Research Article
Araştırma Makalesi
DOI: 10.24011/ barofd.619469

Bartın Orman Fakultesi Dergisi,
22(1): 47-62,
15 Nisan/April, 2020

Journal of Bartin Faculty of Forestry
p-ISSN :1302-0943
e-ISSN :1308-5875

Woody Landscape Plants Used in the Design of Hospital Gardens and Their Sensory Effects on Users

Nilüfer SEYİDOĞLU AKDENİZ[1*]
[1] Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, 16059, BURSA

Abstract

Hospital gardens are one of the most important connection points between health and nature. The creation of visually effective plant compositions in hospital gardens is also important in terms of relaxing users and providing socialization. In this study, observation, data collection and evaluation methods were followed. In the scope of the study, a total of 26 hospital gardens Bursa (Osmangazi, Yıldırım, and Nilüfer) including state and private hospitals in the central districts of Bursa were evaluated. The plant diversity in hospital gardens were examined and form, texture, color and odor characteristics, autumn color effects, sensory effects of the identified taxa, and how they were used in hospital gardens were evaluated. It has been determined that the hospital gardens had a rich plant diversity with 95 woody plant taxa, and 47.37% of the identified plants were natural and 52.63% were exotic species and the gardens were insufficient in terms of planting design. In the hospital gardens, green colors, which gave a sense of tranquility and confidence, were determined to be dominant (81.05%). State hospitals were found to be more successful in terms of plant diversity than private hospitals. In the design of hospital gardens, blue, pink and yellow plant species that make people feel a sense of eternity, desire of living, vitality and love should be included.

Keywords: Hospital garden, plant usage sensory effects of plants, landscape plants

Hastane Bahçeleri Tasarımında Kullanılan Odunsu Peyzaj Bitkileri ve İnsanlar Üzerindeki Duyusal Etkilerinin Araştırılması: Bursa Kenti Örneği

Öz

Hastane bahçeleri, sağlık ve doğa arasındaki en önemli bağlantı noktalarından birisidir. Doğanın iyileştirici gücü bitkiler ile oluşturduğu doğal manzaralardan gelmekte olup, bitkiler ise renkleri, kokuları, yaprak ve çiçekleri gibi birçok özellikleri ile duyusal uyarım kapasiteleri yüksek peyzaj öğelerdir. Hastane bahçelerinde görsel anlamda etkili bitki kompozisyonlarının oluşturulması, kullanıcıların rahatlaması ve sosyalleşmelerinin sağlanması açısından da önemlidir. Bu çalışmada, Bursa Merkez ilçelerinde (Osmangazi, Yıldırım ve Nilüfer) yer alan toplam 26 adet devlet ve özel hastane bahçelerindeki bitkisel çeşitlilik irdelenmiş olup, kullanılan bitkilerin form, renk, koku, sonbahar renk etkisi ve duyusal etkileri ve bahçelerde nasıl kullanıldıkları değerlendirilmiştir. Hastane bahçelerinin toplam 95 adet odunsu bitki taksonu ile zengin bir bitkisel çeşitliliğe sahip olduğu, tespit edilen bitkilerin % 47,37'sinin doğal, % 52,63'ünün egzotik türlerden meydana geldiği saptanmış olup, bahçelerin bitkisel tasarım açısından yetersiz olduğu belirlenmiştir. Devlet hastanelerinin özel hastanelerden bitkisel çeşitlilik açısından nispeten daha başarılı olduğu saptanmıştır. Dinginlik ve güven duygusu veren yeşil renk tonlarının hâkim olduğu (%81,05) hastane bahçelerinde, beyaz ve krem renkli bitkilerin kullanımı yaygın iken mavi, pembe ve sarı tonlardaki bitkilerin kullanımının ise daha az oranda olduğu tespit edilmiştir. Hastane bahçelerinin tasarımında, insanlarda sonsuzluk, yaşama arzusu, zindelik ve sevgi hislerini uyandıran mavi, pembe ve sarı bitki türlerinin dahil edilmesine ihtiyaç vardır.

Anahtar Kelimeler: Hastane bahçeleri, bitkilendirme tasarımı, bitkilerin duyusal etkileri, peyzaj bitkileri.

***Sorumlu Yazar (Corresponding Author):**
Nilüfer SEYİDOĞLU AKDENİZ, Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, 16059, Bursa-Turkey. Tel: +90 (224) 2941638, Fax: +90 (224) 2941637, E-mail: nilsem@yahoo.com, **ORCID:** 0000-0001-6789-4473

Geliş (Received) :12.09.2019
Kabul (Accepted) :22.01.2020
Basım (Published) : 15.04.2020

1. Introduction

Hospitals are urban outer spaces where people come al least once or many times in their lives from their birth to death, and they may experience psychologically negative feelings such as fear, anxiety, depression, and loneliness. Sensory stimulation is a very important factor in order to avoid these negativities and to contribute to the healing process of patients. Sensory stimulation is based on the design of hospital gardens to be intertwined with nature (Kaplan and Kaplan, 1989; Marcus and Barnes, 1999; Sakıcı et.al., 2013; Sakıcı and Var, 2013). Hospital gardens are located within the urban open green spaces, which are the most important elements of cities in terms of quality and quantity, and hospital gardens reduce stress, cholesterol, and pain, provide relief in surgical interventions and affect blood pressure and heart rate positively in case they are designed to be intertwined with nature (Frumkin, 2001; Ulrich, 2002; Diette et al., 2003; Karakaya and Kiper, 2011; Zeybek, 2018). In fact, the shade and color of large trees and the movements of their leaves with breeze provide a meditation effect while the use of wildlife-supporting species gives patients moral support by creating color and sound effect (Yücel, 2013). On the other hand, the use of large lawns, large trees and the element of water together also creates a sense of silence, protection, and confidence (Kaplan and Kaplan, 1989; Ulrich, 2002; Adevi and Matersson, 2013). In order to provide psychological relief for the patients and other users, it is important to leave the appropriate garden area, to ensure that the windows of the patient care rooms look into the garden and to implement effective plant design practices in the gardens dominated by the green (Ulrich, 2002; Karakaya and Kiper, 2011; Blaschke et al., 2018).

Color is one of the most important elements in the planting designs to be applied in hospital gardens. With many color features such as leaves, flowers, and fruit bud colors, plants contribute to the describing of spaces, creating a visual impact and facilitating visual perception (Gültekin, 1994; Altinçekiç, 2000; Eroğlu et al,. 2005; Yıldırım et al., 2006). Colors affect human physiology and psychology in different ways. Bright colors tend to excite and stimulate, while cold colors provide relaxation and tranquility. In particular, the use of colors such as green, blue, white, yellow and lilac should be preferred in hospital gardens. As a matter of fact, it is known that the green color tranquilizes the patient, water blue colors take the electricity of human skin, yellow color makes the patient feel a sense of energy, and white color has a calming effect. In addition, it should be noted that the red and orange colors cause tension and restlessness in case of long-term monitoring (Bulut and Göktuğ, 2006; Whitehouse et al., 2001; Ender et al., 2016). On the other hand, it is important also to use the fragrance feature of the plants in the designs to be applied in the hospital gardens. The fragrance is closely related to memories and emotions. Especially for visually impaired patients, the fragrance characteristic of plants should be utilized to provide sensory stimulation. The beautiful and sweet-smelling plants help those who have amnesia and memory loss by promptly stimulating reactions, lowering blood pressure, slowing down breathing and reducing pain and anxiety. (Yücel, 2013; Sakıcı and Var, 2013). It is also important to take into account the characteristics of the plants which are reminiscent of the seasonal transition (flowering, foliation, dropping leaves, etc.), and the visual color effects in the autumn. The combination of trees, shrubs, and herbaceous plants creates seasonal color effects and also creates awareness about the rhythm and cycle of life on people (Marcus and Barnes, 1999; Altınçekiç, 2000; Yücel, 2013; Sakıcı and Var, 2013; Ender et.al. 2016).

