Asian Journal of Advanced Research and Reports

14(4): 85-91, 2020; Article no.AJARR.63043
ISSN: 2582-3248

Sustainability in Planning Landscape Areas of Konya Province in Turkey

Eray Tulukcu[1*]

[1]Departmant of Plant and Animal Production, Selcuk University, Cumra Vocational School, Konya, Turkey.

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/AJARR/2020/v14i430345
Editor(s):
(1) Dr. Rachid Masrour, University of Cadi Ayyad, Morocco.
Reviewers:
(1) Karpiuk Irina Anatolyevna, Ministry of Education and Science of Ukraine, Ukraine.
(2) Jagreeti Gupta, Dr. YS Parmar University of Horticulture and Forestry, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/63043

Original Research Article

Received 18 September 2020
Accepted 22 November 2020
Published 09 December 2020

ABSTRACT

Konya province (KP) is located in the middle of Turkey has rich plant diversity and production potential. It is known that the plants used in landscaping are selected from the mother-nature and has improved over time. Some of the ornamental plants have medicinal value.In landscape projects, the plants form living material have aesthetic value, some of them have medicinal value also are the reason for their preference in the landscape project.

In this study, the plants in the recreational parks of KP were examined, especially the medicinal and aromatic ones. It has been observed that, while planning the landscape areas as well as water management, the selection of plants is an important criteria for ensuring the sustainability and cost efficiency. The average annual precipitation in Konya is around 300-350 mm, the summer months are hot and dry, whereas a harsh and snowy climate in winters. While selecting the plants for a region, the climatic conditions should be considered. In places, where the summer months are dry, the choice of plants should be based on drought tolerance as well as visuality of plants that makes good use of water.

Keywords: Drought; Konya; landscape; rain; xerophytes.

**Corresponding author: Email: eraytulukcu@selcuk.edu.tr, eraytulukcu@gmail.com;*

1. INTRODUCTION

The development process of civilization is parallel to the development of water use techniques. Early societies grew their crops in areas that could be easily irrigated from rainwater and rivers. Nation has faced many problems in the sharing of water resources in the coming years. The fact that there is still a water shortage in 80 countries, which make up 40% of the world's population living in 250 river basins, and the need for water to increase 400% over the past 50 years reinforces this estimate. Turkey is not rich in water as it may seem and is not in a position to use water efficiently. If the necessary precautions are not taken within 30 years in our country, the water will become a restricted in country. Turkey's groundwater and surface potential of 234 billion m^3 of usable reserves is 110 billion m^3 while, but it uses the 39.3 billion m^3. By 2030, the full reserve of 110 billion m^3 will be required [1].

Table 1. Water use by sectors

Usage	Amount km^3	%
Drinking	5.7	14.7
Industrial	4.0	10.3
Agriculture	29.2	75

Urbanization has increased rapidly with the population increase in the world. People who have to live in congested buildings in cities have also increased their longing for nature. It has become important to organize the building circles in the city as a grass area, and to create a livable urban space by integrating it with green areas. The materials used for these are often nature itself and nature's products. Therefore, the importance of herbal material is always undisputed, whether in urban or rural areas. Plants are used in functional and aesthetic aspects in plantation studies. Since the green areas are affected by different environmental factors according to the seasons of the year, the views changes according to the periods and this feature increases the importance of the landscape studies. In parallel, determination of plant materials, identifcation, utilization possibilities, determination of functional and aesthetic values, and bringing them to design studies also show a rapid development. In planting work, seasonal or perennial ornamental plants are often used in public green spaces. In recent years, among the preferred ornamental plants, medicinal plant species have been included. These plants are used in home gardens, parks and rural landscaping. Medicinal and aromatic plants have been used for medicinal and food purposes throughout history and their importance has increased gradually. These plants are used in different fields such as medicine, food, perfumery and cosmetics in alternative and modern medicine today [2,3]. Approximately 80% of the world's population first rely on medicinal plants for the treatment of their diseases. The active ingredient of 25% of drugs used in developed countries is of vegetable origin [4]. In our country, a great increase in the use of medicinal and aromatic plants and their products is noteworthy [5]. People are increasingly interested in these plants in the environmental arrangements of their living spaces. It is expected that the production of medicinal and aromatic plants will increase in order to meet the ever-increasing demand in the coming years and to obtain a higher quality standard product. [6]. An adequate amount of standards and providing quality products in Turkey is not possible with a collection of native plants. These plants should brought to the desired qualities through regular culture and breeding studies [7,8,9]. In this context, most of the plants that have medicinal and aromatic properties in the landscape areas are economically valuable plants when evaluated as both aesthetically and functionally and these plants are widely used in landscape designing [10]. Quality products can only be made with raw materials that are delivered to the business in a quality manner [11].

