The plant species used as edge elements and their usage types: The case of KTU campus

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Abstract

Aim of study: Planting is a landscape arrangement that best integrates aesthetic, functional, ecological and symbolic influences. There are various organization styles, these styles can be generally classified as formal and naturalistic styles. Plants could be used to create borders, for architectural purposes, to create spaces, to screen bad views, for aesthetic purposes, to create emphasis, to compliment buildings, for erosion control, to direct movements, to screen light, to control noise, to provide shade and for climate control. The present study aims to identify the types of plants used as border elements, the space and purposes of their use.

Area of study: This study was conducted at the Karadeniz Technical University, located on the Trabzon city.

Material and Methods: The main material of the study is planting border elements and Karadeniz Technical University, Kanuni Campus. In the study, observation, data collection, analysis and evaluation were used. At the stage of observation, KTU Kanuni Campus, which is a study area, visited the situation of planting border elements and photographs were taken of the samples that could best represent them.

Main results: Accordingly, it was determined that the plant border elements at KTU Kanuni campus were used to separate the buildings with the garden, to create spaces, to screen bad views, for aesthetic purposes, to create emphasis, to complement the buildings, to cover the elevation differences, to direct movement, to form borders, to screen the light, and to control the noise.

Research highlights: The aim of the present study was to reveal the functions of plant border elements formed with the abovementioned species. In the present study, the adaptation, aesthetic and functional effects of the observed plant border elements on the landscapes they surround and the environment were also investigated.

Keywords: Plant, Planting design, Border element, Place of use, Intended use, Ornamental plant

Smır elemanı olarak kullanılan bitkiler ve kullanım işlevleri; KTÜ kampüsü

Özet

Çalışmanın amacı: Bitkilendirme; estetik, işlevsel, ekolojik ve simbolik etkileri en iyi şekilde bütünleşiren bitkisel peyzaj düzenlemesidir. Çeşitli düzenleme stilleri vardır; bu stiller, genel olarak formal ve naturalistik stil şeklinde sınıflandırılabilir. Bitkiler peyzajda; sınır oluşturma, mimari kullanım, mekân oluşturulmak, köprü görüntü perdeleme, estetik kullanım, vurgu oluşturma, yapıları tamamlamak, erozyon kontrolü, hareketi yönlendirme, ışıği perdeleme, gürtülüyü kontrol etmek, gölge temini ve iklim kontrolü gibi amaçlar için kullanlabilmektedir.

Çalışma alanı: Bu çalışma Trabzon ilinde bulunan Karadeniz Teknik Üniversitesi'nde yürütülmüştür.

Materyal ve Yöntem: Bu çalışmanın ana materyalini, KTU kanuni kampüsündeki bitkisel sınır elemanları oluşturmaktaadır. KTÜ Kanuni kampüsünde sınır bitkisi olarak kullanılan bitkiler hangi türler olduğu, kullanım yer ve amaçları yerinde yapılan gözlem ve analiz çalışmaları ile tespit edilmesi çalışılmıştır.

Temel Sonuçlar: Buna göre; çalışmadı KTÜ Kanuni kampüsündeki bitkisel sınır elemanlarını, bina bahçe ayrimını sağlama, mekân oluşturulmak, köprü görüntü perdelemek, estetik kullanım, vurgu oluşturulmak, yapıları tamamlamak, kot farkını örtme, hareketi yönlendirme, sınır oluşturma, ışığı perdeleme, gürtülüyü kontrol etmek gibi amaçlarla kullanıldığı tespit edilmiştir.

Araştırma vurguları: Bitkisel sınır elemanı olarak kullanılan bitkilerin, tür teşhislerinin yanında kullanım amaçları da tespit edilmiştir. Tespit edilen kullanım amaçları incelendiğinde, daha çok estetik ve fonksiyoneldir.

Anahtar kelimeler: Bitki, Bitkilendirme tasarıı, Smır elemanı, Kullanım yeri, Süs bitkisi
Introduction

A border is more than a two-dimensional line. Although border theories are often associated with the built environment, they actually expand the idea between the design and spatial order in the botanical spaces positively. In this framework, borders exist in every stage of architectural action with structural and / or botanical aspects such as closing, opening, separating, preserving, defining relationships, identifying, communicating, marking, separating the activities and directing movement (Marcuse, 1999; Uçar and Özsoy, 2006).

