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Role of Ornamental Plants in Environmental Protection

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ABSTRACT

Research work is carried out in the laboratory of "Landscape architecture" of the Institute of Dendrology Ministry of Science and Education of the Republic of Azerbaijan. In 2019-2024 the laboratory organized scientific expeditions to the Primorsky National Park of Absheron, the Philharmonic Garden, Samed Vurgun Garden, Khagani Park, Flower Garden, Sahil Garden, Sabir Garden, Nizami Garden and Heydar Park of the Khatai region. Observations were carried out in parks and gardens, the taxonomic composition of ornamental trees, shrubs and herbaceous plants, their origin, the design of compositions in a regular (geometric form) and landscape or landscape style (original form), grouping of plants according to biological and decorative characteristics, rules of use were studied small architectural forms, pruning of trees and shrubs, prospects for the use of ornamental plants in various plantings, the number of types of trees, shrubs and herbaceous plants.

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INTRODUCTION

In cleaning and improving the environment, one of the main and decisive factors are plants - landscaping. In cities and towns where there are decorative compositions, air pollution is much less. Landscaping enriches the general appearance of cities and towns, giving them a special landscape beauty. The protection of the biosphere, its improvement, the creation of favorable conditions for the population are the main tasks of international importance.

When creating flower beds and flower beds, you must try to make them not only beautiful from spring to autumn, but also easy to maintain, and in no case should the convenience of life be sacrificed to beauty [1, p.12].

In the second half of the 19th century, a union of gardening art and urban planning arose, which is landscape architecture. Landscape architecture allows you to create an external environment favorable for recreation and life of the population not only in urban, but also in rural areas and cultural areas. n this case, environmental, functional, aesthetic and technical and economic requirements must be taken into account. The primary objects of landscape architecture are natural mateials (relief, soil, reservoirs, vegetation), which form landscapes with the inclusion of anthropogenic components [2, p.10].

The characteristic features of the physical-geographical situation and natural-climatic conditions of the Absheron Peninsula contributed to the specific development of landscape architecture in Baku. The uniqueness of the landscape architecture and landscaping system of this largest city is largely dictated by factors of the surrounding natural environment - the presence of a sandy shore near the Caspian Sea, an amphitheater relief, rocky slopes and semi-steppe plains, only occasionally covered with vegetation [3, p. 127].

Plants are selected so that the decorative effect in the group is maintained as long as possible. Therefore, it is necessary to considering the beginning and duration of flowering, fruiting, as well as the decorative of the leaf [4, p.192].

Landscape architecture has become part of the life of modern society. For the first time, this area of science and professional practice was called the term "landscape architecture" by the American architect-urbanist, one of the authors of Central Park in New York, Frederick Olmsted in 1863 at the Congress dedicated to the organization of national parks in America. Currently, landscape architecture is the architecture of open spaces, a branch of urban planning, the purpose of which is to create a favorable external environment for the life and recreation of the population in cities, suburban areas, and rural areas, taking into account functional, aesthetic and technical and economic requirements [5, p.5-6].

Today, a comfortable urban environment is a means of improving the quality of life of citizens, an indicator of the economic condition and well-being of both an individual area, a city and a country [6, p.278-293].

Today, much attention is paid to the improvement of public spaces, country houses, and garden plots, therefore, when designing a modern park, the territory of a residential complex or a suburban area, landscape design takes a central place [7, p.3].

The role of green spaces is multi-valued. They play a vital sanitary and hygienic role, influencing thermal, water and wind regimes, determining the formation of the microclimate of the city as a whole or its individual areas. The degree of influence of green spaces on the temperature regime depends on their nature, size and species composition, but the effect always remains positive. In summer, the air temperature among green spaces is lower, and in winter, higher than in open areas. A special group of plants in ornamental gardening consists of flowers and beautifully flowering shrubs. Expanding the range is one of the most important tasks of modern ornamental gardening [8, p.3].

