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KUZEY IRAK'IN BAZI ŞEHİRLERİNDE PARKLARIN TASARIMINDA KULLANILAN ODUNSU BİTKİ TÜRLERİNİN İNCELENMESİ

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MSc THESIS

STUDYING THE TYPES OF WOODY PLANTS USED IN THE DESIGN OF PARKS IN SOME CITIES OF NORTHERN IRAQ

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DEPARTMENT OF HORTICULTURE

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The study **"Studying the types of woody plants used in the design of parks in some cities of Northern Iraq"** prepared by Shno Mawlood MINA under the supervision of Prof. Dr. İzzet AÇAR and Dr. Ali Othman Mohammad SHARBAZHERY was unanimously accepted by the jury on 24/01/2020 as a MASTER'S THESIS at the Department of Horticulture of the Institute of Natural and Applied Sciences of Harran University.

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Note: The use of the original and other references, tables, figures and photographs used in this thesis without reference is subject to the provisions of the Law No. 5846 on Intellectual and Artistic Works.

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ÖZET

Yüksek Lisans Tezi

KUZEY IRAK'IN BAZI ŞEHİRLERİNDE PARKLARIN TASARIMINDA KULLANILAN ODUNSU BİTKİ TÜRLERİNİN İNCELENMESİ

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Çalışma kapsamında Kuzey Irak'taki Erbil, Süleymaniye, Dohuk ve Halabja şehirlerinde bulunan parklarda (Sami Abdul Rahman Parkı, Manara Parkı, Shanadar 1 & 2 Parkı, Glkand Parkı, Hawary Shar Parkı, Azade Parkı, Daik Parkı, Bakhe Gishty, Azade Panorama Parkı, Mohamad Bekhal Parkı, Dohuk Dem Parkı, Halabja Parkı, Bakhe Gishty, Baran Parkı, Kubra Hamedpur Parkı) park tasarımında kullanılan odunsu bitki türleri incelenmiştir. Bu amaçla hangi parkta hangi bitki türlerinin yer aldığı belirlenmiştir. Daha sonra da parklarda yer alan değişik bitki türlerinin bitki yaşı, dikim yılı, gövde çapı, bitki boyu ve bitki sağlığı durumu belirlenmiştir. Elde edilen sonuçlara göre, tüm parklar ziyaret edildiğinde toplam 70 farklı türde odunsu bitki tespit edilmiştir. Bunların %54'ünün ağaç, %36'sının çalı ve %10'unun tırmanıcı bitkiler olduğu saptanmıştır. Ayrıca 39 familyaya ait 36 yaprak dökmeyen ve 34 yaprak döken tür olduğu görülmüştür. Çalışmadan elde edilen sonuçlara göre planlama makamlarına, yürütme taraflarına, park yönetimlerine ve Belediyeler Bakanlığı ve Parklar Dairesine öneri ve tavsiyeler ortaya çıkmıştır.

ANAHTAR KELİMELER: yeşil alan, park, odunsu bitki türleri, Kuzey Irak.

ABSTRACT

MSc Thesis

STUDYING THE TYPES OF WOODY PLANTS USED IN THE DESIGN OF PARKS IN SOME CITIES OF NORTHERN IRAQ

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The study was conducted in the parks of Erbil, Sulaymaniyah, Dohuk, and Halabja cities in Northern Iraq. For this study the types of woody plants used in the design of parks in the Sami Abdul Rahman Park, Minara Park, Shanadar 1 & 2 Parks, Gilkand Park, Hawary Shar Park, Azade Park, Daik Park, Bakhe Gishty, Azade Panorama Park, Mohamad Bekhal Park, Dohuk Dem Park, Halabja Park, Bakhe Gishty, Baran Park, and Kubra Hamedpur Park. To find out the types of woody plants, the purpose of cultivation or uses, responsiveness, and success of plants in the site. Plant age or number of years of planting, the stem diameter and plant length and plant health status was determined. According to the result when visited all parks that were indicated 70 species woody plants, and total numbers of woody plants had 54% trees, 36% shrubs and 10% climbs. Also from all sections that were 39 families, types of woody plants will be 36 evergreen and 34 deciduous. Through the results and conclusions of the study, we reach the following recommendations to the planning authorities, the executive parties, the Ministry of Municipalities and the Department of Parks, and the parks managements.

KEY WORDS: Green area, park, woody plant species, Northern Iraq.

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ABBREVIATIONS

%	: Percentage
M	: Meter
Cm	: Centimeter
°F	: degrees Fahrenheit
°C	: degrees Centigrade
CEC	: Cation Exchange Capacity
CL	: clay loam
SiCL	: silty clay loam
SiC	: Silty Clay
$CaCO_3$	: calcium carbonate
Mm	: Millimeter
G	: Gram
Kg	: Kilogram
m^2	: Square meters
E	: Evergreen
D	: Deciduous

1. INTRODUCTION

The woody plants' elements design landscape scenery and have productive and eco-stabilizing functions in the landscape area. Woody plants have a special position within the greenery elements. Vegetation is considering a significant element of the landscape. They have bigger dimensions of comparison to the other plants, their organs usually have large surfaces and their biomass fills large parts in the overhead space and the soil. Short-term changes in ecosystems do not significantly affect their lifecycle and survival. Woody plants are long-lived organisms with different adaptability to changes in environmental conditions.

The purpose of woody plant inventory is determined that boundaries in green land area, from to catalogue the specific dimensions of woody and bushes. To evaluate the qualitative status in woody plants, develop accounting data for effective management in green areas. To provide information about the environmental conditions of green areas and to ensure that the size in the green areas in compliance with the applicable standards. An elevated methodology of woody plants been used for inventory in green areas of cities North Iraq.

The cities of Northern Iraq are examples in this situation, especially after the urban development and expansion in recent years, at this stage, many parks and gardens have been created with wide sizes and different designs. More suitable for individual trees.

The afforestation projects have taken a large share in the government's interest of cities North Iraq by increasing the green areas within the cities by planting the streets and spreading gardens, public parks, and children's playgrounds. Where the plants of all kinds and forms to modify the climate, temperate and improve the soil and increase fertility and resistance to air pollution and the occurrence of dust storms and breaking the intensity of wind and noise reduction in addition to aesthetic, coordination and economic. One of the most important factors leading to the success of afforestation is

the selection of suitable plant species to withstand climatic conditions in Northern Iraq. There is an urgent need to remove the noise of the city to any place where there is calm and only available in public parks where trees and shrubs help absorb noise (Badr, 1985).

In addition, ornamental trees of general have many economic benefits in various fields of agriculture, medicine, and industry, and therefore their value is psychological and useful. Unfortunately, we always look forward to choosing the flowering herbs for the garden, neglecting the woody plants, trees, shrubs, and climbers, which are the most necessary and most sustainable for the garden. This may be due to the rapid growth of the annual flowers and their low cost, as well as the flowering colour (Bryant et all., 1999).

The problems arise from an increase in the number of importation woody plants in the cities of Northern Iraq, especially after the uprising in 1991, increases types of dendroflora in a city, and the negligence of the gardens and recreational areas, the problem of this research stands out in the following points:

- The lack of previous research studies on the woody plants' that have in the cities of Northern Iraq.
- Unavailability of previous studies on how to use woody plants (trees, shrubs, and climbs) in the park's design process in cities of the Region and the design errors and their relation to environmental improvement.
- The lack of clear local international standards and their effects on the importation of woody plants.
- The lack of attention in choosing the types of woody plants and vegetation and its use in gardens.
- The presence of a vast difference between woody plant importation and original the actual design.

The research aims to achieve the following objectives including:

- Study of the reality of the woody plant (trees, shrubs, and climbs) in the design process of each Park and identifying the important design and functional problems.
- To each a comprehensive perception among local and international standards and its effects on the design of woody plant gardens in North Iraq.
- Woody plant species that have use in the design of each park and their suitability and success in the region conditions.
- Study of the reality of the woody plant situation in the park in terms of quantity and how used in the design, environmental purposes.
- To identify the type of woody plant around the world and taking advantage of them for design parks and in the future
- Reach to some conclusions and recommendations to address some of the problems experienced by the woody plant in the future.

Here comes the importance of studying the reality of these components for woody plants that are there in the landscape cities, including natural components (Growth type, Plant age, Stem diameter, Plant length, Success in the site, Health of woody plants, Uses of woody plants for landscape) in order to know how to use their types, their suitability, success of the site. As the first requirements of providing parks and gardens with efficient designs, treatments and successful strategies are a provision in special studies, and research for a purpose by which this research seeks to cover the simple fraction of them.

2. PREVIOUS STUDIES

In the subject matter here, a lot of studying and subject matters wear published and these ones are somewhat studying proximity and are connected to our study.

For example in the study of Pyatnytsky (1960) and Savelieva (1975), the study was to determine the species composition and evaluate the life state of woody plants in the park stands of industrial cities of the region. A survey conducted in 2011–2012 by means of a route-visual method. Their specific morphological features determined the taxonomic identity of plant species. They determined some densitometric parameters, such as the trunk diameter measured by means of callipers at the height of 1.3 m from the root collar, height of plants, measured by the BM altimeter and age of plants. Trees and shrubs distributed into classes by the level of height by means of the methods conventionally used in dendrology and viability of plants evaluated over 8-point scales.

Also Ito et al. (2003), Sarlov-Herlin & Fly (2000), Moore & Allen (1999), and Kiyono (1990), in their study clarified the factors limiting the occurrence of woody plants (trees, shrubs and climbing plants). They compared the occurrence of woody plants in both sugar plantations and evergreen, broadleaved natural forests in a warm-temperate region in order to characterize the understory vegetation of sage plantations. They evaluated the influence of major stand attributes (stand age, light environment, micro topography and forest edges), on each species occurring in sugar, plantations the plantation-preferring species also tended to occur in younger stands, corresponding to their requirement for disturbance. This was partly because the surveyed stands generally well thinned, and now stands completely lacked understory vegetation. Thinning practice in the region is mostly associated with shrub clearing procedure before each thinning episode. The negative influence of this clearing treatment on understory vegetation also might reduce the positive effects of the improvement of light climate by thinning. The simulation results also displayed an increase in the diversity of evergreen shrubs characteristic of evergreen broadleaved forest type with

stand age, indicating their ability to recolonize and respond to developmental changes in the canopy and light conditions in the understory.

However, Scanlon et al. (2005 and 2006), Dale et al. (2015) in this review indicates that groundwater recharge is sensitive to vegetation transition and the impacts of woody plant encroachment on water budget are complex and still under-studied.

Isotopes and geophysical methods were identified as powerful tools to understand deep drainage and recharge. Hydrological impact in woody plant encroachment is different between sandstone bedrocks and karst regions, and between deep soils and shallow soils. They identified six different methods: water balance, water table, isotopes, chloride mass balance, electrical geophysical imaging, and modelling used in the study the impact of woody encroachment on groundwater. Woody plant encroachment could alter soil infiltration rates, soil water storage, transpiration, interception, and subsurface pathways to affect groundwater recharge. The impact is highly variable, with the extent and the magnitude varying across the soil, substrate, plant cover, and topographic locations. Our review revealed mixed effects of woody plant removal on groundwater recharge. Studies of litter interception, root water uptake, soil moisture dynamics, and deep percolation along with the progression in woody plant encroachment are still limited, warranting further experimental studies focusing on groundwater recharge. Overall, information about woody plant encroachment impacts on groundwater resources across a range of scales is essential for long-range planning of water resources.

In addition, Folse and Roughgarden (2011), Hadany (2001) and Clarke (2011), in they genomic studies within these diverse and undomesticated species have successfully linked genes to ecological, physiological, and developmental traits directly. Moreover, comparative genomic approaches are providing insights into speciation events while large-scale DNA resequencing of native collections is identifying population-level genetic diversity responsible for variation in key woody plant biology across and within species. Current research is focused on developing

genomic prediction models for breeding, defining speciation and local an adaptation, detecting and characterizing somatic mutations, revealing the mechanisms of gender determination and flowering, and application of systems biology approaches to model complex regulatory networks underlying quantitative traits. Emerging technologies such as single-molecule, long-read sequencing is being employed as additional woody plant species, and genotypes within species, are sequenced, thus enabling a comparative "evo-devo" approach to understanding the unique biology of large woody plants. Resource availability, current genomic and genetic applications, new discoveries and predicted future developments are illustrated and discussed for poplar, eucalyptus, willow, oak, chestnut, and pecan.

Flayeh (1990) in the study recent was conducted a domain study for Baghdad and Mustansiriya universities. This study, unfortunately, concluded the feature of most exterior spaces the visual distortion. For disorder in selection of the site components and the materials as well, regardless of the suitability of this section to the function of that space or these spaces seldom left as bear spaces with lots of bad environmental effects, and disregarding the essential aspects, and the detail design stage may lead to a Withal (Kopsell et al. 2005). The study found that a better hardiness was shown the deciduous plants. Growth phenophases presented relatively great differences at the all observed individuals in each year and in both planting types and still greater during all period of observation. These woody species wear planted in two types of planting, plants planted directly into the soil, stayed outside during wintertime, and plants planted in pots and protected during wintertime when plants were removed into polytonal greenhouse from end of November until end of March. The results showed that there are significant differences between plants planted outside and plants protected during wintertime in all of the studied characteristics. Plants planted in-ground had the higher chlorophyll a and, chlorophyll b as well as carotene content in the leaves in comparison with plants in pots, which were in a greenhouse when temperature has recorded from 4 to 8°C. On the other hand, there was fount lower content of starch and total sugar content in the leaves of plants, which planted inland on open spaces (Kopsell et al., 2005).

2.1. The importance of woody plants

Woody plants have substantial value beyond there, the trees surrounding us are necessities it offers many benefits is planted, even after cutting, and the following are the most important benefits to the human.

2.1.1. The importance of woody plants for Psychological health

Living near trees reduces anxiety, stress, and depression by as much as 10 percent of those living in areas where there are no trees, according to a study at the University of Wisconsin. In addition, living near trees accelerates the healing process in diseases, According to research. People facing the wall during the treatment period needed larger amounts of tranquillizers, and a day or more to heal those who had their rooms overlooking the trees (Coombes et al., 2010).

Recent studies have established that the presence of trees and "nearby nature" in human communities generates numerous psychosocial benefits. A series of studies (Kuo, 2001) has determined that having trees in public housing neighborhoods lowers levels of fear, contributes to less violent and aggressive behavior, encourages better neighbor relationships and better-coping skills. Other studies confirm that hospital patients recover more quickly and require fewer pain-killing medications when having a view on nature. Finally, studies suggest that office workers with a view of nature are more productive, report fewer illnesses, and have higher job satisfaction These studies, in combination, suggest extensive economic consequences to urban people who have views of trees and nature in the course their normal, everyday activities and experiences (Wolf, 2007).

2.1.2. The importance of woody plants for Oxygen

Life without trees is impossible because it produces the oxygen we breathe. Ten large paper trees produce in each chapter enough ten people of breath for a full year. It also acts as a giant purifier that cleans the air. It also removes air pollution by cooling

the temperature through Intercepting particles of the air. Trees and vegetation in parks can help reduce carbon dioxide (a dominant greenhouse gas) by directly removing and storing carbon dioxide and indirectly by reducing air temperature and building energy use in and near parks. Park vegetation can increase carbon dioxide by either directly emitting carbon dioxide from the vegetation (e.g., decomposition) or indirectly through emissions from vegetation maintenance practices (Nowak et al., 2010).

2.1.3. The importance of woody plants for Soil

Trees clean the soil, clean up pollutants, clean up sewage and chemicals, reduce the effects in animal waste, and purify spilt and ongoing water. This is known as botanical treatment and helps to maintain soil erosion robust generalizations about WPE impacts of ecosystem C balance are elusive because of insufficient quantification in woody plant productivity in encroached ecosystems. Definitive conclusions have been further constrained by confounding methodologies used to estimate soil organic carbon pools, and how those pools change with disturbance (e.g., drought, wildfire) and land management practices (e.g., prescribed burning, brush management). These knowledge gaps amplified of regional scales were quantifying the net effects of WPE on regional carbon balance would require an accounting of the area undergoing WPE, the stages of encroachment, and the area recovering from past disturbances (Asner et al., 2003). Accordingly, we know very little about how the ecosystem (plant + soil) carbon pools change with changes to grass-woody plant abundance.

2.1.4. The importance of woody plants for Cooling

The shade under the trees cool the atmosphere and reduce the need to use the air conditioner in the summer; studies have shown that cities that do not contain trees have a temperature in 12 degrees higher than other trees planted warming is predicted to continue to take place. Considering this, Parks and green spaces have an important role to play in both the mitigation of an adaptation in climate change (Barton, 2008). Mechanisms at work of cooling by trees and other vegetation include evapotranspiration loss of water from plants as vapour into the atmosphere, which

consumes energy from solar radiation and increasing latent rather than sensible heat, cooling leaf and the temperature of the air surrounding the leaf. Shading from trees, which encompasses intercepting solar radiation and preventing the warming in the surface and air, is another mechanism, at work. Mechanisms depend critically on the type of vegetation (Bowler et al., 2010).

2.1.5. The importance of woody plants for Wind

Wind speed and direction affected by trees, the more compact the foliage in the tree or group of trees, the greater the influence of the windbreak, trees act as windbreaks during storms and cold weather. They contribute to reducing the heating bill by up to 30 percent and reduce the impact on drought of plants planted behind trees (Barian, 1977).

2.1.6. The importance of woody plants for Value of property

Planting trees increase the value of property. Because it increases the aesthetics on the property the surrounding area and increases its price by up to 15 percent or more, the hedonic pricing method is such a technique, and it assumes people's valuation of environmental attributes can be inferred from the amount they are willing to pay for these attributes through the housing market (Hanley et al, 2001). The concept of hedonic or amenity pricing acknowledges that both property values and people's spending behaviours can be affected by the presence of parks and green spaces. Measurement of the effect of parks and open space of adjacent property values has become an accepted value measurement (Wolf, 2007).

Trees and shrubs are the framework in a landscape they are the quiet achievers that are always there and that define the character of the garden.
The purposes for which trees are used summarized on the following:

- Decorate the gardens with elements from vegetable and floral beauty.
- Block unwanted views.
- Shading and decorating streets, agricultural roads and places to be shaded.

- Extracts from woody, paper, charcoal, and many useful materials such as rubber, some pigment, oils and others.
- Reduce airspeed (wind bumpers).

2.2. Woody plant uses in landscape

Woody plant is used as an important element in landscaping, single or of regular or irregular groups of different kinds in beauty. This makes the designer have rich material for manipulating him and his imagination. The trees have a constant beauty in the gardens throughout the year and throughout the days. It does not need to be changed or replaced, but it remains the remainder from the term, a portfolio of beauty, which adds to the garden year after year in different colours from the beauty to childhood of the splendour youth to the glory of ageing, it always a source that radiates tranquillity and is peaceful and reassuring. Trees and trees used as follows (Ayad, 2007).

2.2.1. Engineering uses

Some plants work to carry out the function on some facilities for construction, such as the cultivation of a group in plants close together to form plant fences that serve the same purpose as fences. This is to isolate the garden or to determine the division of certain areas or separate parts of the park from each other or to withhold the unwanted views in addition to identifying ways and walkways in the garden by cultivating plants on the side of the fences to guide the user in a certain direction. These functions are included as mentioned by (Robinette, 1972) and thus, Plants used as architectural factors in the design and coordination of sites, and the criteria for tree use can be concentrated in the following**:**

1. Cultivation in a group of fencing plants close to each other to form the walls of the plant causes the purpose of building walls for isolate the garden or to identify and divide certain areas or the separation in parts of the garden or to block each other unwanted scenes (Figure 2.1.).

2. Identify the paths and roads in the garden by planting fencing plants on its sides to guide the visitor in a certain direction.

3. Work for complete parts or vacuum units of houses to connect the garden at home or to work on the formation of a framework to highlight a particular structure or structure.

4. To achieve coverage of the defects in buildings or the work of an imaginary modification in the forms and height.



Figure 2. 1 Shape of trees in the parks (Anonymous, 2019)

2.2.2. Uses of aesthetics

Trees and other plants form the main element of the beauty in cities and the coordination on sites, parks and parks where the trees add the element of nature and beauty to the facilities and facilities and break the intensity and hardness (Figure 2.1.). The following are the coordinating and aesthetic criteria for different plant groups (Birdel, 1983)

1. Plants should use in the coordination and design of gardens as groups on modern designs with many images, especially of architectural design and in the interior.

2. Plants should use as graphic models with distinctive characteristics or attractors in their natural form and colours of their leaves or legs or flowers or the shape of their crowns and their branches or their ability for cut and shape to regular problems.

3. Plants work to give the element of nature to the place and break the lines of engineering and give a natural image of the design.

4. Allow the plants to give the required colours in the coordination (Ayad, 2007).

2.2.3. Use of the environment

Woody plant is useful to environmental the climate is controlled by the influence of sunlight, rain, and wind. The leaves that fall in the summer and released by winter through branches absorb solar energy. We feel cold in the summer when we sit under trees, and in the winter, we feel warm when trees take out this radioactive solar energy. Protect and enhance natural resources that have outstanding recreation (Figure 2.1.), conservation and educational value to the public (Aurora, 2008). In addition, trees control the direction and speed of the wind. When there is a tree density, it acts as a windbreak. Trees help stabilize the soil and ecological balance. It also takes carbon dioxide, subtracts oxygen from the day and vice versa. Drifts and there are types of trees that eliminate viruses and germs such as eucalyptus, willow, pine, oak, banana,

and cypress. Economic benefits of the tree help in obtaining timber of the industry. It is the source of many medicines. It is an important source of grazing, where the life cycle of some trees ends years later, while the roots of some of them remain in the ground for thousands of years (Nowak et all, 2010).

2.2.4. Architectural uses

Green architecture has dominated by a modern environmental trend in various areas of architectural work. The importance of the plant cover and the enhancement of its presence in urban systems, in addition to taking into account the building materials used and their suitability to the surrounding environment, while penetrating the details of the simple and large design (Anonymous, 2019). All this no longer an architectural luxury, it has become a feature of modern architecture committed to international standards. Health for man and nature in the present future, This solution can be applied to walls, facades, columns, interior and exterior spaces, The installation of green surfaces provides substantial benefits to projects, such as providing ventilated facades, energy savings, temperature control, reduction of pollutant emissions and filter UV rays (Figure 2.1.) (Anonymous, 2019).

2.3. Woody plant types

In general, woody plant sections were divided into the following and Plant Description that we have in the parks of some cities in the north of Iraq. The three types of woody plants are trees, shrubs, and climbing. The effect is that there is no boundary between these species. We find a plant, the tree, shrub, and climbing (Bryant, 1999).

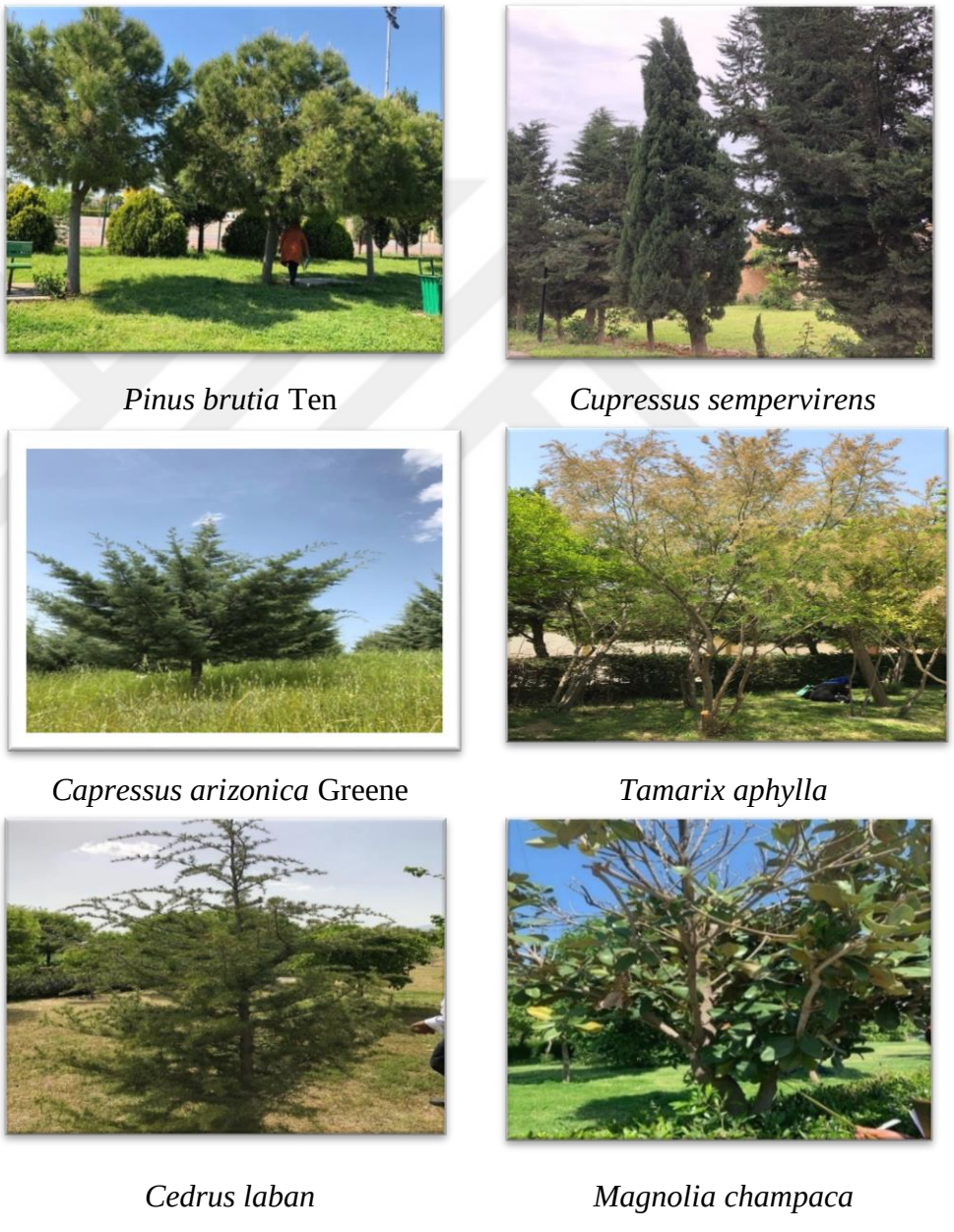
2.3.1. Trees

A woody plant whose height reaches at least 20 feet Maturity and has an original stem that is characterized by its growth and free of branches for several feet above the surface of the earth and carries a distinctive crown (Bryant, 1999).

2.3.1.1. Pine (Snawbary Zaweta)

Family: Pineaceae, **Scientific Name: *Pinus brutia* ten**

Pine is native for the eastern Mediterranean region, an evergreen conical tree whose height ranges between 20-35 m (Figure 2.2.). Its leg is clear and its bark cracks



Pinus brutia Ten

Cupressus sempervirens

Capressus arizonica Greene

Tamarix aphylla

Cedrus laban

Magnolia champaca

Figure 2.2. Pine, cypress, cypress Arizona, cedar of Lebanon and champak trees

with age, her needle leaves, and the flowers are small and numerous note, and the growth rate of the tree is medium to fast. The tree grows well under local environmental conditions and well-tolerated by harsh environmental factors in terms of temperature rise for 45°C and frost, as well as drought, in addition, wind, but tolerates low salinity, prone to infection of leaves and buds. Reproduction: With seeds. Coordinating Value: Used for decoration in streets, gardens and parks (Tofeeq, 2009).

2.3.1.2. Cypress (Serw)

Family: Cupressaceae, Scientific name: *Cupressus sempervirens*

The native citizen Cypress East Mediterranean, an evergreen tree whose height ranges from 36-76 feet, vertical cone or horizontal growth covering its leg dense branches and small scallop leaves, Memphis flowers are numerous and small, spherical conical fruits consist of several scales containing seeds, roots scattered, and the growth rate of the tree is fast (Figure 2.2.). Plant tolerance to local environmental conditions: The mullet grows well under local environmental conditions and well-tolerated by harsh environmental factors of terms in temperature rise for 45°C and more frost, as well as drought and wind, but it carries little salinity. Reproduction: With seeds. Format value: Used for decoration in the streets, gardens and parks. Especially in landscaping engineering style as used to establish windbreaks (Bryant, 1999).

2.3.1.3. Cypress Arizona (Sarwy Ziwy)

Family: Cupressaceae, Scientific name: *Capressus arizonica* Greene

Cypress Arizona, is a type of North American tree of the cypress family, is an evergreen coniferous tree with a conical for a conical oval crown. Growing to heights of 10-25 m (32.8-82.0 ft), foliage grows in dense sprays, ranging from light green to dark blue (Figure 2.2.). Reproduction: With seeds. Format value: Used for decoration on the streets, gardens and parks. Especially in landscaping engineering style as used to establish windbreaks and green belts (Bryant, 1999).

2.3.1.4. Athel Tamariks (Gaz)

Family: Tamaricaceae, Scientific name: *Tamarix aphylla*

Tamarix is an evergreen tree, native across North, East and Central Africa, through the Middle East, in addition, into parts of western and southern Asia. The growth list is between 5-10 m wide and has a grey stalk. Its branches are white and green (Figure 2.2.). They have small squishy leaves, and violet flowers wear clustered of the end branches, they produced in the summer. Fruits have small soft seeds that fly with the wind. Limited and the growth rate of the Ethel is very fast (Bryant, 1999), conditions: The plant grows perfectly under local environmental conditions and is highly tolerant to harsh environmental factors in terms of temperature rise to 50°C. It also bears frost, as well as tolerance, for excellent drought and wind, and salinity is very high. Reproduction: by cutting of solid woody or by seeds. It uses for decoration in gardens, especially saline soils or saltwater, as well as in the streets and parks. It also used to install sand dunes and to protect fences around gardens, farms and windbreaks or green belts around cities (Tofeeq, 2009).

2.3.1.5. Cedar of Lebanon (Urzy Lubnany)

Family: Pinaceae, Scientific name: *Cedrus laban*

Cedrus laban, is a species of cedar native to the mountains in the Eastern Mediterranean basin. It is an evergreen conifer that can reach 40 m (130 ft) in height. It is the national emblem of Lebanon and is widely used as an ornamental tree in parks and gardens. A massive monopodial columnar trunk reaches up to 2.5 m (8 ft 2 in) in diameter (Figure 2.2.), and grows in a horizontal plane. The leaves are needle-like, best grown in deep, moist but well-drained, acidic loams in full sun. Drought tolerant once established, intolerant in poorly drained wet soils. Best winter hardiness in the true cedars. Site trees of locations protected from winter winds (Bryant, 1999).

2.3.1.6. Champak (Magnolia)

Family: Magnoliaceae, Scientific name: *Magnolia champaca*

The range of southern magnolia extends from eastern North Carolina, south along the Atlantic Coast for the Peace River of central Florida, then westward through roughly the southern half of Georgia, Alabama, Mississippi, and across Louisiana into southeast Texas. It is a large evergreen tree, which grows 30 m tall and 1.8 m in trunk diameter, bull-bay, big-laurel, or large-flower magnolia, has large fragrant white flowers, very popular ornamental that planted around the world (Figure 2.2.). This moderately fast-growing medium-sized tree grows best on rich, moist, well-drained soils of the bottoms and low uplands of the Coastal Plains of Southeastern United States. It grows with other hardwoods, and marketed, as magnolia lumber along with other magnolia species make furniture pallets and veneer, wildlife eats the seeds, and florists prize the leathery foliage (Bryant, 1999).

2.3.1.7. Kurrajong Bottle Tree (Brockton)

Family: Malvaceae, Scientific name: *Brachychiton*

This genus consist of around 30 species of warm - climate, evergreen or dry-season deciduous trees and shrubs. They grow for 4-30m tall, all Australian. The leaves are diverse in shape (Figure 2.3.). Cultivation noted for Brachychiton requires light, well-drained, preferably acidic soil. They also prefer a shell tree position with protection from cold or salty winds and from frost when young. Several of the currawongs are widely planned in parks and streets. Propagate from fresh seed in spring or by grafting in the case of selected clones (Bryant, 1999).

