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FLORAL DIVERSITY OF PLANTS ON THE TERRITORY OF THE SOGROVSKY NATURE RESERVE PROTECTED AREA

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Abstract

This article presents the results of a study on the biological diversity of vegetation and species composition of birch forests in the protected area «Sogrovsky Reserve» located in the northernmost part of the North Kazakhstan region. A floral analysis of higher plants has been compiled and carried out.

As a result of the study of the species composition of the flora of the Sogrovsky reserve, we identified and identified 241 plant species belonging to 176 genera from 63 families. At the same time, 235 species were classified as vascular angiosperms.

The leading families in terms of the number of species include 156 species of plants, which is 63.63% of the species composition of the entire flora of the Sogrovsky reserve. The following families are large: Asteraceae (34 species), Rosaceae (21 species), Fabaceae (19 species), Poaceae (13 species), Caryophyllaceae (10 species), Lamiaceae (9 species) and others.

The genera of plants that are large in number of species are: Artemisia (5 species, 9.43%), Silene, Thalictrum, Ranunculus, Astragalus, Plantago, Galatella have 4 species each (7.54%).

Keywords: flora, birch forests, Sogrovsky nature reserve, the terrace by the river, ravines.

СОГРОВ ҚОРЫНЫҢ ҚАЙЫҢ ОРМАНДАРЫ ӨСІМДІКТЕРДІҢ ФЛОРАЛЫҚ АЛУАНТҮРЛІЛІГІ

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Андатпа

Бұл мақала Солтүстік Қазақстан облысының «Согровский қаумалы» ЕҚТА аумағындағы қайың ормандарының флорасы мен өсімдіктерінің биоалуантүрлілігін зерттеуге арналған. Өсімдіктердің тізімі анықталып, флористикалық құрамы талданды.

Согров қорығының аумағында флораны зерттеу нәтижелеріне сәйкес 63 тұқымдасының 176 туысына жататын өсімдіктердің 241 түрі анықталды. Олардың 235 түрі гүлді өсімдіктерге жатады. Споралы өсімдіктерге 5 түрі және бір түрі қарағайларға жатады.

Жетекші тұқымдастарға өсімдіктердің 156 түрі кіреді, бұл Согров қорығының бүкіл флорасының түрлік құрамының 63,63% құрайды. Ірі тұқымдастар: Asteraceae (34 түрі), Rosaceae (21 түрі), Fabaceae, (19 түрі), Poaceae (13 түрі), Caryophyllaceae (10 түрі), Lamiaceae (9 түрі) және басқалары.

Өсімдіктердің саны бойынша ірі туыстары: Artemisia (5 түрі, 9,43%), Silene, Thalictrum, Ranunculus, Astragalus, Plantago, Galatella әрқайсысы 4 түрден тұрады (7,54%).

Түйінді сөздер: флора, қайың ормандары, Согров қорығы, өзен террасасы, сайлар.

ФЛОРИСТИЧЕСКОЕ РАЗНООБРАЗИЕ РАСТЕНИЙ БЕРЕЗОВЫХ ЛЕСОВ СОГРОВСКОГО ЗАКАЗНИКА

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Аннотация

Данная статья посвящена изучению биоразнообразию флоры и растительности березовых лесов на территории ООПТ «Согровский заказник» Северо-Казахстанской области. Выявлен список растений и проведен анализ флористического состава.

Согласно результатам исследования флоры, на территории Согровского заказника был выявлен 241 вид растений, относящихся к 176 родам 63 семейств. Из них 235 видов относятся к сосудистым цветковым растениям. К споровым растениям относится 5 видов и один вид к голосеменным.

Ведущие по числу видов семейства включают 156 видов растений, что составляет 63,63% от видового состава всей флоры Согровского заказника. Крупными являются семейства: Asteraceae (34 вида), Rosaceae (21 вид), Fabaceae, (19 видов), Poaceae (13 видов), Caryophyllaceae (10 видов), Lamiaceae (9 видов) и другие.

Крупными по числу видов родами растений являются: Artemisia (5 видов, 9,43%), Silene, Thalictrum, Ranunculus, Astragalus, Plantago, Galatella имеют по 4 вида (7, 54%).

Ключевые слова. флора, березовые леса, Согровский заказник, прирусловая терраса, овраги.

Introduction

The Sogrovsky Nature Reserve, a specially protected natural area, was established in 1968 and covers an area of 134 thousand hectares. Its western border stretches along the Ishim River for 45 km, and its northern border borders the Tyumen region of the Russian Federation. The conservation of forest plant communities, rare species of animals and plants of floodplain forests is primarily facilitated by the location of the reserve in the floodplain of the Yesil River, which is its main advantage [1].

Birch forests located on the old river terraces of the Yesil floodplain are particularly rich in floral diversity. The peculiarity of the flora is expressed in the presence of boreal elements of the flora. The unique humidification conditions, the presence of ravines, steep slopes and moisture retention as a result of the spring flood contribute to the prosperity of moisture–loving forest plants, more characteristic of the South Siberian plain.

