

Revitalization of Ex-botanical garden in Trnava

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Abstract: This contribution is focused on the description of Ex-Botanical garden in Trnava. This Garden was established in 1967 by the Faculty of Education, Comenius University in Bratislava which was at that time settled in Trnava. Garden was very small – about 3,34 ha but it was registered into the system of Botanical gardens and arboretum of ČSSR (Czechoslovak Socialist Republic) 1974. Into the group of originally planted species belongs *Sequoiadendron giganteum* (Lindl.), *Cedrus deodara* (Roxb.) Loud, *Cryptomeria japonica* (L. f.) D. Don, *Poncirus trifoliata* (L.) Raf., *Quercus rubra* L., *Phellodendron amurense* Rupr. Etc. In 1986 was Faculty of Education moved to Bratislava and into the buildings were moved MTF STU. Focus of new faculty was widely different than the last one and the area of Botanical garden started grown by succession. In 2005 the Department of Environmental Engineering of MTF STU initiated the revitalization of the area.

Keywords: Botanical garden, revitalization, Trnava

Introduction

Botanical gardens and Arboretum are facilities dedicated to the production of selected species of endangered, rare, rare or otherwise protected material products with a focus on the study of biological characteristics and types of claims, using the results of studies to protect their populations in the natural environment; study possibilities for the return of the growing population in the natural environment, formation of genus collections of protected plants; preservation of existing species in artificial environments in the case of their extinction or eradication in the natural environment and acquire seeds and plant

material of protected plant and implement a training and public education aimed at the protection of protected plants (according to Act. 543/2002). According to the above definition every one place that has a potential under artificial condition help to preserve genome of different species has important role in protecting environment.

Basic information

Location

Ex-botanical garden is located in the middle of northern border of the Faculty of Materials Science and Technology (MTF) area between the Botanical and Bottova Street in Trnava. The area is by the common binding regulation of the town Trnava defined as a non build-up green area. Location of the ex-botanical garden is presented in the Fig. 1.



Fig. 1. Location of Ex-botanical garden between the streets: Botanickej, Jána Bottu and Gejzu Dusika. Dot-dashed line bounded area of original Botanical Garden in 1970. Full line bounded area of Ex-botanical garden in the 2010.

View of the area of Ex-Botanical garden from the area of the Faculty of Materials Science and Technology in Trnava is shown in the Fig. 2.

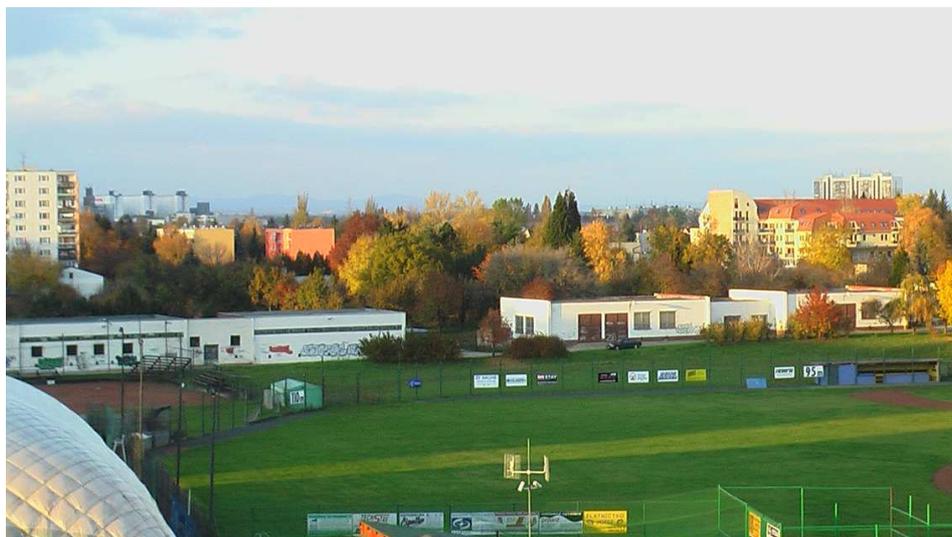


Fig. 2. View of the area of Ex-botanical garden from the area of the Faculty of Materials Science and Technology in Trnava.