The increasing difficulty in water supply has led people to seek new solutions for the efficient use of water. Especially in outdoor use such as recreational parks and gardens, water consumption reaching large dimensions required the development of new forms of landscape arrangement in which water is used efficiently in landscape arrangements. Accordingly, under the general title of "Water-Efficient Landscaping" (Water-Wise, Water-Smart), "Low Water Use" (Low-Water) and "Natural Landscape Arrangement" (New landscaping concepts different from classical landscaping concepts such as Natural Landscaping) have been developed. Although each of these concepts differs in terms of their philosophy and approach to the subject, they are all based on the same basic principles and are often used interchangeably with the same meaning. One of the first conceptual approaches developed by formulating these basic principles is “Arid

Landscaping" (Xeriscaping). Arid Landscaping is defined as a quality landscape creation technique that protects the environment and minimizes water consumption. This technique is based on the basic principle of designing landscape projects to minimize the use of water [12].

Arid Landscaping is based on landscape techniques compatible with the nature in areas with arid climate and limited water resources. Considering the importance of water for human life, the Arid Landscaping approach includes landscape practices that protect the environment and use water effectively, and the aim is to minimize water use [12].

One of the provinces where endemic plants show the most spread in the country is Konya city. Geographically, 360-41 ', and 390-16' north latitude and 310 -14 340 -26 'east longitude 38,257 km^2 located between the surface area and Konya Turkey's largest cities. Konya, with an average altitude of 1016 m, is surrounded by Ankara from the north, Isparta from the west, Afyon, Eskişehir, Icel, Karaman, Antalya from the east, Niğde and Aksaray from the east. Konya province has Haymana plateau in the north, Cihanbeyli Plateau and Salt Lake in the northeast, Beyşehir Lake and Akşehir Lake in the west, Sultan Mountains and Taurus Mountains in the south, and the Obruk Plateau in the east. A large part of the province's territory is on the high plains of Central Anatolia, the southern and southwestern parts are included in the Mediterranean Region. 12% of Konya is forest area and annual rainfall varies between 300 mm and 760 mm. The long term climate conditions have shown that the temperature and precipitation show a continuous fluctuation depending upon the season and years [13]. This research has been carried out on plant and climate characteristics that should be taken into account when planning landscape areas in Konya.

2. MATERIALS AND METHODS

This study was conducted in the jurisdiction of Selcuklu district of Konya Metropolitan Municipality in 2018. In this research, the plants used in recreational-parks and garden arrangement were used. Furhermore, the ecological conditions of KP and the characteristics of some medicinal plants used in environmental regulations were also given.

3. RESULTS AND DISCUSSION

There is a total of 2,119,048 square meter active green area in Konya Selçuklu district. There are 481 parks and gardens in the study area, 294 of which are children's gardens, 183 of which are neighborhood parks and 4 of which are city parks.

There are 13,537,917 m^2 parks and gardens in Konya, including 10,442,866 m^2 in the center, 1,495,051 m^2 in Selcuklu, 1,100,000 m2 in Karatay and 500,000 m^2 in Meram [14]. It has been reported that 470.742 people are living in Selcuklu district and the amount of active green area (park, playground and playgrounds per person) is 4.50 m^2 / person. With the regulation on the principles of the plan construction issued on 2.11.1985 [15], it has been defined that the active green area as park, playground, and urban green areas as 10 m^2 green area per person [16]. It seems that the green areas are not sufficient for the inhabitat where living in current province in the framework of interntional standards. It is clear that to improve and reach international standards, more green field should be created in the province. Moreover, the plants that are resistant to drought and cold climate should be included more in plantations to extend the utilization period of the green areas.

In Konya, an average of 800 thousand bushes, 400 thousand roses, 3,422,276 seasonal flowers, 8,143,450 bulbs and tubers are planted in green areas such as street sides, medians and parks [17].

Park-garden plants that are attractive spots of the cities have herbaceous-bushy-woody, bulbous, flowering-flowerless, fruity-fruitless plants that cover natural and artificial park-garden-median areas. There is a park-garden area in Konya city center in 13,538 da. [14]. Considering the diversity of the plants determined in green areas, it has been seen that materials were obtained from different locations. Plants obtained from different regions should have the ability to adapt to the ecological conditions of Konya.

Some of the plants used in the plantation were determined as medicinal and aromatic plants which were lavender, thyme, rosemary and sage plants.