In this study, the existing plant taxa in the state and private hospital gardens located in the central districts of Bursa (Osmangazi, Yıldırım, and Nilüfer) were determined, they were evaluated in terms of plant diversity and form, texture, color and odor characteristics, autumn color effects, sensory effects of the identified taxa, and how they were used in hospital gardens were evaluated.

2. Material and Method

2.1. Material

The state and private hospitals located in the central districts of Bursa (Osmangazi, Yıldırım, and Nilüfer), which is Turkey's 4th largest province, constitutes the research material. The province of Bursa is located in the Susurluk basin in the south of the Marmara region and is located between 39°35′- 40°40′ northern latitudes and 28°10′ - 30°00′ eastern longitudes. Having the neigbour provinces of Yalova and Kocaeli in the north, Bilecik in the east, Kütahya in the south and Balıkesir in the west, the province of Bursa has a surface area of 1,104,301 ha. The city of Bursa lies by the Marmara Sea coastline and particularly the Mediterranean climate dominates the city where the summers are dry and hot, winters are mild and rainy. Moving away from the sea reveals a semi-continental climate in the interior parts. Although Bursa lowland shows the general characteristics of the Mediterranean climate, the average temperature of the region is low, the annual rainfall sum is high, and monthly rainfalls are partly regular compared to the Mediterranean region. According to De Martonne's drought

index equation, the summer months are dry, and during the autumn and spring months, the city shows the character of the low humidity climate. An examination of the data of the last 65 years reveals that the average temperature has been 14.4°C, the average relative humidity has been 68.6% and the average annual rainfall has been 691.9 mm. (Zencirkiran and Akdeniz, 2017). (Figure 1).

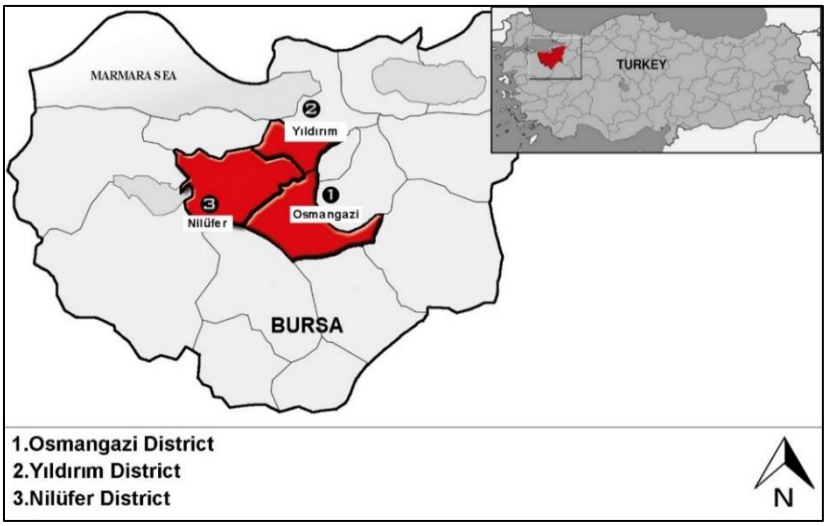

Figure 1. The location of the study area

In this study, observation, data collection and evaluation methods were followed. In the scope of the study, a total of 26 hospital gardens including state and private hospitals in the central districts of Bursa were evaluated (Figure 2).

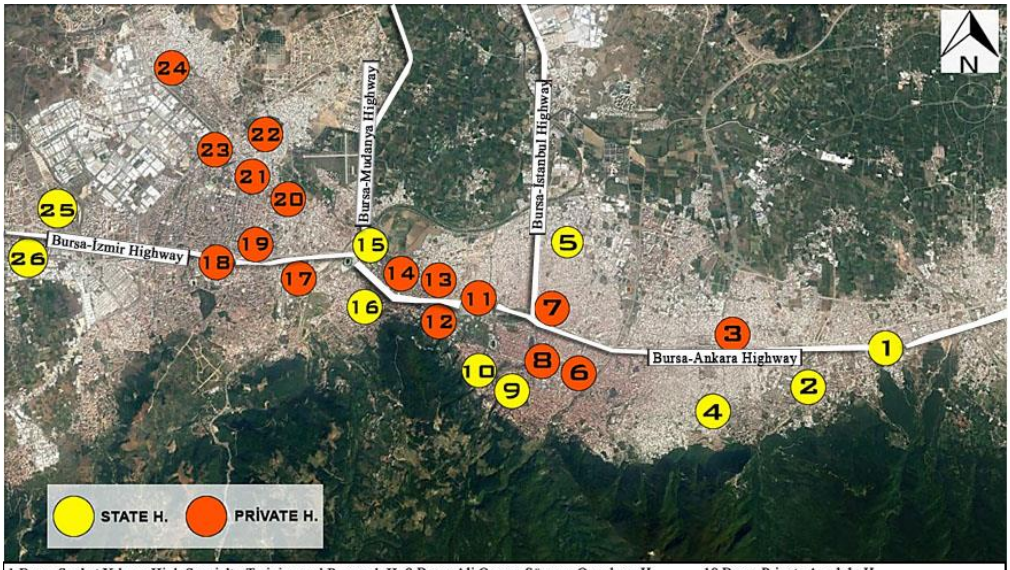

Figure 2. The locations of the state and private hospitals within the scope of the study

2.2. Method

This study consists of observation, analysis and evaluation phases. In the first phase of the study, plant surveys were conducted in the hospital gardens at different times in the spring and autumn months; photographs were taken and plant species were identified (Davis 1965-1988; Kayacık, 1980; Kayacık 1981; Kayacık 1982; Krusmann, 1984; Krusmann, 1985 a; Krusmann, 1985 b; Krusmann 1986; Yaltırık, 1991; Dirr, 1992; Pamay, 1992; Pamay, 1993; Yaltırık, 1993; Mataracı, 2001; Zencirkıran 2009; Zencirkıran, 2013; Babaç et.al. 2017). In the second stage, genus and species distribution, natural / exotic state, taxonomic distribution and life forms of the identified plant taxa were evaluated. In the last stage, form, texture, color and odor characteristics, autumn color effects, sensory effects of the identified taxa, and how they were used in hospital gardens were evaluated.. In the evaluation of the data, frequencies analysis in SPSS 22 program was used. (Kaplan and Kaplan, 1989; Altınçekiç, 2000; Zencirkıran, 2004; Yücel, 2013; Ender et.al. 2016; Yener, 2016; URL-1; URL-2; URL-3; URL-4; URL-5; URL-6; URL-7; URL-8)

3. Results and Discussions

3.1. Plant Diversity and Plant Use in Hospital Gardens

As a result of the evaluations carried out in 26 hospitals in the central districts of Bursa province, 20 hospitals were observed that they have used plants in their gardens and 6 hospitals (Private Doruk Yıldırım Hospital, Private Arrhythmia Osmangazi Hospital, Hayat Hospital, Private Medical Park Hospital, Private Ceylan International Hospital, and Private Bursa Anadolu Hospital) were observed that they have no plant use. Hospitals are located on the streets or boulevards of the city and located in areas with traffic density (Akdeniz et al., 2017). Hospitals with no plant use were not included in the study (Figure 3).

