THE GREEN HERALD

The Annual of the European Route of Historic Gardens

"A Europe of United Gardens"

Issue n. 3 (2024)

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Itinerario Europeo dei Giardini Storici
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Cultural route of the Council of Europe
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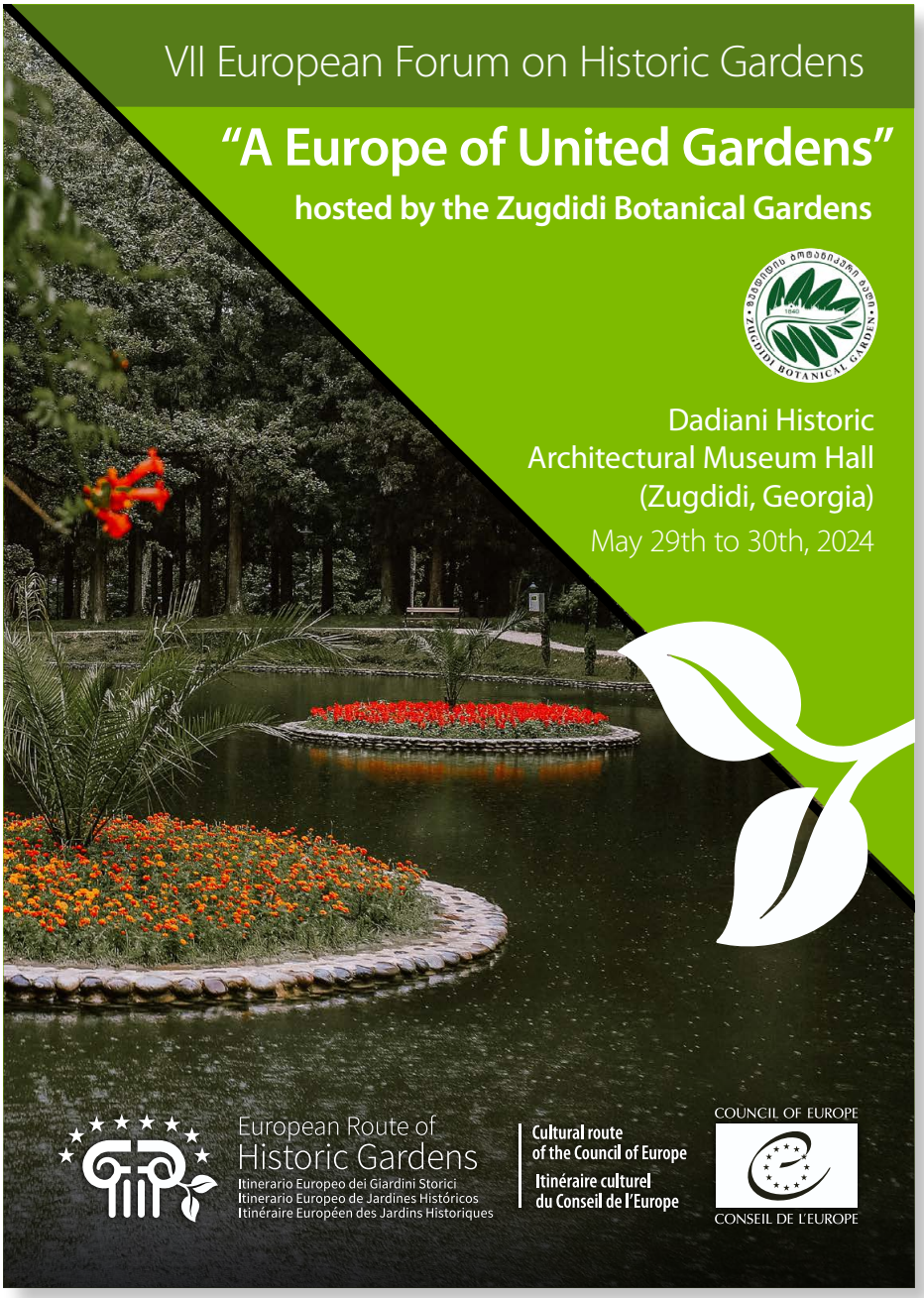
Summary



The VII European Forum on Historic Gardens has been hosted by the Zugdidi Botanical Gardens (Zugdidi, Georgia)

Program

WEDNESDAY
MAY 29th

9.00-18.00
VII EUROPEAN FORUM ON HISTORIC GARDENS «A EUROPE OF UNITED GARDENS»
Venue: Dadiani Historical-Architectural Museum Hall.
Conducted by **Veriko Rapava**, manager of logistic proceedings at Zugdidi Botanical Garden

8.30-9.00 **REGISTRATION**
Forum venue.

9.00-9.30 **OFFICIAL OPENING OF THE FORUM**
Mamuka Tsotseria, Mayor of Zugdidi Municipality
Shalva Agumaya, director, Zugdidi Botanical Gardens
Lukasz Przybylak, acting president, European Route of Historic Gardens.

9.30-14.30 **GENERAL CONFERENCE: "HISTORIC GARDENS AT THE THRESHOLD OF THE NEW CENTURIES: SANCTUARIES OF TRADITION OR EXPERIMENTAL FIELDS OF EXPLORATION?"**
Lectures by European Historic Gardens' representatives.

9.30-9.50
Implementation of large-scale (100 or more participants) projects on the basis of objects with the status of cultural heritage - "Christmas ball in Dadiani palace" - on the example of the project"
Anzor Okujava, director, Historical and Architectural Museum of Dadiani Palaces and **Sophio Kobakhidze**, curator of educational projects & first category certified English guide, Historical and Architectural Museum of Dadiani Palaces, Georgia.

9.50-10.10
Sophiivka: union of art and science,
by **Iryna Denysko**, senior researcher, National Dendrological Park Sofiyivka, National Academy of Sciences, Ukraine.

10:10-10:30
National Botanical Garden of Georgia – Historic Mission and Impact across Centuries by **Irina Danelia**, director, National Botanical Garden of Georgia and **Tinatin Barblishvili**, deputy director, National Botanical Garden of Georgia, Georgia.

10.30-11.00
Coffee break

11.00-11.20
Challenges and concerns, research endeavours, and results in the conservation and management of historic gardens in Romania,
by **Alexandru Mexi**, researcher, Department of World Heritage, National Heritage Institute of Romania, Romania.

11.20-11.40
Batumi Boulevard on the trace of the 143 years history,
by **Lasha Mikeladze**, director, Batumi Boulevard, Georgia.

11.40-12.00
Historic Gardens as specific sites of landscape architecture education,
by **Albert Fekete**, curator, Hungarian Garden Heritage Foundation and director, Institute of Landscape Architecture, Urban Planning and Garden Art, MATE, Hungary.

12.00-12.20
Tradition and experiment in contemporary orangery culture in Polish historic garden,
by **Katarzyna Hodor**, assistant professor, Chair of Landscape Architecture, Cracow University of Technology and **Jacek Kuśmierski**, historic gardens specialist, Museum of King Jan III's Palace at Wilanów, Poland (online).

12.20-12.40
Refunctionalization project of the ancient greenhouses
by **Viola Paola**, salvaguarda e valorizzazione del complesso del parco, Reggia Di Caserta, Italy (online).

12.40-13.00
The Gardens in Complex Times,
by **Maria Adriana Giusti**, full professor of restoration of historic gardens, scientific curator of historic Garzoni garden, Italy (online).

13.00-13.30
Questions and answers.

13.30-15.00
Lunch at Dadani Palace hall

15.00-18.00 **PANEL PRESENTATION. "HISTORIC GARDENS UNITED IN CHALLENGES: PESTS AND DISEASES"**

15.00-15.15
A rare species of dendroflora of Kutaisi Botanical Garden, pests and diseases of endemic plants,
by **Marina Kutsia**, deputy director, Kutaisi Botanical Garden, Georgia.

15.15-15.30
Sustainability practices in combating disease and pest problems in historical gardens,
by **Emine Atalay Seçen**, landscape architect, Directorate of National Palaces of the Republic of Türkiye, Turkey.

15.30-15.45
Preliminary observations on the occurrence of diseases and pests on fruit trees in the gardens of Nieborów,
by **Katarzyna Żak-Zatorska**, head of the garden department, branch of the Museum in Nieborów and Arkadia, National Museum in Warsaw,
Małgorzata Sekrecka, entomologist, and **Hubert Głos**, phytopathologist, Institute of Horticulture in Skierniewice, Poland.

15.45-16.00
Measures to fight pests and diseases of woody plants in Zugdidi Botanical Garden
by **Tamar Zarandia**, agronomist, Zugdidi Botanical Garden, Georgia.

16.00-16.30
Coffee break

16.30-16.45
Biodiversity of Kolkheti National Park,
by **Khatuna Katsarava**, head of administrative division, Kolkheti National Park Administration, Kolkheti National Park, Georgia.

16.45-17.00
Thuya diseases and their control in the urban greening,
by **Mzia Beruashvil**i, principal investigator, Agrarian University, Georgia and
Nani Goginashvili, principal investigator, Agrarian University, Georgia.

17.00-17.15
Challenges of plant protection in the baroque garden of Eszterháza,
by **Ágnes Balogh**, Eszterházy Castle Garden, Fertőd. Hungary (online).

17.15-17.30
Historic gardens of eastern Georgia facing to climate change – threats and challenges,
by **Natalia Kharabadze**, researcher, Plant Protection Laboratory of the National Botanical Garden of Georgia, Plant Introduction and Collection Management Department, Georgia.

17.30-18.00
Questions and answers and closing.

18.00-19.00
Visit to Dadiani Palace
All Annual Forum attendees.

20.00-22.30 **ERHG OFFICIAL DINNER**
Only for partners
Venue: Samefo Restaurant
Transfer to the venue will be arranged by Zugdidi Botanical Garden.

Dear Members of the European Route of Historic Gardens
and all of the enthusiasts of Europe's garden heritage,

The European Forum on Historic Gardens 2024, held in Zugdidi (Georgia), under the theme 'A Europe of United Gardens', brought together experts and enthusiasts of historic gardens from across Europe. On 29-30 May 2024, participants had the opportunity to take part in a rich programme of conference and panel discussions focusing on key challenges and prospects for historic gardens in the 21st century.

One of the leading themes was the dichotomy presented in the panel 'Historic gardens at the dawn of a new century: sanctuaries of tradition or experimental fields of exploration?', which prompted reflection on the balance between preserving historical authenticity and the need for innovation and adaptation to contemporary realities.

An equally important issue, reflected in the session 'Historic gardens united in challenges: pests and diseases', was the urgent need for cooperation and knowledge exchange in the face of increasingly serious phytosanitary threats affecting priceless plant collections and gardens. The forum provided a platform for the exchange of knowledge, experience and best practices in the protection, conservation and management of this valuable cultural and natural heritage.

I am delighted to invite you to read the third issue of The Green Herald, which contains excellent articles prepared by experts participating in the Forum 2024.

Łukasz Przybylak
President
European Route of Historic Gardens

GENERAL CONFERENCE:

“Historic Gardens at the threshold of the new centuries: sanctuaries of tradition or experimental fields of exploration?

Summary

"Botanical Garden"

Sophio Kobakhidze

Curator of educational projects & first category certified English guide, Historical and Architectural Museum of Dadiani Palaces, Georgia

Sophio Kobakhidze graduated from Zugdidi Branch Ivane Javakhishvili Tbilisi State University Main Course. She has a Degree of Bachelor of Philology in the specialty of English. She worked as an English teacher at the Prince Murat Georgian French College and was a volunteer at the International Committee of red cross. From 2007 up to present date, she is working at the Historical Architectural Museum of Dadiani palaces. She is an English Language Guide and curator of educational projects. From 2022, she is certified first category guide.

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Anzor Okujava

Director, Historical and Architectural Museum of Dadiani Palaces

Anzor Okujava graduated in 2000 from the Russian-Georgian educational center. He studied at the Moscow State Academy, Faculty of Finance and Banking and at Tbilisi State University of Economic Relations, Finance and Banking (master's degree). During several years he worked at Liberty Bank in various positions. From 2019 to 2020, he was the head of the folk and applied art department of the Palace of Arts in Tbilisi and in 2021 he started working in the Historical-Architectural Museum of the Dadiani palaces as a curator of the palace of Prince Niko Dadiani. From 2022 up to present date, he is the director of the Historical-Architectural Museum of Dadiani palaces.

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Abstract:

Dadiani's European Garden stands out not only for its diverse collection of trees and plants but also for its historical, archaeological and architectural significance. This garden has a remarkable origin and rich history. At the end of 19th century, eyewitnesses praised the garden and remarked that this kind of garden could not be found elsewhere in the Caucasus.

Following the marriage of Davit Dadiani to Ekaterine Chavchavadze the responsibility for managing and developing the garden was entrusted to the queen Ekaterine. She invited European gardeners and within a short period, creating a garden enriched with exotic species imported from France and Italy.

During the work on this thesis, documents and photos about the botanical garden, which were little known to the public, were discovered in the museum's archives.

The decorative flower gardens, walkways, rare exotic plants, island, peninsula, greenhouse and lake leave an unforgettable impression on observers to this day.

Keywords:

Zugdidi. Botanical Garden. Dadiani. Queen Ekaterine Chavchavadze.

"Have you been to Zugdidi, dear reader? If you haven't, then you haven't seen one of Georgia's most beautiful towns," wrote Konstantine Gamsakhurdia and indeed, the integral part of the architectural complex of Dadiani Palace, the Botanical Garden, is one of our country's unique treasures.

Initially, it was built as a decorative garden for the then ruler's residence. Attention should be drawn not only to its plants and trees but to its history and architecture, as well, which have interesting origin stories.

At the end of the 19th century, eyewitnesses praised the garden and remarked that this kind of garden could not be found elsewhere in the Caucasus.

Its decorative flower gardens, walkways, artificial and natural landscapes, lake, island, peninsula, nursery, greenhouse and rare exotic plants leave an unforgettable impression on observers to this day.

The botanical garden, as it appears today, was not established all at once. It has undergone many changes from its inception and throughout its development. Thus, its development can be divided into several periods:

The famous Georgian historian and geographer Vakhushti Batonishvili mentions that at the beginning of the 18th century: "Zugdidi is at the top of a great valley. Dadiani Palace is towering above with many chambers, enclosed by a fence," (Vakhushti, 1941: 167) but says nothing about the existence of a garden around this palace.

The garden is not mentioned by the 17th century Italian missionary Archangelo Lamberti, nor by subsequent explorers and travelers. After that no one talked about the garden until the 19th century.

Ilia Gogia, scientist, researcher and former director of Dadiani Palace, believes that the garden was created in the second half of the 18th century. The end of the 18th century and of the 19th century is considered the first or beginning period of Grigol Dadiani's reign, when these areas were still covered with impenetrable forests and a section of the barren forest that had covered Kolkhida from the shores of the Black Sea to the mountain slopes since ancient times. The forest was rich with plant life, as well as wildlife. It was declared a secluded sanctuary-estate. One part of the forest was declared part of the Dadiani estate. They had special lumberjacks installed by the ruler to prevent others from encroaching or appropriating it.

At the base of Zugdidi forests, the period of the creation of the Botanical Garden is considered to be between 1828 and 1840, a period of 10-12 years (Gogia, 1947: 91). One part of the forests around the palace was enclosed by an artificial boundary and was considered the palace's garden. This is the first stage of the garden's development.

The construction of the garden from ancient times consisted of two main tasks: the first was utilitarian, when the garden was built for functionality and its survival potential, in this case the main focus was placed on plant species that had any practical application (fruit, building materials, firewood/wood, breeding, etc.) Thus, the garden was built with the aim to make it beautiful. Dadiani's first garden was built for utilitarian purposes. Entering areas considered to be the garden of the palace, cutting plants, eating fruit, letting in cattle, and hunting without the permission of the ruler was strictly forbidden to anyone except family members.

During the reign of Levan V Dadiani, both plants and animals multiplied in the garden day by day. It gradually became a recreational hunting arena for the rulers.

In 1840, during his lifetime, Chief Levan V handed over the throne to his son, David Dadiani.

Young David, who was directly acquainted with the culture and way of life of Western Europe, immediately began to bring about political innovations to the principality, to carry out new reforms in the administration, and at the same time to build palaces, canals and gardens around him with special care and attention. Garden specialists laid the foundation for a permanent staff of a European style decorative garden.

In the book by historian Andrei Muravyov, *Armenia and Georgia,* we read:

> "We met Chief David Dadiani in a dense forest a kilometer away from Zugdidi. After a warm and friendly greeting before heading home, the chief took us for a walk in the garden, which was of great interest to him. It was decorated in the oriental style with wood carvings, where they often spend time in family idyll." (Muravyov 1848: 278)

After David Dadiani married Ekaterine Chavchavadze, he handed upkeep and management of the garden to Ekaterine. The queen embraced this noble cause with great love and enthusiasm, and in a short amount of time, created a rich garden with exotic species of plants.

Famous public figure Iona Meunargia notes:

> "Her (assumed to be Ekaterine Chavchavadze) personal work at Zugdidi Botanical Garden should be praised for making it among the best gardens in the Transcaucasus. The necessary seeds and saplings were ordered from King Louis Philippe's Garden of Versailles and used to construct such a garden whose equal cannot be found anywhere in the Caucasus." (Meunargia 2002:99)

The garden soon fell into the hands of loving and caring patrons. Joseph Babin, a gardener from the city of Trieste, was invited as the main director of the garden. The second stage of garden development began from this period. Babin completely changed the outward appearance of the garden. He defined and determined the perimeter of the decorative garden. He was the first to draw up a plan for this garden in a French symmetrical style and rid it of unsuitable plants. Many local or foreign varieties appeared in their stead. At this time the importation of rare plants began to our country, previously foreign and unknown specimens. Magnolia, tulip, begonia, mimosa, cypress, cryptomeria, thuja, etc. appeared here for the first

Zugdidi Botanical Garden
Photo by Sophio Kobakhidze, 2023

time. Plants were imported from France and Italy. Joseph Babin arranged the first nursery and greenhouse. The artificial lake, with its island and peninsulas, was provided with a canal from the river Chkhoushi, giving a permanent water supply to the lake. In the evenings the leader's family went out for a walk and from here looked from boats at the flow of the pond, swans swimming or fish being caught.

Ionah Meunargia notes:

> "On the south side, at the place where the water comes out of the pool, there was a place to drink coffee carved out of stone. Here the chief and his family were having coffee at parties." (Meunargia 2002: 35)

Ekaterine's children's caretaker and teacher, Korneli Borozdin (1854-1867), an official of the Chancellery of the Crown Prince who witnessed this news, wrote of the garden in Zugdidi:

> "The nature and climate of Samegrelo facilitated the queen's experiment and over the course of ten years such a magnificent garden appeared, the like of which had never been seen in the Transcaucasus before. There were magnificent greenhouses and ground sheds created near the garden, where there were more than 500 trees of orange, lemon, papelmos, bananas and other rare fruits, but the flower section was especially good: it was even difficult to count the thousands of roses, some which had grown to as tall as two meters high. There was also a diverse collection of camellias. In short, Zugdidi garden was amazing in every way and in the entire Transcaucasus its equal could not be found. A park was built next door to it where you would see countless deer and gazelles brought from the Vorontsov estate from Crimea. They came when a man called and they could come get food with their hands." (Borozdin 2019: 80)

After the death of David Dadiani in 1853, along with the management of Samegrelo, the care of the garden completely passed into the hands of the Queen. She didn't even mitigate her attention and upkeep of the garden even a bit. The garden was growing bigger by the day and became a source of pride in this part of Georgia. Its name was praised and spoken far and wide. Internationally it became quite famous as a place of research and travel destination.

