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SIBERIAN PLANTS IN THE BOTANICAL GARDEN OF BSTU

The results of the introduction of species from harsh areas of the West Siberian, Altai-Sayan, Middle, North-East Siberian and Okhotsk-Kamchatka provinces in the botanical garden of BSTU, which is located in the Republic of Belarus in the East European province. The woodland is part of Nemansko-Pridneprovsky geobotanical district subzones hornbeam-oak-conifer forests.

The climate is moderately cold and moist. The period with positive air temperature is 240 days. The amount of rain in a year on average is 650 mm.

Over 60 years of botanical garden planted 59 species of flora of Siberia. Significant replenishment of the collection was carried out in 1961, 1977, 1981. Currently, 40 species survived. The rest for various reasons, dropped out of the collection.

Well settled down and go through the whole cycle of species such as *Picea obovata, Abies sibirica, Pinus sibirica, Berberis sibirica, Spirea humilis, Caragana microphylla, Sorbus sibirica, Betula platyphylla, Caragana aurantiaca* and others.

Not tested species such as *Sibireal altainsis, Prunus sibirica, Alnus hirsuta, Populus laurifolia, Lonicera altaica, Betula fusca, Betula dahurica, Betula kirghisorum, Amygdalus ledebouriana* and others.

In the extremely depressed state on the verge of dropping out of the collection are *Larix gmelinii, Larix sibirica, Quercus mongolica, Malus floribunda* and others.

The main reasons for reducing the total number of species and number of plants in groups are overplanting density, depressing light-loving species of flora, shade under the canopy of trees, etc.

Key words: flora, floral province, climate, plant introduction of Siberia, Botanical Garden of BSTU.

Introduction. The vegetation of Siberia, as well as that one of Belarus, is a part of the Euro-Siberian-Canadian area of the Holarctic boreal subdomain realm in the floristic division of dry land vegetation.

Species of Siberian flora, introduced in the botanical garden of BSTU, form mainly flora of 6 provinces (West-Siberian, Altai-Sayan, Central-Siberian, North-eastern-Siberian and Okhotsk-Kamchatka).

These provinces occupy rather a large territory from the Urals to the Sea cost of Okhotsk. A considerable species and genus variety is presented there: pine-tree, fir-tree, silver fir, larch, birch, alder, rose, spiraea, thicket of rowan, pea shrub and other.

Main part. A part of vegetable cover, introduced in the botanical garden of BSTU, as well as vegetation of Siberia, belongs to the forest zone of Amur-Ussuriysk mixed forests district. In general, the zonality is conditioned by the climatic factors. Geological past time, relief, soil-ground conditions, biotic factors, history of vegetable development has acertain importance for geographical landscapes zones formation. The forests of the Republic of Belarus, the district of the East European mixed forests, with the temperate climate belt, belong to the same zone.

Certain representatives of Siberia arboreal-shrubby plants were introduced into the tree nursery which is in the forest area of Negorelsky educational and skilled forestry, being a part of Neman and Pridnekprovksky geobotanical district of hornbeam-oak-dark coniferous forests subdistrict, in its northern border (I. D. Yurkevich, V. S. Geltman, 1965). According to the district division of Belarus Republic territory for the purpose of introduction developed by N. D. Nesterovich, its territory is located in the extreme southwest of the North Central district in the Western subdistrict (N. D. Nesterovich, 1955). The tree nursery is located on the right river Peretut bank of the Usy river basin of the Neman watershed. The relief is flat, with a small slope to the East, towards the river. Height above sea level is on average 178 m, the level of ground waters lie down at a depth of 4.5 m.

Climate of the district is moderate and cold humidified. The absolute minimum of temperatures is far as –39°C. The earliest autumn frost was observed on September 3, the latest spring one – on June 4. Period duration with positive air temperature makes 240 days, some years it ranged from 184 to 292 days. The sum of rainfall during a year is approximately 650 mm.

When founded a tree nursery in spring-autumn of 1954, 9 species of saplings, brought from Belgospitomnik, were planted in a sector. For the first year of existence (inventory of 1955) the apricot Siberian completely dropped out of a collection (7 plants were planted). From the planted 24 laurel poplar plants remained 10, by 1966 – 6, by 1986 – 4, by 1995 all plants dropped out. The sallow thorn was introduced into a collection of 1954 – 10 plants, 1957 – 9, 1979 – 2, 1982 – 6, periodically in severe winters, it is destroyed by frost. At present, 2 plants which are in a depression remained. The cedar pine was planted in number of 33 plants, 26 from which got accustomed. In 1956 4 plants were planted else. Next years, this quantity remained till 1971, when in the course of crown closure the process of differentiation and self-pruning comes in curtain. Therefore by 1981 22 plants, 1986 – 17, by 2013 – 11 remain in curtain.

In 1954 the planted saplings of a larch Siberian (41 pieces) during species updating carried out by assistant professors A. Ya. Mironenko and N. M. Sakharova was a larch Polish (a species of the European larch, Larix decidua) which successfully remained in number of 36 specimens so far. In 1957 repeated planting of a larch Siberian was made in the sector (13 pieces). At present 4 specimens of very moderate growth and development remained.