The beginnings of landscape gardening art date back to the 10th – 13th centuries. BC At first, the gardens were purely utilitarian in nature: they consisted of a vegetable garden, an orchard and a vineyard. The gardens were laid out mainly in a regular style. Inside, the gardens were surrounded by hedges around the perimeter [9, p.6].

Many comfortable and beautiful parks and gardens have been created in Absheron. These parks and gardens, along with sustainable ways for people to spend their time, play a significant role in preserving biodiversity [10, p.200].

Landscape design is a design method that involves the development of measures for the volumetric-spatial organization of the territory, the formation of a system of plantings, open spaces, lawns, clearings, recreation areas, walking and transit routes for visitors, as well as small architectural forms, equipment, color solutions [11, p.5].

Woody plants are the most important architectural elements, as they are characterized by a huge number of decorative qualities: the original shape of the crown, various inflorescences, foliage, fruits, graceful curves and varied colors of the branches. Currently, gardens and parks, plantings of limited use have become even more important than in previous times and are one of the main components in the system of urban and country recreation, resort construction, and are the only representatives of natural complexes in cities. At the same time, the role of green spaces is exceptionally great, which are characterized by the most important functions, such as dust protection, climate-forming, noise-absorbing, phytoncidal, aesthetic, etc. Green spaces are an effective means of environmental protection. The success of landscape design and landscaping is largely determined by the correct selection of trees and shrubs. Compliance of the biological and environmental properties of the plants used with the soil and climatic conditions of growth is one of the main requirements that determine their stability, durability, effectiveness of impact on the environment, and decorativeness [12, p.5-6].

Specialized objects of landscape architecture are public objects that perform one leading function (for example, exhibition, memorial or sports), providing the opportunity for a wide choice of forms of recreation for the population [13, p.5].

Greening of populated areas - urban planning principles - a set of town planning, architectural and landscape, engineering, agrotechnical measures for the improvement and landscaping of populated areas, urban public centers, territories of residential and industrial development, main street networks, suburban areas, industrial enterprises, along streets and highways [14, p.3].

Considering this into account, research work is being carried out in the “Landscape architecture” laboratory of the Institute of Dendrology of the Ministry of Science and Education of the Republic of Azerbaijan. In 2019-2024, the laboratory organized scientific expeditions to the Absheron National Seaside Park, Philharmonic Garden, Samed Vurgun Garden, Khagani Park, Flower Park, Sahil Garden, Sabir Garden, Nizami Garden and Heydar Park of the Khatai district of Baku.

MATERIAL AND METHODS

The research materials are various types of ornamental trees, shrubs and herbaceous plants. To study ornamental plants in the landscape design of Absheron, the following methods were used: analysis, observation, photography, descriptive method, scientific literature.

When studying plants, families, genera, species, the homeland of ornamental trees, shrubs and herbaceous plants in parks and gardens, styles (regular - geometric shapes and landscape or landscape - original forms) of compositions, biological and decorative characteristics of plants according to phenological phases of development and morphological characteristics, pruning of trees and shrubs according to plant shapes, promising species for landscaping were selected according to the adaptation of plants to the soil and climatic conditions of Absheron.

RESULTS AND DISCUSSION

In these parks and gardens, observations were conducted, the taxonomic composition, origin of decorative trees, shrubs and herbaceous plants, design of compositions in a regular (geometric shapes) and in a landscape or landscape style (original forms) were studied. Grouping of plants in compositions according to biological and decorative features, rules for the use of small architectural forms, decorative forms of pruning trees and shrubs, prospects for the use of plants in decorative different plantings, the number of species of trees, shrubs and herbaceous plants.

In human life, in its healthy development, the importance of greening is very great. Greening plays an exceptional role in the formation and regulation of the climate in nature. A normal ratio of heat and moisture is also very important for the health and vitality of the organism. Greenery is an invaluable means of regulating and maintaining this proportion. Protecting the biosphere from industrial waste and other residues that have a negative impact on human health.

Below are some decorative compositions created in the Arboretum.

