

S.K. Mukhtubayeva^{1*}, N.K. Kuanyshbaev¹, A.K. Zhamangara¹, K.S. Sidakov¹,
M.R. Razhanov¹, R.M. Khadiev²

¹Astana Botanical Garden – branch of the Institute of Botany and Phytointroduction, Astana, Kazakhstan;

²A.N. Bukeikhan Kazakh Scientific Research Institute of Forestry and Agroforestry, Shchuchinsk, Kazakhstan

*Corresponding author: mukhtubaeva@mail.ru

Results of reconnaissance surveys of arboretum of A.N. Bukeikhan Kazakh research institute of forestry

The article presents the results of the inventory of trees and shrubs of arboretum of A.N. Bukeikhan Kazakh research institute of forestry. The paper presents the taxonomic composition of 23 quarters with the identification of dominant plant forms and an assessment of the sanitary condition of plants by category. The taxonomic composition of tree and shrub plantations is represented by 42 genera, 22 families of 14 orders from the departments – *Gymnospermae*, *Angiospermae*. Of the identified 22,489 trees and shrubs, 89.6% are deciduous and 10.4% coniferous. The greatest taxonomic diversity was noted in the families *Rosaceae* and *Pinaceae*. It has been established that most plants belong to the first category. Quarters 18, 19.2, 22, 23 turned out to have the largest number of plants belonging to 5, 6 categories, which are recommended for removal. The arboretum has a large resource of trees and shrubs, acclimatized and adapted to the climatic features of Northern Kazakhstan, and can serve as a key object for the concentration of genetic diversity.

Keywords: inventory, trees, shrubs, flora, sanitary condition category.

Introduction

Green spaces are one of the main indicators of living comfort in settlements. Trees and shrubs maintain the gas composition of the atmosphere, form a microclimate, emit phytoncides, deposit suspended particles on the surface of the leaves, performing a sanitary and hygienic function, and the noise-absorbing role of green spaces is also important. The role of green spaces is also invaluable in improving the aesthetic qualities of the environment. In this regard, tree and shrub plantations require a comprehensive study and systematization of information about them for scientifically based landscaping of settlements.

Biological species diversity is an important factor in the development and conditions for the existence of any biocenosis. Recently, population growth and the consequences of active economic activity have led to irreversible changes in the nature of the planet, which is a threat to the existence of certain species and ecosystems.

The Global Strategy for Plant Conservation obliges the member countries that have ratified the Convention on Biological Diversity to develop National Plant Conservation Strategies that ensure the implementation of the Strategic Plan for Biodiversity Conservation [1-5].

Arboretums are an effective, and sometimes the only possible method of preserving plant biodiversity, both in a given area and on the planet as a whole. Arboretums are a way to increase the total number of a particular taxon, to expand its cultural area. Cultivated rare species can then be used to return to the natural environment, thereby reducing the level of anthropogenic pressure on this species. The concept of the arboretum is to create a collection of rare and endangered plants in order to familiarize children and the population of the city and region with them.

In the state dendrological parks, scientific research is carried out on the introduction and selection of natural, cultural, domestic and world flora, as well as on the study, conservation and effective use of the flora of Kazakhstan.

One of the priority activities of arboretums is the inventory of plants, as a basis for assessing the diversity of species and communities, and developing scientific foundations for the conservation and sustainability of forest ecosystems in Kazakhstan.

The purpose of the study: an inventory of the species composition and sanitary condition of tree and shrub vegetation on the territory of the dendrological park of A.N. Bukeikhan Kazakh research institute of forestry – KazRIF (Shchuchinsk, Akmola region).

Experimental

The material for the research was tree and shrub plants of the dendrological park of KazRIF (Fig. 1).



Figure 1. General view of the studied quarters of the arboretum of A.N. Bukeikhan Kazakh research institute of forestry

The inventory of plantings in the study area was based on our own research. In 2021-2022 a detailed inventory of green spaces was carried out using the method of a complete enumeration of all trees and shrubs growing in the arboretum with a characteristic of each specimen [1].

A total of 23 quarters of woody and shrubby plants were surveyed. A visual tree-by-tree inventory of trees and shrubs was carried out. The description was carried out by continuous recalculation of trees and shrubs with the definition of species and condition. The description was carried out by the route method. Taxonomic identification was carried out using determinants [6-10]. The condition of tree and shrub plantations was established according to generally accepted methods [11]. The studies used the method of reconnaissance survey, including a preliminary visual assessment of the state of plantations, the degree of drying of trees [12].