It has been seen that these medicinal plants used in plantations were selected from plants

that have adapted to drought and cold climatic conditions.

Landscape plants require 15-20°C at night, 25-30°C during the day and a total annual precipitation of around 500-1.000 mm. In addition, these plants grow better in airy, windless, humid places with 40-60% in summer and 60-80% in winter [14].

In terms of the land structure of the region, the vegetation looks like a flat steppe. Therefore, the most important changes in plant growing conditions are of climate origin. Rainfall and temperature are the two most important climatic factors for plants Therefore, climatic assessments are based on these two parameters. The lower and upper limit values of the temperature demand of the plants vary between 5-36°C [18]. However, there are plants such as lavandula and thyme that can grow at higher and lower temperatures than these values. Temperature limits may differ depending on the development stages of the plants and the plant species or variety. Generally, in temperate regions, plants can continue their normal physiological activities starting from + 7°C. Growth and development in most plants take place at temperatures between + 7°C - 38°C. In other words, biological activities cease in most plants at temperatures below 7°C and above 38°C. However, it is a fact that there are many plant species and varieties that exceed these general limits [19].

Water is one of the important factors in the propagation and formation of plants. Temperature and water are needed together in the formation of the plant regions. It is very important to what extent these two plant growing conditions can meet the optimum conditions for plant growth. Water, which is of great importance on plant life, is an important factor in the classification of plant species and distribution areas of communities with different water demands, especially in arid and semi-arid areasThe formation of the flora reflects the character of the general climate type and is significantly affected by the precipitation regime. Although Central Anatolia is between the Mediterranean and Black Sea precipitation regimes, it reflects the transitional type of the Mediterranean precipitation regime. However, the inconsistency between rainfall and temperature is suitable for the development of herbaceous and shrub type plants with short vegetation periods [20,18].

Some researchers, examining daily meteorological data for many years in Konya province, have found that the growth period is generally 220 days (average temperatures above 8°C) [18]. The growing period starts in late March and early April and continues until November. The growing period according to altitude is between 200 and 250 days for 1000 to 1500 meters, while it is less than 200 days for areas above 1500 meters. Another factor that is vital for plants is the frost regiment Frost starts with temperatures falling to 0°C. Vital events such as respiration and photosynthesis slow down and stop at minus values below 0°C. The number of days of frost in Konya has been determined as approximately 103 days.

Rainfalls is the main source of water or moisture for plants to maintain their vital activities. Thus, the distribution of plants on the earth occurs as a combination of temperature and rainfall. However, the most important growth factor that limits the life of plants is water. Because the distribution and growth of plants on land depends primarily on water. When the seasonal rainfall is examined in Konya, which reflects the semi-arid climate characteristics, it is seen that a significant part of it occurs in the spring and winter months Approximate annual precipitation rates in Konya are 34% in spring, 31% in winter, 25% in autumn and 10% in summer. The rainfall in the summer months has no effect reducing the drought. Summer drought creates a suitable environment for the development of xerophyte plant species with this effect [18].

3.1 Examples of Drought Tolerant Plant Species

Pinus Sp.*; Chamaecyparis lawsoniana; Cupressus arizonica; Axus baccata; Thuja orientalis; Ginkgo biloba; Robinia pseudoacacia; Acer campestris; Koelreuteria paniculata; Creataegus* Sp.*; Cercis siliquastrum; Gleditschia triacanthos; Populus tremula; Sophora japonica; Catalpa bignonioides; Quercus pedunculata; Eleagnus angustifolia.*

Berberis Sp.; Caragana arborescens; Ligustrum vulgare; Ligustrum japonica; Lonicera tatarica; Spiraea vanhouttei; Syringa vulgaris; Viburnum fanfare; Viburnum tinus; Juniperus Sp.; Mahonia aguifolium; Euonymus fortunei; Prunus laurocerasus; Yucca flamentosa; Implants Colutea arborescens; Hippophae rhamnoides; Pyracantha coccinea; Rhus typhina; Symhoricarpus orbiculatus; Tamarix Sp.*;*

Cotoneaster horizontalis; Hedara helix; Jasminum fruticans; White Shrub Lycium Sp.*; Parthenocissus tricuspidata; Achillea filipendulina; A.millefolium, A. ptarmica; A.tomentosa, Centaurea cineraria; Cerastium tomentosum; Dianthus* Sp.*; Euphorbia* Sp.*; Gypsophila paniculata; Papaver orientale; Sedum Sp.; Verbascum* Sp.*; Veronica prosrate; Hemerocallis hybrida; Iris germanica; I. Sempervivum; Thymus* Sp.*; Alyssa; Alcea; Amaranthus; Calendula officinale; Cosmos; Felicia; Gazania; Lunaria Annua; Mesembryanthemum; Portulaca; Salvia farinacea* [21,22].

