The article provides an analysis of the biodiversity of the flora of Baum grove in Almaty. In the Baum grove, we identified 122 species of plants belonging to 93 genera and 43 families. Of the 122 species, 43 species are trees, 16 species are shrubs and 63 species are herbaceous plants. Analysis of the leading families of the entire flora of the Baum grove showed that the largest families are: Asteraceae, Rosaceae, Poaceae, Fabaceae, Aceraceae, Oleaceae, Brassicaceae, Pinaceae, Ulmaceae, Cupressaceae and Salicaceae. Analysis of the largest genera of the entire flora of the grove showed that the largest genera of the grove are: Acer, Fraxinus, Ulmus and Artemisia. Of the 59 tree-shrub species found in the grove, 22 species represent the local natural flora of Kazakhstan, which belong to 14 families and 20 genera. The remaining 37 species are introduced species belonging to 21 families and 28 genera. The introducients found in trees and shrubs in the grove of the Baum Grove in Almaty have different centers of origin. Among the trees and shrubs introduced, most of all in the Baum Grove are species from North America and the Palearctic. The analysis of the taxonomic structure showed the absence in the Baum grove of Almaty of lycopodiales, equisetums and ferns.

**Key words:** Baum grove, biodiversity, flora, Almaty city.

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Анализ биоразнообразия сосудистых растений флоры рощи Баума

В статье приводится анализ биоразнообразия флоры рощи Баума г. Алматы. В роще Баума нами выявлено 122 вида растений, относящихся к 93 родам и 43 семействам. Из 122 выявленных видов 43 вида относятся к древесным, 16 видов к кустарникам и 63 вида к травянистым растениям. Анализ ведущих семейств всей флоры рощи Баума показал, что самыми крупными семействами являются: Asteraceae, Rosaceae, Poaceae, Fabaceae, Aceraceae, Oleaceae, Brassicaceae, Pinaceae, Ulmaceae, Chenopodiaceae, Cupressaceae и Salicaceae. Анализ крупнейших родов всей флоры показал, что самыми крупными родами рощи являются: Acer, Fraxinus, Ulmus и Artemisia. Из 59 древесно-кустарниковых видов встречающихся в роще 22 вида представляют местную природную флору Казахстана, которые относятся к 14 семействам и 20 родам. Остальные 37 видов являются интродуцентами, относящимися к 21 семейству и 28 родам. Интродуценты, встречающиеся в древесно-кустарниковых насаждениях рощи Баума г. Алматы, имеют различные центры происхождения. Среди древесно-кустарниковых интродуцентов, больше всего в роще Баума встречаются виды из Северной Америки и Палеарктики. Анализ таксономической структуры показал отсутствие в роще Баума г. Алматы плауновидных, хвощей и папоротников.

Ключевые слова: Роща Баума, биоразнообразие, флора, г. Алматы.

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Introduction

Currently, urbanization is one of the main trends of human development. The increase in population, the increase in the number of cities and territories that they occupy, has taken a global scale. Today, up to 60% of the population lives in cities around the world, whereas in comparison with 1950, the urban population was only less than 30%. The city has a huge impact on the natural environment and all its components, changing the climate, topography, hydrological regime, soil cover, flora and fauna. In large cities, under the influence of various anthropogenic factors, there is a change in the natural environmental conditions, the species composition and their ratio. Plants are an integral part of ecosystems; therefore, the study of urban floras and the peculiarities of their formation is one of the current trends in modern floristics [1]. In connection with the active growth of cities, building new territories, changing landscapes and transforming natural ecosystems, the question arises about the sustainability of transformed ecosystems and their functioning in new, unusual conditions. Therefore, at the present stage it is necessary to study various aspects of the functioning of urban landscapes in order to prevent the complete destruction of already modified ecosystems. Normal human life, his health and life expectancy depends on the sustainable functioning of the urban ecosystem. The city suffers because of a strong pollution of air, a large influx of rural population into the city, increasing overpopulation of certain urban areas, the desire of the population to live closer to the city center, and not on its outskirts. The city of Almaty is located in the center of the Eurasian continent, in the south-east of the Republic of Kazakhstan. Almaty is unique in its physiographic and climatic characteristics, forming the ecological features of its territory. The city of Almaty is located in the foothills of the Zailiysky Alatau, the total area of which is more than 683.51 square kilometers. It is located in the valley of the Bolshaya and Malaya Almatinka rivers and their tributaries flowing from the Zailiysky Alatau glaciers and mountain gorges in the zone of increased seismicity and mudflow danger. The population of the city of Almaty as of June 1, 2018 is 1 806 833 people [2, 3].