The cotoneaster planted by saplings in 1954 in number of 33 bushes occupied the considerable space of the sector. Because of the collection replenishment and rather old age in 1971–1976, it was completely removed and in 1977 it was recovered again by the saplings, grown up from the seeds received from Novosibirsk. 3 bushes were planted, 2 remained.

Next, as far as 1969, there practically wasn't a collection replenishment by saplings.

The second step of the collection replenishment came in 1969 after acceptance of a botanical garden in Regional botanical gardens council. From this moment communications with tree nurseries and botanical gardens of the former USSR develop. Annually, in order of an exchange, the seeds of trees and shrubs, which pass introduction tests in nursery of the botanical garden, are sent. The plants passed tests are planted in a collection of the tree nursery sector (Table 1).

Through 60 years of being a tree nursery in sector "Siberia" 59 species of plants were planted. So far, 40 species, 1/3 of plants for various reasons (frost-killing, instability to diseases, pest injuries, mechanical damages) dropped out of the collection (Table 2). Some species (a rose thorny, a hawthorn Siberian, a honeysuckle Altaian, etc.), have been introduced into the collection several times.

Table 1

The range of the tree and shrub species planted and remained in the sector "Siberia"

Species composition of plants. Year of planting	Planted	Inv. of 1995	Inv. of 2013	Origin of seedlings
Siberian spruce – *Picea obovata* Ledeb, saplings, 1971.	3	3	3	Minsk
Siberian fir – *Abies sibirica* Ledeb, saplings, 1954.	32	24	24	Belgospitomnic
Polish larch – *Larix polonica* Raab, saplings, 1954.	41	36	36	Belgospitomnic
Siberian stone pine – *Pinus sibirica* (Rupr) Mayr, saplings, 1954.	33	17	11	Belgospitomnic
Cotoneaster – *Cotoneaster* sp., saplings, 1961.	9	curt.	3	Trostenets
Boverian meadow-sweet – *Spiraea beauwerdiana* Schneid, seeds, 1977.	8	curt.	curt.	Riga
Siberian barberry – *Berberis sibirica* Pall, seeds, 1977.	7	6	curt.	Moscow
Sallow thorn – *Hippophae rhamnoides* L., 1954, 1979, 1982.	20+6+9	5	2	Khorugh
Balkhash pea shrubs – *Caragana balchaschensis* (Kom.) Pojarfc, seeds.	6	6	6	Khorugh
Thorny pea shrubs – *Caragan spinosa* (L.) DC, seeds, 1981.	6	4	4	lvov
Weeping rose – *Rosa pendulina* L., seeds, 1981.	1	1	shoots	Novosibirsk
Alpine medow-sweet – *Spireae alpina* Pall, seeds, 1981.	1	1	curt.	Arkhangelsk
Low meadow-sweet – *Spirea humilis* Pojark, seeds, 1981.	3	curt.	curt.	Moscow
Microphyllous pea shrubs – *Caragana microphylla* Laiti, 1977, 1981.	18	curt.	curt.	Leningrad
Silky medow-sweet – *Spiraea sericea* Turd, seeds, 1981.	9	9	curt.	Leningrad
Gmelini larch – *Larix gmelini* Rupr, seeds, 1977.	2	2	2	Gorky
Melanocarpous Cotoneaster – *Cotoneaster melanocarpus* Fisch ex Blytt, 1977.	5	5	1	Saratov
Japain medow-sweet – *Spiraea japonica* L., seeds, 1974.	curt.	curt.	curt.	Negoreloye
Chinese spruce – *Picea asperata* Masters, saplings, 1974.	3	3	3	LOS
Siberian pea shrubs "Lorbergn" – *Caragana arborescens* "Lorbergn", saplings, 1980.	1	1	1	Vladivostok