2.3.1.8. Eucalypt Gum Tree (Kafur or Yukalbtoz)

Family: Myrtaceae, Scientific name: *Eucalyptus* L.

Eucalyptus is a group of trees native to Australia. Their evergreen leaves are alternate or opposite, the gum can grow up 12-150 feet (3.5-45 m) smooth-margined and simple, and usually green or blue-grey with lighter undersides. Oil on the leaves is especially fragrant, it useful in many pharmaceutical preparations. Eucalyptus may grow as houseplants, shrubs, small trees or very large trees (Figure 2.3.). Used for decoration in the streets, gardens and parks. Especially in landscaping engineering style as used for, establish windbreaks and green belts (Barian, 1977).

2.3.1.9. Bottlebrush (Gula Fllcha)

Family: Myrtaceae, Scientific name: *Callistemon* spp.

Callistemon Viminal's occurs naturally on the east coast of Australia from Cape York to north-east New South Wales (Figure 2.3.). It is more common along watercourses on the coastal plains where it forms a shrub or small tree up for 8 m tall; it is an evergreen tree, Bloom time year-round, flower colour red, yellow and white (Bryant, 1999). Width: 3-4 feet**.** Exposure: Full Sun**.** Summer Dry: tolerance**.** Irrigation (H_2O Info): Low Water Needs**.** Winter Hardiness: 20-25°F (Barian, 1977).

2.3.1.10. Wattle or Golden Mimosa (Acacia)

Family: (Leguminosae) Mimosaceae, *Scientific* name: *Acacia cyanophylla*

Native range: Australia. The evergreen tree ranges from 4 to 5 m. The branches are limp and short-legged, the leaves are simple long-stemmed and yellow flowers appear in spring, the fruits are small horns, the roots are scattered and deep, growth rate of the tree is very fast (Bryant, 1999). Conditions: It well tolerated for extreme environmental factors. The temperature rises for 45°C but does not tolerate frost. It

also bears good drought and wind but carries a low salt content. Reproduction: Seeds (Figure 2.3.). Format value: Used as a tree to decorate streets, gardens, and parks as well as give shade as well used to install sand dunes (Harris, 1983).



Brachychiton



Eucalyptus L.



Callistemon spp



Acacia cyanophylla



Phoenix dactylifera



Washingtonia filifera

Figure 2.3. Kurrajong bottle tree, eucalypt gum tree, bottlebrush, golden mimosa, date palm and California palm trees

2.3.1.11. Date Palm (Dar Xurma)

Family: (Palmae) Arecaceae, *Scientific* name: *Phoenix dactylifera*

Probably native to northern Africa and southwestern Asia, date palm the tree has an average growth rate of one to one, conditions: The palm grows perfectly under local environmental conditions. The temperature rises for 50°C but does not tolerate frost bound. It is also excellent for drought, wind and salinity tolerance (Figure 2.3.). Reproduction: seeds, beans and tissue culture. Uses for decoration in parks, parks, streets and roads (Bryant, 1999).

2.3.1.12. California Palm (Washtonia)

Family: (Palmae) Arecaceae, *Scientific* name: *Washingtonia filifera*

This tree native to the far southwestern United States, evergreen tree with a vertical height of 15-25 m. Its long stem crown is thick at the base, swollen, covered with leafy bases and visible when it grows older, the growth rate of the tree is slow (Figure 2.3.). Conditions: The Oceania palm grows exceptionally well under local environmental conditions (Anonymous, 2009). The harsh environmental factors well tolerated in terms of temperature rise to 47°C and do not tolerate frost, and well withstand drought, wind and salinity. Reproduction: Seed after treatment with watering. It is uses for decoration in the streets, roads, gardens and parks (Bryant, 1999).

2.3.1.13. Gillespie, Annie Paulson (Xar)

Family: Fabaceae, Scientific name: *Sophora secundiflora*

The native from central Texas west for New Mexico, it is slow-growing. It is an evergreen, usually a multi-trunked shrub or small tree ranging from just a few feet tall to more than 30 ft. in height, glossy compound leaves composed. The bluish lavender flowers (Figure 2.4.). Water Use: Low, Medium, Light Requirement: Sun,

Part Shade, Soil Moisture: Dry, Moist, Soil pH: Alkaline (pH-7.2), CaCO3 Tolerance: High, Drought Tolerance high, Tolerance for cold, and heat, Soil Dry, rocky, well-drained, preferably calcareous soils. Sandy, Sandy Loam, Medium Loam, clay loam, and clay, flower color Purple, flower Season, spring, propagation method, Seed (Barian, 1977).



Sophora secundiflora *Schinus molle* L.

Salix babylonica L. *Ligustrum* species

Olea europaea L. *Parkinsonia aculeata* L.

Figure 2. 4 Gillespie, pepper tree, babylon willow, ligustrum, olive and jerusalem thorn trees

2.3.1.14. Pepper tree (Bibary jwany)

Family: Anacardiaceae, Scientific name: *Schinus molle* L.

The *Schinus molle* L. is native to South America, it is an evergreen tree that grows up for 15 meters (50 feet) tall where it grows mostly on arid slopes and rocky soils of altitude, in areas characterized by long drought periods. It easily reproduces by seed, which is to be sown as soon as picked (Figure 2.4.). Much ornamental plant, widely spread in Mediterranean climate zones, it adapts to every type of soil, even if poor; when adult it resists long drought periods and to temperatures of around -6°, -8 °C. When positioning it (Barian, 1977).

2.3.1.15. Babylon Willow or Weeping Willow (Shora Biy)

Family: Salicaceae, Scientific name: *Salix babylonica* L.

Salix babylonica is a medium- to large-sized, medium-toed-to-large tree with a length of 20-25 m (66-82 ft). It grows fast, but has a short life, between 40 and 75 years. Buds are yellowish-brown, small buds (Figure 2.4.). The leaves are alternate and spiral arrangement, tight and light green, Reproduction: With seeds. Format value: Used for gardens and parks (Philip, 1975).

2.3.1.16. Ligustrum (Qazwany Jwany or Lagstrum)

Family: Oleaceae, Scientific name: *Ligustrum species*

Privet is a group of shrubs and small trees of southern and eastern Asia. They may be evergreen or deciduous, and are tolerant of different soil types, are grows to about 30 feet in height. The leaves are opposite on the stem, folding upward in a “v” shape (Figure 2.4.). The flowers are small and white. Reproduction, with seeds, Format value: Used for, gardens and parks, Light: Sun, part shade, Soil: Most soils,

Moisture: Dry, moist, Duration: Perennial, Bloom Color: White, Bloom Period: July-September (Harris, 1983).

2.3.1.17. Olive (Zetun)

Family: Oleaceae, Scientific name: *Olea europaea* L.

The original olive trees to the Mediterranean Sea, Asia, and Africa. An evergreen tree ranging in height to 5-7 m to many forests, small leaves. Leather is a silver texture on the underside, the small yellowish-white flowers clustered and have a good smell, and the fruits of the seed within one seed and the roots scattered and vertical, its growth slow down. Conditions: The olives grow well under local environmental conditions and the exceptionally harsh environmental factors, especially the temperature rise to 47°C, as well as drought and wind, are also good tolerant to salinity (Figure 2.4.). Reproduction: Side residue, mind, vaccination and seeds, and uses for decoration in streets, gardens (Bryant, 1999).

2.3.1.18. Jerusalem thorn (Sesaban or Drky quds)

Family: Fabaceae, Scientific name: *Parkinsonia aculeata* L.

Native from central Texas south as far as northern South America and west to Arizona, this is a very fast-growing, Paloverde is a spiny shrub or small tree, as high as 30 feet but normally half that, with long, graceful, slightly drooping branches bearing many long, delicate leaves and sprays of yellow flowers (Figure 2.4.). The 5 yellow petals of the flower, The Paloverde has a profusion of blossoms through the warm months, especially after rains, used for decoration in streets, gardens, and parks. Light: Sun, Soil: Well-drained soils of any type: sands, loams, clays, caliche; does well in disturbed soils and poor soils and tolerates salinity and occasional flooding. Moisture: Dry, moist. Duration: Perennial. Bloom Color: Yellow. Bloom Period: April-August (Barian, 1977).

2.3.1.19. Chnar, Chnnar (Sura Chnar)

Family: Platanaceae, Scientific name: *Platanus occidentalis* L.

American sycamore is the original San Antonio River Basin. It is a broad-brimmed tree, 75-100 feet long, with a huge trunk and an open crown of large, wrapped branches. Spherical fruits often last until December. The leaves are large, medium to dark green, maple-shaped to brown in autumn (Figure 2.5.). Used for decoration in the streets, as used to establish windbreaks. Light: Sun, shadow part, shadow, Soil: moist, Sandy silty clay or Clay, Boom period: March and April, Reproduction: With seeds (Bryant, 1999).

2.3.1.20. Black Poplar (Spender)

Family: Salicaceae, Scientific name: *Populus nigra* L.

Plant Black Hawar, a type of Algiers of the genus Populus, native to Europe, Southwest Asia and Central Asia, and North, The black horseradish is a medium for large medium to large tree, 20-30 m long and rarely 40 m long, the tree characterized by rapid growth and is able to colonize open areas quickly, Plant tolerance for local environmental conditions (Figure 2.5.). Reproduction: With seeds, Format value: Used for, gardens and parks (Bryant, 1999).





Platanus occidentalis L. *Populus nigra* L.





Quercus aegilops L. *Quercus infectoria* olive





Morus nigra L. *Fraxinus rotundifolia*

Figure 2.5. Chnar, black poplar, oak, aleppo oak, black mulberry and manna ash trees

2.3.1.21. Oak (Barw)

Family: Fagaceae, Scientific name: *Quercus aegilops* L.

Oak trees 120 ft (36m) high or shrub 3 ft (1 m), high in an oak species (Figure 2.5.). There are approximately 600 species present. The original oak to the northern hemisphere and includes deciduous and evergreen species extending from mild to cold. Light: Sun, shadow part, shadow**.** Soil, different soil and humidity conditions sandy, sandy loam, medium clay, clay loam, clay, kale type, limestone-based**,** moisture dry, wet, wet**,** length durable**,** bloom colour: yellow, green, brown, Reproduction with seeds, Format value: Used for, gardens and parks (Philip, 1975).

2.3.1.22. Aleppo Oak (Dar Barw mazw)

Family: Fagaceae, Scientific name: *Quercus infectoria* olive

Native to parts of southern Europe and the Middle East Turkey, Iran, Iraq, is a small tree with a height of one to two meters to six feet.) The stems are crooked, bushy or tree-shaped, with a height of 10-20 meters (Figure 2.5.). Light: Sun, shadow part, shadow. Soil: Different soil and humidity conditions; sandy, sandy loam, medium clay, clay loam, clay, kale type, limestone based. Moisture: Dry, Wet, Wet. Length: Durable. Bloom colour: yellow, green, brown. Reproduction: With seeds. Used for, gardens and parks (Barian, 1977).

2.3.1.23. White Mulberry or Black Mulberry (Tw)

Family: Moraceae, Scientific name: *Morus alba* L., *Morus nigra L*.

Known as white berries or blackberries, is a fast-growing berries tree, small for medium-sized. Its length reaches 10-20 m (33-66 ft). It is generally a short-lived tree with a life-like life (Figure 2.5.), although some samples are more than 250 years old. This species is native to North China and is widely cultivated and naturalized elsewhere (US, Mexico, Australia, Kyrgyzstan, Argentina, Turkey, Iran, Iraq, etc.), cultivate berries to coordinate gardens. Light: Sun, shadow part. Soil: Most soil. Moisture: moist, dry. Bloom colour: green. Bloom period: March and June Reproduction: With seeds and of the wooden mind (Barian, 1977).

2.3.1.24. Manna Ash (Bnaw or Dara Rash)

Family: Oleaceae, Scientific name: *Fraxinus rotundifolia*

Medium-sized trees with a length of 12-20 meters, leafy leaves, turbulent sites, waste areas, waterways, coastal areas, wetlands, grassland and open forest lands in temperate regions of Australia (Figure 2.5.). Desert ash also was known. Widely planted like a tree in the streets and garden and spread in the grasslands and the original

pastures, in addition to the riverbanks and sewage lines, local plants that compete for moisture, reproduction: with seeds (Barian, 1977).

2.3.1.25. Chinaberry Tree (Dar Tasbih or Zhahra Masy)

Family: Meliaceae, Scientific name: *Melia azedarach*

Chinaberry tree is not original of the San Antonio River Basin. It grows for 50 feet the leaves change to yellow in the autumn, and five petals bloom of early spring. The fruit of yellow berries is made of brown seed capsules. Branches have a purple cast and brown stains (Figure 2.6.). This tree can form a dense forest to replace native plants and inhibit the growth of other plants by releasing a toxic compound. This tree is also toxic to many animals as well as humans (Bryant, 1999). Light: The sun. Soil: Most soil. Moisture: dry, wet. Bloom period: March and June. Reproduction: with seeds (Bryant, 1999).

2.3.1.26. Black Locust or Bristly Locust (Dary Aqaqia)

Family: Fabaceae, Scientific name: *Robinia hispida, R. pseudoacacia*

The tree deciduous, it is a length reaches 3 for 7 m and often emits thorny stems. The leaves are feathery shaped, Problems; Borers can be a significant problem (Figure 2.6.). Branches are susceptible for damage from heavy winter snows and ice storms, Garden Uses excellent flowers and foliage specimen, Good plant for stabilizing embankments and slopes and for planting in poor, dry soils Bloom time May, Cooler rosy pink to purplish-red, Sun, Full sun. flower showy (Bryant, 1999).

2.3.1.27. Honey Locust (Gladishia or Ponciana)

Family: Fabaceae, Scientific name: *Gleditsia tracanthos* L.

Gleditsia triacanthos, also known as the thorny locust, is a deciduous tree, native to central North America where it is mostly found in the moist soil of river valleys. It grows, height of 20-30 m, with fast growth, and is relatively short-lived, having a life span of about 120 years (Figure 2.6.).



Melia azedarach



Robinia hispida



Gleditsia tracanthos L.



Delonix regia Bojer



Ulmus Americana



Ailanthus altissima

Figure 2.6. Chinaberry tree, black locust, honey locust, roya poinciana, American elm and tree of heaven trees.

The leaves are pinnately compound of older trees but bipinnately compound on vivid young trees. The plant grows perfectly under local environmental conditions. Its tolerance is excellent for harsh environmental factors. The temperature rises to 47°C, low to frost, drought and wind and is good for salinity. Reproduction: Seeds that need to treat with hot water before planting. Format value: The plant used for the presence of thorns as windbreakers (Barian, 1977).

2.3.1.28. Roya Poinciana (Gula malik)

Family: Fabaceae, Scientific name: *Delonix regia* Bojer

Delonix regia is a species of a flowering plant. It noted for its fern-like leaves and flamboyant display of flowers. The native in Madagascar and of many tropical parts of world. It grown as an ornamental tree grows only about 40 feet (12m). The Royal Poinciana requires a tropical or near-tropical climate but can tolerate dry and salty conditions (Figure 2.6.). It prefers an open, free-draining sandy or loamy soil enriched with organic matter. The tree does not like heavy or clay soils and flowers more profusely when kept slowly dry. In addition to its ornamental, value (Philip, 1975).

2.3.1.29. American Elm (Narwand)

Family: Ulmaceae, Scientific name: *Ulmus Americana*

This species occurs naturally over eastern and central USA, and southern Canada these trees have spread of most parts northern hemisphere. It can reach a height of 120 ft (36 m), Elm trees, deciduous and semi-deciduous, Cultivation of many species and varieties as trees decorated with streets, gardens and parks (Figure 2.6.). Environmental requirements include the following. Light: Sun, shadow part. Length: Durable. Bloom colour, red, green. The boom period: February – April. Soil; sandy, sandy loam, medium silt, clay loam, clay, limestone based. Moisture: Moist. (Barian, 1977).

2.3.1.30. Tree of Heaven (Zmana Cholaka)

Family: Simaroubaceae, **Scientific name: *Ailanthus altissima* (Mill) swingle**

Tree of heaven is native to China. It can grow up to 100 feet tall. The leaves can be up to four feet long with up to 25 leaflets. Flowers of this tree are small and yellow, located close to the ends of the branches, and have a foul fragrance (Figure 2.6.). The seeds tend flat and twisted looking. This tree produces large amounts of seeds, grows very quickly. It can be found growing almost anywhere and once established can form large dense thickets. Light- Sun, part shade, Soil, most soils, moisture, dry, moist, bloom description, yellow, Green, Bloom time, July-September (Bryant, 1999).

2.3.1.31. Judas Tree or Love Tree (Arxawan)

Family: Caesalpiniaceae, **Scientific name: *Cercis silliquastrum***

The native to regions close to the Mediterranean and Black sea coasts, It is a small tree, seldom exceeds 25 ft (8 m) even after several decades (Figure 2.7.). This tree is known for its beautiful purplish flowers that bloom in the spring. The seeds are

small, red and appear in small bunches along the limbs. Spread 15.00 to 25.00 feet. Bloom Time: March to April. Bloom Rose-purple. Sun, Full sun to part shade. Attracts, Butterflies. Soil, Well-drained, calcareous, rocky, sandy, loamy, or clay soils; (Barian, 1977).

2.3.1.32. Cherry Plum (Haluzhay Jwany)

Family: Rosaceae, Scientific name: *Prunus cerasifer pissardu*

Native to Turkey and the Caucasus region, thornless plum has long been cultivated Europe. It grows to about 30 ft. (9 m).The Prunus are also ornamental species and cultivars with beautiful flowers (Figure 2.7.). The genus includes several shrubby species, but most are trees. It was tolerant of dry conditions. Light**:** Sun, part shade**.** Moisture: Dry, moist**.** Duration: Perennial**.** Bloom Color**,** white, pink**.** Bloom Period**,** February-April, Soil, Dry to moist, well-drained soils; sandy, sandy loam, medium loam, clay loam, clay (Harris, 1983).

2.3.1.33. Catalpa, Indian Bean Tree (Katalba)

Family: Rosaceae, Scientific name: *Catalpa bignonidias, Catalpa syringaefolia*

It is a deciduous tree that grows to 12 m for 15 m (39 for 49 feet) at an average rate. Access to the region (UK) is difficult and not frosty. It is in the flower from June to July, the seeds ripen from October to December. This species is hermaphrodite (has male and female members alike) and is vaccinated by bees (Figure 2.7.). Suitable for, light soil, medium and heavy. PH, Acid, neutral and alkaline soil. Cannot grow in the shade. Can withstand air pollution. Moisture, dry (Barian, 1977).

2.3.1.34. Princess Tree, Empress Tree (Paulounia)

Family: paulowniaceae, scientific name: *Paulownia elengata*

The plant's leaves are very large and pubescent 'fuzzy-hairy'. This species can withstand a very wide range of environmental conditions. It does not grow at higher altitudes, however. It is a species of tree in the family Paulowniaceae, native to Asia it cultivated as an ornamental tree for use in gardens and Parks; It is select for its purple flowers and its shade tolerance (Figure 2.7.) (Bryant, 1999).



Cercis silliquastrum



Prunus cerasifer pissardu



Catalpa bignonidias



Paulownia elengata



Albizia julibrissin var.



Acer L.



Wisteria floribunda



Juniperus oxycedrus L.

Figure 2.7. Judas tree, cherry plum, catalpa, princess tree, silk tree, maple, wisteria and prickly juniper trees

2.3.1.35. Silk Tree (Albizia)

Family: Leguminosae, Scientific name: *Albizia julibrissin* var. *rosea*

Julibrissin is a small deciduous tree growing to 5–16 m tall. In the West Indies and certain parts of South America this tree known as a 'Shak Tree' because of the sound, the seeds make in the pod. The roots are scattered superficial and the growth rate of the tree is very fast the plant tolerated under local environmental conditions. The harsh environmental factors are excellent in terms of temperature rise to 47°C, do not tolerate frost, and are well tolerated by drought and salinity. Nevertheless, they are less tolerant of the wind where they need props and tie. Reproduction: Seeds that treated with hot water before planting (Figure 2.7.). Uses for decoration and shading in streets, gardens, parks (Bryant, 1999).

2.3.1.36. Maple (Kawt or Acer)

Family: Aceraceae, Scientific name: *Acer* L.

This species is a deciduous, its beautiful small tree, height**:** 10-15 m, which develops a spreading crown on arching branches, is one of the best snake bark, maples. Its stunning bark which starts red on young shoots eventually turns for green and white

serpentine stripes (Figure 2.7.). Large mid-green leaves that flush orange, pink and yellow in autumn add year-round interest. It prefers a sheltered location but is fully hardy and it is grown in almost all well-drained soils. it is ideal for a courtyard or garden setting (Barian, 1977).

2.3.1.37. Wisteria (Wisteria)

Family: Fabaceae, Scientific name: *Wisteria floribunda*

The native to Japan, growing to 9 m, it a woody, deciduous twining climber (Figure 2.7.). It brought from Japan to the United States; Wisteria prefers moist soils and full sun, Plant: deciduous woody, twining vine that climbs upwards in a counterclockwise direction; leaves: alternate, compound. Flowers, fruits, and seeds, flowering, occurs in April before the leaves expand. Flowers are violet to violet blue. Spreads: by seed which, in riparian areas, is transported by water; vegetative by producing stolon's (above-ground stems) that produce shoots and roots at short intervals (Barian, 1977).

2.3.1.38. Prickly Juniper (Juniperus)

Family: Cupressaceae, Scientific name: *Juniperus oxycedrus L*

Juniperus thermophile shrub or small tree native across the Mediterranean region, around the Black Sea and the Middle East. It grows in dry areas on the coasts and lowlands under Mediterranean climate conditions, but it also found in higher elevations in wetter forests with a more continental environment. It is suitable as an ornamental tree; which grows up to 10-15m in height (Figure 2.7.). The leaves are needle-like and in alternating whorls of three. This species is dioecious. The male plants have solitary pollen cones in the leaf axils (Bryant, 1999).

2.4. Shrubs

This is a woody plant that is no more than 20 feet tall and usually has more than one vertical stalk, the tree may be shrivelled or predatory, such as the Gaultheria shrubs.

2.4.1. Lilac Hibiscus (Dawany Gula hero)

Family: Malvaceae, Scientific name*: Alyogyne huegelii*

Lilac hibiscus is a native Western Australia. An evergreen shrub that grows for about 6-10 feet tall and 6-8 feet wide. A large-flowered shrub, highly variable in colour, is similar to that of Hibiscus. It is previously placed in that genus (Figure 2.8.).



Alyogyne huegelii



Nerium oleander



Thuja orientalis



Vitex agnus-castus



Photinia glansmispel × fraseri



Pittosporum heterophyllum

Figure 2.8. Lilac hibiscus, oleander, oriental arborvitae, lilac chaste tree, fraser photinia and chinese pittosporum shrubs

It is widely cultivated as a flowering plant for the garden. Shrubs grow well under local environmental conditions. Temperatures are moderately harsh at 42°C, do not tolerate frost and are moderately drought and wind tolerant, but they are less tolerant to salinity. They are suitable for deep, moist soil, easy to drain, and susceptible to infection of the spider Cultural Information: Category: Flower Color, Light Blue. Reproduction: by reason. Bloom time, Year-round.. Exposure, Full Sun. Irrigation: Low Water Needs (Bryant, 1999).

2.4.2. Oleander (Gula Zhala)

Family: Apocynaceae, Scientific name*:* Nerium oleander

Nerium oleander a native to a broad area from Mauritania, Morocco, and Portugal eastward through the Mediterranean region. Evergreen shrub ranges between 1-4 m. Their branches are dense from the base. The leaves are simple. Flowers wear clustered at the branches. Most of the days of the year are from April to October (Figure 2.8.). The plant grows perfectly under local environmental conditions. The harsh environmental factors are excellent in terms of temperature rise to 47°C, and well tolerated by drought, wind and salinity. The decorative value: Used for decoration

in the streets, parks and public parks and used as fences and in the planting of sandy, salty and wetland (Harris, 1983).

2.4.3. Oriental Arborvitae (Soya)

Family: Cupressaceae, Scientific name*: Thuja orientalis*

The Native Range: China, Korea, Russian Far East. Needled evergreen shrub with cones ranging in height from 3-5m. Their stem is short, with thick crowns, with small flowers. The fruits rounded cones end in a claw, the roots are scattered, and the growth rate of the bush is slow, the bush grows perfectly under local environmental conditions, and the harsh environmental factors tolerated in terms of temperature rise to 40 ℃ (Figure 2.8.). Uses for decoration in streets, gardens, and parks (Philip, 1975).

2.4.4. Lilac Chaste Tree (Lapa Myra or Kfr)

Family: *Lamiaceae*, Scientific name*: Vitex agnus-castus*

A native to the Mediterranean and Central Asia, deciduous shrub ranges between 2-4 m. Many branching from the base, the leaves are silvery grey, the flowers are small white clustered, the fruits are small black pulp, the roots are scattered locally and dense, and the growth rate of the shrub is fast. Shrubs grow well under local environmental conditions, withstand harsh environmental factors well, well withstand drought, wind and salinity (Figure 2.8.). Uses for decoration in the streets, gardens, parks (Barian, 1977).

2.4.5. Fraser Photinia (Fotinia)

Family: Rosacea, Scientific name*: Photinia glansmispel × fraseri*

Photonics typically grow from 4–15 m tall, the red tip Photinia (Photinia x fraseri) is a popular shrub used as a fencerow in the eastern half of North America.

The oval leaves of Photinia plants start out red but turn into the dark evergreen after a couple weeks to a month. During the spring, the Photinia also has small white flowers that produce red fruits that often last into the winter. It is important to provide the red tip Photinia with a few basics to maintain a healthy plant and avoid Photinia disease. Be sure to provide a well-drained soil so that it is not too wet. Photinia plants also prefer full sun, but it can tolerate partial shade (Figure 2.8.). Bloom Time, April to May. Bloom Description, Flower, Showy, Fragrant. Leaf, Colorful, Evergreen. Fruit, Showy White. Sun, Full sun to part shade. Water, Medium (Harris, 1983).

2.4.6. Chinese Pittosporum (Pittosporum)

Family: Pittosporaceae, Scientific name*: Pittosporum heterophyllum*

Pittosporum tobira is an attractive evergreen shrub. The native to Asia and Africa. Its tough durable shrub that can withstand severe pruning, is drought, heat and salt spray tolerant. Variegate' is a slightly smaller shrub with creamy white leaf edges. It has showy fragrant blooms that smell as a white blossom has and appear in late spring (April-May). It makes an excellent specimen plant (Figure 2.8.). Where it does not winter hardy it grows well as a container plant that moved indoors when temperatures cool down (Harris, 1983).

2.4.7. Myrtle (Mortk bondaror)

Family: Myrtaceae, Scientific name*: Myrtus communis*

Under the evergreen shrub native to southern Europe, North Africa, it grows to 5 meters (16 feet) tall. .and many branches of the base, the leaves are simple and small glossy contrasts give a nice smell when rubbed, and the berries fruits prevail when ripening contain small seeds, the roots are scattered and deep locally, and the growth rate of the shrub is fast (Figure 2.9.). The harsh environmental factors tolerated in terms of temperature rise to 40 °C, Uses for decoration and coordination in the gardens. Bloom Time, May to July. Reproduction, Seeds and brains (Harris, 1983).

2.4.8. Hopseed Bush (Dadonia)

Family: Sapindaceae, Scientific name*: Dodonaea viscosa*

Origin, Southwest United States North America. The evergreen shrub ranges from 1-3m, many branches, simple leaves, single flowers, yellow or greenish whitish colour, roots are scattered locally, and growth rate is very fast and then slow (Figure 2.9.). The plant grows under local environmental conditions in an excellent manner and bears the harsh environmental factors such as high temperature, drought, wind and salinity. Uses for fences in streets, gardens and parks. Reproduction, with seeds (Brian, 1977).

2.4.9. Spindle Tree (Euonymus or Shmshad)

Family: Celastraceae, Scientific name*: Euonymus fortune*

Euonymus evergreen shrub, a native to East Asia. The green-and-golden-leaved varieties provide a classic but colourful look for the garden. The vines can grow to between 5 and 15 feet. Cultural Information. The plant grows under local environmental conditions of an excellent manner and bears the harsh environmental factors such as high temperature, drought, wind and salinity (Figure 2.9.). Uses for fences of streets gardens (Philip, 1975).

2.4.10. Firethorn or Pyracantha (Goizhy zina)

Family: Rosaceae, Scientific name*: Pyracantha sp.*

Pyracantha evergreen shrubs with thorny branches, dark green leaves, covered in small white flowers in the spring, but the best feature of this shrub is the clusters of orange berries it has in the fall. Berries can be orange or red depending on the variety, a native to an area extending from Southwest Europe (Figure 2.9.), reproduction, Seeds

and brains. Planting time, anytime, but ideally autumn or winter. Aspect, Full sun or partial shade. Hardiness, Most are fully hardy (Harris, 1983).

2.4.11. Barberry (Parzhiny Swr or Zhrshky Swr)

Family: Berberidaceae, Scientific name*: Berberis thunbergii*

Barberry shrubs often reach a height of (6 feet) at maturity, a native in North Americaas well as yellow flowers that bloom in mid-spring. It also has sharp thorns and red, oblong berries that last well into the cold-weather months. The plant grows under local environmental conditions in an excellent manner (Figure 2.9.). İt uses to fences on streets, gardens, parks, and to identify roads, walks and rest areas in gardens. Reproduction, Seeds and brains (Brian, 1977).



Myrtus communis



Dodonaea viscosa



Euonymus fortune



Pyracantha sp



Berberis thunbergii *Cotoneaster salicifolius*

Figure 2.9. Myrtle, hopseed bush, spindle tree, firethorn, barberry and willow leaf cotoneaster Shrubs

2.4.12. Willow Leaf Cotoneaster (Kakif or Ballwk)

Family: Rosaceae, Scientific name*: Cotoneaster salicifolius*

A native to mountain areas of western China, It grows 2 to 3 feet tall, and 6 to 8 feet wide, shrubs evergreen, green shiny leaves. Plant tolerance to local environmental conditions, tolerate a wide range of soil types and plant this cotoneaster in full sun to partial shade. It is a fast grower (Figure 2.9.). Flower Color, white. Reproduction, Seeds (Harris, 1983).

2.4.13. Lantana (Minay shujairy)

Family: Verbenaceae, Scientific name*: Lantana camara*

A native to the American tropics. It hardy evergreen shrub that grows to 6- 8 ft tall, 2-6 feet. Light. The leaves can get to nearly five inches long and have toothed edges (Figure 2.10.). The flowers grow in bunches and can vary from white to rose colours. These colours change as the plant gets older. Bloom time, July-November. Reproduction, Seeds and brains (Bryant, 1999).



Lantana camara



Yucca spp



Rosa spp



Spartium junceum



Santolina icana



Flowering rosemary

Figure 2.10. Lantana, yucca, rose, spanish broom, cotton lavender and rosemary shrubs

2.4.14. Yucca (Yoka)

Family: Agavaceae, Scientific name*: Yucca* spp.

Native to Mexico and the United States (Figure 2.10.). It has more than 30 species of yucca, Evergreen woody trunk above ground or thick, branching, mostly underground main. Many cultivated as ornamentals, stems 6-8 feet. Flower Color, White**.** Seed Type, Fruit/Berry. Reproduction, Seeds and brains. Stem Texture, hairless/smooth. Leaf Shape, Simple with Pinnate or Parallel Venation (Philip, 1975).