3.2 Some Plants Identified in Konya Landscape Areas and Their Properties *Lavandula* sp

Lavender types are of Southern European and Mediterranean origin. It grows in sunny places and in temperate climates. The flowers are spiked on a long stalk; It is bluish-redbud colored. It is a perennial and bushy aromatic plant. Since lavender essential oil has a pleasant odor and antiseptic feature, Lavandula sp. Is widely used in areas such as aromotherapy, cosmetics and personal care products. It is often used for restrictive purposes behind sitting areas in landscape areas [20,23].

3.2.1 Melissa officinalis

It originates from the southern parts of Asia and North America and shows natural spread in all Mediterranean countries, including our country. It is among the leading herbs of the cosmetic industry. It is not planted with other plants due to its dominant growth character in environmental regulations [20].

3.2.2 Archillea millefolium

It is a herbaceous perennial species that grows naturally in Europe, Asia and our country. In summer, it blooms in red, yellow and white according to its species. It is widely used in liquor and perfumery industry. It is also used against aphids found in cultivated plants. Drog has germicidal properties. They can be used in landscape arrangements, roads that get plenty of sun, flower arteries and rock gardens or as groundcovers. It is resistant to drought [20].

3.2.3 Nepeta sp.

It is of Asian and Caucasian origin. There are perennial or one-year species. Its flowers are white blue and rarely yellow on shoots or leaf seats. It is medically pain relieving and relaxing. It is used in landscape to cover the surface on surfaces. It can be used in border making [20].

3.2.4 Salvia officinalis

It grows a lot in our country as in all European countries. Medical Sage is consumed in throat disorders and kidney diseases caused by flu and flu. It is used in environmental arrangements, rock gardens, parks and gardens and flower parterries. Ornamental plant, outdoor plant can be planted in pots, mixed with other plants [20].

3.2.5 Calendula officinalis

It grows naturally in Mediterranean countries. It is a plant that loves sunny places with good air movement. In addition to its antiseptic feature, calendula flower is used in burns as a wound healing agent. Park, garden, grove, junction, median, terrace, rock garden, pool edge, hanging flower, flower pot, square, balcony etc. It can be sewn only with the colors of its own kind in areas [20].

3.2.6 Rosmarinus officinalis

Its homeland is the Mediterranean Basin. It is a perennial evergreen herb that grows in sunny and semi-shade places and in temperate climates. It is resistant to extreme cold. Rosemary has antioxidant, antimicrobial and antiviral properties. It is used in landscape in different bush groups, rock gardens, areas with inefficient conditions. Also suitable for low fence construction [20].

3.2.7 Echinacea purpurea

It is a perennial plant that can easily be found in nurseries in our country, whose homeland is in the central parts of North America. It has showy lilac-pink flowers that open in summer. As a natural antibiotic, it is used especially in the treatment of viral, bacterial and fungal infections of the upper respiratory tract. Due to their long flowering period, showy flowers and contentment, they give successful results in landscape arrangements, flower parterries, natural arrangements and border plants [20].

3.2.8 Ocimum basilicum

Its homeland is Iran and India. It is a very fragrant and durable plant. Basil has antibacterial properties. It can be used in landscape arrangements, flower beds, curbs and wall

bottoms. It has a unique fragrance. Recently, it has begun to be grown on balconies and indoors [20].

3.2.9 Chamomilla recutita

It is a type of daisy that grows in Europe, Asia and Anatolia. It has white flowers that bloom in summer. Externally, its infusion is used as a mouthwash and wound-healing mouthwash against throat inflammations. It can be used in flower arrangements and rock gardens in landscape arrangements. It can be grown comfortably in almost any soil type [20].

3.2.10 Satureja thymbra

It grows naturally in Mediterranean countries. Some species wrap the soil well and do not grow too tall. It is used in the antiseptic manufacture in the pharmaceutical industry. They are used in rock gardens, flat paved stone roads, covering the floor and walls. They often have dense, always green leaves, thick creeping shoots [20].

4. CONCLUSİON

In the study, natural and medicinal plants which have been considered for selection of plants to ensure sustainability in the planning of landscape areas in Konya province of Turkey were discussed.