Geography, soil and climate conditions:

Geographical location:	48 °22 'N 17 °40' E
Elevation:	146 m
Average annual temperature:	9.5 °C
Average yearly rainfall:	400 – 700 mm
Geological background:	loess
Soil type:	muck

Establishment and History

In the 1964 (September) was submit a petition for the change of culture in the land register of Trnava by Faculty of Education, Comenius University in Bratislava which was at that time settled in Trnava. After in 1965 was given an agreement with the change of culture from arable land into a garden with extend 1,5 ha. In 1966 was originated the layout of Faculty of Education Botanical garden establishment. The dean of the faculty was in that time Dr. Jozef Schubert. The layout calculate with extend area 2,5 ha.

The year 1967 was the year of Botanical garden establishment. The extend area was 1,4 ha. It was subordinated by the Institute of Natural Science (Faculty of Education – Comenius University in Bratislava) which settled in that time in Trnava. Area was divided into two sectors: 1. for practical education of ecological and agricultural and gardening character (now cancelled) and 2. for practical

education of dendrology designed as an arboretum (still existing). In 1970 was the area of the garden widened to 3,37 ha. In 1974 was the garden included into the Botanical garden list of ČSSR. In the address book of Botanical Gardens and Arboretums (1974) was named MSc. Vendelín Nádaský as the director. In 1975 was executed the design of the garden and the plan of landscape gardening by in that time M.Sc. Ivar Otruba and M.Sc. Eva Otrubová. By comparing of the gardening plan existing positioning of existing plants are quite different now, so this plan wasn't realized. In the Tab. 1 there is list of coniferous tree proposal and in the Tab. 2 there is list of foliaceous tree proposal.

In 1977, an area for teaching practical environmental and agricultural / nature landscaping located 854 fruit trees (40 varieties), grape vines (10 varieties) - the total number 2 209 pieces, 30 species of conifers and shrubs (400 pieces) and the initial number of roses for the rose garden formed 460 pieces (5 species). The area for the practical teaching dendrology (0,8 ha) was planted with 30 kinds of conifers and shrubs (total of 400 pieces). This is a most likely area of the current Ex-botanical garden, which belongs now to the Faculty of Materials Science and Technology, Slovak University of Technology in Bratislava (MTF STU). By the obtained information it should be given most attention to the dendrological part of the garden. In that time after developing a detailed dendrological plan, there was a presumption felling cherries, pears, peaches, and this area has become a dendrological part too. Botanical Garden initially was not available to the public, and was used only for educational-scientific purposes. Botanical garden was developed until 1986. In 1986 was Faculty of Education moved to Bratislava and into the buildings were moved MTF STU. Focus of new faculty was widely different than the last one and the area of Botanical garden started grown by succession.

Tab. 1. The proposal of coniferous for the original Botanical garden designed by M.Sc. Ivar Otruba and M.Sc. Eva Otrubová in 1975 (nomenclature is cited by the original document).

No.	Latin name	No.	Latin name
4	<i>Taxus cuspidate</i> Sieb.	57	<i>Juniperus virginiana</i> L.
5	<i>Calocedrus decurrens</i> Kurz.	58	<i>Pinus leucodermis</i> Ant.
6	<i>Ginkgo biloba</i> L.	59	<i>P. nigra</i> Arnold
9	<i>Taxus baccata</i> dow. <i>aurea</i> . sp.	60	<i>P. cembra</i> L.
10	<i>Taxus baccata</i> L.	61	<i>P. strobus</i> L.
16	<i>Abies normandinniana</i> Spach.	62	<i>P. ponderosa</i> Laws.
17	<i>Abies cephalonica</i> Loud.	63	<i>P. banksiana</i> Lamb.
18	<i>Picea mariana</i> Mill.	64	<i>Cryptomeria japonica</i> Don.
19	<i>Picea omorica</i> Purk.	65	<i>Cunninghamia lanceolata</i> Lamb.
20	<i>Abies concolor</i> Engelm.	66	<i>Sciadopitys verticillata</i> Zucc.
25	<i>Picea breveriana</i> Wats.	67	<i>Cedrus atlantica</i> Manet
26	<i>Picea glauca</i> Voss.	68	<i>Cedrus libanii</i> Loud.
30	<i>Picea sitchensis</i> Carr.	69	<i>Pseudolarix kaempferii</i> Rehd.
52	<i>Sequoiadendron giganteum</i> Buch.	70	<i>Cephalotaxus fortunei</i> Zucc.
53	<i>Thuja plicata</i> Lamb.	71	<i>Torreya californica</i> Torr.
54	<i>Thuja plicata howeyi</i> sp.	72	<i>Tsuga canadensis</i> Carr.
55	<i>Thujopsis dolobrada</i> Zucc.	73	<i>Pseudotsuga taxifolia</i> Carr.
56	<i>Camaecypris nutkatensis</i> Lamb. , CH. <i>lawsoniana</i> Murr.		

