MINISTRY OF SCIENCE AND EDUCATION OF
THE REPUBLIC OF AZERBAIJAN
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USING PRINCIPLES OF THE MORPHOTYPES OF GREEN PLANTS IN THE LANDSCAPE ARCHITECTURE OF THE BAKU-ABSHERON PENINSULA

MASTER'S DISSERTATION

Specialty: 060633– Landscape architecture

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BAKU-2024

CONTENTS

INTRODUCTION

Greening is one of the most important components of urban planning. In recent times, increasing attention to this issue is due to the fact that the rapid development of the construction site, increasing in urban traffic, as well as the dust, gas, smoke and other harmful waste emitted by some factories and plants lead to air pollution. This problem is especially acute in areas that are distinguished by their natural relief, soil conditions, climate and other factors.

The relevance of the presented topic is first of all reflected in the establishment of landscape architecture in Baku and the Absheron peninsula and support for the protection of the ecological system. At the end of the 20th century and the beginning of the 21st century, the calls made by world scientists regarding the protection of nature and the cessation of ecological pollution were steps taken towards the protection of life on Earth.

Secondly, greening works were started on a large scale after the Republic of Azerbaijan gained its independence. This tradition, established by the national leader Heydar Aliyev, is continued by the President of the Republic of Azerbaijan, Ilham Aliyev.

Thirdly, the creation of gardens and parks is a process aimed at the preservation of living and non-living nature, as well as the further improvement of human life and activities. Construction of roads, bridges, housing estates, etc. in Baku and Absheron Peninsula, it requires the decoration of these areas with trees and shrubs. Thus, the greening of the area is also a source of aesthetic influence for the people living and working here.

Goals and tasks of the work. The goal of the research work is to study the morphotypes of trees and shrubs planted in newly established gardens on the Baku-Absheron peninsula; based on the basic principles of greening, it consists in determining the plants that can live long enough, taking into account the soil and climatic conditions in newly planted gardens.

It is envisaged to solve the following tasks in order to realize the set goal:

1. Determining the uniqueness of the natural relief, soil structure, and climate of the Baku-Absheron peninsula;

2. Looking at the history of the gardens and parks built on the Baku-Absheron peninsula;

3. Gardens and parks built on the Baku-Absheron peninsula during the Soviet era;

4. Gardens and parks built on the Baku-Absheron peninsula during the period of independence as a transition to a new stage of development of landscape architecture in Azerbaijan;

5. General information about the vegetation of the Baku-Absheron peninsula;

6. Investigating the morphological types of plants in the construction of gardens and parks.

The object of the research. Existing and newly built gardens and parks on the Baku-Absheron peninsula.

The subject of the research. Plants used in landscape architecture of Baku-Absheron peninsula.

Research methods and factual materials. Biological, morphological, physiological, topological, geographical and ecological methods were used in the research. In addition to all this, a comprehensive approach method was applied in conducting the research. Heat resistance of plants was reflected in the methods created by K.A. Akhmatov, B.M. Mirkin, drought resistance by P.A. Genkel, T.N. Pustovaitova. The issue of resistance to drought of Absheron's tree species was studied by B.Z. Huseynov. The issue of urban greening is connected with the names of researchers who made great contributions to the theory and practice of Russian landscape architecture. Among them, Y.B. Khromov, L.B. Luns, L.S. Zalesskaya, Y.M. Mikulina, Z.N. Yarchina can be cited as examples.

From the conducted research, it is known that the important issue of laying lawns in greening construction was highlighted by T.S. Mammadov.

Scientific novelty. For the first time in the research work, the idea of planting trees and shrubs introduced from other countries in properly selected places in gardens and parks, taking into account the terrain, soil conditions, and climate of the Baku-Absheron peninsula, is put forward. In the establishment of gardens and parks, evergreen and deciduous trees typical of this area, provided that the soil cover, the specificity of the climate, the amount of precipitation, as well as the investigation of the morphological characteristics of trees and shrubs, flowers, as well as lawn plants, are taken into account, which are characteristic of the Baku-Absheron peninsula, selection of shrubs, grasses, flowers and lianas is brought to the fore. For the first time in the research work, the issue of building gardens and parks on the Baku-Absheron peninsula was investigated from the point of view of complexity.

The practical importance of the work. The presented research work is important because it sheds light on the landscape architecture of the Baku-Absheron peninsula both from a scientific point of view and creates conditions for applying the obtained results in practice. In this sense, from a scientific point of view, the research work can be a necessary tool for the specialists of the Institute of Botany, who are engaged in the study of trees and shrubs found on the Baku-Absheron Peninsula, as well as students studying landscape architecture at the Institute of Architecture and Construction. Experimental implementation of the results of the research work is also important for specialists engaged in landscape architecture on the Baku-Absheron peninsula. Thus, the results of the research can be taken into account as a guiding source in the activities of project-research institutes, water and agricultural enterprises.

Approval and publication of work. The main provisions of the dissertation have been published and approved in the following articles and theses:

1. Ecological and economic maturity of beech stands. // Scientific Works of the Central Botanical Garden of the Azerbaijan National Academy of Sciences. Volume XIV. 2016, pp. 117-121.

2. General characteristics of the natural-ecological conditions of the Baku-Absheron peninsula. // Materials of the International Scientific-Practical Conference

"Yesterday, today and tomorrow of Soil Science". Baku, Khazar University. 5-6 December 2022. etc. 91-93.

3. Some principles of using plants in landscape architecture of Absheron. // Ecology and construction. Ukraine, N1. 2023. pp. 4-9. DOI: 1035688/2413-8452-2023-01-001

Structure and scope of the work. The research paper consists of Introduction, 3 chapters and 9 sub-chapters, Conclusion, Literature and Appendices.

