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RESULTS OF INTRODUCTION OF SHRUB SPECIES FROM JAPAN AND CHINA INTO BOTANICAL GARDEN OF BSTU

The article presents the results of tree and shrub species introduction from the region of Japan and China in a botanical garden of BSTU. Have been determined that conservation of species collection is about 75%. Mortality of species associated with changes of its area and environmental conditions of growth and the felling of certain tree and shrub species at the time of care.

Introduction. A part of vegetation, introduced into the botanical garden of BSTU is referred to the forest area of Amur-Ussuri mixed forests district as well as vegetation of Japan and China. Zonality is mainly provided by climatic factors. Geological past, relief, soil and ground conditions, biotic factors, vegetation development history have certain importance on formation of geographical landscape areas. East European mixed forests district with temperate zone climate consists of forests of the republic. Southern and Seaside districts of the Far East are characterized by the climate of moderate latitudes of monsoon type which is considerably different from the climate of Belarus.

Southern and southeast winds take place in summer bringing humid air mass from the Pacific Ocean and sometimes having cyclone character. Winter monsoons carry currents of Oriental-Siberian continental polar air from the north and the northwest. They contain a small number of steams that is why winters are rather severe, with little snow with fair weather. January thaws in the afternoon and frosts at night even more increase variations in temperature. Summer is on the contrary warm and humid with cloudy weather. Annual sum of precipitations is 600–700 mm and on the coast is over 700 mm. Fog is often observed. However, due to the high mountain ranges situated at the Sea of Okhotsk influence of the ocean does not spread inwards the continent and therefore Amur-Ussuri mixed forests district occupy rather narrow, about 150–200 km, strip along the Amur middle course (to 50° n. l.) and the Ussuri, including the area of lake Khanka and a narrow coastal strip along the sea of Japan. Monsoon climate, provided by the closeness of the Pacific Ocean in combination with fertile soils promoted the development of multilevel mixed coniferous-broad-leaved forests with a great variety of tree species, bushes, semi-bushes and lianas (over 280 species in total). Cedar-broad-leaved forest consisting of Korean pine, single conifers of the Okhotsk taiga and a numerous number of broad-leaved species: Mongolian oak, basswood (Amur and Manchurian), maple (fine-leaved, Manchurian and riverside), Manchurian nut, Amur cork tree are the most essential.

Korean cedar, Khingam and needle fir, Ajan spruce are of a great value of dark coniferous species in mixed forests; Dahurian larch, seaside larch and Alpine larch are of a great value of light coniferous species; Dahurian birch, Siberian yellow birch and Manchurian birch etc., are of great value of small-leaved species. Species composition of underbrush, represented by families of hazel, euonymus, rhododendron, bush-clover, healer etc., liana (kolomiktaactinidia and bower actinidia, Chinese magnolia vine, Amur grape etc.) is very varied. Many species of plants of distant neogenic time became relict have been preserved (Japanese yew, microbiota, prickly castor-oil tree, Amur cork tree, Boston ivy and etc.).

Main part. Some representatives of hardy-shrub plants of Japan and China were introduced into the arboretum situated in the woodland of Negorelsk experimental forestry enterprise which composes Neman-Dnieper geobotanical district of hornbeam-oak-dark-coniferous forests subarea at its northern border [1]. According to the division into districts of the territory of the Republic of Belarus with the purpose of introduction developed by N.D. Nesterovich, its territory is situated in the extreme southwest of the North-Central district in the West subdistrict [2].

Species composition is in the table. The arboretum is situated on the right bank of the river Peretut of the Usa basin of the Neman watershed. The relief is straight with a slight slope into the side of the river. Altitude above sea-level on average is 178 m, the level of under-groundwater is on the depth of 4.5 m.

The soil is sod-podzol, average-podzolsabulous, developing on light loamy sand laid under by cohesive sand from the depth of 90–150 cm by light stony sandy loam. The climate of the region is moderately cold and damped. Absolute minimum is –39°C. The earliest autumn frost can be observed on September 3, the latest spring – June 4. Maximal frost penetration of the soil is 45 cm, minimal – 15 cm. The duration of the period with positive temperature is 240 days, some other years it varied from 184 to 292 days.

The duration of frostless period is from 107 to 178 days. On average annual precipitation is 650 mm.

Variety of hardy-shrubspecies, bedded outand preserved in sector I «Japan, China»