Fig. 1. Decorative flower garden

Fig.2. Original form

Fig.3. Decorative form

Fig.4. Original form

The protection of natural resources and their efficient use have acquired a more serious form and are of concern to the public as a problem of great national importance.Creating a garden in a natural style is more difficult than in a traditional one. Ordinary garden plants have been selected for "getting along" with humans, have learned to adapt to the conditions of the garden, which is an artificial ecosystem, no matter what, even if it is a Natur Garden.

Landscape richness – parks and gardens are of exceptional importance for the health and longevity of people. Greenery is the basis of our life, it plays a key role in regulating the oxygen balance in the biosphere and reducing the amount of harmful waste emitted into the environment. One hectare of forest absorbs 400 kg of sulfur dioxide, 100 kg of gaseous chlorine and 20-25 kg of fluorine from the air without causing harm to itself. One hectare of forest cleans the air from 18 million m3 of dust per year. The study of decorative plants in parks and gardens is of great importance for environmental protection. The compositions consider the bioecological and decorative features of trees, shrubs and grasses. In summer, bright flowers are used composing compositions, and light ones in spring and autumn.

It has been established that greenery is of great importance due to its pollination properties. One hectare of greenery can store 10-40 tons of dust. This feature is more important for conifers and some evergreen trees and shrubs (eldar pine, holm oak, olive, juniper, cypress, etc.). It has been established that any noise tires a person, dulls the mind, reduces labor activity and productivity, increases nervousness. Of particular importance in the fight against them are decorative compositions in the city, multi-row green trees.

In studies conducted at the Institute of Dendrology, when designing decorative compositions, along with the biological properties of planted trees, shrubs and herbaceous plants was consider, their environmental sustainability, due to local soil and climatic conditions.

The prospects for the use of some decorative plants in different plantings in various plantings are shown in table 1.

Table 1. The prospects for the use of some decorative plants in different plantings in various plantings

№	Species	Life form	Border	Single planting	Group planting	Green fence	Flowerbed
1	*Malus prunifolia* Borkh.	tree		+	+		
2	*Rosa pendulina* L.	shrubs	+	+	+		
3	*Vítis vinífera* L.	liane		+	+	+	
4	*Mórus rubra* L.	tree		+	+		
5	*Weigela florida* A.DC.	shrubs	+	+	+		
6	*Nerium oleander* L.	shrubs	+	+	+		
7	*Púnica granatum* L.	tree		+	+		
8	*Pínus stróbus* L.	tree		+	+		
9	*Rúbus idaeus* L.	shrubs	+	+	+		
10	*Eriobotryajaponica* Lindl.	shrubs	+	+	+		
11	*Lavandula dentata* L.	herbaceous	+		+		+
12	*Elaeágnus pungens*	tree		+	+		
13	*Convōlvulus arvensis* L.	herbaceous	+		+	+	+
14	*Juniperus chinensis* L.	shrubs	+	+	+		
15	*Tulbaghia violacea* Harv.	herbaceous	+		+		+

The taxonomic composition and origin of some ornamental plants studied in the parks and gardens of Absheron are shown in table 2.

Table 2. The taxonomic composition and origin of some ornamental plants studied in the parks and gardens of Absheron