The assessment of the category of the sanitary condition of plantations (on the scale of the sanitary condition of trees) was carried out according to the method [12], which consists of the following categories:

I – without signs of weakening – the crown is dense; the foliage is green, drying out, no damage;

II – weakened – the crown is slightly openwork; foliage falls early or eaten up to 25 percent; drying of individual branches; local damage to the trunk and root paws; single water shoots;

III – strongly weakened – the crown is strongly openwork; the foliage is very small, light, turns yellow early and falls off, growth is very weak or absent; dries up to 2/3 of the crown damage to the trunk and root paws on 2/3 of their circumference; sap flow on trunks and skeletal branches; settlement attempts or local settlements of stem pests; abundant water shoots; fruit bodies of mushrooms on the trunk;

IV – drying out – more than 2/3 of the crown has dried up or dries out; damage to more than 2/3 of the circumference of the trunk and root paws; signs of colonization by stem pests drying out water shoots;

V – fresh dead wood (current year) – foliage has withered, withered or is absent; partial fall of the bark; signs of colonization or emergence of stem pests;

VI – old deadwood (previous years) – no foliage; bark and small twigs crumbled partially or completely; exit holes of stem pests; under the bark is a mycelium of wood-destroying fungi.

Results and Discussion

The dendrological park of KazRIF was founded in 1961 on an area of 44.3 hectares under the guidance of Professor Savich V.M.

Geographically, the arboretum is located on the Kokshetau Upland, located on three naturally formed terraces on the shore of Lake Schchuchye in the northeastern part of the city of Shchuchinsk. The territory of the arboretum is currently 31.69 hectares; it has scientific, historical and cultural significance.

The climate is sharply continental, with hot summers and harsh winters with little snow, softened by the influence of hills, reservoirs and forests. The annual precipitation is 250-295 mm in the flat part, up to 400 mm in the elevated part. In the warm season (April-September), an average of 212-254 mm falls as rain, which is 70-85% of the annual precipitation. Winter precipitation is 83-137 mm, which determines a small snow cover height (30 cm), decreasing towards the east [5].

The unique collection of introduced species on the territory of the arboretum is of great importance for this region, they are the most important source of enrichment of the gene pool of woody plants and shrubs.

The territory of the arboretum is divided into quarters (Fig. 1). Plants in quarters are arranged by families, placed in groups. In terms of species composition, the exposition groups of tree species and shrubs are represented by one species or have a wider species composition.

The species composition of dendrological park

The species composition of tree and shrub vegetation in Northern Kazakhstan is poor; there are only about 120 species. Trees make up – 17%, shrubs – 72%; other species are represented by semi-shrubs, shrubs and lianas. In the dendrological park, long-term introduction tests of ornamental trees and shrubs, as well as mother plantations of woody plants, which are unique introducers and are of great importance, are being carried out.

According to [13], more than 2 thousand species, forms and varieties of trees and shrubs from Siberia, Europe, North America, the Far East, Central Asia, Japan, China, and other countries were tested and studied in the arboretum. To date, out of the original 2 thousand valuable and ornamental species, about 500 have survived, belonging to 27 families and 89 genera. Here grows as widespread zonal plants: pines, poplars, birches, as rare species listed in the Red Book of Kazakhstan: *Quercus robur* L. (*Q. pedunculata* Ehrh.), *Corylus colurna* L., *Tilia cordata* Mill., *Malus niedzwetzkyana* Dieck, *Juglans sieboldiana* Max., syn. *J. ailantifolia* Carr.), *Cotoneaster acutifolius* var. *lucidus* L.T.Lu, *Juniperus sabina* L., *Ribes petraeum* Wulfen, *Rhodiola rosea* L., *Rhaponticum carthamoides* (Willd.) Iljin, *Paeonia anomala* L., and others.

Employees conducted long-term trials of tree species, shrubs, lianas, shrubs and other perennial plants [14]. As a result of introduction works, the best 360 species characterized by high productivity, yield, economic value and ornamental value were selected. These species were recommended for production planting in forestry, landscaping of cities and settlements of different regions of Northern Kazakhstan.

For the period from 2021 to 2022 inventory of tree and shrub plants we conducted on 23 quarters according to the map-scheme of the territory of the arboretum (Fig. 1, Table).