CHAPTER I. GENERAL CHARACTERISTICS OF NATURAL AND ECOLOGICAL CONDITIONS OF THE BAKU-ABSHERON PENINSULA

1.1. Natural relief and soil structure

Acquaintance with the sources shows that Baku-Absheron has a very favorable natural geographical position. Absheron region is located on the western shores of the Caspian Sea, in the southeastern corner of the Greater Caucasus.

The peninsula is bordered by Sumgayit from the north and the Caspian Sea from the northeast. The length of the peninsula is 80 km from north to west, 27 km wide, and 22 km in the middle. The total area of the peninsula is 2050 square km.

According to the structure of the surface, the entire peninsula can be divided into several parts. The relief of the Baku area of Absheron is characterized by sharp transitions. But two main parts of the relief are more prominent. The main northeastern part of the area, which varies in size and proportion according to the level of the ocean, is located below the ocean level and forms lowland with itself. It covers the peninsula, starting with the sandy shallows from the coast of the sea. Certain plains and coastal areas alternate with steep rocky outcrops and in some places with small hills located 20-30 meters above the level of the Caspian Sea in regions such as Bilgah, Zagulba, Buzaovna [59, 13].

According to Kamil Abdulov, who researched the soil structure of Absheron, the soils and soil cover of the research region are different. There is soft sandy soil along the sea coast. Wide sandy areas, knots develop in three directions on the Absheron peninsula in the form of a narrow strip on the coast of the Caspian Sea. On the northern coast, the sands are mixed with herringbone and pebbles, spread out in a scoured form. In the inner area, there are clean sands. By its actions, the sands cause great damage to residential areas (Novkhani, Pirshagi, Mashtaga, Bilgah, Buzovna, Zira, Turkan, etc.), agricultural areas and industrial facilities [1, 85].

It is noted that "the eastern part of the Absheron peninsula is covered by gray soils, the middle part by gray-brown soils, and the western part by brown soils in the source of "Biological characteristics of some tree and shrub plants used in greening in

Absheron". Absheron peninsula is surrounded by sand dunes on three sides. The amount of humus in these soils is generally low, its amount decreases from 1.15 to 0.19% in the depth of the soil. Carbonates, on the other hand, increase up to 14.2% in the depths of the soil. The soils of the same area are very diverse according to the degree of salinity. [41, 10-11].

1.2. Climate

The climate of the Absheron economic region is close to the Mediterranean type, dry subtropical. The Baku-Absheron area does not freeze on three sides and, as researcher Abdulla Allahverdiyev emphasized, "Determines the temperature regime of the city to a certain extent" [59, 11]. It is surrounded by the Caspian Sea. This creates the basis for hot summers, mild and rainy winters, and windy autumns in the area. Hot summers and mild winters indicate favorable conditions for settlement in this area.

Like the Absheron Peninsula, the climate of Baku city, which occupies the seaside-desert semi-desert zone, has a higher average annual temperature than the climate of the southern zone of the country, with the vegetation period extending from March to November for some plants (almonds, hazelnuts), with uneven and small amounts of precipitation starting from February, and it is distinguished by almost non-stop blowing winds" [59, 15].

In the construction of landscape architecture, the relief of the area, soil structure and climate factors are taken into account in a complex way and the climate conditions in isolation are formed by the combination of several factors. Acquaintance with the sources shows that "Baku's climate was formed under the influence of factors such as clearly defined climate generators: precipitation, winds, relief, rays of solar energy and scarce vegetation" [59, 16].

1.3. Vegetation

It is important to familiarize yourself with the vegetation of the area in order to achieve a positive result in greening works in Baku and the Absheron Peninsula. Thus, getting acquainted with the types of plants that grow naturally in the area, in addition to

allowing determining the uniqueness of the natural conditions of this place, can also allow making assumptions about the adaptation, growth and development of plants introduced from other countries to this area.

"Vegetation of the Absheron Peninsula belongs to the type of semi-desert vegetation" according to the researcher A.D. Mehraliyev [70]. The researcher emphasizes that "except for some shrubs, there are almost no trees and shrubs growing naturally here. Grass and shrub-type plants is mainly dominate in the natural flora" [70].

It is noted that the Caspian coastal areas of the peninsula are covered with salt marsh vegetation, European salt marsh, fomin vinegar; milkweed, common meadowsweet belonging to relatively hard, clayey and humid sandy vegetation far from the coast; the coastal areas of the northern part of the peninsula are kekrey, baki gevani, finger meadow, southern reed; the relatively low altitudes of the northwestern areas are elongated, and the relatively high areas are thorny and curved in the source of "Natural Monuments of the Absheron Peninsula" [57, 43] .

Acquaintance with the sources shows that according to their need for water, plants are classified into four groups: 1) Hydrophiles - those living in permanent water; 2) Hydrophytes - those living in very humid places; 3) Mesophytes - moderately water-demanding plants; 4) Xerophytes - plants that use water sparingly or are resistant to drought. [37, 15-16].

The vegetation of Baku city and the Absheron peninsula consists of trees and shrubs resistant to dry, hot climate. Acquaintance with the sources shows that these types of trees and shrubs have been spread in this area since the middle ages. The fact that the vegetation of the Absheron peninsula consists of many fruit trees attracts attention. In this sense, information can be found on the widespread distribution of figs, pomegranates, almonds, grapevines, grapes, and rose bushes on the Absheron peninsula.

