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ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

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ВЕСТНИК

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NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабаршысы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабаршысының Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді мультидисциплинарлы контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

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DEVELOPMENT OF PRIMARY LISTS OF WOOD PLANTS FOR INTRODUCTION IN THE CONDITIONS OF NORTH KAZAKHSTAN

Abstract. Nowadays, in North Kazakhstan and in whole steppe ecosystems of the Republic there have been no research institutions developing theoretical and applied issues of introduction and green building in the region, first of all, target institutions for the conservation and sustainable use of the flora of the region.

To solve these problems, a state botanical garden was created in the city of Nur-Sultan. During the formation of the botanical garden, the primary task was to develop primary lists of woody plants for introduction tests, which will create a plan of dendrological expositions representing various types of communities and geographical regions, as well as to recommend an assortment of woody plants for landscaping the capital of our country and the region in overall.

The system-arealogical approach and the interpolation forecasting were used to develop promising lists of woody plants. Introduction procedures were carried out according to traditional techniques. As a result of the research, a perspective list of woody plants of Kazakhstan's Red Book was developed for introduction tests, numbering 19 species, including 10 species attracted from East Kazakhstan and 4 species from the southeast of the country.

The analysis allows us to state that the communities of Boreal (Northern) Kazakhstan - birch, aspen, pine pegs, steppe vegetation, and partially forest ecosystems of Altai - will be potentially viable in the open ground of the botanical garden. According to this, the natural vegetation of Kazakhstan can be represented in the Nur-Sultan Botanical Garden with the following expositions: «Dubnyakswith a birch of Western Kazakhstan», «Woody plants of the Kazakhstan's Altai», «Kolka of Kazakhstan».

Based on the system-arealogical approach to introduce forecasting cold tolerance of woody plants for introduction tests in the capital, 345 species of Eurasian woody plants from 25 genera are recommended and divided into three groups of introduction prospects: A - compliance with the conditions of the Nur-Sultan natural range of the species; B - compliance with the conditions of the city of Nur-Sultan of the species introduction range; B - potential compliance of the species with the conditions of the city of Nur-Sultan by the mechanism of its resettlement. The introduction of plants from each of these groups will require specific approaches to mobilize plant reproduction material.

The Botanical garden created in the city of Nur-Sultan will represent a man-made specially protected natural area, for the creation of which should be taken into account "pros and cons" of its location.

Keywords: woody plants, Botanical garden, ecosystems, green technologies, genetic fund, Northern Kazakhstan, floristic area, introduction, introductions, woody plants.

Introduction. One of the primary objectives at the initial stage is the development of primary lists of arboreal plants for introduction tests. The solution to this problem will make it possible, firstly, to create a dendrological plan, according to which expositions of arboreal plants representing various types of communities and geographical regions will be represented in the Botanical Garden of Nur Sultan. Secondly, the plants that have passed the introduction tests with the greatest success in the botanical garden will befurther proposed as an assortment for landscape works of the capital of our republic and the region as a whole.

Research methods. To develop prospective lists of arboreal plants, a system-arealogical approach and interpolation forecasting were used. Introduction procedures were performed according to traditional methods. The taxonomic affiliation of plants was specified according to works by S.K. Cherepanov.

Results. Introduction studies of plants in Kazakhstan did not develop uniformly in the geographical regions of the Republic. In the southeastern, southern, central, eastern and western regions, two or more introduction nurseries operate. There is only one in the northern region, and no introduction studies have been carried out to date in the north-western region.

In the northern region of Kazakhstan, the only introduction nusery so far has been the arboretum of the Forestry Research Institute of the Forestry Department of the Ministry of Agriculture of the Republic of Kazakhstan located in the city of Schuchinsk. By its departmental affiliation, this nursery is largely engaged in forestry issues. However, the main thing is not even this, but the fact that this nursery is not climatically representative of the northern region.

While a frost-free period per year in most geographical locations in the region, including the northernmost, more than 120 days, this figure in Schuchinskis only 105 days. A shorter vegetation period of half a month or more, typical of the region, determines the limitation of the positive results of the introduction tests of the arboretum. In northern Kazakhstan, one can expect successful introduction of plant species that are not able to adapt to Schuchinsk due to the limited vegetation period.