№	Arboretum species composition	Planted	Inventory	
			1995	2013
1	<i>Berberis silva-taroucana</i> C.K. Schneid	3	2	1
2	<i>Morus alba</i> L.	15	8	4
3	<i>Malus baccata</i> (L.) Borkh.	11	8	4
4	<i>Caragana boissii</i> Schneid.	3	3	3
5	<i>Lonicera muendeniensis</i> Rehd.	3	2	2
6	<i>Berberis thunbergii</i> DC.	23	bed	bed
7	<i>Malus floribunda</i> Sieb.	2	1	1
8	<i>Philadelphica incanus</i> Koehne.	2	2	2
9	<i>Morus alba</i> «Melanocarpa»	2	1	1
10	<i>Sorbus commixta</i> Hedl.	3	2	2
11	<i>Spiraea mongolica</i> Maxim.	3	2	1
12	<i>Juglans cordiformis</i> Maxim.	5	4	2
13	<i>Sorbus serotina</i> Koehne.	6	5	4
14	<i>Betula potaninii</i> Batalin.	10	7	7
15	<i>Primus divaricata</i> Ledeb.	13	10	10
16	<i>Chaenomeles maulei</i> (Mast) C.K. Schneid.	33	bed	bed
17	<i>Betula alba-sinensis</i> Burk.	11	10	10
18	<i>Chaenomeles japonica</i> (Thunb.) Lindl ex spach.	20	–	–
19	<i>Forsythia suspensa</i> (Thunb) Vahl.	10	6	1
20	<i>Malus prunifolia</i> (Willd) Boridi.	2	2	2
21	<i>Berberis korcanica</i> Palib.	3	3	3
22	<i>Lonicera koehneana</i> Rehd.	3	2	1
23	<i>Spirala miyabei</i> Koidz.	2	bed	bed
24	<i>S. virgata</i> French.	7	bed	bed
25	<i>S. uratensis</i> French.	14	bed	bed
26	<i>Spiraea argentiana</i> Rehd.	7	bed	bed
27	<i>Berberis sieboldii</i> Mig.	3	–	–
28	<i>Caragana</i>	2	–	–
29	<i>Pyrus betulifolia</i> Bge.	2	–	–
30	<i>Phellodendron lavalleyi</i> Dode.	6	–	–
31	<i>Padus grayana</i> Schneid.	5	6	5
32	<i>Fraxinus mandshurica</i> Rupr.	24	12	5
33	<i>Lonicera morrowii</i> Gray.	6	3	6
34	<i>Philadelphica tenuifolia</i> Rupr et Maxim.	10	6	2
35	<i>Syringa pubescens</i> Turcz.	10	5	4
36	<i>Exochorda grandiflora</i> (Hook) C.K.	3	–	–
37	<i>Syringa sweginzowii</i> Koehne et Lingelst	6	4	2
38	<i>Juglans sieboldii</i>	10	2	1
39	<i>Berberis aristata</i> DC.	5	3	2
40	<i>Rhamnus utilis</i> Deene.	4	3	2
41	<i>Berberis virescens</i> Hook.	6	2	1
42	<i>B. lucida</i> Schred.	5	2	2
43	<i>Malus hupehensis</i> (Pamp) Rchd.	1	1	1
44	<i>Malus</i> sp.	9	9	9
45	<i>Spiraea vitchii</i> Hemsl.	10	bed	bed
46	<i>Betula kamtschatica</i> (Regel) Janssen.	8	7	5
47	<i>Padus asiatica</i> Kom.	10	10	10
48	<i>Malus x zumi</i> (Matsum) Rchd.	5	3	2
49	<i>Malus sieboldii</i> (Regel) Rchd.	11	10	3
50	<i>Malus mandshurica</i> (Maxim.) Kom.	3	2	2
51	<i>Sorbus pekinensis</i> Kohne.	1	1	1
52	<i>Juglans ailanthifolia</i> Carr.	12	7	5
53	<i>Populus simonii</i> Carr.	10	8	8
54	<i>Philadelphica pekinensis</i> Rupr.	3	1	1

End of the table

№	Arboretum species composition	Planted	Inventory	
			1995	2013
55	<i>Physocarpusribesifolius</i> Kom.	5	bed	bed
56	<i>Syringasp.</i>	3	2	2
57	<i>Cotoneasterintegerrimus</i> Medik.	3	3	3
58	<i>Spiraeagemmata</i> Zabel.	2	1	1
59	<i>Physocarpusamurensis</i> Maxim.	8	8	8
60	<i>Philadelphiadaiavayi</i> L. Henry.	8	8	8
61	<i>Populussimonii</i> «Fastiglata»	10	6	1
62	<i>Spiraeaanipponica</i> Maxim.	1	bed	bed
63	<i>Swidawalteri</i> Wanger.	3	3	3
64	<i>Philadelphusschrenkii</i> Rupr et Maxim.	4	2	1
65	<i>Cotoneaster tomentosus</i> (Ait) Lindl.	3	2	1
66	<i>Malus x cerasifera</i> Spach.	5	2	–
67	<i>Spiraea x arguta</i> Zabel.	3	2	–
68	<i>Tsugacanadeensis</i> (L) Carr.	2	2	2
69	<i>Spiraea japonica</i> sp.	8	bed	bed
70	<i>Larixkaempferi</i> (Lamb) Canr.	40	19	11
71	<i>Spiraeaalbiflora</i> (Miq) Zabel.	5	bed	bed
72	<i>Abiesveitchii</i> Lindl.	4	4	4
73	<i>Chamaecyparispisifera</i> Sieb ex Endl.	1	1	1
74	<i>Philadelphus satsumanus</i> Miq.	5	bed	bed
75	<i>Spiraeavanhouttei</i> (Briot) Zabel.	6	bed	bed
76	<i>Larix x eurolepis</i> Henry	2	2	2

Replenishment of the collection was carried out from 1954 to 1964. For the period of the arboretum existence 101 species of Japan and China flora plants have been introduced into its composition, besides separate species (ailanthus, Chinese magnolia vine and etc.) have been bedded out several times. Analyzing the assortment of preserved and bedded out woody and shrubby species, it should be noted that their species and number composition has been considerably varied. In the course of climate conditions changes during the first years of acclimatization 24 species have been died out from the collection composition: ailanthus, Himalayan pine and etc. As for the shrubs, all bedded out species of roses died out (prickly, Tibetan, multicolored), butterfly-bush (unsteady, narrow-paniculate, lindleyana), and alsorhodotypos, rabbitberry, sambucussieboldiana and etc. Capacity for survival of the species of the collection is about 75%. Some species such as Japanese walnut, cinnamonstem barberry, Chinese poplar and etc., have been preserved in one

specimen only. Capacity for survival of 25 species is less than 50%. 30 species have completely preserved their numerical composition.

Conclusion. Dying out within the plants collection of the sector «Japan, China» is connected with the changes of environmental conditions provoked by the influence of the upper storey of trees. And a big number of shrubs were under its shelter. Some species were cut down by the students during improvement thinning.

References

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