

THE ROLE OF PLANT COLLECTIONS IN TEACHING AND RESEARCH IN FIELD OF LANDSCAPE ARCHITECTURE

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Abstract

The paper describes the practical teaching at the Faculty of Horticulture and Landscape Engineering. The woody plant collection and the Interactive Experimental Garden are educational platforms for experiential education, self-education, and lifelong learning in the field of woody plants and perennial herbaceous planting design at the Faculty of Horticulture and Landscape Engineering, Slovak University of Agriculture in Nitra. These collections are a “living book”, presenting a diverse array of ground-covering woody plants, perennials, bulbous plants, annuals, and biennial plants, as well as their various combinations. The garden serves as a research and educational platform for students, teachers, and the general public to explore innovative ways of acquiring knowledge and experience. In addition to the aforementioned research and educational purposes, these areas serve as a space for implementing and verifying maintenance activities and research in the field of innovative planting design. Our collection of woody plants and the Interactive Experimental Garden is also the platform for discussion in the field of planting design for experts, students, and the public, and what is more, it increases awareness of innovative planting design.

Key words: woody plants, perennials, lifelong learning, research, planting design

Introduction

In an increasingly urbanized world according to Sibthorpe et Brymer (2020), where the connection to the natural environment can feel increasingly tenuous, landscape architecture education stands as a vital bridge, fostering not only practical skills but also a profound appreciation for the intricate world of plants. More than simply teaching how to design a garden or prune a rose bush, landscape architecture education cultivates a holistic understanding of plant science, sustainable practices, and the profound impact of the green world on our lives. This field of study equips individuals with knowledge and abilities to shape and nurture the plant kingdom for the benefit of both humanity and the planet.

Collections of living plants are usually part of botanical gardens, or part of research or educational institutions. They have a specific design that corresponds to the main purpose for which a certain group of plants is concentrated in one place. As is described in Paganová et al. (2013) the collections are also often used for targeted long-term research.

Arboreta and dendrological collections are mainly constituted by tree species. Since the beginning, these collections try to fulfill three main goals: 1) to study the adaptation of tree species in different environmental conditions; 2) to estimate their growing rate, both for economic and aesthetic aim; 3) and to showcase their ornamental value (Sanesi, G. et al. 2003).

The Botanic Gardens Conservation Strategy defines according to Smith et Harvey-Brown (2017) botanic garden as possessing the following characteristics:

- A reasonable degree of permanence
- An underlying scientific basis for the collections
- Proper documentation of the collections, including wild origin
- Monitoring of plants in the collections
- Adequate labelling of plants
- Open to the public
- Communication of information to other gardens, institutions and the public
- Exchange of seed or other materials with other botanic gardens, arboreta or research institutions (within the guidelines of international conventions national laws and customs regulations)
- Undertaking scientific or technical research on plants in the collections
- Maintenance of research programmes in plant taxonomy in associated herbaria
- Long term commitment to, and responsibility for, the maintenance of plant collections
- Promoting conservation through extension and environmental education activities

Materials and methods

Collections of living plants are an important part of education in the fields of landscape architecture and horticulture. Knowledge of plant material, morphological characteristics and ecological requirements is a basic prerequisite for the proper use of woody plants and flowers. Within the collections on the faculty premises, we also strive to present current trends in the use of plants, which is why existing collections are continuously supplemented and modified.

The collections contain a precise record of the plants that are concentrated in them. Other information, such as the origin of the plants, their scientific name and family classification, is also included in the records. Records of changes made to the collections are also precisely recorded.

The collection of woody plants, which has an important role in the education of landscape architecture, belongs to thematic collections. This collection is concentrated in several purpose-built, separate areas within the campus. It allows the study of the range of tree species in various types of plantings and their maintenance.

Students mainly from landscape architecture and horticulture study programs are involved in maintenance and creation of our collections under the professional tutorship of teachers from Institute of Landscape Architecture.

Results

The collection of woody plant species is divided into six separate areas. The individual areas were gradually established from 2005 to 2024. Their creation is an on-going process. The development of the number of species and individuals on each part of the collection shows Fig. 1. Collection provides the experimental environment in the field of different groups of woody plants and their use in landscape creation.

