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MIDDLE ASIA PLANTS IN THE BOTANICAL GARDEN OF BSTU

The results of the introduction of species from harsh areas of the harsh areas of Central Tanshan as well as Turan and Turkmen provinces of Iran-Turan region 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 66 species of flora of Siberia. Significant replenishment of the collection was carried out in 1963, 1975–1977. Currently, 26 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 *Caragana leucophloea* Pojark, *Sorbaria lindleyana*, *Sorbaria kirilowii*, *Caragana turkestanica*, *Caragana brevispina* Royle, *Cornus Torreyana* and others.

Not tested species such as *Populus bolleana* Louche, *Picea schrenkiana* subsp. *tianschanica*, *Spiraea mongolica*, *Kerria japonica*, *Elaeagnus angustifolia*, *Caragana spinosa*, *Caragana arborescens* (f. *pendula*), *Caragana arborescens* (f. *lorbergii*) and others.

In the extremely depressed state on the verge of dropping out of the collection are *Lycium barbarum*, *Lonicera altaica* Pall., *Malus pumila*, *Spiraea pubescens* and others.

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

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

Introduction. Republic of Belarus is the forest country, but its flora is not rich with trees and bushes. Naturally 28 kinds of trees and about 60 kinds of bushes grow here [1].

Such structure of dendroflora in modern conditions does not satisfy constantly growing requests of green construction, forestry, the population when using green plants on their sites. It causes the necessity of enrichment of local flora economically useful plants by an introduction from other regions and areas of the globe.

For initial test of the introduced wood plants special landings – tree nurseries are put. The tree nursery forms the basis for introduced researches of wood plants, liquor an initial material for reproduction of perspective kinds. Concentration in a certain system of a big specific and tin variety of wood and bush plants will be allowed to use a tree nursery as educational base for training of specialists of various qualification and students [2].

Studying of introducers includes the whole complex of works on detection of their biological, ecological and biotechnical features which allow to establish adaptation processes of these types to local conditions.

In botanical gardens preservation and augmentation of a gene pool of rare and endangered species have important value of introduced activity.

Main part. The plants introduced into sector “Central Asia” are a part of flora of an old mediterranean subkingdom. This area approximately cor-

responds to “area of steppes” (Steppengebiet) of A. Grizebakh’s, established to them more than hundred years ago. The flora of Iranian highland is rich, and the flora of Central Asia is poor [3].

In Irano-Turansky area two subareas are allocated – West Asian and Central Asian. The flora of the West Asian subarea is presented partially by vegetation of the Turansk and Turkmen province.

The vegetable cover of the Turansky province consists mainly of purely desert or steppe formations.

The main forest breeds are iron ore (*Parrotia persica*, an endemic monotype sort from family gamamelidovy) and a chestnut oak (*Quercus castanefolia*). In the forests of the lower mountain belt as forest forming breeds join them a zelkova (*Zelkova carpinifolia*) and a hornbeam (*Carpinus betulus*).

The Turkestan province covers mountains and uplands of Central Asia to the Central Tien-Shan and Pamir in the east.

In the foothills and lowlands considerable spaces are occupied by desert types of vegetation, especially haunted vegetation. For mountain sides the secondary communities which resulted from destruction of forest vegetation are characterized. Considerable spaces in mountains are occupied by peculiar formations of steppe type with participation large umbrellate, ephemeral plants and geofit, and also light forests or more rare the woods formed by junipers.

The deciduous forests are found only in the form of certain arrays. The walnut forms the forests

in the western part of Tien-Shan and on the Hissar ridge. Along with pure plantings of a nut are usual the maple-nut and apple-nut forests which adapted to more lit slopes. Also light maple forests of park type from Semenov's (*Acer semenovii*) maple and a Turkestan maple (*Acer turkestanicum*) are characterized. Only small spaces are occupied by the spruce and fir forests. Spruce forests consist of Shrenk's (*Picea schrenkiana*) spruce – a high slender tree. The fir is presented in the Turkestan province by special geographical race of the Siberian fir, known under the name of a fir of Semenov. It does not form pure plantings, but grows in combination with a spruce, an apple-tree and a walnut.

The Central Asian subarea covers the extensive territory of deserts and steppes extending from Balkhash and Central Tien-Shan to Big Hingan. It represents a kingdom of peculiar cold deserts, desert and mountain steppes. Its flora is relatively poor.