Tab. 2 - The proposal of deciduous trees for the original Botanical Garden designed by MCs. Ivar Otruba and MCs. Eva Otrubová in 1975 (nomenclature is cited by the original document).

No.	Latin name	No.	Latin name
1	<i>Magnolia kobus</i> DC.	34	<i>Cercis siliquastrum</i> L.
2	<i>Magnolia acuminata</i> L.	35	<i>Maclura pomifera</i> Sneid.
3	<i>Liriodendron tulipifera</i> L.	36	<i>Gymnocladus dioica</i> Koch.
7	<i>Zelkova carpinifolia</i> Koch.	37	<i>Prunus mahaleb</i> L.
8	<i>Cercidiphyllum japonicum</i> S.	38	<i>Cladrastis lutea</i> Koch.
11	<i>Tilia americana</i> L.	39	<i>Populus simonii</i> Carr.
12	<i>Tilia euchlora</i> Koch.	40	<i>Populus lasiocarpa</i> Oliv.
13	<i>Tilia tomentosa</i> Moench.	41	<i>Liquidambar styraciflua</i> L.
14	<i>Crataegus oxyacantha</i> L.	42	<i>Platanus acerifolia</i> Willd.
15	<i>Sorbus torminalis</i> Cranz.	43	<i>Salix daphnoides</i> Vill.
21	<i>Sorbus aria</i> L.	44	<i>Betula papyrifera</i> Marsh.
22	<i>Evodia huspehensis</i> Dol.	47	<i>Fraxinus ornus</i> L.
23	<i>Acer dasycarpum</i>	48	<i>Corylus colurna</i> L.
24	<i>Phelodendron amurense</i> Rupr.	19	<i>Celtis occidentalis</i> L.
28	<i>Catalpa bignonioides</i> Wat.	50	<i>Quercus borealis</i> Michx.
29	<i>Exochorda racemosa</i> Rehd.	51	<i>Fagus sylvatica atropurpurea</i>
31	<i>Sophora japonica</i> L.	74	<i>Brousonetia papyrifera</i> Vent.
33	<i>Gleditsia triacanthos</i> L.		

Revitalization

In 2005 the department of Environmental Engineering of MTF STU initiated the revitalization of the area. It was realized the first dendrological survey and was developed the Revitalization Area Study. Through grants was obtained funding for professional dendrological survey which was realized in the year 2006 by Atelier Duma Bratislava (Fig. 3). Fig. 3 also represents the status at the beginning of the revitalization. During dormancy were gradually removed most of the old and ill trees and were cut most of shrubs. From 2007-2008 until now were removed approximately 40 pieces of old mainly fruit plants.

