (Almagro & Ramón-Laca, 2007). Water, symbolizing life and divine blessing, played a central role in these gardens, where fountains, canals, and pools were integral elements (Blanco del Piñal, 2023).

This study aims to identify the architectural and landscape principles that characterize these Andalusian gardens and seeks to address the question: What is the landscape architecture model of Islamic civilization gardens in Andalusia? The documentation and analysis of Andalusian gardens are not only epistemologically essential but also contribute to understanding their cultural and historical significance. Such efforts are crucial for the conservation and appreciation of UNESCO World Heritage Sites, including the Alhambra and the Generalife in Granada. It is hoped that this research will enhance the understanding of Andalusian gardens shaped by Islamic civilization and pave the way for future studies in this field.

Literature Review

Petruccioli (2014) examined the principles of Islamic gardens, emphasizing their symbolic connection to paradise and their profound influence across the Islamic world, including Andalusia. Petruccioli traced the origins of the integration of water features, geometric patterns, and green spaces in Andalusian gardens to Persian garden traditions, highlighting their lasting impact on Andalusian design.

Bednorz and Barrucand (1992) investigated the extent to which Persian influences permeated Spanish Islamic gardens, particularly through the use of water as both a symbolic and aesthetic element. Their work underscores the importance of water management and demonstrates how advanced Iranian irrigation systems were adapted to the unique climatic conditions of Andalusia.

Ruggles (2008) further explored the centrality of water in Islamic garden design. He illustrated how water, fountains, and reflecting pools were used in both Persian and Andalusian gardens to create tranquil spaces conducive to contemplation. Ruggles argued that these features serve not only functional purposes but also symbolic ones. He maintained that the influence of Persian garden design on Andalusian landscapes is evident in the integration of these water features, which are characteristic of iconic gardens such as the Alhambra and the Generalife. Blanco del Piñal (2023) demonstrated the profound impact of Persian garden engineering and aesthetics on Andalusia. Blanco del Piñal offers a comprehensive analysis of how Persian garden traditions, particularly their mastery of water management, were transferred to the Iberian Peninsula, particularly during the Islamic Golden Age. He examined both the technical and symbolic dimensions of water use, emphasizing how Iranian-inspired hydraulic systems were integrated into the design of Andalusian gardens, enhancing both their functionality and visual appeal.

Soltani (2012) identified key features of Persian gardens, such as the use of axial symmetry and the division of gardens into four quadrants, principles later adapted in Andalusian designs. His research highlighted the continuity of Iranian aesthetic principles in Andalusia, especially in the layout of courtyards.

The role of Islamic architecture in Andalusia was also explored by Fekri Ershad (2005). In his study, based on interviews with experts at the Andalusian Architecture Exhibition, he discusses how Islamic architecture flourished during the Muslim dynasties in Andalusia, influenced by both Arab and Persian styles. This architectural style is characterized by geometric designs and regular forms.

Ruggles (2012) scrutinized the architectural and symbolic foundations of early Islamic gardens, focusing on the courtyard of the Mosque of Córdoba. He explains that the courtyard represents one of the earliest examples of a Persian-inspired garden in Andalusia, where Persian principles are blended with local materials and the climate to create a harmonious garden setting.

The role of gardens in the broader context of Islamic architectural and artistic traditions was also explored by Hattstein and Delius (2016). In their work on Islamic architecture and art in Spain and North Africa, they discussed the cultural exchange between Persian and Andalusian regions, particularly in the development of garden designs that reflect a fusion of Eastern and Western Islamic aesthetics.

Gothein et al. (1928) provided a historical account of garden design, tracing the evolution of Persian gardens and their transmission to other cultures, including Andalusia. He examined the development of garden art and architecture and highlighted the significant influence of Persian principles on Andalusian garden design.

All these sources provide a rich foundation for understanding the influence of Persian gardens on the design of Islamic gardens in Andalusia. Shared aesthetic and symbolic principles—particularly those related to water features and spatial organization—form a central theme in the research literature.

Research Question

This study seeks to answer the question: What is the landscape architecture Model of the Islamic civilization gardens in Andalusia?

Research Method

This research adopts a qualitative approach to analyze the landscape architecture of these gardens, using a combination of historical records, and written and visual thematic documents. It also examines the existing state of the gardens through aerial and satellite imagery from Google Maps and virtual visits to the gardens. Primary sources, including architectural descriptions and historical reports, provided insight into the design principles of Andalusian gardens. Photographs, virtual visits, and aerial and satellite images were used to analyze the state of the gardens and assess key design elements. In addition, a review of relevant academic literature contributed to a deeper understanding of the cultural, historical, and environmental contexts in which these gardens were created and evolved.