.

Figure 3. Some hospital gardens within the scope of the study (Examples of hospitals with gardens: 1. Bursa High Speciality Training and Research Hospital; 2. Bursa Şevket Yılmaz High Speciality Training and Research Hospital; 3. Private Acıbadem Bursa Hospital –Examples of hospitals without gardens: 4. Private Hayat Hospital; 5. Private Bursa Doruk Yıldırım Hospital; 6. Private Medical Park Bursa Hospital)

A total of 95 woody plant taxa, including species, cultivars, and varieties were determined in the hospital gardens (Table 1). 47.37% of the determined plant taxa were natural and 52.63% were exotic species, on the other hand, 20.00% of them were gymnosperms (coniferous) and 80.00% of them were angiosperms (deciduous) woody taxa. According to the vegetation characteristics, 58.95% of the plants had tree form and 41.05% of them had shrubs form, 58.95% were evergreen and 41.05% were deciduous plant taxa (Figure 4). The evaluation of the genera, species, sub-species and variety distributions of the woody plant taxa used in hospital gardens reveals that the highest rate of genera and species were found for the Rosaceae family with 13.43% and 14.10% respectively and the highest rate of sub-species and variety were found for the Pinaceae family with 17.65%. The families of Oleaceae, Pinaceae and Cupressaceae are families that contain more genera and species than the other families.

Table 1. Woody plant taxa determined in hospital gardens

	Woody Plant Taxa
Gymnosperms (Coniferous)	Abies bornmulleriana Mattf., Cedrus atlantica (Endl.) Carierre, Cedrus atlantica "glauca" Cedrus atlantica "glauca pendula", Chamaecyparis lawsoniana (A.Murray.) Parl., Cupressoscyparis leylandii 'Harlequin', Cupressocyparis leylandii M. L. Green., Cupressus arizonica Greene, Cupressus sempervirens L., Juniperus communis L, Picea orientalis L., Picea pungens Engelm. , Picea pungens "Glauca" Pinus brutia Henry., Pinus nigra Arnold., Pinus pinea L., Taxus baccata L., Thuja orientalis L., Thuja orientalis compacta "nana",
Angiosperms (Deciduous)	Acer negundo L., Acer platanoides L., Aesculus hippocastanum L., Abelia grandiflora, Agave armeniaca L., Alnus glutinosa (L.) Gaertn., Aucuba japonica Thunb., Bambusa textilis var. gracilis, Berberis thunbergii "Atropurpurea" DC., Betula pendula Roth., Buxus microphylla Siebold.&Zucc., Buxus sempervirens L., Campsis radicans Seem., Catalpa bignonoides Walter., Euonymus japonica "Argentea variegata", Euonymus japonica "Aurea variegata",Ficus carica L., Forsythia intermedia Zabel.,Gledithsia triacanthos L.,Hedera helix L.,Pittosporum tobira Thunb.,Hedera helix "variegata", Pittosporum tobira "Nana",Hydrangea macrophylla (Thunb.) Ser.,Pittosporum tobira "Nana variegata", Ilex aquifolium "Aurea marginata" L., Platanus orientalis L., Jasminum officinale L. Prunus cerasifera Ehrh., Juglans nigra L., Prunus domestica L., Prunus laurocerasus L., Lagerstroemia indica L., Pyracantha coccinea Roem., Laurus nobilis L., Robinia pseudoacacia L., Ligustrum japonicum Thunb., Robinia pseudoacacia "Umbraculifera", Ligustrum vulgare L.,Rosa sp., Magnolia grandiflora L., Rosmarinus officinalis L., Magnolia grandiflora 'Gallisoniensis', Rubus fruticosus L., Celtis australis L., Magnolia soulangeana, Salix alba L., Cercis siliquastrum L., Melia azedarach L., Salix babylonica L., Morus nigra L., Salix caprea L., Chaenomeles japonica Thunb., Morus nigra "Pendula", Sophora japonica L., Citrus sp., Nandina domestica Thunb., Spiraea x vanhouttei Zab., Cortaderia selloana Schult., Nerium oleander L., Cotoneaster franchetti Boiss., Olea europaea L., Cotoneaster horizontalis Decne., Parthenocissus quinquefolia (l.) Planch., Paulownia tomentosa Thunb., Tilia argentea Desf.ec.DC., Phoenix canariensis Chabaud., Trachycarpus fortunei Wendl., Phormium tenax J.R. Forst.&G.Forst.Viburnum tinus L., Photinia fraseri "Red Robin" Dress., Wisteria sinensis Swet., Eriobotrya japonica (Thunb.) Lindl., Yucca filamentosa L., Euonymus japonica L., Fraxinus excelsior L.

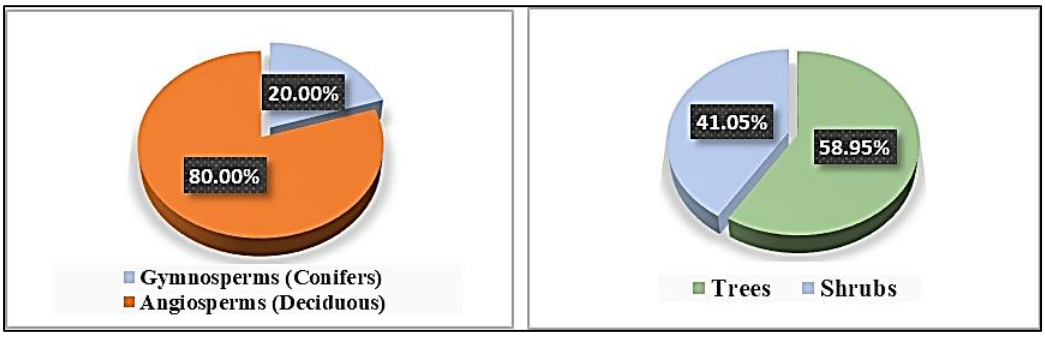

Figure 4. Taxonomic distribution and life forms

On the other hand, there are more plant taxa in the gardens of state hospitals than in private hospitals. With 46 plant taxa, Bursa Şevket Yılmaz High Speciality Training and Research Hospital took place on the top and Bursa Çekirge State Hospital followed it with having 42 of them. Among the private hospitals, the one with the most plant diversity is Private Acıbadem Bursa Hospital with 25 plant taxa. While the hospitals with the highest rate of gymnosperms (coniferous) plant taxa with 9.41% are Bursa Çekirge State Hospital and Uludağ University Training and Research Hospital, there are no gymnosperms (coniferous) plant taxa in Private Pembe Mavi Hospital and Private Retina Ophthalmic Hospital. The highest rates of angiosperms (deciduous) taxa, on

the other hand, were determined in Bursa Şevket Yılmaz High Speciality Training and Research Hospital and Çekirge State Hospital with 16.18% and 14.11% respectively. The highest plant usage rates of 15.10% and 12.50% for the form of trees and the rates of 12.69% and 13.43% for the form of shrubs, were observed in Bursa Şevket Yılmaz High Speciality Training and Research Hospital and Bursa Çekirge State Hospital respectively. The lowest plant usage rate of 0.52% for the form of trees, was observed in Private Pembe Mavi Hospital and the rate of 0.75% for the form of shrubs was observed in Çekirge Cardiac Diseases and Arrhythmia Hospital and Bursa Ali Osman Sönmez Oncology Hospital (Table 2).