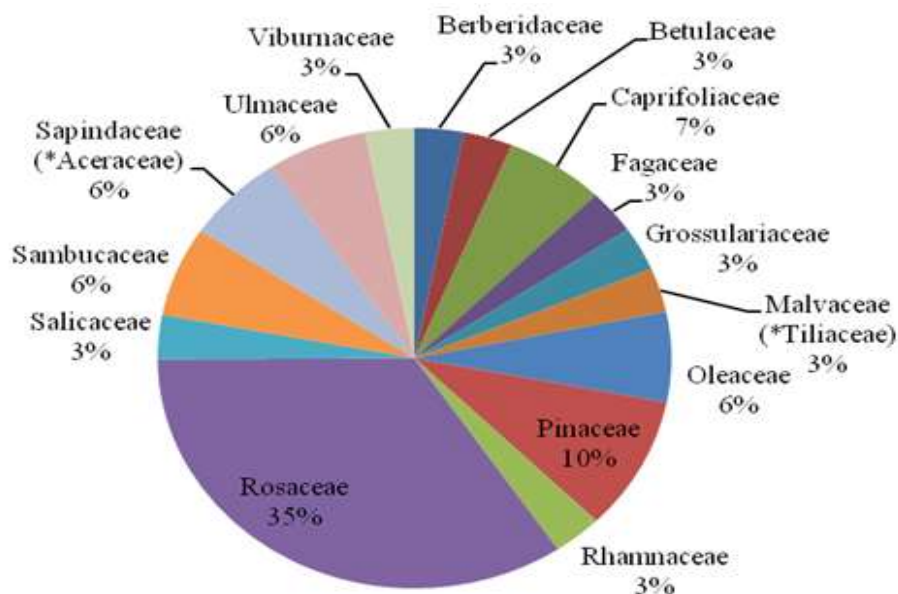


Figure 2. Percentage participation rate of tree and shrub species by family

Summary table of the studied plants state by quarters and categories

№	Quarter	Specific name	Quantity by status of the category, samples						Total:
			1	2	3	4	5	6	
1	18	<i>Symphoricarpos albus</i> (L.) S.F. Blake	80						80
2		<i>Malus baccata</i> (L.) Borkh.	22				9		31
3		<i>Padus avium</i> Mill.	28					4	32
5		<i>Picea obovata</i> Ledeb.	81	16			11		108
6		<i>Rubus idaeus</i> L.	10						10
7		<i>Rosa</i> L. sp.	8						8
8		<i>Syringa vulgaris</i> L.		2					2
9		<i>Betula pendula</i> Roth	7					2	9
10		<i>Populus italica</i> (Du Roi) Moench						1	1
11		<i>Crataegus laevigata</i> (Poir.) DC.		2					2
12		<i>Tilia cordata</i> Mill.	18					1	19
13		<i>Cupressus sempervirens</i> L.	1						1
14		<i>Larix sibirica</i> Ledeb.	11					2	13
15		<i>Sambucus racemosa</i> L.	7						7
16		<i>Caragana arborescens</i> Lam.	4						4
17		<i>Ribes alpinum</i> L.	100						100
18		<i>Rhamnus cathartica</i> L.	12						12
19		<i>Swida alba</i> (L.) Opiz	1						1
20		<i>Salix</i> × <i>fragilis</i> L.	3						3
21		<i>Sorbus aucuparia</i> L.	9						9
22		<i>Amelanchier ovalis</i> Medikus	50						50
23		<i>Ulmus pumila</i> L.	1		3			28	32
24		<i>Berberis vulgaris</i> L.	4						4
25		<i>Pinus sylvestris</i> L.	2				1		3
26		<i>Physocarpus opulifolius</i> (L.) Maxim.	10						10
27		<i>Quercus robur</i> L.	4						4
			27 (26)	473	20	3	0	21	38
1	19	<i>Acer platanoides</i> L.	53						53
2		<i>Acer negundo</i> L.	636						636
3		<i>Amelanchier ovalis</i> Medikus	338						338
4		<i>Berberis vulgaris</i> L.	5						5
5		<i>Betula pendula</i> Roth	94				1	1	96
6		<i>Cotoneaster lucidus</i> Schtdl.	5						5
7		<i>Crataegus laevigata</i> (Poir.) DC.	24		4	1	5		34
8		<i>Crataegus arnoldiana</i> Sarg.	1						1
9		<i>Larix sibirica</i> Ledeb.	7		20				27
10		<i>Lonicera tatarica</i> L.	1						1
11		<i>Malus baccata</i> (L.) Borkh.	24			2	2		28
12		<i>Padus avium</i> Mill.	136	9			5		150
13		<i>Padus maackii</i> (Rupr.) Kom.	4		1		1		6
14		<i>Picea pungens</i> f. <i>glauca</i> Beissn.		2		1			3
15		<i>Picea obovata</i> Ledeb.	65	6				1	72
16		<i>Quercus robur</i> L.	10						10
17		<i>Rhamnus cathartica</i> L.	35						35
18		<i>Ribes aureum</i> Pursh							0
19		<i>Rosa spinosissima</i> L.							0
20		<i>Sambucus nigra</i> L.	1						1
21		<i>Sambucus racemosa</i> L.	3						3
22		<i>Sorbaria sorbifolia</i> (L.) A. Braun	6						6
23		<i>Sorbus aucuparia</i> L.	171					1	172
24		<i>Symphoricarpos albus</i> (L.) S.F. Blake	10						10
25		<i>Syringa vulgaris</i> L.	3						3
26		<i>Tilia cordata</i> Mill.	3		1				4
27		<i>Ulmus glabra</i> Huds.	540				2	1	543
28		<i>Viburnum lantana</i> L.	20						20
		28 (23)	2195	17	26	4	16	4	2262
1	20	<i>Ulmus glabra</i> Huds.	153		1				154
2		<i>Ulmus parvifolia</i> Jacq.	3						3
3		<i>Larix sibirica</i> Ledeb.	19						19