2.4.15. Rose (Gula Bax)

Family: Rosaceae, Scientific name*: Rosa* spp

A rose is a woody perennial flowering plant. There are over a hundred species and thousands of cultivars. This group of plants can be erect shrubs, climbing or trailing with stems that often have thorns. Flowers vary in size and shape and are usually large and showy. Most species are native to Asia, with smaller numbers native to Europe. Species, cultivars and hybrids are all widely grown for their beauty and often are fragrant. Different species hybridize easily and used in the development of the wide range of garden roses, (Figure 2.10.). Shrubs grow well under local environmental conditions, under moderate temperatures 20-25°C and withstand moderately harsh environmental factors in terms of temperature rise to 40°C, well tolerate drought and wind but do not tolerate salinity, Uses for decoration in most places, (Bryant, 1999).

2.4.16. Spanish Broom (Shuashink Shih)

Family: Fabaceae, Scientific name*: Spartium junceum*

Its deciduous shrub a native (southern Europe to northern Africa). It grows to 6-10 ft tall, primarily grown for bright yellow flowers and cylindrical green stems

(Figure 2.10.). Young stems are rush-like, bright green and leafless. Older stems develop a woody bark, with flowers appearing in showy racemes. Flowers bloom July to frost. Leaves small in size, Considerable photosynthesis occurs in the young green stems, Reproduction, Seeds and brains. Sun, Full sun. Water, Dry to medium (Philip, 1975).

2.4.17. Cotton Lavender (Bezhan or Bonxoshka)

Family: Asteraceae, Scientific name*: Santolina icana*

Lavender is a small, semi-woody, tender sub-shrub with aromatic, evergreen, grows in a mound to 2 ft tall spreading to 3' wide (Figure 2.10.). It is native to (southern Europe and northern Africa). Bloom Time, July to August. Bloom Description, yellow. Sun, full sun. Water, dry to medium (Harris, 1983).

2.4.18. Rosemary (Rozmary)

Family: Lamiaceae, Scientific name*: Flowering rosemary*

Rosemary is an aromatic evergreen shrub with leaves similar to hemlock needles. It is native to the Mediterranean and Asia but is reasonably hardy in cool climates. It can withstand droughts, surviving a severe lack of water for lengthy periods. The upright forms can reach 1.5 m (5 ft.) tall, rarely 2 m (6 ft. 7 in). The leaves 2–4 cm long, the plant flowers in spring and summer in temperate climates, but the plants can be in constant bloom in warm climates; flowers are white, pink, purple or deep blue (Figure 2.10.). Uses for fences in gardens. Moreover, to identify roads, walks and rest areas in gardens (Philip, 1975).

2.4.19. Juniper (Leilandy Snawbary Xshok)

Family: Cupressaceae, Scientific name*: Juniperus* × *pfitzeriana* Gold Coast

A native from North America is a compact, spreading, evergreen shrub that typically grows 2-3ft tall and 3-4ft wide, Bloom Time, Non-flowering. Sun, Full sun. Water, Medium (Figure 2.11.). Plant tolerance to local environmental conditions grows well in well-drained soil and tolerates a wide variety of types of soils and conditions. Propagation, take ripe cuttings in late autumn through winter and root in a humid cold frame. (Bryant, 1999)

2.4.20. Mulberry (Shora Tuw)

Family: Moraceae, Scientific name*: Morus bombycis*

A native to China. It a rounded, fast-growing, deciduous tree that typically grows to 6-12 ft tall and Spread 8 to 12 ft. It usually develops a wide-spreading crown with age (Figure 2.11.). Trees introduced into North America in colonial times in an effort to establish a silk industry, Small yellowish-green flowers in drooping catkins bloom in spring (March-April). Garden Uses. Dwarf size and weeping foliage are the main reasons for growing this interesting and unusual mulberry (Barian, 1977).



Juniperus × *pfitzeriana* Gold Coast



Morus bombycis



Figure 2.11. Juniper, mulberry, crape myrtle, meadowsweet, pomegranate and golden hinoki cypress shrubs

2.4.21. Crape Myrtle (Gula Qawa)

Family: Lythraceae, Scientific name*: Lagerstroemia*

It is deciduous shrub or small tree. It typically grows to 6-25 ft tall, Spread 6 to 2 ft. It is native from the Himalayas through southern China, ornamental features include long bloom period; flowers are typically rose to red. Cultivated varieties have expanded the flower colour range to include white, pink, mauve, lavender and purple. Bloom Time: July to September (Figure 2.11.). The plant grows under local environmental conditions in an excellent manner and bears the harsh environmental factors such as high temperature, drought, wind and salinity. Coordinating Value: Used as fences on streets, gardens, parks (Barian, 1977).

2.4.22. Meadowsweet (Shazhny Sar Chiman)

Family: Rosaceae, Scientific name*: Filipendula ulmaria*

These shrubs a native to Europe and Asia that typically grows 3-6 feet, tall and features branched, terminal, stable-like panicles (4-6feet) of fragrant, creamy-white flowers in early to mid-summer. Compound, pinnate, dark green leaves (Figure 2.11.). The plant grows under local environmental conditions in an excellent manner and bears the harsh environmental factors high temperature, drought and salinity. Uses for fences on streets, gardens (Harris, 1983).

2.4.23. Pomegranate (Hanary zina)

Family: Lythraceae, Scientific name*: Punica granatum* Wonderful

Pomegranate is a multi-stemmed deciduous (evergreen in tropical areas) shrub or small tree that grows to 6-20 feet, tall (Figure 2.11.). Its attractive ornamental plant features. Plant tolerance to local environmental conditions. It is native from southern Europe to northern India, in proper growing conditions; trumpet-shaped, orange-red flowers bloom throughout the summer singly or in clusters at the branch ends. Flowers give way to orange-sized, leathery-skinned; glossy green leaves in fall, foliage turns yellow in non-tropical areas (Philip, 1975).

2.4.24. Golden Hinoki Cypress (Sarwy Qazam, Kamspars)

Family: Cupressaceae, Scientific name*: Chamaecyparis obtusa* Aurea

Chamaecyparis obtusa pine shrubs, Beautiful crown shape and needle colour ‘Aurea’ is a full size, golden version of the species with spreading, graceful branches. The well-cupped outer sprays and new foliage of this naturally irregular conifer are warm, rich yellow, while interior and older foliage provide contrast with medium

green. Uses for fences in gardens (Figure 2.11.). Plant tolerance to local environmental conditions (Bryant, 1999).

2.4.25. Sago Palm (Cycas)

Family: Cycadaceae, Scientific name*: Cycas revoluta*

Sago palm or King Sago palm, this cycad is botanically closer for conifers than to palms. This species a native to the Ryukyu Islands and southern Japan. It very slow-growing, symmetrical plant produces a crown of shiny, arching, palm-like, evergreen palmate leaves atop a shaggy upright trunk. Young plants typically grow to 2-3 ft tall over several years but may take 50 or more years, eventually reach 10 ft tall (Figure 2.12.). Sun, Full sun to part shade. Tolerate, Drought (Harris, 1983).



Cycas revolute

Figure 2.12. Sago palm shrub

2.5. Climbing

These are climbing plants, or aerial roots, and these climbers were considered characteristic of tropical forests.

2.5.1. Jasmine (Yasamin)

Family: Oleaceae, Scientific name*: Jasminum officinale*

A native range, Asia Minor, Himalayas, China. Climbing shrub with a height of 3-6 m. Spread, 3 to 5 m. It has several types of thick branches, the leaves are a single-party limb, the yellow flowers have an aromatic, the roots are scattered locally, and the growth rate of the shrub is fast (Figure 2.13.). The plant grows well under local environmental conditions. It tolerated to harsh environmental factors, where the temperature rises to 45°C and drops to frost, drought, wind and salinity. The plant used in ornamental as a climber in gardens, Reproduction, Consistency and brains. Sun, Full sun to part shade. Water: Medium. (Barian, 1977).

2.5.2. English Ivy (Haidari)

Family: Araliaceae, Scientific name*: Hedera helix*

Native Range, Europe, Scandinavia, Russia. Woody evergreen a climbing vine or trailing ground cover 20-80ft tall but spreads over 3 for 50ft. dark green leaves (to 4” long) on non-flowering stems with adventitious roots (Figure 2.13.). It tolerated to harsh environmental factors, where the temperature rises to 45°C and drops to frost, drought, wind and salinity. The plant used in ornamental as a climber in gardens and parks (Philip, 1975).

2.5.3. Trumpet Creeper (Gula Mosiqa)

Family: Bignoniaceae, Scientific name*: Campsis radicans*

It is native to the southeastern U. S. including Missouri, woody, clinging vine deciduous that attaches itself to structures and climbs by aerial rootlets. Grow to 30-40 ft high, spread 5 to 10 ft leaves are shiny dark green, Leaves turn yellow in fall. Clusters (terminal cymes) of red trumpet-shaped flowers Bloom Time in July (Figure

2.13.). It tolerated to harsh environmental factors, where the temperature rises to 45 °C, wind and salinity (Bryant, 1999).

2.5.4. Virginia Creeper (Chnga Pshila)

Family: Vitaceae, Scientific name*: Parthenocissus quinquefolia*

Native range, Eastern United States to Mexico, it a deciduous, woody vine grows to 30-50ft long or more Spread: 5 to 10 ft, stone or woody walls by adhesive holdfasts, also called sucker disks. Compound-palmate leaves emerge purplish in spring, mature to dull green in summer and change to attractive shades of purple and crimson red in fall (Figure 2.13.). Greenish white flowers in late spring to early summer appear in the upper leaf axils (Barian, 1977).



Jasminum officinale



Hedera helix



Campsis radicans



Parthenocissus quinquefolia



Rosa banksiae



Lonicera japonica

Figure 2.13. Jasmine, English ivy, trumpet creeper, virginia creeper, banksia rose and japanese honeysuckle climbing

2.5.5. Banksia Rose (Gula Baxy Xolawas)

Family: Rosaceae, Scientific name*: Rosa banksiae*

Banksian rose, is a vigorous climbing rose that is native to China. It may be trained to a pergola, arbour, fence or wall where it climbs and cover to 15-20ft or more, Spread 6 to 10 ft (Figure 2.13.). Blooms in May-June, almost thornless stems are clad with green leaves. It well-tolerated to harsh environmental factors, where the temperature rises to 45°C and drops to frost, drought, wind and salinity. The plant used in ornamental as a climber in gardens (Harris, 1983).

2.5.6. Japanese Honeysuckle (Panjay Xanm)

Family: Caprifoliaceae, Scientific name*: Lonicera japonica*

A native to Manchuria, Japan, Korea and China. Is a vigorous, deciduous, twining vine, which typically grows 15-30 ft, Spread: 3 to 6 ft (Figure 2.13.). Pure white flowers age to light yellow. Flowers appear from May to frost and give way to blackberries, which mature in late summer to fall, It well-tolerated to harsh environmental factors, where the temperature rises to 45°C and drops to frost, drought, wind and salinity. The plant used in ornamental as a climber in gardens and parks (Philip, 1975).

2.5.7. Bougainvillea (Jahannamy)

Family: Nyctaginaceae, Scientific name*: Bougainvillea spectabilis*

A native South American scrambling shrub and usually remain compact or behave as ground covers if left free-standing. Leaves are thin, sometimes downy, long narrow thorns, found on stems. Foliage is evergreen or deciduous, depending on the species and climate. Bloom Time in the summer months bloom description Purple, red, pink and yellow Figure (2.14.), it tolerated to harsh environmental factors, where the temperature rises to 47 °C and drops to frost, drought, wind and salinity. The plant used in ornamental as a climber in gardens and parks (Bryant, 1999).



Bougainvillea spectabilis

Figure 2.14. Bougainvillea **c**limbing

2.6. Factor Affecting Woody plant Growth in Landscape

The success in planting woody plants depends of several factors. The most important of which the environmental factors (temperature, light, humidity, rain and wind), In addition to the soil factor where these factors play a key role in the distribution and spread of the cultivation of woody plants and thus control the determination of the growth species and varieties in a location (Harris, 1983).

2.6.1. Climatic of Environmental

The most important environmental factors affecting the growth of woody plants are (Temperature, Air humidity, Rain, Wind).

2.6.1.1. Temperature

The heat has a great effect on growth of woody plants as it affects the process of physiological processes in plant and may vary its impact according to the life cycle, whether vegetative or syphilis, Temperature controls all biochemical and chemical processes in the plant and affects related processes such as water, gas and mineral matter (Harris, 1983).

In the case of high temperatures. They increase the rate of transpiration (loss of water from the plant through the vegetative parts) evaporation (loss of water from the soil), which leads to the dryness of woody plants and the wet death. The high temperature also leads to the recent fall of leaves due to the lack of phylogenetic processes in the plant, and injury of leaves disease of sunburn and the killing of floral shoots and lack of growth of roots, especially the surface of them. High heat damage reduced to the growth of woody plants, and limestone coated with limestone to minimize direct sunlight fall (Ayad, 2007). If the temperature dropped or higher than this rate, leads to the inability of the plant to perform functions properly, leading to the weakness of the plant and its deterioration and death. In the case of lower temperatures than the ideal rates for the growth of woody plants, they affect the detrimental effect on the growth and growth of modern branches and may cause cracking tree trees and water depletion within the cells and reduce the ability of plant roots to absorb nutrients from the soil (Barian, 1977).

2.6.1.2. Air Humidity

Air humidity means water vapour and its amount of the atmosphere. Air humidity plays a large role in the velocity of the physiological processes within the woody plants because its effect on the rate of speed of transpiration as the plant absorbs

the water droplets resulting from the fog and thus increases the water content within the plant. Air humidity also inhibits the growth of some plant varieties, and plants growing in areas with high atmospheric humidity are more susceptible to pests such as dengue bugs in roses and Robinia (Ayad, 2007).

2.6.1.3. Rain

Rain is a good source of irrigation for many woody plants because rainwater is fresh and contains a percentage of atmospheric nitrogen. Rain affects the growth of woody plants by:

A - Rain spray materials were used to fight pests

B - Mechanical damage to flowers and pollen decrease pollination

C - May lead to increased air humidity, causing an increase in pests

D- Damage to soil corrosion (Ayad, 2007)

2.6.1.4. Wind

Winds are environmental factors that have a clear effect of the cultivation on woody plants, especially those planted in open areas (outside the city and the mountains) where they are vulnerable to strong winds and may cause severe damage to woody plants, divided into three damages:

A. Mechanical damage: Strong winds lead for the fall of leaves and flowers and breaking branches loaded with fruits and sometimes cause the uprooting of trees, especially in the soil disintegrated.

B. Spatial damage: High winds increase the rate of transpiration and evaporation.

C. Damage to soil erosion: The strong winds disassemble the soil granules and move from one place to another and cause dryness of the soil and thus the wilting of the plant (Dahl and Molnar, 2003).

2.6.2. Soil Factor

Soil is the natural cradle for the growth of woody plants. Plant growth is necessarily influenced by soil properties and their ability to supply the plant with its various nutrient requirements of the right quantities at the right time. When climatic factors are suitable for plant growth and development, terrestrial factors become important and specific for the success and development of woody plants (Barian, 1977).

The main soil characteristics are;

1. Natural properties include soil construction, soil texture, soil porosity, soil depth, and soil colour. Plants vary considerably in their requirements for these factors.
2. Chemical wad include: pH, nutrient soil content, CEC
3. Biochemistry includes the activity of different soil biota, whether plant or animal.

2.6.2.1. Soil Components

Soil is composed of mixtures of mineral and organic matter with each other along with water and air. Components of mineral soil sometimes known as inorganic materials. They are the most important constituents in soil. They represent the bulk of soil size, weight, and structure (Harris, 1983). The components of organic soil source residues in plants. Animal living these components know after the analysis of the soil humus gelatin, substance highly resistant to black analysis or brown structure. and have high ability to retain water and degraded nutrients needed by plants in their food, Soil components and water with dissolved salts is called the soil solution, which is the medium through which the transfer of nutrients from the soil to plant. The air enters soil formation and is about 20-25% of the size of wet soil. It prepares the plants with the necessary oxygen for their growth. It also affects the living organisms that live in the soil and plays an important role in the process of chemical and chemical weathering and oxidation and decomposition of organic matter (Ayad, 2007).

2.6.2.2. Soil pH

Soil pH is the measure of the moly tic activity of hydrogen ions in the soil solution. When the pH values are lesser than 7 the soil is acidic. While in pH values greatest than 7, the soil is alkaline. Soil pH is a major variable in soil because it affects many chemical processes. It affects, in particular, the availability of plant nutrients by controlling the chemical forms of different nutrients and affecting the chemical reactions they undergo. The optimum pH ranges for most plants between 5.5 and 7.5; however, many plants have adapted to flourish in pH values outside this range (Barian, 1977).

2.6.2.3. Organic Matter

Is all the plant and animal material that originates in the soil for which it added regardless of the decomposition stages it is reached, Plant tissues are the primary source of organic matter and represent the leaves of trees and shrubs they include plant roots and plant parts that left in soil or buried in agricultural processes. The bodies of different animals, insects and their waste and microorganisms in soil differ from the needs of woody plants, of organic matter by type and age (Aspden & Calman 2007). The basic condition for the degradation of organic matter in the soil. provide sufficient quantities of water and the plants that cultivated in a particular soil is not benefit from the organic matter present in the soil until these organic matters have been dissolved and transformed into formulas compounds and elements that suck up by the roots of the plants (Harris, 1983).

Improperly applied organic matter can lead to problems in the landscape.

• Organic matter applied too thickly can lead to excess moisture of the root zone, which can stress the plant and cause root rot.
• Organic matter piled high against the trunks of young trees may create habitats for rodents that chew the bark and can girdle the trees. Mulch placed right against tree trunks can stress stem tissues and may lead to insect and disease problems.

• Some Organic matter, especially those containing cut grass, can affect soil ph. Continued use of certain mulches over long periods can lead to micronutrient deficiencies or toxicities.
• Thick blankets of finely textured organic matter become matte and may prevent the penetration of water and air. In addition, a thick layer of fine organic matter can decompose and become like potting soil that supports weed growth (Bobbit and Antonelli, 2005).

2.6.2.4. Calcium Carbonate ($CaCO_3$)

Calcium carbonate directly affects soil pH and is an important source of Ca that shares organic matter in soil building processes. It has many negative effects on calcareous soils. The abundance of calcium carbonate leads to the deposition of phosphorus in $Ca_3(PO_4)_2$.

Also, calcium tends to bind with the clavicle material, resulting in free iron release into the solution, which quickly turns into the unhealthy $Fe(OH)_3$ hydroxide, called hydrochloric lupus, which caused by iron deficiency and phosphorus, especially iron.

Agricultural lime, chalk powder or limestone used as a cheap method to neutralize acid soils, making them suitable for cultivation (Barian 1977).

3. MATERIALS and METHODS

3.1. Materials

This study consummated in the Erbil, Sulaymaniyah, Duhok, and Halabja cities of North Iraq. The aim of our study was to determine the species composition and evaluate the life state of woody plants in the park stands of industrial cities of the region. A survey conducted in 1/3 for 15/ 9/ 2019 by means of a route-visual method. Their specific morphological features determined the taxonomic identity of plant species.

3.2. Methods

The crown shape is evaluated within the field study. The photo documentation of tree habit was made for each of the evaluated woody plants in the park growth type, plant age, stem diameter, plant length, success in the site, health of woody plants, uses of woody plants for landscape. The records were used for other graphic processing. Within chemical and physical analysis soil for each park in the cities processing the other quantitative parameters of the tree, habit was calculated (Table 3.1.).

Table 3.1. Selected parameters of woody plant measured and evaluated for soil analysis within the study of their phenotypic variability and assessment of the gene pool quality.

Quantitative parameters		**Qualitative parameters**	
Measured by devices	Calculated	Measured by photoreception	Calculated
Tree height	Measured of height Tree by formula	Plant age Success in the site	All measured evaluated by photoreception within field study
Stem girth	Measured stem by Vernier and meter callipers at the height of 50-60 cm	Growth type Crown shape	All measured evaluated by photoreception within field study
Soil analysis	Chemical and physical analysis soil for each park in the cities	Health of woody plants Uses of woody plants for landscape	All measured evaluated by photoreception within field study

3.2.1. Height of plants

Height of plants was measured by a formula. On a sunny day hold a yardstick perpendicular to the ground and measure the length of its shadow. Then measure the length of the tree's shadow. Enter your data in the following formula to determine the height of the tree. Everything you enter into the formula needs to have the same units.

$$\text{Hight of the tree} = \frac{(\text{Height of the yardstick X length of tree's shadow})}{\text{length of yardistick's}} \quad \text{Eq (2-1)}$$

Example:

Height of yardstick's = 3 ft length of tree's shadow = 60 ft.

Length of yardstick's shadow = 4 ft height of tree =?

$$\text{Hight of the tree} = \frac{(\text{Height of the yardstick X length of tree's shadow})}{\text{length of yardistick's}}$$

$$\text{Hight of the tree} = \frac{(3\ \text{ft X}\ 60\ \text{ft})}{4\ \text{ft}} = 45\ \text{ft}$$

The height of the tree = 45 feet. , = 13.72 m.

3.2.2. Woody plants shape

In addition to these quantitative parameters, the crown shape, evaluated within field study. In selecting trees for your own landscape, consider both summer and winter impact (Kuhns and Rupp, 2000). Try to envision the forms that best fulfil landscape needs. The forms themselves can provide different feelings (Forrest, 2006).

3.2.2.1. Columnar

Columnar trees shaped like columns or cylinders, with branches of uniform length top to bottom (Figure 3.1.) (Kuhns and Rupp, 2000).

3.2.2.2. Open-head irregular

The branching pattern of these trees is irregular and random, creating an open, asymmetrical canopy shape (Figure 3.1.).

3.2.2.3. Weeping

A branch of weeping trees drops downward and are covered with graceful, cascading foliage (Figure 3.1.).

3.2.2.4. Pyramidal

These broad, cone-shaped trees have triangular canopies -- wider at the base and narrower toward the top (Figure 3.1.).

3.2.2.5. Globe

The canopies of these trees -with their regular, rounded shape- are ideal for formal landscapes (Figure 3.1.).

3.2.2.6. Fastigiated

These trees have an elongated, narrow, tapering profile and a strong vertical habit that draws the eye upward (Figure 3.1.).

3.2.2.7. Vase

Trees that have vase-shaped canopies work well near streets and walks because they do not block the view of traffic or pedestrians (Figure 3.1.) (Forrest, 2006).

3.2.2.8. Horizontal spreading

With strongly horizontal branches, even at the top of the canopy, these trees seem very wide (Figure 3.1.) (Kuhns et al., 2000).

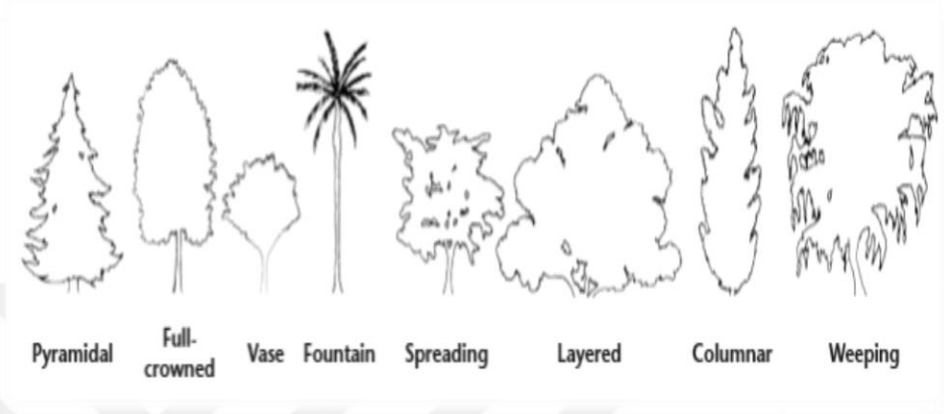


Figure 3.1. Woody plants shapes.

3.2.3. Plant age

The relationship between parameters of the Plant age: computation the age of woody plants in the course of planting trees in the parks.

3.2.4. Stem diameter

As well as the Stem diameter was calculated for all woody plant species based on mentioned quantitative data: such as the trunk diameter measured by means of callipers at the height of 50-60 cm from the root collar.

3.2.5. Growth type of woody plants

Growth type is evaluated by photoreception, within field study**.**

3.2.6. Health of woody plants

Health of woody plants is evaluated by photoreception, within field study**.**

3.2.7. Uses of woody plants for landscape

Most trees and shrubs in cities or communities planted to provide beauty or shade. Woody plants also serve many other purposes, and it often is helpful to consider these other functions and benefits when selecting a tree or shrub for the landscape (Birdel et all, 1983). By visiting each park complex, we evaluated by uses of woody plants for landscape photoreception, within field study that some of woody plant uses for shadow, woody plant uses for prettiness and some of woody plant uses for hedgerow.

3.2.8. Success in the cities

Evaluated woody plants for landscape Success in the cities by photoreception, within field study that some of the woody plants are very good success in the cities, then other woody plants are a good success in the cities, therefore that more different among environmental in the cities.

3.2.9. Soil analysis

Chemical and physical analyses were done on soil for each park in the cities**.**

3.3. Cities which have parks examined in Northern Iraq

3.3.1. Erbil City

3.3.1.1. Sami Abdul Rahman Park

This Park is located on the western edge of the city of Erbil and on the road leading to Mosul, with an area of (200 hectares). (Figure 3.2.), and laid the foundation stone of the project on 14/3/2000, and they itself implemented the design in two phases, that %80 of area are woody plant and turf, %20 of the areas are the park consists of several parts, activities and components, including seating, rest, hiking,

passageway and sidewalk. There is also a forest and large, wide trenches, an open theatre, a restaurant, a cafeteria, several kiosks and a large industrial lake. The roads of park are wide (about 5 m) wide, making it easier to use private and public vehicles to move between the park's parts, it is located in the north Erbil 36° 11′ 2″ N, 43° 58′ 34″ E. Altitude above the sea level 392 m and 232.845 groups of woody plants that grow in this park)Interview with the Department of Gardens “Mam Arab”).



Figure 3.2. Sami Abdul Rahman Park

3.3.1.2. Gilkand Park

The inventory is conduct in Erbil which builds in 1965. Then restored in 2012 (Figure 3.3.). By areas of 7.331 hectares, that %75 of area are woody plant and turf, %25 of the areas are passageway and sidewalk’s and fountain, it is located in the 36° 10′ 59″ N, 44° 0′ 26″ E. Altitude above the sea level 409 m, and 85.917 groups of woody plants grow in this park (Interview with the Department of Gardens).



Figure 3.3. Gilkand Park.

3.3.1.3. Shanadar Park

The inventory is conduct in Erbil. Which build in 2008, by areas of 9 hectares, that %70of areas are woody plant and turf, %30 of the areas are passageway, sidewalk's (Figure 3.4.) fountain and cafeteria, it is located in the 36° 11′ 5″ N, 44° 0′ 25″ E. Altitude above the sea level 409 m, and 31.350 groups of woody plants that grow in this park (Interview with the Department of Gardens).

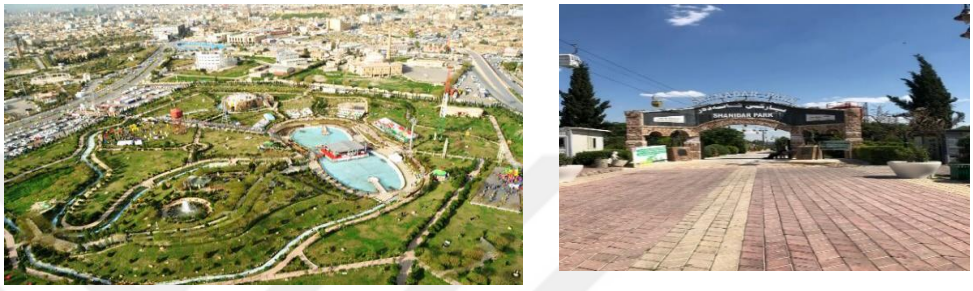


Figure 3.4. Shanadar Park (Anonymous, 2019).

3.3.1.4. Minara Park

The inventory is conduct in Erbil. which build in 2005, By areas of 8 hectares, that %70 of areas are woody plant and turf, %30 of the areas are passageway and sidewalk's and fountain and cafeteria (Figure 3.5.), it is located in the (36° 11′ 5″ N, 44° 0′ 2″ E). Altitude above the sea level 409 m, and 28.090 groups of woody plants that grow in this park (Interview with the Department of Gardens).



Figure 3.5.Minara Park (Anonymous, 2019)

3.3.2. Sulaymaniyah City

3.3.2.1. Hawary Shar Park

The inventory is conduct in Sulaymaniyah, which build in 2010. Hawary Shar Park one of the largest parks in the Region of Kurdistan and even Iraq; it is also one of the large parks in the Middle East, located in the north-west part for Sulaymaniyah city, near the Kallakn village and on the Peaks of Azmar Mountain, and has a beautiful geographical composition. It established an area of 500 hectares; the park is linking with Malik Mahmoud Street by the main street. It is one of the strategic projects for the Municipality of Sulaymaniyah. As well as to increase the green areas and to protection of the environment in the region. The project implements by the Furat Construction Turkish, that 70% of areas are woody plant and turf, 30% of the areas are passageway, sidewalk's, fountain and cafeteria (Figure 3.6.), it is located in the 35° 36′ 33″ N, 45° 25′ 38″ E. Altitude above the sea level (925 m), and 119.586 groups of woody plants that grow in this park (Interview with the Department of Gardens).



Figure 3.6. Hawary Shar Park (Anonymous, 2019)

3.3.2.2. Azade Park

The inventory is conduct in the center of Sulaymaniyah. Which build in 1994-2005. It has a significant impact on the temperament of the atmosphere. Withal, the environment of the city, because of the large areas of forests gardens, lakes and green areas, by areas (44) hectares. that 70% of areas are woody plant and turf, 30% of the areas are, the park has several parts, components, and activities such as sitting, rest, walking, swimming, swimming pool, open theatre, restaurant, kiosks, nurseries, three large parks inside the park, a large toy city, a children's and skateboard playground, and four main streets, easy access (Figure 3.7.). It is located in the 35° 33′ 51″ N, 45° 25′ 54″ E. Altitude above the sea level 458 m, and 18.456 groups of woody plants that grow in this park (Interview with the Department of Gardens mister Jamal).



Figure 3.7. Azade Park

3.3.2.3. Bakhe Gishty

The inventory is conduct in Sulaymaniyah. Which build in 1937, by areas of 3 hectares. That 80% of area's woody plant and turf, 20% of the areas, passageway, sidewalk’s, fountain and office. this park indicated in the city center and it is divided from 12 parts which were building on British design (Figure 3.8.), it is located in the 35° 33′ 27″ N, 45° 26′ 4″ E. Altitude above the sea level 843 m, and 10.019 groups of woody plants that grow in this park.



Figure 3.8. Bakhe Gishty.

3.3.2.4. Daik Park

The inventory is conduct in Sulaymaniyah, which build in 2009, by areas of 1.465 hectares. That 80% of areas are woody plant and turf, 20% of the areas are passageway, sidewalk's and fountain, this park indicated in the east of the city (Figure 3.9.), it is located in the 35° 33′ 27″ N, 45° 26′ 4″ E. Altitude above the sea level 843 m, and 1.186 groups of woody plants that grow in this park.



Figure 3.9. Daik Park .

3.3.3. Duhok City

3.3.3.1. Azade Panorama park

The inventory is conduct in Duhok which was building in 2006-2009, by areas of 4.535.317 hectares that 70% of areas are woody plant and turf, 30% of the areas are passageway, sidewalk's, office and fountain, this park indicated in the city center (Figure 3.10.), it is located in the 36° 50′ 42″ N, 42° 59′ 40″ E. Altitude above the sea level 579 m, and 4.277 groups of woody plants that grow in this park.



Figure 3.10. Azade Panorama Park

3.3.3.2. Mohamad Bekhal park

The inventory is conduct in Duhok, which build in 2017, by areas of 1.477952 hectares, that 98% of areas are woody plant and turf, 2% of the areas are balustrade, this park indicated in the city center (Figure 3.11.), It is located in the 36° 50′ 51″ N, 42° 59′ 41″ E. Altitude above the sea level 574 m, and 3.237 groups of woody plants that grow in this park.