The borders must be compatible with the architectural approach of the environment in which they could be used aesthetically. The border elements, also called enclosure elements, include walls (of stone, brick or concrete material), screens, iron-wood railings or green hedges (Lang, 1987; Lynch, 1992; Başal et al., 1993; Tanrıverdi, 2001; Bilen, 2004; Bulut et al., 2008; Yöruk et al., 2006). The height of border elements is determined based on the law, environment and function. The quality and the grade of the enclosure should be decided based on the environment. There are several different types of material and solutions that could be used in borders. In addition to the aesthetic and usage principles for the border element design, psychological effects should also be considered (Yücel, 2006).

Borders are obstacles that could or could not be penetrated, separating non-identical regions. Regions are areas with similar features separated by borders. Lynch (1992) defined the borders as important constructs for many users, although not as dominant as other elements in the environment (paths, regions, focal points, sign elements). Lynch indicated that the border between the two regions is an important item that many people use to find directions. Border elements assume functions such as providing privacy, protecting from external factors, specifying boundaries based on the intended use and the location of use. These assumed functions affect their size and building material (Bulut et al., 2008).

The low border elements should be designed 20-60 cm high, medium border elements should be designed 80-140 cm high, and high border elements should be designed 180-250 cm high. The quality and grade of the border elements should be suitable for the environment. There are several different types of material and solutions that could be used in borders. In addition to the aesthetic and usage principles for the border element design, psychological effects should also be considered. For example, if the purpose is to provide privacy and to hide a bad view, the border must be higher than human height and massive, if the aim is to prevent people from entering, they must be sufficiently high that people cannot pass over them and narrow that people cannot pass through them. If it is desired that the border area be open to the beautiful views in the surrounding area, the border element should be partially open and low or should not exist at all (Yücel, 2006).

Work conducted to create borders are permanent and long-lasting. Thus, the landscape border elements create a sense of space effective in the vertical and horizontal direction (Uzun, 1997). Border elements cannot be considered apart from the architectural form and approach in the environment they would be used aesthetically. Therefore, traditional and aesthetic features should be emphasized in their planning (Başal et al., 1993). Border elements could include living and non-living material. Plant border elements have constantly changing features, while non-living elements lack this feature, their size, form, color and texture do not change. The changing and alive nature of plant material require constant maintenance, repair and protection. Non-living border elements do not need that kind of maintenance. Their initial construction costs may be high, but their maintenance and repair costs after construction could be very low. Although the speedy bordering with non-living material cannot be obtained immediately with living material, aesthetic and functional results can be obtained in a short period when they are utilized together (Uzun, 1997).

The main functions of border elements are as follows (Başal et al. 1993; Tanrıverdi, 2001):

1. Making an open and green area distinct by enclosing its borders
2. Being effective on the view of the open and green area
3. To partially or completely block the view from or of the open and green area
4. To prevent humans or animals to enter the open and green area
5. To reduce the wind or noise.

Based on the above mentioned information, the status of vegetal border elements at Karadeniz Technical University, Kanuni Campus were examined in the present study.

Material and Method
The main study material includes plant border elements located at Karadeniz Technical University Kanuni Campus. In the present study, landscape research methods of observation, data collection, analysis and assessment were used. In the observation stage, KTU Kanuni Campus, the study area, was visited to observe the status of plant border elements and photographs of the samples that would represent them the best were taken. During the data collection phase, relevant literature was reviewed. In the analysis stage, all available data were evaluated, plant species that were used as border elements, and the functional and aesthetical principles utilized in landscaping were examined.

Study area
Karadeniz Technical University Kanuni Campus (40 ° 33' N - 41 ° 07' N, 37 ° 07' E 40 ° 30' E), which is located within the boundaries of Trabzon province in the Eastern Black Sea region in Turkey was selected as the study area. The population of Trabzon, the third largest city in the region, is 250,000 and the province covers a surface area of 190 km². Its altitude is 37 m, the annual precipitation is 760 mm and the average temperature is 14.6 ° C. The study area is displayed in Figure 1.