The flowering era of the garden was not long. It went through a lot of misfortune in 1853-56, during the Russo-Ottoman war. In 1855 Samegrelo became the war's arena. Ottoman's army of 30,000 men, under the command of Omer-Pasha, stayed in Samegrelo for more than half a year and during this time completely ravaged this place. In 1856, by the order of Iskander Pasha, the head of one of the garrisons oppressed by the Megrelians, the garden was uprooted and destroyed. The trees were cut down at their root. The palaces and greenhouses in the garden area were set on fire, and they took the experienced gardener with them. In short, the magnificent garden that the queen had planted and which she cared for like the apple of her eye was leveled to the ground.

The Queen's letterfrom Gordy dated February 2, 1856, is noteworthy:

> "There is no longer the garden, the result of 16 years of work, in Zugdidi, which was praiseworthy not only in the Caucasus, but also in foreign countries, was razed to the ground by enemies. Some fruits, flowers and foreign plants were taken and some were cut down." (Meunargia 2002: 160)

Many precious specimens withered and became extinct in the garden, which was ruthlessly destroyed by the Ottomans, some of the trees were still uprooted, but many of them took a long time, and some did not get back to their original beautiful look.

Then began the third period of garden development. In 1869, when Catherine returned from Paris, she invited the gardener and decorator Gaetano Zamberlett from the town of Varese, who she appointed to head two gardens in Zugdidi and Gordi.

In the diary of Tevdore Khoshtaria, the pastor of the Dadiani Church, we read:

> "Paris is a city of great order, with sparkling streets, great culture, upbringing and public order. That day I went for a walk in the garden of Boulogne with Ekaterine and her children. I've seen many gardens in my time, but nothing like this. The garden is outstanding for its size, rare trees, amazing trails, artificially made cliff hills and spring waters. Here horse and buggy come for a walk. Ekaterine was saying to me that this is how I should arrange my gardens in Zugdidi and in Gordi."

Later, Ekaterine additionally invited Gaetano Zamberletti's younger brother, Giovanni Zamberletti, and the construction of the garden proceeded at a rapid pace. Seeds and saplings of exotic plants were brought from St. Petersburg. They expanded the garden's territory, making more pathways and tree walkways. The famous plane trees of this period stood at 1,182 meters and hornbeam at 187 meters, which are not much inferior in beauty to plane trees and sprouted up from the remains of the trees chopped down by the Ottomans.

The queen died in 1882, after which the garden was no longer expanded or filled with new collections. However,maintenance and upkeep continued.

Niko, the son of David Dadiani, died in 1903. In that same year, the head gardener, the elder Gaetano Zamberleti also died. After that, upkeep of the garden gradually diminished, but over the course of this time the garden's cultivation went beyond the palace and was introduced to the masses. Various useful and beautiful species of plants have passed from the palace garden and adorned many corners and areas of Samegrelo. This should explain the abundance of exotic plants and ornamental gardens that make Samegrelo stand out.

Archaeological excavations in the area of the Botanical Garden

The remains of a number of buildings are being studied at various locations in the garden, for the purpose of learning about the relevant field archeological works that were carried out, which were led by archaeologist Revaz Papuashvili. One of them is the hitherto unknown government palace of Dadiani. As a result of archaeological excavations, the fortresses' plans were drawn up. According to today's data, the length of the building is 76 m and the width is 30 m. There are several stages of construction. If we believe the written sources and archeological data, we are dealing with the Samegrelo Ruler's Palace, most of which was built in the 1840s, then rebuilt and expanded, but when Omer-Pasha invaded Samegrelo and burned down the garden and buildings in the area. This palace was rebuilt thanks to Dimitri Kipiani, although it burned down on March 1, 1864 and it was not rebuilt, though the remains of the palace were used to build a new palace known as the Niko's Palace.

Zugdidi Botanical Garden
Photo by Sophio Kobakhidze, 2024

Zugdidi Botanical Garden

Historical and Architectural museum of Dadiani palaces, Photographic collection, 20th century

Another palace, which stood on the territory of the garden, is the so-called guest house, a palace in the shape of a cross. On the night of Easter in 1848, Marie Brose, a famous French scientist and Kartvelologist who had been invited to the palace, described it as follows:

> "At the bottom of the garden there is a cross-shaped palace with rounded corners. The lower floor is made of stone, with several rooms for guests. The upper floor is completely made of wood. The ceiling of the hall is made of wood, carved in two colors, yellow and black, from which runs a chain made of one piece of wood, on which a chandelier hangs. Ertota, a beautiful staircase, leads up to the hall. In the middle of the hall there is a table which sits 32 in the shape of a cross for the guests of the ruler. There are chairs around the balcony, which can seat up to 300 people at a time, but if we add more chairs, it can accommodate up to 500 people. Each hall has its own artistically decorated caisson. The open balcony is completely decorated. There is wood between the pillars. Carved ornaments are especially impressive when lit by lanterns." (Brose 1849: 54)

Marie Brose not only described this palace but also left us the sketch and plan of the palace.

In addition to the palaces, on the territory of the Botanical Garden we find the ruins of a greenhouse from the time of Joseph Babin. The famous French scientist and public figure Andrey Muravyov wrote about these ruins in his famous work *Samegrelo*.

> "The magnificent garden, which was turned into a paradise eagerly by Chief David, was unfortunately destroyed by the Turks during the Crimean War, but due to the abundant vegetation of the soil, everything eventually reappeared. In a few years, the picturesque ruins of the greenhouse under Khiara plants and rose bushes, which look like the portico of an ancient temple from afar, will be the only trace of the wartime ruin that even nature could not hide." (Murray, 2018: 246)

As the result of archaeological excavations, they have uncovered clay artefacts found here, mostly in flower pots, which once again confirms the existence of a greenhouse here.

Currently, the area of the botanical garden is about 26 hectares. According to current data, many species of trees, shrubs and plants of different genera grow in the garden. Due to its location and climatic conditions, Zugdidi Botanical Garden is one of the best sites for the introduction, research and acclimatization of rare subtropical plants.

In 2018-2019, a complete rehabilitation of the garden was carried out, which can be considered as the fourth period of the garden development. The garden is gradually returning back to its original appearance.

Zugdidi Botanical Garden is considered to be interesting for visitors due to its location, history and climatic conditions. It is one of the must-see sites in Georgia. Especially locals have a sense of pride and responsibility for its beauty that generations created for this city and have made a part of people's lives.

The Botanical Garden is ours! We owe it to everyone to protect, care for and take care of it equally.

“Sofiyivka — union of art and science”

Iryna Denysko

Senior researcher, National Dendrological Park Sofiyivka, National Academy of Sciences, Ukraine.

Iryna Denysko graduated from Pavlo Tychyna Uman State Pedagogical University (1996), majoring in biology; Candidate of Biological Sciences. She has been working at the National Dendrological Park “Sofiyivka” of the National Academy of Sciences of Ukraine since 2002. The main direction of scientific research is biology of roses and introduction them in urban areas in the natural and climatic conditions of the Right-Bank Forest-Steppe of Ukraine. She is a laureate of the M.M. Grishko Prize in the field of plant introduction. I. Denysko is engaged in the preparation of documentation for the entry of “Sofiyivka” into the UNESCO World Heritage List, as well as in maintaining relations with foreign institutions. She is a member of the Academic Council of the park.

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The National Dendrological Park “Sofiyivka” NAS of Ukraine

Abstract:

Throughout its history, the National Dendrological Park “Sofiyivka” of the National Academy of Sciences of Ukraine has absorbed trends of various styles of the European garden tradition, combining them in a single, unique ensemble. Therefore, when planning work on restoration, repair or maintenance of park objects, specialists always have to solve the problem of ensuring an optimal aesthetic appearance while maintaining the authenticity of “Sofiyivka” as a historic park. The restoration of historic objects and the creation of new park compositions in “Sofiyivka” is based on scientific developments and compliance with the requirements of the Florentine Charter regarding historical gardens. The new territories of the park have become a place for the implementation of the results of scientific research — collections of introduced plants, as well as modern artistic means. This significantly reduced the recreational load on the historic core of the park and made “Sofiyivka” even more attractive to tourists.

Keywords:

historic park, restoration, landscape, plant introduction, artistic means

1. Introduction

The National Dendrological Park "Sofiyivka" of the National Academy of Sciences of Ukraine, situated in the city of Uman, Cherkasy region, combines the roles of a historic garden — a museum of gardening art, and a scientific research institute — a center of introduction and acclimatization of plants on the territory of the Right Bank Forest-Steppe Zone of Ukraine.

Like any historic park, "Sofiyivka" has a number of problems that require unceasing solutions: age-related changes in green spaces and architectural structures, silting of ponds, etc. Landscapes are influenced by mass visitation, as well as environmental factors such as climate change and soil erosion. Landscapes are influenced by huge numbers of tourists, as well as environmental factors such as climate change and soil erosion. Therefore, specialists are always faced with the question of what principles to use to care for existing park objects and create new ones in order to ensure an optimal aesthetic appearance and preserve the authenticity of "Sofiyivka" as a historic park.

2. Transformations of the park throughout its history

At present, "Sofiyivka" is a park complex, the components of which differ in the time of creation, stylistic content and functional purpose.

The historic core of "Sofiyivka" is a romantic park, a poem of stone, water, architectural structures and green trees. The park was built at the expense of Polish magnate Stanislaw-Szczęsny Potocki as a gift for his wife Sofia. Construction began in the autumn of 1796. During six years, numerous grottoes and artificial rocks, alley and water systems of the park were built. From archival documents it is known that the planting of native tree species was completed in the spring of 1799 (Kosenko, Pylyp'iuk, 2016). Planting of exotic trees and shrubs continued. As S. Trembetsky noted, here, next to the well-known trees, there were guests from the Antipodes, Atlas and Lebanon (Trembecki, 1815). They were brought for a lot of money through Odessa from Asia, Italy, Crimea and were planted mainly in the Tempe Valley, on the Elysian Fields and at the Grotto of Thetis (fig.1). Th. Themery provides a list of exotics in his "Sofiyivka" guide-book, citing the famous Ukrainian-Polish botanist A. Andrzejowski, who visited "Sofiyivka" in 1829 and, at the request of its then owner Alexander Potocki, made a description of the park's plant wealth (Themery, 1846). In particular, a large number of narrow crowned Lombardy poplars were planted in "Sofiyivka" and widespread far beyond the park. They became one of the poetic symbols of Ukraine.

In 1831, Alexander Potocki supported the Polish patriotic uprising (The November Uprising). In 1832, in accordance with the decree of the russian emperor, the estates of the "rebel" Potocki were sequestered and transferred to the Kyiv State Chamber. On April 21, 1836, the tsar gave a gift to his wife: "...I command: to consider this Garden the property of Her Imperial Majesty, calling it henceforth Tzarina's Garden" (Kosenko, Pylyp'iuk, 2016). In fact, the park was subordinated to the Department of Military Settlements. During 1836–1859, new pavilions and terraces were created in the park. New plants were planted instead of those that died in frosty winters. At once, there are evidences that the park landscapes were turning into forest ones at that time. Most introduced plants grew "in closed plots, or in the wilderness among a dense forest, where they were difficult to notice" (Baziner, 1851).

FIGURE 1
The Tempe Valley and the Grotto of Thetis
Source: engravings by W. F. Schlötterbeck (1815) after drawings by W. Allan (1811)

In 1859, military settlements ceased their activities. In the same year, by imperial decree, the park was transferred to the Main School of Horticulture, relocated to Uman from Odesa (now Uman National University of Horticulture). The subsequent change of the profile of the school to agriculture and forestry also did not contribute to the preservation of the landscape areas of the park. In the 1880–1890s, researches on plant introduction started in the park. They determined the perspective of the main activity of "Sofiyivka" in the future (Kosenko et al., 1996).

In 1929, "Sofiyivka" (at that time it was called "Garden of the III International") was granted independent status and declared a State Reserve. Of course, this was done with the noble goal of preserving it in its integrity for future generations. However, the protected regime absolutely excluded any landscape felling necessary for the care of the park with its artificial biocenoses, so this status led to the loss of previously created massifs and composition groups. The park landscapes of "Sofiyivka" gradually turned into forest. As stated in the report for 1960 on the topic "Restoration and improvement of park compositions of the Dendrological Park "Sofiyivka": "Over the 160-year period of the park's existence, many of its areas have lost their compositional merits, some exotics have outlived their age, and in their place, self-sowing, aboriginal species have appeared. As a result, the park began to take on the character of a forest massif" (Kosenko, Pylyp'iuk, 2016).

Since 1955, when the park was transferred to the system of the Academy of Sciences of Ukraine and subordinated in its activities to the Central Botanical Garden of the Academy of Sciences of Ukraine. The territory of "Sofiyivka" was expanded: the city authorities transferred land plots west of the historic core to the park. Much has been done to preserve the park and restore its historical authenticity based on archival sources. During that period, considerable works were being carried out on the restoration of the park objects. But most of the restoration and repair works were carried out in "Sofiyivka", starting after the flood of 1980.

3. Restoration works in the historic part of the park

The restoration works do not stop even today. During the preparation of "Sofiyivka" for the celebration of the 200th anniversary of its foundation, the following objects were restored in the historic part of the park: the bridge in the Tempe valley, the "Devil's Bridge" composition, the underground river Acheront and the Amsterdam lock, Diana's grotto. Ferry service to Anti-Circe Island has been renovated.

The site of the Parterre Amphitheater underwent thorough restoration. By 1996, as a result of numerous reconstructions, it no longer had the serpentine paths that could be seen in the historical plans and photographs; it was planted with savin junipers (*Juniperus sabina* L.), arborvitaes (*Thuja occidentalis* L.) of a columnar ornamental variety, mulberries (*Morus nigra* L.), tamarixes (*Tamarix* L.). In front of the "Seven-Jet" fountain, even before the Second World War, a trellis of thuja ordinary variety was planted; cut at a certain height, it was used as a barrier separating the parterre as an element of regular style from the landscape part of the park. Over the years, the parterre was overgrown with self-seeded ash-trees (*Fraxinus* L.), hornbeams (*Carpinus* L.), maples (*Acer* L.) and other native trees and shrubs. However, when the management of the park proposed a project to restore this important site, taking into account historical sources, many experts spoke in favor of leaving the Parterre Amphitheater in its existing state at the time, without creating rhombi and, accordingly, paths around them. Only when the director of "Sofiyivka", I. S. Kosenko, enlisted the support of the Polish Professor L. Maidecki, a well-known expert in garden and park art in Europe, did the reconstruction begin: the granite steps were removed and instead the serpentine paths were restored, 40-year-old thuja trees, junipers, and mulberries were removed to other parts of the park (Kosenko, Pylyp'iuk, 2016). Nevertheless, in 1996, the reconstruction of this area remained incomplete; the works were renewed in 2012, and lasted for two years: cleaning the parterre from self-seeding, grubbing stumps, sowing lawn grasses and creating new boxwood borders (fig. 2).

In 2012-2013, another part of the park, the so-called "Menagerie", was arranged: for more than 200 years. this site was not brought to a logical completion. First, a stream of spring water, which flows from a well about 10 m deep, carved in the granite sole of this area, was restored. The stream itself is now enclosed in banks made of oak pales, and, twisting like a snake, sinks underground and flows into the Lower Pond. A lawn was created on both sides of the stream. To the right of the path, self-seeded trees and bushes were removed and magnolias were planted. In 2019, the Menagerie with animals (ungulates) was reestablished. Today, the inhabitants of the Menagerie are spotted deer, roe deer, muntjac and European fallow deer.

The next composition, restored in recent years, is "The Ithaca Island", the homeland of Odysseus. For many years, the rocky slope of the hill, which used to be called the Caucasus Hill, was overgrown with savin junipers, which over the years lost its decorativeness and covered the beauty of the granite. So, along with the reconstruction of the granite steps to the very shore of the pond, the stones were cleaned of age-old silt, and the juniper was replaced with *Sedum* L. From the top of "The Ithaca Island" there is a perspective

FIGURE 2

The Parterre Amphitheater before and after restoration

Source: top left — by G. Ugrynovych, K. Shamshyn (1977), top right — by V. Mitin (1986), bottom — by I. Denysko (2009)

on the statue of Mercury, standing on the opposite bank of the Lower Pond on the Upper Alley; and from there — correspondingly, a picturesque landscape of huge stone blocks of "The Ithaca Island", on top of which the statue of Odysseus stands as the completion of the composition.

All stages of the restoration work, from design to implementation, are aimed at returning "Sofiyivka" to its original appearance: the selection and restoration of distinct park compositional groups hidden in long standing forest undergrowth now for the purpose of their proper perception against the background of aboriginal vegetation and introduced plants. These groups should stand out in contrast by creating an internal perspective and renovating accordingly once placed and oriented lawns.

According to historical literary sources, even in the first years of the existence of "Sofiyivka", the water level of the Kamianka River was not enough to ensure the functioning of hydraulic structures. This is evidenced by documents that the water was supplied to fountains and waterfalls only on holidays. Over the recent decades, a complex of works aimed at increasing the water level of the Kamianka has been carried out: clearing and strengthening of the banks in the upper reaches of the river in the village of Rodnykivka of the Uman district, the creation of water protection plantations around the Krasnostavsky pond, which is a reservoir for all hydraulic structures of the park, a water return system has been built, which also ensures the addition of water from the Umanka River to the hydraulic system of the park.

The park's team has contributed greatly to the conservation, renewal and enhancement of "Sofiyivka's" beauty. This work was awarded by Europa Nostra, the Polish ICOMOS-IFLA Committee and other international, governmental and public organizations.

4. Development of new territories

The area of "Sofiyivka" is approximately 180 hectares now. The Western part of the park, added to the historic core in the 50–70s of the 20th century, was opened for guests in 1996, when "Sofiyivka" celebrated its bicentennial. The Western part of the park is a logical continuation of its historic core, as it is a landscape park too. The main collection fund of introduced plants of "Sofiyivka" is located here, which currently amounts to 4665 taxa.

In 1991, in view of the significant achievements of the park team in the field of dendrology, introduction and acclimatization of plants, garden and park construction, "Sofiyivka" was granted the status of an independent research institution, and in 2005, the status of a scientific research institute. The structural divisions of the park are three scientific departments: Dendrology & Park Construction, Decorative & Fruit Plants, Herbaceous Plants. Scientists of the park, among them 2 doctors and 22 candidates of sciences, work in the laboratory and administrative building, also built in the Western part of the park. The building is equipped with a laboratory for microclonal propagation of plants, an herbarium and a seed laboratory.

In accordance with the Order of the Cabinet of Ministers of Ukraine dated February 11, 2004 No. 73, the collection of introduced tree and shrub plants of the National Dendrological Park "Sofiyivka" NAS of Ukraine was included in the Register of Scientific Objects That Constitute the National Patrimony. These are, in particular, collections of beech-trees (*Fagus* L.), lianas, hazels and filberts (***Corylus*** L.), roses (***Rosa*** L.), spruces (*Picea* A. Dietr)., junipers, etc.

For the general public, the Western part of the park is most attractive during the flowering of certain crops, presented in monoculture gardens (monogardens), the work on the development of which is ongoing: lilac (*Syringa* L.) on syringarium, magnolia garden, rosary.