Figure 3.11. Bekhal Park.

3.3.3.3. Duhok Dem Park

The inventory is conduct in Duhok, which was built in 2000; the park is located in the northeastern part of the city and below the Duhok dam inside a narrow valley. It is difficult to estimate its total area because the work is still ongoing. In addition to the nature of the rugged location in the valley, it is surrounded by mountains, plateaus on three sides, and has a narrow road to exit and enter. Waterfall or place to rest. The estimated area utilized within the valley (about 6.25 hectares). that 70% of areas are woody plant and turf, 30 % of the areas are passageway, sidewalk's, cafeteria and fountain (Figure 3.12.), it is located in the 36° 50′ 42″ N, 42° 59′ 40″ E. Altitude above the sea level 579 m, and 6.340 groups of woody plants that grow in this park.



Figure 3.12. Duhok Dem Park.

3.3.4. Halabja City

3.3.4.1. Halabja Park

Study Area The inventory is conduct in Halabja. Which build in 2006-2012. By areas of 10 hectares. that 70% of areas are woody plant and turf, 30% of the areas are passageway, sidewalk's, amusement park, office and fountain, this park indicated in north city (Figure 3.13), it is located in the 35° 10′ 11″ N, 46° 0′ 3″ E. Altitude above the sea level 791 m, and 7.360 groups of woody plants that grow in this park (Interview with the Director of the Park / Engineer Bakhtiar Shaqwlly, Date 5/5/2019).



Figure 3.13. Halabja Park

3.3.4.2. Bakhe Gishty

The inventory is conduct in Halabja. Which build in 1945, by areas of 1.1 hectare. That 70% of areas are woody plants, and turf 30% of the areas is passageways, sidewalks, offices, and fountains. This park indicated in the city center and it divided from four parts (Figure 3.14.), it is located in the 35° 10′ 35″ N, 45° 59′ 21″ E. Altitude above the sea level 727 m, and 2.188 groups of woody plants that grow in this park (Interview with the Director of the Park / Engineer Bakhtiar Shaqwlly, Date 5/5/2019).



Figure 3.14. Bakhe Gishty

3.3.4.3. Baran Park

Study Area The inventory is conduct in Halabja. Which build in 2010, by areas of 0.36 hectare. That 80% of areas are woody plants and turf. 20% of the areas are passageway, sidewalk's and fountain, this park indicated in the city center in alleyway

kimiabaren (Figure 3.15.), it is located in the 35° 10′ 35″ N, 45° 58′ 10″ E. Altitude above the sea level 729 m, and 590 groups of woody plants that grow in this park (Interview with the Director of the Park / Engineer Bakhtiar Shaqwlly, Date 5/5/2019).



Figure 3.15. Baran Park.

3.3.4.4. Kubra Hamedpur Park

The inventory is conduct in Halabja. This was built in 2012, by areas of 1 hectare, that 80% of areas are woody plant and turf, 20% of the areas are passageway, sidewalk's and fountain, this park indicated in the city center in alleyway sharawany (Figure 3.16.), it is located in the 35° 11′ 13″ N, 45° 59′ 40″ E. Altitude above the sea level 709 m, and 1300 groups of woody plants that grow in this park (Interview with the Director of the Park / Engineer Bakhtiar Shaqwlly, Date 5/5/2019).



Figure 3.16. Hamedpur Park.

4. RESULTS and DISCUSSIONS

In the planning of public gardens, parks, and their designs, environmental conditions of the location must be taken into account, paralleled to the desires of the community to meet is needs, in which the design is to add its required signature, so public gardens and parks come in line with the social, cultural and environmental reality. This research is designed to choose the (15) parks in some cities of Northern Iraq to study their woody plants (Trees, Shrubs and Climbs) through observation to achieve the objectives of the research to find out the Dendroflora of parklands includes, their situation and their suitability of the site. This part reviews the stages of the field study, results and discussion of a sample search. Description, methods of collecting information and analysis of information derived through the means of different field studies indicated in result and discussion. When visited to all parks that indicated 70 species woody plants and total numbers of woody plants had (54% trees, 36% shrubs and 10% climbs) (Figure 4.1.). In addition, from all sections that were 39 families, types of woody plants were 36 evergreen and 34 deciduous.

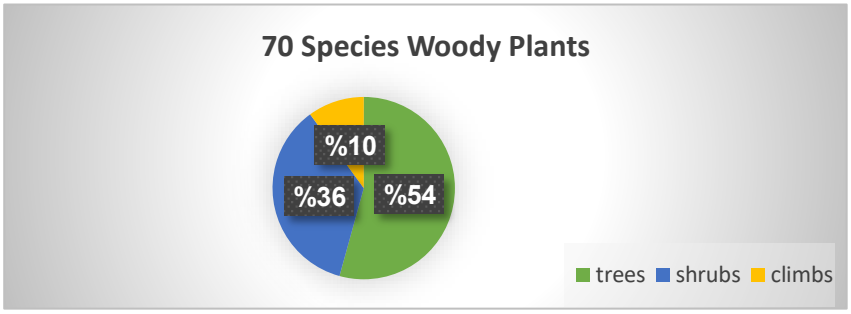


Figure 4.2. Percentage of 70 Species Woody Plants in all Parks

4.1. Environmental Data

Climatic characteristics are affecting the design of open spaces and parks. The most significant climatic characteristics, which must be considered in any planning and design of the open spaces and parks, are:

1. The extent of the quarterly and daily temperatures
2. Radiation period hour/day
3. Angle of the fall of the solar radiation and intensity
4. The amount of rainfall and changes in relative humidity
5. Wind direction and its speed, time and path of storms
6. The quantity, quality and availability of water.

4.1.1. Environmental conditions of the city of Erbil

That the city of Erbil, an area of 16.484 km2 located on the latitude 36.11 degrees north and longitude 44.00 degrees east and at an altitude of 420 meters from sea level (Stevanovic and Markovic, 2003). The most important elements of the environmental conditions that study for the city of Erbil (Based on climatic data from the Aeronautics Department for the period 1941-2019).

Climate factors

Temperature: The average temperature of the city of Erbil is approximately 35.2 °C and represents about six months from May to October. The minimum temperature is about 7.9 °C and for about six months from November to April. While the average annual temperature in the city of Erbil is 20.8 °C. The city is characterized by large differences between temperatures during the winter and summer (Figure 4.2. and Table 4.1.) shows minimum and maximum air temperature during (2018-2019) (General Directorate meteorology & Semiology, Weather station of Erbil, 2019).

Relative Humidity: As shown by the Figure, the humidity is low and reaches its lowest level during the summer months, reaching an average of 19.5%, and the percentage increases during the winter months to reach about 77.5%. As is known, relative temperature and humidity are the most important determinants of thermal comfort.

Rain and Precipitation: The forms of rainfall in this city are mostly in the form of rain and there are days, few falls in it / Snow in December, as there are a few cases

of falling hail in March and April. The average annual precipitation in Arbil is approximately 454.5 mm, while the lowest rainfall rate was 33.0 mm in 1975 and the highest was 894.3 mm in 2019. That the amount of rain falling gradually at the end of May and until the end of September then take the rise, and note from the Figure 4.2. That the dry period a few or equal with the wet period. The rate of evaporation daily (1966, Guest). It takes rising from the month in March, and reaches the upper limited during the month in July, and then takes the declined from the month in December. For the lowest rate and the total evaporation rise to 1505 mm in the city of Erbil annually and this higher compared to the amount of rainfall during the year (Markovic, Stevenovic, 2003).

Wind and Dust: The wind of the city of Erbil, shows that the most important winds considered are the north and north-west winds, which are prevailing in the region (Figure 4.2.). The amount of dust is cool while it looks dry in the winter, while the southeastern and eastern wind may be low impact (Guest, 1966). In recent years, the average number of days of storms has increased. Which takes up during the month of March and reaches a maximum in July and then begins to decline during the month of August and September (General Directorate Meteorology & Semiology, Weather station of Erbil, 2019).

Solar Radiation: Solar irradiance is the determining factor in identifying the thermal environment in the ground, the main source of energy that moves the air masses in the atmosphere (Rasul, 1986). The longest day is in June (14.27 hours), the shortest day is in December (9.83 hours) and that the brightness in June (12.85 hours), and the shortest brightness would be in December and January (4.50 hours) (General Directorate meteorology & Semiology, Weather station of Erbil, 2019).

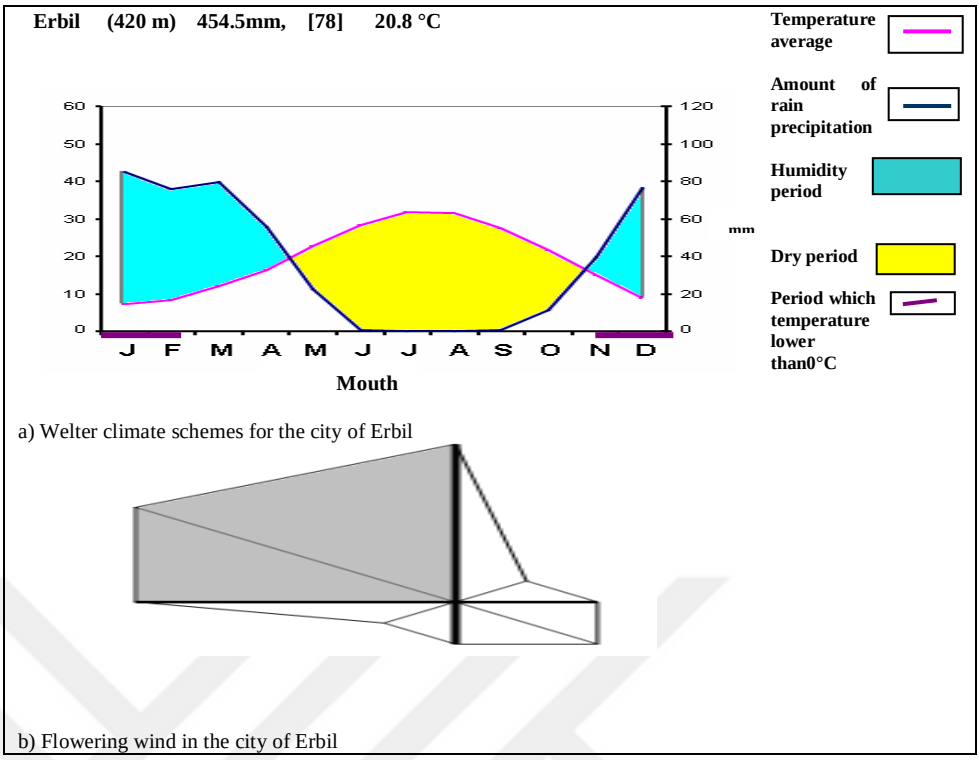


Figure 4.3. Welter climate & Flowering wind in the city of Erbil

4.1.2. Environmental conditions of the Sulaymaniyah city

The environmental conditions play a key role in the planning of parks, gardens and their designs, and its difference from one area to another, there are different design processors, natural and physical components for the park (Dahl and Molnar, 2003). Although the city of Sulaymaniyah, which has an area of 1200 km2, it is located between the latitudes of 35.55 -36.55 N, and the longitudes 45.55-46.55 E, with an altitude of 853 meters above sea level (Figure 4.3.) (Stevenovic and Markovic, 2003). The most important elements of the environmental conditions are: (Based on the analysis of climate data during the years 1941-2019) (General Directorate meteorology & Semiology, Weather station of Sulaymaniyah 2019).

Climate factors

Temperature: The rate of maximum temperatures for the city of Sulaymaniyah is 34.32°C representing a rate of approximately six months from May until October.

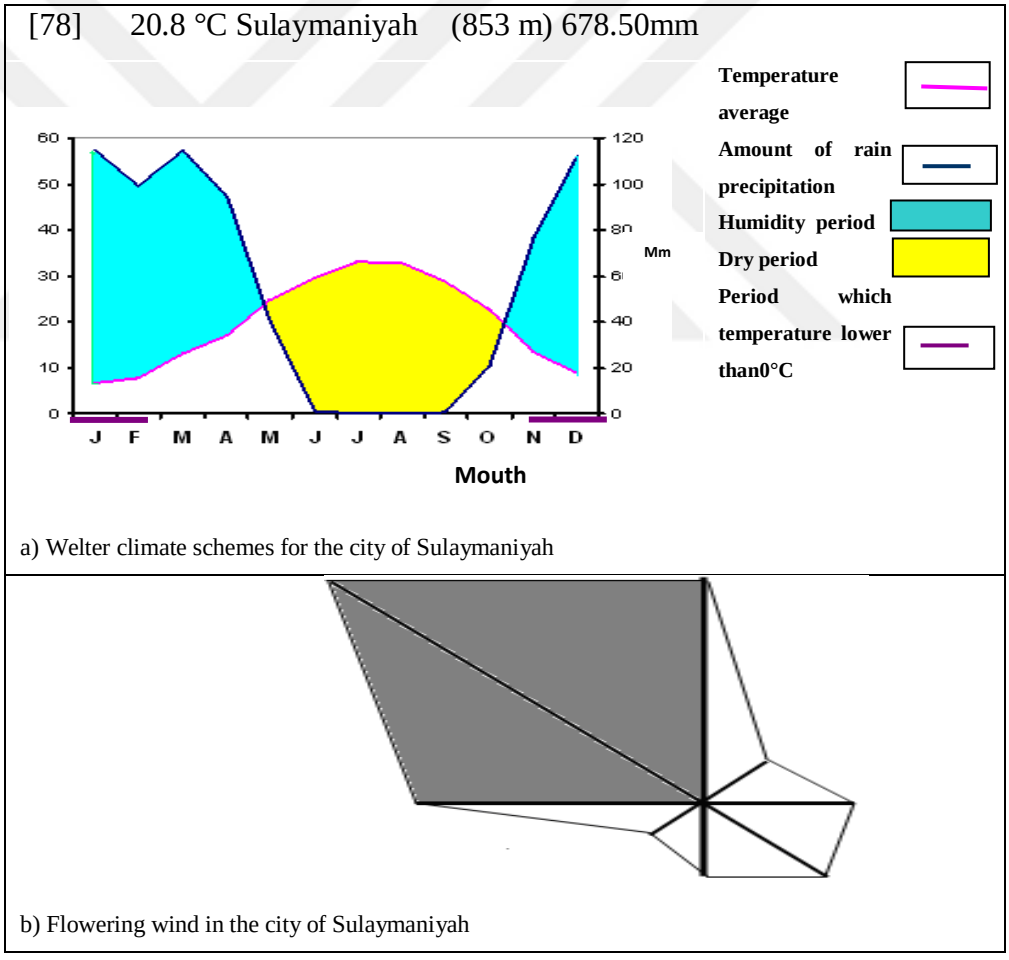
The rate of minimum temperature is approximately 6.8°C representing a rate of approximately six months from November until April. The town has the presence of significant differences between the temperatures during winter and summer. The temperature takes rise clearly from the beginning of May, and up to a maximum during July and then takes decline, but the period of the cold start during mid-November, and up to the minimum during January and then takes to rise at the beginning of March. While the average annual temperature in the city of Sulaymaniyah is 20.8 °C. Figure 4.3 and Table 4.1. shows minimum and maximum air temperature during (2018-2019).

Relative Humidity: As shown in Figure 4.3. The humidity decreases and reaches its lowest level during the summer months, with an average of 24.8%. Temperature and relative humidity are the most important determinants of thermal comfort. When temperatures are higher than thermal comfort and relative humidity, this requires air movement, shading and addition of water vapor. This is called a warm season. In the case of under- Shading for thermal comfort. This requires exposure to solar radiation and called situation in the cold period. The months of January, February, March, November, and January are entirely cold. This period requires the exposure of parks and open spaces to the sun and the cold period in the city equates to approximately 55% of the total days of the year. This requires planting leafy trees within the gardens and parks of Sulaymaniyah.

Rain and Precipitation: Precipitation in this area is mostly in the form of rain, and there are days of snowfall in December, January, and February and there few cases in the form of dusk in March, April, and May. The average annual rainfall in Sulaymaniyah is 678.50 mm. While the lowest rainfall rate was 45.4 mm in 1950 and the highest rate was 133.7 mm in 1/1 for 15/9/2019 (Meteorological Department in Sulaymaniyah, 2019). The amount of rainfall falling gradually in June and mid-September then take a rise, and note from the Figure that the dry period compared to the wet period (Figure 4.3.). The daily evaporation rate is rising from March to the upper limit during July and then dropping from December to its lowest level. Also, the total evaporation of up to 1350 mm in the city of Sulaymaniyah annually and these

higher compared to the amount of rain falling during the year (Markovic, Stevenovic, 2003).

Wind and Dust: The most important wind which should be taken into account is the north wind and the north-west wind, the latter is the most prevailing wind in the area that is characterized by hot and dry in the summer, especially the daylight hours, as occupies the amount of dust while looks dry cool in winter. However, the southeasterly wind and easterly wind may be low impact (Figure 4.3.). And in recent years, the average numbers of days have increased in which they occur dust storms (Guest, 1966).



a) Welter climate schemes for the city of Sulaymaniyah

b) Flowering wind in the city of Sulaymaniyah

Figure 4.4. Welter climate & Flowering wind in the city of Sulaymaniyah

Solar Radiation: Solar irradiance is the determining factor in identifying the thermal environment in the ground, the main source of energy that moves the air masses in the atmosphere (Rasul, 1986). The longest day in the year in June (14.25 hours) and the shortest day in the year in December (9.85 hours). While the longest brightness of the sun in June (12.80 hours) and the shortest brightness in December and January (3.20 hours).

4.1.3. Environmental conditions of Duhok city

That the city of Duhok, an area of 11.000 km^2 located on the latitude 36.44 degrees north and longitude 42.59 degrees east and at an altitude of 583 meters from sea level (Stevanovic and Markovic, 2003). The most important elements of the environmental conditions that study for the city of Duhok, The most important elements of the environmental conditions are: Based on the analysis of climate data during the years 1941-2019 (General Directorate meteorology & Semiology, Weather station of Duhok 2019).

Climate factors

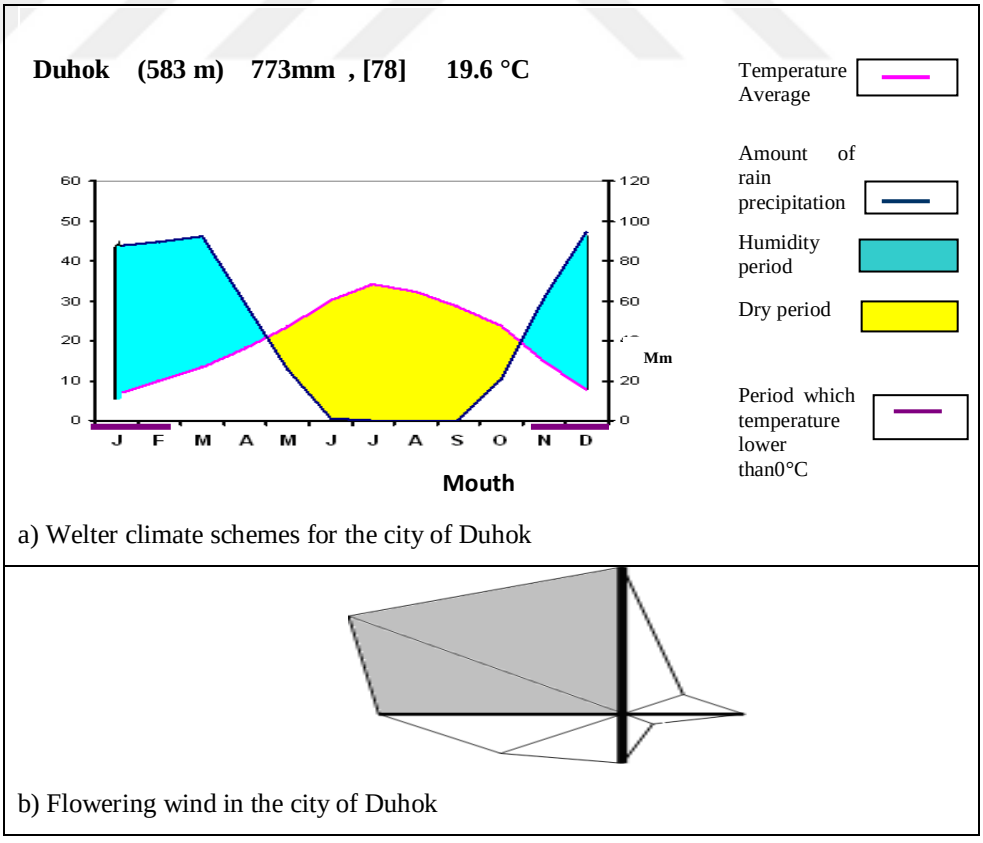
Temperature: The average temperature in the city Duhok is approximately 34.9 °C. Approximately six months from May to October, the minimum temperature is 7.2 °C. Besides, for about six months from November to April. While the annual rate of degrees. The heat in Duhok is 19.6°C. The city is characterized by large differences between temperatures during the winter and summer, Figure 4.4. and Table 4.1. shows minimum and maximum air temperature during (2018-2019), (General Directorate Meteorology & Semiology, Weather Station of Duhok, 2019)**.**

Relative Humidity: The Figure 4.4 shows that relative humidity is declining in Duhok and reaches its lowest level during the summer months, reaching 21%.

Rain and Precipitation: The most frequent form of rainfall in Duduk is in the form of rain and there are days when the snow falls in the months in December and January, and there are few cases where the droughts occur in the months in March and

April. The annual average rainfall in Duduk is 678.83 mm. While the lowest rainfall rate was 305.90 mm in 1990 and the highest rate was 1199.3 mm per the year 2019. The amount of rainfall falling gradually at the end of the month in May until the end of September. Then take the rise that the dry period is few compared to the wet period. (1966, Guest), the evaporative level, the Figure 4.4 takes up from March and reaches the upper limits during July and then decreases from December to reach the highest rate, and total evaporation total reaches 1.359 mm in the city of Duhok annually (Stevenovic, 2003).

Wind and Dust: Note from the Figure 4.4. which represents the wind rose of the city of Duhok. The most important winds that take into account the Northwest and Western winds, which are prevalent in the region, its characteristics are hot dry in the summer and loaded with a quantity of dust while looking cool dry in the winter, the southeastern wind may be low impact. (1966, Guest) (General Directorate Meteorology & Semiology, Weather Station of Duhok, 2019).



a) Welter climate schemes for the city of Duhok

b) Flowering wind in the city of Duhok

Figure 4.5. Welter climate & Flowering wind in the city of Duhok.

Solar Radiation: There are differences between the number of daylight hours and the number at hours of sun brightness. In the longest day is in June (14.29 hours) and the shortest day in the first month (9.80 hours) and the longest brightness of the sun in the month (12.25 hours), The shortest brightness is in December and January (4.50 hours).

4.1.4. Environmental conditions of Halabja city

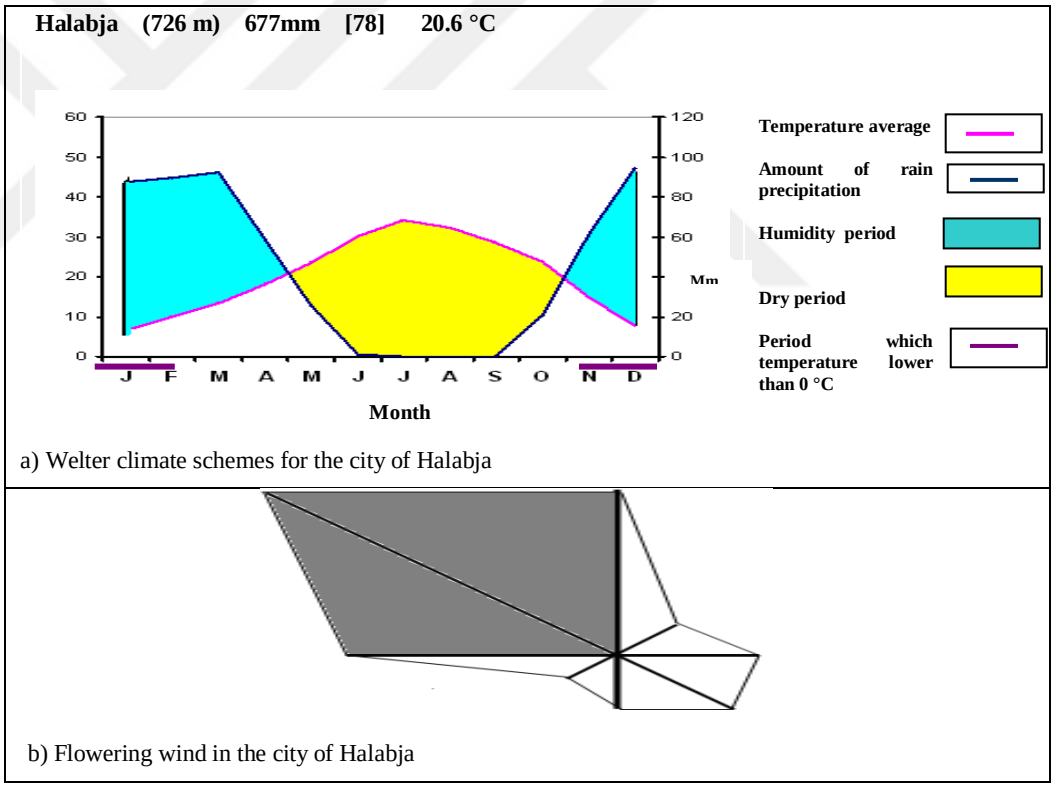
The city lies at the base of what is often referred to as the greater Hewraman region stretching across the Iran–Iraq border. Hewraman and Shinrwe range in the northeast, Balambo range in the south and Sirwan River in the west, surround Halabja. And that the city of Halabja, an area of 1.532 km, Located on the latitude 35°11′11″N 45°58′26″E and at an altitude of 726 meters from sea level (Hama, 1997). The most important elements of the environmental conditions that study for the city of Halabja (Based on climatic data from the Aeronautics Department for the period 1941-2019).

Climate factors

Temperature: Halabja climate is classified as warm and temperate. In winter, there is much more rainfall in Halabja than in summer. According to Koppen and Geiger, this climate classifies as Caste's average temperature of the city of Halabja is approximately 31.2°C. Approximately six months from May to October, the minimum temperature is 4.8°C. Besides for about six months from November to April. While the annual rate of degrees. The heat in Halabja is 18.1°C. The city is characterized by large differences between temperatures during the winter and summer, Figure 4.5 and Table 4.1. shows the minimum and maximum air temperature during 2018-2019 (General Directorate meteorology & Semiology, Weather Station of Halabja, 2019).

Relative humidity: The Figure 4.5 shows that relative humidity is declining in Halabja and reaches its lowest level during the summer months, reaching 21%.

Rain and precipitation: The most frequent form of rainfall in Halabja is in the form of rain and there are days when the snow falls in the months of December and January, and there are few cases where the droughts occur in the months of March and April. The annual average rainfall in Halabja is 773 mm. While the lowest rainfall rate was 298 mm in 1990 and the highest rate was 1076.6 mm per the year 2019. The amount of rainfall falling gradually at the end of the month in May until the end of September. Then take the rise that dry period few compared to the wet period (Guest, 1966) to the evaporative level, the Figure 4.5 takes up from the month of March and reaches the upper limits during the month in July and then decreases from the month of December, to reach the highest rate, and total evaporation total reaches 146 mm in the city Halabja, annually (Stevenovic et all, 2003).



a) Welter climate schemes for the city of Halabja

b) Flowering wind in the city of Halabja

Figure 4.6. Welter climate & Flowering wind in the city of Halabja

Wind and Dust: Figure 4.5. shows the most important wind which should be taken into account is the north wind and the north-west wind, the latter is the most prevailing wind in the area that is characterized by hot and dry in the summer, especially the daylight hours, as occupies the amount of dust while looks dry cool in

winter. However, the southeasterly wind and easterly wind may be low-impact. (Guest, 1966).

Solar radiation: Solar irradiance is the determining factor in identifying the thermal environment in the ground, the main source of energy that moves the air masses in the atmosphere (Rasul, 1986). The longest day in the year in June (14.29 hours) and the shortest day in the year in December (9.89 hours). While the longest brightness of the sun in June (12.85 hours) and the shortest brightness in December and January (3.25 hours).

Table 4.1. Min. and max. Air temperature in cities of North Iraq during 2018-2019

Years		Erbil		Sulaymaniyah		Duhok		Halabja	
	Months	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2018	January	19.9°	11.1°	19.7°	-7.2°	18.4°	9.7°	18.5°	8.4°
	February	21.8°	13.2°	21.5°	-11.2°	21.9°	12.9°	22.6°	11.8°
	March	29.1°	17.6°	28.7°	9.8°	29.2°	17.6°	32.1°	17.5°
	April	31.1°	19.2°	28.1°	16.2°	30.2°	16.2	31.1°	18.1°
	May	36.3°	23.2°	34.3°	14.1°	36.3°	23.1°	38.2°	23.1°
	June	42.3°	34.2°	40.2°	34.2°	42.3°	34.2°	44.3°	26.2°
	July	46.3°	38.3°	45.3°	38.2°	45.3°	35.3°	47.3°	32.2°
	August	44.3°	36.4°	42.3°	37.2°	44.3°	36.3°	44.3°	32.2°
	September	43.3°	34.2°	40.3°	31.2°	43.3°	34.2°	42.3°	30.2°
	October	38.2°	23.2°	36.2°	19.1°	38.2°	19.2°	36.2°	17.1°
	November	26.2°	14.1°	21.1°	11.9°	26.2°	14.1°	26.1°	10.6°
	December	18.1°	9.9°	16.8°	6.5°	18.1°	9.9°	17.6°	7.4.4°
Years		Erbil		Sulaymaniyah		Duhok		Halabja	
2019	Months	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
	January	18.1°	-8.1°	19.2°	-7.1°	18.1°	7.7°	14.4°	3.1°
	February	18.7°	8.6°	19.7°	-4.3°	18.7°	10.6°	17.5°	9.7°
	March	20.1°	7.6°	16.9°	2.2°	20.1°	7.6°	19.6°	8.3°
	April	26.1°	11.9°	24.1°	9.7°	23.1°	11.1°	27.1°	13.7°
	May	36.3°	16.2°	34.2°	10.1°	36.3°	16.2°	40.2°	21.1°
	June	42.3°	33.3°	41.4°	30.2°	42.3°	33.3°	44.2°	36.2°
	July	45.3°	35.2°	44.3°	27.2°	45.2°	34.2°	47.3°	38.2°
	August	43.2°	38.2°	43.3°	34.2°	43.2°	38.3°	45.3°	42.0°
	September	41.2°	32.2°	38.2°	30.2°	38.2°	31.2°	40.0°	31.0°

4.2. Thermal comfort of North Iraq

As the field of thermal comfort in some cities in the north of Iraq. As follows, there are no months of the year located completely within the field of thermal comfort. However, a large part of each of the months, of April, June, September and October, and during certain times of the morning, evening and night, humidity falls within the

field of thermal comfort, the proportion of comfortable days in the north of Iraq about 20% of the total days of the year. Months of January, February, March, November, and December fall completely within the cold period, this period requires exposure of parks and open spaces to the sun, as the cold period in the city approximately equivalent to 53% of the total days of the year (Table 4.2.). This requires the cultivation of deciduous trees in gardens and parks in the north of Iraq.

Table 4.2. Comfort zone fields in the North of Iraq.

Months	Day Hours							
	0	3	6	9	12	15	18	21
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

Cold period	Hot period	Comfort Zone

4.3. Soil Conditions

4.3.1. Soil conditions in Erbil

Topography: Erbil has a different topography, especially in the south and south-west direction, where the topographical complexities increase as we head to the north and northeast, characterized by a topographical diversity from plains to flat plains and ripples. The city rises from the sea level by 420-453 m.