Family	Genus	Specie	Homeland
1	2	3	4
1.*Pinaceae* Lindl.	1.*Pinus* L.	1.*P.eldarica* Medw.	Iran, Afghanistan
	2.*Cedrus* Mill.	2.*C.deodara* Laws.	Northern and western parts of the Himalayas
	3.*Picea* Dietz.	3.*P.excelsa* Link.	North hemisphere
		4.*P.pungens* Engelm.	North America
2.*Cupressaceae* F.W.Neger	4.*Juniperus* L.	5.*J.virginiana* L.	North America
		6.*J.chinensis* L.	China, Korea
	5.*Thuja* (L.) Tourk.	7.*T.plicata* Don.	North America
	6.*Cupressus* L.	8.*C.sempervirens* L.	Asia Minor, Mediterranean countries
	7.*Chamaecyparis* Spach.	9.*C.nootkatensis* Spach.	North America
		10.*C.lawsoniana* Parl.	North America Northern California
3.*Magnoliaceae* J.St.Hil.	8.*Magnolia* L.	11.*M.liliflora* Desr.	China
4.*Platanaceae* Dumort.	9.*Platanus* L.	12.*P.orientalis* L.	Balkan Peninsula
5.*Oleaceae* Lindl.	10.*Ligustrum* L	13.*L. japonicum* Thunb.	Japan, Korea
		14.*L.chinensis* L.	China
6.*Fagaceae* A.Br.	11.*Quercus* L.	15.Daş palıd – *Q.ilex* L.	South Europe
7.*Malvaceae* Juss.	12.*Hibiscus* L.	16.*H. syriacus* L.	India, China
8.*Rosaceae* Juss.	13.*Pyracantha* Roem.	17.*P.coccinea* Roem.	Italy, Caucasus
	14.*Photinia* Lindl.	18.*P.serratifolia* Kalkman	South and East Asia
	15.*Prunus* Mill.	19.*P.divaricata* Ledeb.	Caucasus, Middle Asia
9.*Celastraceae* Lindl.	16.*Euonymus* L.	20.*E.japonica* L.	Japan
10.*Lamiaceae* Juss.	17.*Rosmarinus* L.	21.*R.officinalis* L.	Mediterranean countries

11.*Myrtaceae* R.Br.	18.*Callistemon* R.Br	22.*C.lanceolatus* DC.	Australia, Tasmania
1		3	4
12.*Buxaceae* Dumort.	19.*Buxus* L.	23.*B.colchica* Pojark.	Asia Minor
13.*Caprifoliaceae* Vent.	20.*Abelia* R.Br.	24.*A.grandiflora* Rehd.	China, Himalaya
	21.*Lonicera* L.	25.*L.caucasica* Pall.	Caucasus
		26.*L.fragrantissima* Lindl.	China
	22.*Viburnum* L.	27.*V.opulus* Roseum.	Europe, North Africa
		28.*V.tinus* L.	Mediterranean countries
14.*Elaeagnaceae* Lindl.	23.*Elaeagnus* L.	29.*E.pungens* Thunb.	Japan
15.*Fabaceae* Lindl.	24.*Gleditsia* J.Clayton.	30.*G.triacanthos* L.	North America
16.*Lauraceae* Lindl.	25.*Laurus* L.	31.*L.nobilis* L.	Asia Minor
17.*Lythraceae* J.St.Hil.	26.*Lagerstroemia* L.	32.*L.indica* L.	China, Japan
18.*Moraceae* Lindl.	27.*Morus* L.	33.*M.alba* L.	China, Japan
19.*Pittosporaceae* Lindl.	28.*Pittosporum* Dryand.	34.*P.tobira* Dryand.	Japan
20.*Taxaceae* F.Gray	29.*Taxus* L.	35.*T.baccata* L.	Europe, Africa

In the conducted studies, drafting decorative compositions were widely used perennial, annual, bulbous and tuberous decorative flowers. Bulbous plants, such as tulips and hyacinths, differ from other flowers in that they bloom earlier, in early spring, therefore, in the research work, were studied the bioecological features and used in the composition of local, dutch sorts of these plants. The importance of greenery in human life and health is the result of research conducted by people over many years. Greenery is a symbol of abundant harvest, clean and clear air, and is also one of the main factors that give impetus to human health and vital activity, as a wonderful benefit in life.

That keep maintain the process of proportional development in the interaction of nature and man, our honorable duty - mind and effectively to use the benefits of nature, to increase and preserve them for future generations. We need to strengthen our care for the flora and fauna of our country, because they are easy to destroy and almost impossible to restore. Let us all take an active part in protecting plants to protect the environment.

CONCLUSION

As a result of the research work, it was revealed that the ornamental trees, shrubs and herbaceous plants studied in parks and gardens adapt well to the soil and climatic conditions of Absheron, are promising and are recommended for use in landscape design, when creating various forms of compositions.

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