Continuation of Table 1

№	Quarter	Specific name	Quantity by status of the category, samples						Total:
			1	2	3	4	5	6	
4		<i>Rhamnus cathartica</i> L.							0
5		<i>Acer negundo</i> L.							0
6		<i>Padus avium</i> Mill.	185						185
7		<i>Sorbus aucuparia</i> L.	16						16
8		<i>Betula pendula</i> Roth	43						43
9		<i>Acer platanoides</i> L.	12						12
10		<i>Populus italica</i> (Du Roi) Moench	1						1
11		<i>Fraxinus excelsior</i> L.	11						11
12		<i>Tilia cordata</i> Mill.	1						1
13		<i>Berberis vulgaris</i> L.	4						4
14		<i>Ribes aureum</i> Pursh	5						5
		14 (13)	453	0	1	0	0	0	454
1	21	<i>Rhamnus cathartica</i> L.	88						88
2		<i>Betula pendula</i> Roth		41				1	42
3		<i>Acer negundo</i> L.	36						36
4		<i>Caragana arborescens</i> Lam.	9						9
5		<i>Malus baccata</i> (L.) Borkh.	3						3
6		<i>Lonicera tatarica</i> L.	2						2
7		<i>Lonicera xylosteum</i> L.	152						152
8		<i>Ulmus laevis</i> Pall.	3					1	4
9		<i>Crataegus sanguinea</i> Pall.	2						2
10		<i>Ulmus pumila</i> L.	2				1		3
11		<i>Sorbaria sorbifolia</i> (L.) A. Braun	1						1
12		<i>Sambucus racemosa</i> L.	1						1
13		<i>Acer tataricum</i> L.	2					1	3
14		<i>Acer platanoides</i> L.	5			1		2	8
		14 (10)	306	41	0	1	1	5	354
1	22	<i>Amelanchier ovalis</i> Medikus	4						4
2		<i>Betula pendula</i> Roth	32					4	36
3		<i>Cotoneaster lucidus</i> Schldtl.	1						1
4		<i>Juniperus horizontalis</i> Moench	30						30
5		<i>Larix sibirica</i> Ledeb.	78	1				20	99
6		<i>Lonicera tatarica</i> L.	453						453
7		<i>Malus baccata</i> (L.) Borkh.	1						1
8		<i>Padus avium</i> Mill.	7						7
9		<i>Picea abies</i> (L.) H. Karst.	1						1
10		<i>Pinus sylvestris</i> L.	105						105
11		<i>Prunus spinosa</i> L.	15						15
12		<i>Rhamnus cathartica</i> L.	6						6
13		<i>Rosa canina</i> L.	102						102
14		<i>Rosa spinosissima</i> L.	3						3
15		<i>Sorbus aucuparia</i> L.	18						18
16		<i>Symphoricarpos albus</i> (L.) S.F. Blake	13						13
17		<i>Syringa vulgaris</i> L.	3						3
18		<i>Ulmus glabra</i> Huds.	9					25	34
19		<i>Ulmus laevis</i> Pall.						4	4
		19 (17)	881	1	0	0	0	53	935
1		<i>Amelanchier ovalis</i> Medikus	1						1
2		<i>Berberis vulgaris</i> L.	1						1
3		<i>Betula pendula</i> Roth	15	6	4				25
4		<i>Caragana arborescens</i> Lam.	1						1
5		<i>Crataegus laevigata</i> (Poir.) DC.	3						3
6		<i>Crataegus laevigata</i> (Poir.) DC.	1						1
7		<i>Larix sibirica</i> Ledeb.	2	5				4	11
8		<i>Lonicera xylosteum</i> L.	2						2
9		<i>Lonicera tatarica</i> L.	35						35
10		<i>Malus baccata</i> (L.) Borkh.	12						12
11		<i>Padus avium</i> Mill.	4						4
12		<i>Picea abies</i> (L.) H. Karst.	145					5	150
13		<i>Pinus sylvestris</i> L.	10						10
14		<i>Populus italica</i> (Du Roi) Moench	29						29

