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Evaluations on the Use Potential of Some Woody Plants Naturally Growing in Elazığ Flora in Landscape Architecture

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Abstract: In this study, the potential of use in the landscape area of some woody plants that naturally spread in the flora of Elazig was investigated. As a result of the researches, it was determined that 29 genera and 54 natural plant taxa belonging to 18 families in the region have potential landscape plant characteristics. Families with the most taxa; Rosaceae (19 taxa), Salicaceae (4 taxa), and Fagaceae (4 taxa). The genera with the most taxa are; *Crataegus*, *Rosa* and *Quercus* with 4 taxa each, followed by *Acer*, *Tamarix* and *Sorbus* with 3 taxa each. As a result of the evaluation, the woody plants with landscape potential in the region are used for ornamentation, aesthetics, fence, ground cover, etc. It has been found that it can be used for many purposes.

Elazığ Florasında Doğal Olarak Yetişen Bazı Odunsu Bitkilerin Peyzaj Mimarlığında Kullanım Potansiyeli Üzerine Değerlendirmeler

Anahtar Kelimeler
Elazığ,
Flora,
Odunsu bitkiler,
Peyzaj

Öz: Bu çalışmada Elazığ florasında doğal olarak yayılış gösteren bazı odunsu bitkilerin peyzaj alanında kullanım potansiyelleri incelenmiştir. Araştırmalar sonucunda bölgede 18 familyaya ait 29 cins ve 54 doğal bitki taksonunun potansiyel peyzaj bitkisi özelliklerine sahip olduğu belirlenmiştir. En çok taksona sahip familyalar; Rosaceae (19 takson), Salicaceae (4 takson) ve Fagaceae (4 takson). En çok taksona sahip olan cinslere bakıldığında ise; *Crataegus*, *Rosa* ve *Quercus* 4'er takson, onu 3'er taksonla *Acer*, *Tamarix* ve *Sorbus* takip etmektedir. Değerlendirme sonucunda yörede peyzaj potansiyeli olan odunsu bitkilerin süsleme, estetik, çit, yer örtücü vb. birçok amaçla kullanılabileceği tespit edilmiştir.

1. INTRODUCTION

Flora is considered to be one of most important figure of the landscape. The greenery space design landscape scenery and have productive and eco-stabilizing functions in the landscape area. Trees and shrubs have great influence on the environment and living conditions of the other organisms. Short term changes in ecosystems do not significantly impact their lifecycle and survival. Woody plants are long lived organisms with different adaptability to changes of environmental conditions [1,2].

Trees and shrubs constitute an important element in the cityscape [3]. The natural, graceful shapes of trees provide an architectural transition between human size and the scale of buildings and streets [4,5], and over the ages urban tree plantings have been regarded as a mirror of the prosperity and achievements of society. Trees help reduce the urban heat intensity [6]. Urban trees are capable of reducing storm water runoff and thereby reduce flooding [7]. They act as noise filters and purify the air through capturing particulate matter, carbon dioxide, ozone and other air pollutants originating from traffic and industrial activities [7,8,9]. However, the above-mentioned aesthetic, social and microclimatic ameliorations are only possible if the urban tree stock is vital.

Natural flora is the main source of landscape plants all over the world. Turkey is one of the major floral regions in the world, with more than 12,000 taxa of herbaceous and woody species, of which 3500 species are endemic.

The rich vegetation in Turkey is because of its geographic location, vegetation zones and the different climate and sub - climate types [10].

The aim of this study is to reveal wild woody plants that have the potential to be used for landscaping purposes, which naturally spread in the flora of Elazığ.

2. MATERIAL AND METHOD

2.1. Study Area

Study area was located on the east of Anatolian diagonal, in the skirts of South-Eastern Taurus Mountains [11], in the Upper Euphrates Region of the Eastern Anatolia Region, Elazığ **(Fig. 1)** is under the influence of Irano-Turanian Plant Geography Region and falls within the B7 grid square according to the Grid classification system developed by Davis [12].