In our work, we set a goal to determine the indicator of plant species diversity (index of species richness) at the time of our research. This provides a basis for further monitoring of the plant species diversity of the Sogrovsky Nature Reserve protected area.

Widespread shrub species are: *Vibrurnum opulus* L., *Cerasus fruticosa* Pall. (shrub cherry). Rare shrubs include alder buckthorn (*Frangula alnus* Mill.), which also occurs sporadically. *Vibrurnum opulus* L. is an important food source for various bird species, which makes it a valuable component of ecosystems, especially during periods when access to other food resources is limited [2]. In some cultures, the fruits of the shrub cherry were used in folk medicine to treat various diseases due to the content of useful elements [3, 4].

Most species of these families are of great importance both for the environment and for humans. For animals, they serve as a source of nutrition. The ability to hold soil on slopes helps to prevent soil erosion [5].

Research methods

We used such methods as route reconnaissance, test sites, as well as statistical processing methods. The research was conducted in the period from the end of April to September 2022. The object of the study is plants in the territory of the protected area "Sogrovsky reserve" of the North Kazakhstan region. To replenish the herbarium collection, plants were collected and photographs of growing plants were taken.

To determine plant species, a standard methodology was applied using illustrated determinants of Kazakhstan and the Flora of Kazakhstan [6, 7, 8]. Modern summaries were also used to clarify the taxa and Latin names of plants [9].

To analyze the life forms of plants of birch forests of the Kyzylzhar district of the North Kazakhstan region, we used the classification of I.G. Serebryakov. This classification is based on the features and conditions of growth, as well as the structure possessed by vegetative and generative organs of plants [10]. Modern sources on dendrology were used.

The results of the study

According to the results of our research, 241 species of vascular plants belonging to 176 genera of 63 families were identified in birch forests on the territory of the Sogrovsky Nature Reserve of the North Kazakhstan region. The distribution of plant species by genus and the quantitative ratio are shown in Table 1. The taxonomic structure corresponds to the flora of the temperate latitudes of the Holarctic floral kingdom. Among the 63 families, there are 12 leading families with 156 plant species. These families make up 64.65% of the species composition of the entire flora of the studied area. The 12 leading in terms of the number of species families include 112 genera out of a total of 176 genera, which is 63.63%. There are 32 families represented by one species, among them 5 families of higher spore plants, 1 – coniferous (Pinaceae), the rest belong to flowering plants.

Table 1. Flora of the Sogrovsky Nature Reserve in the North Kazakhstan region.

№	Families	Number of genus	Number of species
1	2	3	4
1	*Woodsiaceae*	1	1
2	*Dennstaedtiaceae*	1	1
3	*Equisetaceae*	1	3
4	*Pinaceae*	1	1
5	*Typhaceae*	1	1
6	*Sparganiaceae*	1	1
7	*Alismataceae* Vent	2	2
8	*Butomaceae*	1	1
9	*Poaceae* Barnchart	11	13
10	*Juncaceae*	1	1

11	*Cyperaceae*	5	8
12	*Araceae*	1	1
13	*Convallariaceae* Horan	2	2
14	*Liliaceae*	1	1
15	*Asparagaceae*	1	1
16	*Alliaceae*	1	2
17	*Iridaceae*	1	2
18	*Orchidaceae*	1	3
19	*Acoraceae*	1	1
20	*Salicaceae*	2	4
21	*Betulaceae*	1	2
22	*Cannabaceae*	2	2
23	*Urticaceae*	1	1
24	*Polygonaceae*	3	4
25	*Chenopodiceae*	3	4
26	*Amaranthaceae*	1	1
27	*Caryophyllaceae*	6	10
28	*Ranunculaceae*	6	12
29	*Cruciferae*	8	8
30	*Droseraceae*	1	1
31	*Crassulaceae*	1	1
32	*Rosaceae*	14	21
33	*Fabaceae*	9	19
34	*Geraniaceae*	1	3
35	*Polygalaceae*	1	1
36	*Euphorbiceae*	1	1
37	*Aceraceae*	1	1
38	*Rhamnaceae*	1	1
39	*Malvaceae*	1	1
40	*Guttiferae*	1	1
41	*Violaceae*	1	2
42	*Lythraceae*	1	1
43	*Onagraceae*	1	1
44	*Apiaceae*	8	8
45	*Ericaceae*	3	3
46	*Primulaceae*	1	1
47	*Plumbaginaceae*	1	1
48	*Menyanthaceae*	1	1
49	*Asclepiadaceae*	2	2
50	*Convolvulaceae*	2	2
51	*Cuscutaceae*	1	1
52	*Boraginaceae*	7	7
53	*Lamiaceae*	8	9
54	*Solanaceae*	1	1
55	*Scrophulariaceae*	5	7
56	*Plantaginaceae*	1	4

57	*Rubiaceae*	1	3
58	*Dipsacaceae*	1	1
59	*Campanulaceae*	2	4
60	*Ulmaceae*	1	1
61	*Caprifoliaceae*	1	1
62	*Cucurbitaceae*	1	1
63	*Asteraceae*	25	34
	Total	176	241

In table 2, we present data on the total number of predominant families. The Asteraceae family is the leader in terms of the number of species. The number of their species is 34 (14.1%). In the study area, Asteraceae are represented by 25 genera, which is 13.6%. (Table 2).