Table 2. Plant usage in hospital gardens

Hospitals	Plant use in hospital gardens			
	Gymnosperms (Conifers) (%)	Angiosperms (Deciduous) (%)	Trees (%)	Shrubs (%)
Bursa State Hospital	7,06	6,64	6,25	7,46
Bursa High Speciality Training and Research Hospital	8,24	9,13	10,42	6,72
Bursa Prof. Dr. Türkan Akyol Breast Diseases Hospital	7,06	3,73	6,25	2,24
Bursa Çekirge State Hospital	9,41	14,11	12,50	13,43
Bursa Dörtçelik Children's Diseases Hospital	4,71	3,73	5,21	2,24
Bursa Ali Osman Sönmez Oncology Hospital	4,71	1,24	3,13	0,75
Bursa Dr. Ayten Bozkaya Spastic Children's Hospital and Rehabilitation Center	7,06	5,39	6,25	5,22
Bursa Zübeyde Hanım Maternity Hospital	7,06	4,15	5,73	3,73
Bursa Şevket Yılmaz High Speciality Training and Research Hospital	8,24	16,18	15,10	12,69
Uludag University Training and Research Hospital	9,41	7,88	7,29	9,70
Çekirge Cardiac Diseases and Arrhythmia Hospital	3,53	0,83	2,08	0,75
Private Medicabil Hospital	4,71	2,49	2,60	3,73
Private Retina Ophthalmic Hospital	0,00	1,66	0,52	2,24
Private Dünya Ophthalmic Hospital	4,71	2,90	3,65	2,99
Private Esentepe Hospital	1,18	1,66	1,04	2,24
Bursa Private Romatem Hospital	4,71	2,90	3,13	3,73
Private Pembe Mavi Hospital	0,00	2,49	0,52	3,73
Private Jimer Hospital	1,18	2,49	1,04	3,73
Private Acıbadem Bursa Hospital	5,88	8,30	6,25	9,70
Çekirge Private Doruk Hospital	1,18	2,07	1,04	2,99

In the evaluations made in terms of plant designs in the hospital gardens, a rich diversity was observed in terms of plant taxa, however, the design was found to be relatively insufficient. *Platanus orientalis*, *Acer* sp., *Ligustrum* sp., x *Cupressoscyparis leylandii*, *Pinus* sp., and *Cupressus* sp. are the common species. In general, *Ligustrum* sp., x *Cupressoscyparis* sp., and *Photina* sp. are preferred as fence plants, while species such as *Picea pungens* are used as accent plants and species as *Pinus* sp. are used for separating and guiding purposes. On the other hand, aesthetic dynamism is tried to be achieved with the design of seating units and plants together and seasonal flowers under the trees. Although state hospitals have a large garden area where patients can walk around, certain parts have been put to good use and there are unused and unidentified areas with very few plants. However, in private hospitals, the garden area was restricted, while in others it was determined that the plant use was only in the form of container designs. A relatively successful design was encountered only at Private Acıbadem Bursa Hospital. On the other hand, it has been observed that the care of the plant elements is more attentive in private hospitals and not in state hospitals Examples of plant usage are given in Figures 5 and 6.

Figure 5: The use of seasonal flowers at Bursa Dörtçelik Children's Diseases Hospital 2: The use of fence at Uludağ University Training and Research Hospital 3. The use of seating units and plants at Bursa State Hospital

Figure 6: Plant use at Private Dünya Ophthalmic Hospital 2. Example of the use of Hedera helix at Bursa Private Romatem Hospital. 3. Plant use together with sculpture at Bursa Çekirge State Hospital.

3.2. Sensory Effects of Plants Used in Hospital Gardens

The evaluations carried out within the scope of the form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa are given in Table 3. According to Table 3, in terms of form and texture, the observations revealed that the two top forms of plants were with thin texture with a rate of 60.00% and with round form (sphere) with a rate of 38.95%. Plant use was determined to be used lessless preferred for the form of pendula plants and wrapper-climber plants with ratios of 3.16% and 5.26% respectively. *Platanus orientalis* is the most widely used species among the round-form plants. With this type of form feature and monumental characteristic, it directs people to their past memories and places, providing a positive effect on people with memory loss and making people feel a sense of peace and confidence. Evaluation in terms of color revealed that the main color tone as the color of the leaves in the hospital gardens is the green color which gives a sense of tranquility and confidence with a maximum of 81.05%. Regarding the color of flowers, on the other hand, white and cream flowering species are widely used, and in the sensory sense, these species feel a sense of purity, tranquility, continuity, and vitality. Purple, white, pink and blue color flowering plant use such as *Cercis*

siliquatrum, *Cotoneaster horizontalis*, *Eriobotrya japonica*, and *Hydrangea macrophylla* was determined to be less. However, the use of multicolored leaf plant taxa was found to be less with yellow, white, and silvery with a rate of 6.32%, blue and blue-green with a rate of 6.32%, and gray-green with a rate of 4.21%. Among the multicolored leafy plant taxa, while species like *Euonymous japonica* 'Aurea variegata' with yellow multicolored leaves (Private Jimer Hospital, Private Acibadem Bursa Hospital, Bursa State Hospital, and Bursa Çekirge State Hospital), 'Harlequin' (Bursa Şevket Yılmaz High Speciality Training and Research Hospital) give a sense of vitality, species such as *Agave armeniaca* (Bursa Şevket Yılmaz High Speciality Training and Research Hospital) and *Olea europea* (Private Dünya Ophthalmic Hospital) give the feeling of laziness with their gray-green multicolored leaves. Blue and blue-green leaf plants such as *Picea pungens* (Bursa Zübeyde Hanım Maternity Hospital, Çekirge Private Doruk Hospital), *Picea pungens* 'Glauca' (Private Acıbadem Bursa Hospital, Bursa Çekirge State Hospital), and *Cupressus arizonica* are the symbols of eternity and as the colors of the sky, they give the feelings of tranquility, vitality, hugging on life and happiness. On the other hand, species with red leaves such as *Berberis thunbergii* 'Atropurpurea' (Bursa State Hospital, Bursa Çekirge State Hospital) and *Prunus cerasifera* (Bursa Şevket Yılmaz High Speciality Training and Research Hospital, Private Acıbadem Bursa Hospital, and Bursa Dörtçelik Children's Diseases Hospital) are reminiscent of the sun and flame, they feel vivid and strong, but when they are watched for a long time, they give tension and accelerate blood flow. These taxa are generally considered to be solitary and the rate of use is limited to 2.11%. Within the scope of wrapper-climber plant taxa, while the intense orange flowers of *Campsis radicans* used at Bursa Çekirge State Hospital and the purple flowers of *Wisteria sinensis* increase vitality, creativity and the feeling of communication, they give the feelings of tension and impatience when used predominantly. The use of taxa, which is reminiscent of seasonal transitions in the hospital gardens and which is effective in autumn coloration, was determined as 25.26% and the most commonly used taxa were determined to be *Platanus orientalis* and *Acer negundo*. Another important element of sensory stimulation was the use of fragrance-specific species in hospital gardens and they were determined to be used with a low rate (34.74%). The most commonly used species for its fragrance is *Rosa* sp. The determinations of the study reveal that *Jasminum officinale* with its flowers with fragrance is used at Bursa Çekirge State Hospital and *Laurus nobilis* with its leaves with fragrance is used at Private Acıbadem Bursa Hospital.