CHAPTER II. DEVELOPMENT STAGES OF LANDSCAPE ARCHITECTURE OF BAKU-ABSHERON PENINSULA

2.1. The end of the 18th century and the beginning of the 19th century in the landscape architecture of Baku

From the researcher M. Kokhman's opinion, it can be concluded that everything mentioned in the example of the greening of the city of Tabriz is informative. Therefore, in the example of the city of Tabriz, he presented generalized information about the greening works carried out in all the Middle Eastern countries, which do not differ sharply from each other due to their climate and nature.

Although the notes of travelers and merchants, the books written by them were mainly created before the 18th century, these sources allow us to obtain information about the geographical environment and vegetation of Baku in the 18th century. For example, the Safavi State of Azerbaijan in the 17th century (based on the diaries of I.Chardin, J.V.Tavernye, P.D.Valle and E.Kempfer) in a brief information about the geographical location of Baku city by Pietro Della Valle in the source "Baku city is located in the Caucasus on the edge of the Caspian Sea and writes that oil is used for fuel in this city" [53, 122].

In addition, the interesting notes of Evliya Chelebi, a Turkish traveler who traveled to Azerbaijan, about the city of Baku attract attention. Describing the structure of the Baku fortress, the traveler writes: "Since it is on a rock, it does not have a moat. Inside the castle there are only ancient houses covered with pure earth. There are no traces of a khan, a bath, or a bazaar in this castle. However, it is a prosperous city with up to a thousand buildings, gardens, camels, khans and baths, royal bazaar, surrounded by solid walls on three sides" [17, 106].

The "Baku Parks" source note that "The landscape of the Governor's Garden was formed over half a century" [65, 24]. Later, it became one of the most beautiful addresses of the city as "Sonalar lake". "Although they tried to build a garden here in the 1870s, the salinity of the underground water and the fact that the soil was made of clay did not allow the development of trees" [32, 30].

The fourth garden of Baku was "Evening market" "Vecherma" (now S. Vurgun garden) built in 1895. At first it was an empty square. There are wooden booths around. It would be dark in the evening. Trading usually took place after dark. The establishment of the garden here is also connected with the name of H.Z. Taghiyev [32, 30].

2.2. Gardens and parks in the Soviet era (1930-1990)

From the acquaintance with the sources, it is known that the greening works carried out in Baku and the Absheron peninsula are divided into five stages by some investigators. Beginning in the 19th century, Abdulla Allahverdiyev illuminates this process as follows:

1. The first phase of green construction covers a 40-year period from 1880 to 1920. This period begins with the foundation of the first gardens in Absheron and directly in Baku.

2. The second phase of green construction covers the ten-year period from 1920 to 1930. Despite the initial concerns of the recovery of light industry and oil production, during this time the area of green buildings gradually began to increase.

3. The third phase of green construction covers the eleven-year period from 1930 to 1941.

4. The fourth stage covers the post-war period, the years of peaceful construction and restoration of neglected farms, including gardens and parks. This stage covers the years 1945-1960. The characteristic feature of this period for Baku was the creation of large green massifs outside the city and greening of streets and highways [59, 38-39].

5. The fifth stage of green construction covers the decade 1960-1970 [59, 39].

The issue of the construction of gardens and parks during the period of 1930-1990 in this sub-chapter of the research, that is, when Azerbaijan was part of the former Soviet Union, is highlighted. It should be noted that the information presented by the researcher Abdulla Allahverdiyev creates a broad impression about the work in garden and park construction in Baku and the Absheron Peninsula from the 1930s to the 1970s.

It should be emphasized that during this period, many important works were done in the greening of Baku and the Absheron peninsula. Thus, in the late 1920s and early 1930s, the first wind protection strips were built.

A decision was made to allocate 80-100 hectares of land for the Botanical Garden and Botanical Institute between the roads to the "Gurd Gapisi" starting from the Mountainous Park (now "Shahidlar khiyabani") and supply the area with water on July 3, 1934.

With the aim of enriching the raw material base of plant resources in our republic, in the botanical garden, extensive scientific-research works are carried out on the introduction and acclimatization of ornamental, medicinal, essential and other useful plants growing in Azerbaijan and other countries, and on the reproduction and protection of the plant gene pool, including rare and endangered plants. The botanical garden has a collection of more than 2000 trees, shrubs, flowers and herbs from different botanical and geographical regions of the world, including the flora of Azerbaijan. The years 1960-1978 are considered the flourishing years of the garden. In these years, the Botanical Garden has provided 10,000 trees, shrubs and flower plants of 100 species for the greening of the cities of Baku, Ganja, Sumgayit and Nakhchivan MR, including to the Greening Department of the city of Baku and the industrial enterprises of Absheron, the Baku Household Air Conditioners plant, Azerelektroterm, radio, helped ship repair factories, greening schools and gardens. In those years, the Botanical Garden exchanged seeds with 290 Botanical Gardens of 70 foreign countries, prepared agrotechnical recommendations for medicinal, essential, industrial and ornamental plants and gave them to farms. Currently, the Garden has a collection of 125 species of rare and endangered plants from the Caucasian flora, whose names are included in the "Red Book" of the former USSR and Azerbaijan.

A new kennel of the Green Farm Trust in the Vorovsky settlement on an area of 65 ha; researching of the slope for the planting of eldar pines in 40 ha area for the greening of Bayil was started; near the zoo and the slopes of the mountain park began to be explored in 1948-50. Works were carried out in the direction of greening the areas where trees were not planted, i.e. the highways and the streets and districts of the city in 1950-55.