Continuation of Table 1

№	Quarter	Specific name	Quantity by status of the category, samples						Total:
			1	2	3	4	5	6	
15		<i>Prunus spinosa</i> L.	10						10
16		<i>Quercus robur</i> L.	1						1
17		<i>Rhamnus cathartica</i> L.	30						30
18		<i>Ribes alpinum</i> L.	1						1
19		<i>Rosa canina</i> L.	8						8
20		<i>Rubus idaeus</i> L.	17						17
21		<i>Sorbus aucuparia</i> L.	12						12
22		<i>Swida alba</i> (L.) Opiz	43						43
23		<i>Symphoricarpos albus</i> (L.) S.F. Blake	207						207
24		<i>Syringa vulgaris</i> L.	73						73
25		<i>Tilia cordata</i> Mill.	3						3
26		<i>Ulmus glabra</i> Huds.	40	15				44	99
27		<i>Viburnum lantana</i> L.	4						4
		28 (26)	713	26	4	0	0	53	796
1		<i>Lonicera caerulea</i> L.	9						9
2		<i>Cotoneaster lucidus</i> Schldtl.	6						6
3		<i>Malus baccata</i> (L.) Borkh.	10						10
4		<i>Crataegus sanguinea</i> Pall.	42						42
5		<i>Ulmus glabra</i> Huds.	23						23
6		<i>Malus baccata</i> (L.) Borkh.	70						70
7		<i>Acer tataricum</i> L.	65						65
8		<i>Rhamnus cathartica</i> L.	48						48
9		<i>Betula nigra</i> L.	2						2
10		<i>Picea pungens</i> f. <i>glauca</i> Beissn.	9						9
11		<i>Pinus sylvestris</i> L.	10						10
12		<i>Lonicera tatarica</i> L.	114						114
13		<i>Tilia cordata</i> Mill.	17						17
14		<i>Hippophae rhamnoides</i> L.	7	10	23	3		23	66
15		<i>Acer negundo</i> L.	42						42
16		<i>Berberis vulgaris</i> L.	4						4
17		<i>Rosa rugosa</i> Thunb.	47						47
18		<i>Caragana arborescens</i> Lam.	3						3
19		<i>Padus avium</i> Mill.	53						53
20		<i>Betula pendula</i> Roth	154						154
21		<i>Prunus spinosa</i> L.	20						20
22		<i>Amelanchier ovalis</i> Medikus	33						33
23		<i>Elaeagnus angustifolia</i> L.	34						34
24		<i>Padus virginiana</i> (L.) Mill.	15						15
25		<i>Salix alba</i> L.	4			10			14
26		<i>Populus alba</i> L.	47						47
27		<i>Cotoneaster integerrimus</i> Medik.	6						6
28		<i>Swida alba</i> (L.) Opiz	5						5
29		<i>Viburnum lantana</i> L.	2						2
30		<i>Ulmus pumila</i> L.	1						1
31		<i>Spiraea hypericifolia</i> L.	3						3
32		<i>Syringa vulgaris</i> L.	23						23
33		<i>Sorbus aucuparia</i> L.	3						3
34		<i>Symphoricarpos albus</i> (L.) S.F. Blake	21						21
35		<i>Lonicera xylosteum</i> L.	3						3
36		<i>Sambucus racemosa</i> L.	2						2
37		<i>Viburnum opulus</i> L.	1						1
		37 (29)	958	10	23	13	0	23	1027