Findings and Discussion

Based on a review of visual and written documents, satellite and aerial images from Google Maps, and a virtual visit to the gardens, the authors have extracted and analyzed the main landscape features of the gardens of Islamic civilization in Andalusia, along with citing evidence from the gardens.

• Water

Water was often used in these gardens in the form of streams, pools, fountains, and sometimes the water stairway or Escalera del Agua (e.g. in Generalife). The engineering of the water systems in Andalusian gardens was complex. The use of water channels (qanats) and irrigation systems allowed water to flow efficiently through the gardens, often in the form of linear paths or networked canals. This irrigation system was influenced by, Chaharbagh, in which water was used to divide the garden into four symmetrical sections.

As Hattstein and Delius (2016) stated, to provide water in the highlands, water was raised with the help of a waterwheel (Albolafia) and transferred to the garden pool with clay pipes (Fig. 1). The water axis inside the garden was narrow and stream-like. Qanats were used to supply water to gardens located on flat lands or in the plains.

The Alhambra in Granada and the Alcázar in Seville are notable examples of water displays (Fig. 2), where water channels wind through gardens, creating ponds and fountains that serve as both visual focal points and functional elements (Fig. 3). The water systems in the gardens of the Alhambra, such as the Patio de los Leones (Court of the Lions), show an advanced way of using water. The water is channeled through a central fountain and streams (Fig. 4). This central fountain and streams are said to have been previously surrounded by lush vegetation, a sign of the Persian influence on Andalusian garden design (see Fig. 5).

In Generalife, the water system consists of a series of fountains and channels, including the aqueduct, where water cascades down the steps, creating a dynamic visual

Fig. 1. waterwheel along the Guadalquivir River.
Source: Barrucand & Bednorz, 1992.

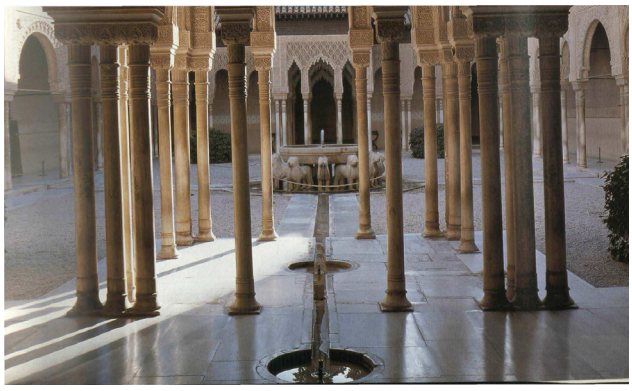

Fig. 2. Fountains and waterways of Court of the Lions, Alhambra. Source: https://www.britannica.com/topic/Alhambra-fortress-Granada-Spain

Fig. 3. Patio de Los Leones/ Court of the Lions, Alhambra. Source: https://www.britannica.com/topic/Alhambra-fortress-Granada-Spain

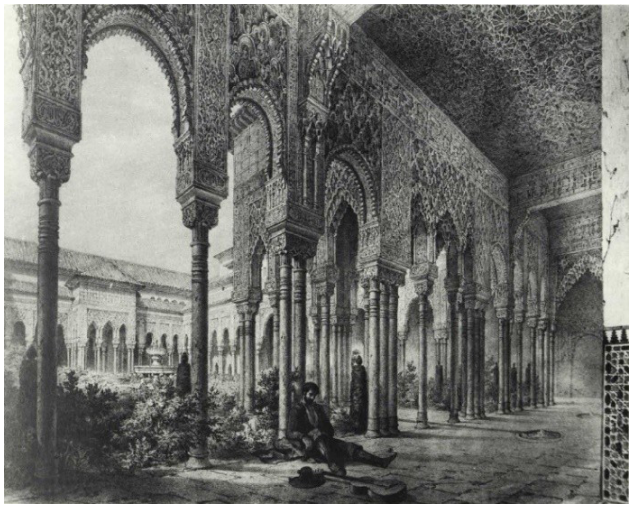

Fig. 4.A print from the Court of the Lions in the 19th century. Source: Bednorz & Barrucand, 1992.