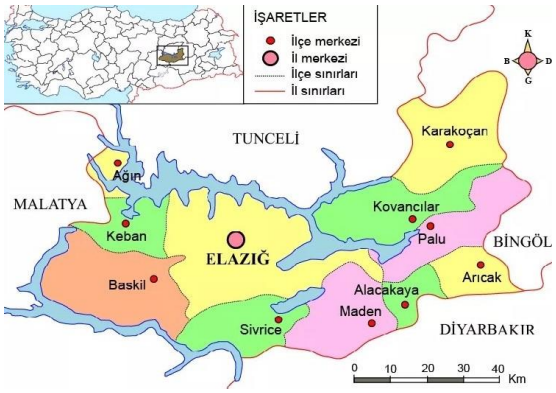


Figure 1. Study area

The surface area of the province is 9313 km^2 and is 1067–1225 m high from sea level. It is located on the high plateaus of Eastern Anatolian Region and it is located between 40°21′–38°30′ northern latitudes and 38°17′–39°11′ eastern longitudes. Elazığ has 10 sub-provinces and 544 villages.

2.2. Methods

In this research the potential landscape usages of some of the woody plants in Elazığ Providence have been investigated. In between the years 2019-2021 visits to the field have been made in different vegetation seasons. Identification of plants in the area was made mostly during fieldwork. Plant samples were taken from unidentified species and preserved for later identification. Various floristic works on natural plants were used in the identification of plants [10,12,14-16]. Current scientific names and author names of taxa are arranged according to World Flora Online [17].

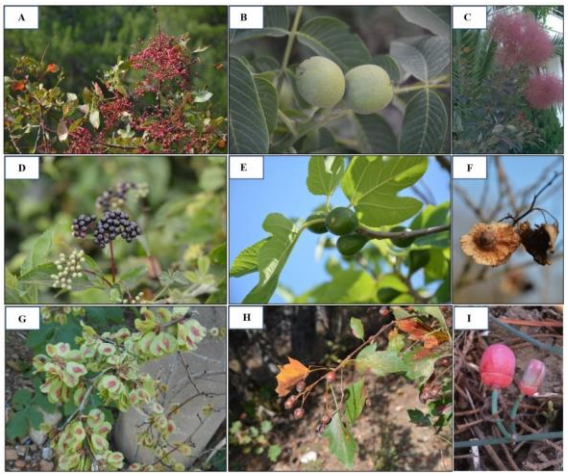
In the evaluation phase of the general data, the potential use of plant species in the landscape (aesthetics and visuality, hedge formation, surface covering, shading, emphasis, naturalness, etc.), flowering periods, flower/fruit colors were emphasized. The appearance of some plant taxa in the field, which were determined during the studies and could come to the fore in landscape use, were photographed.

3. RESULTS

Landscape studies generally consider the characteristics of plants such as emphasis, color, form and aesthetics. There are many woody plant taxa in the flora of Elazığ, which stand out with their color, form and aesthetic features and have the potential to be evaluated in the landscape**.**

As a result of the studies, it was determined that 29 genera and 54 natural plant taxa belonging to 18 families in the region have potential landscape plant characteristics**.** Families with the most taxa; Rosaceae (19 taxa), Salicaceae (4 taxa), and Fagaceae (4 taxa). The genera with the most taxa are; *Crataegus*, *Rosa* and *Quercus* with 4 taxa each, followed by *Acer*, *Tamarix* and *Sorbus* with 3 taxa each. As a result of the evaluation, the majority of the woody plants are used for more than one purpose (Table 1).

When the data obtained in the study were evaluated, it was determined that many taxa attracted attention with their flower beauty and fruit characteristics **(Fig. 2, 3).** Woody plants with flower characteristics are preferred to create spring coloration in the landscape with their flower characteristics.