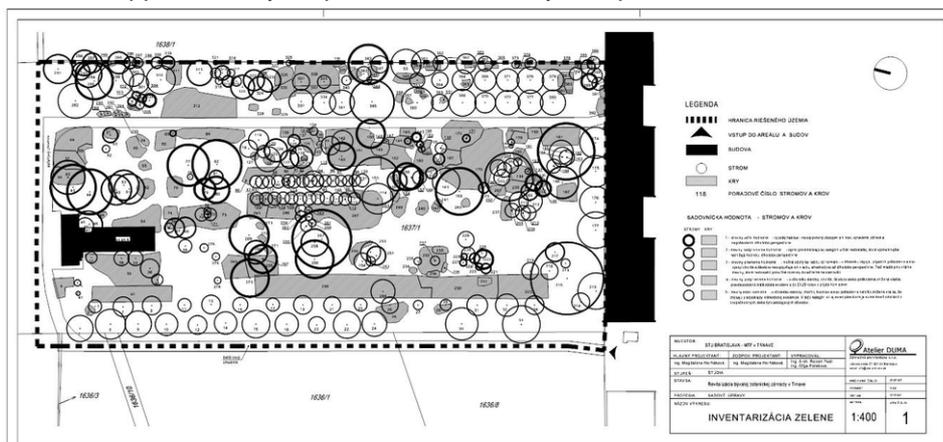


Fig. 3. Inventory of trees and shrubs in the Ex-Botanical garden (acc. HORŇÁKOVÁ 2008). (Ateliér DUMA Bratislava, 2008). In 2008 was contemplate only with the displayed part of the garden (72 m x 144 m, app. 1 ha, plat number 1637/1).

In 2007 was in the site (72 m x 144 m, app. 1 ha, plat number 1637/1) located 248 pieces of trees and 3 248 square meters of shrubs. The species composition were predominant representation of deciduous trees (152 pieces), which was 92 pieces of fruit trees and the rest of the ornamental trees. The largest area occupied shrub deciduous shrubs – 2 782 square meters. Evergreen shrubs cover the area of 313 square meters. The smallest area was occupied by coniferous shrubs – 151 square meters.

A dominant presence in the area had in 2007 *Prunus sp.* (14.1%), *Malus sp.* (12.5%) and *Thuja occidentalis L.* (12.5%), subdominant *Pyrus communis L.* (6.9%) and *Chamaecyparis lawsoniana (A. Murray.) Partl.* (5.6%).

In 2008 MTF STU obtained a grant of 26 555, - EUR from the Environmental Fund. The starting point of revitalization funded by the grant is shown in the Fig. 3. It was removed next 20 pieces of trees and replaced by new 20 trees in the eastern part of the garden (Fig. 4). The list of new planted trees is in the Tab. 3.

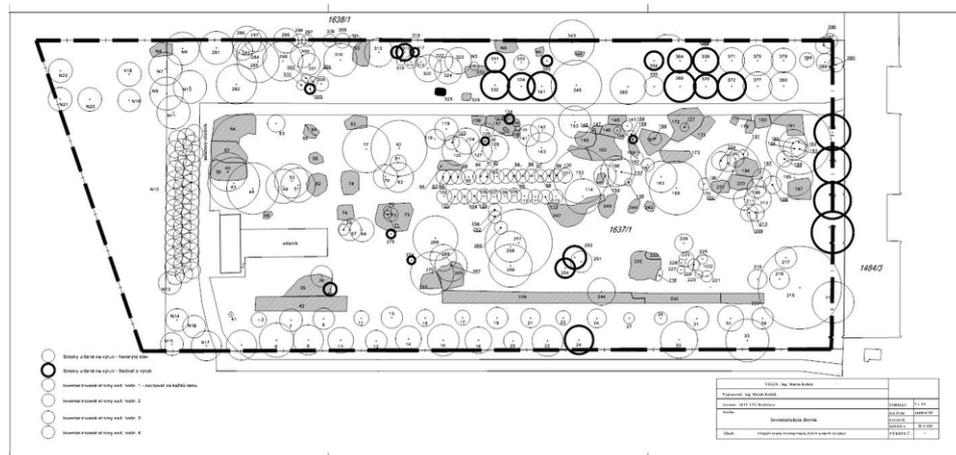


Fig. 4. Trees removed from Ex-Botanical garden in 2008 (acc. HORŇÁKOVÁ, KOLNÍK 2008), supported by Environmental Fund in 2008 (plat number 1637/1 and 1637/3).

Tab. 3. List of planted trees in Ex-Botanical garden, supported by Environmental Fund in 2008 (HORŇÁKOVÁ, KOLNÍK 2008).