In the last decade, the growth of new buildings in the city of Almaty has strengthened the processes of anthropogenic impact on urban flora. The existing experience of the green construction of the city of Almaty does not fully take into account the specificity of the environmental conditions of various areas of the city and the level of their technogenic pollution, and the state of plantings in residential and industrial areas and the resistance of vegetation to the effects of the urban environment remain insufficiently studied. Interest in the study of urban flora in major cities around the world has increased markedly, as evidenced by the large number of works on this issue [4,5,6,7,8,9,10,11,12,13,14,15,16,17,18]. But there are very few special scientific
studies and summarizing works on the flora of the cities of Kazakhstan, including in the city of Almaty [19, 20]. To date, the flora of the largest metropolis of the country has not been the object of a special floristic study, so the need arose for its detailed scientific research using modern techniques. In cities, as nowhere else, the processes of moving plant species are activated. It is the cities that are the centers of concentration of adventive plants, and often it is from the cities that the introduction of invasive species begins in other regions and areas.

Grove “Baum” is a park area in Almaty, is based on the site of a natural forest in the years 1892-1894 near the big Almaty village, on an area of up to 150 acres. The grove is named after the famous forest organizer Semirechye E.O. Baum, who advocated that every locality of the Semirechye region had a state grove or orchard [21,22]. In 1874, E.O. Baum arrived in Verny and was actively involved in the transformation of Verny into a garden city. At the same time, Baum turned to the city government with a request to take the land belonging to the Cossack village, to bookmark an amusement park. He received agreement, and to the north of Bolshaya Stanitsa, a huge green massif with a length of 3.5 km in the meridional direction and 0.4-0.6 km in latitude appeared. Vernensky forest grove, later named after Baum in memory of the great merits in gardening the city. Breeding Vernensky grove began in 1868 with a small Cossack grove, laid in accordance with the order 1867. By the 1890s, the Verny forest grove became one of the main bases of the Semirechye forestry. The grove served for the transformation of Verny into a garden city. At the 1874, E.O. Baum arrived in Verny and was actively involved in the transformation of Verny into a garden city. At the same time, Baum turned to the city government with a request to take the land belonging to the Cossack village, to bookmark an amusement park. He received agreement, and to the north of Bolshaya Stanitsa, a huge green massif with a length of 3.5 km in the meridional direction and 0.4-0.6 km in latitude appeared. Vernensky forest grove, later named after Baum in memory of the great merits in gardening the city. Breeding Vernensky grove began in 1868 with a small Cossack grove, laid in accordance with the order 1867. By the 1890s, the Verny forest grove became one of the main bases of the Semirechye forestry. The grove served for the reproduction of a growing forest (cultivation of fruit and ornamental trees and shrubs, berries and vegetables) and the cutting of dead forest (harvesting for fuel and economic needs of lumber). She defended the city from the dusty steppe winds [3]. Coniferous, fruit, and ornamental trees and shrubs were introduced in the grove. One of the remarkable places of the grove “Baum” – oak alley. Oaks along it have more than a century of age and were planted during the life of E. Baum (Figure 1).

In Soviet times, with the development of the urban area, the Baum grove was significantly trimmed, primarily with the punching of new avenues of Suyunbai and S. Seyfullin, along which buses, trams and railway transport (the so-called “gorvetka” between Almaty I and Almaty II). In 2008, the territory of the grove was renewed, where more than 30,000 trees were planted, however, the territory has not been landscaped to date.

In 2008, the territory of the grove was included in the Ile-Alatau National Park, which will preserve the oldest green area of the megapolis [3].

Grove “Baum” is located at an altitude of about 750 meters above sea level. It is delineated by clear boundaries: from the east – a railway line, from the south and north – residential buildings, from the west – a river. The terrain has a slight slope from south to north about 50 meters by 3 kilometers. The grove stretched from south to north for 3.5 km and a width of about 900 meters at its widest point. Along the river along the western contour of the map, the relief is cut up with logs and gullies, in some places there are marshlands on the river [3].