Findings
The study material included the plant border elements located at Karadeniz Technical University Kanuni Campus and on the field. Karadeniz Technical University (KTU) was established on May 20, 1955 as the first university outside Ankara and Istanbul and is the fourth university established in the country. KTU has become institution that includes approximately 55,000 students, 1,800 academic and 1,600 administrative personnel. KTU is in the province of Trabzon, which is located on the historical Silk Road, and is a coastal city in the north-eastern Turkey and known as the center of several civilizations in its history of 4000 years. KTU Kanuni Campus is the home to several natural, exotic and endemic species with different physical and visual functions. The campus is rich in flora. The plants are used for several purposes within the campus. They are used to emphasize architectural structures, for aesthetic concerns, functional goals, engineering and climate control, presentation purposes, orientation, borders. Kanuni campus, which is the study area, occupies 1.422 acres of land. The campus includes 467,581 m² of indoor space. There are 84,210 m² (18.4%) of classrooms, 54,110 m² (11.6%) of laboratories, 6,751 m² (1.4%) of indoor sports facilities, 12,258 m² (2.6% of canteen and cafeteria space, 61,008 m² (13%) of housing and 226,563 m² (48%) of administrative space. The total area of all outdoor sports facilities is 22,681 m² (5%) (URL1, 2013).

In campus open green areas, there are good examples of plant border elements based on form, color, texture and their harmony with their surroundings. Since the maintenance is conducted regularly, these elements have continuous aesthetic effects. Bambusa nana, Berberis thunbergii 'Atropurpurea', Buxus sempervirens Rotundifolia, Cupressocyparis leylandii, Euonymus japonica Aurea, Euryops pectinatus, Fagus orientalis, Hydrangea macrophylla, Iris sp., Laurocerasus officinalis, Laurus nobilis, Ligustrum japonicum, Parthenocissus quinquefolia, Pelargonium hybridum, Platycladus orientalis, Prunus cerasifera 'Atropurpurea', Pyracantha coccinea, Rosa sp, Rosmarinus officinalis, Senecio maritima, Salvia splendens, Spiraea × vanhouttei, Thuja occidentalis, Tilia platyphyllos, Wisteria sinensis species were used as plant border elements.
Figure 1. Study area, KTU Kanuni campus (Düzenli, 2010)
Table 1. The locations of border elements used in the KTU Kanuni Campus

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<tr>
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<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>Species: <em>Berberis thunbergii</em> 'Atropupurea'</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Species: <em>Senecio maritima</em></td>
<td><img src="image3.png" alt="Image" /></td>
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<td></td>
<td>Height: 40-50 cm</td>
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<td><img src="image4.png" alt="Image" /></td>
<td>Species: <em>Salvia splendens</em></td>
<td><img src="image5.png" alt="Image" /></td>
<td>Species: <em>Thuja occidentalis</em></td>
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<td>Height: 20-30 cm</td>
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<td>Height: 60-70 cm</td>
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<td><img src="image7.png" alt="Image" /></td>
<td>Species: <em>Wisteria sinensis</em></td>
<td><img src="image8.png" alt="Image" /></td>
<td>Species: <em>Cupressocyparis leylandii</em></td>
<td><img src="image9.png" alt="Image" /></td>
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<td>Height: 1.5-2 m</td>
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<td>Height: 6-8 m</td>
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<td><img src="image10.png" alt="Image" /></td>
<td>Species: <em>Ligustrum japonicum</em></td>
<td><img src="image11.png" alt="Image" /></td>
<td>Species: <em>Spiraea × vanhouttei</em></td>
<td><img src="image12.png" alt="Image" /></td>
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<td></td>
<td>Height: 60-70 cm</td>
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<td>Height: 80-100 cm</td>
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</table>
Species: *Euonymus japonica* Aurea  
**Height:** 50-60 cm