According to the research conducted by the researcher A. Allahverdiyev, the total number of areas greened in Baku city according to the plan submitted for the greening

of Baku during 1986-1989 is 1235.4; the number of green areas for general use is 43.2; the number of areas greened for limited use is 88.2; the number of areas greened for special use is 1104.0. Of these, the total number of greened areas in Kirov region is 230.1; the number of areas greened for general use is 4.2; the number of areas greened for limited use is 6.9; the number of areas greened for special use is 219.0; the total number of green areas in Nasimi district is 45.6; the number of green areas for general use 1.0; the number of areas greened for limited use is 6.6; the number of areas greened for special use is 38.0; the total number of green areas in Lenin district is 14.5; the number of green areas for general use is 2.6; the number of areas greened for limited use is 11.9; green areas for special use have not been built; the total number of green areas in Surakhani district is 117.7; the number of areas greened for general use is 15.4; the number of areas greened for limited use is 17.3; the number of areas greened for special use is 85.0; the total number of green areas in Azizbeyov district is 249.4; the number of green areas for general use is 0.2; the number of areas greened for limited use is 5.2; the number of areas greened for special use is 244.0; the total number of green areas in Narimanov district is 60.3; the number of green areas for general use is 0.8; the number of areas greened for limited use is 5.5; the number of areas greened for special use is 54.0; The total number of green areas in Nizami district is 6.4; the number of green areas for general use is 0.2; the number of areas greened for limited use is 6.2; green areas for special use have not been constructed [59, 136] and other districts can be cited as an example. Gardens and parks are places that serve the public to relax and have fun. However, it should be noted that there are other important factors that are of positive importance in the construction of gardens and parks. These important factors were especially emphasized in Heydar Aiyev's speech: "Research by scientists has shown that plants not only moderate the hot temperature, but also clean the air of harmful substances. Air pollution by gas decreases by 5 times, and the amount of microorganisms decreases by 8 times in the zone of green plants. Green plants even help fight against urban noise" [56, 5]. The foundation of M.A. Sabir garden was laid in the early 1920s. The statue of M.A. Sabir was erected in 1922. Greening and expansion works were carried out in the park in the 1950s. A monument was erected in memory of the poet in 1958 [65].

Zabitler Park is one of the oldest parks of the capital. Formerly called the boulevard, this park was dedicated to the memory of the soldiers who died during World War II. After the war, the park was named after Hazi Aslanov, who was twice awarded the title of Hero of the Soviet Union. Zabitler park was again given to the residents of the city after major reconstruction in 2011 [65, 44].

Another large garden located in the center of Baku is Sahil Park. The coast park, which was founded in the Soviet era, used to be called "26 Baku Commissar Square". Famous revolutionaries were buried here in the fraternal cemetery, and the architectural memorial complex "eternal torch" was erected in their honor [65, 48].

2.3. Garden and parks in the period of independence

As mentioned in the article "Gardens and Parks of Baku", "The trees, ornamental bushes and flowers planted on the boulevard were pleasing to the eye after only one year" [32, 30].

Huseyn Javid Park is one of the parks that attract attention in Baku. A statue was erected in the park in memory of the genius poet Huseyn Javid in 1993. Dede Gorgud Park is one of the parks built after Azerbaijan gained its independence.

Dede Gorgud, the capital's largest park, was opened in 2013. Greenery has been planted; an artificial lake has been created, as well as a lighting system that meets modern standards in this park, which has all the conditions for the rest of the capital's residents. One of the points that attract attention is that Dede Gorgud Park is also a square that demonstrates the ancient history and culture of Azerbaijan under the open sky. The "Kitabi-Dade Gorgud" monument was erected in the center of the park.

The correct selection of tree-shrub species plays a major role in the creation of green plantations with various goals for the successful implementation of these measures [58, 4].

Despite the difficult soil-climatic conditions and insufficient irrigation, 150 types of ornamental trees and shrubs are used in the construction of Absheron's greenery and are developing normally. Their species composition is getting richer every year. However,

the assortment of species used in the greening of Baku city and Absheron at the present time requires a considerable increase. [58, 4].

CHAPTER III. USING PRINCIPLES OF MORPHO TYPES IN LANDSCAPE ARCHITECTURE OF BAKU-ABSHERON PENINSULA

3.1. Classification of vegetation of Baku-Absheron peninsula

More than 4,500 flowering, high-grade plant species are spread in the territory of the Republic of Azerbaijan according to the sources. The flora of Azerbaijan is much richer than in other republics of the South Caucasus in terms of the number of species. Plant species found in our republic make up 66% of the total number of plant species growing in the Caucasus" [69].

It can be seen that "The areas along the Caspian coast are mainly surrounded by sandy and calcareous soils when characterizing the soil conditions of the Absheron peninsula. Sandy soils are mainly composed of sand and shale debris and are spread over a wide area" [41, 9].

1. Psemophyte plants of the sandy strip along the coast, plants of wet and dry sand dunes.

2. Xerophytic plants growing in plains and hilly areas of Absheron. This plant group includes plants growing on sandy hills, clayey and loamy gray soils, stony soils, sandy and sandy plains.

3. Halophytic plants that spread in saline and brackish soils. [41, 11].

Another type of wormwood (sandwort or sea wormwood), sedum, Iranian ivy, Caspian khashanbul and hundreds of other ephemeral plant species can be found in the coastal and underwater dunes. Very rich and rare plants, although short-lived, activate their development in spring and fade quickly in the sandy areas of Absheron. Sedges, sedges and various perennial grasses are abundant plants in semi-steppes and steppes. Mountain xerophytic plants often join the steppes and create special formations. [69].