End of Table 1

Species composition of plants. Year of planting	Planted	Inv. of 1995	Inv. of 2013	Origin of seedlings
Mongolian oak – *Quercus mongolica* Fisch ex Ledeb, seeds, 1981.	1	1	1	Negoreloye
Siberian larch – *Larix sibirica* Ledeb, saplings, 1957.	13	4	4	Moscow
Goldish honeysuckle – *Lonicera chrysantha* Turcz ex Ledeb, seeds, 1981.	8	3	1	Negoreloye
Recumbent meadow-sweet – *Spiraea decumbens*, 1981.	curt.	curt.	curt.	Moscow
Asian bird cherry-tree – *Padus asiatica* Kom, seeds, 1976.	10	9	4	Leningrad
Pallas honeysuckle – *Lonicerl PaJlasii* Ledeb, seeds, 1980.	11	4	curt.	Tomsk
Siberian mountain ash – *Sorbusca* Hedl, seeds, 1977.	10	6	4	Novosibirsk
Lustrous cotoneaster – *Cotoneaster lucidus* Schlecht, 1954, 1977.	33+5	3	2	Irkutsk
Siberian currant – *Ribes diacantlian* Pall, seeds, 1982.	1	curt.	curt.	Moscow
Flat-leaved birch – *Betula platyphylla* Sukacz, seeds, 1975.	3	3	3	Belgospitomnik
Red dogwood – *Swida sanquinea* (L.) Opiz, saplings, 1954.	23	curt.	curt.	Riga
Japanese flowering crab apple – *Malus floribunda* Sieb, saplings, 1976.	10	2	2	Saratov/Tomsk
Siberian apple – *M. boccata* (L.) Borkh, saplings – 1977, seeds – 1981.	5+10	1	1	Irkutsk
Germander spiraea – *Spiraea chamaedryfolia* L., seeds, 1979.	10	curt.	curt.	Lipetsk LOS
Crataegus of Maximovich – *Crataegus maximowiczii* Schneid, saplings, 1973.	6	3	3	Askaniya-Nova
Tortuous birch – *Betula tortuosa* Ledeb, seeds, 1976.	6	3	3	Minsk
Honeysuckle of Korolkov – *Lonicera korolkowii* Stapf, seeds, 1981.	1	1	1	Askaniya-Nova
Orange pea shrub – *Caragana aurantiaca* Kohne, seeds, 1976.	9	9	curt.	Minsk
Indian currant – *Symphoncarpos* sp., saplings, 1954.	curt.	curt.	curt.	Minsk
Schizonotus – *Sorbaria sorbifolia* (L.) A. Br., saplings – 1973, saplings – 1974.	24+10	curt.	curt.	Tomsk

Table 2

The range of tree and shrub species dropped out of the sector "Siberia"

Species composition of plants	Year of planting	Quantity	Species of planting material	Origin region of planting material	Year of death
Rose thorny – *Rosa acicularis* Lindl	1977 1981 1982	5 5 1	seeds	Irkutsk Alma-Ata Kirovsk	1995
Middendorf's birch – *Betula middendorffi*	1975	6	seeds	Lipetsk LOS	1995
Birch-leaf spireae – *Spireae betulifolia* Pall	1979	10	seeds	Siberian botanical garden	1995
Fine-leaved pentaphylloid – *Pentaphylloides parvifolia* (Fisch. ex Lehm.) Sojak	1982	1	seeds	Tomsk	1995
Birch low – *Betula humilis* Schrank	1975	3	seeds	Moscow	2003
Sibirka Altain – *Sibiraea altaiensis* (Maxim.) Sc.	1977	15	seeds	Novosibirsk	1981
Redhaw hawthorn – *Crataegus sangunea* Pall	1954 1973	20 4	saplings seedlings	Belgospitomnik Lipetsk	2010
Apricot Siberian – *Prunus sibirica* L.	1964	6	saplings	Belgospitomnik	1955
Daurian pentaphylloid – *Pentaphylloides davurica* (Nestler) Ikonn	1981	4	seeds	Arkhangelsk	2007
Alder bushy – *Alnus hirsuta* (Spach) Rupr	1981	1	seeds	Vladivostok	1996
Poplar laurel-leaved – *Populus laurifolia* Ledeb	1954	24	saplings	Belgospitomnik	1991
Honeysuckle Altaian – *Lonicera altaica* Pall	1977 1980 1981	1 1 3	seeds	Volhynia Novosibirsk Leningrad	1996
Cotoneaster felted – *Cotoneaster villosulus*	1975	11	seeds	Perm	1983
Brown birch – *Betula fusca* Pallas ex Georgi	1975	2	seeds	Leningrad	2013
Ledebour's almond – *Amygdalus ledebouriana* Batsch	1981	2	seeds	Minsk	1996
Daurian birch – *Betula dahurica* Pall	1970	5	saplings	Trostenets	1986
Kyrgyz birch – *Betula kirghisorum* Sawicz	1973	3	seeds	Tomsk	1986
Bean tree – *Laburnum*	1961	1	saplings	Gorky	1962
Pea-shrub – *Caragana frutex* (L.) K. Koch	1961	5	saplings	Gorky	1966

Such species as Sukachyov's larch (*Larix Sukaczewii*), hagi (*Lespedeza bicolor*), spiraea everlasting blossomed (*Spiraea semperflorens*), spiraea gray (*Spiraéa cinérea*), a honeysuckle edible (*Lonicera edulis*), spiraea John's wort-leaved (*Spiraea hypericifolia*), Pallas's thicket of rowan (*Sorbaria pallasii*), elder Siberian (*Sambucus sibirica*) failed tests in introduction nursery and die in 1981–1985.

Conclusion. The majority of plants grow and develop successfully. They blossom and produce fruit and seeds. These are representatives of pea shrub, meadowsweet, fir-tree, pine, etc.

Gmelin Larch and larch Siberian, Siberian apple-trees and Japanese flowering crab apple, Mongolian oak, sallow thorn, golden honeysuckle are in unsatisfactory state and are on the verge of loss.

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