The Area of Ground Covering Plants was established in 2005, and represents the possibilities of use, as well as the system of maintenance of a wide group of woody plants. The use of ground cover woody plants, which are planted in larger groups, is particularly emphasized. The numbers of planted woody plants allow students to quantify the consumption of plants in relation to the size of the area.

Students are actively involved in regular maintenance with the aim of effectively directing competitive relationships between taxa. This area presents the possibility of vertical modeling of space with woody plants. Ground cover woody plants are supplemented with solitary trees and groups of shrubs.

In this area 61 taxa, and 402 plants were planted. Over the years, the number of plants on the site has changed. Currently, there are 55 species and 358 plants on the site. There were 10 taxa removed from the collection due to health reasons, and two taxa were transplanted to another area within the site. In total, this loss represents 56 plants.

The Area of Dwarf Conifers was established in 2007. In this area 30 taxa and 361 plants were planted. In present it is being remodeled. This collection is mainly focused on dwarf conifers, supplemented by ground cover species. The collection presents the possibilities of their use and maintenance. The structure of the collection corresponds to the educational mission, which is the study of morphological and habit characteristics of individual taxa. 8 taxa were removed for health reasons. The highest loss represented *Buxus sempervirens*, all shrubs were destroyed by *Cydalis perspectalis*.

The Area of Evergreen Species was established in 2005 - 2012. This part of the collection documents the possibilities of using and maintaining evergreen woody plants. Evergreen species dominate the collection in terms of numbers. The structure of the planting allows the study morphological characters, and the nature of compositional relationships between taxa. In this area 23 taxa and 101 plants were planted. Currently the collection consists of 18 taxa and 78 plants.

The Area of Coniferous Cultivars was established in 2006. The educational mission of this area is to learn about the characteristics and properties of various cultivars of coniferous trees. It is also possible to study the growth and development of individuals and the dynamics of changes in their shape and color during the growing season. In this area 30 taxa and 109 plants were planted. Due the health condition were 5 taxa removed, what represented 12 plants.

The Area of Moorland Plants, established in 2008, represents an example of a characteristic habitat with specific microclimate and substrate properties. These conditions influence the growth of woody plants and the richness of flowering. There were planted 10 taxa in this area, represented by 167 plants. Three taxa represented by 40 plants were removed.

The Area of Lianas presents the possibilities of using and maintaining climbing plants. It allows knowledge of morphological features, but also the possibilities of using climbing plants on various types of support structures. In the collection, the growth dynamics of individual taxa can be observed. For some taxa (*Clematis* sp. *Akebia quinata*), relationships with herbs are demonstrated. There were planted 16 taxa (42 plants).