This is followed by the *Rosaceae* family, which includes 21 species, the proportion of which was 8.71%. Representatives of the *Rosaceae* family are often used for landscaping gardens, parks and landscapes due to their beautiful colors, aroma and variety of shapes. *Fabaceae* is in third place in terms of the number of species, which contains 19 species with a share of 7.88%. The *Poaceae* family accounts for 5.39%, i.e. 13 species. The *Ranunculaceae* family comprises 4.97% - 12 species. Quite large families of *Lamiaceae* and *Caryophyllaceae*. 10 species belong to the *Caryophyllaceae* family, which is 4.14%. The *Lamiaceae* family contains 9 species - 3.73%.

Table 2. List of the leading flora families of the Sogrovsky Reserve of the North Kazakhstan Region

№	Families	Number of species	% of the total number of species	Number of genus	% of the total number of genus
1	*Asteraceae*	34	14,1	25	14,2
2	*Rosaceae*	21	8,71	14	7,95
3	*Fabaceae*	19	7,88	9	5,11
4	*Poaceae*	13	5,39	11	6,25
5	*Ranunculaceae*	12	4,97	6	3,41
6	*Caryophyllaceae*	10	4,14	6	3,41
7	*Lamiaceae*	9	3,73	8	4,55
8	*Cyperaceae*	8	3,31	5	2,84
9	*Apiaceae*	8	3,31	8	4,55
10	*Brassicaceae*	8	3,31	8	4,55
11	*Scrophulariaceae*	7	2,9	5	2,84
12	*Boraginaceae*	7	2,9	7	3,97
	Total	156	64,65	112	63,63

The high number of these families indicates the features of the ancient Mediterranean flora in the region. The top ten families include: *Apiaceae, Cyperaceae, Brassicaceae* or *Cruciferae*.

With a share of 3.31%. there are 8 species in these families. The *Boraginaceae* and *Scrophulariaceae* families complete the group of leading families, including 7 species each, which makes up 2.9% of the total list of leading plants.

41 flora families contain 1 genus, 7 families – 2 genera, 3 families – 3 genera, 2 families of 5 genera, 2 families of 6 genera, 1 family of 7 genera, 3 families – 8 genera. The most species-rich 15 genera are represented in the spectrum of the leading genera (Table 3).

Such taxa as *Artemisia* contain 5 species (9.43%), *Silene, Thalictrum, Ranunculus, Astragalus, Plantago, Galatella*, include 4 species (7.54%) are the leading ones in the flora.

A number of genera contain 3 plant species, among them: *Equisetum, Cypripedium, Trifolium, Lathyrus, Geranium, Veronica, Campanula*, which account for 5.66%. The number of monotypic genera, or represented by one species, is 250 (64.4%). The herbaceous tier is dominated by common eaglet (*Pteridium aquilinum* L., Figure 1), forest horsetail (Equisetum sylvaticum L.).

Table 3. The spectrum of the leading genera of the Sogrovsky reserve

№	Genera	Number of species	%
1	*Equisetum*	3	5,66
2	*Cypripedium*	3	5,66
3	*Silene*	4	7,54
4	*Thalictrum*	4	7,54
5	*Ranunculus*	4	7,54
6	*Astragalus*	4	7,54
7	*Trifolium*	3	5,66
8	*Lathyrus*	3	5,66
9	*Geranium*	3	5,66
10	*Veronica*	3	5,66
11	*Plantago*	4	7,54
12	*Galium*	3	5,66
13	*Campanula*	3	5,66
14	*Galatella*	4	7,54
15	*Artemisia*	5	9,43
	Total	53	100

Figure 1. *Pteridium aquilinum* L., dominant of the grassy tier, Sogrovsky reserve, 2023

The presence of the *Cyperaceae* family in the top ten largest families is quite reasonable. The Yesil River flows through the region, there is a huge network of lakes, and various wetland vegetation is widespread in the river floodplain.

And also in the Kyzylzhar administrative district of the region, swamps are widespread, small in size with characteristic marsh vegetation. Therefore, representatives of the sedge family play a significant role in the composition of vegetation in this region. Thus, the diverse composition of vegetation may indicate the richness and diversity of flora in the Kyzylzhar region of North Kazakhstan region.

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