Taking into account the unique soil and climate conditions of the Baku-Absheron peninsula shows that the tree species common here are mainly resistant to heat, drought, winds and are not demanding on the soil. For example, Arizona cypress, Evergreen cypress, Horizontal cypress, Pyramidal cypress belonging to the cypress genus (Cupressus L.) of the Cupressaceae Bartl. Eldar pine, Aleppo pine, Italian pine

belonging to the pine genus (Pinus L.) of the pine family (Pinaceae Lindl.); Himalayan cedar belonging to the cedar genus (Cedrus Trew) of the pine family (Pinaceae Lindl.); Virginia juniper belonging to the juniper genus (Juniperus L.) of the family Cupressaceae Bartl.; Engelmann fir belonging to the fir genus (Picea A. Dietr.) of the pine family (Pinaceae Lindl.); Blackberry with berries belonging to the genus Taxas L. of the family Taxaceae S.F.Gray; An example is the Western thuja tree belonging to the thuja genus (Thuja L.) of the Cupressaceae Bartl. family. It should be noted that acquaintance with different types of cypresses and pines demonstrates that they are trees that are very resistant to natural conditions, as well as easy to adapt, based on their longevity factor.

3.2 Basic principles of greening

Greening of the city has a long history. Acquaintance with the sources shows that in Mesopotamia, India, China, and ancient Europe, the greening of the city was important. For many years, this issue has been investigated from a theoretical point of view. Many European and Russian researchers have put forward interesting ideas about the greening of the city.

For example, let's take a look at the information about the meeting of the sanitary-hygienic requirements of the greenery planted in the area. "Green light for green!" in the source, doctor of medical sciences, professor Shukur Hasanov put forward the following views on the matter: "From a sanitary-hygienic point of view, it is recommended to use the following trees in the greening of Baku city: acacia, oak, broad-leaved chestnut, sycamore, feather, pumice, etc. In this regard, it is worth using thuja tree on a large scale. That tree has great sanitary-hygienic advantages" [56, 13].

Like chain-linked processes in nature, the above-mentioned principles complement each other and thus manifest themselves as components of a whole system. Taking this uniformity as a basis, K. Mammadova recommends considering the important points in the establishment of greenery [47, 21].

However, it should be noted that conducting research in the direction of greening the city shows that the main principles exist:

- Greening system;

- Design principle;

- Additional space;

Greening system - planned gardens, parks, squares, etc. directly related to the destination. Acquaintance with sources shows that urban greenery is divided into three groups:

1. Greens for general use;

2. Greens with limited use;

3. Special purpose greens [47, 22].

Special purpose greens include protective green zones of industrial enterprises, multi-row green lanes, highway greens, nurseries, greens planted in areas where flower farms are located [47].

It is mentioned in the source "Decorative gardening and floriculture" that "It is strictly forbidden to build gardens and parks, boulevards and other public greenery in the area between industrial enterprises that emit toxic gases. In such regions, protective green massifs of trees and shrubs, which are more resistant to gases and smoke, are built" [47, 25].

As it can be seen, the division of the green system into 3 groups directly brings to the fore its difference in a certain sense because it is built in different areas.

However, it should be taken into account that the main function of greenery planted in different areas is related to the implementation of general principles that are important for each group. In other words, regardless of which area they are built, general purpose, limited purpose and special greens contain three main principles. These are the following:

a) keep the main part of the dust in the city, dust, smoke, solid waste in factory areas, ozonize and biologically clean the air with resinous and ethereal substances that absorb carbon dioxide and destroy toxic bacteria;

b) equalize the air temperature, create shade and coolness;

c) reduce city noise, prevent direct hot sun rays in summer [47, 22].

3.3. Rules of use according to the morpho types of plants

Green plants play an invaluable role in protecting the air from dust, smoke, gas and harmful waste, preventing solar radiation, strong winds, and regulating relative humidity. This main function performed by trees and shrubs ensures the existence of the ecological system as a whole, as well as human survival. It is not by chance that the researcher A. Allahverdiyev, expressing his attitude to the issue, said, "Green plantations renew the climate of the city. As a strong thermoregulating factor, it affects the temperature of the air, its degree of humidity, the wind regime, the intensity of the solar radiation to the degree that will be felt" [59, 99].

In this sense, the list of demanding, wind-resistant tree and shrub plants for sunny areas presented by the researcher Asif Mehraliyev in his resource "Gardener's Synopsis" attracts attention. Sycamore *Platanus* from trees that lose their leaves in the sun-resistant winter; Oak *Quercus*; Maple *Acer*; Goyrush *Fracsinus*; Catalpa *Catalpa*; Azat (Nil) *Zelkova*; Elm *Ulmus*; Walnut *Juglans*; Dagdagan *Celtis*; Adam's tree *Pavlovnia*; *Elaeagnus* in Id; Melia *Melia*; Acacia *Robinia*; Safora *Sophora* and others; Pine *Pinus* from the evergreen trees; Cypress *Cupressus*; Cryptomeria *Cryptomeria*; Fir *Picea*; Cedar *Cedrus*; Laurel *Laurus*; Olive *Olea*; Palma *Palmae*; Ceratonia *Ceratonia*; Eucalyptus *Eucalyptus*; Magnolia *Magnolia*; Stone oak *Quercus ilex* and other names of the trees are reflected in Table 1 [37, 71]. Rose Rose from sun-tolerant winter-defoliating shrubs by the researcher; Syrian rose *Hibiscus*; *Ligustrum vulgare*; Chinese one-eyed L. *sinense*; Common lilac *Syuringa vulgaris*; Common barberry *Berberis*; Topulga *Spirea*; Lonusera *fragrantissima*; Indian jasmine *Lagestroemia indica* and other names of the bushes are in table 2 [37, 72]; from evergreen shrubs Strawberry tree *Arbutus*; Birch *Viburnum*; Abelia *Abelia*; Japanese *ligustrum japonica*; Bright one-eyed *Ligustrum licidum*; Photinia *Photinia*; Pittosporum *Pittosporum* and other names in Table 3 [37, 72]; from herbs (flowers) Carnation *Dianthus*; Rose *Calendula*; *Celosia* cocklebur; Horned *Paeonia*; Mountain *Tulipa*; Gunotu *Hemerocallis*; *Cladiolus* and other names in Table 4 [37, 72]; from lianas Rooted tecoma (pomegranate rose) *Compsis radicans*; Filbahar (wisteria) *Wisteria*; Hourglass *Passiflora*; My daughter *Parthenocissus*; *Rosa multiflora* and other names are reflected in table 5 [37, 73].

