

Analysis of the State of Woody Plants in the City of Nukus (Streets of Ernazar Alakoz)

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Abstract

This article observed seven species of *Fraxinus excelsior* L., *Fraxinus pennsylvanica* March., *Salix alba* L., *Populus alba* L., *Juniperus communis* L., *Catalpa bignonioides* Walt., *Ulmus densa* Litv for seasonal growth. The Republic of Karakalpakstan is located in the North-West of Uzbekistan, covers 166,600 km² (28%), and is the largest in terms of territory by region. The study of woody plants in the flora of Karakalpakstan is an important aspect of the convention on biological diversity. The species composition of the natural flora of Karakalpakstan is quite poor in ornamental plants, especially evergreens, suitable for gardening. At the same time, the biodiversity of these plants in Nukus and the factors contributing to them were analyzed. **Relevance of the study:** Creating an environmentally friendly environment in cities is possible by optimizing intra-urban tree plantations that perform forming, improving and regulating functions in the environment. The effectiveness of green spaces mainly depends on the range of trees and shrubs and their correct use in accordance with biological characteristics, environmental requirements and decorative qualities. The degree of impact of plantings on the environment also depends on the type, age and physiological characteristics of plants [1]. Woody plants, unlike hardwoods, enrich and purify the air throughout the year and can be used for single and group planting when creating hedges and borders, as well as green gardens. All year round, they enrich the air with oxygen, absorb street noises, and lower the air temperature. However, the conservation of flora is necessary not only for individual components, but also for the entire population diversity. Salinized land, unfavorable climate and other environmental factors are among the obstacles or restrictions to the introduction of new species of trees and shrubs, especially evergreen ones, in arid areas [2] [3]. The urban environment differs from the natural environment in terms of the degree of illumination, the amount of solar radiation, air temperature and humidity, soil properties, etc. In this re-

gard, green plants only with proper planning, selection of assortment, sufficient quantity and good care ensure the improvement of the ecological state of the city. For scientifically based gardening, it is necessary to have objective ideas not only about the quantity and quality of existing plantings, but also to know the ecological and physiological state of each species, which allows us to assess the role of plants in improving the quality of the environment [4]. The sharply continental climate, aridity of the territory, increased wind activity and salinity of the soil contribute to the aggravation of environmental problems in the cities of the southern Aral sea region. The deteriorating environmental situation in Nukus requires the development of a specific gardening strategy aimed at creating sustainable urban plantings of various types. In this regard, we conduct research on the biological characteristics of ornamental woody plants in urban conditions. The range of tree and shrub species used in the landscaping of the city of Nukus remains quite poor today [5]. The predominant tree species are *P. alba* L., *P. nigra* L., *P. diversifolia* L., *F. excelsior* L., *F. pensylvanica* Marsh., *Fraxinus potamaphylla* Herd, *S. excels* S. Gmel, *S. babylonica* L., *S. alba* L., *Juniperus communis* L. In the landscaping of Nukus, introduced plants are also used, which have adapted to local conditions, although they are damaged by frosts. These include *C. bignonioides* Walt, *Ulmus pumila* L., *F. pensylvanica* Marsh.

Keywords

Woody Plants, Stability in the Urban Environment, Morphology, Distribution, Phenological Observation

1. Introduction

Currently, one of the most pressing issues in the field of biology is the study of anthropogenic dynamics of vegetation cover, as well as the composition of the flora of anthropogenic vegetation cover. When studying the features of Genesis, the emergence of synanthropic flora that occurs under the influence of man, great importance is attached to the division of plant species that are distributed throughout the city, into groups. Cities are growing, and as a result, the impact of centers on the natural environment is increasing. On the one hand, there is indigenous, that is as a result of penetration by local species of flora in stenotopic Bank types, their interferences with metophyma plants, Degradation, degradation of the natural Association of plants. On the other hand, along with the disappearance of apophytes, there is a purposeful development of new species of adventurous plants. The vegetation cover of cities is considered an important factor in people's lives.