Due to dryness and very big difference between extreme temperatures and the flora of the Central Asian subarea is characterized by depression comparative monotony. The mountain steppes passing with places into forest-steppes, mountainous meadows, but especially various desert and semidesert formations are dominate. In some places there are islands of the spruce, spruce-fir, larch and very poor deciduous forests.

The introduced plants are presented only from the Central Tien-Shan province. In flora of this province steppe communities dominate. As for trees and shrubs vegetation, it is presented here fragmentary and occupies the small spaces. There are separate, usually small, islands of spruce forests. Also deciduous plantings consisting of a poplar, a birch, types of a honeysuckle, occasionally wild apricot, etc. [3].

Certain representatives of wood and shrubs plants of Central Asia were introduced into a tree nursery of a botanical garden of BSTU, which is in forest area of the Negorelsky educational and experimental forestry, which is part of the Dnieper-Neman geobotanical district subzone of hornbeam-oak-conifer forests in its northern border Yurkevich I. D., Geltman V. S., 1965). According to zoning of the territory of Belarus, which developed by N. D. Nesterovich, its territory is located in the extreme southwest of the North Central district in the Western subdistrict (Nesterovich N. D., 1955).

The soil sod-podsolic, medium podzolized sandy, developing on sandy loam, the underlying sand connected, and from depth of 90–150 cm light sandy loam with boulders. Climate of the area is moderately-cold and humidified. The absolute minimum of temperatures reaches –39°C. The earliest autumn frost was observed on September 3, the latest spring – on June 4. The maximum soil

freezing – 45 cm, minimum – 15 cm for the winter period. Duration of the period with positive air temperature is 240 days, in separate years it hesitated from 184 to 292 days. Duration of the frost-free period is from 107 to 178 days. The sum of rainfall in a year averages 650 mm.

The tree nursery is located on the right bank of the river Peretut of a Usa river basin of the Neman watershed. A relief is flat, with a small bias to the East, towards the river. Height above sea level on average of 178 m, the level of ground waters is located at a depth of 4.5 m.

Sector “Central Asia” is the smallest on the area (0.49 hectares) in a tree nursery.

The first landings of plants in sector are made in 1954 by saplings of the oleaster of narrow-leaved (*Elaeagnus angustifolia*) in quantity of 31 pc., which was received from Belgospitomnik. By 1960 only 15 plants with abundant root shoots remained. Due to the landing of other plants and formation of the closed landscape all plants of the sucker narrow-leaved dropped out by 1981. In the spring 1957 and 1963 and in the autumn 1962 by associate professor I. V. Gunyazhenko were imported to replenish the collection saplings from a botanical garden of the Kiev agricultural academy and dendrology park “Trostyanyets”. Such types as a poplar Ball (*Populus bolleana Louche*), rozovik four-leaved (*Paris quadri-folia*), an apple-tree dwarf (*Malus pumila*), spireya Mongolian (*Spiraea mongolica*), a karagana weeping (*Caragana arborescens* (f. *pendula*)), prickly (*Caragana spinosa*) and Lorberg's (*Caragana arborescens* (f. *Lorbergii*)), Albert's honeysuckle (*Lonicera alberti* Rgl) and east, some other plants. The plants planted during this period practically everything dropped out (Table 2). On the last in the 70–80th of the XX century the introduction of plants from various regions of the former USSR in this sector was carried out by seeds which passed introduction tests in nursery of a tree, with the subsequent their jumping in sector “Central Asia”. It generally represents of the genera an apple-tree (*Malus*), a karagan (*Caragana*), a fieldfare (*Sorbaria*) which well settled down and dominate at the moment (Table 1).

During the existence of a tree nursery into sector “Central Asia” 66 species of plants of flora of Irano-Turansk area were entered from which remained only 26, dropped out 40 types (Table 2). The causes of loss of plants are various.

Conclusion. Results of systematic inventories show that there is a marked tendency to loss introduced into 60–70s XX century.

Especially photophilic and thermophilic types suffer. In the dropping-out curtains there are changes of specific structure due to introduction of local types of a maple (*Acer*), a linden (*Tilia*), an euonymus (*Euonymus*), spirey (*Spiraea*), etc.