Currently, the grove “Baum” – is a favorite vacation spot of city residents. The total area of the grove of “Baum” is 73 hectares. The coordinates of the grove: N 43° 18’28 “, E 76° 57’1” (Figure 1).

**Materials and research methods**

The main methods of studying the urbanized (urban) flora of the Nauryzbai and Turksib districts of Almaty were the generally accepted classical methods of botanical and floristic research: the traditional route-reconnaissance method was used in the field. The collection and processing of herbarium material was carried out according to the generally accepted method. Copies of woody, shrub and herbaceous plants were collected in herbarium folders describing collection sites (recorded using GPS), dates and a collector. The collection and processing of herbarium material was carried out according to the standard technique of A.K. Skvortsov [23]. In the process of determining the herbarium, multivolume reports were used as sources: “Trees and Shrubs of the USSR” [24], “Flora of Kazakhstan” [25], “Trees and Shrubs of Kazakhstan” [26], “Plants of Central Asia” [27], “The determinant of plants in Central Asia” [28], “Key to Central Asian plants” [29], Illustrated determinant of plants of Kazakhstan [30]. To clarify the species and generic names, the latest reports of S.K. Cherepanov [31], S.A. Abdulina [32], A.L. Tahtajyan [33]. The types of the ranges of the studied plant species were identified by us according to the classifications developed by E.P. Lavrenchko, A.I. Tolmachev, R.V. Kamelin, V.P. Goloskokov, [34, 35, 36].

On the territory of the “Baum” grove, the main forest-forming species are hard-leaved, soft-leaved and coniferous trees. For hardwood species include: *Ulmus pumila* L., *Ulmus laevis* Pall., *Quercus robur* L., *Aesculus hippocastanum* L., *Gleditsia triacanthos* L., *Fraxinus pennsylvanica* Marshall,
Fraxinus sogdiana Bunge, Fraxinus excelsior L., Acer tataricum L., Acer mono Maxim. ex Rupr., Acer semenovii Regel & Herder, Acer saccharum Marshall, Elaeagnus oxycarpa Schltdl., and etcetera. Softwood species include: Betula pendula Roth, Populus italica (Du Roi) Moench, Populus nigra L., Salix arbuscula L., Tilia cordata Mill., Morus nigra L., Morus alba L. Conifers include: Pinus sylvestris L., Pinus pallasiana D. Don, Larix sibirica Ledeb., Juniperus communis L., Platycladus orientalis (L.) Franco., as well as other tree species: Acacia albida Delile, Armeniaca vulgaris L., Chaenomeles speciosa (Sweet) Nakai, Crataegus sanguinea Pall., Catalpa speciosa (Warder ex) Warder ex Engelm., Rhus typhina L., Padus avium Mill., Sorbus sibirica Hendl., Malus domestica Borkh.

Figure 1 – Oak Alley in the “Baum” grove

Research results and discussion

In the “Bauma” grove, we identified 122 species belonging to 93 genera and 43 families.

Of the 122 species of vascular plants registered on the territory of the Baum Grove, 43 species belong to trees, 16 species to shrubs and 63 species to grassy plants [19, 20].

Of the 59 tree-shrub species found in the grove, 22 species represent the local natural flora of Kazakhstan, which belong to 14 families and 20 genera. The remaining 37 species are introduced species belonging to 21 families and 28 genera.

The ratio of introducients (37; 30.3%) between the occurring tree and shrub living forms is 27 species (trees) (22.1%) and 10 species (shrubs) or 8.20%, respectively. From tree species – 16 tree species represent the natural flora of Kazakhstan (13 hardwood and 3 conifers), which belong to 10 families and 15 genera. The largest numbers are represented by the family: Rosaceae which contains 3 species (Padus avium Mill., Crataegus sanguinea Pall., Armeniaca vulgaris L.), the family Pinaceae 3 species (Pinus sylvestris L., Larix sibirica Ledeb., Pinus sylvestris L.), the family Ulmaceae 2 species (Populus italica (Du Roi) Moench., Populus nigra L.), family Salicaceae 2 species (Populus nigra L., Populus italica (Du Roi) Moench.).