No.	Taxon name	No.	Taxon name
1	<i>Acer campestre L.</i>	11	<i>Gleditsia triacanthos L. 'Skyline'</i>
2	<i>Acer cappadocicum Gled.</i>	12	<i>Crataegus x lavalleyi 'Carrierei'</i>
3	<i>Acer rubrum L.</i>	13	<i>Liliodendron tulipifera L.</i>
4	<i>Aesculus hippocastanum L.</i>	14	<i>Metasequoia glyptostroboides Hu et Cheng</i>
5	<i>Amelanchier lamarckii F.G.Schroed.</i>	15	<i>Paulownia tomentosa (Thunb.) Steud.</i>
6	<i>Carpinus betulus L. - 2x</i>	16	<i>Quercus cerris L.</i>
7	<i>Corylus colurna L.</i>	17	<i>Quercus palustris Münchh.</i>
8	<i>Crataegus monogyna Jacq. 'Sticta'</i>	18	<i>Sorbus torminalis (L.) Crantz</i>
9	<i>Fagus sylvatica L.</i>	19	<i>Catalpa bignonioides Walt.</i>
10	<i>Gingko biloba L.</i>		

Positioning of new planted trees is shown in the Fig. 5.

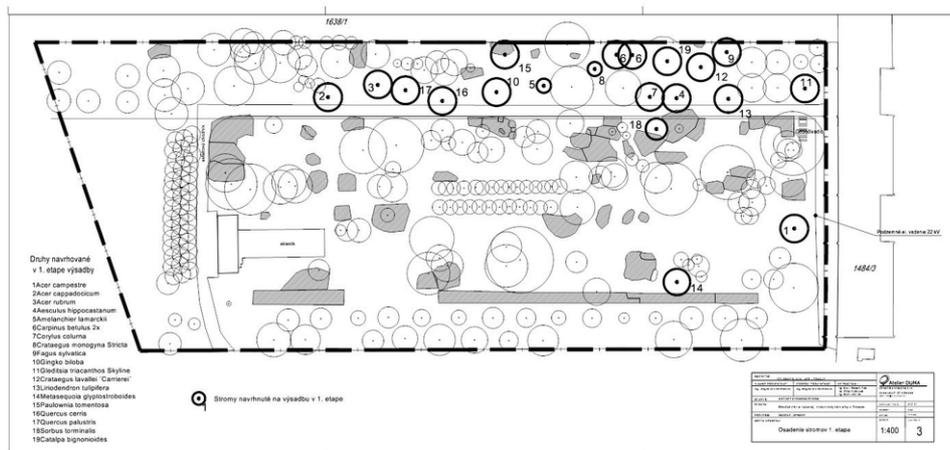


Fig. 5. The Position of planted trees in Ex-Botanical garden (acc. HORŇÁKOVÁ, KOLNÍK 2008), supported by Environmental Fund in 2008.

In the Fig. 6 and 7 there are shown the status before revitalization in the year 2007 and after in the year 2008.



Fig. 6. Status before revitalization (year 2007). Fig. 7. Status after revitalization (year 2008).

Current status

The area of current Ex-botanical garden is situated in the plat number 1637/1 and 1637/3. Total area is 1,15 ha. Areal of Ex-Botanical garden is fenced and there exist three main entrance gates – two from the southern part and one from the western part of the garden.

In the area there are 256 pieces of trees and shrubs 975 square meters. The species compositions have prevailing representation of deciduous trees (161 pieces). The largest area occupied deciduous shrubs - 600 square meters.

Evergreen shrubs are an area of 395 square meters. Smallest area occupied by coniferous bushes - 315 m². A dominant presence in the area occupied *Thuja occidentalis* L. (27,7 %), *Prunus* sp. (12,5 %), *Pyrus communis* L. (7,1%), subdominant are *Chamaecyparis lawsoniana* (A. Murray.) Parl. (5,4 %), *Juniperus Sabina* L. (3,1 %) and *Malus* sp. (2,3%). Fruit trees make up the largest share by domestic plants. The most common landscaping value is No. 4, which means mediocre condition. Perspective of fruit trees which creates totally about 21,8 % of all according to their health and growing status is very short. Potential trees to cut down represent Fig. 8 (*Prunus* sp., *Malus* sp., *Pyrus* sp., *Thuja* sp.).