Species: *Hydrangea macrophylla*  
**Height:** 70-80 cm

Species: *Parthenocissus quinquefolia*  
**Height:** 8-10 m

Species: *Fagus orientalis*  
**Height:** 70-80 cm

Species: *Tilia platyphyllos*  
**Height:** 10-12 m

Species: *Prunus cerasifera* 'Atropurpurea'  
**Height:** 10-12 m

Species: *Rosa* sp.  
**Height:** 50-70 cm

Species: *Buxus sempervirens Rotundifolia*  
**Height:** 30-40 cm

Species: *Rosmarinus officinalis*  
**Height:** 60-70 cm

Species: *Bambusa nana*  
**Height:** 70-80 cm

Species: *Laurocerasus officinalis*  
**Height:** 50-60 cm

Species: *Euryops pectinatus*  
**Height:** 30-40 cm

Species: *Pyracantha coccinea*  
**Height:** 60-70 cm

Species: *Pelargonium hybrida*  
**Height:** 30-40 cm

Species: *Platycladus orientalis*  
**Height:** 70-80 cm

Species: *Rosa sp.*  
**Height:** 40-50 cm
A total of 23 different taxa was identified. Five of these are groundcover plants: *Salvia splendens*, *Iris* sp., *Pelargenium hybrida*, *Euryops pectinatus*, *Senecio maritima* These are 20-50 cm in height. Three are tall plant border elements. These are *Tilia platyphyllos*, *Laurocerasus officinalis* ve *Cupressocyparis leylandii*, *Fagus orientalis*, *Prunus cerasifera* ‘Atropurpurea’. These are 200–400 cm in height. Medium height plants are *Hydrangea macrophylla*, *Berberis thunbergii* ‘Atropurpurea’, *Thuja occidentalis*, *Wisteria sinensis*, *Ligustrum japonicum*, *Thuja orientalis*, *Euonymus japonica* ‘Aurea’, *Euonymus japonica* ‘Aurea variagata’, *Rosa* sp., *Spirea x vanhouttei*, *Laurocerasus officinalis*; *Fagus* sp., *Laurus nobilis*, *Bambusa nana*, *Pyracantha coccinea* (enclosed seeds). Accordingly, these species belong to the group Gymnospermae, in other words “naked seed” plants (*Thuja occidentalis*, *Platycladus orientalis*, *Cupressocyparis leylandii*). The remaining 18 taxa belong to the Angiospermae category (enclosed seeds). Accordingly, these species are used as border elements as well as for other purposes such as aesthetical, separation, orientation, limitation, canopy, to enhance the effects, to hide bad views. They were used around ornamental ponds, at the central refuge, sidewalk edges, to separate hard-soft grounds, at the edges of pedestrian crossings, road sides, in front of the walls, as garden and grass field borders. Plants used as border elements at Kanuni Campus;

1. *Bambusa nana*
2. *Berberis thunbergii* ‘Atropurpurea’
3. *Buxus sempervirens* ‘Rotundifolia’
4. *Cupressocyparis leylandii*
5. *Euonymus japonica* ‘Aurea’
6. *Euryops pectinatus*
7. *Fagus orientalis*
8. *Hydrangea macrophylla*
9. *Iris* sp.
10. *Laurocerasus officinalis*
11. *Laurus nobilis*
12. *Ligustrum japonicum*
13. *Parthenocissus quinquefolia*
14. *Pelargonium hybrida*
15. *Platycladus orientalis*
16. *Prunus cerasifera* ‘Atropurpurea’

17. *Pyracantha coccinea*
18. *Rosa* sp
19. *Rosmarinus officinalis*
20. *Senecio maritima*
21. *Salvia splendens*
22. *Spiraea × vanhouttei*
23. *Thuja occidentalis*
24. *Tilia platyphyllos*
25. *Wisteria sinensis*

The plant border element in photo number 1 is *Berberis thunbergii* Atropurpurea. It was used in the central refuge for aesthetic purposes. The leaves of this species are burgundy color and creates a harmony with the leaves of *Prunus cerasifera* Atropurpurea species used next to it. *Salvia splendens* species could be observed in the photograph number four. This species is a seasonal summer flower in the Lamiaceae family. It is an annual plant. It was used next to the ornamental pond in KTU campus, to render the pond form more distinctive. The plant in photograph number 7, used as the border element, is *Wisteria sinensis* species. It is a deciduous creeper woody plant. It has blue-purple fascicle flowers. It was used on the KTU campus wall to break the rigid structure of the wall and to cover it. It has a very effective appearance during flowering periods. *Ligustrum japonicum* species was used as border element in the photograph number ten. This area is one of the shared spaces in the campus.