Table 1

The range of the wood and shrubby breeds planted and which preserved in sector “Central Asia”

The species composition of plants, year of planting	Year of planting	Quantity	Inventory 1986, piece	Inventory 2013, piece	Origin of the planting material
Fieldfare narrow-leaved, <i>Sorbaria sorbifolia</i> L.	1982	2	2	2	Dnepropetrovsk
Karagan without bark, <i>Caragana leucophloea</i> Pojark.	1975	7	Curtain	Curtain	Leningrad, LTA
Fieldfare Lindleya, <i>Sorbaria lindleyana</i>	1982	5	5	Curtain	Kirovsk
Fieldfare Kirillov's, <i>Sorbaria kirilowii</i> Maxim.	1961	5	Curtain	Curtain	Trostryanets
Sheydekker's apple-tree, <i>Malus schiedeckeri</i>	1979	8	1	1	Voronezh
Barberry spinous, <i>Berberis aristata</i> DC.	1977	8	5	1	Veselye Bokovenki
Apple-tree of Sivers, <i>Malus sieversii</i> (Ledeb.) M. Roem.	1972	2	2	2	Moscow, b. g. drug plants
Cotoneaster felt, <i>Cotoneaster tomentosus</i> L.	1975	10	10	Curtain	Perm
Karagan Turkestan, <i>Caragana turkestanica</i> Kom.	1981	6	4	Curtain	Minsk, CBS
Karagan with short needle, <i>Caragana brevispina</i> Royle	1977	5	3	Curtain	Veselye Bokovenki
Rowan of Tien-Shan, <i>Sorbus tianschanica</i> Rupr.	1981	3	3	1	Kirovsk
Svidin Torrey's, <i>Cornus torreyi</i> Torrey & A. Gray	1976	9	Curtain	Curtain	Leningrad, LTA
Poplar white, <i>Populus alba</i> L.	1976	9	9	5	Minsk, BTI
Spirey, <i>Spiraea trilobata</i> L.	1976	6	13	1	Moscow, Tomsk
Barberry oblong, <i>Berberis oblonga</i> Regel.	1977	5	5	Curtain	Saratov
Karagan orange, <i>Caragana aurantica</i> Koehne.	1976	10	8	3	Askaniya-Nova
The mock pubescent, <i>Philadelphus pubescens</i> Loisel	1975	6	6	Curtain	Lipetsk LOS
Birch useful, <i>Betula utilis</i> D.Don	1975	3	1	1	Leningrad, LTA
Maple with green bark, <i>Acer tegmentosum</i> Maxim	1961	3	3	2	Trostryanets
Nedzvedsky's apple-tree, <i>Malus niedzwetzkyana</i> Dieck	1973	2	2	2	Kiev, Agricultural Academy
Apple-tree purple, <i>Malus purpurea</i> Rehder	1969	5	4	2	Lipetsk LOS
Currant two-needles, <i>Ribes diacanthum</i> Pall.	1979	6	6	Curtain	Irkutsk
Semenov's maple, <i>Acer semenovii</i> Regel & Herder	1981	3	3	2	Lipetsk LOS
Maple twisted, <i>Acer circinatum</i> Pursh	1969	2	2	2	Lipetsk LOS
Willow white, <i>Salix alba</i> L.	1970	10	6	3	Trostryanets
Fieldfare treelike, <i>Sorbaria arborea</i> A. Braun	1981	1	1	1	Arkhangelsk

Table 2

The range of the wood and shrubby types which dropped out of sector “Central Asia”

The species composition of plants	Year of planting	Quantity	Region of receiving planting material	Year death
Karagana doubtful, <i>Caragana ambigua</i> Stocks	1981	4	Khorog, Kiev, Agricultural Academy	1986
Poplar Bolle's, <i>Populus bolleana</i> Louche	1957	38	Khorog, Kiev, Agricultural Academy	1981
Spruce of Tien-Shan, <i>Picea schrenkiana</i> subsp. <i>tianschanica</i>	1979	3	Lipetsk LOS	1995
Jetbead climbing, <i>Rhodotypos scandens</i> (Thunb.) Makino	1983	62	Trostryanets	1995
Boxthorn of barber, <i>Lycium barbarum</i> L.	1983	45	Alma-Ata	1986
Honeysuckle Altai, <i>Lonicera altaica</i> Pall.	1975	4	Leningrad, LTA	1991
Morrou's honeysuckle, <i>Lonicera morrowii</i> A. Gray	1975	6 + 4	Saratov	1993
Colutea Paulsen's, <i>Colutea paulsenii</i> Frein & Sint	1981	5	Minsk TsBS	1986
Rose sharp-toothed, <i>Rosa oxyodon</i> Boiss	1962	11	Kiev, Agricultural Academy	1986
Apple-treedwarf, <i>Malus pumila</i> Poit & Turp	1979	4	Kiev, State University	1986
Spirey crenate, <i>Spiraea crenata</i> L.	1975	3	Tomsk	1991
Cotoneaster pinkish, <i>Cotoneaster roseus</i> Edgew	1977	1	Tomsk	1998
Hawthorn with spaced leaves, <i>Crataegus remotilobata</i> Rai-kova & Popov	1981, 1984	2 + 1	Minsk TsBS	1998