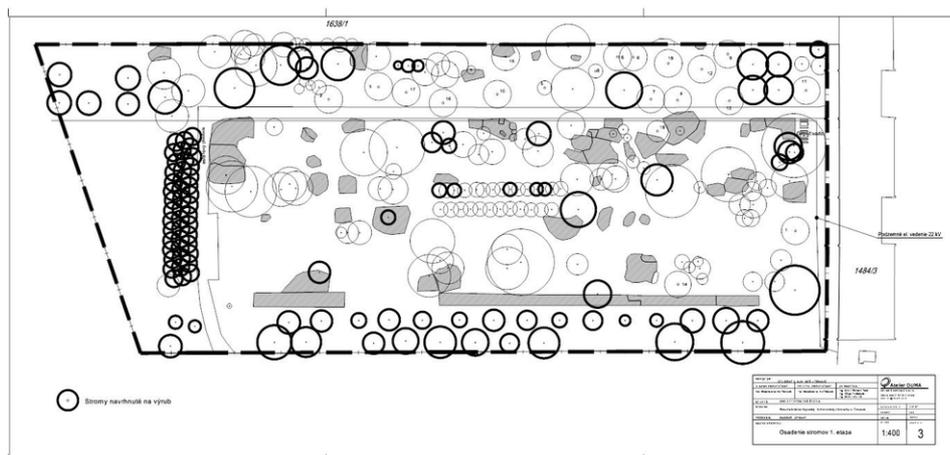


Fig. 8. Trees with potential to cut down (acc. HORŇÁKOVÁ, KOLNÍK 2008) - *Prunus* sp., *Malus* sp., *Pyrus* sp., *Thuja* sp. etc.

As the area of the former botanical gardens, other species are represented in smaller numbers, mostly 1-3 pieces of one species. A large part consists mainly of introduced plants, such as many cultivar types.

A stabilizing element for the restoration of the site area can be used *Sequoiadendron giganteum* (Lindl.) J. Buchholz, *Cedrus deodara* (Roxb.) Loud., *Cryptomeria japonica* (L. f.) D. Don, *Quercus rubra* L., *Abies concolor* (Gord.) Engelm., *Platanus occidentalis* L., *Liquidambar styraciflua* L., *Tilia cordata* Mill., *Pseudotsuga menziesii* (Mirbel) Franco, *Larix decidua* Mill., *Catalpa ovata* G. Don, which belong to the originally planted species.

The most exotic trees, whether in terms of landscaping, or aesthetic dendrological are: *Sequoiadendron giganteum* (Lindl.), *Cedrus deodara* (Roxb.) Loud., *Cryptomeria japonica* (L. f.) D. Don, *Poncirus trifoliata* (L.) Raf., *Quercus rubra* L., *Phellodendron amurense* Rupr. In the Tab. 4, there is a list of most important existing trees with their parameters.

Tab. 4. List of the most important existing trees and scrubs located in the Ex-Botanical garden in Trnava (according HORŇÁKOVÁ, KOLNÍK 2008).