Along the thalweg of the Greek gully, in accordance with the plans of "Sofiyivka" ("Tzarina's Garden") for 1855 and 1896, four ponds were renovated (fig. 3). Magmatic granite outcrops have been opened here, a road-alley system has been created to connect the Central Entrance with the newly created tourist service area, where a hotel for 65 people, a cafe, a parking, a shop "Flora of "Sofiyivka" has been opened, where visitors can buy planting material of fruit and ornamental plants and accessories.

The joining of the western part of the park made it possible to divide the flow of tourists almost equally among the entrance zones, however, the recreational load on the central part of the park did not decrease.

FIGURE 3
The Forest Pond in the Greek Gully
Source: I. Denysko (2016)

Exceeding the capacity of the park was especially evident on weekends and holidays at the end of spring and during the so-called "golden autumn".

At the time when "Sofiyivka" was celebrating its bicentennial, the director of the park I. S. Kosenko had a dream to create a Higher International School for training specialists in landscape gardening on the basis of the park. The prospects for this were opened by the construction of the scientific and laboratory building, and joining the territory in the lower reaches of the Kamianka River to the park. It was planned to create diverse ethnocultural expositions of gardens there. And although the preparatory work on cleaning the territory began in 2006, the real financing of the project, and later the construction of the new park, became possible only at the beginning of 2018. The opening of the "New Sofiyivka" fantasy-park took place on July 14, 2019.

As well as the western part of the park, the "New Sofiyivka" was created in accordance with the requirements of the Florentine Charter as a buffer zone in order to preserve the historic "Sofiyivka" and reduce the extremely large anthropogenic load on its core.

The fantasy park, located near the Central Entrance, actually continues the main compositional axis of "Sofiyivka", conceived by L. Metzel, that is the Kamianka River. The watercourse of this part of the river is slightly winding, the banks are steep, sometimes abrupt. The river floodplain is mostly flat, 40–60 m wide. Between the floodplain and the foot of the slope of the left bank there is a terrace rising 1–3 m above the level of the river. Along the river, almost throughout this site of the park, granite outcrops can be seen.

On the territory of the "New Sofiyivka", which is about 12 ha, there are exposition and functional zones:

- the Regular Garden;
- the Topiary;
- the Fairytale Garden where a playground for children and a small house of a "Forest Library" were arranged. In the pyramid — "Santa's Residence", there is a children's karaoke hall;
- the Japanese Garden with pavilions "For tea ceremonies", "For meditations" with a rock garden. The site is decorated with the "Red Bridge" and the Yatsuhashi Bridge;
- the Ukrainian Homestead, where the pavilions "Peasant's House", two "Barns", "Mill", and "Forge" are located. This ethnic exposition presents a selection of wooden sculptures — characters of ancient Ukrainian myths.

Water objects have also been created on the territory of the fantasy park: an artificial lake in the site of the Japanese Garden, the artificial Zaplava Pond, as well as a number of small basins in thematic compositions. In order to attract visitors in the evening time, additional artistic means were applied. The fountains and waterfalls are equipped with dynamic lighting systems. They are: the "Wonder Flowers" and "Rain Trees" on the Square of Fountains; the Arch fountain leading to the Regular Garden; the Geyser fountains of the Fairytale Garden; the floating fountain "Ship" on the Zaplava pond; waterfall "Dragons"; cascade waterfall in the park structure "Grotto"; artificial waterfalls that adorn the design sculpture "Garden of Lost Civilizations" in the "Valley of Dreams". "Santa's Residence" pavilion is also used to demonstrate a 3D mapping show.

The opening of the "New Sofiyivka" not only attracted a flow of tourists to the park, but also largely corrected its direction. According to the statistics of 2021, in the spring and autumn months, when the hydraulic facilities were not working, the number of visitors to the "New Sofiyivka" averaged 45.7% of the number of visitors to the historical part of the park; in May–July this figure was 73.4%.

5. Conclusions

The National Dendrological Park "Sofiyivka" of the National Academy of Sciences of Ukraine with a complex of park structures has undergone a number of transformations throughout its history, but has preserved its historical and cultural value and authenticity.

The implementation of scientific developments in the restoration of historic park compositions and creation of new ones in "Sofiyivka" is based on compliance with the requirements of the Florentine Charter for historic gardens, as well as on modern principles of garden and park art, which are based on the generalization of the main traditional elements of the theory of gardening and the use of appropriate composition techniques.

The construction of the "New Sofiyivka" not only significantly reduced the recreational load on the objects of the historic park ensemble, but also made the park even more attractive in terms of tourism.

References

Baziner F., Brief desctiption of Tsarina's Garden near the town of Uman, Kiev province, „Journal of the Ministry of State Property", 1851, No. 4/2, pp. 79–84 [Базинер Ф., Краткое описание Царицына сада близ г. Умани Киевской губернии, „Журн. М-ва гос. имуществ", 1851, № 4, ч. II., с. 79–84]

Cabinet of Ministers of Ukraine, Decree On Classification of Scientific Objects as National Property, No. 73-r, 11.02.2004 [Кабінет Міністрів України, Розпорядження Про віднесення наукових об›єктів до таких, що становлять національне надбання, N 73-р, 11.02.2004]

ICOMOS. International Council on Monuments and Sites, Historic Gardens (The Florence Charter - 1982), December 1982

Kosenko I. S., Khraban H. Yu., Mitin V. V., Harbuz V. F., Dendrological Park „Sofiyivka", Kyiv, 1996 [Косенко І. С., Храбан Г. Ю., Мітін В. В., Гарбуз В. Ф., Дендрологічний парк „Софіївка", Київ, 1996]

Kosenko I. S., Pylyp'iuk V. V., „Sofiyivka". The National Dendrological Park: photo album. Kyiv, 2016

Themery Th., Guide de Sophiowka, surnommé la merveille de l'Ucraine, Jardin de la Couronne, situé près d'Human, dans les colonies militaires. Odessa, 1846

Trembecki S., Sophiowka: poeme polonaise par Stanislas Trembecki traduit en vers francais par le comte de Lagarde. Vienne, 1815

"National Botanical Garden of Georgia – historic mission and impact across the centuries"

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Abstract:

Based on the overview and analysis of the history of National Botanical Garden of Georgia (NBGG) (former Tiflis/Tbilisi Botanical Garden) and its activities, the changes in its mission from its official establishment in 1845 to the present day are discussed. Its role as a regional botanical center for the Caucasus was determined initially: "Dissemination of the gardening practices in the region and gathering of the local Caucasus flora, distinguished by its beauty or useful features of local plants". For almost a century Tbilisi Botanical Garden has been a leading scientific center in the Caucasus Region 1

In a brief, the change in the mission can be tracked from cultivation of medicinal plants and plant acclimatization trials to the botanical studies, the science-based introduction of plants and research in the fields of plant conservation and ethnobotany, environmental education and public outreach. Safe and enjoyable environment of the garden is ideal for the recreation purposes and dissemination of knowledge about plant diversity and sustainable living. It cares about its cultural heritage, as the whole garden has the status of cultural heritage with numerous monuments, dated by 5th -19th centuries. It also provides expert services in the field of urban greening and horticulture.

Keywords:

plant introduction, plant conservation, horticulture, living collections, cultural heritage, environmental education, public outreach

1. Introduction

General overview of the origin of Botanical Gardens and their role

The history of gardens and plant cultivation goes in the depth of thousands of years and is associated with ancient Egypt and Mesopotamia. The first "true" botanical gardens originated in Italy in the 16th-17th centuries, mostly for the scientific study and cultivation of medicinal plants (Botanical Gardens of Padua, Pisa and Palermo) and then spread to Central Europe, where they were affiliated with the universities and pharmacies. Over time the functions of botanical gardens and their mission for the society underwent changes. The gardens became important centers of botanical research, plant introduction and plant conservation.[2]

Introduction of plants from foreign countries, their propagation and selection in Georgia has been carried out since time immemorial, as the geographical location of our country is favorable for such activities. Greek and Roman authors of ancient world point to the existence in ancient Colchis (the 13th-12th centuries BC) of a garden with healing plants, associated with Medea's name.[3]

Georgia was a part of the Silk Road connecting Asia and Europe. The remains of an old Ganja Gate (probably dating back to 4th-5th centuries) located in the botanical garden are part of this ancient route. Ganja Gate is marked on the map of Tbilisi by Vakhushti Batonishvili (1735).[4]

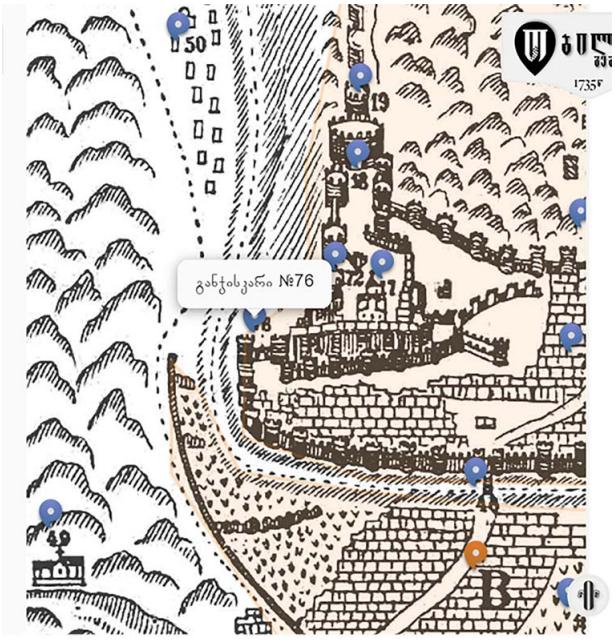


FIGURE 1
Ganja Gate (4th-5th centuries) is marked on the map of Tbilisi by Vakhushti Batonishvili (1735)

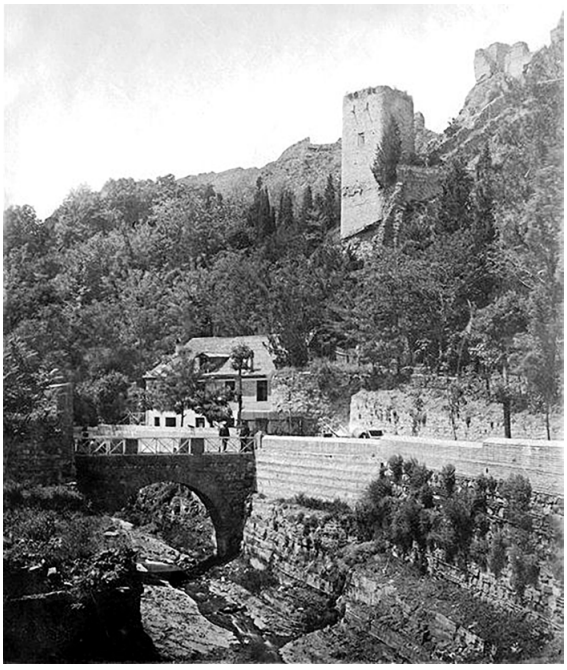


FIGURE 2
The remains of an old Ganja Gate on the territory of the NBGG

The place in the historical heart of the capital city Tbilisi, recently occupied by the National Botanical Garden of Georgia belonged to the Georgia's Royal Family and it had a function of the botanical garden since 1636. The three small gardens in different parts of the present terrain of the Botanical Garden, are marked on maps of Tbilisi by Vakhushti Batonishvili, (1735), Pischevich (1735) and Chuiko (1800).

Devastated due to the Persian invasion of 1795, the garden was revived in the early 19th century.

During 1801-1809, after the establishment of Russian governance, the garden was supplying with medicinal plants, the so-called "field pharmacies".

On May 1st, 1845 the garden was officially given the status of the "Botanical Garden" by the Decree of Mikhail Vorontsov, commander in-chief and the Viceroy of the Caucasus and it was named Tiflis Botanical Garden.[1, 4]

To demonstrate the change of the mission and role of NBGG, the history of the Garden is conventionally divided into three periods, during which the main functions and type of the Garden activities and its role are characterized according to the literary sources and periodicals of the botanical garden.

2. Historical overview

2.1 The role played by the botanical garden (1845-1900)

If in the 17th-18th centuries the main function of the garden was recreation and cultivation of medicinal plants, its new status of a botanical garden led to a new mission - introduction of plants, creation of collections, scientific research both in botany and agriculture. The Botanical Garden became the first regional center in both theoretical and practical directions - the first in the regional Caucasus scale scientific periodicals were issued, the first experimental nursery and horticultural school were run, regional branches were created, introduction, propagation, dissemination of outdoor and indoor ornamental plants took place here.

Already in 1847 the 165,000 and in 1849 - 500,000 seedlings of woody plants were grown and prepared for distribution. In the same year, more than 900 grafted saplings of fruit trees were produced. These were the best varieties of apple, pear, cherry, peach, plum, which were mainly imported from Crimea. During this period the cultivars of currant, gooseberry, strawberry and 6 varieties of potato new for the region, were imported from Europe and tested in the garden. The first attempts were undertaken to grow tobacco varieties and propagate the citruses by grafting.

FIGURE 3
School of gardening

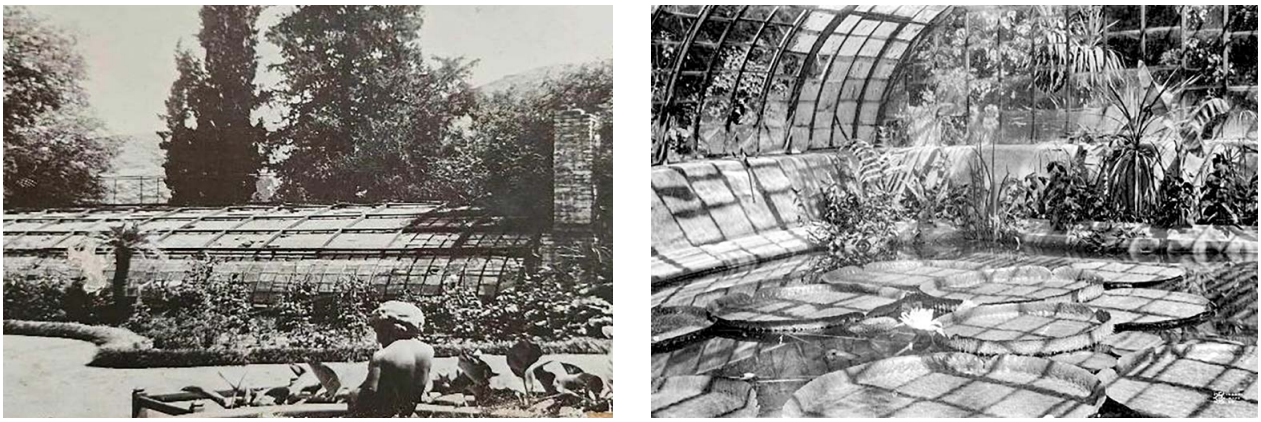


FIGURE 4-5
The French orangery, 1873

With seedlings grown in the Botanical Garden the first parks were planted in different cities of Georgia as well as outside its borders - in Vladikavkaz, Stavropol, Derbent, Semakha.

From 1849 young seedlings of fruit trees, grapevine and ornamental plants as well as greenhouse seedlings of new cultivars of some vegetables were distributed to the citizens free of charge.

In 1858 the first school of horticulture was opened.

Since 1861, Hans Scharrer, a scholar, horticulturist and landscape designer, has been taking care of the garden for 28 years. According to the Italian style of terrace gardening he arranged 12 terraces on the slope of Sololaki ridge, where conifers and deciduous plants were planted and some flower beds arranged.

In 1871-1873 two small arched greenhouses were brought from France, for indoor plant collections and*Victoria regia*.

By the end of 1875 the garden had more than 1238 species of outdoor and indoor plants, among them 134 varieties of roses.

During 1889-1898 various floristic collections were created: Caucasian plants, bulbous plants, alpine hills, expositions of coniferous and useful plants. [5]

From 1884 the garden was directed by the prominent botanist and dendrologist Jacov Medvedev. In 1886, under his guidance the Museum of the Botanical Garden was established.

The first catalogue of the outdoor plants of Tbilisi Botanical Garden, published in 1887 included 451 species, among them were 180 species of Caucasian origin and 271 were introduced species. In 1892 the collection of the herbarium of the Caucasian plants began and the library was founded.

Due to the lack of local specialists several botanists were invited to the garden for the study of the Caucasian flora. Among them were N. Albov, A. Lomakin, S. Timofeev, A. Fomin, E. Koenig, D. Sosnowskyi, and A. Grossheim. In 1895, their studies and works resulted in the edition of "Proceedings of Tiflis Botanical Garden" ("Труды Тифлисскаго ботаническаго сада"). From this period onwards quite purposeful scientific research work began to be carried out at Tiflis Botanical Garden and the first scientific periodicals in the Caucasus region were published.

2.2 The role played by the botanical garden (1900-2000)

Since the beginning of the 20th century, scientific studies, enrichment of collections, introduction of plants, breeding, trainning of local scientific personnel have been the main directions of the Botanical Garden. The foundation was laid for international contacts, the landscape design direction and involvement of the institution in scientific exchanges of seeds (Delectus Seminum) were strengthened. The number of periodical scientific journals of the garden has increased: since the year of 1895 were regularly published "Proceedings of Tiflis Botanical Garden" ("Труды Тифлисскаго ботаническаго сада" later "Works of Tbilisi Botanical Garden" (total 47 volumes).

Since 1905 “Bulletin of Tbilisi Botanical Garden” (“Вестник Тифлисскаго Ботаническаго Сада” was published (total 53 issues). During the period of 1919-1930 total 7 volumes of “Records of Scientific-Applied Departments of Tbilisi Botanical Garden” were published.

In different volumes of these journals, the fundamental works have been published, which have a key role in the study of the flora of the Caucasus: N. M. Albov, “Materials for the flora of Colchis”; V. I. Lipsky, “Flora of Caucasus”; N.N. Speshnev, “Materials of the study of the mycological flora of the Caucasus”; V.I. Lipsky ,”Flora of Central Asia”; Y.N. Voronov, “Materials for the flora of Abkhazia”, “On the flora of Artvin”; I. S. Medwedev “Vegetation of the Caucasus”, “Trees and Shrubs of the Caucasus”; A.V. Fomin and Y.N. Voronov,”Key to the Plants of the Caucasus and Crimea”.

The upturn of the garden at the beginning of the 20th century was largely related to its leader Adolf Christian Roloff. With his initiative in 1899, the project of establishing a school of gardeners was approved and the school was opened in 1900. During his tenure - 1899-1918, the Botanical Garden turned into a large-scale scientific institution, with well-equipped laboratories.

In 1902-1916 all the scientific departments and laboratories of the present Botanical Garden were founded by Adolf Roloff. The 4 phytogeographical divisions of the Botanical Garden and 5 experimental stations in the South Caucasus were established: Bakuriani Alpine Botanical Garden, Bobokvati (Jiati) garden for introducing subtropical plants (Adjara), Karayaz nursery (Kvemo Kartli), Gogcha (Sevan) Alpine Botanical Garden (Armenia), Aghstapa and Mughan (today’s territory of Azerbaijan), Ozurgeti, Sakara and Zugdidi experimental stations.

Active scientific work was continued and developed. Famous scientists D. Sosnowsky, I. Kushke, E. Maximov, L. Dekaprelevich, A. Grossheim; P. Zhukovsky and others worked there.