Decorative properties of a particular plant species allow you to diversify a certain territory. Various types of ornamental plants, performing a specific role in the construction of the composition, can also significantly affect the state of en-

environmental sustainability of the environment when placed rationally [6].

According to the results of our research, 7 plant species were recorded in the flora of the studied cities, and their quantity is 243 (total number pc.). This is 1/3 of the total number of plant species distributed in the city of Nukus. From this point of view, it can be seen that plant species that are common in urban areas are almost identical in their richness compared to plant species that are common in natural conditions and are not significantly poorer.

2. Materials and Methods

The Objects of research are tree plantations in Nukus (on the streets of Ernazar Alakuz). The objects of research were selected woody plants adults who entered fruiting (seeding in coniferous trees). The observations were carried out in 2017-2018 years. When selecting an assortment for gardening, it is necessary to assess the viability of the species, that is, its ability to adapt to adverse environmental conditions (frost, drought, lack of moisture and light, etc.). The phenological observation of I. N. Beydeman "Method of studying plant phenologies" [7], the assessment of the features of the landscape of N. I. Shtonda was made on the basis of the method.

3. Results and Discussion

When studying the growth of woody plants, shoots were selected first of all the most richly represented genera. Seven species of *Fraxinus excelsior* L., *Fraxinus pennsylvanica* March., *Salix alba* L., *Populus alba* L., *Juniperus communis* L., *Catalpa bignonioides* Walt., *Ulmus densa* Litv. were studied for seasonal growth (Table 1).

The Cupressaceae family contains 2 genera. Of these, *Juniperus* L. genera are distributed in 5 species in Uzbekistan [8]. In the city of Nukus (streets of Ernazar Alakoz) grows 1 species.

Table 1. Spectrum of families and genera of urban dendroflora.

№	Family	Genus	Species	quantity	
				Number	comparative, %
1	Oleaceae	<i>Fraxinus</i> L.	<i>Fraxinus excelsior</i> L.	35	14.4
			<i>Fraxinus pennsylvanica</i> March.	52	21.39
2	Saliaceae	<i>Salix</i> L.	<i>Salix alba</i> L.	4	1.64
			<i>Populus</i> L.	<i>Populus alba</i> L.	85
3	Cupressaceae	<i>Juniperus</i> L.	<i>Juniperus communis</i> L.	41	16.87
4	Bignoniaceae	<i>Catalpa</i> Scop.	<i>Catalpa bignonioides</i> Walt.	8	3.29
5	Ulmaceae	<i>Ulmus</i> L.	<i>Ulmus densa</i> Litv.	26	10.69
Total				243	100

***Juniperus communis* L.** Shrub or tree up to 8 - 10 (15) m high. Very variable in crown shape and height, depending on the growing conditions. Dioecious. Male specimens have a narrower, conical or ovoid crown; female specimens have a more prostrate crown. The bark of the main trunk is gray-brown, the side shoots are reddish-brown.

Grows slowly, very hardy, tolerates shading. It is undemanding to the soil, growing both on poor stony and dry sandy soils, and on swampy ones. It does not tolerate salinity of the soil and dry winds. Durable. Propagation by seeds, cuttings.

It has a vast area of natural distribution, covering a large part of Europe, Asia and North America.

In the Botanical garden of Karakalpak branch of Academy of Sciences of Uzbekistan (Nukus) *Juniperus communis* introduced in 1965 one-two age seedlings from Botanical garden of Academy of Sciences of Uzbekistan (Tashkent). In the conditions of the Botanical garden does not suffer from high summer temperatures, frost-and heat-resistant, painlessly tolerates significant dryness of the air. At 8 - 9 years of life, common juniper first bloomed, but there were few seeds, maturing in late July or early August of the following year [9].

The Oleaceae family contains 5 genera. Of these, *Fraxinus* L. genera, 7 species are distributed in Uzbekistan [8]. In the city of Nukus (streets of Ernazar Alakoz) grows 3 species.