*Ligustrum japonicum* species border elements were created to support the sitting units and canopy elements in this area. The purpose was to limit the back of the individuals sitting in this area with this plant species and to make individuals, who sit in this area which is occupied all day long, feel safe. Yet another aim was to provide a hard ground-to-soft ground separation. In the seventh photo, *Tilia platyphyllos* plant species was used as border element. It is indigenous in the Central and Southern Europe. It is rarely found in the wild. It is a tree commonly used for forestation of boulevards and parks. It is indigenous around Rize, Trabzon, Artvin and Çanakkale in Turkey. It was used on the central refuge of the main transportation axis in the KTU Kanuni campus continuously and along with other species. The species was used for the
allee effect in some parts of the main transportation axis, in others, utilized to form a single axis. The species was used to divert the traffic, to limit the driver's area of interest, to prevent vertical and horizontal adverse views, and to separate the two directions in this bi-directional axis. *Rosmarinus officinalis* was used as the border element in photograph number twenty one. It is an evergreen plant with thin needle-like foliage of the Lamiaceae family. It is a bushy plant with purple flowers. It was also used to cover the elevation difference at KTU Kanuni campus. In photograph 20, the border element was created with *Buxus sempervirens* 'Rotundifolia' and *Platycladus orientalis* species. These were used to separate the hard and soft grounds. In the photo number thirteen, *Euonymus japonica* 'Aureus', species, in other words, multicolored and golden versions of *Euonymus* species were used to create border elements. They were used to separate the edges of the pedestrian crossings and the central refuge. The photographs number eleven shows the *Spirea x vanhouttei* species border element. It was used to border the immediate surroundings of the buildings and separate the private areas from the pedestrian sidewalk. The photo number 14 is the continuation of the area in the photo number nine. In the photo number 14, *Hydrangea macrophylla* was used as border element. The aim was to confine the vicinity of the building the same way and separate its private area from the pedestrian sidewalk. In the photo number 26, the geranium plant, *Pelargonium hybridum* species was used to separate the green areas next to the pedestrian sidewalk. Some examples of plant border elements used in the central refuges at the KTU Kanuni campus. *Euryops pectinatus*, a perennial herbaceous species was used as the border element in photograph number thirteen, *Rosa* sp. species was used as the border element in photograph number 24, *Euonymus japonica* 'Aurea variegata' was used as the border element in 13 photograph, in the 22 photograph, *Bambusa nana* was used as the border element, and on the 25 photograph, *Pyracantha coccinea* 'Lalendei' species was used; all these plants were used for aesthetic purposes in the central refuge. Some of plants border elements were used in front of the walls. *Wisteria sinensis* was used in the seventh photo, *Fagus orientalis* was used in the sixteenth photo, *Laurocerasus officinalis* was used in the twenty third photo and *Cupressocyparis leylandii* was used in the eighth photo. They were usually used to cover the bad appearance of the walls. In the eighteenth and twenty-fourth photographs, fences were formed with plant border elements around the green area. In the photograph 12, *Laurus nobilis*, in the 10 photograph *Ligustrum japonicum* species were used as green area borders. In the photographs, some of plant border elements were used on sidewalk edges. *Hydrangea macrophylla* in the 14 photo, *Thuja occidentalis* in the 5 photo, *Spirea x vanhouttei* in the 11 photo, *Iris* sp. in the 3,6 photos, and *Ligustrum japonicum* species in the 12 photo were used for that purpose. These border elements were used for aesthetic, to hide bad views, to reduce noise, to hide to view, directions, separation and limitation purposes.

Figure 2. The purpose of the use of plant border elements
The purpose of the use of plant border elements in the KTU Kanuni campus:

1. **To hide bad views**
   - Fagus orientalis
   - Laurocerasus officinalis
   - Parthenocissus quinquefolia
   - Rosmarinus officinalis
   - Wisteria sinensis

2. **Seperation**
   - Salvia splendens
   - Ligustrum japonicum
   - Senecio maritima
   - Thuja occidentalis
   - Spiraea × vanhouttei
   - Iris sp.
   - Laurus nobilis
   - Buxus sempervirens Rotundifolia

3. **To reduce noise**
   - Tilia platyphyllos
   - Bambusa nana
   - Pyracantha coccinea

4. **Limitation**
   - Ligustrum japonicum
   - Thuja occidentalis
   - Spiraea × vanhouttei
   - Senecio maritima
   - Iris sp.
   - Laurus nobilis
   - Hydrangea macrophylla
   - Platycladus orientalis
   - Buxus sempervirens Rotundifolia