Since 1921 due to the soviet occupation the Botanical Garden was under the management of the People’s Commissariat for Agriculture. Some famous outstanding Georgian scientists such as Niko Ketskhoveli, Levan Kanchaveli, Vladimer Menabde, Ksenia Bakhtadze, Tamar Sulakadze, Luba Kemularia, Levan Japaridze, Mikheil Sakhokia and others worked here, young specialist were trained. The Botanical Garden has made a profound contribution to many scientific disciplines.

From 1934, Tbilisi Botanical Garden was divided into several independent scientific organizations: Institute of Botany, Institute of Plant Protection, Institute of Zoology, Institute of Field-Farming and the Selection Station of the Georgian SSR. The herbarium and library moved to the newly established Institute of Botany. Due to this, the Botanical Garden lost its scientific function and the status of a scientific research institution.

It is worth to note that the first director of the Institute of Botany and Botanical Garden of Baku, Azerbaijan, founded in 1936, was the famous researcher of the flora of the Caucasus A.A. Grossheim, who worked in the Tbilisi Botanical Garden from 1913-1926.

In the year of 1943 status of the botanical garden as a scientific-research institution was restored and it was subordinated to the Georgian Academy of Sciences. Scientific studies carried out in the Garden since this period were mostly dedicated to the introduction and acclimatization of plants.

FIGURE 6
The waterfall and bridge (1914) at the river Tsavkisistskai

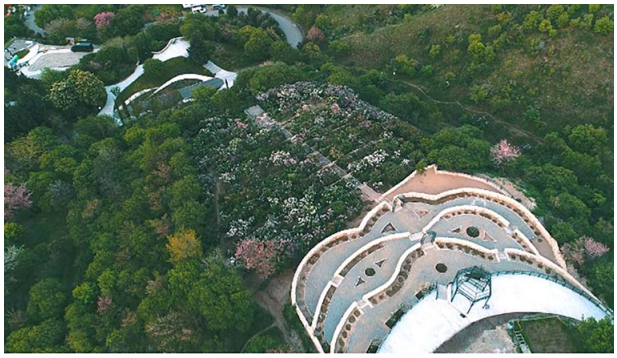


FIGURE 7
Aerial photo over the Lilac display, Display of perennial grasses and Events’ squire

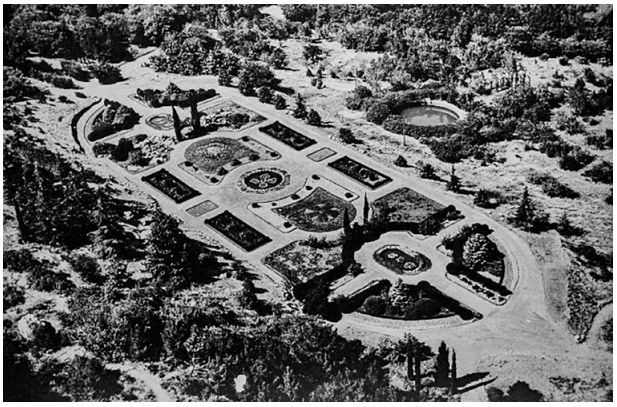


FIGURE 8
Parterre – the French style garden, designed by Georgian Landscape Architect Giorgri Managadze, 50ies of the 19th century

FIGURE 9
View of a Parterre from Tabori range, 2019

In 1947-1956 a new ornamental site - the Parterre, designed by a landscape architect, honoured artist Giorgi Managadze was constructed.

New floristic departments: the forest of western Georgia, the Mediterranean, East Asian, North American and the Himalayan phytogeographic departments were created in the garden.

During the 1953-1989 period the area of the garden was extended by 40 hectares. The laboratory of plant physiology and the departments of medicinal plants, agrotechnology of ornamental flowering plants, nature protection and scientific-information departments were established.

During 1960-1975 two experimental bases were established in the suburbs of Tbilisi, (Krtsanisi and Tsavkisi) to study and test different plants. The botanical gardens were opened in Zugdidi and Kutaisi.

In 1980 the dendrological museum of woody plants was opened, the department of the medicinal plants was re-established, the collection plot of rare and endangered species of Caucasian and Georgian flora and the Syringarium were established.[4] This period was then followed by the crisis of 1990-ies, which caused heavy damage to living collections of trees and shrubs and greenhouse plants. Only due to the great efforts of the staff of the garden horticulturists, scientists and supporting personnel the Botanical Garden survived from the complete destruction.

2.3 The activities and achievements of NBGG in 21st century (2001-2024)

Since the beginning of the 21st century practical work and research in the field of Plant Conservation has become one of the priorities of the National Botanical Garden. In 2011 the Plant Conservation Department (former Department of Living Flora of Caucasus, established in 1891), which since 2005 has been implementing Conservation of Georgian Flora within the Millennium Seed Bank Partnership, was incorporated in the structures of the Botanical Garden. At the same time the Botanical Garden was re-established by the Tbilisi City Hall as the 'Non-entrepreneurial Non-commercial Legal Entity'.

With support of the Royal Botanic Gardens Kew, the NBGG and funding gained from the Rufford Foundation (UK) the old building of the Department of Plant Conservation was expanded, rehabilitated and the seed bank, operating at the Department, was equipped. At present the seed bank, already holds seeds of more than 47% of vascular flora of Georgia.[6]

According to the data of the year of 2012, due to the economic crisis and deteriorated infrastructure of the garden, the collection of woody plants was represented by only 996 species and forms.

Since the end of 20th century and beginning of the 21st century for more than two decades the International Charity Foundation "Cartu" has been financially supporting the Botanical Garden. The fund's support made it possible to maintain the plant collections and organizational structure of the Botanical Garden. Several thousands of trees and shrubs were planted in the phytogeographical plots and ornamental collections

enriched. From 2012 the restoration of historic monuments in the Botanical Garden was underway, the central bridge, two towers, a fragment of Narikala fortress, Tamar's Bridge and the historic building at the central entrance, which have status of the cultural heritage, were repaired, a playground for children was set up.

In 2014 the first scientific conference "Biodiversity and Georgia" was held on the occasion of the celebration of the 170th anniversary of the Botanical Garden. It was followed by a series of Scientific Conferences, titled "Biodiversity and Georgia", which gathered representatives of all institutions of Georgia, involved in botanical and horticultural studies. Achievements of research in the field of biodiversity were summarized on the 1st International Conference -"Advances and Perspectives of Biodiversity Research and Conservation in Georgia" organized and held in 2019 by NBGG, with support of Tbilisi City Hall, Deutsche Gesellshaft fur Internationale Zusammenarbeit und BGCI (Botanic Garden Conservation International). The conference gathered 110 representatives of more than 40 partner organizations from 13 countries.

Since the restoration of the institutional membership of BGCI in 2016, NBGG has been actively involved in global plant conservation and research networks. Sharing of experience allows for the better performance of the Botanical Garden. NBGG is a member of global networks - International Plant Sentinel Network of BGCI, OPTIMA, Millennium Seed Bank Partnership.

In 2019 - NBGG joined the European Route of Historical Gardens. It cooperates with Morton Arboretum, Arnold Arboretum and various Botanical Gardens of the world - Kew Gardens (RBG, Kew), Missouri Botanical Garden, Istanbul Nezahat Gokyigit Botanical Garden, Botanical Gardens of Berlin, Tallinn, Lviv, Yerevan, Palermo and others.

In 2020 the Tbilisi City Hall approved the Strategic Development Plan for the Botanical Garden, developed with support of the international council of experts led by BGCI. The priorities defined for the period 2020-2030 embrace study and documentation of the Flora of the Caucasus, including ethnobotanical uses of plants; study and analysis of factors, threatening the local flora; assessment of plants according to IUCN Red List criteria; conservation of wild vascular flora and crop wild relatives (CWR), their long term storage and availability for research and breeding programmes.

An important challenge is management of living collections according to the international standards –their proper documentation and efficient demonstration in the Botanic Garden - signage and labeling of living collections, provision of their availability for research, education and recreation.

Collection policy document is developed. Evaluation of Plant Genetic resources is also carried out – the specialists of the Botanical Garden are involved in urban greening programmes and evaluation of green cover in the capital city Tbilisi and other regions of Georgia, provide consultations for the management of dendrologic parks.

3. Social responsibility - Environmental education, public outreach programmes

Education of the broader society on the importance of plant diversity, plant conservation, the cultural significance of plants and sustainable living is among the priorities of NBGG.

Environmental education department of NBGG, established in 2018, leads at average 10 education programmes for different age groups annually, which attract at average 3500-4000 pupils of Public Schools per year. The education programmes of NBGG cover a broad range of issues and follow the trends, defined at BGCI Education Congresses.

It is worth mentioning that the term "Environmental Education" itself was coined at the UNESCO Intergovernmental Conference, held at Tbilisi, Georgia, USSR, on 26th October 1977. Educational environment was discussed at the mentioned meeting and it first appeared in the so-called Tbilisi Declaration, saying that: "Environmental education should be provided for all ages, at all levels and in both formal and non-formal education".[7]

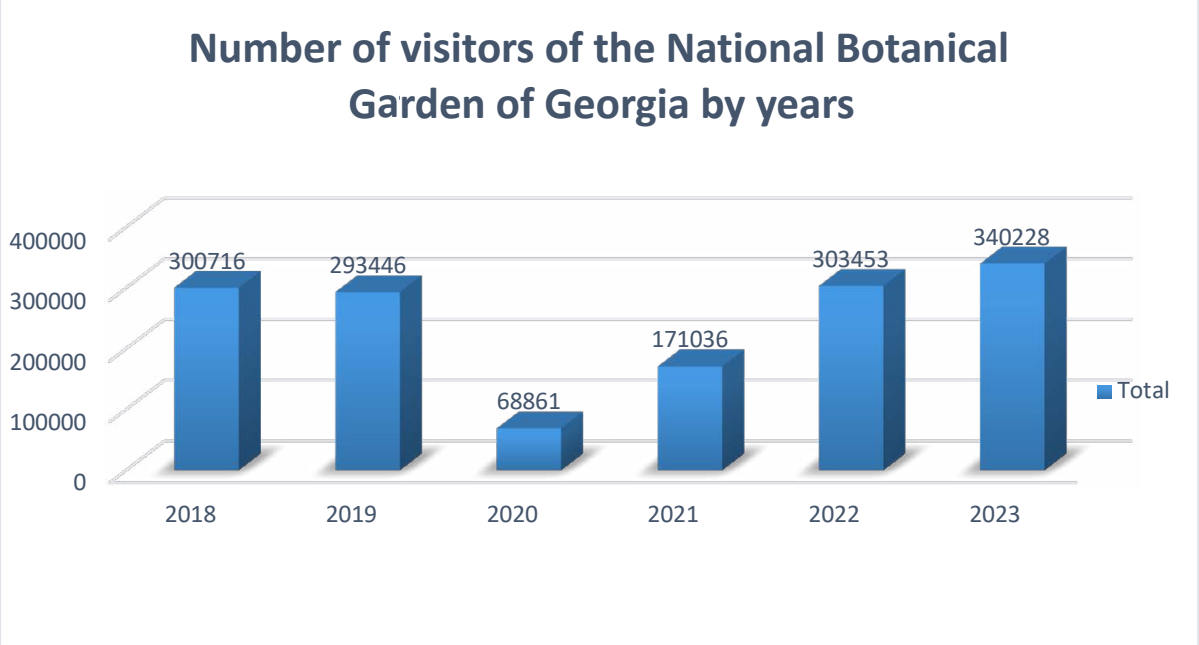
Inclusiveness of educational programmes will be improved in the future by adding new aspects, such as therapeutic horticulture, whose aim is alleviation of conditions caused by various societal stresses.

In 2020 the Landscape Masterplan, developed in 2019 by the British Company CBA (Chris Blandford and Associates) was adopted by the Tbilisi City Hall.

Currently several infrastructural projects are in progress in NBGG – construction of the new Multifunctional Centre, Gardener's house, rehabilitation of the Collection of Roses (Rosarium), etc., which will strengthen the basis for the implementation of strategic priorities of NBGG and consolidate the social function of NBGG.

Public programmes of the Botanical Garden - annual festivals, like Bread Festival, Sakura Festival, Days of Lilac Blooming, Flower shows attract more visitors and tourists, thus contributing to the increase of income of the botanical garden, favour its recreational function and contribute to the better awareness of the public about plants and sustainable living (Figure).

FIGURE 10



4. Conclusions

Across the centuries the functions of botanical gardens and their mission for the society underwent changes. The gardens became important centers of botanical research and plant conservation. If in the 20th century the activities of botanical gardens were targeted at solving the problems of biodiversity conservation and

sustainable use of plant resources, in the 21st century, in the light of global climate change and a number of environmental and anthropogenic threats, their tasks were further expanded and ecological and social responsibilities were added to it.

Living plant collections and the setting – the landscape and cultural heritage remain the core values of botanic garden, though use of collections and the corresponding outcomes have diversified over time and serve the society in a different ways – for scientific research, breeding programmes, for the enforcement of natural populations of plants, use in habitat restoration and environmental education.

NBGG continuously maintained its scientific, horticultural and recreational function throughout its existence, including the periods of pandemic (in 2020-2021 and in 1918 – during the Spanish flu, since we have no information that the garden was closed). The social role and responsibility of NBGG were well demonstrated during the Covid19 pandemic – excluding a very short interval of time, the garden was open to the public and helped to reduce the stress in the days of lockdown. Environmental education themes were delivered to the public via social media by short videos.

The efforts of botanic gardens, targeted at Covid19 crisis management, were evaluated by the special surveys of BGCI and ERHG. NBGG was involved in sharing its experience in this field.

Compliance with global targets of Botanic Gardens in the 21st century is ensured by the guidance of BGCI, which developed the Accreditation scheme in 2018 and by the regular surveys the economic, social and environmental impacts of botanic gardens on the society are measured. [8]

With its plant collections, research basis, cultural heritage, scientific and educational activities National Botanical Garden of Georgia contributes to the achievement of Sustainable Development Goals.

References

1. Short notes on Tiflis Botanical Garden. Proceedings of Tiflis Botanical Garden, 1895, Issue 1, (in Russian) pp. 1-10
2. Sarada Krishnan and Ari Novy, 'The role of botanic gardens in the twenty-first century. CAB reviews, 2016, Vol. 11, No. 023, 1-10
3. Nani Khelaia, Ramaz Shengelia, Revaz Gagnidze, Nino Chikhladze (2007) New Information about the plants from Medea's Garden and their use for medical purposes in traditional and modern Phasis, 10 (II) 2007 pp. 201-207. (Retrived from https://phasis.tsu.ge/index.php/PJ/article/view/2140/2431) medicine.
4. Kereselidze J., Loria M., Elbakidze M.,Tbilisi Botanical Garden is 365 years old. Dedaena, Tbilisi, 2001. (in Georgian)
5. Report on scientific activities of Tiflis Botanical Garden for four years - 1896-1899 (Отчет о научной деятельности Тифлисскаго Ботаническаго Сада за четырехлетие с 1896 по 1899 год включительно. Тифлис. Proceedings of Tiflis Botanical Garden, 1900
6. Tsira Mikatadze-Pantsulaia, et al. Report of the Department of Plant Conservation of NBGG for 2023 (Manuscript)
7. Gillett, M. (1977). The Tbilisi Declaration. McGill Journal of Education/Revue Des Sciences De l'éducation De McGill, Vol. 12 No. 2, 1977 (Retrieved from https://mje.mcgill.ca/article/view/7156)

Online publication:

8. Paul Smith & Yvette Harvey-Brown. BGCI Technical Review: The economic, social and environmental impacts of botanic gardens, August 2018 Published by Botanic Gardens Conservation International Descanso House, 199 Kew Road, Richmond, Surrey, TW9 3BW, UK. P.20.

   https://shorturl.at/KDR3N

"Challenges and Concerns, Research Endeavours, and Results in the Conservation and Management of Historic Gardens in Romania"

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Over the years, Alexandru Mexi has contributed to national and international cultural and research projects focused on historic gardens and cultural landscapes. He has also developed projects for the conservation, restoration, management, monitoring, and/or enhancement of historic listed public parks and private gardens, cultural landscapes, as well as UNESCO World Heritage sites in Romania. In 2019 he has initiated the first garden restoration summer school in Romania (at the Cantacuzino Domain at Florești, Prahova county), an annual interdisciplinary program dedicated exclusively to garden heritage. In 2017, he authored a book on the royal gardens and cultural landscape at Sinaia, which is anticipated to be included this year in the Romanian World Heritage Tentative List. He has also published scientific papers and chapters in collective volumes on landscape architecture, historic gardens, and cultural landscapes, both domestically and internationally. Active in professional organizations and NGOs related to cultural heritage, landscape, and environment, Alexandru Mexi is a member of bodies such as ICOMOS Romania and the Romanian Landscape Architect's Association. He also serves in the Executive Committee of the European Council of Landscape Architecture Schools since 2018.

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Abstract:

This paper aims to present a synthetic overview of Romania's historic parks and gardens, highlighting both their cultural significance and the complexities involved in their conservation and management. It delves into the various challenges these heritage sites face, including issues related to their current state of conservation, maintenance, and the historic and contemporary factors affecting these cultural spaces. The paper will also briefly review past and ongoing research efforts aimed at understanding and addressing these challenges, including studies on conservation techniques, historical landscape analysis, and management practices. Furthermore, the paper will also briefly present the results of such research endeavours.

Keywords:

Historic gardens, cultural heritage, Romania, preservation

1. Introduction

Romania's *landscape heritage* includes, in addition to various landscapes of undeniable cultural and/or natural value, a significant number of historic parks and gardens such as gardens/parks associated with churches and monasteries, belonging to historic noble or royal estates, municipal public parks and planted spaces associated to public institutions (eg. historic school gardens, museums, ministries, etc.). Some of these sites benefit directly from legal protection under the status of historic monuments, being individually listed in the List of Historic Monuments. Meanwhile, even if not individually listed, many other benefits from the same legal protection by being part of a listed property, an ensemble, or a site registered on the List of Historic Monuments, or by being located within the buffer zone around a listed monument or inside a protected built area defined as such in a urban planning document.

Regardless of their legal protection status, these cultural sites face a series of issues, such as, for example: fragmentation of the historic property and lack of cadastre, ownership issues, poor state of conservation, insufficient dedicated information and research, lack of specialists trained in historic garden preservation, inappropriate interventions and/or public funding criteria. The following chapters will provide a concise overview of such particular issues.

In addition to discussing the difficulties faced, the paper will also briefly highlight examples of positive developments and successful interventions in the management of historic gardens of Romania. This includes showcasing projects and research initiatives aimed at addressing some of the challenges mentioned before. The focus will be on efforts in conservation, restoration, and management, illustrating how different approaches and strategies have been applied to preserve and enhance some of Romania's historic parks and gardens.

By presenting both the problems and the progress made, this paper aims to offer a balanced perspective on the current state of these heritage sites.

2. Challenges and concerns

2.1 Fragmentation of the historic property and lack of cadastral data

One of the significant challenges in the conservation of historic gardens in Romania is the fragmentation of the historic property and the absence of either / or historic and contemporary cadastral records (see Mexi, 2021, pp. 158-164). Historic properties in Romania are often divided, leading to difficulties in their management and preservation. The lack of comprehensive cadastral data exacerbates the problem, making it challenging to maintain the integrity of these designed landscapes.