The remaining families: Betulaceae, Elaeagnaceae, Facaceae, Aceraceae, Juglandaceae, Oleaceae contain 1 species each. Of woody plants, 27 species are introductions. These include plants grown in the soil outside the range of their natural distribution. Of these, 2 conifers (Pinaceae, Cupressaceae) and 20 hardwoods (Fabaceae, Ulmaceae, Rosaceae, Salicaceae, Bignoniaceae, Aceraceae, Tiliaceae, Moraceae, Hippocastanaceae, Anacardiaceae), which consist of 18 genera and 12 families. The largest number of species among tree introductions are represented by the families: Rosaceae (6 species – Pyrus communis L., Crataegus sanguinea Pall., Sorbus aucuparia...
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L., Malus domestica Borkh., Prunus domestica L., Cerasus vulgaris Mill.), Aceraceae (4 species), Moraceae (2 species), Fabaceae (2 species), Oleaceae (2). The remaining 7 families: Ulmaceae, Cupressaceae, Salicaceae, Bignoniaceae, Pinaceae, Tiliaceae, Hippocastanaceae are represented by one species. The largest genera among tree introductions are: Acer which contains 4 species (Acer negundo L., Acer platanoides L., Acer saccharum Marshall, Acer mono Maxim.), Fraxinus contains 2 species (Fraxinus lanceolata Borkh., Fraxinus excelsior L.) The genus Morus contains 2 species each (Morus nigra L., Morus alba L.). The shrubs of introducents in the Baum Grove, there are 10 species represented by 10 genera and 8 families.

The introducents found in trees and shrubs in the grove of the Baum Grove in Almaty have different centers of origin. Among the tree-shrub species introduced into the species richness are species from North America (10.6%) (Acacia albida, Acer saccharinum, Acer negundo, Crataegus harrida, Fraxinus lanceolata Borkh., Fraxinus excelsior L., Platycladus orientalis (L.) Franco., Catalpa bignonioides Walter., Gleditsia triacanthos L., Cotinus coggyria Scop., Rhus typhina f. laciniiata Rehder., Parthenocissus quinqufolia Planch., Symphoricarpos rivularis Susk.), Palmarctic (6.2%) (Crataegus sanguinea Pall., Pyrus communis

L., Viburnum opulus L., Sambucus nigra L., Salix purpurea L.). A small percentage of species belong to Eurasia (5.0%) (Frangula alnus, Acer platanoides L., Sorbus aucuparia L., Tilia cordata Mill., Sorbus aucuparia L., Acer mono Maxim.), Asia (3.28%) (Ailanthus altissima (Mill.) Swingle, Salix babylonica L., Morus nigra L., Morus alba L.), Caucasus and Crimea (3.28%) (Ulmus glabra Huds., Amelanchier spicata (Lam.) K. Koch., Pinus pallasiana, Amelanchier spicata), Holarctic (2.5%) (Swida alba (L.) Opiz., Aesculus hippocastanum L., Grossularia uva-crispa), Mediterranean (1.6%) (Ligustrum vulgare L., Syringa vulgaris L.), Central Asia and the Caucasus (Cydonia oblonga Mill.) And Front Asia (Prunus domestica L.).

The analysis of the taxonomic structure showed the absence in the Baum grove of Almaty of lycopodiales, equisetums and ferns.

Analysis of the leading families of the whole flora of the Bauma grove showed (Figure 2) that the largest families are: Asteraceae (13; 10.6%), Rosaceae (13; 10.6%), Poaceae (15; 12.3%), Fabaceae (6; 5.0%), Aceraceae (5; 4.0%), Oleaceae (5; 4.0%), Brassicaceae (5; 4.0%), Pinaceae (4; 3.2%) , Ulmaceae (3; 2.4%), Chenopodiaceae (3; 2.4%), Cupressaceae (3; 2.4%), Salicaceae (3; 2.4%). These 12 families account for 59.0% (72 species) of the entire flora of the Baum grove.

Figure 2 – The spectrum of the largest families of the grove “Baum”
The following 8 families contain two types of each: Polygonaceae (2; 1.6%), Plantaginaceae (2; 1.6%), Anacardaceae (2; 1.6%), Moraceae (2; 1.6%), Malvaceae (2; 1.6%), Urticaceae (2; 1.6%), Betulaceae (2; 1.6%), Chenopodiaceae (2; 1.6%) (Table 1).