On the basis of ecological structure, Konya city has a semi-arid climate features. Konya city, which has a terrestrial climate feature, has arid and hot events in summer and cold and frost events in winter. In particular years, as in 2000, the drier time period that does not receive precipitation during the year is increasing. The plants are based on drought in two ways. The first is genetically resistant to drought The second is escape from arid time periods. The resistance of drought and cold in plants supports each other. In other words, a plant that is resistant to drought also has resistance against cold. For this reason, Konya city has a wide plant pattern and many of them are endemic in the country. The natural environment provides a wide opportunity to provide plant diversity in landscape areas in Konya. It will pave the way for the sustainability of the plantations that will ensure environmentally compatible and more economical landscape planning with the selection of plants and adaptation works that will be adapted to the region collected from natural flora. The most important factor in growing plants in regions such as Konya city with a semi-arid climate is the distribution of precipitation and precipitation throughout the year. It is of great importance to identify and use plants that are resistant to drought and can benefit from water economically in the selection of plants for designing in landscaping areas and especially in the selection of medicinal plants.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Cagla H, Tulukcu E. The ımportance of water and Konya plain project. III. vocational schools symposium. Burdur; 2005.
2. Faydaoglu E. Ve Surucuoglu M. The Use of medicinal and aromatic plants and their economic ımportance. Kastamonu University Faculty of Forestry Journal. 2011;11(1):52-67.
3. Tulukcu E, Sagdic O. Medicinal plants and parts used in Aktar in Konya. Erciyes University Journal of Science Institute. 2011;27(4):304-308.
4. Farnsworth NR, Akerev O, Bingel AS. The Bullettion of WHO. 1985;63:9865-9871.
5. Bayramoglu MM, Toksoy D, Sen G. medicinal plants of commerce in turkey. II. ın the congress of socio-economic problems in forestry. Isparta: Faculty of Forestry. 2009;88-98.
6. Phillipson JD. Quality assurance of medicinal plants Acta Horticulture. 1993; 333:117-122.
7. Arslan N. Our endemic medicinal plants. II. medicinal and aromatic plants symposium, 23-25 September 2014 Yalova, Proceedings Book. 2014;9-21.
8. Arslan N. Cultivation of natural plants. turkish journal of the ministry of agriculture and rural affairs Ankara; 2004.
9. Kirici S. General availability of medicinal and aromatic plants in Turkey. TURKTOB, cilt.4. 2015;4-11.
10. Armstrong M, Peng M. Taiwan and use of medicinal and aromatic plant species in turkey. v. ornamental plants congress in proceedings book. Yalova: Atatürk Horticultural Central Research Institute. 2013;163-169.
11. Yucer A, Ve Altıntas G. Turkey's foreign trade of medicinal and aromatic plants.

Medical and Aromatic Plants Symposium on 13-15 September 2012 in Tokat. 2012;55-63.
12. Corbaci LO, Ozyavuz M, Yazgan EM. Intelligent use of water in landscape architecture: Xeriscape Journal of Agricultural Sciences Research. 2011;4 (1):25-31.
13. Tulukcu E, Cağla H. Cumra agriculture and land consolidation. Journal of Selcuk-Teknik. 2005;4(1):1-19.
14. Zengin M. Nutrition and fertilization in the park-garden plants of Konya. Green Capitals Congress Konya Turkey; 2018.
15. Emür SH, Onsekiz D. *Kentsel Yaşam Kalitesi Bileşenleri Arasında Açık Ve Yeşil Alanların Önemi –Kayseri/Kocasinan İlçesi Park Alanları Analizi*, Sosyal Bilimler Enstitüsü Dergisi Sayı. 2007;22:367-396.
16. Anonymous. Konya metropolitan municipality directorate of parks and gardens records. Konya; 2020. (Access January 2020)
17. Anonymous 2018. Konya Metropolitan Municipality Directorate of Parks and Gardens. (Interview)
18. Kaya B, Aladag C. Relationship between rainfall, temperature and vegetation in Konya conditions. Journal of Social Sciences Institute of Selcuk University 22 Konya; 2009.
19. Eser D. Agricultural ecology, ankara university, faculty of agriculture, Publication. Ankara. 1986;975:87.
20. Ceylan A. Medicinal Plants I. Field Crops Department Ege Üniv. Faculty of Agriculture Publication No: 312 Izmir. 1995;13.
21. Graham LE, Graham JM, Wilcox W, Lee. Plant biology. palme publications. Ankara; 2015.
22. Kilinc M, Kutbay G. Plant Ecology. Palme Publications. Ankara; 2007.
23. Tulukcu E. The ımportance of cultivating medicinal plants. III. Vocational Schools Symposium. Burdur; 2005.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/63043