

## **Educational aspect of the Botanical Garden of PJŠU in the context of teaching the subject "Dendrology"**

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Abstract: "Dendrology" was included as an optional subject in the teaching plans since the academic year 2006/2007. The aim was to connect it to the teaching of vascular plants systematics and botany, deepening knowledge on the basic species of native and introduced trees and shrubs, their ecological requirements, as well as current problems of woody plants in urban areas. The collections of plants in BG PJŠU allow exploring the woods within exercises, showing their geographical and individual variability and the possibility of their use in landscaping and park creation. BG PJŠU offers opportunities for educational and professional development across all three levels of higher education (bachelor, master and doctorate study). It also allows to find talented pupils and students within primary and secondary schools.

Keywords: educational use of BG PJŠU, dendrology, ecological requirements of woody plants.

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### **Introduction**

Botanical gardens and arboreta create conditions for spreading knowledge about evolutionary patterns of plant development, biological - ecological strategies of specific taxa and for practical use of plant collections for teaching the botanical and other scientific subjects. They play an active role in inspirations for the gardening - architectural landscape design, but also for the creation and protection of the landscape. They provide knowledge for practical teaching in forestry and agricultural disciplines. Due to their availability to the public, they

have an important positive impact on the visitors in the promotion and implementation of ideas of creation and protection of the environment and forming relationships to the nature and their surroundings.

In Slovakia, the pedagogical types of botanical gardens and arboreta are prevailing. Their main mission is to create conditions for teaching botanical, ecological and environmental disciplines at various levels of education (MOCHNACKÝ 1998). As university workplaces, botanical gardens and arboreta were established in Bratislava, Nitra, Zvolen and Košice. From the viewpoint of science and research, of special importance are Arboretum in Mlyňany of Institute of Forest Ecology and Forestry of SAS in Zvolen and Arboretum in Kysihýbeľ oriented to forestry. Arboreta were constituted also at the forestry high schools, e.g. in Liptovský Hrádok (MOCHNACKÝ 1998). In the present days, arboreta are founded at some leisure centers and junior-centers (Mochnacký 1998).

From historical viewpoint, since its inception in 1950, BG PJŠU has undergone very hectic development with regard to multiple alternation of its founders. Originally it was established by the Commission of Education on 05<sup>th</sup> May 1950 as the Institute of Botany of University of Agriculture and Forestry Engineering (UAFE) in Kosice, in the area of the then Comenius Institute (MOCHNACKÝ 2001). Already at that time it was to be used for educational purposes for the needs of the then UAFE in Kosice. Land area of about 3 ha was insufficient and therefore it was later selected a more appropriate space in the area of Red Bank. In 1953, it was transferred under the SAS, in 1959 was delimited under the Pedagogical Institute in Košice and from January 1st 1964, it was attached to the University of P.J. Šafárik (PJŠU), where it was gradually profiled itself as a scientific and educational institution.

Arboretum of BG PJŠU covers an area of approximately 20 ha, on which forest and meadow communities alternating. At present, there are more than 300 taxa (both indigenous and introduced ones) of broadleaved and coniferous trees and shrubs. ZÁVODNÝ (1985, 1986, 1989) draw the attention to the importance of some taxa and their possible application in urban plantings during the inventory process of trees in parks and gardens of Košice city. The area of the arboretum underwent several fundamental conceptual changes during the development: from a focus on basic research through applied orchards and vines programs, through planting focused on practical demonstrations of didactic approaches at teaching subjects (biology, botany, practical works, etc.), through processed planting model of the botanical system to the actual status. Current status of taxa inventory process provides the Catalog of plant collections of BG PJŠU (MÁRTONFIOVÁ et al. 2010).

Most arboreta have protected and endangered species in their collections, sometimes species of local regional flora are preferred. About 100 botanical gardens and arboreta around the world jointly coordinate their work to save endangered species. Worldwide example is the so-called living fossil - Ginkgo biloba, which were originally preserved only in parks and arboreta in China and Japan, where the tree species has spread out to many countries in the world

(MOCHNACKÝ 1998). The problems of this taxon is worked out in detail in the publication of RAŽNÁ et al. (2014).

## **Subject "Dendrology" in the educational process at Faculty of Science of PJŠU**

Woody plants are an essential part of the urban environment, within which they were applied either within the parks (in groups), or in individual planting. Major expansion of introduction into parks was recorded in the 18th and 19th centuries. The largest share of introducing exotic woody species into plantations was attributed to the founders of parks in Topoľčianky and Mlyňany and botanical gardens in Banská Štiavnica.