After the end of World War II and the establishment of the communist regime, private properties were progressively brought under state ownership through various measures. For instance, on March 2, 1949, Decree No. 83/1949 was enacted, leading to the expropriation of estates exceeding 50 hectares, and model farms. This resulted in the nationalisation of over 6,000 estates and 4,400 manors, (http://bogdansuditu.ro/guvernanta-urbana-si-teritoriala/destinul-conacelor-si-mosierilor-romani-noaptea-de-23-martie-1949/, accessed July 2024) many of which included parks or landscaped gardens at the time. More than five decades later, following the Revolution of 1989, new legislation was introduced that allowed for the restitution of these nationalised lands (Mexi, 2022, pp. 276-293). However, the restitution process has been intricate and

FIGURE 1
Division and agricultural use of the former historic garden (listed as a historic monument) at the Teleki manor in Luna de Jos, Cluj county.
Source: Mexi (2023)

faced numerous challenges, leading to the partial or segmented return of many historic properties. As a result, a considerable number of historic parks and gardens, particularly originally part of castles, manors, or palaces, have been divided into multiple parcels.

In addition to the restitution challenges and other factors contributing to the fragmentation of historic parks and gardens – such as the sale of portions of the properties – the absence of comprehensive cadastral data, both historical and/or contemporary, further complicates the situation, making it challenging to maintain the integrity of these landscapes (see Mexi, 2021, pp. 162-164 and Mexi, 2022, pp. 292-293).

2.2 Ownership issues

Another significant challenge facing the preservation of historic gardens is the uncertainty or fragmentation of ownership. In many cases, the legal status of these gardens is either unclear or involves multiple rightsholders. This dispersion of ownership can arise from historical changes in property laws and/or partial restitutions as mentioned before, complex inheritance situations, etc. (Mexi, 2022, pp. 276-293).

Such fragmentation presents significant challenges for conservation efforts. When ownership is divided among various parties or remains unclear, implementing cohesive conservation, restoration, enhancement, or management strategies becomes increasingly difficult. Achieving consensus among all stakeholders is often a complex and lengthy process, and often results in inconsistent or conflicting approaches to the management and care of these sites. Furthermore, securing funding for conservation projects is frequently impeded by the need to negotiate with multiple owners, navigate intricate legal frameworks, or address incomplete conservation, restoration, or enhancement works.

2.3 State of conservation

As part of a European Interreg project – INNOCASTLE (INNOvating Policy Instruments for Historic CASTLEs, Manors, and Estates: https://projects2014-2020.interregeurope.eu/innocastle/, accessed July 2024) –, which focused on castles, manors, and their surrounding gardens, a detailed study was conducted in Romania's Central Region, with a particular emphasis on Mureș County (see also de Roo *et. al.*, 2021).

This project involved not only the inventory of rural noble estates but also an analysis dedicated to the current conservation status of both the architectural structures, as well as to the landscaped environments associated with these historic properties. The findings not only highlighted the rich heritage of the region but also called attention to the challenges faced in safeguarding these historic sites for future generations.

One outcome of this research was the evaluation of the state of conservation of the historic gardens, whether legally protected as historic monuments or not, associated with the castles and manors of Mureș County. The study covered 47 castles and manors situated along the Târnava Mică, Niraj, and Mureș rivers, all of which were historically documented through ancient plans, maps, and dedicated literature as having been surrounded at some moment in time by parks or gardens. Of the 47 sites surveyed, 23 parks or gardens disappeared completely; an additional 18 sites still retained some fragments of their historic features, whether in the form of remnants (often severely damaged) of original structures, partial plantings, or traces of the once elaborate designs. Of the six sites that still maintained the semblance of their historical integrity, only one garden was relatively well-preserved. The remaining five were, unfortunately, in a state of significant deterioration.

These results were not surprising and do not reflect a regional peculiarity. Rather, they contribute to a broader national picture characterised by the fragile state of conservation of the landscape heritage across the country.

FIGURE 2
The ruins of Huszár castle and its gardens, in Apalina, Mureș county
Source: Mexi (2021)

FIGURE 3
The park of the Cantacuzino Palace in Florești, Prahova County, prior to the development of a preservation strategy in 2018
Source: Domeniul Cantacuzino (cca 2010)

2.4 Information and research

Publications

The lack of documentation in the field of garden history and landscape heritage preservation in Romania has been noted since the 1980s by Maria Paleologu (1982) in an article titled "Câteva observații cu privire la ocrotirea și valorificarea grădinilor istorice" ("Some Observations on the Preservation and Valorization of Historic Gardens") published in *Revista Monumentelor și Muzeelor* (Revue of Monuments and Museums), the precursor to *Revista Monumentelor Istorice* (Historic Monuments' Revue). Despite the critical importance of research in this area, the bibliography in Romania concerning topics such as the history and evolution of parks and gardens or the conservation and restoration of landscape heritage remains insufficient. It is particularly concerning that Rică Marcus's (1958) volume—*Parcuri și grădini din România* ("Parks and Gardens of Romania"), published in 1958—remains the only quasi-comprehensive inventory of parks and gardens in the country, despite significant errors identified over time. This book continues to be a primary reference in Romanian landscape heritage documentation, highlighting a major area of concern.

Although there is growing interest in this field, and an increase in both the quantity and quality of publications – evidenced by recent books and journal issues dedicated to such topics (see Bibliography) –

there remains a significant knowledge gap. This gap is evident both in academic and research settings and in the fields of documentation, professional practice, and specialization.

Research

Research on parks and gardens in Romania remains at a basic level, as evidenced by the limited number of specialized publications, the relatively low expertise of specialists, and the quality of proposals and interventions related to these designed spaces. Aside from issues related to funding schemes for specific and/or systematic research on this heritage, the small number of trained, interested, or involved specialists, and other factors, a major concern is the absence of a methodology or general guidelines for researching this category of heritage. Without such a methodology, even general research on historic gardens and parks often boils down to historical and/or comparative analysis with other parks, both within the country and abroad, or an examination of the plant composition of the green layer of the design. Frequently overlooked are the relationships between the elements composing the garden, as well as the historical, social, economic, cultural, and built contexts – local, regional, national, and international – in which the design has developed and exists today. Additionally, the causes of changes in the garden's appearance and components, and the reasons for modifications (such as differing visions on the garden's role and its mineral and vegetative components, social, economic, or real estate pressures, plant diseases, species extinction, etc.) are often neglected. The adverse outcomes of these oversights are readily apparent today.

As reflected in documents such as the Florence Charter (1982), the ICOMOS-IFLA Document on Historic Urban Public Parks (2017), the Declaration of Sanssouci on the Maintenance of Historic Gardens and Cultural Landscapes (2014) and subsequent guidelines and dedicated bibliography, gardens represent a complex ecosystem where the built components and plant composition are equally significant, and all elements must be considered in relation to their historical and current contexts, as well as their roles over time. Pathways and circulation routes, water features and mirrors, underground and above-ground installations, various types of enclosures, specific constructions (e.g., rockeries, statues, pavilions, water towers), and garden furniture are common built components found in most gardens and parks, whether recent or historic. These built components are complemented by plant compositions, including solitary trees and shrubs, alignments, groups, and masses, lawns, patches and floral bands, aquatic plants, or vines covering structures (e.g., pergolas, walls, fences). Designed at a specific point in time, all these built and natural components have evolved together, with plants adapting to the environmental conditions of the design,

FIGURE 4
Intrusive archaeological research in the park of the Cantacuzino Palace in Florești
Source: Stoica (2021)

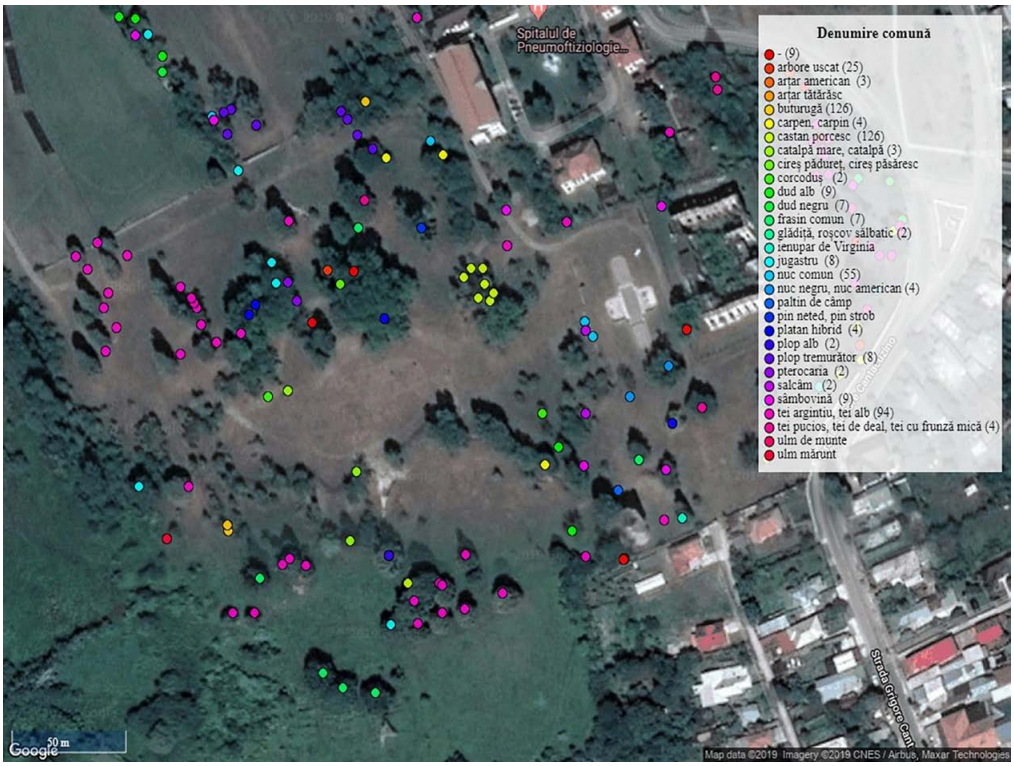

FIGURE 5
Tree survey and tree evaluations in the park of the Cantacuzino Palace in Florești
Source: Culescu (2019)

developing in response, and not necessarily aligning with the original vision of the designer(s). In some cases, this vision was not even fully designed but rather depicted through a few graphic representations possibly accompanied by plant lists, and not through technical planting plans. Each of these characteristics and the individual elements – both mineral and vegetal – that make up a park or garden must be analyzed both separately and collectively to understand their design, integration into the implemented project, evolution over time, and current issues. This includes assessing risks to their conservation status and relationships in the near or distant future, and determining how these risks can be mitigated or eliminated. Such research should be conducted both in archives and libraries, as well as on-site, sometimes using intrusive methods like archaeological investigations or specific analyses of historic trees. Given the nature of parks and gardens, this analysis should typically span at least 12 months to ensure thorough observation across all seasons and weather conditions. A crucial requirement, often overlooked, is that such research should be carried out by a multidisciplinary team capable of understanding the various facets of the evolution, specifics of the components, and current issues facing the landscape design.

2.5 Specialists trained in historic garden preservation

The conservation and restoration of landscape heritage is not the responsibility of a single category of specialists but requires an interdisciplinary approach. Depending on the specifics of the research or intervention needed, the team of experts may include architects, landscape architects, structural engineers, historians, archaeologists, arborists, and specialists in the restoration of stone, wood, metal, and other materials. However, the situation becomes more complex when examining the role of landscape architects – a profession that should be involved in any project concerning a historic park or garden.

Landscape architecture remains a relatively new field in Romania. The first specialized program was established only in 1998 at the University of Agronomic Sciences and Veterinary Medicine in Bucharest, with the first graduating class completing their studies in 2003. Furthermore, the profession was officially recognized quite late, entering Romania's Occupation Code (COR) only in 2014. Although courses in garden and landscape history and/or landscape restoration are included in landscape architecture programs in

Romania, they rely, as already stated, on a still insufficiently rich bibliography. Even with supplementary documentation and case studies from abroad, these programs fall short of providing the comprehensive knowledge base required for future specialists to build their careers in the field.

Professional development programs organized by foreign universities, research institutes, professional associations, and some cultural projects or summer schools in Romania complement domestic academic programs. However, they still cannot fully address the current need for theoretical training, applied field research, and specialized practice in Romania. Additionally, the migration of qualified personnel to Western countries or other fields offering greater financial stability and professional benefits poses another challenge for the preservation of landscape heritage in Romania.

2.6 Inappropriate interventions and funding schemes

In the current context, with a few notable exceptions, most interventions carried out in historic parks and gardens have been limited to localized conservation-restoration works targeting specific components, whether built elements, such as architectural or decorative features, or natural ones, such as water mirrors or canals, or vegetation. These interventions have rarely been extended to address the entire landscaped ensemble or to encompass broader, well-defined areas with historical coherence and functional significance. This fragmented approach has often led not to an improvement in the overall state of conservation of historic gardens but rather to their progressive degradation, as isolated actions frequently caused more harm than benefit.

In some cases, the funding for these works was provided through national or European programs. However, these funding schemes were predominantly designed for the restoration of historic buildings and, as a result, did not include financial provisions or eligible expenditures for the specific types of interventions required for historic gardens – such as, for instance, detailed vegetation surveys, pruning, controlled clearing, or replanting, which are essential for the maintenance and restoration of historic landscapes. Moreover, these funding programs did not allocate resources for the ongoing and adequate maintenance after the completion of initial works. Thus, despite the well-intended aim of utilizing non-reimbursable funding for the conservation and restoration of historic gardens, the existence of inadequate eligibility criteria and the lack of alignment between eligible expenditures and the specific needs of such monuments have posed significant challenges. These issues were further compounded by the implementation of interventions based on insufficiently documented or poorly executed studies (see Mexi, 2022, 276-293). Consequently, rather than contributing to the improvement of the conservation status of historic gardens, these publicly funded interventions have, in many cases, exacerbated existing conservation issues.

Nevertheless, the new funding guidelines for European projects, as well as national programs for the restoration of historic monuments – such as the Historic Monuments' Stamp Duty (https://patrimoniu.ro/en/articles?category_id=rkju-hytgh6yhg, accessed June 2024) and the National Restoration Program (https://patrimoniu.ro/en/articles/programul-national-de-restaurare-pnr, accessed June 2024), both managed by the National Institute of Heritage – have been improved to better address the specific conservation-restoration needs of landscape heritage. These updates contribute to enhancing the quality of intervention projects and hold the potential to improve the conservation status of this category of heritage. However, as these guidelines and funding programs have only been recently revised, insufficient time has passed to observe the anticipated improvements.

3. Research endeavors

Alongside the improvement of funding programs and guidelines, Romania is witnessing a growth in interdisciplinary programs dedicated to the research, awareness, conservation, restoration, and valorization of cultural heritage. Such complex initiatives integrate various fields of expertise and pursue a holistic approach to landscape heritage, essential for its protection and promotion.

These programs encompass activities such as the investigation of private and public archives to document the history and evolution of gardens (see Bibliography), assessments of current conservation conditions, inventories and archaeological surveys, and the development of intervention strategies. Additionally,

thematic exhibitions are organized to raise awareness about historic gardens and the challenges associated with their conservation (see Bibliography). These efforts are complemented by outreach publications and scholarly articles in prestigious national and European journals, contributing to the advancement of knowledge in this field (see selection in Bibliography).

Among the most noteworthy initiatives are summer schools focused on the research, conservation, and restoration of historic gardens held at Florești (Prahova county, 2018-2024), Luna de jos (Cluj county, 2023), or Kiseleff (Bucharest, 2024). These serve as educational and training platforms for professionals and students, providing practical opportunities for direct study of landscape heritage. Similarly, voluntary projects involving emergency interventions on degraded elements of historic gardens stand out for their direct contribution to improving conservation conditions and safeguarding these cultural assets (see https://ambulanta-pentru-monumente.ro/bulci-sera-de-pe-domeniul-mocioni/, accessed November 2024).

These endeavors not only support the preservation of landscape heritage but also enhance public awareness of its significance and contribute to the advancement of professional knowledge and practices in the field. By integrating efforts in research, education, and intervention, these interdisciplinary initiatives have the potential to create a lasting and meaningful impact on the conservation and valorization of Romania's historic gardens.

4. Results in the conservation and management of historic gardens

The increasing focus on the conservation and restoration of historic parks and gardens – despite the challenges outlined in previous chapters – along with the development of interdisciplinary projects and programs dedicated to this category of immovable cultural heritage, has created a strong foundation for high-quality projects and strategies ready for implementation, with the potential to bring significant advancements to the field. Beyond restoration efforts, impact assessments have been conducted to

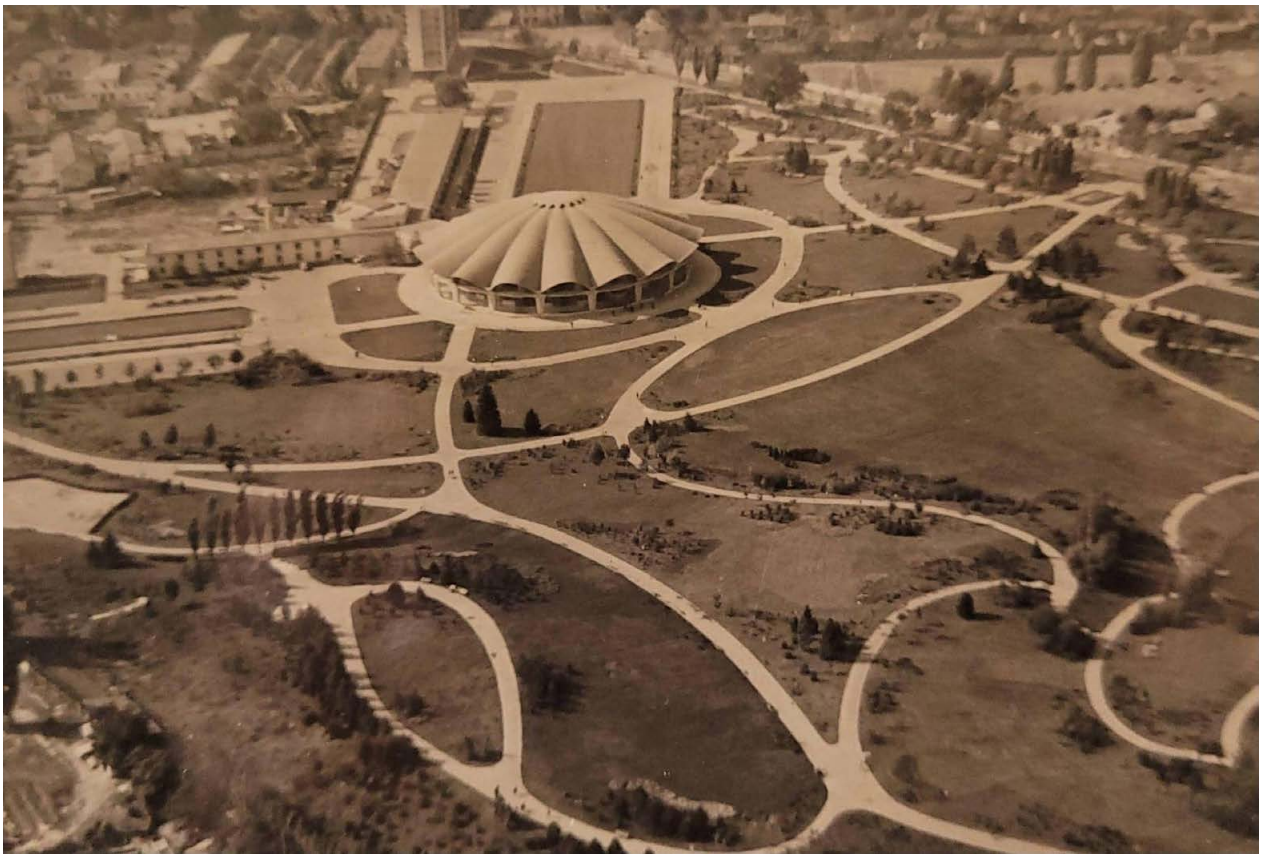

FIGURE 6
A bird's eye view of the Circus Park in Bucharest – currently being considered for historic monument status
Source: Mexi, private archive (cca 1965)

evaluate interventions that may negatively affect historic parks and gardens, leading to modifications aimed at reducing adverse consequences. Additionally, research projects have facilitated the preparation of listing documentation for parks and gardens not yet designated as historic monuments, supporting their official recognition and legal protection (e.g., Copou Park in Iași, Circus Park in Bucharest, and *Grădina Conților de Roma* in Viziru). Moreover, as interest in preserving historic gardens and cultural landscapes continues to grow, national and international competitions for restoration and enhancement projects have been launched, with others currently in preparation (see https://oar.archi/concursuri/, accessed November 2024).