5. **Direction**
   - Thuja occidentalis
   - Iris sp.
   - Spiraea × vanhouttei
   - Laurus nobilis
   - Tilia platyphyllos
   - Hydrangea macrophylla

6. **Aesthetic**
   - Berberis thunbergii 'Atropupurea'
   - Salvia splendens
   - Wisteria sinensis
   - Parthenocissus quinquefolia
   - Euonymus japonica Aurea
   - Tilia platyphyllos
   - Rosmarinus officinalis
   - Pyracantha coccinea
   - Laurocerasus officinalis
   - Fagus orientalis

   The location of the use of plant border elements in the KTU Kanuni campus;

1. **Edges of pedestrian sidewalks**
   - Thuja occidentalis
   - Iris sp.
   - Hydrangea macrophylla
   - Spiraea × vanhouttei
   - Ligustrum japonicum
   - Pelargonium hybrida
   - Senecio maritima

2. **In front of the walls**
   - Wisteria sinensis
   - Cupressocyparis leylandii
   - Hydrangea macrophylla
   - Parthenocissus quinquefolia
   - Prunus cerasifera 'Atropurpurea'

3. **Building-garden border**
   - Spiraea × vanhouttei
   - Hydrangea macrophylla
   - Rosmarinus officinalis
   - Fagus orientalis

4. **Roadside**
   - Berberis thunbergii 'Atropupurea'
   - Iris sp.
   - Tilia platyphyllos
5. To cover elevation difference
*Rosmarinus officinalis*

**Result and Discussion**
As a result, it was determined that the plant boundary elements in the study areas met the functional requirements and were quite successful in the aesthetic aspect as well. Because the plants on KTU Kanuni campus are maintained regularly. Thus, the KTU Kanuni campus contains very successful examples of aesthetical plant border elements. Plant border elements were used in conjunction with other landscaping elements such as buildings, gardens, roads, pavements, green spaces, refuges and walls.

When the observations were conducted, the plant species used as the plant border elements, their locations and purpose of use were taken into consideration. The plants can be motivated for different purposes when they are used to create a borders. Some of these purposes are;

- Identification, support and enforcement of structural design (Tarakcı Eren and Var, 2016; Şişman et al., 2008)
- Creating a space (Erdoğan and Erdinç, 2009; Şahin and Dostoğlu, 2009)
- Connecting objects and spaces (Yılmaz and Özbilen, 2010; Özdemir and Çetinkaya)
- To provide privacy (Sakıcı and Var, 2013;)
- Hiding unwanted views (screening) (Sakıcı and Var, 2012)
- Define, highlight, and create focal points (Bekçi et al. 2015)
- Orientation (Yılmaz et al. 2017)
- Symbolization (Mahmut and Barış, 2012)
- Providing movement in spaces (Özer et al., 2010)
- Creating background (Sakıcı et. al.2013)
- Light, temperature, precipitation, relative humidity, and wind control (Çorbacı and Var, 2011)
- Noise control (Erdoğan and Yazgan, 2011; Yılmaz and Özer, 1997; Ilgar, 2012)
- Erosion control (Bekçi et al. 2010; Ertekin, 2010).

Similarly, the plant border elements identified within the limits of the study area were used as border elements first, and then for other purposes listed above.
Table 2. Details on the plant border elements used in KTU Kanuni