Table 1 – Leading families of the flora of the grove “Baum”

| Families               | Number of genera | Number of species | % of the total number of species |
|------------------------|------------------|-------------------|----------------------------------|
| 1 Asteraceae           | 10               | 13                | 10,6                             |
| 2 Rosaceae             | 12               | 13                | 10,6                             |
| 3 Poaceae              | 12               | 15                | 12,3                             |
| 4-5 Fabaceae           | 5                | 6                 | 5,0                              |
| 4-5 Aceraceae          | 1                | 5                 | 4,0                              |
| 6-7 Oleaceae           | 3                | 5                 | 4,0                              |
| 6-7 Brassicaceae       | 5                | 5                 | 4,0                              |
| 8 Pinaceae             | 3                | 4                 | 3,2                              |
| 9-10 Cupressaceae      | 2                | 3                 | 2,4                              |
| 9-10 Chenopodiaceae    | 3                | 3                 | 2,4                              |
| 9-10 Ulmaceae          | 2                | 3                 | 2,4                              |
| 9-10 Salicaceae        | 2                | 3                 | 2,4                              |
| 11-12 Moraceae         | 1                | 2                 | 1,6                              |
| 11-12 Anacardaceae     | 2                | 2                 | 1,6                              |
| 11-12 Caprifoliaceae   | 2                | 2                 | 1,6                              |
| 11-12 Polygonaceae     | 2                | 2                 | 1,6                              |
| 11-12 Malvaceae        | 2                | 2                 | 1,6                              |
| 11-12 Urticaceae       | 1                | 2                 | 1,6                              |
| 11-12 Plantaginaceae   | 2                | 2                 | 1,6                              |
| 11-12 Betulaceae       | 2                | 2                 | 1,6                              |
| Total:                 | 72               | 94                | 77,0                             |

The remaining 23 families contain only one species in their composition, which is 18.8% of the total species composition of the flora of the “Baum” grove. These include: Fagaceae, Papaveraceae, Amaranthaceae, Ranunculaceae, Tiliaceae, Simaroubaceae, Viburnaceae, Rhamnaceae, Sambucaceae, Cannabaceae, Vitaceae, Caprifoliaceae, Solanaceae, Balsaminaceae, Apiaceae, Primulaceae, Caryophyllaceae, Bignoniaceae, Convolvulaceae, Celastraceae, Buxaceae, Cornaceae, Juglandaceae, Elaeagnaceae.

Analysis of the largest genera of the flora of the “Baum” grove showed that the large genera of the grove are: Acer (5; 4.0%), Fraxinus (3; 2.4%), Ulmus (3; 2.4%), Artemisia (3; 2.4%). The following genera contain 2 species each and constitute 1.6%.

These include: Tilia, Pinus, Trifolium, Festuca, Plantago, Poa, Populus, Urtica and Chenopodium (table 2). These 15 genera account for 22.1% of the total flora of the grove. The remaining 78 genera contain one species each.

These include: Picea, Armeniaca, Acacia, Betula, Pyrus, Quercus, Larix, Platycladus, Sorbus, Juglans, Tilia, Salix, Catalpa, Thuja, Cydonia, Ailanthus, Prunus, Cerasus, Gleditsia, Aesculus, Cotinus, Rhus, Corylus, Viburnum, Ligustrum, Syringa, Caragana, Amelanchier, Parthenosissus, Frangula, Euonymus, Juniperus, Lonicera, Rosa, Sambucus, Salix, Symphoricarpos, Swida, Ambrosia, Cirsiurn, Hyoscyamus, Convolvulus, Polygonum, Capsella, Rumex, Lycopus, Lactuca, Sonchus, Eltrigia, Potentilla, Onopordon, Setaria and others.
Table 2 – The largest kind of flora of the grove “Baum”

| Genera     | Number of species | % of the total number of species |
|------------|-------------------|---------------------------------|
| 1 Acer     | 5                 | 4.1                             |
| 2-3 Ulmus  | 3                 | 2.4                             |
| 2-3 Artemisia | 3              | 2.4                             |
| 2-3 Fraxinus | 3               | 2.4                             |
| 2-3 Poa    | 3                 | 2.4                             |
| 4-5 Pinus  | 2                 | 1.6                             |
| 4-5 Crataegus | 2              | 1.6                             |
| 4-5 Morus  | 2                 | 1.6                             |
| 4-5 Populus | 2                | 1.6                             |
| 4-5 Trifolium | 2              | 1.6                             |
| 4-5 Urtica | 2                 | 1.6                             |
| 4-5 Plantago | 2               | 1.6                             |
| 4-5 Festuca | 2               | 1.6                             |
| 4-5 Arctium | 2                | 1.6                             |
| 4-5 Chenopodium | 2          | 1.6                             |
| Total:     | 27                | 22.1                            |

