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PHENOLOGICAL OBSERVATIONS IN AVAILABLE TREES IN KARAKALPAKSTAN

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Аннотация. Ушбу мақолада Нукус шаҳрини кўкаламзорлаштиришда фойдаланилаётган дарахт ва буталарнинг ҳаётидаги фаслий ходисаларнинг муддатларини аниқлаш бўйича ўтказилган тадқиқот натижалари келтирилган. Бу жараёнлар шу ҳудуднинг табиий иқлим шароитларига чамбарчас боғлиқ. Тадқиқот ишлари Қорақалпоғистон Республикаси Нукус шаҳри шароитидаги маҳаллий ва интродукцияланган дарахт-бута ўсимликларида фенологик кузатишлар бўйича олиб борилди ва натижалар махсус жадвалларга қайд этилди.

Калит сўзлар: кўкаламзорлаштириш, дарахт, бута, фенологик баҳолаш, табиий шароитлар, *Catalpa speciosa* Engelm, *Sophora japonica* L, вегетация давомийлиги, манзаравий, нинабаргли, япроқбаргли.

Аннотация. В статье представлены результаты исследования, проведенного с целью определения сроков наступления сезонных явлений в жизни деревьев и кустарников, используемых в озеленении города Нукус. Эти процессы тесно связаны с природно-климатическими условиями региона. Исследования проводились по фенологическим наблюдениям за местными и интродуцированными деревьями и кустарниками в городе Нукус Республики Каракалпакстан, результаты заносились в специальные таблицы.

Ключевые слова: ландшафтный дизайн, дерево, кустарник, фенологическая оценка, природные условия, *Satalra speciosa* Engelm, *Sophora japonica* L, продолжительность вегетации, декоративный, листопадный, листопадный.

Annotation. This article presents the results of a study conducted to determine the timing of seasonal events in the life of trees and shrubs used in the landscaping of the city of Nukus. These processes are closely related to the natural climatic conditions of the region. The research was carried out on phenological observations of local and introduced trees and shrubs in the city of Nukus, Republic of Karakalpakstan, and the results were recorded in special tables.

Keywords: landscaping, tree, shrub, phenological evaluation, natural conditions, *Satalra speciosa* Engelm, *Sophora japonica* L, vegetation duration, ornamental, deciduous, deciduous.



Introduction. Seasonal events in the life of trees and shrubs are closely related to climatic conditions. The study of these phenomena and their interrelationships is of great practical importance. Because they go through different periods in different climates.

It is impossible to know their biological, ecological and other characteristics without knowing the seasonal changes of tree-shrub plants. In order to study the seasonal changes, observations are made on the developmental stages of trees and shrubs in different seasons [1], [3].

Analysis of the literature on the subject. In the Republic of Karakalpakstan, one of the most important measures to increase green areas, gardens, landscaping and beautification of urban and rural centers and other settlements, improving the hot and dry climate of the country and increasing soil fertility is to cover our environment with green areas [5], [6].

I.T. According to Remiskevich (1967), the intensity of carbon dioxide absorption by trees and shrubs varies, depending on the type and age of the tree. Twenty-five-year-old poplars reported 44 kg of carbon dioxide, 20 kg of oak, 16 kg of linden, 18 kg of ash, 21 kg of maple and evergreen conifers.

Phenological observations are of great importance in the introduction of trees, shrubs and plants. In addition to the observation of seasonal changes in trees and shrubs, the flight of harmful insects from the wintering grounds, laying eggs, hatching and the development of fungal diseases are also recorded. These observations allow the development of countermeasures against them [8].

The flowering of trees and shrubs, the duration of flowering, the yellow-red color of the leaves are of great importance in landscaping, they are selected for landscaping according to these properties. These, in turn, indicate the climatic conditions under which the species can be grown and how it can be used [10], [11].