"Dendrology" was included as an optional subject in the teaching plans since the academic year 2006/2007. The aim was to join to the teaching the subjects vascular plants systematics and botany. The main task is to deepen the knowledge on basic species of both native and introduced woody plants, the need for recognition of their ecological demands as well as current problems of woody species in urban areas. The purpose of this professional subject was best described by PAGAN (1997), which stated that in dendrology there can not be seen only mere descriptions of species and their variations in different seasons of the year. It should be noted that this subject tries to include all intra-species and ecological variability of woody plants. It deals with impacts of the species to the environment in which it grows and with changes that arise by its operation, as well as the interrelationship among species in plant communities. Also for this reason, at the main characteristics of the basic taxa, we started with works of authors such as PAGAN & RANDUŠKA (1987, 1988), PAGAN (1997) and BENČAĽ (2005, 2009). In addition to this, we also deal with the variability of whether geographical type - the formation of ecotypes (climatypes, edaphotypes), or individual - description of individual forms (morphological, biochemical, biological, technical). It is important to define the specific woody plant communities created on the base of their natural requirements for environmental conditions, such as e.g. pioneer woody plants, plants of ravines and screes, forest steppe plants, species of floodplain forests, peatlands, woody species on the upper level of forests etc ..

Given the complexity of the issues, we have tried, at least to the necessary extent, to teach students about the basics of forest seed subject, genetic origin of seeds, principles of their collection and storage. When creating these chapters we have used the knowledge of PAULE (1992) and ŠMELKOVÁ (2009). Therefore, Students can gain knowledge on saving the original gene pool of plants using the methods "in situ" (forest reserves, gene bases, stands certified for collecting seeds, seed stands and selected trees - criteria for their selection, high-quality stands certified for collecting seeds) and "ex situ" (reproductive plantings for preservation of genetic resources, gene banks, clonal archives, seed orchards - nuclear and clonal, experimental areas - whether as provenance areas, areas for testing the progenies etc.). Using these issuee we are dealing with related information on international cooperation of botanical gardens and arboreta in the

are of seed sources - namely the international exchange of seeds (Index seminum) where we are demonstrating the potential benefits but also the risks.

The collection of plants in BG PJŠU allows, during the exercises, to use practical demonstrations of main species of both indigenous and introduced species of woody plants, species variability and the use of indigenous plants in the landscaping and park creation, to what has been drawn particular attention by LUKÁČIK (2004). At the same time we have the opportunity to show also the negative phenomena such as invasive species, the direct consequences of global warming in the form dieback of certain tree species, but also the negative human intervention (line building infrastructure), and so on.

During teaching process, we are updating and completing the selected lectures on actual topics (protected trees, selected exceptional taxa – e.g. *Ginkgo biloba*, or the issues about biotic invasions).

BG PJŠU offers other possibilities of its educational use and professional growth, for example in the form of diploma works (for acquiring the academic title Mgr.), advanced works (for an academic degree RNDr.). It is important to underpin young talents, for example at works in high school professional activities (HSPA). Last but not least is the provision of determination material for different levels of biology olympiad and Botanikiáda project organized by BG PJŠU for 5<sup>th</sup> grade pupils of primary schools.

In enriching the collections of plants in BG PJŠU we want to mention an extraordinary activity, namely KETA - Košice (KE) tree adoption (TA). This is a project of planting 2013 tall trees in Košice city in public areas with active participation of the public as from implementation aspect, as well as financially. The project is elaborated by Management of urban greenery in Košice, on the occasion of Košice ECOC 2013. The Management of urban greenery in Košice carries out this project with the aim not only to plant new trees in the city according to some established concept, but also to strengthen the educative aspect in tree planting, maintenance and growing urban greenery and to create social communities that would participate not only in planting but also in other care of planted trees planted, respectively to encourage various social events through planting. Therefore, we welcome the opportunity to carry out the planting in the area of BG PJŠU, at locations selected in advance. The planting was preceded by individual selection of trees which would be suitable from the viewpoint of species presence and enriching the range of species with older trees satisfying also the established aesthetic criteria immediately after planting. Ceremonial planting was held on October 28<sup>th</sup> 2014, when the range of tree species grown increased by a total of 12 trees, including four conifer species - white fir (*Abies concolor*), Jeffrey pine (*Pinus Jeffrey*), Swiss pine (*Pinus cembra*) and Nordmann fir (*Abies nordmanniana*) and one broadleaved woody plant species - red buckeye (*Aesculus pavia*).