Shade resistance of some trees shows that they have a characteristic feature. In this sense, in the table presented by the researcher A.Mehraliyev, among the shade-tolerant trees, Blackberry (evergreen) *Taxus*; Dicotyledonous kingo *Ginkgo biloba*; Juniper (evergreen) *Juniperus*; Atshabalid *Aesculus*; Ironwood *Parrotia persica*; Gusharmudu *Sorbus*; Laurel (evergreen) *Laurocerasus*; Hawthorn *Grataegus*; Azgil *Mespilus*; Quince *Cydonia* and other tree names are in table 6 [37, 73]; Zirinc *Berberis* from bushes that lose their leaves in winter; *Cotoneaster horizontalis*; Nineteen *Lonisera*; *Vitex* in Erku; Forsythia *Forsythia*; Japanese quince *Chaenomele*; Raspberry *Rubus*; Currant *Ribes* and other names in table 7 [37, 73]; of evergreen shrubs Incense bush *Cistus*; Rabbit *Cotoneaster*; Yucca Yucca Rosemary *Rozmarinus*; Colvari jasmine *Jasminum fruticans*; Azalea (Rhododendron) *Rhododendron*; Mersin *Murtus* and other names in table 8 [37, 74]; from herbs (flowers) *Salvia*; Violet *Viola*; Canna *Canna*; Centranthus *Centranthus*; Forest *Cyclamen*; Autumn *Chrysanthemum*; Dandelion *Geranium*; Mint *Manthapiperitta*; Basil *Osimum kasilicum* and other names in table 9 [37, 74]; from lianas (creeps) Stone ivy *Hedera*; My daughter *Parthenocissus*; Carbobrotus *Carpobrotus* and other their names are listed in table 10 [37, 74].

We would like to draw attention to an important point when talking about conifers. This is due to the fact that, no matter how important the role played by evergreen conifers in landscape architecture, it is not recommended to use only these trees in the construction of gardens and parks due to soil alkalinization. Therefore, using of deciduous trees along with conifers in the construction of gardens and parks in Baku and the Absheron Peninsula can be considered as a purposeful case.

Another important issue in the construction of gardens and parks on the Baku-Absheron peninsula is related to the inability of some tree species introduced to Azerbaijan to adapt to the natural conditions of the area. In other words, there are some exotic trees that have been introduced to Azerbaijan, which are less resistant to the climate of the Baku-Absheron Peninsula, the humidity of the air, especially the winds characteristic of the Baku-Absheron Peninsula.

A certain number of trees and shrubs show that their morphological types do not correspond to the conditions of landscape architecture. This can be explained by the

unique nature of some trees and shrubs. This can be seen in the unique way some trees react to the heat from the sun. According to the current opinion, "The intensity of solar heat conduction in trees with openwork, sparse canopy is more important during the irradiation time and is 12-14 percent" [59, 101].

The feature of shedding leaves in the hot summer season, which is typical for Baku, is characteristic of moisture-loving species - Eastern sycamore, cluster willow, Canadian poplar, blue-leaved birch. In addition to deciduous and evergreen trees and shrubs, there are also plants that are important in creating coolness in the hot summer season. Plants called "Lian" that "climb along walls and fences to minimize excess heat and humidity" [59, 100] and are mainly used in vertical greening are of great importance in the construction of landscape architecture. [47, 3].

Researcher Kamala Mammadova notes that "When designing parks and gardens, the characteristic features of the relief should be taken into account, more effective places should be in front of the eyes, and unsightly places should remain in the background. In addition to the correct selection of tree and shrub species, their correct and attractive arrangement should occupy an important place in the project plan" [47, 26].

As noted by the researcher K. Mammadova, "In large green massifs (parks, gardens, boulevards) the main leading place is occupied by large-sized trees planted in groups and in rows" [47, 27] For example, where large green massifs - parks, gardens, boulevards are located taking into account the size of the area, evergreen conifers, evergreen broad-leaved trees that shed their leaves in winter can be planted in those areas. Arizona cypress belonging to the cypress genus (Cupressus L.) of the cypress family (Cupressaceae Bartl.) from evergreen coniferous trees; evergreen cypress (Cupressus sempervires L.); cypress (Cupressus sempervirens v. horizontalis Mill.) and other trees belonging to the cypress family; Aleppo pine (Pinus halepensis Mill.), which belongs to the pine genus (Pinus L.) of the pine family (Pinaceae Linds.); Italian pine (Pinus pineral) belonging to the pine genus (Pinus L.) of the pine family (Pinaceae Lindl.); trees such as Himalayan cedar (Sedrus Trew), belonging to the cedar genus of the pine family (Pinaceae Lindl.), can be an example. From this point of view, it is appropriate to look at the morphological types of a number of trees.

For example, cypresses are trees that are very resistant to natural conditions and easy to adapt due to their longevity factor.