The average long-term annual minimum air temperature was used by A. Raeder [1] as an unambiguous criterion for dendrological zoning of the territories of North America. A. Raeder identified by gradations of this indicator the following zones of plant wintering conditions: 1-st - below -50 degrees; 2-nd - from -50 to -35 degrees; 3-rd - from -35 to -20 degrees; 4-th - from -20 to -10 degrees, etc. In accordance with this classification, the northern, eastern and central regions belong to the 2-nd category of plant wintering conditions. The southeastern, southern, and northwestern regions belong to the 3-rd category of plant wintering conditions. In the western region, conditions of the 3-rd and 4-th categories of the winter period are combined.

Positive temperatures have a dual effect on plants. On the one hand, positive air temperatures are indicators of solar energy - an energy source of photosynthesis and plant life reaching the Earth's surface. The active physiological state of plants - "vegetation" - is only possible in the presence of positive air temperatures. On the other hand, high air temperatures cause both thermal shocks and desiccation of plants with a deficiency of atmospheric and soil moisture.

The southern and western regions, where there is a maximum availability of energy resources for plants, where the annual accumulation of positive temperatures is 3.8 -4.7 thousand degrees. Further, in respect of this indicator, this is followed by the south-eastern region (3.4-3.9 thousand degrees), the central and north-western regions (2.7-3.3 thousand degrees). The eastern and northern regions (2.2-2.9 thousand degrees) are characterized by the minimum availability of energy resources for plants.

Adaptation of introduced plants under new growing conditions depends on the duration of the annual frost-free period, which determines the annual duration of the plant vegetation [2]. The ratio of the average long-term annual duration of the frost-free period in the regions of Kazakhstan is similar to this ratio of energy supply resources.

We hereby consider seven geographical regions of Kazakhstan. Should the region, which is most rich in energy, with the maximum potential duration in the year of vegetation of plants be defined as Grade 1, and the least energy-rich with the shortest potential duration of the year of vegetation of plants be defined as Grade 7, then the ratio of these indicators will be as follows: Southern and Western regions - grades 1-2; Southeast Region – Grade 3; Central and North-West - ranks 4-5; Eastern and Northern regions - grades 6-7.

The aridity of plant growth conditions is characterized by the Selyaninov hydrothermal coefficient (HTC). This indicator varies significantly in each of the regions, since along with atmospheric processes it is determined by the altitude of a geographical point above sea level. The average for the region HTC and the average altitude of the points analyzed in the region (N, m) are fundamentally different in the southeast, south and central regions in comparison with other regions of Kazakhstan. In respect of the southeastern, southern and central regions, this relationship has the following form:

$$HTC = 0,002\ H - 0,3,$$

and in respect of all the other regions the following equation is characteristic of them:

$$HTC = 0,003\ H + 0,4.$$

The different quality of the relationships between the hydrothermal coefficient and the altitude of the geographical point above sea level indicates the different quality of climatic regimes, which is certainly essential for plants.

The generalized climatic characteristics of the geographical regions of Kazakhstan are summarized in table. It ensues from it that each of the selected geographical regions is climatically specific. Should two regions reveal the proximity of one or more indicators, they still necessarily differ at least in the values of one of the summarizing indicators.

Comparison of generalized climatic characteristics of geographic regions of Kazakhstan

Geographical regions of Kazakhstan	Categories of conditions of plant wintering by a Rehder	Ranges of Energy Supply and Vegetation duration of plants	Average value of hydrotherman coefficient of Selyaninov (HTC)	Relation ship between the altitudeabove sea level (N, m) and HTC
South-east	3	3	0,8	HTC = 0,002H – 0,3
South	3	1-2	0,3	
Central	2	4-5	0,5	
East	2	6-7	1,7	HTC = 0,003H + 0,4
North	2	6-7	1,2	
North-west	3	4-5	1,1	
West	3-4	1-2	0,3	

In the eastern region, there is currently one introduction nursery- the Altai Botanical Garden of the Ministry of Education and Science of the Republic of Kazakhstan, located in the city of Ridder. Our data, obtained as a result of the scientific justification for the creation of a botanical garden in the city of Nur-Sultan [3] show that this introduction nursery is not representative of the northern region. Due to its mountainous location, it is characterized by the annual frost-free period of less than 105 days and a very high (SCC = 3.2) humidity.

The completed analysis of climatic regimes demonstrates that the establishment of the state botanical garden in the city of Nur-Sultan will ensure the representative nature of the system of botanical gardens of the Republic of relative northern Kazakhstan, which is currently absent. This will ensure an increase in the effectiveness of fundamental introduction studies, and ensure the provision of the northern region, specifically, the capital of Kazakhstan, with effective scientific recommendations for improving green construction. Moreover, the establishment of a botanical garden in Nur-Sultan will make it possible to provide such recommendations to the settlements of low-mountainous eastern Kazakhstan.