Table 3. Form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa.

Taxa	Form	Texture	Odor Effect	Color		Autumn Color Effect	Sensory Effects
				Leaf Color	Flower Color		
Abelia grandiflora	3	2	-	Green-Red	White-Pink	+	Tranquility, confidence, purity, honesty
Abies bornmulleriana Mattf.	1	1	-	Green	-	-	Tranquility, confidence,
Acer negundo L.	2	1	-	Light green	White-Yellow	+	Tranquility, confidence, joy, vitality, relaxing, remember the past
Acer platanoides	4	1	-	Light green	Yellow	+	Tranquility, confidence, joy, vitality, relaxing
Aesculus hippocastanum	2	1	-	Dark green	White	+	Tranquility, confidence, purity, honesty,continuity
Agave armeniaca L.	1	2	-	Gray green	Yellow	-	Laziness
Alnus glutinosa	2	1	-	Green	Red-Yellow	+	Tranquility, confidence, vitality, strong, exciting,
Aucuba japonica	2	1	-	Yellow variegated green	Green	-	Tranquility, confidence, vitality
Bambusa textilis gracilis	4	1	-	Green	-	+	Tranquility, confidence,
Berberis thunbergii "Atropurpurea"	3	2	-	Red	Yellow	+	Exciting, vitality, strong, tension

Table 3. Form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa (Continuing)

Taxa	Form	Texture	Odor Effect	Color		Autumn Color Effect	Sensory Effects
				Leaf Color	Flower Color		
Betula pendula	7	2	-	Dark Green	Green	+	Tranquility, confidence,vitality
Buxus microphylla	2	2	+	Dark Green	Light green	-	Tranquility, confidence,vitality
Buxus sempervirens	2	2	+	Dark Green	Green	-	Tranquility, confidence,vitality
Campsis radicans Seem.	6	2	-	Green	Orange-yellow	+	confidence,vitality creativity, tension
Catalpa bignonoides	3	2	-	Light green	White	+	Tranquility, confidence,, purity, honesty
Cedrus atlantica Manetti.	1	1	-	Green	-	-	Tranquility, confidence,vitality
Cedrus atlantica "glauca"	1	1	-	Light blue	-	-	Tranquility, infinity,happiness, hugging on life
*Cedrus atlantica "*glauca pendula*"*	7	1	-	Light blue	-	-	Tranquility, infinity,happiness, hugging on life
Celtis australis	2	1	-	Green	Yellow	+	Tranquility, confidence, joy vitality, relaxing
Cercis siliquastrum L.	2	2	-	Green	Light Purple	-	Tranquility, confidence, love camlness, joy,
Chamaecyparis lawsoniana	4	1	+	Blue-Green	-	-	Tranquility, confidence,
Chaenomeles japonica Thunb.	2	2	-	Green	Pink-Red	+	Vitality, tension, exciting
Citrus sp.	3	2	-	Green	White	+	Tranquility, confidence, purity, continuity
Cortaderia selloana Schult.	1	2	-	Green	Creamy-Beige	+	Tranquility, confidence, purity,positive
Cotoneaster franchetti	3	2	-	Green	Creamy	+	Tranquility, confidence, purity, continuity, vitality
Cotoneaster horizontalis Decne.	5	2	-	Green	White	+	Tranquility, confidence, purity, continuity, vitality
xCupressocyparis leylandii harlequin	1	1	-	Yellow variegated green	-	-	Tranquility, confidence, joy vitality, relaxing,
Cupressocyparis leylandii M. L. Green.	1	1	-	Light green	-	-	Tranquility, confidence
Cupressus arizonica Greene.	1	1	+	Blue green	-	-	Tranquility, infinity,happiness, hugging on life
Cupressus sempervirens L.	1	1	-	Gray green	-	-	Tranquility, confidence, tension
Eriobotrya japonica	3	1	+	Dark green	White	-	Tranquility, confidence, purity, continuity, vitality

Table 3. Form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa (Continuing)

Taxa	Form	Texture	Odor Effect	Color		Autumn Color Effect	Sensory Effects
				Leaf Color	Flower Color		
Euonymus japonica L.	3	2	-	Dark green	Green-White	-	Tranquility, confidence, purity, continuity, vitality
Euonymus japonica "Argentea variegata"	3	2	-	Silvery variegated green	Creamy	-	Tranquility, confidence
Euonymus japonica "Aurea variegata"	3	2	-	Yellow variegated green	Creamy	-	Tranquility, confidence, joy, relaxing
Ficus carica L.	2	2	-	Dark green	Creamy	-	Tranquility, confidence
Forsythia intermedia Zab.	2	2	+	Light green	Yellow	-	Joy, vitality, confidence
Fraxinus excelsior	2	2		Green	Creamy-White	+	Tranquility, confidence, purity
Gledithsia triacanthos	3	1	+	Light green	Yellow	+	Tranquility, confidence, joy vitality
Hedera helix L.	6	1	-	Dark green	-	-	Tranquility, confidence,
Hedera helix "variegata"	6	2	-	Yellow variegated green	-	-	Tranquility, joy confidence, vitality
Hydrangea macrophylla (Thunb.) Ser.	2	2	-	Dark green	Pink-Blue-Purple	+	Compatibility, joy, calmness, tolerance happiness,
Ilex aquifolium "Aurea Marginata" L.	1	1	-	Yellow variegated green	White	-	Tranquility, confidence, vitality, joy
Jasminum officinale L.	6	1	+	Green	White	-	Tranquility, confidence, purity, honesty
Juglans nigra	2	2	+	Green	Green	-	Tranquility, confidence
Juniperus communis L.	4	2	+	Green	-	-	Tranquility, confidence
Lagerstroemia indica L.	3	2	-	Green	Pink-White	+	Tranquility, calmness, compability, continuity
Laurus nobilis L.	2	2	+	Dark green	Creamy-Yellow	-	Tranquility, confidence, joy, vitality
Ligustrum japonicum Thunb.	2	1	+	Dark green	White	-	Tranquility, confidence,
Ligustrum vulgare L.	2	1	+	Dark green	White	-	Tranquility, confidence,
Magnolia grandiflora L.	1	1	+	Green	White	-	Tranquility, confidence, purity, honesty
Magnolia grandiflora 'Gallisoniensis'	1	1	-	Green	White	-	Tranquility, confidence, purity, honesty

Table 3. Form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa (Continuing)