Research methodology. The research was carried out on phenological observations of trees and shrubs, which are widely used in landscaping of Nukus. Experimental sites were located in the central streets of Nukus 3, in industrial areas 2, in Nukus State Forestry 1 (control option). A total of 23 species were studied in 3-5 model trees by species every 5-7 days to identify seasonal events. The following observations were made to study the seasonal events of each tree:

- The beginning of the movement of aphids in the body of plants,
- Embossing and writing of buds,
- leaf formation,
- Growth of branches,
- The appearance of flower buds,
- The beginning and end of flowering,
- Beginning and full ripening of fruits,
- The onset of leaf shedding and complete shedding.

The results obtained were recorded in special tables.

Analysis and results: In order to study the growth and development characteristics of trees and shrubs during the growing season, phenological observations were carried out on deciduous and coniferous species present in the conditions of Nukus.



Depending on the biological characteristics and weather conditions in the studied species of trees and shrubs, it was found that the growing season begins in late March or the first ten days of April. In 2018, in some rounds, it started 5-6 days later than in previous years. This phenomenon has been observed in the following species: *Fraxinus excelsior* L., *Sophora japonica* L., *Ailanthus altissima* Swingle., *Ulmus pinnato-ramosa* Dieck., *Salix alba* L., *Hippophae rhamnoides* L., *Berberis integgerima* Bge., *Populus alba* and others.

The annual averages of the results obtained are given in Table 1.

The growth duration of the tree-shrub branches studied was 76 days in the virgin spruce (*Juniperus virginiana* L.) from the coniferous species, and 74 days in the eastern biota (*Platigladus orientalis* S.). This figure was 60 days in the Crimean pine (*Pinus Pallasiana* Lamb.).

The duration of growth of twigs in deciduous trees ranged from 58 to 76 days. Most of the species of trees and shrubs included in our conditions will bloom for several years and produce seeds and fruits that will germinate well. The results of phenological observations show that the beginning and end of the growing season of all species differ in terms of growth period.

As a result of experimental work on the cultivation of some deciduous tree species, it was found that the most effective method of propagation is propagation from this seed. A study of the growth biology of the Eastern biota has shown that the most intensive growth is observed in May, June, and July, while the slowest is observed at the beginning and end of the growth period. In the conditions of Nukus, the eastern biota bloomed for the first time at the age of 4-5 years. It tolerates dry weather, high summer and low winter temperatures, and the yield is also high, which indicates its good flexibility.

Conclusions and suggestions. According to the results of the study, the following conclusions were drawn.

1. Without knowing the seasonal phenomena in tree-shrub plants, it is impossible to know their biology, ecology and important phases in landscaping.
2. Scenic flowering *Satalra speciosa* Engelm. the flowering period on the tree was 15 days, while the flowering period on the *Sophora japonica* L. tree was 19 days.
3. Differences in general seasonal phenomena were observed in trees and shrubs of other species.
4. The duration of vegetation in tree species was 196 to 231 days, while in shrubs it was found to be 188 to 223 days.



Table 1.