Acquaintance with the sources shows that the Arizona cypress belonging to the cypress genus (Cupressus L.) of the cypress family (Cupressaceae Bartl.); evergreen cypress (Cupressus sempervires L.); cypress (Cupressus sempervirens v. horizontalis Mill.) and other trees belonging to the family of cypresses have a medium and quite tall color depending on their structure. For example, Arizona cypress, native to America, is 12-15 (21) m. It is a conical or broad pyramidal tree with dense canopy. The bark is thin, reddish-brown in color [47, 88]; the evergreen cypress, native to Asia Minor, Northern Iran, Crete, and Cyprus, is a tree reaching 25-30 m in height and 50-60 cm in diameter. The umbrella is very dense, broad, scattered on the sides or narrow-pyramidal or columnar. The bark of the trunk is thin, gray-brown in color, with longitudinal cracks [47, 89]; The umbrella of the horizontal cypress is wide-pyramidal or narrow-cylindrical, its branches extend to the sides in a horizontal position and rise up a bit [47, 90]; Aleppo pine, which belongs to the genus of pines of the pine family, is 10-15 (20) m. tall, straight or rarely curved tree [47, 93]; the height of the Himalayan cedar, which belongs to the cedar genus of the Shamkimi family, can reach a height of 50 m under favorable conditions.) [47, 96]; Virginia juniper belonging to the juniper genus (Juniperus L.) of the cypress family (Cupressaceae Bartl.) is native to the eastern part of North America. Under favorable conditions, the height of Virginia juniper reaches 15 m [47, 96].

CONCLUSION

1. The formation and development of tree and shrub plants takes place as a result of the participation of several main factors. The first of these factors is soil conditions, which are both a reference and a support for plants, as well as a source of nutrients. Through its various genetic layers, soil conditions ensure the formation of a plant's root system and nutrition for its overall development.
2. Like soil conditions, climate, air temperature, and relative humidity are the main factors that are important in the growth and development of trees and shrubs.

3. The vegetation of Baku and Absheron peninsula consists of trees and shrubs adapted to the natural relief, soil conditions, climate and water resources of this area.
4. Researching of the landscape architecture of Baku and Absheron peninsula at the end of the 18th century and the beginning of the 19th century allows us to come to the conclusion that during this period there was a great interest in the cultivation of fruit plants and the cultivation of decorative flower bushes.
5. The greening of Baku and the Absheron peninsula has gone through a long process of formation during the 1930s-1990s. At the beginning of the 20th century, due to the lack of a single center dealing with issues such as planting and caring for greenery, the development of this process can be traced in detail. In this sense, the lack of a single center at the beginning of the 20th century shows that the maintenance of gardens and parks built in Baku and the Absheron peninsula is somewhat weak.
6. Soil structure is an important factor determining the vegetation of the Baku-Absheron peninsula. Investigation of the mechanical composition of the soil on the Baku-Absheron peninsula, as well as the fact that the three sides of the peninsula are surrounded by gray, gray-brown and brown soils with a low content of humus, i.e. sand, show that plants that can adapt to the conditions of this area develop.
7. Greening is an activity conditioned by the planting of trees and shrubs in the area, not individually, but based on certain rules. For this reason, the observance of the basic principles for the creation of a certain uniform image of trees and shrubs in the area where the greening work is carried out ensures the organization of the overall greening work.
8. The construction of gardens, parks and squares in Baku and the Absheron peninsula, greening works in the streets and districts of the city should be carried out under the guidance of relevant departments and by professionals of this work, i.e. landscape architects.

LITERATURE

In Azerbaijani language

1. Abdulov K.Sh. The importance of ensuring ecological balance in the process of economic development of Absheron economic-geographic region // Sumgayit State University Scientific News Social and Humanities Department. vol. 13, N4, 2017, p. 81-86 (pdf)
2. Aghayeva Z. Environmental policy and its socio-philosophical aspects. Azerb. E.A. Verb., Law. and Siolo Institute, Baku: Elm, 2000, 119 p.
3. Allahverdiyev A. Let's turn Baku into a laughing stock. Baku, 1964, 18 p.
4. Trees and bushes of Azerbaijan. Baku: Azerb. Publishing house of the SSR Academy, II c. 1964, 221 p.
5. Vegetation of Azerbaijan. Abutalibov M., Hajiyev V. Baku: Isik, 1976, 47 p.
6. Flora of Azerbaijan: Use and protection of vegetation. Chief ed. V. C. Hajiyev. Baku: Elm, 1999, 424p.
7. Babayev B.G. Gardener's handbook. Baku 1977, 246 p. (pdf)
8. Babayev M.P. Morphogenetic diagnostics of Azerbaijani soils. Baku: Elm, 2011, 452 p.
9. Babayev N. Some trees and shrubs cultivated in Absheron. Baku: Ganjlik, 1976, 81 p.
10. Environmental problems of Baku city and its suburbs. Scientific practice. conf. November 26-27, 1992, Baku, 1992, 266 p.
11. Baryakin A.S., Mahmudbeyova A., Babayev Sh. A quick guide for those who green Absheron. Baku, 1964, 67 p.
12. Introduction and acclimatization of plants. (Works of the Central Botanical Garden. VI). Baku: Elm, 2006. (pdf)
13. Budagov B. Let's protect nature. Baku: Elm, 1977, 65 p.
14. Jafarov M. Soil science. Baku: Maarif, 1998, 234 p.
15. Basics of ecology. Azizov A., Abdullayev M., Alishov R. Baku: Az.IAI, 2000, 186 p.