***Fraxinus excelsior* L.** Tree. Leaves with 9 - 13 leaflets. Leaves sessile or on short petioles, ovate-lanceolate or oblong-elliptic, pointed at the top, on the edge almost tselkraynye or round-toothed, on the edge of gnawed or toothed, dark-below light green, on both sides glabrous or below the middle vein hairy. The calyx and Corolla are missing. Fruit wing oblong or obovate-oblong, slightly notched at the top, 3 - 4.5 cm long. General distribution Europe, Caucasus [8].

***Fraxinus pennsylvanica* Marsh.** Tree. Leaves with 5 - 9 leaflets. Leaves are almost sessile, ovate-lanceolate or oblong-lanceolate, pointed at the top, almost tselkraynye or round-toothed on the edge, young hairy. Calyx bell-shaped. The fruit wing is oblong, rounded, sharp or notched.

The General distribution is North America [8]. The family Salicaceae contains 2 genera, of which *Salix* L. genera are distributed 5 species in Uzbekistan [8]. In the city of Nukus (streets of Ernazar Alakuz) grows 3 species.

***Salix alba* L.** Tree, 10 - 15 m high. Branches are flexible, naked, young silvery-fluffy. The kidneys are elongated, reddish-yellow. Stalks with glands. The leaves are large, linear-lanceolate and lanceolate, pointed, often finely filiform, dark green above, with pressed hairs, glaucous below, with pressed longitudinal silvery hairs. Catkins develop simultaneously with the leaves, rather loose.

General distribution Eurasian part, Caucasus, Siberia, Western Europe, Mediterranean, Iran, India, China [8]. The genus *Populus* L. contains 6 species, of which 3 are distributed in Nukus (streets of Ernazar Alakoz).

***Populus alba* L.** Tree up to 15 - 20 m tall., spreading or pyramidal crown. Young branches are white-wooled. Buds are young felt, later often naked. Leaf

petioles pubescence. The leaves of long shoots are triangular, 3 - 5 lobed, at first white-flake-like on the bottom, later lose pubescence. The leaves of short shoots are oval or round-ovate, with large rounded notches and blunt teeth along the edge.

General distribution Middle Asia, Europe part, North Caucasus, Western Siberia, Western Europe, Kashgaria [8]. The family Bignoniaceae contains 1 genus [10], of which *Catalpa* Scop. the genus is distributed in 3 species in the city of Nukus (streets of Ernazar Alakuz).

***Catalpa bignonioides* Walt.** Tree, 10 - 12 m high., leaf heart-shaped-ovate, suddenly pointed, pubescent from below, 12 - 24 cm long. and up to 20 cm wide., long-stemmed, up to 16 cm long. calyx two-sided, 0.8 cm long. The Corolla is white, 3 - 3.2 cm long, with two yellow stripes inside and reddish-brown spots.

General distribution in North America. Introduced to Western Europe in 1726, on the territory of the USSR since 1813 (Pilipenko, 1962). Decorative with large leaves and flowers [8].

The family Ulmaceae contains 2 genera, of which *Ulmus* L. genera are distributed 8 species in Uzbekistan [8]. In the city of Nukus (streets of Ernazar Alakuz) grows 3 species.

***Ulmus densa* Litv.** Tree up to 15 m tall, dense crown, spherical. Branches are pubescent. The leaves are ovate, just or twice large-toothed, glabrous or softly downy above, with hairs at the corners of the veins at the bottom. Leaf petioles 6 - 7 mm long, rarely pubescent. Flowers in bunches on very short legs. The perianth is ciliated along the edge. The wing is 2 cm long and 1.2 cm wide, with a recess at the top.

General distribution of Central Asia [8].