The site, within which boundaries the formation of collection funds of the botanical garden is currently underway, is located in the floodplain of the Yesil (Ishim) river with a distance of 300-2000 m from the left bank of the river. The River (Ishim) is a tributary of the Irtysh River, into which it flows outside of Kazakhstan. The city of Nur-Sultan is located on Ishim, 200 km below its origins. In this section, Ishim is characterized by strongly pronounced seasonal variability of the watercourse with a maximum in May and a minimum in December - February [4]. In 2002, the river flow along Ishim within Kazakhstan amounted to 4.9 cubic kilometers of water [5]. According to this indicator, the river occupies the fourth position in Kazakhstan, second only to the Syr Darya, Ili and Ural rivers.

The level of surface groundwater occurrence in the Yesil floodplain (Ishim), as in the floodplains of other rivers, depends on the fullness of the channel and its seasonal dynamics. At the stage of the scientific substantiation, in some parts of the territory of the botanical garden, we recorded the *Elaeagnusoxycarpa* self-sowing, which indicates a shallow occurrence of groundwater, which is an additional stress factor during the introduction of plants in the new botanical garden of Nur-Sultan.

When raising the question of establishing a botanical garden, an analysis of the floristic specific nature of the region of its location is necessary. The territory of the city of Nur-Sultan is located in the floristic region "Western Shoal" [6]. Based on floristic reports [6] and their current taxonomic refinement [7], an analysis of the species diversity of vascular plants of this floristic region and Kazakhstan as a

whole has been performed. The analysis demonstrated that 20.3% of the species of seed plants characteristic of Kazakhstan grow in the floristic region "Western Shoals"

Representation in the floristic region of various plant life forms is different in the floristic region. Here, the maximum number (30.3% of the number of species in Kazakhstan) are represented by full-season annual herbs. Trees, shrubs, and ephemeral grasses are characterized by an average representation (about 20%). Shrubs, shrubs, perennial ephemeroid herbs are characterized by the minimum representation (13.1-16.5%).

The representativeness in the floristic region of various systematic plant groups is also different in the floristic region. Gymnosperms are represented by 13.0% of the total number in Kazakhstan, monocots - by14.7%, dicots - by 21.5%.

According to the above characteristics, we can conclude that in the analyzed floristic region, dicots perennial and annual herbs are characterized by the greatest variety.

The territory of the floristic region "Western Small Hills" comprises 10.3% of the area of Kazakhstan. The species diversity of seed plants in the floristic region makes up 20.3% of the total flora of the Republic. From this it ensues that the concentration of species diversity in this floristic region is 2 times higher than the average for Kazakhstan. 1101 species of seed plants naturally grow in the floristic region "Western Small Hills".

Including 19 species of trees, 47 types of shrubs, 8 types of shrubs, 48 types of shrubs and 979 species of herbaceous plants. This species diversity is the "source" for the development of promising lists of plants of collection funds of the botanical garden in the city of Nur-Sultan.

A special objective of botanical gardens is the ex situ conservation of regional rare and endangered plant species. Based on the above literature sources [6, 7] and the "Red Book of Kazakhstan [8], an analysis of the severity of the threat of species extinction in the Western Shallow Hills and in Kazakhstan as a whole was performed. The analysis showed that in the floristic region the proportion of species requiring protection is 10 times lower than in Kazakhstan as a whole (0.5% and 5.3%, respectively). In accordance with the affiliation with the floristic region, the priority tree species for ex situ conservation of the botanical garden will be: sticky alder *Alnusglutinosa* (L.) Gartn.,*Betulakirgisorum*Sav.-Ryczg., *Atraphaxisteretifolia* (M. Pop.) Kom. When it comes to grassy plants the list is as follows: thin poppy *Papaver tenellum*Tolm.,*Tulipaschrenkii* Regel, *Paeoniahybrida* Pall.,*Pulsatillapatens* (L.) Mill.s.l. [9].

In general, we have developed a promising list of Red Book arboreal plants of Kazakhstan for introduction tests in the botanical garden of Nur-Sultan, which has 19 species, 10 of which are from East Kazakhstan (mountain peaks of Southern Altai, Tarbagatai, Saur), and 4 species from the south -east of Kazakhstan.