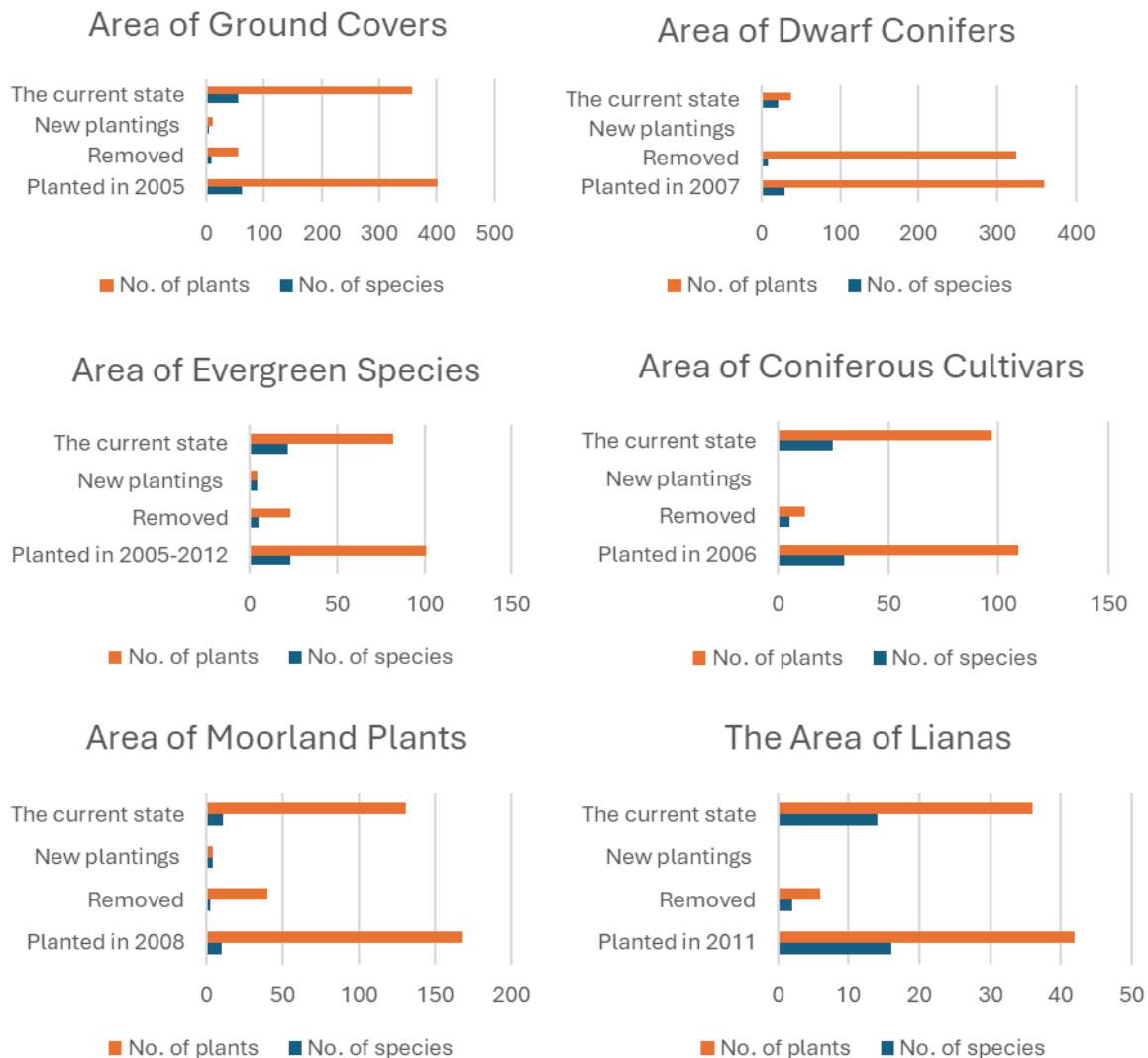


Fig. 1: Development of species and number of plants in individual parts of Woody plants collection at Faculty of Horticulture and Landscape Engineering.

Discussion

Landscape architecture is the art and science of designing outdoor spaces, corresponding aesthetic, functional, ecological, and social factors. Our collection of woody plants represents a platform for experimental learning for landscape architecture students. Experiential learning according to Bartle (2015) can be represented as a four-stage cycle where learning begins with experiences that allow participants to observe, review and reflect on what they have practised, and then critically reflect to consciously link their experiences to theory or previous experiences. Involving students and teachers in the creation and maintenance of individual areas of the collection represents an important part of education and building the competencies and skills of students and teachers. Plant collections serve as indispensable resources for teaching. They are dynamic, evolving libraries of life, offering unique opportunities for observation, experimentation, and the generation of new knowledge (Dosmann et Groover, 2012). Beyond the classroom, living plant collections offer unique opportunities for experimental learning and research.

Conclusion

Living collections of woody plants are an essential part of experimental teaching, which takes place within various study programs at the Faculty of Horticulture and Landscape Engineering. Their creation has a long history at the faculty, during which the collections and individual plants in them have undergone development. For the needs of current creation, the collections should necessarily reflect modern trends, which is presented by their reconstruction and the creation of new plantings, focused on water retention measures and the creation of vertical greenery.

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Souhrn

Živé sbírky stromů jsou nezbytnou součástí experimentální výuky, která probíhá v rámci různých studijních programů na Fakultě zahradnictví a krajinného inženýrství. Jejich tvorba má na fakultě dlouhou historii, během níž sbírky i jednotlivé rostliny v nich prošly vývojem. Pro potřeby současné tvorby sbírek by měly odrážet moderní, současné trendy, což je prezentováno jejich rekonstrukcí a tvorbou nových výsadeb, zaměřených na opatření k zadržování vody a tvorbu vertikální zeleně.

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