5. Conclusions

The conservation and management of Romania's historic parks and gardens remain a complex and multifaceted challenge. Despite existing legal frameworks and increasing awareness of their cultural significance, these sites continue to face critical issues such as fragmentation of ownership, lack of comprehensive cadastral data, insufficient research and documentation, poor conservation conditions, and inadequate funding mechanisms. The challenges are further compounded by a limited number of specialists trained in historic garden preservation and inappropriate interventions that often fail to consider the unique characteristics of landscape heritage.

However, in recent years, progress has been made through the development of interdisciplinary research initiatives, improved funding programs, national and international restoration and enhancement competition, and impact assessment projects that aim to mitigate the adverse effects of interventions. The refinement of national and European funding schemes, along with the growth of awareness campaigns, has contributed to a more structured approach to historic garden conservation and restoration. Additionally, the inclusion of some unprotected historic gardens in the List of Historic Monuments reflects a growing institutional recognition of their importance, ensuring legal protection and increased chances of preservation.

Ongoing efforts, such as archival research, field studies, thematic exhibitions, and specialized training programs, play a crucial role in enhancing the understanding and management of historic gardens. Educational initiatives, including summer schools and volunteer-driven emergency interventions, contribute both to the formation of future specialists and to the immediate safeguarding of at-risk sites.

Despite the progress made, further efforts are required to establish comprehensive methodologies for research and conservation, integrate historic gardens more effectively into national and local policies, and foster interdisciplinary collaboration among experts in landscape architecture, history, archaeology, and conservation sciences. A long-term, holistic approach is necessary to ensure not only the survival of these valuable cultural landscapes but also their appreciation and sustainable use for future generations.

References

Books

Andreucci, M. B., Anghelache, M. A., Bostenaru Dan, M., Crăciun, C., de Vries, J., Fekete, A., Fricker, P., Gârjoabă, A.-I., Halmagi, Ș.-R., Hostiuc, C., Pozzana, M. C., Tóth, A., & Troll, H. (2022). *Heritage, landscape and restoration of historical gardens*. Cuvillier Verlag.

De Roo, B., Van Damme, S., Tomescu, A., Bărbulescu, C. R., Dragu, A., Leca, I., Leca, L., Mexi, A., Ballesteros, R., Martín, J. P., Mora, P., Cortés, C., Moraga, P., Thissen, P., & Storms-Smeets, E. (2021). *Studiu inter-regional INNOCASTLE. Inovarea politicilor publice pentru prezervarea, transformarea şi exploatarea castelelor, conacelor şi grădinilor acestora*. Patrimonia.

Dinică, C., Ilie, B., Ion, Z., Vasile, P., Cezar, A., & Sorin, L. (1999). *Grădinile și parcurile Craiovei*. Craiova: Editura de Sud.

Fekete, A. (2007). *Transylvanian Garden History: Castle Gardens Along the Maros River*. Cluj-Napoca: Mûvelôdés.

Feyer, C. (2008). *Grădinile lui Brukenthal*. Sibiu: Schiller Verlag.

Marcus, R. (1958). *Parcuri și grădini din România*. București: Ed. Tehnică.

Marinache, O. (2016). *Grădini bucureștene și peisagiști din spațiul cultural german*. București: Editura Istoria Artei.

Woinaroski, C. (2013). *Istorie urbană: Lotizarea și parcul Ioanid din București în context european*. București: Simetria.

Articles

Borș-Opriș, S., & Tănăsescu, I. (2013). Restoration and conservation of gardens, parks, and historic landscapes in terms of multidisciplinary guidelines. *Agricultura, 85*(1-2).

Ciubotaru, M. (2014). Grădinile publice din Iași în secolul al XIX-lea: Grădina Publică din Copou. *Monumentul XVI, partea I*. Iași.

Criveanu, I. (2018-2019). Trei parcuri și toți trei. *Revista Infinitezimal*.

Mexi, A., & El-Shamali, S. A. (2015). Cismigiu Garden in between original design and further transformations – A comparative study on a continuously redesign process. *Scientific Papers. Series B, Horticulture, 59*.

Mexi, A. (2021). Fragmented historic gardens from Romania and issues related to their legal protection and proper conservation. In *1981-2021 Giardini storici. Esperienze, ricerca, prospettive, a 40 anni dalle Carte di Firenze* (pp. 158-163). Firenze University Press.

Mexi, A. (2022). Un (nou) semnal de alarmă privind protejarea grădinilor istorice. *Caietele Restaurării, (1)*, 10-27.

Mexi, A. (2022). Cercetări recente și intervenții punctuale de restaurare și punere în valoare a parcului palatului «Micul Trianon» din Florești. *Revista Transsylvania Nostra*.

Mexi, A. (2022). Early history of landscape architecture education initiatives in Romania: The pioneering work of Friedrich Rebhuhn. In D. Bruns & S. Hennecke (Eds.), *The Routledge Handbook of Landscape Architecture Education*. Routledge.

Mexi, A. (2024). Un instrument de cercetare, inventariere și analiză a grădinilor istorice. Studiu de caz: Grădina Kiseleff din București. *Caietele Restaurării, (1)*, 198-231.

Paleologu, M. (1992). Câteva observații cu privire la ocrotirea și valorificarea grădinilor istorice. *Revista Monumentelor și Muzeelor, (4)*, 74-75.

Stan, S., & Mexi, A. (2017). Restaurarea peisagistică a grădinii istorice Liebrecht-Filipescu. *Revista Arhitectura*.

***, Transsylvania Nostra Foundation. (2015). *Transsylvania Nostra Journal*, 1(2015), special issue on historic gardens, and 3(2021), special issue on historic gardens and cultural landscapes. (https://transsylvanianostra.eu/en/tna/about-tna)

Webpages

ICOMOS-IFLA Charter on Historic Gardens. (1982). *The Florence Charter*. Retrieved from https://www.icomos.org/en/what-we-do/focus/179-articles-en-francais/ressources/charters-and-standards/158-the-florence-charter.

ICOMOS-IFLA Document on Historic Urban Public Parks (2017). Retrieved from https://www.icomos.org/images/DOCUMENTS/General_Assemblies/19th_Delhi_2017/Working_Documents-First_Batch-August_2017/GA2017_6-3-2_HistoricUrbanPublicParks_EN_final20170730.pdf

Council of Europe. (n.d.). *HEREIN Historical Gardens*. Retrieved from https://www.coe.int/en/web/herein-system/historical-gardens.

Institutul Național al Patrimoniului. (n.d.). *Programul Național de Restaurare (PNR)*. Retrieved from https://patrimoniu.ro/en/articles/programul-national-de-restaurare-pnr.

Parcuri 360. (n.d.). *Proiecte de restaurare a grădinilor istorice*. Retrieved from https://www.parcuri360.ro/proiecte/.

Domeniul Cantacuzino. (n.d.). *Historic garden preservation projects*. Retrieved from https://domeniulcantacuzino.ro/.

Ambulanța pentru Monumente – Intervenții de Urgență la Sera de pe Domeniul Mocioni din Arad (n.d.). Retreived from https://ambulanta-pentru-monumente.ro/bulci-sera-de-pe-domeniul-mocioni/, accessed November 2024

OAR Concursuri (The Romanian Order of Architects - Department of Competitions). Retrieved from: https://oar.archi/concursuri/

Varia

Popescu-Criveanu, I., Culescu, D., Comănescu, S., Culescu, M., Streza, I., & Popescu-Criveanu, Ș. (2014). *Amenajarea peisagistică a grădinii publice din cadrul zonei protejate a ansamblului monumental „Calea Eroilor" din Târgu Jiu – studiu istoric de fundamentare a DALI*.

Popescu-Criveanu, Ș., Popescu-Criveanu, I., Tulbure, I., Moldovan, H., Mexi, A., Pîrvu, O. G., Culescu, D., & Tudora, I. (2018). *Planuri Urbanistice Zonale pentru Parcurile Carol I, Cişmigiu şi Herăstrău aflate în administrarea ALPAB – Etapa 1. Analiza multicriterială a zonei (studii de fundamentare)*.

Historic garden preservation summers schools at Domeniul Cantacuzino Florești (Prahova county, 2019-2024), Domeniul Teleki at Luna de jos (Cluj county, 2023), Kiseleff Public Garden (Bucharest, 2024).

ICOMOS-IFLA International Scientific Council on Cultural Landscapes (2014). *The Declaration of Sanssouci on the Maintenance of Historic Gardens and Cultural Landscapes*

"On the footsteps of 143 years of history"

Lasha Mikeladze

Director of Batumi Boulevard, Georgia

Lasha Mikeladze graduated from high school with honors and continued his studies at Batumi Shota Rustaveli State University. In 2013 he graduated from the Faculty of Ecology and Natural Sciences with a bachelor's degree. In 2015, at the A. Tsereteli State University, he was granted a master's degree in ecology, and in 2017 in biology. Since 2020 he has been a doctoral candidate in the field of agroecology. Since 2011, he has many years of work experience in leading positions in private and public agencies. Among them: Batumi Waters LLC, Agroservice Center N(N)LE, Batumi Greening Service N(N)LE, Batumi Botanical Garden N(N)LE. During the same period, he actively participated in various scientific conferences, as well as in local and international trainings on environmental protection and ecology issues. Since 2022, he has been the director of Batumi Boulevard LEPL.

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Abstract:

General Overview

Batumi Boulevard has been one of the most important attractions of the city since its foundation until today, which along with a recreational destination, connection with the sea, has become an established and indispensable place for human interaction with nature for almost a century and a half. Seaside Boulevard is unique in its history, location and significance. It plays a big role in the life of the residents of Batumi.

The history of the visiting card of the region "Batumi Boulevard" begins in 1881, when the city of Batumi, under the influence of the Russian Empire, enjoyed the status of "Porto-Franco" and with its first-class harbor played a leading role in the transit trade of Transcaucasia and Central Asia. Initially, two alleys were planted on the boulevard, its further expansion became possible in 1895, when the sea receded and thus the area of the beach increased. By 1897, the total area of the boulevard was 11,790 square meters.

Since 1987, Batumi Boulevard has been a monument of national importance of Georgian horticultural art, which was formed from the beginning as a European-style park, which has preserved to this day elements characteristic of French horticultural art.

Keywords:

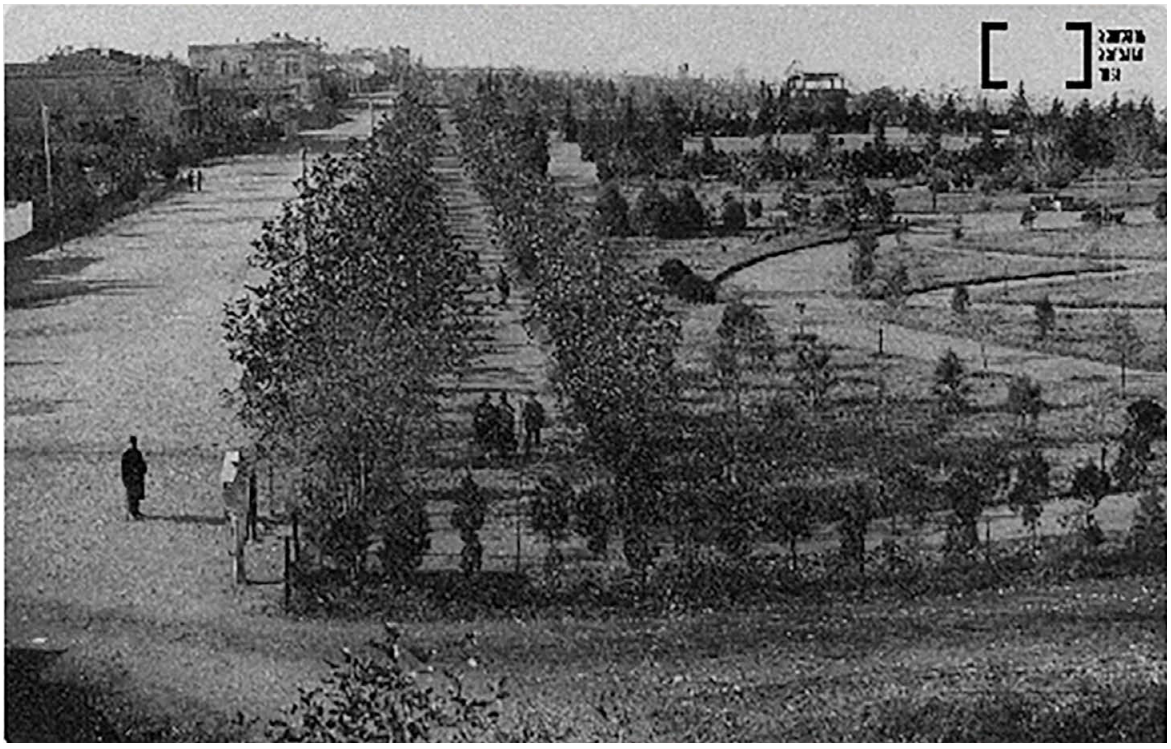
Batumi Boulevard, recreation, old boulevard, history of the boulevard, coastline.

Introduction

Historical angle

The history of the seaside park begins in 1881, when the police chief of the city, Voznesensky, critically assessed the lack of a suitable place for seaside walks in Batumi, and considering the subtropical climate, came up with the idea of planting a boulevard.

To begin with, 2,000 rubles were requested from the city administration, however, the start of the planned works was delayed and only at the end of 1884 it was possible to start the construction of the boulevard. Works started with the plan of the Prussian gardeners A. Ressler and Reyer. Alexander Ressler was invited to Batumi from Poti, where he had carried out serious works for the landscaping and greening of the city. From the summer of 1884, he began the constraction of the boulevard along the northern coast of the sea. After Ressler's death in 1884, the successfully started work was continued by by the French nobleman, famous gardener Michael D'Alfons. His contribution to the planning of the boulevard is so great that in historical sources, D'Alfons is referred to as "the kind genius of the Batumi coast". He abundantly enriched the boulevard with precious and rare plants brought from his own garden in Chakvi. The next stage of the development of the boulevard is connected with the gardener-decorator Iason Gordeziani, who, using the knowledge obtained at the National Agricultural Institute of Versailles, refreshed the vegetation, expanded the old and created new nurseries. In 1889, as part of the boulevard development project, about twenty Magnolia trees were planted here.



Source: from archival materials

Development stages of Batumi Boulevard

Batumi Boulevard has gone through many stages of development, however, the main stages from its foundation to the present are three main stages of the boulevard's evolution, during which its structural formation took place:

- Foundation and development of Batumi Boulevard in the initial stage (1884-1921)
- Batumi Boulevard during the Soviet period (1921-1990)
- Batumi Boulevard in the post-Soviet period (1990-2014)
- Modern Boulevard (2014 to present)

The change in the political situation was reflected primarily in its name. Initially, the boulevard was in honor of Nicholas II, the heir to the throne of the Russian Emperor; Later, during the Soviet period, it was first A. Sajaya, and in the 1950s, it was named after I. Stalin.

At the beginning of the 20th century, the boulevard was a wonderful place for recreation. It was also called little "Nice". From the beginning, there were buildings of various purposes in the boulevard, such as the "Burun-Tabie" fortress, and the "Lighthouse", created by French engineers in 1882 and still preserved. The building of strategic importance performed a navigation function. The boulevard has become a favorite place of Batumi residents and city guests since its inception. It was intended not only for walking. It offered a variety of leisure and entertainment options to people with with different interests. 1884-192 recreational, sports, entertainment and educational facilities were located on the Boulevard, including: Boyajian sea healing baths, hydrotherapy facility, multipurpose building of the public council, reading room, cinema, information bureau. Part of the boulevard was intended for active recreation, which was served by open sports fields: croquet, tennis, keggle, gymnastics, as well as a skating rink, a hippodrome, a bicycle track, etc.

In the 1930-1950s, the boulevard was expanded, the planning kept the main feature of the network of parallel longitudinal alleys and their intersecting crosswalks on the line of the city streets. There are quite a lot of changes in the boulevard dendrology. This process is related to the gardener Iason Gordeziani (1876-1960). In 1933, under I. Gordeziani's initiative and leadership, the entire renovation of the boulevard plantings was carried out. As mentioned in historical sources, there was no soil in the entire area of the boulevard. It was covered with a thick layer of clay and sand, which the Chorokhi River brought down to the sea. Therefore, plants were planted in pits 1-2 meters deep, in which clay was artificially replaced with soil. Coniferous and ornamental trees, cypresses, and shrubs were planted. Along with the renewal of the plantings of the seaside park, new architectural accents appear on the boulevard: colonnades, stage, stadium, public catering facilities. With the advent of the new millennium, development of the boulevard continued at an even faster pace.

In the 1930s, a colonnade was installed at the central entrance to the boulevard, and the territory was surrounded by a decorative fence, which was adorned with flowerpots, sculptures, arches. In 1934, the first colonnade of Boulevard was built, which played the role of a sea gate, and is still preserved in its authentic form. The idea of building colonnade belonged to Ivane Mchedlidze, a famous doctor from Batumi.The colonnades were the central gateway to the beach before the retreat of the coastline. By 1959, as a result of the receding of the sea, it was possible to arrange an additional 6-meter wide promenade divided by lawns in the large area freed up along the coast. In 1930-1950, the alley of the central entrance was decorated with flower beds and a circular fountain. In the 1950s-1960s, walking paths were gradually expanded. In 1977, colorful musical fountains were installed at the central entrance of the boulevard. (architect G. Erkomaishvili, engineers G. Abramian, A. Kazhoian). The area on the left side of the Alley of the Dancing Fountains was set aside for planting a bamboo forest. In the same period, an artificial lake, the so-called Swan Lake, was created in the boulevard, and a zoo-corner around it. From the beginning, the boulevard was distinguished by its functional diversity; active and passive recreation areas were allocated on the territory. During the construction of objects in the Soviet period, the choice was made in favor of classicism architecture. Bright examples of which were: Summer Theater, Colonnades, Salkhino restaurant, from the 1960s, on modernist architecture. In 1948, a Summer theater was built on the boulevard with a lightweight nailless wood structure, with a capacity of 600 spectators. In 1996 it burned down and in 2013 returned to the city in

a renewed form. In 1975, "Cafe Fantasia" (Octopus) - a mosaic pavilion was built near the University, the authors of which were artist Zurab Kapanadze and architect Giorgi Chakhava. "Octopus" returned to the boulevard in a renewed form in 2019.