Fig. 5. One of Alcazar Seville Gardens. Source: https://www.alcazar-seville-tickets.com/alcazar-seville-gardens/.

and auditory experience. Fountains were an integral part of Andalusian garden design, which was influenced by the Persian garden, where fountains were used as symbols of the source of life or divine grace. The presence of ponds and fountains in the courtyards was not only a functional design for cooling and irrigation but also a decorative element that enhanced the aesthetic experience. The gardens of the Alcázar of Seville, another outstanding example of Andalusian garden design, feature large rectangular pools surrounded by trees and garden paths. These pools were designed to create reflections, enhance the visual harmony of the garden, and strengthen the connection between the garden architecture and its natural environment (Ruggles, 2008) (see Fig. 5). Water in Andalusian gardens was a solution to the region's hot, dry climate. The arrival of Islam in Andalusia brought advanced Persian water management techniques, including the use of underground canals (qanats) and water distribution systems that allowed gardens to thrive in dry conditions. These systems were vital to maintaining the lush gardens seen in places like the Alhambra and the Generalife, where water was used not only for aesthetic purposes but also to cool and enhance the garden's microclimate.

• Symmetry and geometry

According to the authors' analysis, the spatial organization of gardens in Islamic civilization in Andalusia was achieved in several ways: the quadrilateral arrangement, symmetry, and repetition, the use of arches and arcades, tiling and mosaics, plants and natural geometry, and water features. All of these elements generally emphasized the symmetry and geometry that governs the garden.

The Quadrilateral Arrangement (like the Persian Garen style, Chaharbagh), is one of the most prominent geometric principles in Andalusian gardens. This arrangement divides the garden into four sections, often using water channels. The channels divide the garden into four sections and often cross at right angles. These channels are often filled with flowing water, which adds to the sensory experience of the garden and makes it a place for relaxation and reflection. As stated by Petruccioli (1994), the general form of the courts is rectangular, which in some gardens became quadrangular or cruciform due to the presence of water axes or paths. At least two other gardens with a cruciform plan have been found in the Alcazar of Seville, one of which is the Patio de Crucero and the other is an unnamed garden, both of which date back to the 12th century. Shortly after that, the famous gardens of Granada were formed (Petruccioli, 1994). Geometric motifs, in the form of symmetry and repetition, play an essential role in Andalusian garden design. The repetition of geometric shapes in the layout, planting, and even in decorative elements such as tiles and fountains creates a sense of harmony and balance. The principle of symmetry is prevalent in both the layout and decorative details of Andalusian gardens. The quadrilateral plan itself is a prime example, but symmetry also appears in the arrangement of paths, plantings, and fountains. This sense of balance seems to suggest order and unity. The repetition of

geometric shapes, such as circles, squares, and diamonds, is an integral part of the design. These shapes are often reflected in garden features such as paving tiles, fountain ponds, and planting beds. The use of arches and lattice panels (known as mashrabiya) in Andalusian gardens is not only used as architectural features but also to frame the landscape, creating a sense of depth and perspective (Fig. 6). Arches often act as garden entrances (Fig. 6) or connect different parts of the garden, while mashrabiya create intricate models that filter light and create shadow (Fig. 7). The interwoven Models of the lattice suggest the interconnectedness of all things and are often designed using geometric shapes such as stars, polygons, and spirals. These Models reflect Islamic aesthetics, which emphasize abstraction and avoid naturalistic depictions of life.

In addition to the layout, tiles, and mosaics play a role in the overall geometric design of Andalusian gardens. These tiles often feature geometric patterns, such as repeating stars, hexagons, and interlocking designs. These tile patterns can be seen in paths, fountains, and walls (Figs. 8 & 9) and provide a visual connection between the built environment and the garden space. The geometric motifs in tiles and mosaics are not just decorative, they also have symbolic significance.

The planting design in Andalusian gardens is also influenced by geometric principles. The arrangement of trees, flowers, and shrubs often follows an underlying grid that reflects the architectural geometry of the garden. Plants are arranged in circular or polygonal beds that are integral to the overall symmetry of the garden. These plantings provide an experience of visual pleasure, drawing the eye to the intricate structure of the design. The integration of plants and water is often arranged geometrically, with flowers and trees arranged along the course of the water or in precisely ordered rows (see Fig. 10).

Water is a central element in Andalusian gardens, both for its cooling effect and its symbolic significance. In these gardens, fountains, pools, and flowing water follow geometric principles of symmetry and balance. Water features are often integrated into the design to reflect the underlying geometric pattern and enhance the visual and auditory experience. The placement of water features often follows straight lines, grids, or circular arrangements, reflecting the geometric structure of the garden itself.