Along with the ex situ conservation of rare plant species, the objective of the botanical garden is to preserve the unique natural communities of northern and low-mountain eastern Kazakhstan. The analysis performed so far suggests that communities of Boreal (Northern) Kazakhstan- birch, aspen, pine pegs, steppe vegetation, and partially forest ecosystems of Kazakhstan Altai - will be potentially viable in the open ground of the botanical garden.

According to this, the natural vegetation of Kazakhstan can be represented in the Nur-Sultan Botanical Garden by the following expositions: "Dubnyaki with a birch of Western Kazakhstan", "Arboreal plants of the Kazakhstan Altai", "Kolka of Kazakhstan". We have compiled a promising list of arboreal plants "Dubnyaki with a birch of Western Kazakhstan" which is represented by 19 species, belonging to 9 families and 8 genuses. Among the dominant plants of this exhibition, we propose that the following species be tested in the botanical garden: *Betula pendula*Roth.,*Corylusavellana* L., *Qercusrubur*L., *Loniceratatar*ica L., *Caraganafrurex*(L.) C. Koch, *Genistatinctoria* L., *Crataegussanguinea* Pall.

The promising list of arboreal plants "Kolka of Kazakhstan" that we developed is represented by 5 species: *Betula pendula*Roth.,*Betulapubescens*Ehrh., *Rosa acicularis*Lindl., *Cerasusfruticosa* Pall., *Populustremula* L.

For the exposition: "Arboreal plants of the Kazakhstan Altai", a promising list of 12 species was developed in the botanical garden of Nur-Sultan: *Abiessibirica*Ledeb., *Betulapubescens*Ehrh., *Loniceracaerulea* L., *Larixsibirica*Ledeb., *Piceaobovata*Ledeb., *Pinussibirica* Du Tour., *Ribesatropurpureum* C.A.Mey., *Spiraeachamaedryfolia* L., *Sibiraeaaltaensis* (Laxm.) C.K. Schneid., *Daphne altaica* Pall., *Calophacasoongorica*Karelin&Kir.

The obvious objective of the botanical garden in the city of Nur-Sultan is the introduction of foreign district plants, both for resolving scientific matters and for the development of green construction in the capital of Kazakhstan and in the region. To assess the possibility of introducing enrichment of plant assortments for green construction of the capital of Kazakhstan, the use of wood and flower-decorative plants in its landscaping was analyzed [10].

The research included surveys of 36 model landscaping areas where there were 6181 arboreal plants and 25 flower gardens with a total area of 1722 sq. M. meter. In the landscaping of the capital, 50 taxa of arboreal plants were revealed, of which 7 are breeding varieties. Of the 43 identified species of arboreal plants, 22 (51.2%) have a Kazakhstani natural habitat, 9 species (20.9%) have a European and North American natural habitat, 3 species (7.0%) have a Siberian natural habitat [11].

All four arealogical groups of plants are represented in the five most common species in the landscaping of the city of Nur-Sultan. Plants of North American maple ash accounted for 24.0% of the total number of plants examined.

The occurrence of this species in the surveyed areas was 88%. Kazakhstani species, such as drooping birch and squat elm, accounted for 21.5% of the total number of plants examined. The occurrence of these species in model plots was 50-65%. Siberian berry apple tree (*Malus bakata*) has a share of 3.0%, but the incidence is 56%. European common lilac is characterized by a share of 1.2% and an occurrence of 38%. From these data it follows that Kazakhstan, North America, Europe and Siberia are deemed to be verified or reliably promising areas of donor introductions of arboreal plants for the botanical garden of Nur-Sultan.

Discussions. Forty three species of arboreal plants from 33 genera, having been Used in landscaping the capital in 2003 are the result of many years of painstaking work of landscapers without special support for introduction specialists. As far back as the end of the 20th century, 185 species of arboreal plants and 95 taxa of flower and ornamental plants were recommended for planting greenery in Almaty by introducers of the Main Botanical Garden of Kazakhstan [12].

In order to implement such broad recommendations, the botanical garden must conduct even wider introduction tests. The practice of the Main Botanical Garden of the RSE "Institute of Botany and Phytointroduction" of the Ministry of Education and Science of the Republic of Kazakhstan [13] shows that out of the 5 taxa that underwent introduction tests, only one is recommended in green construction practice.

The same broad introduction tests of plants will have to be performed by the State Botanical Garden in the city of Nur-Sultan. Their theoretical fundamentals and methodology are already being developed. Based on the system-arealogical approach to introduction prediction of cold tolerance of arboreal plants [14], 345 species of arboreal plants of Eurasia from 25 genuseswere recommended for introduction tests in the capital.