Fiure 2. Some potential taxa with fruit characteristics in Elazığ flora : A) *Pistacia palaestina* Boiss. B) *Juglans regia* L .C) *Cotinus coggygria* Scop. D) *Sambucus nigra* L. E) *Ficus carica* L. subsp. *carica* F) *Paliurus spina-christi* P. Mill. G) *Ulmus minor* Mill. H) *Sorbus torminalis* (L.) Crantz var. *torminalis* I) *Ephedra major* Host. subsp. *major*

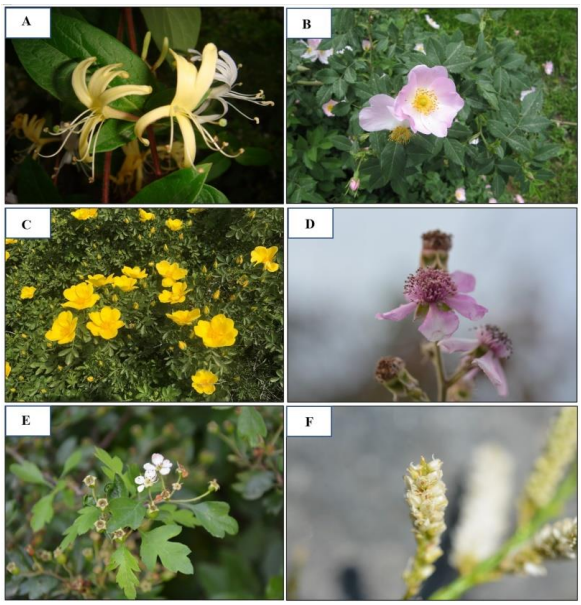


Figure 3. Some potential taxa with flower characteristics in Elazığ flora : A) *Lonicera etrusca* Santi var. *etrusca.* B) *Rosa canina* L. C) *Rosa foetida* J. Herrm.. D) *Rubus sanctus* Schreb. .*L.* E) *Crataegus monogyna* Jacq. F) *Tamarix smyrnensis* Bunge

However, it has been observed that some taxa spreading in the region have the potential to be used as hedges and ground covers as well as ornamentation. In addition to ornamental/aesthetic use, approximately 17 taxa from the plants identified in the studies conducted in the region have also been found to be used as hedges (Table 1). Some of the plant taxa that have the potential to be used as hedges are as follows; *Berberis crataegina*, *Colutea cilicica*, *Ephedra major*, *Genista albida*, *Genista aucheri*, *Lonicera etrusca*, *Glycyrrhiza glabra*, *Tamarix smyrnesis.*

Studies in the research area mention the usage areas of some taxa (13 taxa) distributed in the flora of Elazig as groundcovers in landscape studies. *Sambucus nigra*, *Lonicera etrusca*, *Genista albida*, *Spiraea crenata* and *Tamarix tetrandra* are some of these taxa.

4. DISCUSSION AND CONCLUSION

The selection of proper plants for specific stand conditions is a very important task that effects success in the landscape planning and landscape design. In Europe recent studies [18,19], documented poor diversity of tree genera an species planted in urban areas. A few genera of woody plant (*Acer*, *Aesculus*, *Platanus* and *Tillia*) are used at street trees.

In a study conducted in the Gürün (Sivas) region, which is close to the study area, it was determined that 42 plant taxa were used in urban landscape studies for various purposes [20]. In a study conducted in the Bartın region, it was determined that about 25 woody plants were used in landscape studies [21].The variety of species planted on roadsides, parks, gardens and residential areas in the region is very limited. The number of exotic taxa is high in plants used in landscape studies in Elazig and other province.

Spellenberg and Given [22], reviewed general criteria for tree selection for urban environments. According to their worldwide knowledge, the most important criteria for selecting trees for urban environments are: suitability of taxa to local conditions, low maintenance cost and avoidance of structural problems. Considering these criteria, the importance of local taxa becomes more evident.

In order to have a healthy and sustainable urban landscape tree and shrub population, a high diversity of species and genera is so important. The reflection of potential taxa in the natural flora to the landscape areas in the region will increase the diversity. The diversity in the city's landscape clarifies the distinction between street and green space. The diversity of native and non-native tree species is also of great importance in urban environments in the region [23].