In this table we see that the genus *Fraxinus* L. is common in the city of Nukus (streets of Ernazar Alakoz). 2 species of category. *F. excelsior* L., *F. pensylvanica* March., their total number is 87 pc. (according to data for 2017-2018), as you know, Nukus (streets of Ernazar Alakuz) is one of the most common categories in the city and makes up 35.79% of the total number. One of the most common categories is *Populus* L. in the city of Nukus (streets of Ernazar Alakoz) there is 1 species of the category *P. alba* L. Its total population is 85 thousand individuals. Total-35%. *J. communis* L., *U. densa* Litv. this category of species is also widespread. *Salix alba* L., *Catalpa bignonioides* Walt. moreover, the species is not widespread, so the biological diversity of urban flora depends primarily on the diversity of biotopes in the urban area and the demand for various environmental conditions that cause them, on the anthropogenic-tolerant characteristics of plant species.

4. Conclusions

As a result of surveys conducted in 2017-2018 years of green spaces in the city of Nukus (streets of Ernazar Alakuz), it was found that they contain 7 species and

forms of ornamental plants belonging to 5 families from various floral areas. The most diverse families are: Salicaceae Lindl., Oleaceae Lindl., Cupressaceae F. M., Bignoniaceae, Ulmaceae Mirb. Relatively widely used 6 species of woody plants, the rest of the species are represented by a small number (single specimens).

Dendrology urban green spaces in the city of Nukus (streets of Ernazar Alakuz) according to their geographical origin are heterogeneous. According to the analysis, woody plants of the Central Asian flora predominate. Among the introduced plants, species from the European-Caucasian dendroflora predominate.

A comparative study of plant growth and development has shown that the adaptation of plants to drought and soil salinity, as well as to other adverse factors of the urban environment is manifested in the habits, growth suppression, reduction of plant height, changes in physiological and biochemical processes, etc.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- [1] Erkebaev, T.K. (1994) Complex Study of Sanitary and Hygienic Properties of Woody Plants Used in Landscaping of Children's Medical Institutions: Dis... Cand. Biol. Nauk, Tashkent.
- [2] Gerasimova, E.Yu., Abaimov, V.F. and Kulagin, A.A. (2016) Types and Forms of Woody and Shrubby Plants Promising for Landscaping of the Southern Urals (on the Example of the City of Orenburg). *Bulletin of the Altai State Agrarian University*, **10**, 70-75.
- [3] Kurbaniyazov, B.T. (2012) Bioecological Features of Some Woody Plants in the Conditions of Nukus. *IV International Scientific and Practical Conference on Problems of Rational Use and Protection of Biological Resources of the Southern Aral Sea*, June 22-23 2012, 236-238.
- [4] Legoshchina, O.M. (2018) Adaptive Reactions and Phyto-Indication Ability of Woody Plants in Conditions of Technogenic Pollution. Kemerovo, 7-15.
- [5] Kurbaniyazov, B.T. (2013) Woody Plants in the Landscaping of the City of Nukus. Introduction of Plants: Achievements and Prospects Materials. *6th Republic Scientific and Practical Conference*, Tashkent, 23-24 May 2013, 69-70.
- [6] Nefedov, V.A. (2002) Landscape Design and Sustainability of the Environment. "Science", Sankt Petersburg, 143 p.
- [7] Beydeman, I.N. (1974) Methods of Studying Plant and Plant Phenology. Communities-Novosibirsk, Nauka, 153 p.
- [8] Nabiev, M.M. and Kazakbayev, R.Yu. (1975) Determinant of Ornamental Trees and Shrubs of Uzbekistan. Fan Publishing House of the Uzbek SSR, Tashkent, 30, 34, 46, 131, 132, 142.
- [9] Otenov, T.O., Grokhovatsky, I.A., Otenova, Z.T. and Otenova, F.T. (2019) Introduction and Bioecological Features of Coniferous Plants in Karakalpakstan.

Bulletin of the Karakalpak Branch of the Academies of Sciences of the Republic of Uzbekistan. № 2, 32.

- [10] Lupova, I.V. (2006) The Current State of Vegetation Cover of Urbanized Territories of the Steppe Zone (on the Example of the City of Orsk). Orenburg.