Modern boulevard

Since 2004, Batumi Boulevard has experienced special innovations. The length of the seaside park before 2004 was 1.9 km. In the next two years it grew to 5 km and covered Ardaghan Lake. Two artificial islands were made on the lake, an amphitheater and a musical fountain were arranged. By 2009, the length of the boulevard reached 7 km. In 2009, a new section was added to the Boulevard, the so-called "New Boulevard", which was designed by the Spanish architect Alberto Domingo Cabo. In the same period, the Miracle Park was also created, where the 130-meter-high "Alphabet Tower" of the DNA model is located, in the form of a DNA model, with 33 letters of the Georgian alphabet represented on it. The moving statue of Ali and Nino, created by Georgian artist Tamar Kvesitadze, is one of the popular attractions is also located here.

Source: Photographer, George Tsetskhladze 2023

Development plan of Batumi Boulevard

In 2022, Batumi Boulevard completed work on the "Batumi Boulevard Development Plan", which was approved by the Batumi Municipality Council. The development plan includes green greening, dendrology and landscape design recommendations, adaptive, inclusive and universal design needs, design and technical solutions for existing infrastructure, cultural heritage management guidelines and other issues important to the boulevard.

Planned and current projects

In 2023-2024, all infrastructure projects implemented on Batumi Boulevard are in accordance with the recommendations of the development plan, such as: a new skate park, modern sport-training spaces, updated bicycle path, children's playgrounds, renovation of beach infrastructure, themed squares, etc. This year, the restoration works of the historical colonnade, the renewal of the boulevard dancing fountain program and the audio system were carried out. Restoration works were carried out on monumental statues, which significantly improved the appearance of the boulevard.

Inclusive tourism

The administration of Batumi Boulevard actively cares for the existence of an adapted environment and the arrangement of appropriate spaces, which is evidenced by the presence of adapted infrastructure on the beach. On the adapted beach, specially trained instructors provide assistance to disabled people in using a floating water wheelchair for enter the sea independently. Using this service is completely free. The mentioned project is one of the important and successful projects of the past years, which serves the development of inclusive tourism and equal access of disabled people to existing services.

Source: Photographer, George Tsetskhladze 2023

Conclusion

Due to its location, the boulevard acquired the significance of a unique symbol of the seaside city and became a place of special attraction for the local community and visiting guests, with which all people connected their individual attitudes and emotions, both in the past and today. Nowadays, Batumi seaside boulevard covers an area of about 7 kilometers along the Black Sea coast. The main garden of the city has about 45 thousand tree-plants, including more than 10 thousand evergreen varieties. The garden area covers135 hectares. The uniqueness of Batumi Boulevard is not only determined by its location along the sea, it includes four green alleys, one seaside promenade and a bicycle path, where century-old trees, palm trees, pine forests and other natural treasures are presented. In addition to the recreation area, Batumi Boulevard includes beach infrastructure, night clubs, entertainment and other tourist facilities.

In 2022, Batumi Boulevard was named the most visited place in Adjara and won the region's most prestigious award "Magnolia 2022". Last year, Batumi Boulevard was nominated for the World Travel Awards along with leading European tourist attractions such as the Eiffel Tower, Sagrada Familia, the Colosseum, Buckingham Palace and the Acropolis.

The boulevard with a 143-year history is one of the unique gardens in Georgia in terms of its location and landscape. Its main value is not only in its aesthetic, cultural-remedial or historical value, but also in its current opportunity to be a symbol of a European-type city.

References

Books

N. Nikoladze, N. Scandel, among others (felt and heard) 1872-1873, Journalist. "Collection", 1873 Tsetshlashvili, Batumi Boulevard, Bat., 2019

D. Komakhidze, Batumi yesterday, today and tomorrow, Batumi. Publisher: Sov. Adjara, 1977

Online publications

N. Inaishvili, "Development of the historical boulevard of Batumi is a new reality and challenges for the society", electronic journal, www.rcchd.icomos.org.ge

Legal Acts

Municipality of Batumi, Resolution of the Municipality Council: on the approval of protection and development (development plan) of Batumi Boulevard. Registration code - 010250050.35.132.016553 Batumi, August 22, 2022.

"Historic gardens as specific sites of landscape architecture education"

Albert Fekete

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Abstract:

The paper highlights the outstanding role of historical gardens and landscapes in Hungarian landscape architecture education. It provides insight into some aspects and history of education and research, on-site survey, and applied design methodologies and design attitudes at the Institute of Landscape Architecture, Urban Planning and Garden Art Budapest, thereby highlighting the fundamental role of historical gardens in the training of future landscape architects. Through examples and case studies, it illustrates the importance of connecting education, research and planning. Similarly, it places the Hungarian garden heritage education in a European context, emphasising the importance of the preservation and renewal of the garden heritage in Hungarian landscape architecture practice and education.

Keywords:

garden heritage, landscape education, research, landscape design, garden renewal

1. Introduction

Historic gardens as part of Hungarian landscape architecture education are linked initially to the name of Imre Ormos, a professor who founded the Department of Garden Art at the University and taught from 1932 until his death at the School of Horticulture, known as the predecessor of today's Buda Campus of the Hungarian University of Agriculture and Life Sciences. Over time, Historic gardens have grown into a wider subject group, and the related educational and research tasks have also become very diverse.

The Institute of Landscape Architecture, Urban Planning and Garden Art Budapest in the frame of Hungarian University of Agriculture and Life Sciences (MATE) is the only place in Hungary to study landscape architecture. The training dates back more than 100 years and has functioned as an independent university programme since 1963. As a comprehensive, independent Faculty - unique to European practice – it covers the entire landscape education spectrum, in an integrated manner, since 1992. The European Council of Landscape Architecture Schools (ECLAS) considers the training an exemplary practice. The ECLAS lifetime achievement awards for European Landscape Architecture Education were given to Mihály Mőcsényi in 2010 and to Imre Jámbor in 2013. The quality, rating and standards of the Faculty have been recognised by the accreditation of the courses by the European Division of the International Federation of Landscape Architects. Based on data gathered in March 2024, the Faculty employed 55 teachers and researchers, of which 73% were qualified lecturers.

The Department of Garden Art – still existing nowadays – has set its goal as the teaching of garden art, firmly rooted in the study of historic landscape and garden artworks and the oeuvre of the most important masters, with a growing emphasis on the protection and restoration of historic gardens and landscapes, the preparation of students for scientific work, the assessment and research required in landscape planning and design and, lastly, the specific tasks of construction and maintenance of historic gardens.

Teaching historic gardens and landscapes become over decades one of the main tasks and goals of the Hungarian school of landscape architecture, as far as we consider that without of garden landscape history knowledges, it is not possible to teach contemporary planning, design or long-term strategy-making. Without knowledge of the past no perspectives for the future.

2. Teaching Historic Gardens - overview

The first garden history research and planning commission that the department took on, in 1947, related to historic research, survey and preparation of reconstruction plans for the castle park of Lengyel in Tolna County. Mihály Mőcsényi, assistant professor with Ormos, completed this assignment. [1]

In 1952, Imre Ormos set up frameworks that allowed for the research of historic gardens. The fruits of this work would be seen within a few years in the excellent final projects of landscape and garden architects, who later became renowned professionals, and who laid the foundations of Hungarian garden history research and restoration. As first examples in this respect can be mentioned "The park of the baroque palace of Nagytétény" (György Kiácz, 1955), "The historic landscape design of Siklós" (Károly Őrsi, 1960), "The environmental planning of Solomon's Tower at Visegrád" (Irén Bozsó, 1963), "The historic gardens of Gyula Castle" (Katalin Szentistványi, 1963.) [2]

In 1956 Ormos published "A kerttervezés története és gyakorlata" (The history and practice of landscape design), a book that became famous and, with several new editions, a kind of 'bible' for generations of landscape architects. The book is still used in education. [3]

The first large-scale exposition of Garden History took place in 1965 at the Hungarian Hall of Art. It was an exhibition curated by András Balogh entitled „Landscape architecture in the fine arts", where historic gardens were exhibited within a special section called „Old parks of Hungary". In the second half of the 1960s, Mihály Mőcsényi described, in one of his research reports, the systematic garden historic research carried out at the Department: "*The work group has identified, per county within the country, the location of the public gardens and parks, their former and present owners, the area of each park, and the approximate orientation.* (...) *Our associate András Balogh has examined 42 parks in Szabolcs-Szatmár County from the perspective of styles and periods in history* (...)" At this time, the Department's research was incorporated into the systematic inventory of gardens and parks carried out by the researchers (Károly Őrsi and Antal Csorna) of the Hungarian Inspectorate for Heritage: 431 gardens were surveyed, and served as the basis of the registry of protected historic gardens, put together in 1969, comprising 135 entries. [1]

Thanks to the development of research experience and methodologies, from the 1970s onwards the influence of research dealing with the themes of comprehensive garden history, e.g. "Early Hungarian landscape gardens" (Ágnes Horányi, 1970:), and the influence of long-term, systematic research of priority garden history sites, e.g. the research on the palace courtyard of the Esterházy palace in Fertőd, or the research and restoration of courtyards in Buda Castle District, became increasingly noticeable in the choice of topic for final projects and for research at the Department.

The 1970s and 1980s were characterised by the further development of research infrastructure and networking. The Department deepened relationships with relevant professional organisations, such as the OMVH (National Office for the Protection of Historic Monuments), ÁMRK (Public Centre for the Preservation and Restoration of Historical Monuments), ICOMOS International Committee on Historic Gardens and Sites, IFLA (International Federation of Landscape Architects). Mihály Mőcsényi held first the role of Vice-President, then President, of the latter institution, for two four-year terms, between 1982-1990. After the change in political regime, from 1992, the activity of the Department of Garden Art was led by Ilona Balogh-Ormos, who launched a series of exhibitions called "Our ancestors' gardens", with themes such as "Renaissance gardens" (in 2003), or "Ancient plants of ancient gardens" (in 2004). It was also under the guidance of Ilona Balogh-Ormos, in the beginning of the 2000s, that research began into cemetery gardens, and design studies were produced, in cooperation with the Department, for the reconstruction of the allées of several Budapest cemeteries. [4]

After the 2000s, won via public tenders and funded by external resources, comprehensive research started to shift the emphasis from the former individual research work to group research (e.g. the creation of the Hungarian Garden History Archive, survey of castle parks in Transylvania, research on dendrological gardens). PhD students and specialisation students have actively participated in these research works.

As part of the education, research work at the Department was always closely related to its teaching activity, and students work alongside teaching staff and researchers in this area.

Basic researches in the area of Hungarian garden history, the continuation and completion of the historic research on some historic gardens of paramount importance has been associated with the Department (e.g. the gardens of the Esterházy palaces in Fertőd, Csákvár, and Cseklész, the new sans souci garden of the Csáky family in Illésfalva, or the gardens of the Batthyány palace in Bicske, the L'Huillier-Coburg palace in Edelény, of the Ráday palace in Pécel, of the L'Huillier-Pappenheim palace in Iszkaszentgyörgy, or the gardens of the former Camaldolese Hermitage's Monastery in Oroszlány-Majkpuszta. Within the framework of research funded by OTKA (Hungarian Scientific Research Fund), and with the collaboration of the Department of Landscape Planning and Regional Development, the Department, between 2002 and 2004, set up the Hungarian Garden History Archive, a database of Hungarian research works on the history of gardens, which continues to steadily expand, and at the present time contains data relating to 1555 green spaces with historic interest. The gardens are searchable both by location and by settlement name,

and each entry contains a description and detailed photographic record. The database contains different amounts of data according to the importance of each garden, and is kept dynamically updated

Geophysical research in historic gardens and archaeological sites; because of archaeological excavations in historic gardens commissioned by many different heritage preservation organisations and institutions, we apply instrumental survey methods to measure specific soil resistivity results, a procedure that also supports ongoing applied research into the history of gardens.

Preservation of historic landscapes and traditional urban image, protection of the urban built environment in collaboration with the Office of Cultural and Heritage Preservation, has been also completed through several survey works (for instance in case of the cemeteries of Komárom-Esztergom County), and submitted them for heritage preservation. With the assistance of our colleagues and students, the exploration of the garden heritage for protection purposes of several Hungarian and Transylvanian settlements and part of settlements (Leányfalu, Balatonalmádi, Mátyásföld, Sztána, Zabola, Székelyhíd, Makkfalva, Havadtő) has been completed.

It is among the Department's goals to preserve the traditional landscape character, folk art, local formal treasures and intellectual capital, and to transform them, for landscape architecture purposes, into value-protection projects, or to define them as design and development tasks. The PhD dissertation "Analysis of the landscape characterisation of Kalotaszeg", defended in 2012 by Anna Eplényi, is an outstanding work in this field. Many teachers of the Department were founding members of and are actively participating in the continuing movement to restore vernacular bath sites in Szekler Land, initiated almost two decades ago. This movement lead by Ágnes Herczeg resulted in the renovation of dozens of traditional vernacular bath sites, embedded in unique urban or natural environments, with the collaboration of local communities, other participants (such as landscape architect offices, municipalities, foundations, civil organisations, private persons, partner universities, etc.), and students.

Design in heritage environments and historic gardens is also an important tradition of heritage-related design at the Department. The list of projects, often completed with the help of the students, ranges from the design of historic garden restorations and environmental planning for historic landscapes or industrial heritage sites, to the production of design guidance and codes for urban heritage environments, and the application of universal design guidelines for open spaces.

3. The Hungarian Landscape and Garden heritage education in a European context

The Institute of Landscape Architecture, Urban Planning and Garden Art is one of the 21'st Institutes of the Hungarian University of Agriculture and Life Sciences. The Institute is in Budapest, and its structure is organised in 6 Departments and one Research Group, according to the main fields related to Landscape Architecture and Urban Planning profession (Figure 1).

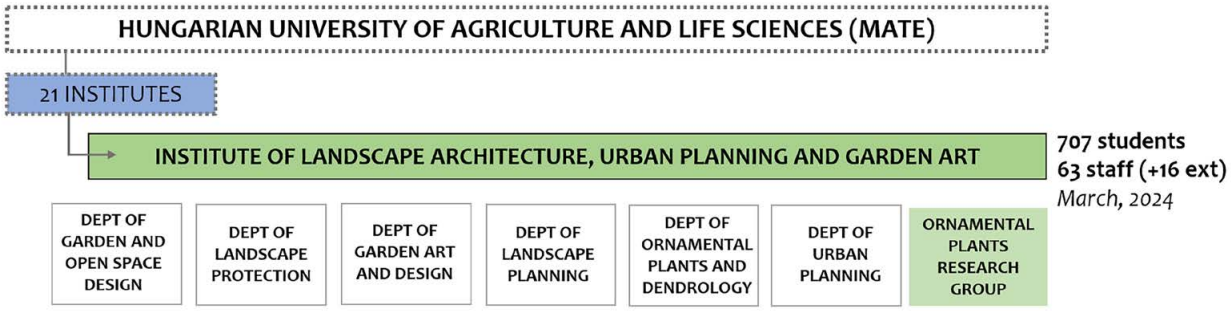

FIGURE 1

The structure of the Institute of Landscape Architecture, Urban Planning and Garden Art Budapest in the frame of Hungarian University of Agriculture and Life Sciences (MATE)

Source: prepared by the Author

The school in Budapest nowadays offers training in three scientific areas, with an undergraduate and three master's programmes: BSc in Landscape Management and Garden Construction in seven semesters, on which are built the four semesters long MSc in Landscape Architecture, the MSc in Urban Planning and the MA in Landscape Architecture and Garden Design programmes. The BSc in Landscape Management and Garden Construction and the MA in Landscape Architecture and Garden Design programme are also offered in English. Doctoral studies are part of the Doctoral School of Landscape Architecture and Landscape Ecology and offer five different programmes.

Landscape architecture is an interdisciplinary profession where one must be familiar with, and skilful in, ecology and the natural sciences, engineering, social aspects, artistic expression, planning, spatial vision and creativity. Working in this field requires a generalist approach, being well-informed as well as having a wide range of knowledge in the related professions. The three Master's programmes support this generalist and overarching approach. Specialisation is available during the Master's programmes in order to ensure high quality project delivery in garden or open space design, regional landscape planning or nature and heritage conservation projects when working in a contemporary landscape practice after university studies.

The Institute provides mentoring and pedagogic methodologies which support student-focused training. This educational approach ensures a good teacher-student relationship that prevents disruption in student numbers and withdrawals by students. Regular consultations on planning and conceptualising are part of the training on every course. One-to-one consultations help the students to manage any ongoing issues and create flexible learning paths for them. Reference to a real site, participants and clients motivates students better and helps them to commit to their project work. It prepares them for challenges and any difficult situation after graduation, encourages autonomy, and enables appropriate guidance and support from the lecturers.

In between 2017-2019 and 2020-2022 two Erasmus + founded research projects, the "EU Land21" [5, 6] and the "Innoland" [7] has been launched with our institute's participation, together with several other European professional bodies[1], in order to establish pan-European quality standards for Landscape Architecture study programmes and homogenizing landscape architecture education in Europe and developing an exemplar master study programme framework in line with the European CTF.