End of Table 2

The species composition of plants	Year of planting	Quantity	Region of receiving planting material	Year death
<i>Exochorda grandiflora</i> , <i>Exochorda racemosa</i> Lindl.	1982	2	Askaniya-Nova	1998
Diervilla with sessile leaves, <i>Diervilla sessilifolia</i> Buckley	1975	Group	Askaniya-Nova	1966
Spirey Mongolian, <i>Spiraea mongolica</i> Maxim.	1963, 1977	6 + 3	Veselye Bokovenki, Trostyanets	2013
Spirey pubescent, <i>Spiraea pubescens</i> Turcz	1979	5	Irkutsk	2013
Barberry spring, <i>Berberis vernae</i> Schneid	1977	4	Lipetsk LOS	1995
Barberry coins, <i>Berberis nummularia</i>	1977	1	Askaniya-Nova	1995
Ekzokhorda of Tien-Shan, <i>Exochordara cemoso</i> Lindl.	1979	1	Askaniya-Nova	1988
Kerriya Japanese, <i>Kerria japonica</i> DC.	1975	7	Askaniya-Nova	1986
Hawthorn Altai, <i>Crataegus altaica</i> (Loud.) Lange	1977	1 + 2	Omsk, Novosibirsk	2000
Oleaster narrow-leaved, <i>Elaeagnus angustifolia</i> L.	1954	8	Belgospitomnik	1981
Sea-buckthorn rhamnaceae, <i>Hippophaë rhamnoides</i> L.	1962	5	Kiev, Agricultural Academy	1964
Karagan prickly, <i>Caragana spinosa</i> L. (DC)	1962	2	Kiev, Agricultural Academy	1970
Karagan weeping, <i>Caragana arborescens</i> (f. <i>pendula</i>) Lam.	1962	1	Kiev, Agricultural Academy	1964
Karagan Lorberg's, <i>Caragana arborescens</i> (f. <i>lorbergii</i>)	1962	1	Kiev, Agricultural Academy	1964
Albert's honeysuckle, <i>Lonicera alberti</i> Rgl.	1963	4	Trostyanets	1966
Honeysuckle east, <i>Lonicera orientalis</i> Pall.	1963	1	Trostyanets	1964
Elder Kamchatka, <i>Sambucus kantschatica</i> E. L. Wolf	1963	7	Trostyanets	1966
Budley with white flowers, <i>Buddlejaceae albiflora</i>	1963	5	Trostyanets	1964
Gooseberry needle, <i>Ribes acicularis</i> (Smith) Spach	1962, 1963	2 + 2	Kiev, Agricultural Academy, Trostyanets	1966
Oriental olive, <i>Elaeagnus orientalis</i> L.	1963	21	Trostyanets	1964
Veygella hybrid, <i>Weigela hybrid</i> Jaeg.	1962	9	Trostyanets	1986
Honeysuckle small-leaved, <i>Lonicera microphylla</i> R. Schult.	1984	3	Khorog	1998
Tomariks branchy, <i>Tamarix ramosissima</i> Ldb.	1970	5	Trostyanets	1973
Poplar pyramidal, <i>Pupulus pyramidglis</i> Salisb.	1982	8	Trostyanets	1986

Self-sowing of these types extend so actively that create existence threat to the introduced types which were less adapted for local conditions.

The loss of the collection is also the fact that appear in clumps plants that have reached their critical age and their quantity is steadily increasing.

At the moment in a collection in connection with loss there was an intensive growth of curtains of the plants possessing ability of weed forming reproduction. Species of these plants, having 5–7 seats, in a collection grow together in curtains, form a dense cover that leads to displacement of other types.

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