Taxa	Form	Texture	Odor Effect	Color		Autumn Color Effect	Sensory Effects
				Leaf Color	Flower Color		
Magnolia soulangeana	5	1	+	Light Green	Pink	-	Tranquility, calmness, compatiblity, continuity
Melia azedarach L.	2	2	+	Green	White-Lilac	-	Tranquility, honesty, continuity, joy
Morus nigra L.	2	1	-	Green	Green	-	Tranquility, confidence
Morus nigra "Pendula"	7	1	-	Green	Green	-	Tranquility, confidence
Nandina domestica Thunb.	3	1	-	Green - red	Creamy	+	Vitality, strong, exciting, tension
Nerium oleander L.	2	1	-	Green	Different colours	-	Compatibility, tranquility, vitality, joy, purity, honesty
Olea europaea L.	2	2	-	Gray-Green	Creamy		Tranquility, confidence, joy, vitality
Parthenocissus quinquefolia	2	1	-	Green - red	Green	+	Tranquility, confidence, exciting, tension
Paulownia tomentosa Thunb.	2	1	-	Green	Lilac-Purple	-	Tranquility, confidence
Phoenix canariensis Chabaud.	4	1	-	Green	Orange	-	Tranquility, confidence, vitality, tension
Phormium tenax	5	1	-	Green	White	+	Tranquility, confidence, purity, positive
Photinia fraseri "Red Robin"	5	1	+	Green, red	White	+	Confidence, vitality, tension, creativity
Picea orientalis L.	1	2	-	Green	Dark red	-	Confidence, vitality, tension, creativity
Picea pungens Engelm.	1	2	-	Blue green	-	-	Infinity, tranquility, life hugging, hapiiness
Picea pungens "glauca"	3	2	-	Blue green	-	-	Infinity, tranquility, life hugging, hapiiness
Pinus brutia Henry.	1	2	-	Green	-	-	Tranquility, confidence
Pinus nigra Arnold.	1	2	-	Green	-	-	Tranquility, confidence
Pinus pinea L.	2	2	+	Green	-	-	Tranquility, confidence
Pittosporum tobira Thunb.	5	2	+	Dark green	White	-	Tranquility, confidence, purity, continuity
Pittosporum tobira "nana"	2	2	+	Green	White	-	Tranquility, confidence, purity, continuity
Pittosporum tobira "nana variegata"	5	2	+	Light green	Yellow	-	Tranquility, confidence, purity, joy, continuity
Platanus orientalis L.	2	2	-	Light green	Greeny brown	-	Tranquility, confidence, vitality, remember the past
Prunus cerasifera Ehrh.	2	2	-	Green-red	White	-	Strong, vitality, stability, tension

Table 3. Form, texture, color and odor characteristics, autumn color effects and sensory effects of the identified taxa (Continuing)

Taxa	Form	Texture	Odor Effect	Color		Autumn Color Effect	Sensory Effects
				Leaf Color	Flower Color		
Prunus domestica	3	2	-	Light green	White	-	Tranquility, confidence, purity, honesty
Prunus laurocerasus L.	2	2	+	Dark green	White	-	Tranquility, confidence, purity, honesty
Pyracantha coccinea Roem.	3	1	+	Dark green	White	-	Tranquility, confidence, purity, honesty, vitality
Robinia pseudoacacia L.	2	2	+	Green	White	-	Tranquility, confidence, purity, honesty
Robinia pseudoacacia umbraculifera	2	2	-	Dark green	White	-	Tranquility, confidence, purity, honesty
Rosa sp.	2	2	+	Dark green	Different colours	-	Vitality, joy, purity, love, honesty, prestige
Rosmarinus officinalis L.	3	2	+	Green	Purple	-	Tranquility, confidence, prestige, thinking
Rubus fruticosus L.	5	2	-	Dark green	White	-	Tranquility, confidence, purity, honesty
Salix alba L.	2	2	-	Green	Creamy yellow	-	Tranquility, confidence, joy, vitality
Salix babylonica L.	7	2	-	Green	Creamy yellow	-	Tranquility, confidence, joy, vitality
Salix caprea L.	2	2	-	Green	Creamy yellow	-	Tranquility, confidence, joy, vitality
Sophora japonica L.	2	2	-	Dark green	White-Yellow	-	Tranquility, confidence, purity, honesty
Spirea vanhouttei Zab.	3	2	+	Green	White	-	Tranquility, confidence, purity, honesty
Taxus baccata L.	1	2	-	Dark green	Creamy	-	Tranquility, confidence, purity, honesty
Thuja orientalis	1	2	+	Dark green	-	-	Tranquility, confidence, vitality, creativity
Thuja orientalis compacta ''nana''	2	2	+	Light green	-	-	Tranquility, confidence, vitality,
Tilia argentea	2	2	+	Gray green	Creamy yellow	-	Tranquility, confidence, joy, vitality
Trachycarpus fortunei Wendl.	4	1	-	Green	Yellow	-	Tranquility, confidence, joy, vitality
Viburnum tinus L.	2	1	+	Dark green	White	-	Tranquility, confidence, purity, honesty
Wisteria sinensis Swet.	6	2	+	Green	Purple	-	Confidence, thinking, tolerance, prestige
Yucca filamentosa L.	1	1	+	Dark green	Creamy white	-	Tranquility, confidence, purity, honesty

Form: 1. Pyramidal (Conical), 2. Round (Spherical), 3. Oval, 4. Column, 5. Spreading, 6. Wrapping- Climber, 7. Hanging; Texture: 1. Coarse, 2. Thin; Odor Feature : Yes (+), None (-); Autumn Color Effect: Effective (+), Inactive (-)

The plants that make up the aesthetics of the city and contribute to the ecology of the city play an important role in helping people to get rid of their stress as well as supplying aesthetic and functional features to their environment. Especially in hospitals, where people feel restless and nervous, the role of plants is even more important. In terms of plant diversity, state hospitals are better than the private hospitals. Among the state hospitals, the leading hospitals are Bursa Dörtçelik Children's Diseases Hospital with 46 taxa, Bursa Çekirge State Hospital with 42 taxa and Bursa High Speciality Training and Research Hospital with 29 taxa. Among the private hospitals, Private Acıbadem Bursa Hospital is one of the best hospitals with 25 taxa. In the hospital gardens, mostly trees and angiosperm taxa are used and 47.37% of the plants used are natural species. Bursa Şevket Yılmaz High Speciality Training and Research Hospital and Bursa Çekirge State Hospital have more use of tree species whereas coniferous species are not used at Private Pembe Mavi Hospital and Private Retina Ophthalmic Hospital. However, observations revealed that the use of wrapping-climbing taxa and seasonal flowering plants is quite low and especially the seasonal flowering plants have been evaluated under the trees or pots as in the examples of Bursa Dörtçelik Children's Diseases Hospital and Private Dünya Ophthalmic Hospital. Similarly, Aksu and Demirel (2012) stated that there is intensive use of tree species in the hospital gardens of the city of Trabzon and there are no different, interesting and relaxing species; Marcus & Barnes (1999) stated that there should be wide and impressive lawn areas and flower beds containing colorful flowers

in hospital designs; Sakıcı & Var (2013), on the other hand, stated that designs should exist in which there are mostly seasonal flowers that make feel or emphasize the season as much as possible. On the other hand, Yücel (2013) stated that care costs are important in plant selection in hospital gardens and it would be appropriate to prefer to use natural species belonging to the region and location. Ender and Zencirkiran (2017) found that Discovering examples of sustainable design, urban planting, the presence and composition of natural plants in the city have great prospects.

The plants used in the hospital gardens within the scope of our study were observed to be generally scattered within the garden but not in composition. Just like in the cases of Bursa Bursa Şevket Yılmaz High Speciality Training and Research Hospital, Bursa State Hospital, and Private Dünya Ophthalmic Hospital, the hospitals tried to apply relatively effective designs in the form of plant use in combination with seating units or in flower pots-containers. In fact, Karakaya and Kiper (2011) stated that plant selection of hospital gardens in the city of Edirne was not made in accordance with the design criteria and that there were wrong plant usages in wrong places.