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Height</th>
<th>Purpose of use</th>
<th>Location</th>
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<tbody>
<tr>
<td><em>Bambusa nana</em></td>
<td>Bamboo</td>
<td>20-50cm</td>
<td>Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Berberis thunbergii Atropurpurea</em></td>
<td>Barberry</td>
<td>50-80cm</td>
<td>Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Buxus sempervirens Rotundifolia</em></td>
<td>Boxwood</td>
<td>20-50cm</td>
<td>Hard-soft ground separation, To cover the elevation difference</td>
<td>Between the pavement and green areas</td>
</tr>
<tr>
<td><em>Cupressocyparis leylandii</em></td>
<td>Cypress</td>
<td>800-900 cm</td>
<td>To cover concrete walls, Aesthetics</td>
<td>In front of walls</td>
</tr>
<tr>
<td><em>Euonymus japonica Aurea</em></td>
<td>Euonymus</td>
<td>50-80cm</td>
<td>To limit the pedestrian crossing in the central refuge</td>
<td>Passenger crossing edges</td>
</tr>
<tr>
<td><em>Euryops pectinatus</em></td>
<td>Yellow daisy</td>
<td>20-50cm</td>
<td>Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Fagus orientalis</em></td>
<td>Beech</td>
<td>50-80cm</td>
<td>Aesthetics in front of building wall</td>
<td>In front of walls</td>
</tr>
<tr>
<td><em>Hydrangea macrophylla</em></td>
<td>Hortensia</td>
<td>50-80cm</td>
<td>To hide structural walls, To limit the space, To emphasize the road axis, Orientation, To separate the building hinterland, Roadside, In front of walls, Building garden border</td>
<td></td>
</tr>
<tr>
<td><em>Iris sp.</em></td>
<td>Iris</td>
<td>20-50cm</td>
<td>Aesthetics, Orientation, To limit the sidewalk axis</td>
<td>Central refuge, Sidewalk edges</td>
</tr>
<tr>
<td><em>Laurocerasus officinalis</em></td>
<td>Prune</td>
<td>50-80cm</td>
<td>To cover building / garden walls, Aesthetics</td>
<td>In front of walls</td>
</tr>
<tr>
<td><em>Laurus nobilis</em></td>
<td>Bay tree</td>
<td>50-80cm</td>
<td>In front of buildings, To separate hard and soft grounds</td>
<td>Grass area border</td>
</tr>
<tr>
<td><em>Ligustrum japonicum</em></td>
<td>Ligustrum</td>
<td>50-80cm</td>
<td>To separate vehicle road and green area</td>
<td>Roadside</td>
</tr>
<tr>
<td><em>Parthenocissus quinquefolia</em></td>
<td>American ivy</td>
<td>800-900cm</td>
<td>To cover wall</td>
<td>Over the wall</td>
</tr>
<tr>
<td><em>Pelargonium hybridum</em></td>
<td>Geranium</td>
<td>20-50 cm</td>
<td>To strengthen green area and sidewalk separation</td>
<td>Sidewalk edges</td>
</tr>
<tr>
<td><em>Platycladus orientalis</em></td>
<td>Thuja</td>
<td>50-80 cm</td>
<td>To separate green area and sidewalk</td>
<td>Sidewalk edges</td>
</tr>
<tr>
<td><em>Prunus cerasifera Atropurpurea</em></td>
<td>Fountain Cherry</td>
<td>800-1000 cm</td>
<td>Aesthetics</td>
<td>Over the wall</td>
</tr>
<tr>
<td><em>Pyracantha coccinea</em></td>
<td>Scarlet firethorn</td>
<td>50-80 cm</td>
<td>Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Rosa sp</em></td>
<td>Rose</td>
<td>50-80 cm</td>
<td>Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Rosmarinus officinalis</em></td>
<td>Rosemary</td>
<td>50-80 cm</td>
<td>To cover the elevation difference</td>
<td>In front of building walls</td>
</tr>
<tr>
<td><em>Senecio maritima</em></td>
<td>Senecio</td>
<td>30-40cm</td>
<td>To separate green area and sidewalk</td>
<td>Sidewalk edges</td>
</tr>
<tr>
<td><em>Salvia splendens</em></td>
<td>Sage</td>
<td>20-50 cm</td>
<td>Improve the distinction of the form of the pond</td>
<td>Near the ornamental pond</td>
</tr>
<tr>
<td><em>Spiraea × vanhouttei</em></td>
<td>Astibe</td>
<td>50-80 cm</td>
<td>To separate the building hinterland and the sidewalk</td>
<td>Building garden border</td>
</tr>
<tr>
<td><em>Thuja occidentalis</em></td>
<td>Thuja</td>
<td>50-80 cm</td>
<td>To separate sidewalk and building private space</td>
<td>Sidewalk edges</td>
</tr>
<tr>
<td><em>Tilia platyphyllos</em></td>
<td>Linden tree</td>
<td>800-1000 cm</td>
<td>Separation Aesthetics</td>
<td>Central refuge</td>
</tr>
<tr>
<td><em>Wisteria sinensis</em></td>
<td>Wistaria</td>
<td>100-150 cm</td>
<td>Canopy</td>
<td>On the walls</td>
</tr>
</tbody>
</table>
References