In connection with degradation of environment there is increasingly raised the need of its sustainability, namely in terms of satisfying the needs of the present generation without threat to the needs of future generations. The principle of sustainable environment was consciously and unconsciously suppressed by the

majority of human activities. That is why, within the urban environment, the parks, urban and purposeful planting, botanical gardens, arboreta etc have and always will have irreplaceable role from ecological and social aspects.

The importance of BG PJŠU in preserving species biodiversity in the Eastern Slovakia region was highlighted by the Generally Binding Regulation of the Regional Office in Košice no. 1/2002 of 21<sup>st</sup> March 2002 declaring the protected area "Košice Botanical Garden" with effect from 1<sup>st</sup> August 2002. As mentioned in § 1 of the said Regulation, "the purpose is the declaration of the protected area Košice Botanical Garden to guarantee the protection of the significant pedagogical - didactic and scientific-research institute, which is the only working place in Eastern Slovakia focused on maintaining the plant gene pool of wild and cultivated species of flora of temperate, tropical and subtropical zones, which also represents a major landscape and eco-stabilizing element within the boundaries of Košice city".

## References

- BENČAĽ T. (2005): Dendrológia. Skriptum. Zvolen, Technická univerzita vo Zvolene, 205 pp.
- BENČAĽ T. (2009): Dendrológia a ekológia drevín. Zvolen, Technická univerzita vo Zvolene, 225 pp.
- LUKÁČIK I. (2004): Uplatnenie autochtónnych drevín vo verejnej zeleni. In: Dreviny vo verejnej zeleni, Zborník z konferencie s medzinárodnou účasťou, Zvolen, 8. – 9. 6. 2004, Edičné stredisko SPU Nitra, 2004, p. 50–54, ISBN 80-967238-8-X
- MÁRTONFIOVÁ L. (ed.) (2010): Catalogue of Plant Collections No. 5. P. J. Šafárik University, Botanical Garden. Press: EQUILIBRIA, s.r.o., Košice, 95 pp.
- MOCHNACKÝ S. (1998): Botanické záhrady a arboréta. Učebné texty pre dištančné štúdium. Vydavateľské a edičné stredisko SPU Nitra, 67 pp.
- MOCHACKÝ S. (2001): Botanická záhrada Univerzity P.J. Šafárika v Košiciach. ES UPJŠ Košice, 85 pp.
- PAGAN J. & RANDUŠKA D. (1987): Atlas drevín 1, Vydavateľstvo Obzor, n. p., Bratislava, 1987, 360 pp.
- PAGAN J. & RANDUŠKA D. (1988): Atlas drevín 2, Vydavateľstvo Obzor, Bratislava, 1988, 408 pp.
- PAGAN J. (1997): Lesnícka dendrológia. Skriptum. Zvolen, Technická univerzita vo Zvolene, 378 pp.
- PAULE L. (1992): Genetika a šľachtenie lesných drevín. Bratislava, Príroda, 304 pp.
- RAŽNÁ K., HRUBÍK P., ŽIAROVSKÁ J., KOLLÁR J., KULLAČOVÁ D., PAVEL J. & ŠTEFÚNOVÁ V. (2014): Kultúrne rozšírenie ginka dvojlaločného (*Ginkgo biloba* L.) na Slovensku a hodnotenie jeho variability pomocou DNA markérov. Nitra, Vydavateľstvo SPU v Nitre, 104 pp., ISBN 978-80-552-1231-9
- ŠMELKOVÁ Ľ. (2009): Zakladanie lesa. Vysokoškolská učebnica. Zvolen, Technická univerzita vo Zvolene, 339 pp.
- Všeobecne záväzná vyhláška KÚ v Košiciach č. 1 / 2002 z 21. marca 2002, ktorou sa vyhlasuje chránený areál Košická botanická záhrada. In: Vestník vlády SR, roč.12, čiastka 8 / jún 2002.
- ZÁVODNÝ V. (1985): Ihličnaté dreviny košických parkov a záhrad. Zborník Východoslovenského múzea v Košiciach, Prírodné vedy, 26: 55-70.

- ZÁVODNÝ V. (1986): Opadavé listnaté dreviny košických parkov a záhrad. Zborník Východoslovenského múzea v Košiciach, Prírodné vedy, 27: 55-71.
- ZÁVODNÝ V. (1989): Vždyzelené a zimozelené listnaté dreviny košických parkov a záhrad. Zborník Východoslovenského múzea v Košiciach, Prírodné vedy, 30: 51-61.

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