Soil testing: As shown in Table 4.3, the soil pH of Irbil is between 7.74-7.52 at a rate 7.6, it has a slight base reaction, and CaCo3 is between 25.94-12.2% and the degree of electrical conductivity from 0.88-0.71 Dis Siemens / m. The texture of their layers ranges from a clay-clay loam to silty clay loam, as the amount of organic matter

between 1.48-3.58%, while phosphorus was 14.42-16.5 ppm in soil testing. Soil was analyzed by Directorate of Agriculture Research of Sulaymaniyah.

Table 4.3. Some physical-chemical properties soil of the Erbil city.

Properties		Location			
Particle Size Distribution-PSD g kg^{-1}		Sami Abdul Rahman	Gilkand	Shanadar	Minara
	Sand	559.2	506.3	436.1	435.1
	Silt	166.8	133,5	290.8	290.9
	Clay	274	360.2	273.1	273
Depth (cm)		0-30	0-30	0-30	0-30
Textural Class		CL	SiCL	CL	SiC
Ph		7.74	7.55	7.94	7.91
ECe dS m^{-1} at 25ºC		0.88	0.52	0.39	0.54
Soluble ions mmolc L^{-1}	Ca^{2+}	1.55	1.50	1.6	1.57
	Mg^{2+}	0.52	0.54	0.55	0.50
	Na^{+}	0.29	0.30	0.32	0.32
	K^{+}	0.08	0.7	0.07	0.09
	HCO_3^{-}	2.11	2.03	2.10	2.35
	SO_4^{2-}	0.40	0.45	0.50	0.50
Cation Exchange capacity cmolc kg^{-1}		27.60	27.08	27.20	27.12
Organic matter. g kg^{-1}		1.48	11.90	12.00	11.98
Total $CaCO_3$ equivalent g kg^{-1}		25.94	17.22	21.75	18.14

CL= clay loam, SiCL = silty clay loam, SiC = Silty Clay, ECe = electrical conductivity, $CaCO_3$ = calcium carbonate

4.3.2. Soil conditions in Sulaymaniyah Include

Topography: Sulaymaniyah has different topographic areas, especially southwest. The city surrounded by a mountain range such as Mount Goizha and Azmar on the east, north and east, and Mount Branan on the west and south-west. It also has several low hills and medium-sized valleys with narrow, somewhat (FAO, 2001).

Soil testing: As shown in Table 4.4, the soil acidity (pH) in Sulaymaniyah region is between7.6 to 7.8 and the amount of calcium carbonate is between 169.5-228.2 g/kg, the degree of electrical conductivity is 1.65-1.54 Dis Siemens / m. While the class of soil texture did not differ according to the layers and are clay, as the amount of organic matter between 2.15-7.77 g/kg (Faraj, 2007), Soil was analyzed by (Directorate of Agriculture Research of Sulaymaniyah)

Table 4.4. Some physical-chemical properties soil of the city of Sulaymaniyah

Properties		Location			
Particle Size Distribution (PSD) g kg^{-1}		Daik Park	Azade Park	Bakhe Gishty	Hawary Shair
	Sand	89.7	350.9	376.8	359.2
	Silt	389.6	159.1	143.1	165.6
	Clay	520.7	490.0	480.1	475.2
Depth (cm)		0-30	0-30	0-30	0-30
Textural Class		C	C	CL	SiC
Ph		7.78	7.6	7.8	7.56
ECe ds m^{-1} at 25ºC		0.32	1.65	1.50	0.31
Soluble ions mmolc L^{-1}	Ca^{2+}	1.31	1.30	1.37	1.50
	Mg^{2+}	0.45	0.6	0.7	0.8
	Na^{+}	0.18	0.11	0.07	0.09
	K^{+}	0.07	0.07	0.17	0.19
	HCO_3^{-}	2.53	2.50	2.19	2.22
	SO_4^{2-}	0.15	0.15	0.2	0.3
Cation Exchange capacity cmolc kg^{-1}		33.66	33..08	27.2	29.1
Organic matter. g kg^{-1}		12.90	11.99	8.00	7.77
Total $CaCO_3$ equivalent g kg^{-1}		217.05	205.4	25	27.7

CL= clay loam, SiCL = silty clay loam, SiC = Silty Clay, ECe = electrical conductivity, $CaCO_3$ = calcium carbonate

4.3.3. Soil Conditions in Duhok Include

Topography: The city of Duhok is characterized by complex geography. Surrounded by the mountain range of northern. Eastern and southern, the city also penetrates a series of hills and hills of multiple heights with valleys of different depths with narrow plains; the city consists of two parts with a seasonal river in the middle, from east to west. The topography of the northern part to the south and south Western section Interviewer reverse so the city rises above sea level by 583 m.

Soil testing: As shown in Table 4.5, the degree of pH interaction in Duhok is 7.6 to 7.9, which it has a neutral interaction, the ratio of calcium carbonate $CaCO_3$ between 140.1-150.3 g / kg and the degree of electrical conductivity of 0.51 -0.55 m / ds, the texture of their layers ranges from a clay to silty clay.

Table 4.5. Some physical-chemical properties soil of the city of Duhok

Properties		Location		
		Duhok Dem Park	Azade Panorama	Mohamad Bekhal
Particle Size Distribution (PSD) g kg^{-1}	Sand	29.00	29.92	27.10
	Silt	433.00	389.97	433.9
	Clay	538.00	580.11	539.00
Depth (cm)		0-30	0-30	0-30
Textural Class		SiC	C	SiC
Ph		7.6	7.8	7.90
ECe dS m^{-1} at 25°C		0.54	0.51	0.55
Soluble ions mmolc L^{-1}	Ca^{2+}	2.98	2.90	3.00
	Mg^{2+}	1.15	1.63	1.12
	Na^{+}	0.65	0.61	0.65
	K^{+}	0.09	0.19	0.09
	HCO_3^{-}	3.53	3.03	3.35
	SO_4^{2-}	0.35	0.31	0.36
Cation Exchange capacity cmolc kg^{-1}		29.16	29.00	29.12
Organic matter. g kg^{-1}		11.9	8.58	11.8
Total CaCO3 equivalent g kg^{-1}		160.3	247.50	150.4

CL= clay loam, SiCL = silty clay loam, SiC = Silty Clay, ECe = electrical conductivity, $CaCO_3$ = calcium carbonate

4.3.4. Soil Conditions in Halabja Include

Topography: Halabja has different topographic areas, especially north, North West. The city is surrounded by a mountain range such as Mount Hawraman, Shnerwe and Balambo on the east, south-south- and east, throughout 75km away from the Iranian border. Steppe Sharazur it was begging on the west city and end from the Swrdash town on the east. It also has several low hills and medium-sized valleys with narrow (Hama sidiq, 1997)

Soil testing: As shown in Table 4.6, the soil acidity (pH) in Halabja region is between7.6 to 8.18 and the amount of calcium carbonate is between 169.5-228.2 g/kg, the degree of electrical conductivity is 1.65-1.54 Dis Siemens / m. While the class of soil texture did not differ according to the layers and are clay (Faraj, 2007) as the amount of organic matter between 2.15-7.77 g/kg (Directorate of Agriculture Research of Sulaymaniyah Analyzing Soil.

Table 4.6. Some physical-chemical properties soil of the city of Halabja

Properties		Location			
Particle Size Distribution (PSD) g kg^{-1}		Bakhe Gishty	Halabja Park	Baran Park	Kubra Hamid Pur Park
	Sand	91.70	91.90	91.99	91.50
	Silt	447.63	440.7	440.8	451.40
	Clay	460.67	467.4	467.21	457.10
Depth (cm)		0-30	0-30	0-30	0-30
Textural Class		SiC	SiC	C	SiCL
Ph		8.00	8.18	7.99	7.8
ECe dS m^{-1} at 25ºC		0.45	0.45	0.43	0.40
Soluble ions mmolc L^{-1}	Ca^{2+}	1.50	1.50	1.60	1.51
	Mg^{2+}	0.60	0.63	0.59	0.45
	Na^{+}	0.60	0.59	0.49	0.55
	K^{+}	0.17	0.17	0.15	0.19
	HCO_3^{-}	4.13	4.03	3.90	3.95
	SO_4^{2-}	0.14	0.14	0.10	0.12
Cation Exchange capacity cmolc kg^{-1}		29.06	29.08	29.21	29.09
Organic matter. g kg^{-1}		42.90	43.0	42.94	41.89
Total $CaCO_3$ equivalent g kg^{-1}		176.95	177.5	171.75	147.99

CL= clay loam, SiCL = silty clay loam, SiC = Silty Clay, ECe = electrical conductivity, $CaCO_3$ = calcium carbonate

4.4. Data collection

We obtained accurate information on each of 15 samples; it continued to collect information by visiting the sample locations.

4.4.1. Erbil City

4.4.1.1. Sami Abdul Rahman Park

It has studied in the Sami Abdul Rahman Park, consisting of specialists in the field of ornamental trees, and they selected plants appropriate for the site conditions. Although it is planted for prettiness, fence and Climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and the age of woody plants may be less or 19 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.7.). Also in this park included *Cupressus sempervirens* (45.550), *Pinus brutia ten* (25.800), *Callistemon* spp (1.150), *Washingtonia filifera* (3.500), *Thuja orientalis (*17.000), *Nerium oleander* (3.500), *Yucca* spp. (60), *Berberis*

thunbergii (250), *Rosa* spp (4.000), *Lagerstroemia* (90), *Bougainvillea* spp. (100). Number of dendroflora and total dendroflora planted in this park 191.130 that 0% climbs, 15 % shrubs and 85% trees (Figure 4.6.).

Table 4.7. Data collection of Dendroflora, planted in the (Sami Abdul Rahman Park)

Qualities for Woody Plants								
Scientific name	Growth type	Plant age/ year	Stem diameter/cm	Plant length /m	Success in the city	Health	Plant shape	Uses
Pinus brutia ten	E	19	25	7	Very good	Very good	Pyramidal	Prettiness
Cupressus sempervirens	E	19	17	10	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	15	33	18	Very good	Spiffy	Columnar	Prettiness
Callistemon spp	E	15	10	7.5	Good	Good	Weeping	Prettiness
Washingtonia filifera	E	19	40	13	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	19	18	8	Very good	Spiffy	Pyramidal	Prettiness
Albizia julibrissin var. *rosea*	D	11	12	7	Very good	Unscathed	Open-head i	Prettiness
Morus alba L	D	19	20	12	Spiffy	Unscathed	Pyramidal	Prettiness
Ailanthus altissima	D	15	13	13.8	Very good	Unscathed	Pyramidal	Prettiness
Gleditsia tracanthos L.	D	19	18	7.6	Very good	Unscathed	Open-head i	Prettiness
Robinia hispida	D	15	14	6.65	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	19	27	7	Very good	Unscathed	Globe shaped	Prettiness
Fraxinus rotundifolia	D	19	16	6	Very good	Unscathed	Pyramidal	Prettiness
Platanus occidentalis L.	D	20	21	15.3	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	19	12	4	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	12	-	3.4	Very good	Unscathed	Open-Head I	Prettiness
Yucca spp.	E	13	11	2.5	Very good	Unscathed	Round headed	Prettiness
Berberis thunbergii	D	19	-	-	Very good	Unscathed	-	Fence
Myrtus communis	E	19	-	-	Very good	Unscathed	-	Fence
Dodonaea viscosa	E	19	-	-	Very good	Unscathed	-	Fence
Rosa spp	D	7-19	-	-	Very good	Good	Vase shaped	Prettiness
Lagerstroemia	D	15	-	1.9	Good	Unscathed	Vase shaped	Prettiness
Punica granatum Wonderful	D	8-15	-	1.95	Very good	Unscathed	Vase shaped	Prettiness
Bougainvillea spp.	E	9-18	-	-	Very good	Unscathed	Vase shaped	Climbing
Parthenocissus quinquefolia	D	7-19	-	-	Very good	Unscathed	-	Climbing

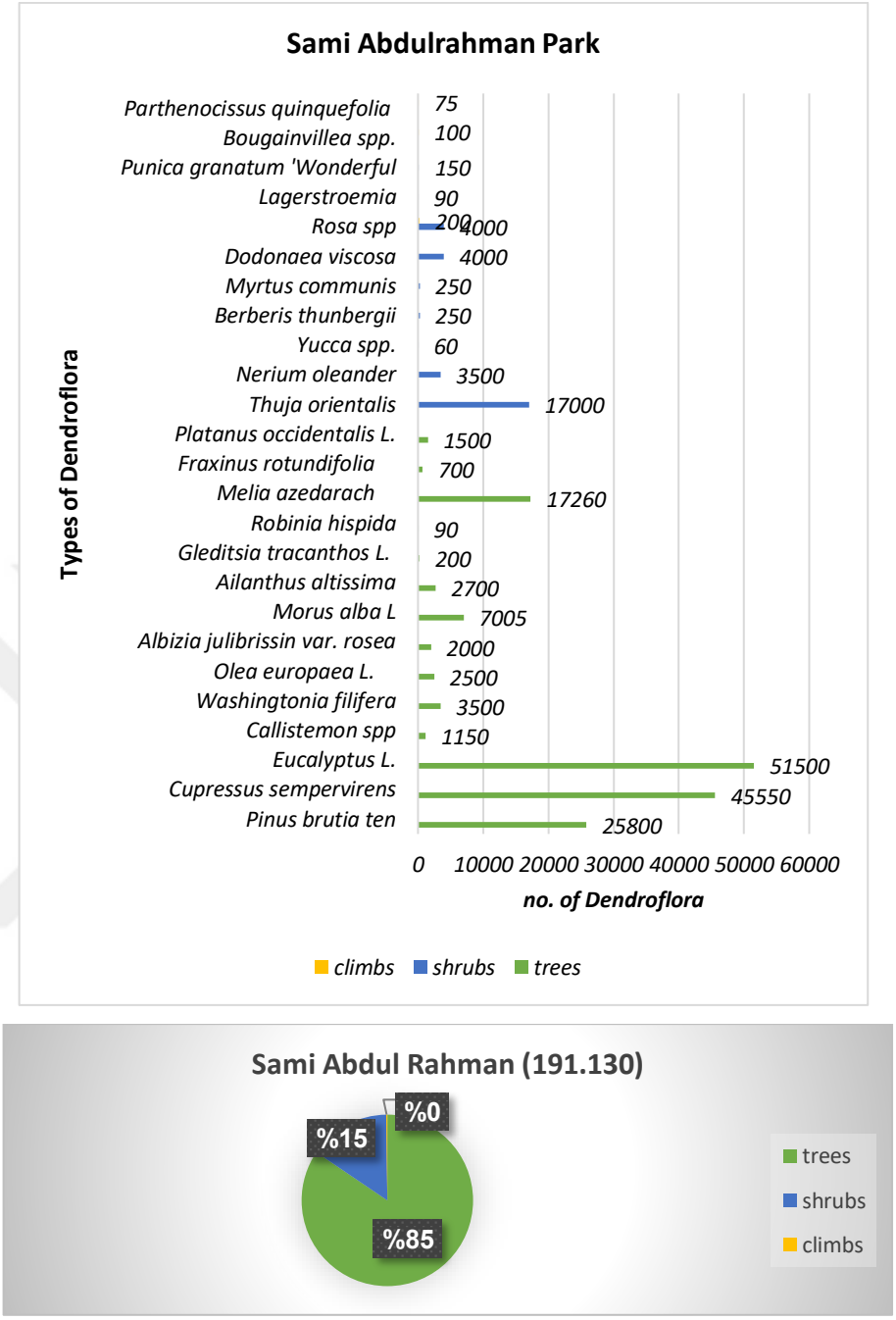


Figure 4.7 . Number and percentage of dendroflora in Sami Abdulrahman Park

4.4.1.2. Gilkand Park

It has studied in the Gilkand Park, consisting of specialists in the field of ornamental trees, and they selected plants appropriate for the site conditions. Although

it is planted for prettiness, fence, and Climbing, all of woody plan are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 8 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.8.). Also in this park included *Cupressus sempervirens* (1003), *Magnolia champaca* (2), *Callistemon* spp (240), *Capressus arizonica Greene* (300), *Washingtonia filifera* (9), *Euonymus fortune* (7.000), *Thuja orientalis* (700), *Nerium oleander* (120), *Yucca* spp. (41), *Berberis thunbergii* (10.615), *Dodonaea viscosa* (22.500), *Rosa* spp (33.500), *Flowering rosemary* (2.091), *Jasminum nudiflorum* (10) number of dendroflora and total dendroflora planted in this park 109.938 that 0% climbs, 98% shrubs and 2% trees (Figure 4.7.).

Table 4.8. Data collection of Dendroflora that planted in the (Gilkand Park)

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cites	Health	Plant shape	Uses
Cupressus sempervirens	E	8	10	4.87	Very good	Spiffy	Columnar	Prettiness
Callistemon spp	E	8	8	11.4	Good	Good	Weeping	Prettiness
Washingtonia filifera	E	8	33	7.9	Very good	Spiffy	Round headed	Prettiness
Ligustrum species	E	8	12	5	Very good	Spiffy	Pyramidal	Prettiness
Sophora secundiflora	E	8	10	3	Very good	Unscathed	Open-head	Prettiness
Magnolia champaca	E	8	9	4.3	Good	Unhealthy	Vase shaped	Prettiness
Morus alba L	D	8	13	8	Spiffy	Unscathed	Weeping	Prettiness
Schinus molle L.	E	8.5	10	4,1	Very good	Unscathed	Open-head	Prettiness
Brachychiton	E	9	14	7.5	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	9	11	4	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	9	20	7	Very good	Unscathed	Globe shaped	Prettiness
Photinia Glansmispel × fraseri	D	9	-	2.4	Very good	Unscathed	-	Fence
Euonymus fortune	D	9	-	1.6	Very good	Unscathed	-	Fence
Thuja orientalis	E	9	-	3	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	9	-	2.9	Very good	Unscathed	Open-head	Prettiness
Flowering rosemary	E	9	-	0.9	Very good	Unscathed	Vase shaped	Fence
Yucca spp.	D	9	8	2.3	Very good	Unscathed	Round headed	Prettiness
Berberis thunbergii	D	9	-	-	Very good	Unscathed	-	Fence
Dodonaea viscosa	E	9	-	-	Very good	Unscathed	-	Fence
Rosa spp	D	8	-	-	Very good	Good	Vase shaped	Prettiness
Lagerstroemia	D	9	-	2.8	Good	Unscathed	Vase shaped	Prettiness
Jasminum nudiflorum	D	5-9	-	-	Very good	Good	Vase shaped	Climbing

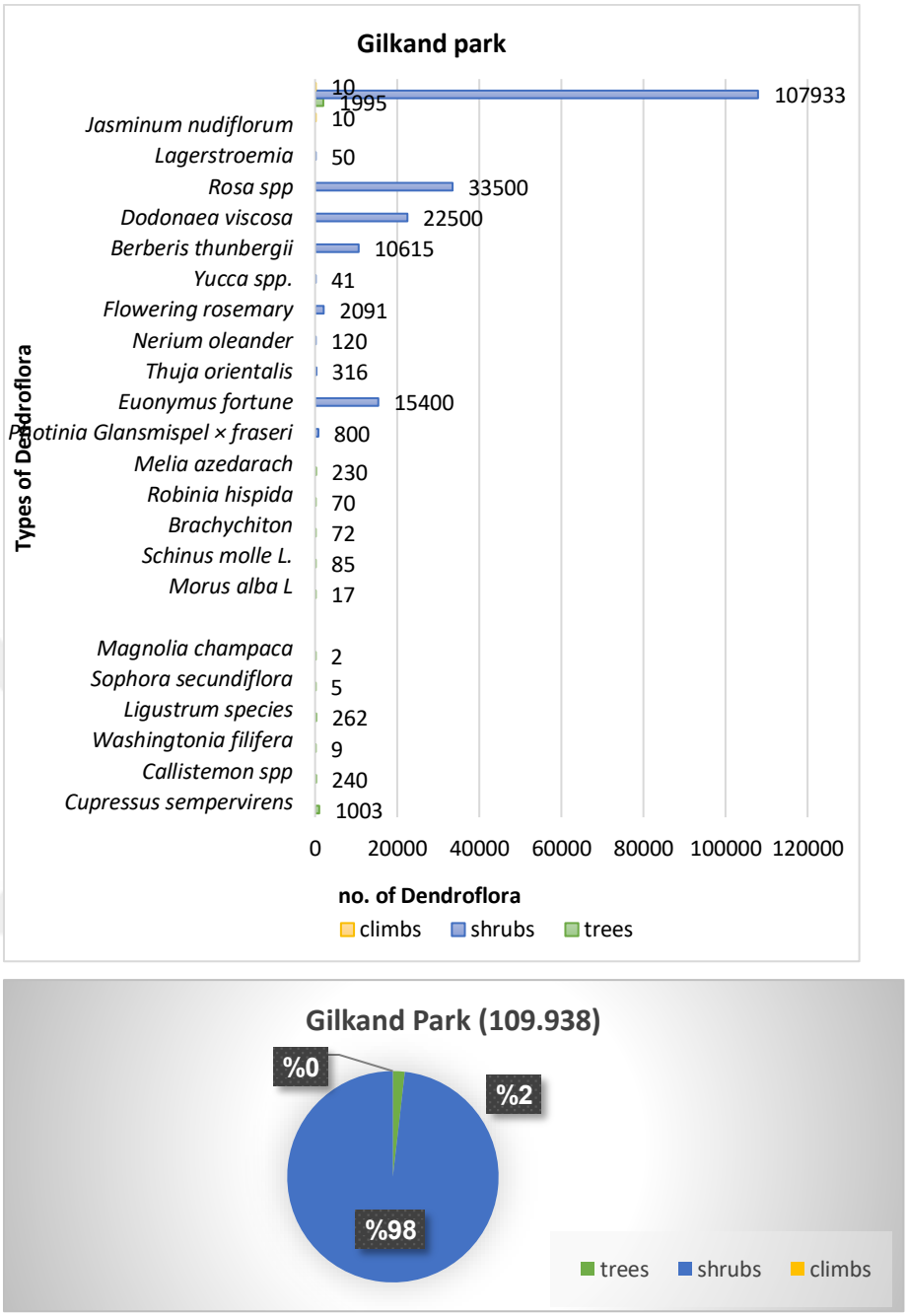


Figure 4.8. Number and percentage of dendroflora in Gilkand Park

4.4.1.3. Shanader Park

It has studied in the Shanader Park, consisting of specialists in the field of ornamental trees, and they selected plants appropriate for the site conditions. Although it is planted for prettiness, fence and Climbing, all of woody plants are successes in

this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 11 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.9.). Also in this park included *Cupressus sempervirens* (2.500), *Pinus brutia ten* (4.050), *Callistemon* spp (2.500), *Capressus arizonica Greene* (300), *Washingtonia filifera* (29), *Euonymus fortune* (7.000), *Thuja orientalis* (700), *Nerium oleander*, *Yucca* spp. (80), *Berberis thunbergii* (4.000), *Chamaecyparis obtusa 'Aurea* (1.500), *Rosa* spp (3.000), *Santolina icana* (2.000) number of dendroflora and total dendroflora was planted in this park 23.440 that 0% climbs, 69% shrubs and 31% trees (Figure 4.8.).

Table 4.9. Data collection of Dendroflora that planted in the (Shanader Park)

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the site	Health	Plant shape	Uses
Cupressus sempervirens	E	< 11	18	8.9	Very good	Spiffy	Columnar	Prettiness
Pinus brutia ten	E	< 11	20	9.2	Very good	Very good	Pyramidal	Prettiness
Callistemon spp	E	< 11	13	5	Good	Good	Weeping	Prettiness
Capressus arizonica Greene	E	< 11	17	7	Very good	good	Pyramidal	Prettiness
Washingtonia filifera	E	< 11	33	8	Very good	Spiffy	Round headed	Prettiness
Ligustrum species	E	< 11	15	4.2	Very good	Spiffy	Pyramidal	Prettiness
Sophora secundiflora	E	< 11	11	3.4	Very good	Unscathed	Open-head	Prettiness
Morus alba L	D	< 11	13	3.7	Spiffy	Unscathed	Weeping	Prettiness
Schinus molle L.	E	< 11	10	3	Very good	Unscathed	Open-head	Prettiness
Magnolia champaca	E	< 8	9	4.6	Good	Unhealthy	Vase shaped	Prettiness
Brachychiton	E	< 11	15	7	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	< 11	11	4.2	Good	Unscathed	Globe shaped	Prettiness
Acer L	D	< 11	13	6	Very good	Unscathed	Pyramidal	Prettiness
Melia azedarach	D	< 11	30	6.7	Very good	Unscathed	Globe shaped	Prettiness
Photinia Glansmispel × fraseri	D	< 5	-	2.3	Very good	Unscathed	-	Fence
Euonymus fortune	D	< 11	-	1,82	Very good	Unscathed	-	Fence
Thuja orientalis	E	< 11	-	2.3	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	< 11	-	2,4	Very good	Unscathed	Open-head	Prettiness
Yucca spp.	E	< 11	8	2.4	Very good	Unscathed	Round headed	Prettiness
Berberis thunbergii	D	< 11	-	-	Very good	Unscathed	-	Fence
Chamaecyparis obtusa 'Aurea	E	< 11	-	1.90	Very good	Unscathed	Round headed	Prettiness
Rosa spp	D	< 11	-	-	Very good	Good	Vase shaped	Prettiness
Santolina icana	E	< 11	-	0.2	Good	Unscathed	Vase shaped	Fence

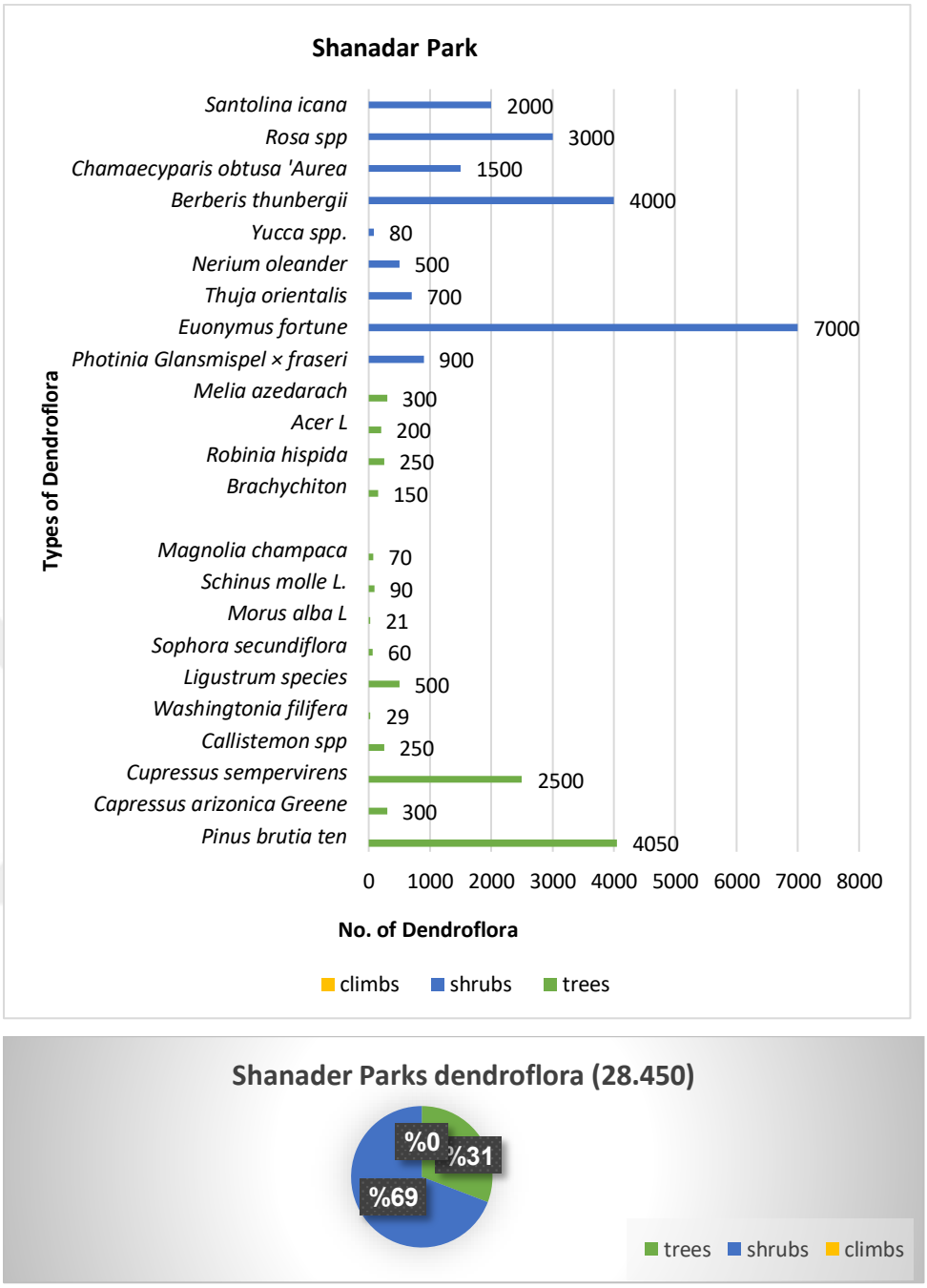


Figure 4.9. Number and percentage of dendroflora in Shanader Park

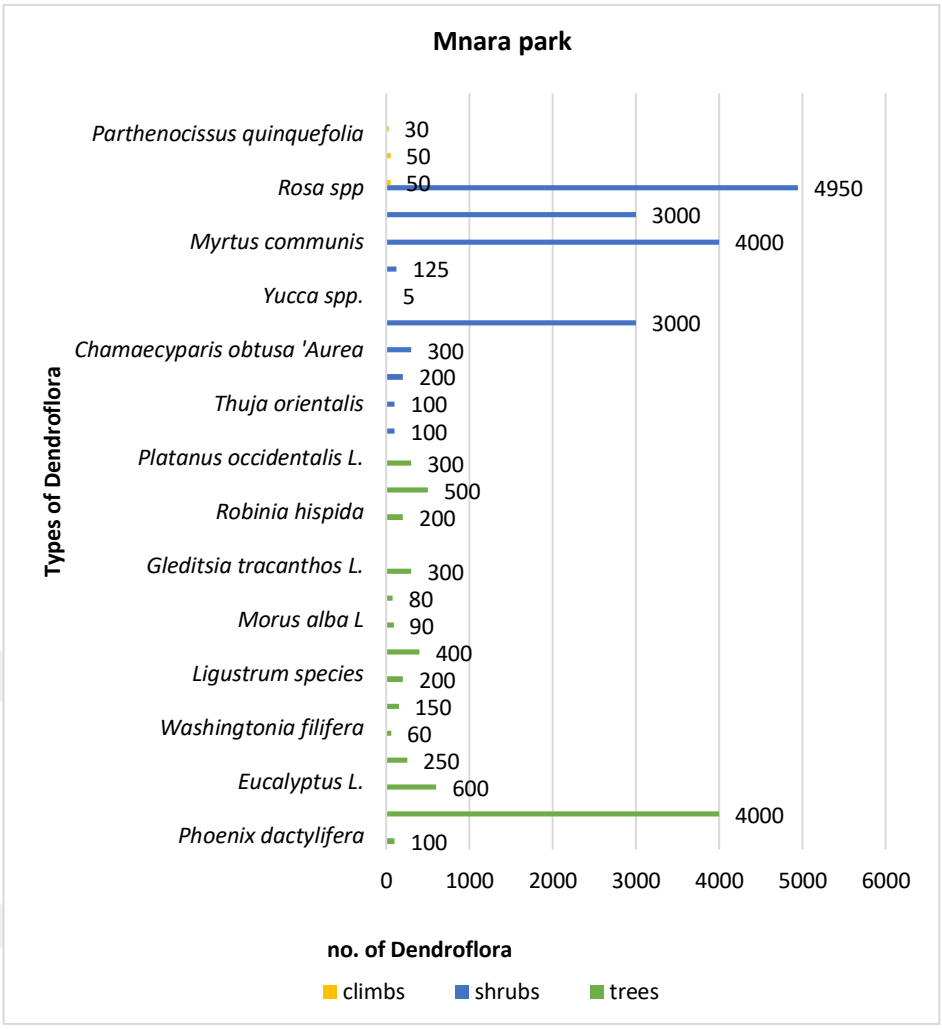
4.4.1.4. Minara Park

It has studied in the shanader Park, consisting of specialists in the field of ornamental trees, and they selected plants appropriate for the site conditions. Although

it is planted for prettiness, fence and climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 11 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.10.). Also in this park included *Cupressus sempervirens (*4.000), *Callistemon* spp (250), *Ligustrum species* (200), *Washingtonia filifera* (60), *Euonymus fortune* (3.000), *Thuja orientalis* (100), *Nerium oleander* (200), *Yucca* spp. (5), *Berberis thunbergii* (4.000), *Chamaecyparis obtusa 'Aurea* (300), *Rosa* spp (4950), *Parthenocissus quinquefolia* (30) number of dendroflora and total dendroflora is planted in this park 23.240 that 1% climbs, 68% shrubs and 31% trees (Figure 4.9.).