They are divided into three groups of introduction prospects: A - conformity with the conditions of Nur-Sultan natural habitat of the species; B - conformity with the conditions of the city of Nur-Sultan of the species introduction habitat; B - potential conformity of the species with the conditions of the city of Nur-Sultan according to the mechanism of its settlement. The introduction of plants from each of these groups will require specific approaches to mobilizing plant reproduction material.

The forecast of prospects for the exposition of East Asia and North America was based on data on the average long-term annual minimums of air temperature in the natural and cultivated areas based on the data of Chekalin et al. [13] with a modern refinement according to adjustment et al. [15].

For the Nur-Sultan Botanical Garden, 80 taxa of North American plants are recommended, of which 20 are recommended according interpolation prediction methods, 3 are recommended according to prediction by cultivated area, and 57 are recommended according the traditional method of climatic identical plants. Also recommended are 147 taxa of East Asian plants, of which 35 species are recommended based on interpolation prediction, 14 by prediction by cultogenic habitat, and 86 by the traditional method of climatic similarities.

Currently, about 2,000 forms and varieties of decorative arboreal plants of foreign selection are entering the Kazakhstani market. For their effective use in the landscaping of the capital and of the northern region of Kazakhstan, introduction tests of cultivar diversity of arboreal plants must become one of the special objectives of the botanical garden in the city of Nur-Sultan.

The botanical garden established in the city of Nur-Sultan will have to represent a man-made specially protected natural territory, in which the "pros" and "cons" of its site should be taken into account.

Thus, in order to minimize risks and threats to preserve the objects of the botanical garden, the composition of expositions and of plant species included in their composition should be scientifically predicted by the level of stability in the conditions of the introduction nursery, taking into account the factors of cold resistance, heat resistance, and salt tolerance of plants.

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СОЛТҮСТІК ҚАЗАҚСТАН ЖАҒДАЙЫНДА ИНТРОДУКЦИЯЛАУҒА АҒАШ ӨСІМДІКТЕРІНІҢ БАСТАПҚЫ ТІЗІМДЕРІН ЖАСАУ

Аннотация. Қазіргі уақытқа дейін Солтүстік Қазақстанда және жалпы Республиканың дала экожүйелерінде жерсіндіру мен жасыл құрылыстың теориялық және қолданбалы мәселелерін құратын ғылыми-зерттеу мекемелері, бірінші кезекте өңірдің өсімдік әлемінің алуан түрлілігін сақтау және тұрақты пайдалану жөніндегі мақсатты мекемелер өңірде болған жоқ.Осы міндеттерді шешу үшін Нұр-Сұлтан қаласында мемлекеттік ботаникалық бақ құрылды. Ботаникалық бақтың қалыптасу кезеңінде интродукциялық сынақтар үшін ағаш өсімдіктерінің бастапқы тізімін әзірлеу бірінші кезектегі міндет болып табылады, бұл қауымдастықтардың әртүрлі типтері мен географиялық өңірлерден тұратын дендрологиялық экспозициялардың жоспарын жасауға, сондай-ақ біздің Республикамыздың астанасы мен жалпы өңірді көгалдандыру үшін ағаш өсімдіктерінің ассортиментін ұсынуға мүмкіндік береді.

Ағаш өсімдіктерінің перспективті тізімін әзірлеу үшін жүйелі-ареалогиялық тәсілмен интерполяциялық болжау қолданылды. Интродукциялық жұмыстар дәстүрлі әдістемелер бойынша орындалды.

Зерттеу нәтижесінде интродукциялық сынақтарға арналған Қазақстанның Қызыл кітабына енген ағаш өсімдіктерінің 19 түрі, оның ішінде Шығыс Қазақстаннан алынған 10 түрі және республиканың оңтүстік-шығысынан алынған 4 түрінен тұратын перспективалы тізімі әзірленді.

Жүргізілген талдау жұмыстары, ботаникалық бақтың ашық топырағында тіршілікке қабілетті болатын Қазақстанның бореалдық (Солтүстік) қоғамдастығы – қайың, көктерек, қарағай шоқ ормандары, дала өсімдіктері, ішінара-Қазақстандық Алтайдың орман экожүйелері болатынын тұжырымдауға мүмкіндік береді. Осыған сәйкес, Қазақстанның табиғи өсімдіктері Нұр-Сұлтан ботаникалық бағында мынадай экспозициялармен ұсынылуы мүмкін: "Батыс Қазақстанның қайыңы бар еменді тоғай", "Қазақстандық Алтайдың ағаш өсімдіктері", "Қазақстанныңшоқормандары".