According to preliminary data identified plant species belong to 42 genera, 22 families of 14 orders and two classes (Pinopsida, Magnoliopsida), which belong to two divisions – *Gymnospermae*, *Angiospermae*. Conifers are represented mainly by species: *Juniperus horizontalis* Moench, *Larix sibirica* Ledeb., *Picea asperata* Mast., (*P. pungens* Engelm. form blue, *P. excelsa* Link., *P. obovata* Ledeb., *P. omorica* (Panc.) Purk.), *P. pungens* Engelm., *Pinus contorta* Dougl., *P. sibirica* (Rupr.) Mayr., *P. sylvestris* L.

Deciduous species also include representatives of woody and shrub life forms. According to preliminary data, a total of 22,489 specimens of woody and shrubby plants grow on the surveyed blocks, of which 2,347 (10.4%) are conifers and 20,142 (89.6%) are deciduous. Based on the results of inventories, the highest taxonomic diversity was found in the family *Rosaceae*, followed by *Pinaceae*.

Sanitary condition of tree and shrub plantations of the arboretum

According to the scale of sanitary condition, trees and shrubs growing on the territory of the arboretum according to their quantitative ratio can be divided into the following categories: category 1 – 20,558 (91.41%), category 2 – 1,038 (4.62%), category 3 – 285 (1.27%), category 4 – 267 (1.19%), category 5 – 81 (0.36%), category 6 – 260 (1.16%) (Fig. 3, Table 1).

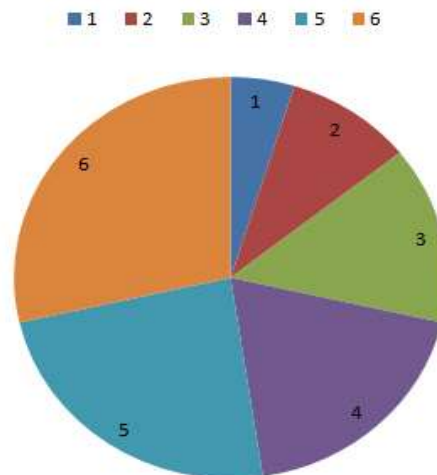


Figure 3. Percentage ratio of tree and shrub plants by their sanitary condition according to a 6-point scale

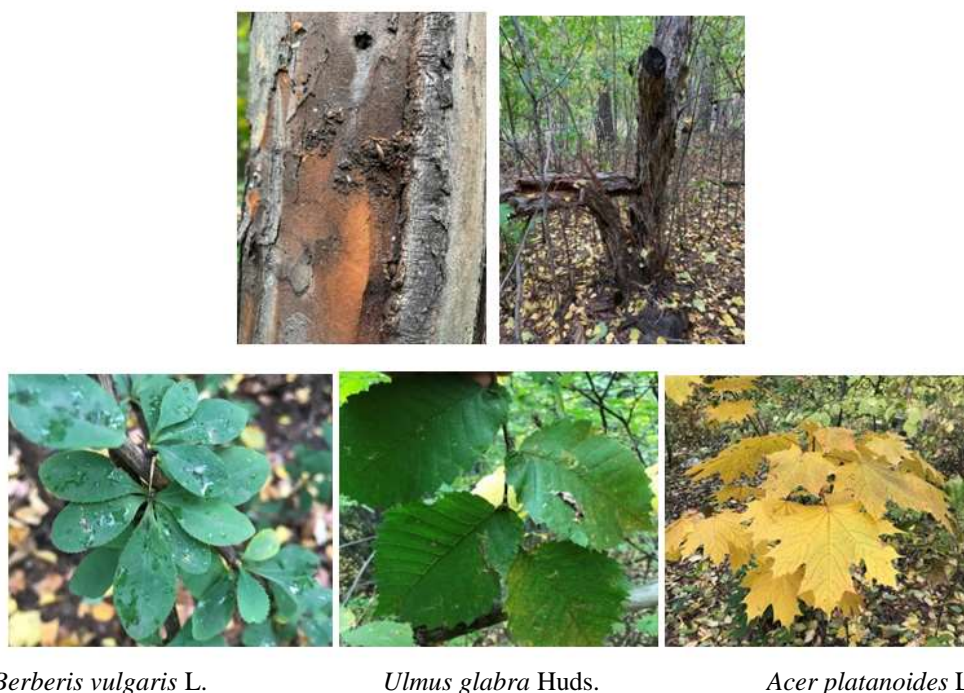
According to the condition categories, most plants belong to the first category – without signs of weakening, with a dense crown, green foliage, without drying out and damage (Fig. 4). Quarters 18, 19.2, 22, 23 turned out to have the largest number of plants belonging to 5, 6 categories.