Taxon names	Average of tree trunk (cm)	Circuit of tree trunk (cm)	Average of tree-top (m)	Height (m)	Age (year)	Lands-caping Value*
<i>Abies concolor</i> (Gord.) Engelm.	46	145	7,2	12	20 - 40	1
<i>Abies concolor</i> (Gord.) Engelm.	33,4	105	5,2	12	20 - 40	2
<i>Abies concolor</i> (Gord.) Engelm.	20,7	65	4,6	8	20 - 40	3
<i>Acer tataricum</i> L.	10,8	34	7	5	20 - 40	
<i>Acer tataricum</i> L.	19,1	60	9	6	20 - 40	
<i>Catalpa ovata</i> G. Don	24,5	77	5,8	8	20 - 40	2
<i>Catalpa ovata</i> G. Don	22,9	72	6,5	8,4	20 - 40	2
<i>Catalpa ovata</i> G. Don	27,4	86	6,4	9	20 - 40	2
<i>Cedrus deodara</i> (Roxb.) Loud.	12,4	39	4,6	9,5	20 - 40	2
<i>Cedrus deodara</i> (Roxb.) Loud.	19,1	60	7	12,5	20 - 40	2
<i>Cedrus deodara</i> (Roxb.) Loud.	37,2	117	9,8	12	20 - 40	1
<i>Cryptomeria japonica</i> (L. f.) D. Don	11,4	36	2,65	4,5	20 - 40	2
<i>Cryptomeria japonica</i> (L. f.) D. Don	26,4	83	5	9,5	20 - 40	1
<i>Liquidambar styraciflua</i> L.	5,8	18	7,5	5,1	20 - 40	1
<i>Phellodendron amurense</i> Rupr.	11,1	45	6,8	5	20 - 40	4
<i>Phellodendron amurense</i> Rupr.	22,2	70	6,2	5,2	20 - 40	4
<i>Poncirus trifoliata</i> (L.) Raf.	area: 3m ²			2	< 30	1
<i>Quercus rubra</i> L.	54	170	12	12	20 - 40	1
<i>Quercus rubra</i> L.	53,4	168	12	12	20 - 40	1
<i>Sequoiadendron giganteum</i> (Lindl.)	61,4	193	7,2	15	35 - 50	1
<i>Sequoiadendron giganteum</i> (Lindl.)	64,4	200	6,2	14	35 - 50	1
<i>Staphylea pinnata</i> L.	area: 8m ²			3,2	< 30	3

* According to Act No. 24/2003 and 543/2002.

Ex-Botanical Garden in Trnava is the only territory in the Trnava region, which was previously entered into the system of Botanical gardens. The closest Botanical Garden accessible to the public is located in Bratislava region (Botanical Garden of Comenius University in Bratislava), and in the Nitra region (Arborétum S.A.V. Tesárske Mlyňany). The species composition and age of plants in the Ex-Botanical garden in Trnava has the potential to become after revitalization a very important regional territory, which will increase the attractiveness of the Trnava city and the entire region.

For residents and students an extraordinary renewal area located in the urban panel houses, where the next rest area is located approximately 15 minutes

walk. It is a green oasis recoverable by the revitalization will be used as a refreshing minipark with use by general public, students of primary, secondary and higher education schools, visitors by planned Pastoral Centre, children from a neighboring orphanage, residents blocks of flats adjacent neighborhoods, and also for random visitors, and tourists.

Ex-Botanical Garden after revitalization can be used for the cultural and educational activities, on teaching activities, on research and development activities and to the protection of environment.

Perspectives of the area

There existed two basics variants of next development of the Ex-botanical garden:

Variant A – Continuing revitalization will create a park with access to public to dendrological important species of plants. This variant involve removing of minor fruit plants which will be replaced by botanical important species and collection, area shall be maintained, but there will be no further development and use of space.

Variant B - Continuing revitalization will create a space with botanical important species approaching with functions to real Botanical gardens and arboretums with potential to applying to the system of Slovak Botanical gardens and Arboretums.

According to paragraph 3 (Act No. 543/2002) Botanical gardens and Arboretum are facilities dedicated to the production of selected species of endangered, rare, rare or otherwise protected material products with a focus on the study of biological characteristics and types of claims, using the results of studies to protect their populations in the natural environment; study possibilities for the return of the growing population in the natural environment, formation of genus collections of protected plants; preservation of existing species in artificial environments in the case of their extinction or eradication in the natural environment and acquire seeds and plant material of protected plant and implement a training and public education aimed at the protection of protected plants.

According to the Act no. 543/2002, § 45 subsection 11 the name "Botanical Garden" or "arboretum" can use only devices that have the approval under paragraph 4 or 8 (of this Act.). Under paragraph 4, the agreement to establish and operate a Botanical garden or Arboretum issue, if this device employed by at least one person with the higher education, vocational education, which has at least five years experience in the growing current group of plants. This condition is not satisfied yet so the second variant involve activities to fulfill basic conditions as it is define in the legislative.

Schedule for the next period involve presentation of the garden to scientific; determine of development opportunities; creation of planting plan (species, location etc.); planting trees; planting shrubs; creation of genoma bank; preparation of Index seminum resp. Index plantarum. During next function

focused the activities to employee a specialist for leading the garden, create cooperation to other gardens and specialists etc.

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