Table 4.10. Data collection of dendroflora that planted in the (Minara Park)

Qualities for Woody Plant's								
Scientific name	Growth type	plant age/year	Stem diameter/cm	Plant length /m	Success in the site	Health	Plant shape	Uses
Phoenix dactylifera	E	13	25	4,6	Very good	Very good	Pyramidal	Prettiness
Cupressus sempervirens	E	13	11	4	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	13	25	11	Very good	Spiffy	Columnar	Prettiness
Callistemon spp	E	13	19.5	13	Good	Good	Weeping	Prettiness
Washingtonia filifera	E	13	27	12	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	14	18	5	Very good	Spiffy	Pyramidal	Prettiness
Ligustrum species	E	13	23	4.1	Very good	Unscathed	Open-head	Prettiness
Ulmus giabra	D	13	30	4.8	Spiffy	Unscathed	Globe shaped	Prettiness
Morus alba L	D	14	20	3	Spiffy	Unscathed	Pyramidal	Prettiness
Schinus molle L.	E	14	15	4	Very good	Unscathed	Open-head	Prettiness
Gleditsia tracanthos L.	D	13	19	6	Very good	Unscathed	Open-head	Prettiness
Robinia hispida	D	14	9	4.3	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	14	23	5	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	14	20	8	Very good	Unscathed	Pyramidal	Prettiness
Photinia Glansmispel	D	14	-	2.2	Very good	Unscathed	-	Fence
Thuja orientalis	E	14	12	3.5	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	14	-	3.6	Very good	Unscathed	Open-head	Prettiness
Chamaecyparis obtusa	E	14	-	2	Very good	Unscathed	Round headed	Prettiness
Euonymus fortune	D	14	-	1.2	Very good	Unscathed	-	Fence
Yucca spp.	E	13	11	2	Very good	Unscathed	Round headed	Prettiness
Berberis thunbergii	D	14	-	1,2	Very good	Unscathed	-	Fence
Myrtus communis	E	13	-	1.4	Very good	Unscathed	-	Fence
Dodonaea viscosa	E	11	-	0.94	Very good	Unscathed	-	Fence
Rosa spp	D	3-14	-	-	Very good	Good	Vase shaped	Prettiness
Bougainvillea spp.	E	4-14	-	-	Very good	Unscathed	Vase shaped	Climbing
Parthenocissus quinquefolia	D	7-14	-	-	Very good	Unscathed	-	Climbing



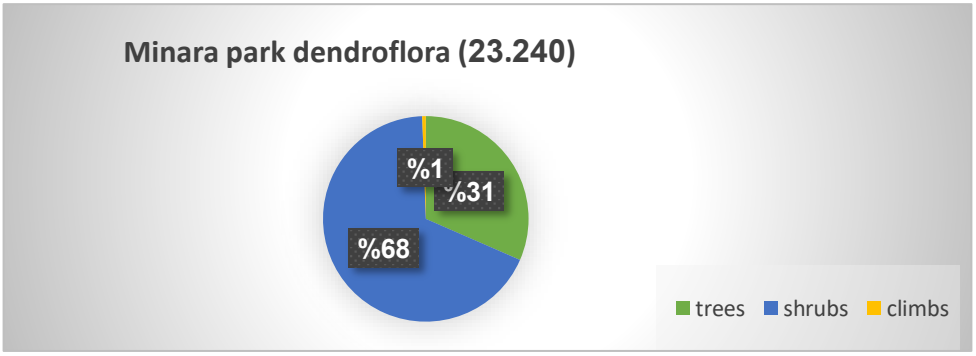


Figure 4.10. Number and percentage of dendroflora in Minara Park

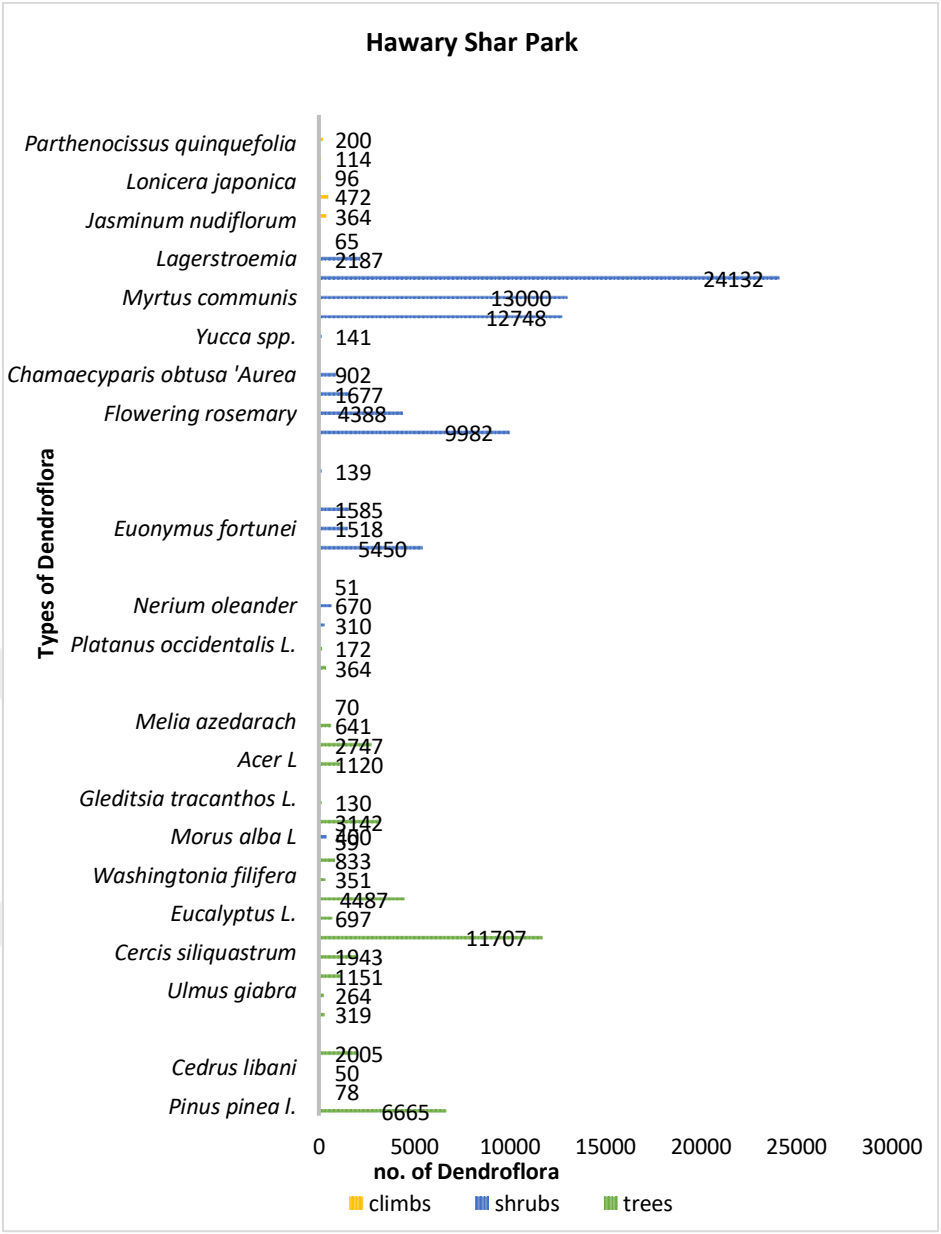
4.4.2. Sulaymaniyah city

4.4.2.1. Hawary Shar Park

It has studied in the Hawary Shar Park, consisting of specialists in the field of ornamental trees, although more than 90% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Sulaymaniyah city, Also it was planted for prettiness, fence, and Climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and the age of woody plants may be less or 12 years, in this park woody plant that was evergreen or deciduous. Moreover, the shapes of Dendroflora have (pyramidal, columnar, horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.11.). Also in parks included this dendroflora *Cupressus sempervirens* (11.707), *Wisteria floribunda* (364), *Pinus pinea* L. (6.665), *Salix babylonica* L. (78) *Ligustrum species* (2005), *Washingtonia filifera* (351), *Euonymus fortune* (1.518), *Thuja orientalis* (310), *Nerium oleander* (670), *Yucca* spp. (141), *Berberis thunbergii* (12.748), *Chamaecyparis obtusa 'Aurea* (902), *Rosa* spp (24.132), *Parthenocissus quinquefolia* (200) number of dendroflora and total dendroflora planted in a park 119589 that 1% climbs, 66% shrubs and 33% trees (Figure 4.10.).

Table 4.11. Data collection of dendroflora that planted in the (Hawary shar Park)

Qualities for Woody Plant's								
Scientific name	Growth type	plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	10-11	11	4.5	Very good	Very good	Pyramidal	Prettiness
Salix babylonica L.	E	10-12	9	4.1	Very good	Unscathed	Weeping	Prettiness
Cedrus libani	E	10-12	8	2.90	Very good	Unscathed	Pyramidal	Prettiness
Ligustrum species	E	10-12	7	2.43	Very good	Unscathed	Pyramidal	Prettiness
Juniperus oxycedrus L	D	10-12	6	2.2	Very good	Unscathed	Crown shape	Prettiness
Ulmus giabra	D	10-12	11	3	Spiffy	Unscathed	Globe shape	Prettiness
Prunus cerasifer pissardu	D	10-12	9	3.4	Very good	Unscathed	Pyramidal	Prettiness
Cercis siliquastrum	D	10-12	4	2	Spiffy	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	10-12	20	5	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	10-12	25	8	Very good	Spiffy	Columnar	Prettiness
Capressus arizonica	E	10-12	9	3	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	10-12	28	4	Very good	Spiffy	Round head	Prettiness
Albizia julibrissin var. *rosea*	D	10-12	24	4.3	Very good	Unscathed	Vase shaped	Prettiness
Morus alba L	D	10-12	10	2.2	Spiffy	Unscathed	Weeping	Prettiness
Ailanthus altissima	D	10-12	13	5	Very good	Unscathed	Pyramidal	Prettiness
Gleditsia tracanthos L.	D	10-12	6	3	Very good	Unscathed	Open-Head	Prettiness
Acer L.	D	11	7	3.5	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	10-12	18	3.2	Good	Unscathed	Globe shape	Prettiness
Melia azedarach	D	10-12	10	4	Very good	Unscathed	Globe shape	Prettiness
Quercus infectoria	D	10-12	4	2	Very good	Unscathed	Pyramidal	Prettiness
Wisteria floribunda	D	10-12	5	1.3	Very good	Unscathed	Vase shaped	Prettiness
Platanus occidentalis L.	D	10-12	7	3,7	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	10-12	12	2	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	10-12	-	2.8	Very good	Unscathed	Vase shaped	Prettiness
Alyogyne huegelii	E	10-12	5	2.1	Very good	Spiffy	Vase shaped	Prettiness
Pittosporum tobira	E	10-12	-	-	Very good	Unscathed	-	Fence
Euonymus fortunei	E	10-12	-	-	Very good	Unscathed	-	Fence
Pyracantha sp.	E	10-12	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lantana camara	E	10-12	-	1	Very good	Unscathed	Vase shaped	Prettiness
Spartium junceum	E	10-12	-	1.9	Very good	Unscathed	Vase shaped	Prettiness
Santolina icana	E	10-12	-	0.4	Very good	Unscathed	Vase shaped	Fence
Flowering rosemary	E	10-12	-	0.5	Very good	Unscathed	Vase shaped	Fence
Juniperus nudiflorum	E	10-12	-	-	Very good	Unscathed	-	Prettiness
Chamaecyparis obtusa	E	10-12	-	1	Very good	Unscathed	Round head	Prettiness
Yucca spp.	E	10-12	11	2	Very good	Unscathed	Round head	Prettiness
Berberis thunbergii	D	10-12	-	1	Very good	Unscathed	-	Fence
Myrtus communis	E	10-12	-	0.7	Very good	Very good	-	Fence
Rosa spp	D	10-12	-	-	Very good	Unscathed	-	Fence
Lagerstroemia	D	10-12	3	2	Very good	Unscathed	-	
Punica granatum	D	10-12	-	2	Very good	Unscathed	-	Fence
Jasminum nudiflorum	D	10-12	-	-	Very good	Good	Vase shaped	Climbing
Hedera helix	E	10-12	-	-	Good	Unscathed	-	Climbing
Lonicera japonica	E	10-12	-	-	Very good	Unscathed	Vase shaped	Climbing
Bougainvillea spp.	E	10-12	-	-	Very good	Unscathed	Vase shaped	Climbing
Parthenocissus quinquefolia	D	10-12	-	-	Very good	Unscathed	-	Climbing



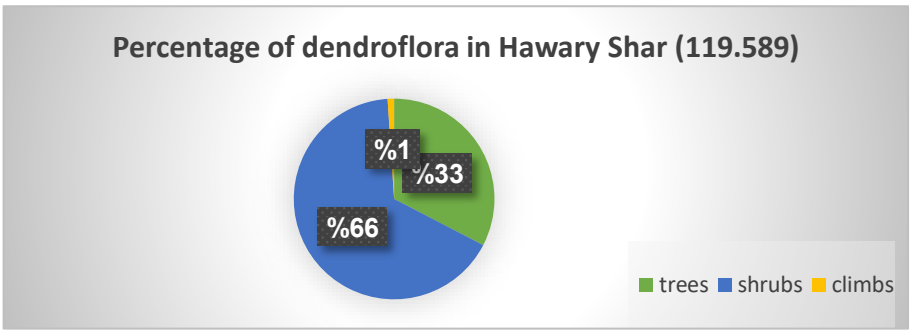


Figure 4.11. Number and percentage of dendroflora in Hawary Shar Park

4.4.2.2. Azade Park

It has studied in the Azade Park, consisting of specialists in the field of ornamental trees, although more than 95% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Sulaymaniyah city, Also it is planted for prettiness, fence and Climbing, age of woody plants may be less or 25 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped). As seen from the table (Table 4.12.).

Table 4.12. Data collection of dendroflora that planted in the (Azade Park)

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	20-25	29	14	Very good	Very good	Pyramidal	Prettiness
Ligustrum species	E	20-25	9	4	Very good	Unscathed	Pyramidal	Prettiness
Ulmus giabra	D	20-25	25	8	Spiffy	Unscathed	Globe shaped	Prettiness
Prunus cerasifer pissardu	D	20-25	17	4.5	Very good	Unscathed	Pyramidal	Prettiness
Cercis siliquastrum	D	20-25	12	4	Spiffy	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	20-25	10	7	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	20-25	33	14	Very good	Spiffy	Columnar	Prettiness
Capressus arizonica	E	20-25	12	6	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	20-25	33	3.4	Very good	Spiffy	Round headed	Prettiness
Melia azedarach	D	20-25	16	6	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	20-25	19	9	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	20-25	20	3.4	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	20-25	-	4.2	Very good	Unscathed	Vase shaped	Prettiness
Alyogyne huegelii	E	20-25	-	2.5	Very good	Spiffy	Vase shaped	Prettiness
Pittosporum tobira	E	20-25	-	1.2	Very good	Unscathed	-	Fence
Euonymus fortune	E	20-25	-	-	Very good	Unscathed	-	Fence
Pyracantha sp.	E	20-25	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lantana camara	E	20-25	-	1.1	Very good	Unscathed	Vase shaped	Prettiness
Spartium junceum	E	18-20	-	1	Very good	Unscathed	Vase shaped	Prettiness
Santolina icana	E	18-20	-	0.3	Very good	Unscathed	Vase shaped	Fence
Flowering rosemary	E	18-20	-	0.8	Very good	Unscathed	Vase shaped	Fence
Juniperus nudiflorum	E	18-20	-	-	Very good	Unscathed	-	Prettiness
Chamaecyparis obtusa	E	18-20	-	1.2	Very good	Unscathed	Round headed	Prettiness
Filipendula ulmaria	E	18-20	-	0.4	Very good	Unscathed	Vase shaped	Prettiness
Berberis thunbergii	D	18-20	-	1	Very good	Unscathed	-	Fence
Myrtus communis	E	18-20	-	1.2	Very good	Very good	-	Fence
Dodonaea viscosa	D	8-20	-	1.4	Very good	Good	-	Fence
Rosa spp	D	18-20	-	-	Very good	Unscathed	-	Fence
Lagerstroemia	D	6	-	1.23	Very good	Unscathed	-	
Punica granatum' Wonderful	D	10	-	2	Very good	Unscathed	-	Fence
Jasminum nudiflorum	D	18-20	-	-	Very good	Good	Vase shaped	Climbing
Hedera helix	E	18-20	-	-	Good	Unscathed	-	Climbing
Lonicera japonica	E	18-20	-	-	Very good	Unscathed	Vase shaped	Climbing
Parthenocissus quinquefolia	D	18-20	-	-	Very good	Unscathed	-	Climbing

Also in parks included this dendroflora *Cupressus sempervirens* (400), *Ulmus giabra* (700), *Pinus pinea* L. (5.000), *Albizia julibrissin* var. *rosea* (18), *Ligustrum species* (600), *Thuja orientalis* (500), *Nerium oleander* (250), *Yucca* spp. (141),

Berberis thunbergii (400), *Chamaecyparis obtusa 'Aurea* (130), *Rosa* spp (1.000), *Parthenocissus quinquefolia* (50) number of dendroflora and total dendroflora planted in a park 18.456 that 1% climbs, 54% shrubs and 45% trees (Figure 4.11.).

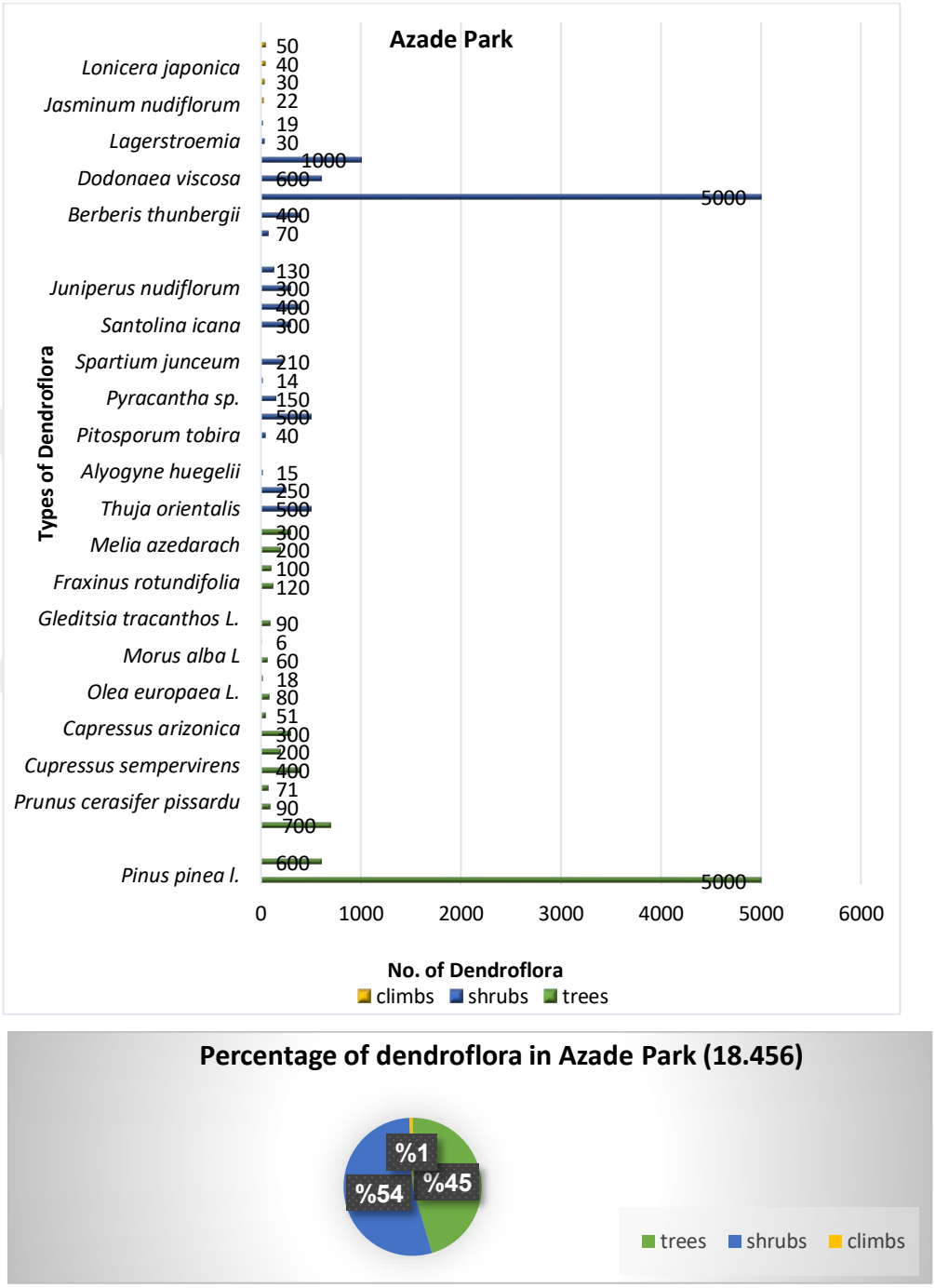


Figure 4.12. Number and percentage of dendroflora in Azade Park.

4.4.2.3. Bakhe Gishty Park

It has studied in the Bakhe Gishty Park, consisting of specialists in the field of ornamental trees, although more than 100% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Sulaymaniyah city, Also it is planted for prettiness, fence and Climbing. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 80 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.13.).

Table 4.13. Data collection of dendroflora that planted in the Bakhe Gishty

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /M.	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	20-80	40	15	Very good	Very good	Pyramidal	Prettiness
Salix babylonica L.	E	20-80	50	14	Very good	Unscathed	Weeping	Prettiness
Ligustrum species	E	20-80	39	12	Very good	Unscathed	Pyramidal	Prettiness
Fraxinus rotundifolia	D	20-80	50	17	Very good	Spiffy	Open-head	Prettiness
Callistemon spp	E	20-80	30	7	Very good	Unscathed	Weeping	Prettiness
Ulmus giabra	D	20-80	70	15	spiffy	Unscathed	Globe shape	Prettiness
Cercis siliquastrum	D	20-80	35	16	spiffy	Unscathed	Pyramidal	Prettiness
Cupressus semperviren	E	20-80	75	17	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	20-80	35	20	Very good	Spiffy	Columnar	Prettiness
Capressus arizonica	E	20-80	25	14	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	20-80	30	5	Very good	Spiffy	Round head	Prettiness
Olea europaea L.	E	20-80	70	19	Very good	Spiffy	Pyramidal	Prettiness
Catalpa bignonidias	D	30	28	11.2	Very good	Unscathed	Vase shaped	Prettiness
Morus alba L	D	20-80	110	25	spiffy	Unscathed	Pyramidal	Shadow
Ailanthus altissima	D	30	30	11	Very good	Unscathed	Pyramidal	Prettiness
Gleditsia tracanthos L.	D	20-80	70	21	Very good	Unscathed	Open head	Prettiness
Acer L	D	20-80	45	16	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	20-80	30	12	Good	Unscathed	Globe shape	Prettiness
Melia azedarach	D	20-80	45	15	Very good	Unscathed	Globe shape	Prettiness
Quercus infectoria	D	20-80	35	18	Very good	Unscathed	Pyramidal	Prettiness
Paulownia elengata	D	16	30	12	Very good	Unscathed	Vase shaped	Prettiness
Platanus occidentalis L	D	20-80	85	22	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	20-80	20	4	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	20-80	-	3.8	Very good	Unscathed	Vase shaped	Prettiness
Pyracantha sp.	E	20-40	26	7	Very good	Unscathed	Vase shaped	Prettiness
Lantana camara	E	20-40	-	2	Very good	Unscathed	Vase shaped	Prettiness
Spartium junceum	E	20-40	-	2.4	Very good	Unscathed	Vase shaped	Prettiness
Vitex agnus-castus	E	20-40	-	2.3	Very good	Unscathed	Vase shaped	Fence
Photinia Glansmispel	E	20-40	-	1.5	Very good	Unscathed	Vase shaped	Fence
Cycas revolute	E	13	20	1	Very good	Unscathed	Globe shape	Prettiness
Yucca spp.	E	19	11	2	Very good	Unscathed	Round head	Prettiness
Berberis thunbergii	D	20-40	-	1	Very good	Unscathed	-	Fence
Myrtus communis	E	20-60	-	2	Very good	Very good	-	Fence
Rosa spp	D	20-40	-	-	Very good	Unscathed	-	Fence
Lagerstroemia	D	9	3	2.4	Very good	Unscathed	Vase shaped	Prettiness
Jasminum nudiflorum	D	20-40	-	-	Very good	Good	Vase shaped	Climbing
Hedera helix	E	30	-	-	Good	Unscathed	-	Clmbing
P. quinquefolia	D	20-40	-	-	Very good	Unscathed	-	Climbing

Also in parks included this dendroflora *Cupressus sempervirens (*400), *Ulmus giabra* (700), *Pinus pinea* L. (5.000), *Albizia julibrissin* var. *rosea* (18), *Ligustrum species* (600), *Washingtonia filifera* (51), *Euonymus fortune* (500), *Thuja orientalis* (500), *Nerium oleander* (250), *Yucca* spp. (141), *Berberis thunbergii* (400), *Chamaecyparis obtusa 'Aurea* (130), *Rosa* spp (1.000), *Parthenocissus quinquefolia* (50) number of dendroflora and total dendroflora planted in a park 10.019 that 0% climbs, 93% shrubs and 7% trees (Figure 4.12.).

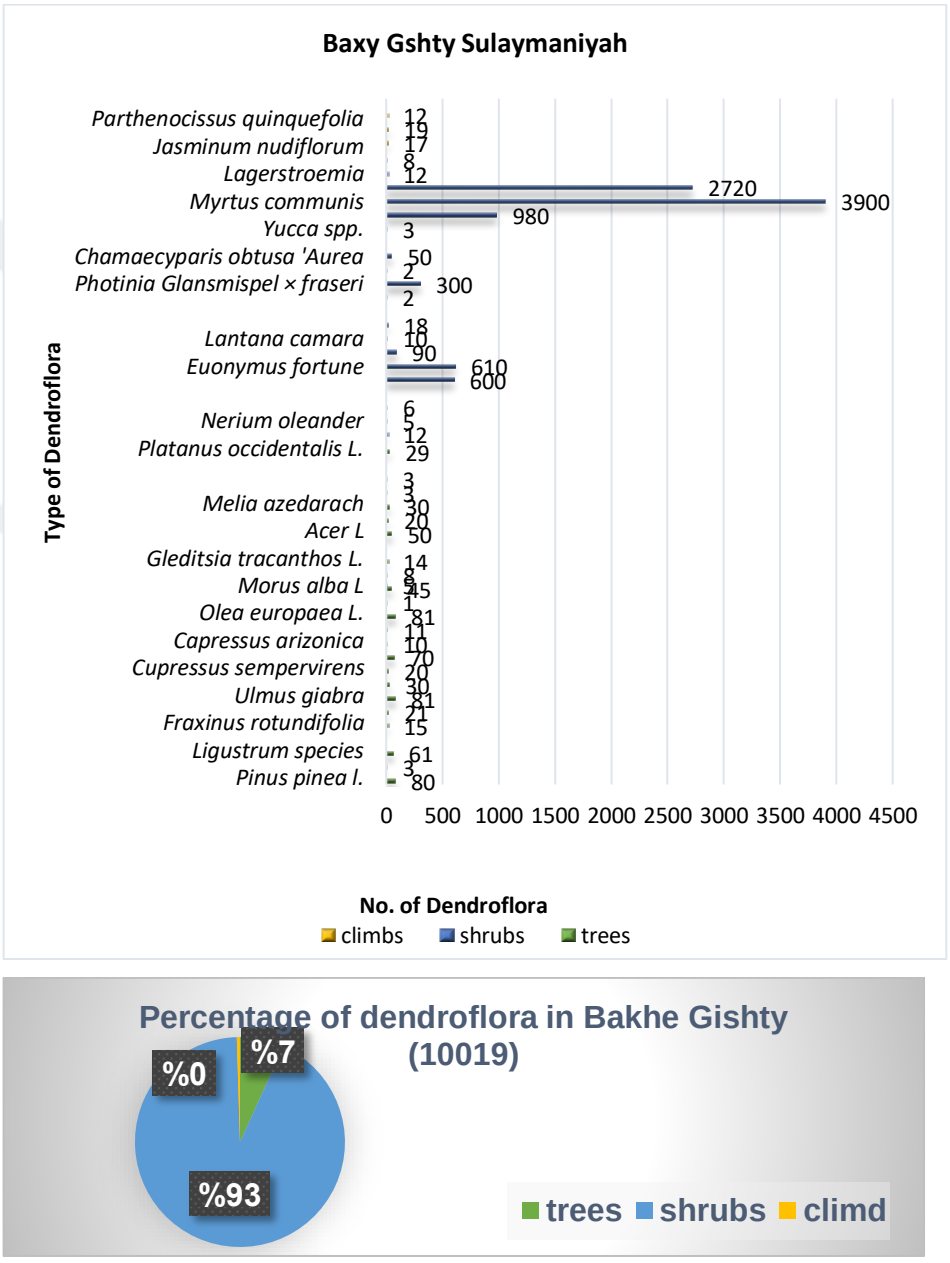


Figure 4.13. Number and percentage of dendroflora in Bakhe Gishty.

4.4.3.4. Daik Park

It has studied in the Bakhe Gishty Park, consisting of specialists in the field of ornamental trees, although more than 100% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Sulaymaniyah city, Also it is planted for prettiness, fence and Climbing. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 11 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.14.).

Table 4.14. Data collection of dendroflora that planted in the (Daik Park).