When the sensory effects of the plants used in hospital gardens were examined such as *Cupressus sp. Cedrus sp. Pinus sp., Thuja sp., Cupressoscyparis leylandii, Ligustrum sp. and Buxus sempervirens* that give the feelings of tranquility and confidence were observed to be widely used. The use of multicolored leafy species such as *Picea pungens, Euonymus japonica,* 'Aurea variegata', *Hedera helix* and 'Variegata' which give the feelings of eternity, vitality, hugging on life and happiness was observed to be less. The use of white and cream-colored flowering species which are the symbols of cleanliness, honesty and continuity such as *Magnolia grandiflora, Prunus domestica, Jasminum officinale, etc*. was seen to be intense while the use of pink and yellow color flowering plant species that make people feel joy, comfort, sweetness, and compatibility was found to be less. As a matter of fact, in a survey conducted in hospital gardens, Ulrich (2002) found that showing people photographs with open green spaces, a dim forest area and water elements surrounded by trees helps them heal, reduce their fear and anxiety levels, and reduce their stress and pain. Similarly, Whitehouse et al. (2001) suggest that users prefer the green color to make them feel good; Şahin et al. (2016) stated that green, white and blue colored plants, which function like tranquilizers, should be included. Also, Altınçekiç (2000) emphasized that continuous and effective red leafed plants should be used moderately and carefully in the design, while red color expresses excitement and vitality, it also has a provocative and sometimes disturbing effect. Zencirkiran et. al. (2018) said that flower color in plants is more memorable than other features. Flower colors can directly influence the users of an area and the beneficiaries of this space. The fragrance of plants is another design feature that affects people sensually. In the hospital gardens that were examined in our study, the usage rate of the species which have fragrance property is low. The most preferred fragrant plant species is *Rosa sp*. However, Yücel (2013) stated that fragrance feature is closely related to memories and senses and fragrance stimulates memories instantaneously, helps those with memory loss and is especially important for visually impaired patients. Similarly, Redd et al. (1994) stated that fragrance, especially pleasant aromas may reduce blood pressure, slow breathing and reduce pain severity and anxiety. In addition, monumental trees such as *Platanus orientalis*, which are found in many of the hospital gardens, are important for their long lives and for taking people to the past and thus helping them to remember their memories. In addition, autumn coloring species such as *Acer negundo* and *Aesculus hippocastanum* were determined to be effective in terms of sensory stimulation to remind the seasonal transition and reflect the changing time. In fact, Yücel (2013) stated that seasonally changing flowering trees and shrubs in terms of sensory stimulation and the use of long-lasting plants create awareness about the rhythm of life.

4. Conclusion

The hospital garden with a good planting design will allow its users to relax with its standout as the image of the city. This study included the plant diversity of 26 hospital gardens in the central districts of Bursa city (Osmangazi, Yıldırım, and Nilüfer) and the study concluded that hospital gardens were rich in plant taxon but not enough in terms of design. Hospital gardens should be considered as a whole with their structural and plant elements and the designs to be made in this direction should be contributed both to support the treatment processes of the patients and to increase the satisfaction of the users and the staff. At the same time;

- In state hospitals with large garden areas, the unused areas with a few plants should be made available with suitable designs.
- In private hospitals without gardens, suitable designs should be established with plant use in pots/containers according to the adequacy of the area.
- In hospital gardens, wrapper-climber, ground cover and seasonal flowers should be given more space and color images should be provided in every season.

- The plants that are intended to use for children and the group of patients undergoing psychiatric treatment should not be thorny, poisonous, etc.

Designs should be enriched with species with blue color (*Abies concolor, Cedrus atlantica* 'Glauca', *Juniperus scoplorum, Picea pungens,* etc.) and pink, lilac and yellow colors (*Abelia florida, Hibiscus syriacus, Liriodendron tulipifera, Spirea arguta, Caesalpinia gillesi, Albizzia jülibrissin, Syringa vulragis, Malus floribunda, Prunus sp.,* etc.) which give people the feelings of eternity, life, vitality and love, and also species that are fragrant such as *Lavandula sp.* and *Rosmarinus sp*., species that attract birds and butterflies such as *Buddleja davidii, Elaeagnus pungens,* and *Viburnum dentatum*, and species that provide decorative autumn coloration such as *Cercis siliquastrum, Ginkgo biloba* and *Liriodendron tulipifera* should be included in the designs.

References

1. **Adevi, A.A., Martesson, F. (2001).** Stress Rehabilitation Through Garden Therapy: The Garden as a Place in the Recovery From Stress. *Urban Forestry & Urban Greening*. 12, 230-237.

2. **Akdeniz, N.S. Dalgıç, C., Deniz, D., Kara, Z., Özkan, P. (2017).** Evaluation of hospital gardens from the point of landscape design: Bursa city sample. *Eurasian Journal of Forest Science*. 5 (2): 70-78.

3. **Aksu, O.V., Demirel, O. (2012).** Landscape Designs in Hospital Gardens: The Example of Trabzon City. *Kastamonu Univ. Journal of Forestry Faculty*. 12(2):236-250.

4. **Altınçekiç, T. H. (2000).** "Peyzaj Mimarlığında Renk Ve Önemi. *İ.Ü. Orman Fakültesi Dergisi*, c50, 79-83.

5. **Babaç, M.T., Uslu, E., Bakış, Y. (2017).** Turkish Plants Data Service. http://www.tubives.com. (1/11/2019)

6. **Bulut, Y., Göktuğ, T.H., (2006).** Healing Gardens as an Environmental Factor to be Fit. *GOÜ. Ziraat Fakültesi Dergis*i, 23 (2), 9-15.

7. **Davis PH (1965-1988).** *Flora of Turkey and The East Aegean Islands*. Edinburgh University Press. Volume 1-10. Edinburgh.

8. **Diette, G.B., N. Lechtzin, E. Haponik, A. Devrote, H.R. Rubin, (2003).** Distraction therapy with nature sights and sounds reduces pain duringflexible broncoscopy: a complementary approach to routine analgesia, *Chest*, 123 (3): 941-948.

9. **Dirr, MA (1992)** *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture Propagation and Uses*. Varsity Press. 1187 pages.

10. **Ender, E., Zencirkiran, M. (2017).** Researches on Attractive Flowered Natural Woody Plants of Bursa Flora in Terms of Landscape Design. World Academy of Science, Engineering and Technology, *International Journal of Agricultural and Biosystems Engineering*. 11 (7): 668-673.

11. **Ender, E., Akdeniz, N.S., Zencirkıran, M. (2016).** Colors and Landscape. *Journal of Agricultural Faculty of Uludag University*, 30, 669-676.

12. **Eroğlu, E., G.K. Akıncı, and H. Müderrisoğlu. (2005).** Determination of plants in open and green areas in düzce and evaluation of these plants according to some planting design principles. *Journal of Agricultural Sciences*, 11 (3): 270-277.
13. **Frumkin, H. (2001).** Beyond toxicity: Human health and the natural environment, *American Journal of Preventive Medicine*, 20(3):234-240.
14. **Gültekin, E. (1994).** *Plant composition*. Ç.Ü. Faculty of Agriculture Textbook. Adana.70 pages.

15. **Kaplan, S., Kaplan, R., (1989).** *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, New York. http://willsull.net/resources/270-Readings/ExpNature1to5.pdf. (18.09.2019).

16. **Karakaya, B., Kiper, T. (2011).** Investigation of Hospital Outer Space Design in Edirne City. *Journal of Tekirdag Agricultural Faculty*. 8(2): 49-64.

17. **Kayacık, H., (1980).** Orman ve Park Ağaçlarının Özel Sistematiği, I. Cilt, Gymnospermae (Açık Tohumlar), İstanbul Üniversitesi Orman Fakültesi Yayınları, İ.Ü. Yayın No: 2642, O.F. Yayın No: 281, İstanbul. 388 sayfa.