• Plant

The selection of plant species in Andalusian gardens focused on those that could thrive in the Mediterranean climate of the region while contributing to the sensory and aesthetic appeal of the garden. Common plants included citrus trees such as oranges and lemons, as well as pomegranates, cypresses, and roses. These species were chosen for their fragrance, fruit production, and symbolic significance. For example, the Generalife gardens feature prominent hedges and cypress trees, while orange trees provide shade and fragrance in the patios (Ruggles, 2008). In the Alcázar of Seville, citrus trees are planted in geometric arrangements, combining utility with aesthetic order. These trees also create a sensory experience with the scent of their blossoms, especially in spring (Turner,

Fig. 6. Alcazar Gardens, Seville. Source: https://www.washingtonpost.com/lifestyle/travel/in-andalusias-three-key-cities-one-of-historys-great-architectural-mash-ups/2018/07/12/73743504-7eee-11e8-bb6b-c1cb691f1402_story.html.

Fig. 7. South portico of the Patio del Yeso, in Alcázar, Seville. Source: https://www.alcazarsevilla.info/en/history.html.

Fig. 8. Mirador de Daraxa, Alhambra, Granada. Source: https://www.britannica.com/topic/Alhambra-fortress-Granada-Spain/

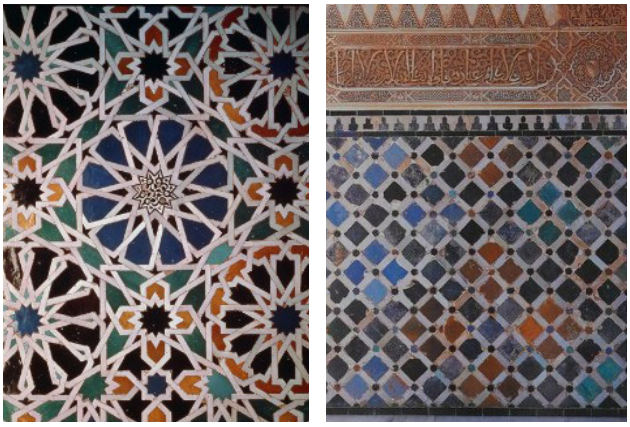

Fig. 9. Left: Tilework on the Comares Tower in the Alhambra. Source: https://www.britannica.com/topic/Alhambra-fortress-Granada-Spain, Right: Wall of Court of the Myrtles, Alhambra. Source: Hattstein & Delius, 2016.

2005). Spatial Arrangement and Symbolism Plants in Andalusian gardens were arranged to create cool, shaded environments that often served practical functions such as reducing heat and maintaining humidity. Symmetry and geometry played an important role in the arrangement of plants, with trees and hedges often defining paths, courtyards, and water features.

The Patio de los Naranjos/ Orange Tree Courtyard of the Mosque-Cathedral of Córdoba is one of the earliest examples of an Islamic garden, in which rows of orange trees aligned with the courtyard design and provided shade for visitors (Ruggles, 2008) (Fig. 11).

The terraced gardens of Medina al-Zahra featured plants that emphasized the hierarchy of spaces, with ornamental plants on the higher levels for royal use and functional agricultural species on the lower terraces (Bednorz & Barrucand, 1992) (Fig. 12).

Plants in Andalusian gardens were often combined with water features such as fountains, streams, and ponds/ pools, which enhanced their beauty and provided irrigation. As mentioned, water not only preserved the plants but also helped create a cool microclimate.

Generalife uses narrow canals lined with lush vegetation, creating a tranquil environment in which water preserves and highlights the green space (Petruccioli, 1994). In the Alcázar of Seville, water features are intertwined with plantings, ensuring that the gardens remain lush even in the dry Andalusian summers (Blanco del Piñal, 2023). The summer palace of the Nasrid rulers features a plant system with hedges around the ponds, cypress trees, and aromatic plants that enhance the sensory experience. The use of drought-tolerant plants demonstrates an understanding of the local climate and a commitment to sustainable garden design (Ruggles, 2008). The courtyard of the Córdoba Orangery features uniform rows of orange trees planted in a grid, demonstrating how functional agriculture was integrated into the ornamental design. The

Fig. 10. The Patio de la A cequia/ Court of the Water Channel, Generalife. Source: Hattstein & Delius, 2016.