16. Azerbaijan in Evliya Chalabi's travelogue. Baku: Nurlar, 2012, publication of the Caucasus Research Institute, Caucasus University, No. 14, 296 p.
17. Ahmadzade A. Flower growing in Azerbaijan. Baku: Azernashr, 1970, 88 p.
18. Aliyev J.A. Guide to identifying Absheron plants. Baku, 1978, 92 p.
19. Aliyev J.A. Plant geography /with the basics of botany/. Baku: Maarif, 1984, 209p.
20. Aliyev H.A., Khalilov M. On guard of green wealth. Baku: Ganjlik, 1982, 99 p.
21. Aliyeva R.Sh., Badalov E.S. Settlement and architecture in Absheron. Baku: Europe, 2016, 264 p.
22. Asadov K.S., Mirzayev O.H., Mammadov F.M. Dendrology. Baku: Ganjlik, 2014, 484 p.
23. Gasimov M.A. Morphology and systematics of higher plants. Baku, 1959, 478 p.
24. Gadirov H.M. Greening of cities and villages in Azerbaijan. Baku: Az. SSR EA publishing house, 1948, 105 p.
25. Biological productivity of useful plants of Gobustan and Absheron peninsula flora. Science. work. tem. acc. Ed. Aliyev D.A. Baku: ASU, 1984, 137 p.
26. Guliyev V.Sh., Khalilov M.Y. Dendrology. Baku: Ecology, 2000, 260 p.
27. Huseynov B.Z. Physiology of drought tolerance of tree species of Absheron. Baku: Azerbaijan SSR EA publishing house, 1960, volume 1, 200 p.
28. Huseynov M. Golden rose and other flower plants cultivated in Absheron. Baku: Azernashr, 1958, 64 p.
29. Khalilzadeh F. Gardens and parks of Baku. // Cultural education, 2009, No. 5/6, pp. 29-31.
30. Ibadli O.V., Agamirov U.M., Bayramov A.A. Florist. Baku: Ozan, 2003, 224 p.
31. Systematics of primitive plants. Nakhchivan: Ajami NPB publishing house, 2019, 320 p. (pdf)
32. Kazimova T.H. The importance of greening. Baku: Elm, 1975, 23 p.
33. Mehraliyev A.D. Synopsis of the gardener. Baku: "Vector" International Publishing House, 2017, 160 pages. (pdf)

34. Mammadov F.M. Green fences. Baku: Azerbaijan State Publishing House, 1977, 92 p.
35. Mammadov G.Sh. Ecological evaluation of Azerbaijani lands. Baku: Elm, 1998, 281 p.
36. Mammadov G.Sh. Basics of soil science and soil geography. Textbook. Baku: Elm, 2007, 660 p. (pdf)
37. Mammadov T.S. Biological characteristics of some tree and shrub plants used in greening in Absheron. Baku: Elm, 2002, 185 p.
38. Mammadov T.S. Ecology. Baku: Elm, 2003, 300 p.
39. Mammadov T.S. Lawn and decorative architecture. Baku: Chashioglu, 2006, 48 p.

In Russian language

1. Агамиров У.М., Алиев А.Р., Сафаров И.С. Ассортимент деревьев и кустарников для озеленения Баку и Апшерона (Краткий справочник). Баку: Азербайджанское Государственное Издательство, 1976, 78 с.
2. Аллахвердиев А.С. История зеленого строительства города Баку и Апшеронского полуострова. Баку: Ишыг, 1991, 163 с.
3. Бакутин В.Э., Бутягин В.А., Лунц Л.Б. Инженерное благоустройство городских территорий. Москва, 1971, 223 с.
4. Ващенко И.М., Девочкина З.Л. Декоративные растения в саду. Москва: Колос, 2000, 139 с.
5. Вакуленко В.В., Труевцева М.Ф., Вакуленко Вл.В. Декоративное садоводство, Москва: Просвещение, 1982, 143 с.
6. Кохман М.Л. Человек и ландшафт. Баку: Азернешр, 1976, 170 с.
7. Фатуллаев Ш.С. Апшерон (Градостроительство и мечети). Баку: Элм, 1991, 46 с.
8. Парки Баку. Пособие для туристов. Ред. Наджи Ф. Министерство культуры и туризма. Баку, 2015.

9. Тугова Т.А. Озеленение городских территорий. Учебно-методическое пособие. Бишкек: КРСУ, 2014, 47 с.

Cytography (Azerbaijani language)

10. Azerbaijani lands. https://gsaz.az/articles/view/81/Azarbaycan_torpaglari
11. Biodiversity of Azerbaijan. https://biodiversity.az/az/ekoturizm/11
12. Vegetation. https://a-r.az/az/page/52
13. Mehraliyev A.D. Some principles of using plants in Absheron's landscape architecture. ./https://bakubotanicalqarden.az/news/34/abseronun-landsaft-memarliqinda- itkilerden-istifadenin-bezi-prinsipleri
14.https://az.m.wikipedia.org/wiki/Bak%C4%B1_parklar%C4%B1n%C4%B1n_siyah%C4%B1s%C4%B1%)

Cytography (Russian language)

1. Горохов В.А. Принципы формирования системы озелененных территорий города. // https://landscape.totalarch.com/node/9
2. Основные принципы озеленения городов. // https://www.bibliotekar.ru/spravochnik-49/26.htm
3. Принципы озеленения центра города. // https://mirrorqroup.ru/principy-ozeleneniya-centra-qoroda
4. Сидорова А.Д., Яруллина Д.А. Принципы и особенности устройства озеленения жилых территорий. // Евразийский Союз Ученых №1(82), 2021, с.12-15.https://cyberleninka.ru/article/n/printsipy-i-osobennosti-ustroystva-ozeleneniya-zhilyh-territoriy/viewer