Figure 4. Woody plants of the first category: A – *Picea pungens*, B – *Tilia cordata*

It should be noted that trees and shrubs of the 5th category are fresh deadwood (of the current year), their foliage is shrunken, withered or absent, partial fall of the bark, and have signs of pest settlement or departure.

Trees and shrubs of the 6th category have the following features: lack of foliage, bark and small branches crumbled partially or completely, there exit holes of stem pests, under the bark a mycelium of wood-destroying fungi. Trees and shrubs of the 5th-6th category are in a depressed and emergency state, which is why they are fire hazardous, they need to be removed and cleared of thickets (Fig. 5, 6).



Berberis vulgaris L.

Ulmus glabra Huds.

Acer platanoides L.

Figure 5. Plants in emergency, fire and disease-prone condition



Figure 6. Overgrowth of self-sown oyster maple in quarter 15

In the 18th quarter, Siberian spruce (11 specimens) and Squat elm (28 specimens) turned out to be “unfavorable”. In quarter 22, all plants of the sixth category constitute a threat. These are: Rough elm (25 specimens), Siberian larch (20 specimens), Silver birch (4 specimens), and Smooth elm (4 specimens). In the 23rd quarter, also, plants of an unfavorable state belong to the 6th category: Siberian larch (4), European spruce (5), Rough elm (44 specimens). These tables also indicate the ecological vulnerability, mainly of species of the genus Elm and Spruce. A slightly worse condition of trees is observed in Quarter 19 (2), where all larch specimens are in weakened condition. All larch specimens are characterized as Category 3, i.e. weakened. The trees have foliage that is heavily trailing and very small, light-colored, yellowing and falling off early, very weak or no growth; desiccation of up to 2/3 of the crown damage to the trunk and root paws on 2/3 of their circumference; attempted settlement or local settlement of trunk pests; abundant water shoots; fruiting bodies of fungi on the trunk. Five specimens of common hawthorn were categorized as Category 5 – fresh dry wood (current year). Trees are characterized by wilted foliage, partial bark fall with signs of stem pest infestation.

Thus, the plants of the surveyed neighborhoods are represented by woody and shrub forms. According to the condition categories, most of the plants belong to the first category. Plants classified in the 5th and 6th categories are in an emergency condition and require removal.

It should be noted that the surveyed squares are often overgrown and require thinning. Root-propagating plants produce a lot of shoots, occupying the free space around them or choking out nearby plants of other species. By now, many shrubs, due to their short life cycle, have become old and naturally die off. In dense plantings, thinning, removal of damaged and stunted plants, cutting down or digging up self-seeded plants should be carried out. Old plantings should be cut down and replaced with young plantings. For this purpose, breeding material (seeds, seedlings, cuttings, etc.) shall be sought and the collection shall be replenished with new species.

In addition to the threat of extinction of rare species, there is a general degradation of introduced objects, weed infestation of the territory, their overgrowing with less valuable species, deterioration of sanitary condition, reduction of protective functions of plantations and loss of their aesthetic visibility, increasing cases of fires.

Conclusion

In the course of the research work an inventory of existing plantations was carried out. The predominant number of plants in the arboretum of LLP “KAZSRIFA named after A.N. Bukeykhan” is in satisfactory condition, a significant part of them – in good condition.

It is necessary to perform shaping and sanitary pruning of preserved trees, as well as related phytosanitary measures to improve their condition.

Preservation of the planning structure, reconstruction of existing plantings, landscaping, development of the necessary infrastructure for the full utilization of the recreational potential of the garden – a way out to the modern level, today should be brought to the forefront in the strategy of its further development. This will give an opportunity to improve the recreational quality of plantings and confirm the status as a nature conservation site.