18. **Kayacık, H., (1981).** Orman ve Park Ağaçlarının Özel Sistematiği, II. Cilt, Angiospermae (Kapalı Tohumlar), İstanbul Üniversitesi Orman Fakültesi Yayınları, İ.Ü. Yayın No: 2766, O.F. Yayın No: 287, İstanbul. 224 sayfa.

19. **Kayacık, H., (1982).** Orman Park ve Ağaçlarının Özel Sistematiği, III. Cilt, Angiospermae (Kapalı Tohumlular), İstanbul Üniversitesi Orman Fakültesi Yayınları, İ.Ü. Yayın No: 3013, O.F. Yayın No: 321, İstanbul. 353 sayfa.

20. **Krussmann, G., (1984).** Manual of Cultivated Broad-Leaved Trees & Shrubs, Volume I, A- D, Timber Press, Oregon, ISBN: 0-917304-78-0. 624 pages.

21. **Krussmann, G., (1985 a).** Manual of Cultivated Broad-Leaved Trees & Shrubs, Volume II, E- PRO, Timber Press, Oregon, ISBN: 0-88192-005-3. 321 pages.

22. **Krussmann, G., (1985 b).** Manual of Cultivated Conifers, Timber Press, Oregon, ISBN: 0-88192-007-X.

23. **Krussmann, G., (1986).** Manual of Cultivated Broad-Leaved Trees & Shrubs, Volume III, PRU- Z, Timber Press, Oregon, ISBN: 0-88192-006-1.

24. **Marcus, C.C., Barnes, M. (1999).** *Healing Gardens: Therapeutic Benefits and Design Recommendations*. John Wiley and Sons, Inc., New York. 624 p.

25. **Mataracı, T. (2002).** Ağaçlar. *Marmara Bölgesi Doğal Egzotik Ağaç ve Çalıları.* Tema yayınları. 371s.

26. **Pamay, B. (1992).** *Plant Material I: Trees and shrubs.* Uycan Press. Istanbul. 80p.

27. **Pamay, B. (1993).** *Plant Material II: Woody Origins, Flowering Shrubs, Vines, Cacti and Succulent Plants, Reeds.* Orhan Press. Istanbul.128 p.

28. **Redd, W.H., S.L. MAnne, B. Peters, P.B. Jacobsen and H. Schmidt, (1994).** Fragrance Administration to Reduce Anxiety During Mr İmaging. *Journal of Magnetic Resonance Imaging*. 4 (4): 623-626

29. **Sahin, C.K., Gül, A., Orucu, O.K., Eraslan, S., Akten, S. (2016).** Investigation of Design Principles and Users Demand for Hospital Gardens: Case Study of Egirdir-Turkey. *British Journal of Pharmaceutical Research.* 11(5): 1-9.

30. **Sakıcı, C., Celik, S., Kapucu, O. (2013).** Evaluation of Landscape Designs of Hospital Gardens İn Kastamonu. *SDU Faculty of Forestry Journal*. 14 : 64-73.

31. **Sakıcı, C., Var, M. (2013).** The Determination of Restorative Experiential Qualities and Design Attributes Because of Revealed to Recuperative Effects of Psychiatric Hospital Gardens. *Journal of the Faculty of Forestry, Istanbul University* 63 (2): 21-32.

32. **Tse, M.M.Y., J.K.F. Ng, JWY. Chung, T.K.S. Wong, (2002 a).** The Effect of Visual Stimulation Pain Threshold and Tolerance. *Journal of Clinical Nursing*, 11(4): 462-469.

33. **Tse, M.M.Y., J.K.F. Ng, JWY. Chung, T.K.S. Wong, (2002 b).** The Effect of Visual Stimulation Via The Eyeglass Display and The Perception Of Pain, Cyper. *Psychology&Behavior*, 5(1): 65-75.

34. **Ulrich, R.S. (2002).** *Health Benefits Of Garden Hospitals*. Plants for People. International Exhibiton Floriade. 10 p.

35. **URL-1 (1998).** *The Hillier Manual of Trees And Shrubs*. Pocket edition. A David and Charles Book. 928 pages.

36. **URL-2 (2017a).** Plants. NC State University Extension. https://plants.ces.ncsu.edu. (01/10/2019)

37. **URL-3 (2017 b).** Plant files https://davesgarden.com. (01/10/2019)

38. **URL-4 (2017 c).** Landscape Plants. https://landscapeplants.oregonstate.edu. (10/10/2019)

39. **URL-5 (2017d).** Bitki Veritabanı. http://www.agaclar.org. (10/10/2019)

40. **URL-6 (2017e).** Plants. Royal Horticultural Society. https://www.rhs.org.uk/plants. (10/10/2019)

41. **URL-7 (2004).** Uconn Plant Database of trees, shrubs and vines. University of Conneticut. http://www.hort.uconn.edu/plants. (01/10/2019).

42. **URL-8 (2013).** Environmental Horticulturae. Plant Information Database. http://hort.ifas.ufl.edu/database. (10/10/2019)

43. **Whitehouse, S., Varni, J.W., Seid, M., Marcus, C.C., Ensberg, M.J., Jacobs, J.R., Mehlenbeck, R.S. (2001).** Evaluating A Children's Hospital Garden Environment: Utilization and Consumer Satisfaction. *Journal of Environmental Psychology*, 21: 301-314.

44. **Yaltırık F (1993).** Dendrology Textbook II. Angiospermae (Angiosperms) Vol. I. Istanbul.

45. **Yaltırık, F. (1991).** *Bazı Yapraklı Ağaç ve Çalıların Kışın Tanınması* (Uygulama Kılavuzu), Ormancılık Eğitim ve Kültür Vakfı, Yayın No: 5, İstanbul. 188 sayfa.

46. **Yener, D.Y. (2016)** A Research on Use of Woody Plants of Istanbul Historical Peninsula Landscape Design Areas. *Kastamonu Univ., Journal of Forestry Faculty.* 16 (1): 1-13

47. **Yıldırım, T.B., A. Güney., H.S. Türel., and Ç. Kılıçaslan (2006).** *Planting design*. . Üniversiteliler Press. ISBN: 9944-5419-0-7. İzmir.

48. **Yucel, G.F. (2013)** Hospital Outdoor Landscape Design. *Intech.* Chapter 15. http://cdn.intechopen.com/pdfs/45442.pdf. (01/10/2019)

49. **Zencirkıran M (2004).** Plant Species to be Used İn The City of Bursa Landscape And İdentification of Domestic and Foreign Origin Plant can be Used for This Purpose. Uludag Univ Research Project Number: 2002/24.

50. **Zencirkıran M (2009).** Determination of Native Woody Landscape Plants in Bursa and Uludağ. *African J of Biotecn.* 8: 5737-5746.

51. **Zencirkıran, M. (2013).** *Peyzaj Bitkileri I. (Açık tohumlu bitkiler – Gymnospermae)* Nobel Yayınevi. 475 s.

52. **Zencirkiran, M. Akdeniz, N.S., (2017).** Evaluation of Woody Plant Taxons in The Bursa Urban Parks in Terms of Ecological Tolerance Criteria. *Journal of Bartin Faculty of Forestry*. 19 (2):25-35.

53. **Zeybek, O. 2018.** The Effects of Wireless Internet Connection as a New Design Element on the Park Design: Sample of İzmir Passport Internet Park. *Journal of Bartin Faculty of Forestry*. 20 (1): 1-13.