As a result of the studies in Elazığ province, it has been seen that many natural plant taxa that can easily benefit from the landscape in terms of fence, ground cover and similar features, especially visual-form and aesthetics, spread in the region. Indigenous natural taxa should support to increased biodiversity in urban areas with ecologically better-balanced plant communities. Preferring natural taxa suitable for the texture of the city in urban landscape areas will provide important economic advantages as well as solving ecological adaptation problems. The reflection of the rich natural flora of our country on the landscape of the cities, besides increasing the visual diversity, provides the recognition of the flora.

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Tablo 1. Elazığ Florasında potansiyel peyzaj bitkileri listesi.

Family	Plant name	Turkish Name/Local Name	Life Form	Potential Use in Landscape
Adoxaceae	*Sambucus nigra* L.	Mürver	Small tree	ornamental, fence, ground cover
Anacardiaceae	*Cotinus coggygria* Scop.	Boyacı sumağı, Duman ağacı	Shrub, Small tree	ornamental, aesthetic
Anacardiaceae	*Pistacia palaestina* Boiss.	Çöğre	Small tree	ornamental, aesthetic
Betulaceae	*Betula litwinowii* Doluch.	Huş, Düzük	Tree	ornamental, aesthetic
Betulaceae	*Betula pendula* Roth	Huş ağacı	Tree	ornamental, aesthetic
Berberidaceae	*Berberis crataegina* DC.	Karamuk	Shrub	ornamental, fence, ground cover
Cannabaceae	*Celtis planchoniana* K.I.Chr	Dahum	Small tree	ornamental, aesthetic
Cannabaceae	*Celtis tournefortii* Lam.	Dardagan	Small tree	ornamental, aesthetic
Caprifoliaceae	*Lonicera etrusca* Santi var. *etrusca*	Dokuzdon	Shrub	ornamental, aesthetic, fence
Ephedraceae	*Ephedra major* Host. subsp. *major*	Hum	Shrub	ornamental, fence, ground cover
Fabaceae	*Colutea cilicica* Boiss. & Balansa	Patlangaç	Shrub	ornamental, fence, ground cover
Fabaceae	*Genista albida* Willd.	Ak borcak	Shrub	ornamental, fence, ground cover
Fabaceae	*Genista aucheri* Boiss.	Bayır borçağı	Shrub	ornamental, fence, ground cover
Fabaceae	*Glycyrrhiza glabra* L.	Meyan	Shrub	ornamental, fence, ground cover
Fagaceae	*Quercus brantii* Lindl.	Kara meşe	Small tree	ornamental, aesthetic
Fagaceae	*Quercus cerris* L.	Saçlı meşe	Tree	ornamental, aesthetic
Fagaceae	*Quercus infectoria* Oliv. subsp. *veneris* (A.Kern.) Meikle	Zindiyen	Small tree	ornamental, aesthetic
Fagaceae	*Quercus petraea* (Matt.) Liebl. subsp. *pinnatiloba* (K.Koch) Menitsky	Koca pelit	Tree	ornamental, aesthetic
Juglandaceae	*Juglans regia* L.	Ceviz	Tree	ornamental, aesthetic
Moraceae	*Ficus carica* L. subsp. *carica*	İncir	Tree	ornamental, aesthetic
Moraceae	*Ficus carica* L. subsp. *rupestris* (Hausskn.) Browicz	İt inciri	Tree	ornamental, aesthetic
Rhamnaceae	*Paliurus spina-christi* P. Mill.	Karaçalı	Shrub	ornamental, aesthetic