Plant introduction is the main way to enrich the northern region with new valuable plants. Especially in the conditions of increasing anthropogenic activity, it is impossible to solve the problem of preserving existing forests and artificial plantations of various purposes (forest crops, protective and landscaping plantations, fruit orchards and others) and increasing their productivity at the expense of local, naturally growing species. Dendropark activities should be aimed at attracting from other regions various species of trees and shrubs that are most sustainable for the region.

In addition to the threat of extinction of rare species, there is a general degradation of introduced objects, weed infestation of the territory, their overgrowing with less valuable species, deterioration of sanitary condition, reduction of protective functions of plantations and loss of their aesthetic visibility, increasing cases of fires.

The arboretum has a large resource of trees and shrubs acclimatized and adapted to climatic features of Northern Kazakhstan and can serve as a key site for concentration of genetic diversity.

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С.К. Мухтубаева, Н.К. Куанышбаев, А.К. Жамангара, Қ.С. Сидақов,
М.Р. Ражанов, Р.М. Хадиев

«Ә.Н. Бөкейхан атындағы ҚазОШАҒЗИ» ЖШС Дендросаябағында жүргізілген барлау жұмыстарының нәтижелері

Мақалада «Ә.Н. Бөкейхан атындағы ҚазОШАҒЗИ» ЖШС Дендросаябағындағы ағаштар мен бұталарды есепке алу нәтижелері берілген. Авторлар өсімдіктердің басым формаларын анықтай отырып, 23 тоқсанның таксономиялық құрамын ұсынған және санаттар бойынша өсімдіктердің санитарлық жағдайына баға берген. Ағашты-бұталы екпелердің таксономиялық құрамы *Gymnospermae*, *Angiospermae* бөлімдеріне жататын 14 қатар, 22 тұқымдас, 42 туыспен берілген. Анықталған ағашты-бұталы өсімдіктердің 22 489 данасының 89,6%-ы жапырақты және 10,4%-ы қылқан жапырақты. Ең үлкен таксономиялық әртүрлілік *Rosaceae* және *Pinaceae* тұқымдастарында байқалды. Өсімдіктердің басым көпшілігі бірінші санатқа жататыны анықталды. 18, 19.2, 22, 23 кварталдар өсімдіктердің ең көп санына ие болды, ал 5 және 6 санатқа жататын өсімдіктерді алып тастау ұсынылды. Дендропарк Солтүстік Қазақстанның климаттық ерекшеліктеріне бейімделген және жерсіндірілген ағаштар мен бұталардың үлкен ресурсына ие және генетикалық әртүрлілік шоғырлануының негізгі объектісі бола алады.

Кілт сөздер: есепке алу, ағаштар, бұталар, флора, санитарлық жағдай категориясы, өсімдіктердің басым формалары.

С.К. Мухтубаева, Н.К. Куанышбаев, А.К. Жамангара, Қ.С. Сидақов,
М.Р. Ражанов, Р.М. Хадиев

Результаты рекогносцировочных обследований Дендропарка ТОО «КазНИИЛХА имени А.Н. Букейхана»

В статье приведены результаты инвентаризации древесно-кустарниковых растений Дендропарка ТОО «КазНИИЛХА имени А.Н. Букейхана». Авторами представлен таксономический состав 23 кварталов с выявлением доминирующих форм растений, и дана оценка санитарного состояния растений по категориям. Таксономический состав древесно-кустарниковых насаждений представлен 42 родами, 22 семействами из 14 порядков из отделов — *Gymnospermae*, *Angiospermae*. Из выявленных 22 489 экземпляров древесно-кустарниковых растений 89,6 % представлены лиственными и 10,4 % хвойными породами. Наибольшее таксономическое разнообразие отмечено в семействах *Rosaceae* и *Pinaceae*. Установлено, что большинство растений относятся к первой категории. Кварталы 18, 19.2, 22, 23 оказались с наибольшим количеством растений, относящихся к 5, 6 категориям, которые рекомендуются к удалению. Дендропарк располагает большим ресурсом деревьев и кустарников, акклиматизированных и адаптированных к климатическим особенностям Северного Казахстана, и может служить ключевым объектом концентрации генетического разнообразия.

Ключевые слова: инвентаризация, деревья, кустарники, флора, категория санитарное состояние, доминирующие формы растений.

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