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	11	8	5	Very good	Very good	Pyramidal	Prettiness
Salix babylonica L.	E	10	9	3.2	Very good	Unscathed	Weeping	Prettiness
Phoenix dactylifera	E	10	25	2	Very good	Unscathed	Pyramidal	Prettiness
Ligustrum species	E	10	14	3.3	Very good	Unscathed	Pyramidal	Prettiness
Tamarix aphylla	D	10	14	4	Very good	Unscathed	Crown shape	Prettiness
Ulmus giabra	D	10	15	3.4	spiffy	Unscathed	Globe shaped	Prettiness
Prunus cerasifer pissardu	D	10	25	4	Very good	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	10	14	7	Very good	Spiffy	Columnar	Prettiness
Brachychiton	E	10	25	9	Very good	Spiffy	Columnar	Prettiness
Capressus Arizonian	E	10	24	6	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	10	19	3	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	10	50	3	Very good	Spiffy	Pyramidal	Prettiness
Sophora secundiflora	E	10	11	5	Very good	Unscathed	Vase shaped	Prettiness
Magnolia champaca	E	10	12	3.3	spiffy	Unscathed	Vase shaped	Prettiness
Ailanthus altissima	D	10	14	10	Very good	Unscathed	Pyramidal	Prettiness
Delonix regia Bojer	D	10	11	3	Very good	Unscathed	Open-head	Prettiness
Acer L	D	10	9	4	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	10	24	4.1	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	10	13	4.2	Very good	Unscathed	Globe shaped	Prettiness
Quercus infectoria	D	10	6	2	Very good	Unscathed	Pyramidal	Prettiness
Wisteria floribunda	D	10	15	2.1	Very good	Unscathed	Vase shaped	Prettiness
Platanus occidentalis L.	D	3	5	2	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	10	6	2	Very good	Unscathed	Horizontal	Prettiness
Filipendula ulmaria	E	10	-	1	Very good	Spiffy	Vase shaped	Prettiness
Pittosporum tobira	E	10	-	-	Very good	Unscathed	-	Fence
Euonymus fortune	E	10	-	-	Very good	Unscathed	-	Fence
Pyracantha sp.	E	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lantana camara	E	10	-	1	Very good	Unscathed	Vase shaped	Prettiness
Spartium junceum	E	10	-	1.2	Very good	Unscathed	Vase shaped	Prettiness
Santolina icana	E	10	-	0.4	Very good	Unscathed	Vase shaped	Fence
Flowering rosemary	E	10	-	0.5	Very good	Unscathed	Vase shaped	Fence
Myrtus communis	E	10	-	0.8	Very good	Very good	-	Fence
Rosa spp	D	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lagerstroemia	D	10	3	2	Very good	Unscathed	Vase shaped	Prettiness
Campsis radicans	D	10	-	-	Very good	Unscathed	Vase shaped	Climbing
Jasminum nudiflorum	D	10	-	-	Very good	Good	Vase shaped	Climbing
Hedera helix	E	10	-	-	Good	Unscathed	-	Climbing
Lonicera japonica	E	10	-	-	Very good	Unscathed	Vase shaped	Climbing
Bougainvillea spp.	E	10	-	-	Very good	Unscathed	Vase shaped	Climbing
P. quinquefolia	D	10	-	-	Very good	Unscathed	-	Climbing

Also in parks included this dendroflora *Cupressus sempervirens* (5), *Ulmus giabra* (8), *Pinus pinea* L. (45), *Brachychiton* (25), *Ligustrum species* (95), *Washingtonia filifera* (1), *Wisteria floribunda* (2), *Euonymus fortune* (100), *Thuja orientalis* (20), *Myrtus communis* (80), *Chamaecyparis obtusa 'Aurea* (40), *Rosa* spp (160), *Parthenocissus quinquefolia* (6) number of dendroflora and total dendroflora planted in a park 1.186 that 3% climbs, 60% shrubs and 37% trees (Figure 4.13.).

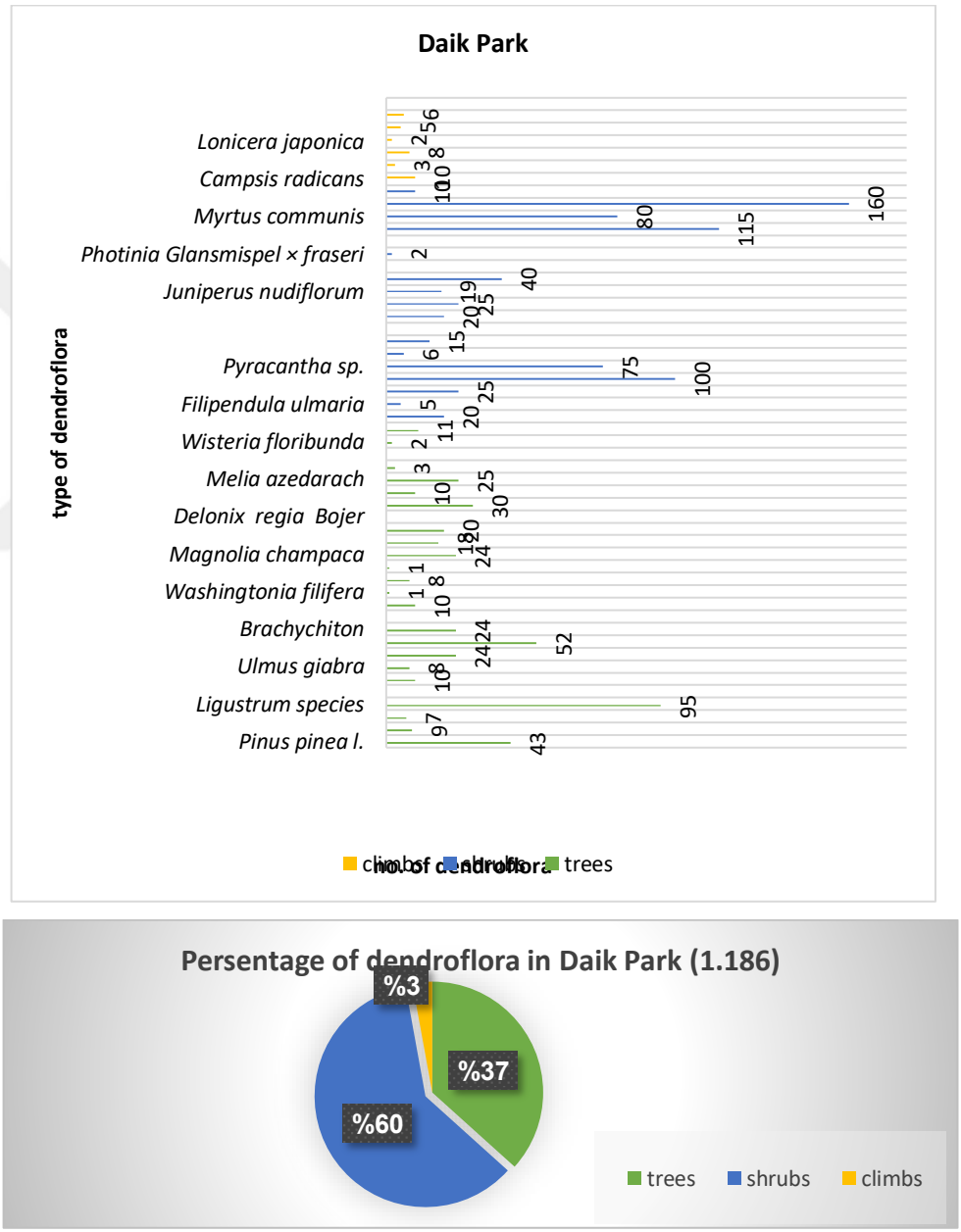


Figure 4.14. Number and percentage of dendroflora in Daik Park.

4.4.3. Duhok city

4.4.3.1. Azade Panorama Park

It has studied in the Azade Panorama Park, consisting of specialists in the field of ornamental trees, although more than 90% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Duhok city, Also it is planted for prettiness, fence and Climbing, plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 13 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.15.).

Table 4.15. Data collection of dendroflora that planted in the (Azade Panorama Park)

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Ligustrum species	E	10-13	8	5	Very good	Unscathed	Pyramidal	Prettiness
morus bombycis	D	10-13	15	2.5	Very good	Unscathed	Weeping	Prettiness
Prunus cerasifer pissardu	D	10-13	17	3.5	Very good	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	11	14	5	Very good	Spiffy	Columnar	Prettiness
Catalpa bignonidias	D	11	9	4	Very good	Unscathed	Pyramidal	Prettiness
Cedrus libani	E	10-12	8	2	Very good	Unscathed	Pyramidal	Prettiness
Capressus Arizonian	E	10-13	10	3.5	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	10	40	3.6	Very good	Spiffy	Round heade	Prettiness
Magnolia champaca	E	11	10	4	Spiffy	Unscathed	Vase shaped	Prettiness
Robinia hispida	D	11	20	7	Good	Unscathed	Globe shape	Prettiness
Melia azedarach	D	11	20	7.1	Very good	Unscathed	Globe shape	Prettiness
Platanus occidentalis L.	D	11	7	3	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	10	10	2	Very good	Unscathed	Horizontal	Prettiness
Euonymus fortune	E	10	-	-	Very good	Unscathed	-	Fence
Pyracantha sp.	E	10	-	3.2	Very good	Unscathed	Vase shaped	Prettiness
Lantana camara	E	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Spartium junceum	E	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Cotoneaster salicifolius	E	10	-	-	Very good	Unscathed	-	Prettiness
Nerium oleander	E	11	-	3	Very good	Unscathed	Vase shaped	Prettiness
Chamaecyparis obtusa	E	12	-	1	Very good	Unscathed	Round head	Prettiness
Photinia Glansmispel	E	11	-	2	Very good	Unscathed	Round head	Fence
Yucca spp.	E	10	10	2.3	Very good	Unscathed	Round head	Prettiness
Punica granatum	D	10	-	2	Very good	Unscathed	Vase shaped	Prettiness
Myrtus communis	E	10	-	-	Very good	Very good	-	Fence
Rosa spp	D	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lagerstroemia	D	10	7	2	Very good	Unscathed	Vase shaped	Prettiness
Jasminum nudiflorum	D	10	-	-	Very good	Good	Vase shaped	Climbing
P. quinquefolia	D	10	-	-	Very good	Unscathed	-	Climbing

Also in parks included this dendroflora *Cupressus sempervirens* (40), *Magnolia champaca* (12), *Prunus cerasifer pissardu* (89), *Platanus occidentalis* L. (86), *Ligustrum species* (116), *Washingtonia filifera* (16), *Robinia hispida* (169),

Punica granatum 'Wonderful (12), *Thuja orientalis* (16), *Myrtus communis* (1.500), *Yucca* spp. (3), *Nerium oleander* (20), *Chamaecyparis obtusa 'Aurea* (95), *Rosa* spp (390), *Parthenocissus quinquefolia* (95) number of dendroflora and total dendroflora planted in a park 4.277 that 3% climbs, 60% shrubs and 37% trees (Figure 4.14.).

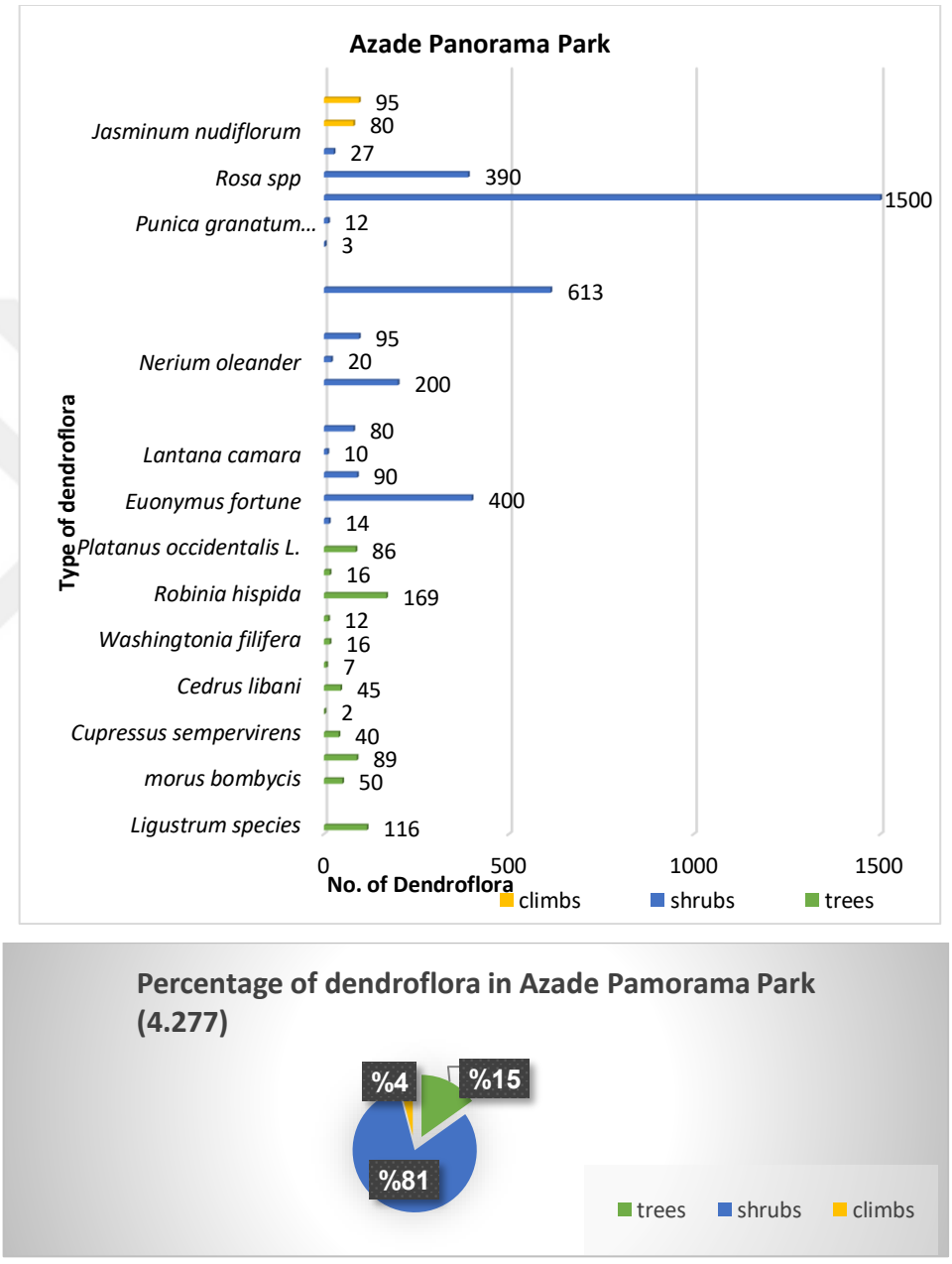


Figure 4.15. Number and percentage of dendroflora in Azade panorama Park

4.4.3.2. Mohamad Bekhal Park

It has studied in the Azade Panorama Park, consisting of specialists in the field of ornamental trees, although more than 90% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Duhok city, Also it is planted for prettiness, fence and Climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 4 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, horizontal, weeping, round-headed, open-head irregular, globe-shaped, vase-shaped) (Table 4.16.). Also in parks included this dendroflora *Robinia hispida* (13), *Platanus occidentalis* L. (45), *Ligustrum species* (47), *Washingtonia filifera* (19), *Robinia hispida* (33), *Punica granatum 'Wonderful* (11), *Thuja orientalis* (50), *Myrtus communis* (1.450), *Dodonaea viscosa* (300), *Chamaecyparis obtusa 'Aurea* (76), *Rosa* spp (623) number of dendroflora and total dendroflora planted in a park 4.277 that 0% climbs, 97% shrubs and 7% trees (Figure 4.15.).

Table 4.16. Data collection of dendroflora that planted in the Mohamad Bekhal Park

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Ligustrum species	E	3-4	6	2	Very good	Unscathed	Pyramidal	Prettiness
Salix babylonica L.	E	3-4	15	2.9	Very good	Unscathed	Weeping	Prettiness
Washingtonia filifera	E	3-4	30	2.3	Very good	Spiffy	Round headed	Prettiness
Callistemon spp	E	3-4	5	2	Spiffy	Unscathed	Vase shaped	Prettiness
Robinia hispida	D	3-4	3	2.1	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	3-4	7	3.2	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	3-4	7	3	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	3-4	-	1	Very good	Unscathed	Horizontal	Prettiness
Euonymus fortune	E	3-4	-	-	Very good	Unscathed	-	Fence
Sophora secundiflora	E	3-4	6	2	Very good	Unscathed	Vase shaped	Prettiness
Chamaecyparis obtusa 'Aurea	E	3-4	-	0.61	Very good	Unscathed	Round headed	Prettiness
Photinia Glansmispel × fraseri	E	3-4	-	0.8	Very good	Unscathed	Round headed	Fence
Dodonaea viscosa	E	3-4	-	1	Very good	Good	-	Fence
Punica granatum 'Wonderful	D	3-4	4	2	Very good	Unscathed	Vase shaped	Prettiness
Myrtus communis	E	3-4	-	-	Very good	Very good	-	Fence
Rosa spp	D	3-4	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lagerstroemia	D	3-4	5	2	Very good	Unscathed	Vase shaped	Prettiness

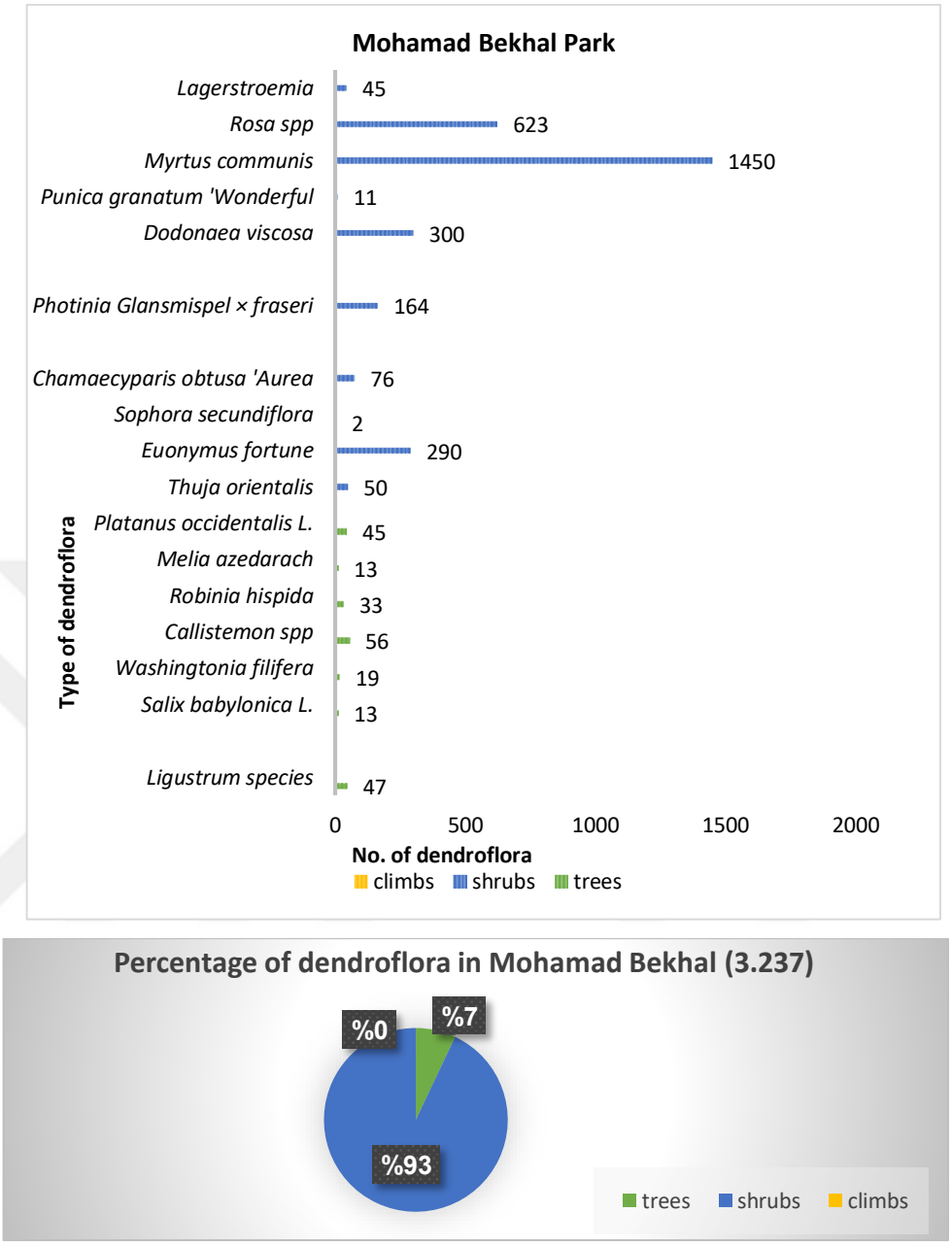


Figure 4.16. Number and percentage of dendroflora in Mohamad Bekhal Park

4.4.3.3. Duhok Dem Park

It has studied in the Duhok Dem Park, consisting of specialists in the field of ornamental trees, although more than 90% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Duhok city, Also it is planted for prettiness, fence and Climbing, all of woody plants are successes in

this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 17 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.17.). Also in parks included this dendroflora *Cupressus sempervirens* (180), *Pinus pinea* L. (700), *Acer* L. (200), *Platanus occidentalis* L. (140), *Ligustrum species* (90), *Washingtonia filifera* (70), *Robinia hispida* (180), *Punica granatum 'Wonderful* (90), *Thuja orientalis* (80), *Myrtus communis* (2.000), Nerium oleander (90), *Chamaecyparis obtusa 'Aurea* (150), *Rosa* spp (350), *Parthenocissus quinquefolia* (90) number of dendroflora and total dendroflora planted in a park 4.277 that 2% climbs, 61% shrubs and 37% trees (Figure 4.16.).

Table 4.17. Data collection of dendroflora that planted in the Duhok Dem Park

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	< 17	33	14	Very good	Very good	Pyramidal	Prettiness
Salix babylonica L.	E	< 17	26	7	Very good	Unscathed	Weeping	Prettiness
Ligustrum species	E	< 17	15	3	Very good	Unscathed	Pyramidal	Prettiness
Cercis siliquastrum	D	< 17	23	3.9	spiffy	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	< 17	13	13	Very good	Spiffy	Columnar	Prettiness
Populus nigra L.	D	< 17	25	15	Very good	Spiffy	Columnar	Prettiness
Capressus arizonica	E	< 17	23	11	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	< 17	20	6	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	< 17	22	4	Very good	Spiffy	Pyramidal	Prettiness
Catalpa bignonidias	D	< 17	10	3.5	Very good	Unscathed	Open-head	Prettiness
Morus alba L	D	< 17	20	7	spiffy	Unscathed	Pyramidal	Shadow
Gleditsia tracanthos L.	D	17	18	6	Very good	Unscathed	Open-head	Prettiness
Acer L	D	< 17	32	7.4	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	< 17	14	4	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	< 17	30	5.3	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	< 17	30	15	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	< 17	-	3	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	< 17	-	4	Very good	Unscathed	Vase shaped	Prettiness
Alyogyne huegelii	E	< 17	5	3	Very good	Spiffy	Vase shaped	Prettiness
Euonymus fortune	E	< 17	-	2.8	Very good	Unscathed	-	Fence
Photinia Glansmispel	E	< 17	-	1	Very good	Unscathed	Vase shaped	Fence
Chamaecyparis obtusa	E	< 17	-	2	Very good	Unscathed	Round headed	Prettiness
Berberis thunbergii	D	< 17	-	1	Very good	Unscathed	-	Fence
Myrtus communis	D	< 17	-	2	Very good	Very good	-	Fence
Rosa spp	D	< 17	-	-	Very good	Unscathed	-	Fence
Hedera helix	E	< 17	-	-	Good	Unscathed	-	Climbing
Parthenocissus quinquefolia	D	< 17	-	-	Very good	Unscathed	-	Climbing

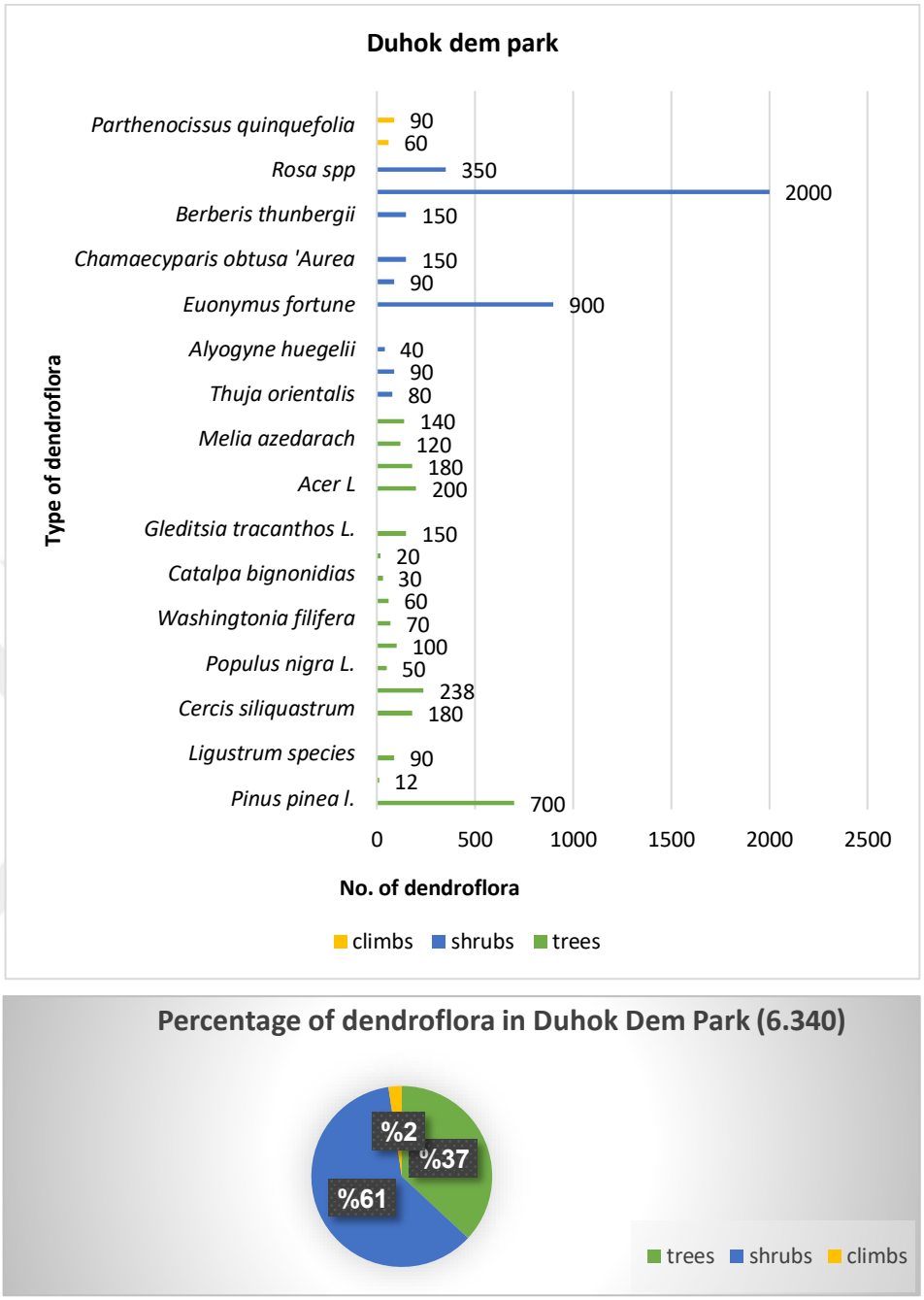


Figure 4.17. Number and percentage of dendroflora in Duhok Dem Park

4.4.4. Halabja City

4.4.4.1. Halabja Park

It has studied in the Halabja Park, consisting of specialists in the field of ornamental trees, although more than 80% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Halabja city, Also it is planted for prettiness, fence and Climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 8 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.18.). Also in parks included this dendroflora *Cupressus sempervirens* (190), *Ulmus giabra* (550), *Platanus occidentalis* L. (300), *Ligustrum species* (500), *Washingtonia filifera* (20), *Robinia hispida* (330), *Punica granatum 'Wonderful* (12), *Thuja orientalis* (40), *Myrtus communis* (960), *Euonymus fortune* (590), *Chamaecyparis obtusa 'Aurea* (1.000), *Rosa* spp (1.900), *Parthenocissus quinquefolia* (10) number of dendroflora and total dendroflora planted in a park 7.360 that 0% climbs, 66% shrubs and 34% trees (Figure 4.17.).

Table 4.18. Data collection of dendroflora that planted in the Halabja Park

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Ligustrum species	E	8	10	3	Very good	Unscathed	Pyramidal	Prettiness
Fraxinus rotundifolia	D	8	8	4	Very good	Spiffy	Open-head	Prettiness
Ulmus giabra	D	8-12	29	9	Spiffy	Unscathed	Globe shaped	Prettiness
Cupressus sempervirens	E	8	15	5	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	9	7	6	Very good	Spiffy	Columnar	Prettiness
Capressus arizonica	E	8	18	4	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	8	35	3	Very good	Spiffy	Round head	Prettiness
Morus alba L	D	8	16	7	Spiffy	Unscathed	Pyramidal	Shadow
Robinia hispida	D	8	8	4.3	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	8	25	6	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	8	9	5	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	8	-	2.6	Very good	Unscathed	Horizontal	Prettiness
Euonymus fortune	E	8	-	1.5	Very good	Unscathed	-	Fence
Chamaecyparis obtusa	E	8	-	1.3	Very good	Unscathed	Round head	Prettiness
Berberis thunbergii	D	8	-	1	Very good	Unscathed	-	Fence
Myrtus communis	E	8	-	1.6	Very good	Very good	-	Fence
Rosa spp	D	8	-	-	Very good	Unscathed	-	Fence
Parthenocissus	D	8	-	-	Very good	Unscathed	-	Climbing

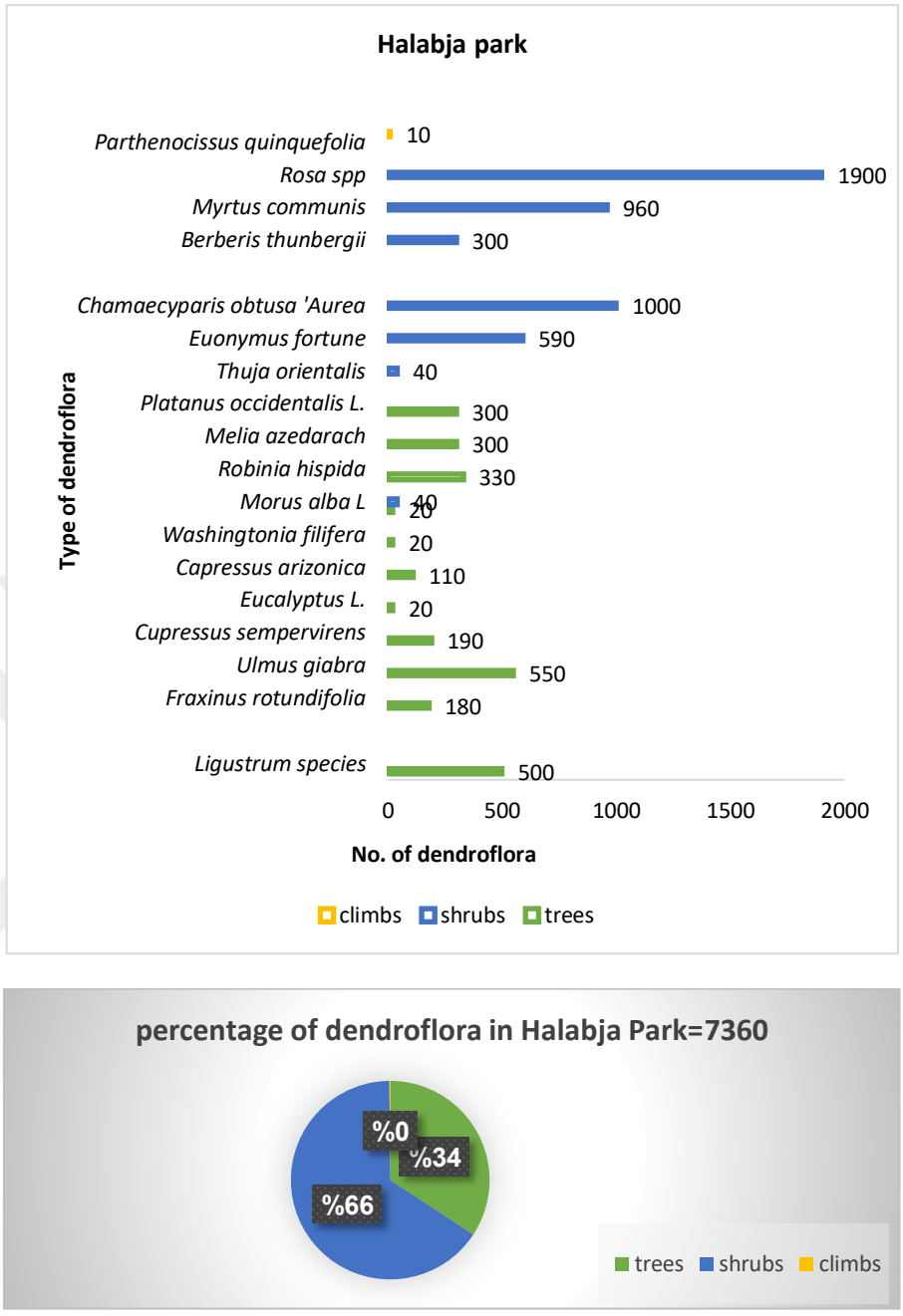


Figure 4.18. Number and percentage of dendroflora in Halabja Park

4.4.4.2. Bakhe Gishty Park

It has studied in the Bakhe Gishty Park, consisting of specialists in the field of ornamental trees, although more than 100% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Halabja city, Also

it is planted for prettiness, fence and Climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 17 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.19.), also in parks included this dendroflora *Cupressus sempervirens* (30), *Pinus pinea* (100), *Ailanthus altissima* (9), *Platanus occidentalis* L. (20), *Ulmus giabra* (100), *Washingtonia filifera* (8), *Robinia hispida* (20), *Punica granatum 'Wonderful* (8), *Thuja orientalis* (31), *Myrtus communis* (730), Nerium oleander (8), *Chamaecyparis obtusa 'Aurea* (60), *Rosa* spp (250) number of dendroflora and total dendroflora planted in a park 2.188 that 0% climbs, 66% shrubs and 34% trees (Figure 4.18.).