Rhamnaceae	*Rhamnus alpina* L. subsp. *fallax* (Boiss.) Maire & Petitm.	Dağ cehrisi	Shrub	ornamental, aesthetic
Rhamnaceae	*Rhamnus pallasii* Fisch. & C.A.Mey.	Ala cehri	Shrub	ornamental, aesthetic
Rosaceae	*Amelanchier ovalis* Medik. subsp. *integrifolia* (Boiss. & Hohen.) Bornm.	Tüylü karagöz	Shrub	ornamental, fence, ground cover
Rosaceae	*Amygdalus communis* L.	Badem	Tree	ornamental, aesthetic
Rosaceae	*Amygdalus trichamygdalus* (Hand.-Mazz.) Woronow var. *trichamygdalus*	Haşmet bademi	Small tree	ornamental, aesthetic
Rosaceae	*Cerasus microcarpa* (C.A.Mey.) Boiss. subsp. *tortuosa* (Boiss. & Hausskn.) Browicz	Sarı dağkirazı	Shrub	ornamental, aesthetic
Rosaceae	*Crataegus ambigua* A.K.Becker	Kuşyemişi	Small tree	ornamental, aesthetic
Rosaceae	*Crataegus azarolus* L. var. *azarolus*	müzmüldek	Small tree	ornamental, aesthetic
Rosaceae	*Crataegus monogyna* Jacq.	Alıç, Sez, Sinz	Tree	ornamental, aesthetic
Rosaceae	*Crataegus orientalis* Pall. ex M.Bieb. subsp. *szovitsii* (Pojark.) K.I.Chr.	Koyun alıcı	Small tree	ornamental, aesthetic
Rosaceae	*Pyrus syriaca* Boiss. var. *syriaca*	Çakal armudu	Tree	ornamental, aesthetic
Rosaceae	*Rosa foetida* J.Herrm.	Acem sarısı	Shrub	ornamental, aesthetic
Rosaceae	*Rosa beggeriana* Schrenk	Bağdagül	Shrub	ornamental, aesthetic
Rosaceae	*Rosa canina* L.	Kuşburnu	Shrub	ornamental, aesthetic
Rosaceae	*Rosa hemisphaerica* J. Herrm.	Kadın göbeği	Shrub	ornamental, aesthetic
Rosaceae	*Rosa orientalis* A.Dupont ex DC.	Askergülü	Shrub	ornamental, aesthetic
Rosaceae	*Rubus sanctus* Schreb.	Böğürtlen	Shrub	ornamental, aesthetic
Rosaceae	*Sorbus torminalis* (L.) Crantz var. *torminalis*	Pitlicen	Small tree	ornamental, aesthetic
Rosaceae	*Sorbus umbellata* Fritsch	Geyik elması	Small tree	ornamental, aesthetic
Rosaceae	*Sorbus roopiana* Bordz.	Kanık üvez	Small tree	ornamental, fence, ground cover
Rosaceae	*Spiraea crenata* subsp. *crenata* L.	Keçi sakalı	Shrub	ornamental, fence, ground cover
Salicaceae	*Populus alba* L. var. *alba*	Ak kavak	Tree	ornamental, aesthetic
Salicaceae	*Populus tremula* L. subsp. *tremula*	Titrek kavak	Tree	ornamental, aesthetic
Salicaceae	*Salix alba* L. subsp. *alba*	Aksöğüt	Tree	ornamental, aesthetic
Salicaceae	*Salix caprea* L.	Sorgun	Small tree	ornamental, aesthetic
Sapindaceae	*Acer campestre* L.	Ova Akçaağacı	Tree	ornamental, fence
Sapindaceae	*Acer tataricum* subsp. *tataricum* L.	Akçaağaç	Tree	ornamental, fence
Sapindaceae	*Acer hyrcanum* Fisch. & C.A.Mey. subsp. *hyrcanum*	Akçaağaç	Tree	ornamental, fence
Tamaricaceae	*Tamarix tetrandra* Pall. ex M.Bieb.	Ilgın, Gezik	Shrub	ornamental, fence, ground cover
Tamaricaceae	*Tamarix smyrnensis* Bunge	Ilgın	Shrub	ornamental, fence, ground cover
Tamaricaceae	*Tamarix gracilis* Willd.	İnce ılgın	Tree	ornamental, fence, ground cover
Ulmaceae	*Ulmus minor* Mill.	Ova karaağacı	Tree	ornamental, aesthetic