Figure 3 – Composition of life forms of the flora of the grove “Baum”

Woody species in the grove of “Bauma”, there are 42 species, or 34.4%. Shrubs in the grove “Bauma” there are 16 species or 13.1%. Of these, 5 species from the local flora and 11 species are introduced species (Figure 3). Herbaceous plants, there are 63 species or 51.6%.
Conclusion

On the territory of the “Baum” grove, the main forest-forming species are hard-leaved, soft-leaved and coniferous trees [Figure 4]. The hardwood species include: *Ulmus pumila* L., *Ulmus laevis* Pall., *Quercus robur* L., *Aesculus hippocastanum* L., *Gleditsia triacanthos* L., *Fraxinus pennsylvanica* Marshall, *Fraxinus sogdiana* Bunge, *Fraxinus excelsior* L., *Acer tataricum* L., *Acer mono* Maxim. ex Rupr., *Acer semenovii* Regel & Herder, *Acer saccharum* Marshall, *Elaeagnus oxyarpa* Schildl., and others.

Softwood species include: *Betula pendula* Roth, *Populus italica* (Du Roi) Moench, *Populus nigra* L., *Salix arbuscula* L., *Tilia cordata* Mill., *Morus nigra* L., *Morus alba* L.

Conifers include: *Pinus sylvestris* L., *Pinus pallasiana* D. Don, *Larix sibirica* Lede., *Juniperus communis* L., *Platycladus orientalis* (L.) Franco., and other tree species: *Acacia albida* Delile, *Armeniaca vulgaris* L., *Chaenomeles speciosa* (Sweet) Nakai, *Crataegus sanguinea* Pall., *Catalpa speciosa* (Warder ex) Warder ex Engelm., *Rhus typhina* L., *Padus avium* Mill., *Sorbus sibirica* Hedl., *Malus domestica* Borkh.

In the “Baum” grove, we identified 122 species belonging to 93 genera and 43 families. The remaining 78 genera contain one species each. The analysis of the taxonomic structure showed the absence in the Baum grove of Almaty of lycopodiales, equisetums and ferns. An analysis of the leading flora families of the “Baum” grove showed (Figure 2) that the largest families are: *Asteraceae* (13; 10.6%), *Rosaceae* (13; 10.6%), *Poaceae* (15; 12.3%), *Fabaceae* (6; 5.0%), *Aceraceae* (5; 4.0%), *Oleaceae* (5; 4.0%), *Brassicaceae* (5; 4.0%), *Pinaceae* (4; 3.2%), *Ulmaceae* (3; 2.4%), *Chenopodiaceae* (3; 2.4%), *Cupressaceae* (3; 2.4%), *Salicaceae* (3; 2.4%). These 12 families account for 59.0% (72 species) of the entire flora of the “Baum” grove. Analysis of the largest genera of the flora of the “Baum” grove showed that the large genera of the grove are: *Acer* (5; 4.0%), *Fraxinus* (3; 2.4%), *Ulmus* (3;
Analysis of biodiversity of vascular plants of the Baum grove of Almaty

2.4%), *Artemisia* (3; 2.4%). The following genera contain 2 species each and constitute 1.6%. These include: *Tilia, Pinus, Trifolium, Festuca, Plantago, Poa, Populus, Urtica and Chenopodium*. These 15 genera account for 22.1% of the total flora of the grove.

Of the 59 tree-shrub species found in the grove, 22 species represent the local natural flora of Kazakhstan, which belong to 14 families and 20 genera. The remaining 37 species are introduced species belonging to 21 families and 28 genera. The introducers found in trees and shrubs in the grove of the Baum Grove in Almaty have different centers of origin. Among the tree-shrub species introduced into the species richness are species from North America (10.6%), Palaeartic (6.2%). A small percentage of species belongs to Eurasia (5.0%), Asia (3.28%), the Caucasus and the Crimea (3.28%), the Holarctic (2.5%), the Mediterranean (1.6%), Central Asia and Caucasus and Front Asia.

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