Table 4.19. Data collection of dendroflora that planted in the Bakhe Gishty Park

Qualities for Woody Plant's								
scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	15-72	57	22	Very good	Very good	Pyramidal	Prettiness
Callistemon spp	E	15-72	18	5	Spiffy	Unscathed	Vase shaped	Prettiness
Ulmus giabra	D	15-72	22	9	Spiffy	Unscathed	Globe shaped	Prettiness
Cercis siliquastrum	D	15-72	17	4	Spiffy	Unscathed	Pyramidal	Prettiness
Cupressus sempervirens	E	15-72	60	25	Very good	Spiffy	Columnar	Prettiness
Eucalyptus L.	E	15-72	70	28	Very good	Spiffy	Columnar	Prettiness
Sophora secundiflora	E	15-72	15	4	Very good	Unscathed	Vase shaped	Prettiness
Capressus arizonica	E	15-72	20	14	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	15-72	30	3.4	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	15-72	15	3.1	Very good	Spiffy	Pyramidal	Prettiness
Acer L	D	15-72	33	9.6	Very good	Unscathed	Pyramidal	Prettiness
Catalpa bignonidias	D	8-15	7	11	Very good	Unscathed	Open-head	Prettiness
Morus alba L	D	15-72	60	14	Spiffy	Unscathed	Weeping	Prettiness
Ailanthus altissima	D	15-72	17	5	Very good	Unscathed	Pyramidal	Prettiness
Gleditsia tracanthos L.	D	15-72	20	10.3	Very good	Unscathed	Open-head	Prettiness
Robinia hispida	D	15	15	6	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	15-72	27	8	Very good	Unscathed	Globe shaped	Prettiness
Platanus occidentalis L.	D	15-72	26	0.7	Very good	Unscathed	Horizontal	Prettiness
Thuja orientalis	E	15-72	16	4	Very good	Unscathed	Horizontal	Prettiness
Nerium oleander	E	15-25	-	3.2	Very good	Unscathed	Vase shaped	Prettiness
Alyogyne huegelii	E	10-25	12	3	Very good	Spiffy	Vase shaped	Prettiness
Euonymus fortunei	E	7-25	-	-	Very good	Unscathed	-	Fence
Pyracantha sp.	E	11-25	-	-	Very good	Unscathed	Vase shaped	Prettiness
Flowering rosemary	E	10-15	-	1	Very good	Unscathed	Vase shaped	Fence
Chamaecyparis obtusa	E	11-15	-	2	Very good	Unscathed	Round headed	Prettines
Berberis thunbergii	D	11-20	-	1.1	Very good	Unscathed	-	Fence
Myrtus communis	E	11-20	-	2	Very good	Very good	-	Fence
Rosa spp	D	18-25	-	-	Very good	Unscathed	Vase shaped	Prettiness
Lagerstroemia	D	8	9	3	Very good	Unscathed	Vase shaped	Prettiness
Punica granatum	D	5	-	2.6	Very good	Unscathed	Vase shaped	Prettiness

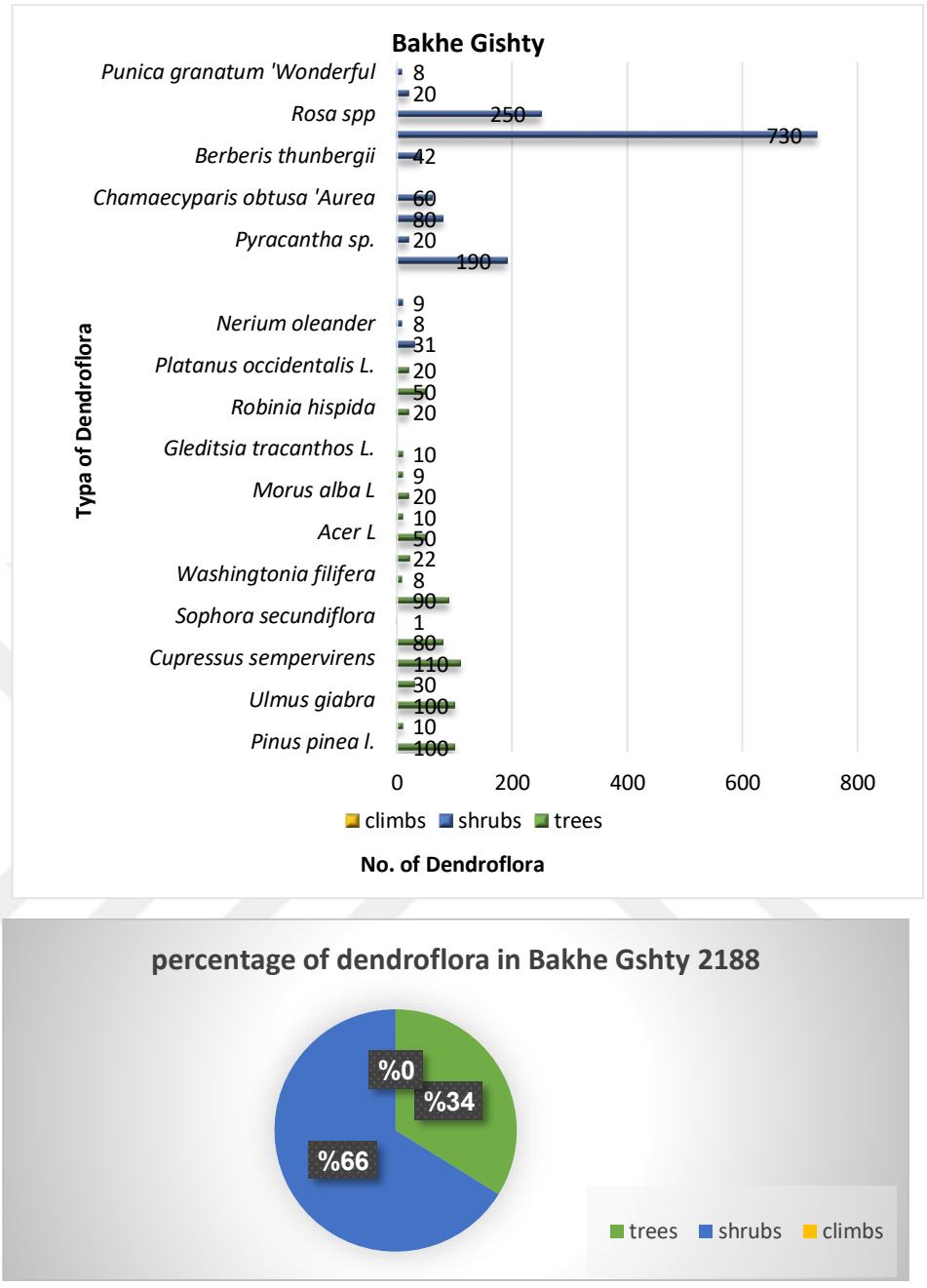


Figure 4.19. Number and percentage of dendroflora in Bakhe Gishty

4.4.4.3. Baran Park

It has studied in the Baran Park, consisting of specialists in the field of ornamental trees, although more than 80% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Halabja city. Also

it is planted for prettiness, fence and climbing, all of woody plants are successes in this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 10 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.20.). Also in parks included this dendroflora *Cupressus sempervirens* (5), *Magnolia champaca* (8), *Prunus cerasifer pissardu* (5), *Washingtonia filifera* (4), *Robinia hispida* (20), *Punica granatum 'Wonderful* (3), *Thuja orientalis* (9), *Euonymus fortune* (240), *Chamaecyparis obtusa 'Aurea* (20), *Rosa* spp (120), *Bougainvillea* spp. (8) number of dendroflora and total dendroflora planted in a park 591 that 12% climbs, 66% shrubs and 22% trees seen from the (Figure 4.19.).

Table 4.20. Data collection of dendroflora that planted in the Baran Park

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	10	21	7	Very good	Very good	Pyramidal	Prettiness
Cupressus sempervirens	E	10	10	6	Very good	Spiffy	Columnar	Prettiness
Brachychiton	E	10	26	9	Very good	Spiffy	Columnar	Prettiness
Capressus Arizonian	E	10	15	7	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	10	40	6	Very good	Spiffy	Round headed	Prettiness
Olea europaea L.	E	10	34	8	Very good	Spiffy	Pyramidal	Prettiness
Sophora secundiflora	E	10	8	3	Very good	Unscathed	Vase shaped	Prettiness
Magnolia champaca	E	10	12	3.9	Spiffy	Unscathed	Vase shaped	Prettiness
Acer L	D	10	13	4	Very good	Unscathed	Pyramidal	Prettiness
Fraxinus rotundifolia	D	10	11	7	Very good	Spiffy	Open-head	Prettiness
Platanus occidentalis L.	D	10	23	10	Very good	Unscathed	Horizontal	Prettiness
Prunus cerasifer pissardu	D	10	15	4	Very good	Unscathed	Pyramidal	Prettiness
Robinia hispida	D	10	18	5	Good	Unscathed	Globe shaped	Prettiness
Melia azedarach	D	10	16	6	Very good	Unscathed	Globe shaped	Prettiness
Paulownia elengata	D	10	25	11	Very good	Unscathed	Vase shaped	Prettiness
Thuja orientalis	E	10	-	3	Very good	Unscathed	Horizontal	Prettiness
Euonymus fortune	E	10	-	-	Very good	Unscathed	-	Fence
Chamaecyparis obtusa	E	10	-	1.2	Very good	Unscathed	Round headed	Prettiness
Punica granatum	D	5	-	1.3	Very good	Unscathed	Vase shaped	Prettiness
Rosa spp	D	10	-	-	Very good	Unscathed	Vase shaped	Prettiness
Campsis radicans	D	10	-	-	Very good	Unscathed	Vase shaped	Climbing
Jasminum nudiflorum	D	10	-	-	Very good	Good	Vase shaped	Climbing
Lonicera japonica	E	10	-	-	Very good	Unscathed	Vase shaped	Climbing
Bougainvillea spp.	E	10	-	-	Very good	Unscathed	Vase shaped	Climbing

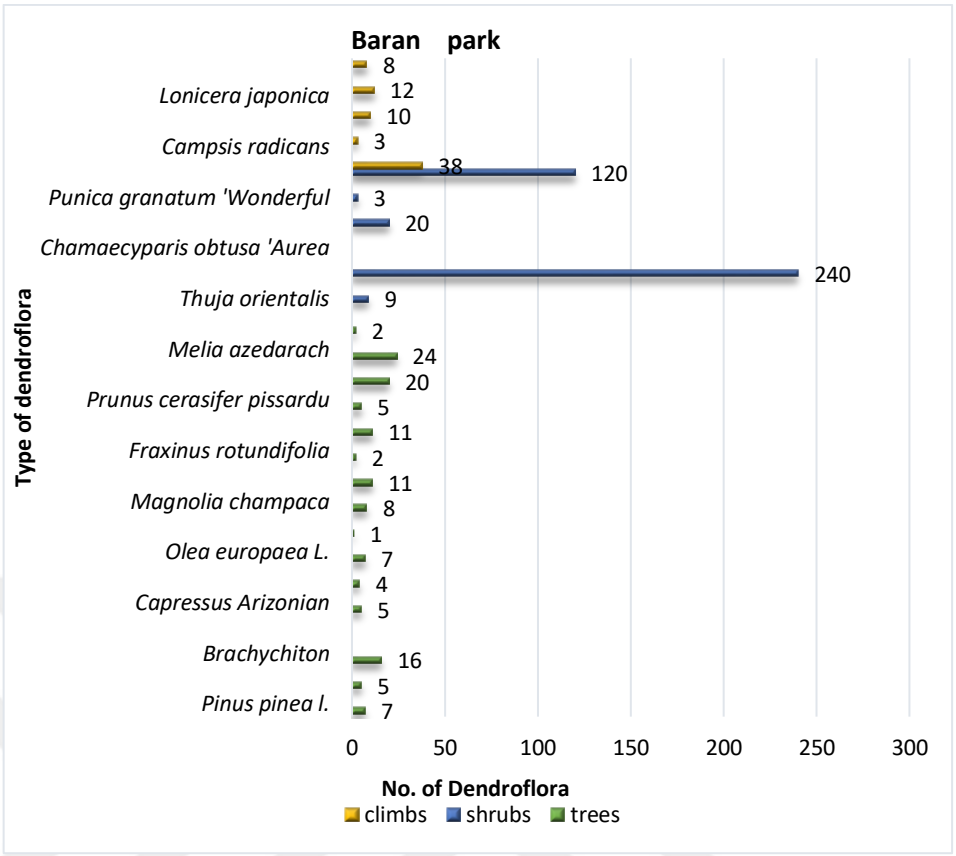


Figure 4.20. Number and percentage of dendroflora (Baran Park)

4.4.4.4. Kubra Hamid Pur Park

It has studied in the Kubra Hamid Pur Park, consisting of specialists in the field of ornamental trees, although more than 80% of the selected planted dendroflora are native trees or are localized dendroflora with climatic conditions of Halabja city, Also it is planted for prettiness, fence and Climbing, all of woody plants are successes in

this park. Plant length and Stem diameters are different by virtue of woody plants and age of woody plants may be less or 8 years, in this park woody plant that was evergreen or deciduous. And shapes of Dendroflora have (pyramidal, columnar, Horizontal, weeping, round-headed, Open-Head Irregular, globe-shaped, vase-shaped) (Table 4.21.). Also in parks included this dendroflora *Cupressus sempervirens* (12), *Populus nigra* L. (28), *Platanus occidentalis* L. (30), *Ligustrum species* (50), *Washingtonia filifera* (2), *Robinia hispida* (50), *Punica granatum 'Wonderful* (27), *Thuja orientalis* (15), *Myrtus communis* (428), *Berberis thunbergii* (150), *Chamaecyparis obtusa 'Aurea* (30), *Rosa* spp (145) number of dendroflora and total dendroflora planted in a park 1300 that 1% climbs, 69% shrubs and 30% trees (Figure 4.20.).

Table 4.21. Data collection of dendroflora that planted in the Kubra Hamedpur Park

Qualities for Woody Plant's								
Scientific name	Growth type	Plant age/year	Stem diameter/cm	Plant length /m	Success in the cite	Health	Plant shape	Uses
Pinus pinea L.	E	8	7	2.3	Very good	Very good	Pyramidal	Prettiness
Cupressus sempervirens	E	8	7	4	Very good	Spiffy	Columnar	Prettiness
Capressus Arizonian	E	8	10	3.9	Good	Good	Pyramidal	Prettiness
Washingtonia filifera	E	8	32	3	Very good	Spiffy	Round head	Prettiness
Ligustrum species	E	8	9	6	Very good	Unscathed	Pyramidal	Prettiness
Acer L	D	8	12	7	Very good	Unscathed	Pyramidal	Prettiness
Fraxinus rotundifolia	D	8	12	5	Very good	Spiffy	Open-head	Prettiness
Ailanthus altissima	D	8	7	7	Very good	Unscathed	Pyramidal	Prettiness
Morus alba L	D	8	30	11	Spiffy	Unscathed	Pyramidal	Shadow
Platanus occidentalis L.	D	8	16	10	Very good	Unscathed	Horizontal	Prettiness
Populus nigra L.	D	8	23	19	Very good	Spiffy	Columnar	Prettiness
Robinia hispida	D	8	8	5	Good	Unscathed	Globe shape	Prettiness
Melia azedarach	D	8	30	8	Very good	Unscathed	Globe shape	Prettiness
Paulownia elengata	D	8	25	7.9	Very good	Unscathed	Vase shaped	Prettiness
Thuja orientalis	E	8	-	2.5	Very good	Unscathed	Horizontal	Prettiness
Euonymus fortune	E	8	-	-	Very good	Unscathed	-	Fence
Chamaecyparis obtusa	E	8	-	2	Very good	Unscathed	Round head	Prettiness
Punica granatum	D	8	9	2.6	Very good	Unscathed	Vase shaped	Prettiness
Rosa spp	D	8	-	-	Very good	Unscathed	Vase shaped	Prettiness
Berberis thunbergii	D	8	-	1.2	Very good	Unscathed	-	Fence
Myrtus communis	E	8	-	1.1	Very good	Very good	-	Fence

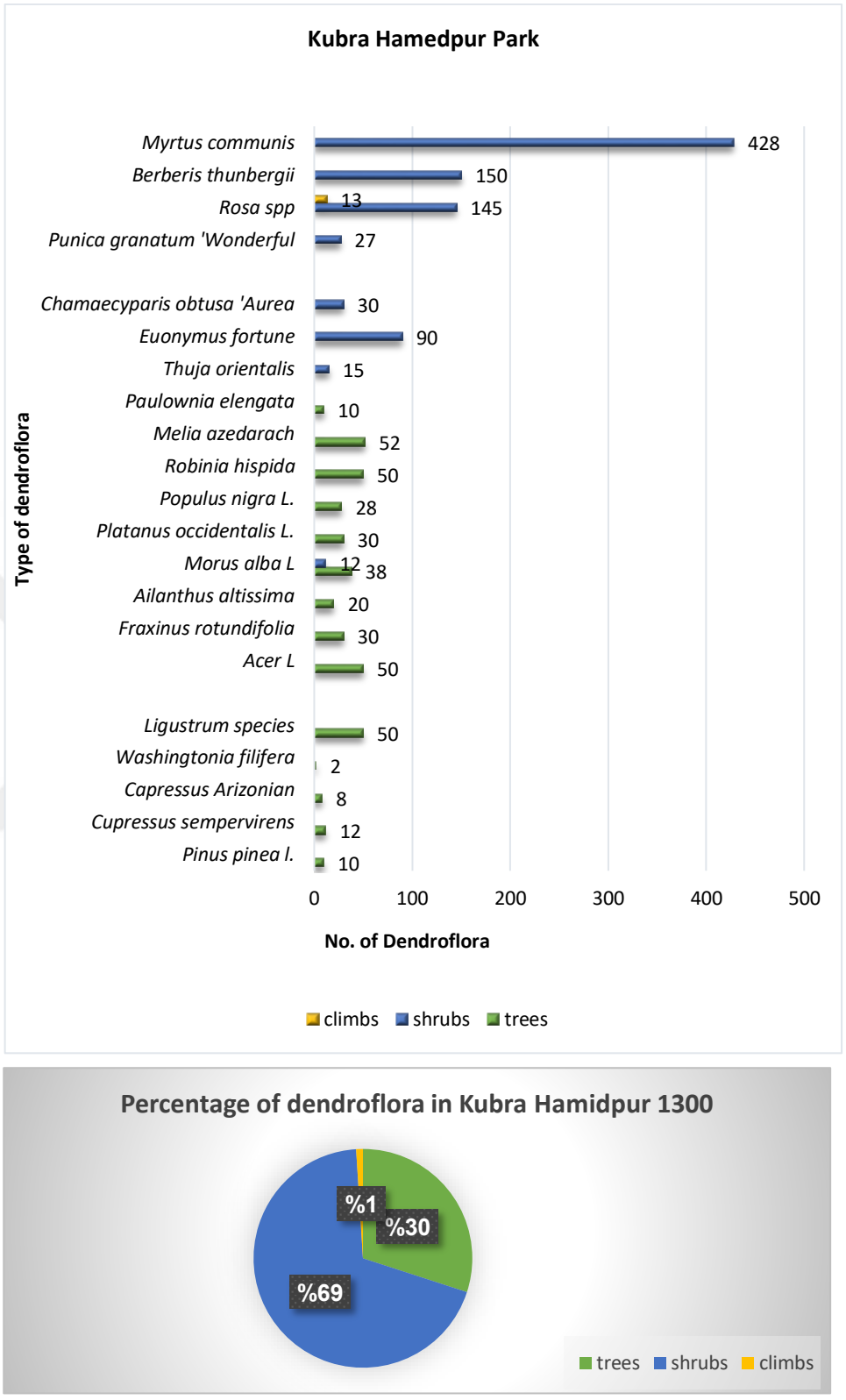


Figure 4.21. Number and percentage of dendroflora Kubra Hamedpur Park

5. CONCLUSION and RECOMMENDATIONS

5.1. Conclusion

This study describes criteria and tools for woody plant selection for landscape planning, where there is potential to use a wider range of species, as well as using native species and importation their communities for urban plantings, Utilization of indigenous species should support an increase of the biodiversity in urban areas with ecologically better-balanced plant communities. A limiting factor for the selection of other woody plant species is the lack of information about their physiological characteristics. These are key characteristics of the adaptability of woody plants to changed environmental conditions in the cultural landscape areas. Data about the phenotypic structure and the selection of woody plant species for landscapes according to the ensemble of the quantitative and qualitative, As a result, we registered 70 species and 39 families in the park cities of Northern Iraq, by the results of the case study, and we conclude the following:

1. As a result of our visits to each of the sample, locations is indicated 80% percentage after year 2000 from each park that it is grown rise to verdure in all parks from cities.

2. Most of the plants wear exported and relative to success, it is 85% percentage.

3. In general, health of woody plants are good but some of the woody plants have problems, for example, in magnolia tree is not good in Sulaymaniyah and Halabja park, because this tree that must be shade, not like of light, and so the flowers it is sick, cause to more relative humidity in all parks from the cities.

4. Age of dendroflora between 4-80 years for example in Muhamad Bekhal park age of dendroflora are 4 years, and so in Bakhe Gishty Sulaymaniyah age of dendroflora are 80 years.

5. In general, the weather of Kurdistan is suitable for infusion, and so that it was seen to differ much among the cities.

6. Types of woody plants are (evergreen and deciduous) various used to form each city (30 % for beauty, 30%for fence, 30% for shadow, and 10% keep to soil).

7. The percentage of dendroflora each of four cities are as follows: trees 54%, shrubs 36% and climbs 10% in total 70 species

8. There are international criteria in selecting types of woody plants that importation is suitable for the environmental region.

9. Environmental factors are the most important factors that directly influence woody plants: These factors include the climate and soil conditions, as environmental treatments and design differ from one area to another.

10. Inefficiency of the workers in the management of the park in terms of numbers and experience may reflect the park aesthetic and service in the future, for example, Azade park in Sulaymaniyah.

11. The percentage of green space in each park is about 80%, but the solid space (walkways and sidewalks, roads and parking lots) may up to 10% of the total area of each park.

12. Dendroflora are the largest garden and park plants, and the most use among plants have different sizes and shapes and are used for multiple purposes in gardens and parks. Shrubs with aesthetic values have multiple uses, the woody plants organized in the parks depending on their sizes, shapes and functional uses in the garden. Important consideration in selecting woody plants is the speed of growth, age, shape and other specifications. However, the main parts in the parks are green spaces; they represent the largest percentage of the park area.

13. Most of the gardens designated modern based on garden standards, as was found in Duhok city and Erbil, but some of the parks designated a contradictory as was found in Bakhe Gishty Sulaymaniyah and Bakhe Gishty Halabja.

14. Generally, the soil from each of parks is of a different kind and has pros and cons hood- physical and chemical as from seen in the cities, therefore fertile or suitable different for plant growth.

15. The appearance of ageing signs in the woody plant observed in the fast-growing trees when they reach the age of 30 years.

16. In the case of selecting the trees used to decorate the cities, consider the following:

a. Do not fall any part of the tree parts such as paper, fruit or shell so as not to lead to the dirt of the street.

b. It is preferable to grow flowering trees that are also growing

5.2. Recommendations

Through the results and conclusions of the study, we reach the following recommendations to several parties:

5.2.1. Recommendations to the planning authorities

1. Reconsider the policies of Spatial and Urban Planning allocated to public gardens, parks and open spaces in all cities, by increasing the spaces according to the international or local standards.

2. There should not be expansion and development of the plans for the city at the expense of open spaces specialized for public gardens and parks.

3. Select a suitable city for gardens and parks. In terms of proximity to the city and residential areas, association with the main street and must be far away from various kinds of the pollution and noise sources as well as choose sites with good soil, fertile, suitable for cultivation and there must be a good source of water or be close to it.

4. Development of communication methods in the future between the various researchers and involved with planning, design and study of parks and green space subjects in order to reach the best.

5. Maintain archaeological, heritage and natural areas and entered within allocated areas for public gardens and parks.

5.2.2. Recommendations to the design parties

1. Prepare a measure of progress of work in line with time, because dealing with associated woody plants in a timely manner, the project plan must adhere to them.

2. The designer should study the natural environment and climate location in detail to know their problems and develop good environmental solutions and treatments, in order to improve the weather conditions and achieve thermal comfort that man is always looking for and choose the appropriate method to design the garden or garden.

3. Study the psychological factors, customs and traditions of the city's inhabitants and know their needs and desires before choosing the woody plants for the design process.

4. Demonstrate the movement structure of the woody plants in the park system through the following preamble to reach the park and the importance at the most prominent entry points and the importance of the visual with the provision of safety and associated with the occasion with external lines.

5. Climatic treatments of woody plants in gardens and parks should be flexible according to the seasons so that they can control all exposure to solar radiation, moist air movement and glow with a choice of perception of the scheme, direction and nature of the ground cover and thermal properties of the natural and physical components of space including climate-responsive.

6. The need to complete the three basic stages of the planning and architectural design of open spaces and not to neglect the final stage of the detailed design, which reflects the creativity of the designer of the gardens in whole or in part, which creates a sense of open space with all its elements and components.

7. Consideration should give to harmony and diversity in the selection of woody plants in gardens and gardens in terms of form and colour and their suitability to environmental conditions.

8. However, the need to use water in all its forms; lakes, fountains, waterfalls, swimming pools, sprinklers and canals are one of the main features of climate

treatments because of their effect on cooling with rain spray and contact with ambient air which increases the cooling effect on water in the process of rapid evaporation. Increased evaporation.

9. When choosing new plants for gardens and parks. It necessary studied in terms of suitability with the environmental conditions of all respects for the region. At the suitability preferably introducing a small number of each type and grown in the number of places of the park, then is studying for a period of 5-10 years and after that prove their success, allow plants to entry the region and used in garden and park designs with large numbers by function and needed.

10. When selecting trees and shrubs for planting in parks and reserves park prefers choice of plants resistant to fires, the nests for birds, wildlife and resistant to disease, insect and pest.

11. When designing parks in the allocated and unallocated spaces as farmland, natural ingredients must preserved on the site such as plants, water springs or canals, lakes or stones, valleys, hills.

5.2.3. Recommendations to the executive parties

1. It is necessary to implement the plan proposed by the designer fully implemented without change or altered any of the dendroflora because it leads to a deformation the design, particularly plants.

2. Work will be steps and not to provide a step after another step and commitment to agriculture times during the agricultural operations and during appropriate times.

3. Do not burial the waste of the buildings under the roofs of the gardens that cause problems after planting, but preferably filed and cleaning the land before settling the land or initialized for agriculture.

4. When any changes occur in woody plants or design of the garden or the park, it must tell the designer or responsible parties and must specify the change on the maps for the project.

5. Allocate sufficient funds for the purpose of establishment and maintenance and the subsequent sustainability because the project stays for the full year after completing in the responsibility of the executing party.

6. The delivery of the plans, and information on the distribution of poles, water and electricity to the garden administration.

5.2.4. Recommendations to the ministry of municipalities and the department of parks

1. Work to increase the establishment of public gardens, public squares and parks in order to increase the green areas in cities, ought Selection a suitable woody plant. according to population increases and alleviate efforts on current parks,

2. Increase interest in the service operations and maintenance within the parks by define the annual budget for that purpose in the appropriate times of the year.

3. Work to meet the needs of the parks inappropriate times and allocation a special budget to them in order to maintain a woody plant freshness in the parks and its aesthetical with initialization for all emergency matters, such as drought and sudden appearance of agricultural pests.

4. Work on the introduction of the new type of woody plant, and modern facilities and activities, as well as new industrial components, which lead to increase availability of comfort for the park visitor.

5. Follow up woody plant with continuous periodically way to identify problems and negative aspects in order to find the urgent and radical solutions.

6. Opening continuous courses for cognition type of woody plant, park managers and engineers by sending those abroad for training and educational courses and observation parks for increase their experience and skills in the preview of the dendroflora development and service in order to provide the best services for visitors.

7. Conducting annual competitions between parks in terms of aesthetics, cleanliness and provide better services to its visitors, offering nominal or value prizes to management and employees in the park to induce the continuing competition and evolution.

8. The need for participation of citizens in the Selection woody plant for planning and design of parks or other open spaces, as well as give them a chance to take responsibility for maintaining their installations and facilities and the use of their opinions and suggestions to develop and contribution for its sustainability, maintenance and preservation.

9. Obtain plants locally, where similar soils, conditions, and habitats will promote a healthy transplant. When possible, salvage plants already in existing landscapes. Timing for plant salvage is important – evergreens in early to mid-autumn, and deciduous in late fall to early spring when they are dormant.

5.2.5. Recommendations to the parks managements

1. Work to provide a diverse range of activities and facilities, and must not only on the traditional facilities and activities, but management must enter new activities for the parks to increase continuously for attracting visitors.

2. Pruning, pruning woody plant above shape geometrical, lawn trimming, planting resistant dendroflora, transfer of seedlings and other prefer to perform these operations during the morning times or in the absence of visitors or in some cases prevents access to these parks.

3. Conduct periodic cleaning for parks and disinfecting children's playgrounds, sand pool from time to time to maintain the safety of the children as well as prevent the entry of dogs and other animals to parks.

4. The park must be ready for any emergency could face the park in all respects by providing money, workers and preparing the necessary machinery

5. The need to provide specialized staffs and the hands of skilled workforce have experience in the field of horticulture, gardening, and can apply scientific methods in the design of plantation and its sustainability and its maintenance.

6. Opening continuous courses for staff and workers the parks through send engineers for special courses outside the country in addition to education and training courses for orchards and garden workers on how to conduct agricultural operations in good scientific methods.

5.2.6. The Beneficiaries of this research

1. The Ministry of Municipalities and Tourism.
2. General Directorates of municipalities - Department of Parks and Gardens.
3. Faculty of Engineering -Department of Architecture.
4. Center for Urban and Regional Planning.
5. Faculty of Agriculture - Department of Horticulture and Landscape Design.
6. Administrations of Parks.
7. Researchers and designers in this speciality.

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