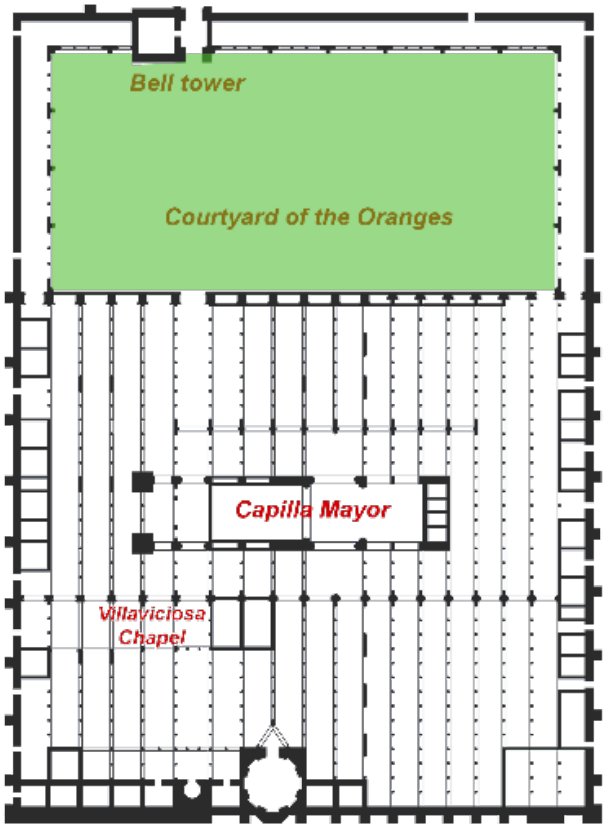

Fig. 11. The Patio de los Naranjos/ Orange Tree Courtyard of the Mosque-Cathedral of Cordoba. Source: Murad et al., 2019.

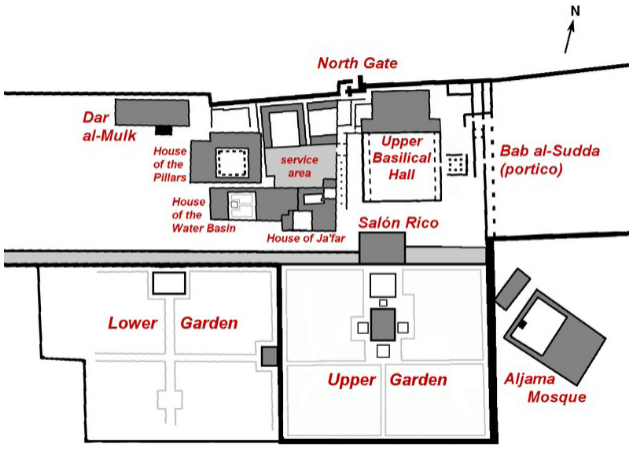

Fig. 13. Plan of the Medina al-Zahra Palace. This plan is a simplified reproduction of maps published by archaeologists and researchers to help understand the layout of the site. Source: https://commons.wikimedia.org/w/index.php?title=File:Madinat_al-Zahra_plan_alcazar_with_labels3.png&oldid=673474281.

trees are irrigated by a network of canals, demonstrating early examples of water conservation techniques in garden planning (Ruggles, 2008; Turner, 2005). The gardens of the Alcázar emphasize the geometric arrangement of plants with hedges, fruit trees, and flower beds carefully organized to enhance the symmetry of the garden. The use of evergreen species such as cypress ensures greenery all year round, while seasonal flowers (Bednorz & Barrucand, 1992) add color diversity. The terraced gardens of the royal city of Medina al-Zahra demonstrate how vegetation adapted to the challenges of topography. Olive, grape, and pomegranate trees were planted on the lower terraces for agricultural purposes, while ornamental species adorned the upper terraces, creating a visual and functional hierarchy (Petruccioli, 1994).

Conclusion

The gardens of Islamic civilization in Andalusia, exemplified by iconic sites such as the Alhambra, the Generalife, and the Alcázar of Seville, display a masterful blend of cultural, functional, and aesthetic elements. The water system and the Quadruple arrangement design, borrowed from the Persians, play a vital role in creating a microclimate in these gardens. Water channels, fountains, and pools not only cooled the air and watered the plants, but also provided mental and aesthetic pleasure. Symmetry and geometric order, as essential features in Islamic garden design, are revealed through the design of paths, planting patterns, and decorations. The chahar-bagh design repeated geometric motifs carefully placed in tiles, arches, and mashrabiyas, reinforcing a sense of organization and spatial unity. The use of plants such as citrus, pomegranate, and cypress in these gardens provided function, beauty, and symbolic meaning. Lush vegetation Shade trees and fragrant plants (such as jasmine, roses, and lavender) are among their characteristic features. Finally As the authors perceive, the way water appears the way water appears, the quality of geometric order and symmetry, and the type and design of planting plants are three general characteristics that constitute the Model of gardens of Islamic civilization in Andalusia. The souvenir of a walk to Andalusian gardens can include a deeper understanding of the structure and composition of Andalusian gardens and aesthetic perception.

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