Елордада ағаш өсімдіктерінің суыққа төзімділігін интродукциялық болжауға жүйелік-ареалогиялық тәсіл негізінде интродукциялық сынау үшін интродукциялық перспективаның үш тобына бөлінген 25 туысынан тұратын Еуразия ағаш өсімдіктерінің 345 түрі ұсынылды: А – түрлердің табиғи таралу аймағының Нұр-Сұлтан қаласының жағдайларына сәйкестігі; Б – түрлердің интродукциялық таралу аймағының Нұр-Сұлтан қаласының жағдайларына сәйкестігі; В – түрлердің таралуы бойынша Нұр-Сұлтан қаласының жағдайларына сәйкестігі. Осы топтардың әрқайсысының өсімдіктерін жерсіндіру, өсімдіктердің репродукциялық материалдарын жұмылдырудың арнайы тәсілдерді талап етеді.

Нұр-Сұлтан қаласында құрылатын ботаникалық бақты құру кезінде оны орналастыру аймағының "артықшылықтары" және "кемшіліктері" ескерілуі тиіс, қолдан жасалған ерекше қорғалатын табиғи аумақты білдіретін болады.

Түйін сөздер: ағаш өсімдіктері, ботаникалық бақ, экожүйелер, жасыл технологиялар, генетикалық қор, Солтүстік Қазақстан, флора аймағы, интродукция, интродуценттер, ағаш өсімдіктері.

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РАЗРАБОТКА ПЕРВИЧНЫХ СПИСКОВ ДРЕВЕСНЫХ РАСТЕНИЙ ДЛЯ ИНТРОДУКЦИИ В УСЛОВИЯХ СЕВЕРНОГО КАЗАХСТАНА

Аннотация. До настоящего времени в Северном Казахстане и в целом в степных экосистемах Республики отсутствовали научно-исследовательские учреждения, разрабатывающие теоретические и прикладные вопросы интродукции и зеленого строительства в регионе, в первую очередь, целевые учреждения по сохранению и устойчивому использованию разнообразия растительного мира региона. Для решения этих задач был создан государственный ботанический сад в городе Нур-Султан. В период становления ботанического сада первостепенной задачей является разработка первичных списков древесных растений для интродукционных испытаний, что позволит создать план дендрологических экспозиций, представляющих различные типы сообществ и географические регионы, а также рекомендовать ассортимент древесных растений для озеленения столицы нашей республики и региона в целом.Для разработки перспективных списков древесных растений использовался системно-ареалогический подход и интерполяционное прогнозирование. Интродукционные процедуры выполнялись по традиционным методикам.

В результате исследований разработан перспективный список краснокнижных древесных растений Казахстана для интродукционных испытаний, насчитывающий 19 видов, в том числе 10 видов,привлеченных из Восточного Казахстана, и 4 вида – из юго-востока республики.

Выполненный анализ позволяет утверждать, что потенциально жизнеспособными в открытом грунте ботанического сада будут сообщества Бореального (Северного) Казахстана – березовые, осиновые, сосновые колки, степная растительность, частично-лесные экосистемы Казахстанского Алтая. Согласно этому природная растительность Казахстана может быть представлена в ботаническом саду Нур-Султан следующими экспозициями: «Дубняки с березой Западного Казахстана», «Древесные растения Казахстанского Алтая», «Колки Казахстана».

На основании системно-ареалогического подхода к интродукционному прогнозированию холодоустойчивости древесных растений для интродукционных испытаний в столице рекомендовано 345 видов древесных растений Евразии из 25 родов, подразделенных на три группы интродукционной перспективности: А – соответствие условиям г. Нур-Султан природного ареала вида; Б – соответствие условиям г. Нур-Султан интродукционного ареала вида; В – потенциальное соответствие вида условиям г. Нур-Султан по механизму его расселения. Интродукция растений каждой из этих групп потребует специфических подходов к мобилизации репродукционного материала растений.

Ботанический сад, создаваемый в г. Нур-Султан будет представлять рукотворную особо охраняемую природную территорию, при создании которой должны быть учтены «плюсы» и «минусы» участка ее размещения.

Ключевые слова: древесные растения, Ботанический сад, экосистемы, зеленые технологии, генетический фонд, Северный Казахстан, флористический район, интродукция, интродуценты, древесные растения.

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