**Period of seasonal changes in the life of existing trees and shrubs in Nukus
(2018-2020)**

№	Tree and shrub species	age	Buds		Appearance of leaves	Growth of branches		The emergence of flower buds	Flowering			Ripening of fruits		Leaf shedding			Vegetation duration, days
			bulge	spelling		beginning	finish		beginning	gross	finish	beginning	finish	beginning	gross	finish	
1.	<i>Juniperus virginiana L.</i>	15	-	-	-	04.IV	20.VI	23.III	09.IV	23.IV	29.IV	25.IX	03.XI	-	-	-	-
2.	<i>Platigladus orientalis S.</i>	16	-	-	-	01.IV	14.VI	21.III	03.IV	17.IV	24.IV	29.IX	30.X	-	-	-	-
3.	<i>Pinus Pallasiana Lamb.</i>	15	-	-	-	06.IV	05.VI	15.IV	02.V	10.V	27.V	04.X	10.XI	-	-	-	-
4.	<i>Fraxinus excelsior L.</i>	17	22.III	01.IV	04.IV	09.IV	14.VII	23.IV	08.V	14.V	21.V	28.VI	07.IX	10.X	18.X	28.X	220
5.	<i>Sophora japonica L.</i>	19	14.IV	17.IV	25.IV	29.IV	28.VII	07.VI	11.VI	18.VI	30.VI	08.VII	03.X	06.X	14.X	28.X	197
6.	<i>Robinia pseudoacacia L.</i>	17	22.III	30.III	05.IV	12.IV	19.VI	22.IV	24.IV	29.IV	05.V	14.VIII	09.IX	03.X	14.X	02.XI	225
7.	<i>Catalpa speciosa engelm.</i>	18	19.III	25.III	02.IV	10.IV	24.VI	05.V	18.V	25.V	03.VI	25.IX	09.X	04.X	24.X	05.XI	231
8.	<i>Morus alba L.</i>	14	17.III	22.III	26.III	06.IV	01.VII	09.V	14.V	19.V	26.V	08.VI	24.VI	02.X	10.X	22.X	219
9.	<i>Maclura aurantiaca N.</i>	21	19.III	26.III	03.IV	14.IV	18.VII	24.IV	01.V	12.V	18.V	22.IX	14.X	18.X	28.X	05.XI	230
10.	<i>Salix babylonica L.</i>	19	23.III	31.III	04.IV	09.IV	26.VI	18.IV	01.V	12.V	18.V	22.IX	14.X	18.X	28.X	05.XI	227
11.	<i>Elaeagnus orientalis L.</i>	16	27.III	10.IV	18.IV	21.IV	09.VIII	14.V	24.V	01.VI	06.VI	18.VI	01.VII	02.X	14.X	26.X	212
12.	<i>Ailanthus altissima Swingle.</i>	17	21.III	02.IV	05.IV	10.IV	11.VII	20.IV	07.V	15.V	26.V	02.VI	02.IX	16.X	24.X	01.XI	224
13.	<i>Ulmus pinnato-ramosa Dieck</i>	14	26.III	01.IV	16.IV	01.IV	09.VII	03.IV	05.IV	09.IV	12.IV	22.IV	16.V	09.X	24.X	10.XI	228
14.	<i>Crataegus sanguinea</i>	20	10.IV	19.IV	23.IV	26.IV	14.VI	23.IV	02.V	08.V	13.V	23.VII	07.VIII	19.IX	10.X	23.X	196
15.	<i>Gleditsia triacanthos L.</i>	12	04.IV	14.IV	17.IV	28.IV	19.VI	29.IV	11.V	17.V	22.V	20.VIII	16.IX	20.IX	12.X	27.X	206
16.	<i>Salix alba L.</i>	26	27.III	04.IV	07.IV	10.IV	30.V	09.IV	13.IV	16.IV	21.IV	07.V	18.V	10.IX	05.X	18.X	205
17.	<i>Populus alba</i>	13	02.IV	06.IV	09.IV	15.IV	17.VI	18.IV	22.IV	25.IV	02.V	-	-	20.IX	10.X	25.X	204
18.	<i>Ligustrum vulgare L.</i>	7	22.III	03.IV	09.IV	10.IV	25.VI	21.V	05.VI	09.VI	11.VI	14.IX	25.IX	02.X	08.X	14.X	207
19.	<i>Hippophae rhamnoides L.</i>	8	24.III	09.IV	18.IV	21.IV	05.VII	20.IV	22.IV	29.IV	05.V	22.IX	25.X	14.X	26.X	02.XI	223
20.	<i>Rosa canina L.</i>	8	25.III	03.IV	07.IV	11.IV	03.VII	17.V	25.V	02.VI	02.VII	11.IX	09.X	21.X	28.X	04.XI	223
21.	<i>Berberis integerrima Bge.</i>	8	06.IV	18.IV	23.IV	26.IV	17.VI	23.IV	16.V	22.V	28.V	23.VII	22.VIII	17.IX	13.X	25.X	188
22.	<i>Buxus sempervirens L.</i>	10	25.III	29.III	02.IV	05.IV	19.VI	07.IV	11.IV	18.IV	29.IV	03.IX	22.IX	-	-	-	180
23.	<i>Amorfa</i>	8	05.IV	15.IV	21.IV	25.IV	03.VII	08.V	16.V	30.V	03.VI	16.VIII	03.IX	04.X	14.X	23.X	201



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