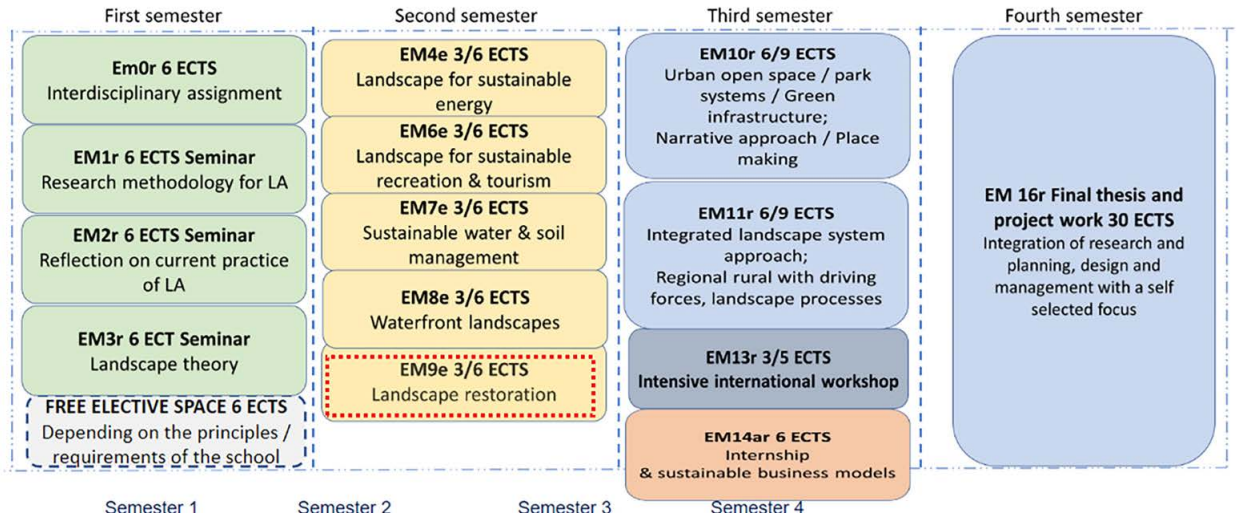

FIGURE 2

The theoretical structure of a common European "Master of Landscape Architecture " and the proportion of landscape heritage oriented subjects (Landscape restoration – see second semester) counting 3-6 ECTS

Source: Innoland Project report [8]

1 EuLand21 partner organisations: Vilnius Gediminas Technical University, IFLA Europe, Dutch School of Landscape Architecture, Szent István University, Estonian University of Life Sciences, Craców Rolniczy University, AEP-Spain; Innoland partner organisations: Vilnius Gediminas Technical University, IFLA Europe, Aalto University, Le Notre Institute, Szent Istvan University, University of Evora Portugal, TU Wien

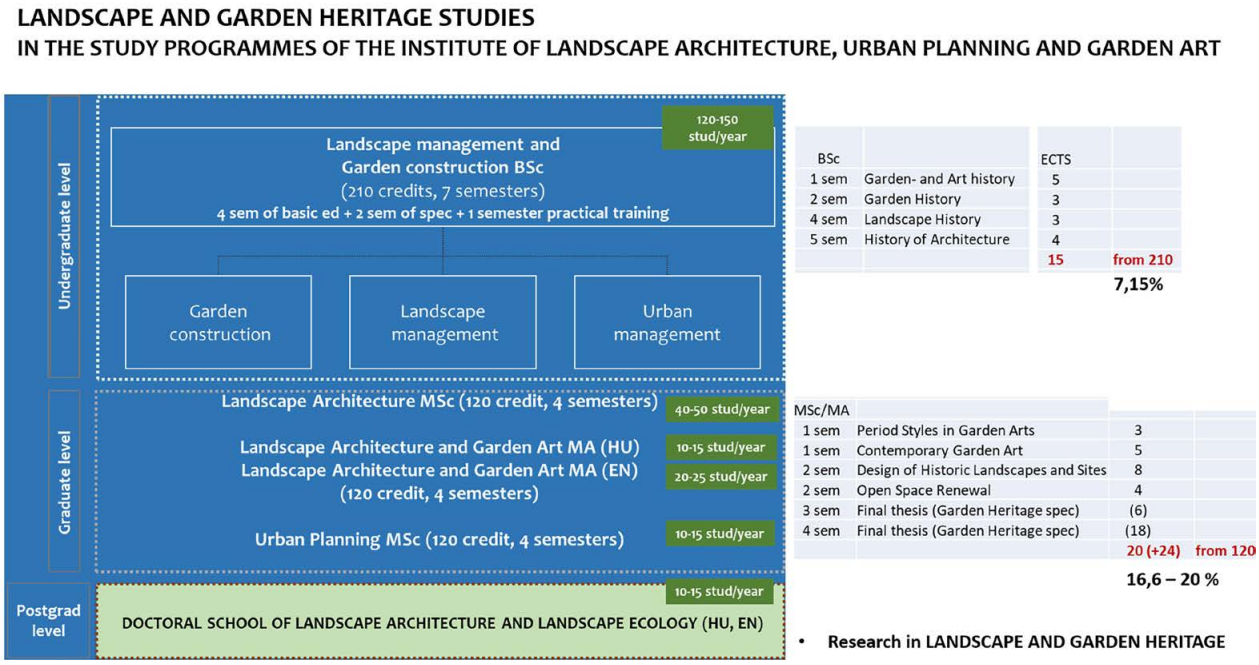

FIGURE 3

The structure of the "Landscape management and Garden Construction engineering" undergraduate training and that of the master's programmes, and the proportion of landscape heritage oriented subjects in the frame of both curriculas

Source: prepared by the Author

EuLand21 and InnoLAND aims to facilitate transparency and recognition of skills and qualifications of landscape architecture professionals in the EU by developing the Common Training Framework for the Profession along with relevant tools to support its implementation. In this two initiatives the partner profesional and higher educational organisations took as basis the existing European master programmes in Landscape Architecture, and the already prepared ECLAS educational guidelines; accordingly, the ECTS numbers for pure Landscape and Garden Heritage studies in frame of a common master program of Landscape Architecture has been established between 3-6 ECTS, taking into consideration an average ECTS in this heritage educational field offered at the meoment by different European schools. (Figure 2)

Comparing this ECTS number with the Hungarian educational practice, a considerable difference can be observed: in Hungary the percentage of heritage related subjects both in BSc (7,15%) and MLA (from 16,6 to 20%, depending from the specialization) programmes, having a much higher proportion reported to the total ECTS number of the whole Landscape Architecture training. (Figure 3) This proportion highlights the importance of the heritage-based subject in the Hungarian Landscape Architecture Education, and indirectly in the profession. as a whole.

Conclusions

The Budapest approach focusses on a professional education of historic analysis- and evidence-based design, on strong links with practice, and on learning and teaching by doing. More than 50% of our lecturers – mostly those teaching design subjects – are professionals working in practice. Site work is a core competence the students need to learn. The site work facilitates the learning in real time and in real place. Helps them experiencing physically and observing forms and features of historic gardens through drawing, sketching, measuring, and documenting; walking, climbing, listening, smelling, seeing and touching plants contribute to other types of experiences than only visual.

Teaching on site in a historic garden (landscape) requires special didactic qualities from educators as well: to be a trained observer, to be a generalist rather than a specialist, stimulating students to develop their

own capacities and potentials, and to be able for interpretation of historic landscape features. They build their teaching on experience and raise the standards and historic authenticity of designing and planning assignments. Promoting the profession in society is one of our goals, with particular regard to the challenges of dynamic societal transformations, preserving the historic values and the messages of the past.

References

1. Csemez Attila; Csima Péter; Fekete Albert; Jámbor Imre; Schneller István: Landscape Architecture in Higher Education - 25th Anniversary of the Faculty of Landscape Architecture and Urbanism, Gödöllő: Szent István Egyetemi Kiadó Nonprofit Kft., 229 p. (2018)
2. The diploma theses are available at the Library of the Department of Garden Art and Landscape Design (MATE)
3. Imre Ormos: A Kerttervezés Története és Gyakorlata, Mezőgazdasági Kiadó: Budapest, Hungary, 1956.
4. Fekete Albert; Jámbor Imre; Csemez Attila: An insight into the Hungarian landscape architecture education between two IFLA conferences:1984-2024, 4D JOURNAL OF LANDSCAPE ARCHITECTURE AND GARDEN ART (1787-6613 2939-886X): 73 pp 34-51, 2024.
5. "Trans-European Education for Landscape Architects" on IFLA Europe website. https://iflaeurope.eu/index.php/site/general/euland21-project
6. Stauskis Gintaras; Vries Jeroen de; Fekete Albert; Bell Simon; Cervera Alonso de Medina: EULand-21 Output 02 – Trans-European Education for Landscape Architects: Peer learning methods on the development of a curriculum, 2018.
7. "Innoland" on IFLA EU website, https://iflaeurope.eu/index.php/site/general/innoland-project
8. Carapinha, Aurora, Conceição Martins Lopes de Castro, da, Maria; Conceição Marques Freire, da, Marina; Fekete Albert; Stauskis Gintaras; Trolf Norbert; Vries Jeroen de; Sárospataki Máté; Stiles Richard; Triboi Roxana; Valánszki István; Weckman Emilia: A Pan-European Common Training Framework for Landscape Architecture. Report Output 2 of the Erasmus+ Strategic Partnership InnoLAND: InnoLAND LAUNCHING AN INNOVATION-BASED LANDSCAPE ARCHITECTURE TRAINING FRAMEWORK IN EUROPE, 2022, DOI: 10.13140/RG.2.2.22244.14728

"Tradition and experiment in contemporary orangery culture in polish historic gardens"

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D.Sc. Ph.D. Arch. Katarzyna Hodor, Prof. PK is an academic specializing in landscape architecture, serves as a Professor and member of the Senate of the Cracow University of Technology. In 2008 she defended her Ph.D. dissertation with distinction on *The influence of suburban manor houses and their gardens on the landscape of the microregion of the Krzeszowicki through*, under the supervision of Full Prof. D.Sc. Ph.D. Arch. Anna Mitkowska. Throughout her scientific career, Prof. Hodor has conducted research focused on identity and cultural heritage in relation to sacred landscapes and the revalorization of historic gardens, villages, and towns. She has collaborated with organizations such as ICOMOS, IFLA, and the Ministry of the Interior, Sports, and Infrastructure of Rhineland-Palatinate. An accomplished author, she has published numerous works on landscape protection and revalorization. Her book, *The Riformati monks in the Lesser Poland Province towns from the 17th to the 18th century and their influence on shaping cultural landscapes*, received recognition from the General Conservator of Monuments and the Association of Monument Conservators – Poland (SKZ). Prof. Hodor serves also as the Landscape Architecture Section editor in the „Space-Urbanism-Architecture" magazine and as a guest editor in the „Sustainability" and „Land" magazines. She is the main organizer of the Conference in the series of garden art and historical dendrology in Cracow and a member of several organizations: the Polish National Committee of International Council on Monuments and Sites (ICOMOS Poland), the Polish Academy of Sciences (PAN), the Association of Polish Landscape Architects (SPAK), the Association of Landscape Architecture – Poland (SAK).

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Jacek is a historic gardens specialist, currently employed at the Museum of King Jan III's Palace at Wilanów, Warsaw. Vice-chair of the Eduard Petzold Foundation and co-founder of the Eduard Petzold European Centre for Garden Art, which will be the first garden museum in Poland. He is studying at Cracow University of Technology and conducting research for his doctoral dissertation on the exotic plant collections restoration in historic gardens. Previously, he earned a master's degree in landscape architecture and postgraduate diplomas in museum studies, cultural diplomacy and cultural management at leading universities in Poland. Author of books: *Oriental paradise : Turkish influence in the Polish gardens* (2023), *A Europe of united gardens : the role of the European Route of Historic Gardens in the implementation of the cultural policy of the European Union* (2021), *Hortuseum : musealisation of the European gardens in the twenty-first century* (2020). He is an independent collaborator of the European Route of Historic Gardens (ERHG) and member of several organizations such as: the Polish National Committee of International Council on Monuments and Sites (ICOMOS Poland), the International Council of Museums (ICOM Poland), the Association of Monument Conservators – Poland (SKZ), the Association of Landscape Architecture – Poland (SAK) and the Association of Polish Architects (SARP). His interests focus on cultural history of gardens, protection and conservation of historic gardens, heritage interpretation and garden tourism.

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Abstract:

Recreation of exotic plants collections is one of the most challenging tasks in the conservation of historic gardens. The projects implemented in recent decades in Poland have often been a combination of traditional craftsmanship and experiment based on extensive knowledge and skills of specialists. The aim of the paper is to present contemporary orangery culture on examples of the European Route of Historic Gardens Members in Poland: the Wilanów Palace, the Radziwiłł Palace in Nieborów and the Kamieniec Palace. Particular attention was paid to the conservation work carried out within the structures and exotic plant collections. The data was collected as part of desk research and study visits in 2023–2024. The results revealed the most important trends that contribute to the continued importance of orangery culture in Polish historic gardens.

Keywords:

historic garden, plants, orangery, conservation, recreation, traditional craft, Poland

1. Introduction

Orangery culture is a broad, interdisciplinary area covering the knowledge and skills, and the material products of human activity related to indoor cultivation of exotic plants. It refers both to architectural structures and the selection of species, cultivation and maintenance methods, containers, tools, and the exposition of the plants in gardens. Traditional orangery cultures in Poland are nearly 500 years old and were closely related to the advances in botanical and horticultural sciences, but also to the development of trade, transport and technology. In the Renaissance gardens owned by wealthy aristocrats were home to collections of precious species imported from the south of Europe, such as oranges, lemons, figs and rosemaries. Greenhouses or fighouses were a rare sight back then, and in winter plants were usually stored in designated basements or garden rooms.

The dynamic development of the orangery culture in Poland began in the Baroque period, at the turn of the 16th and the 17th centuries. Not only were exotic trees the symbol of wealth and a high social status, but they were also the metaphor of princely or royal virtues, e.g. citruses were identified with Hercules, while laurel tree - with Apollo. Apart from the mentioned species other commonly cultivated plants included pomegranates, myrtles, jasmines and evergreen cypresses. Massive orangeries were built to store them. They featured a brick wall on the northern side, protecting the construction from cold winds, and large windows on the southern side, ensuring maximum exposure to sun rays. The interior was heated with furnaces, and the hot air coming from them was distributed using a system of canals in the floor.

In the second half of the 18th century the development of life sciences stimulated interest in exotic plants. The first botanical garden in Poland was founded at the Jagiellonian University in Kraków in 1783, where plants from all over the world were collected, cultivated and displayed. The collections at aristocratic residences were enriched with many new species, including pineapples, banana trees, camellias, magnolias. At that time many classicistic orangeries and greenhouses, dedicated to specific groups of plants, were built, including greenhouses for pineapples, peaches, grapes.

In the 19th century, especially in the second half, exotic plants became considerably more popular. The widespread production of glass, cast iron and steel helped build light constructions whose interiors were heated with hot water distributed in pipes. Greenhouses were distinguished based on temperature and humidity (cool house, temperate house, warm house, hothouse), as well as the species that were grown in them (aquarium, camellia house, fernery, fig house, orchid house, palm house, pinery, vinery). Winter gardens were built near palaces where the owners could enjoy exotic trees all year round. The new structures, along with the developing railway system and maritime trade, facilitated the transport and cultivation of tropical and sub-tropical species from distant regions. The most desired ones included orchids, camellias, rhododendrons, palm trees and ferns.

During WWI and WWII a large part of the plant collections was scattered, and most orangeries were destroyed. A large number of lives lost and the resulting economic losses, and later also nationalisation and improper management of the former aristocratic residences made it impossible to restore the old orangery culture. The majority of historic greenhouses in Poland were left in ruins or adapted to serve other functions. Cultivation of exotic plants continued in botanical garden, palm houses and some palaces intended for cultural and scientific purposes. In recent decades, several heritage conservation projects have been successfully completed and have revived interest in this issue.

The purpose of this paper is to present the modern orangery culture in Poland from the perspective of structures and collections of exotic plants, based on the examples of the objectives of the European Route of Historic Gardens: Wilanów Palace, Nieborów Palace and Kamieniec Palace. The data was collected as part of the research and study tours completed between 2023 and 2024. Special attention was paid to completed conservation works which frequently combine traditional craft with experimental solutions.

2. Orangeries and greenhouses

Until now, 165 orangeries and greenhouses have been preserved in Polish historic gardens and entered into the Register of Historic Monuments. The majority of them were left in ruins or changed their function, and are used for cultural, educational, business, residential or commercial purposes. Nowadays, only 12% of them are still used for cultivation or storage of plants. What's important, only 4.2% of the buildings have their original structure, interior design, and even a part of the equipment, such as the heating and watering system or shelves for plants. Therefore Polish orangeries and greenhouses can be considered endangered heritage. The reasons may be the impermanence of such structures, exposed to damage resulting from wars, fires, the lack of regular conservation, as well as the evolution of technology and modernisations.

However, there are many valuable examples of historic buildings, such as the **Old and New Orangery at Radziwiłł Palace in Nieborów**. The first one was built around 1790, based on the project by Szymon Bogumił Zug, an architect from Saxony. In the 19th century the eastern wing was added, increasing its length by 42 m. Its facade is decorated with columns in the Tuscan order, and the roof is covered with wooden shingles. The building survived intact up until December 1981, when it burnt completely due to the bad condition of technical and heating equipment. The structure was being re-built for the next 4 years, based on inventory plans and program guidelines. As part of the works, the facades that survived were preserved, along with the original interior layout with the historic heating system which has been turned off since then. All remaining architectural elements were reconstructed, and a new central heating boiler room was added to the northern part. The last renovation works were completed in 2013, when windows were replaced with new ones (Figure 1).

FIGURE 1
Interior of the Old Orangery at the Nieborów Palace
Source: Authors, 2023

FIGURE 2
The New Orangery at the Nieborów Palace
Source: Authors, 2023

The second building in Nieborów is the New Orangery which was preserved as a part of the former Grand Orangery from 1796. The structure was originally 100 m long and was build based on the project by Szymon Bogumił Zug. Because the plant collection was sold to the Royal Łazienki, the building was dismantled between 1870 and 1875. Only its 16-metre-long eastern part was preserved, where windows were bricked up, and the inside was adapted to a shed for storing grain and tools. Its old form was restored between the years of 1948 and 1951, when window holes were uncovered, the ceiling and the roof framework were replaced, and a new shingle hip roof was added (Figure 2). The orangery has a temporary gravel floor. Experimentally, due to the lack of heating, a temporary plastic tunnel was built inside, where air heating works during winter. In the summer season the New Orangery is used as a café for visitors of the garden. To light up the inside in both orangeries, large round mirrors are hanging on the walls, reflecting the natural light.

Since it is impossible to adapt old orangeries to storage of plants, more frequently modern structures are built in historic gardens. There is an orangery and a fighouse from the 18th century in the area of **Wilanów Palace**, however, they were entirely destroyed during WWII. They were rebuilt to serve as conservation workshops and an exhibition hall. Therefore the plants were cultivated in the garden area. There was an old greenhouse complex which was replaced with a modern block glasshouse and a storage room in the 1980s. They were replaced with two new structures in 2008. Both buildings have a steel and aluminium construction with a concrete base. The facades and roofs are completely glazed. The storage room is 24 metres long, 9.3 metres wide and 7.5 metres high. It has two rooms where the largest plants are stored. The greenhouse is 45 metres long, 14.2 metres wide and 5.6 metres high. The inside is divided into five separate rooms, connected with a corridor on the northern side, however, the orangery trees and bushes take up only two rooms. The weather conditions are managed using internal shading nets (no automatic ventilation). It is heated with heaters powered by the greenhouse's own boiler room. Thanks to the materials and technology used the greenhouses are more energy efficient and cheaper to use compared to historic buildings.

FIGURE 3
The Kamieniec Palace Greenhouse
Source: The Kamieniec Palace, 2022

There are also marvellous examples of combining them with historic elements, as in the Kitchen Garden at **Kamieniec Palace**. In 2022, on the ruins of the Gardener's House a modern greenhouse with Victorian-style decorative elements was built (Figure 3). The works started with arranging the area and securing the preserved walls of the building. The wall tops were covered with recovered roof tiles, and the window holes were filled to prevent the building from falling apart. Once the building was prepared in this way, a new greenhouse with dimensions of 10 x 5 m was built inside. The structure has a steel and aluminium structure with a base made from old bricks from demolition. The inside features a floor made from old roof tiles from the barn, laid in a simple English pattern. In line with sustainable development, the whole equipment is recycled, including tables and shelves made from old garage gates, a cast-iron sink and ceramic plant pots. Although the greenhouse is not heated, it successfully performs many other functions. The main one is cultivation and storage of seasonal herb plants, but occasionally it is home to small events and gardening and floral workshops for visitors of the palace (Figure 4).

3. Plant collections

Currently, in Poland we only have several collections of orangery plants cultivated in historic buildings. The first group includes the ones who have a scientific nature and belong to the collections of historic botanical gardens of the Jagiellonian University in Kraków, the University of Wrocław, the University of Warsaw and Adam Mickiewicz University in Poznań. Exhibitory collections are also displayed in Poznań Palm House, the Palm House at Książ Castle in Wałbrzych and Legnica Palm House. The second group has mainly compositional and decorative significance, complementing the space of historic palace gardens in the summer season. Such collections are available in: Wilanów, the Royal Łazienki in Warsaw, the Wawel Royal Castle in Kraków, Nieborów, Białystok, Opinogóra and Łańcut.

The orangery collection in **Wilanów Palace** is a reconstruction referring to the 18th and the 19th century, because of the largest number of preserved historical materials. Its resources have been recreated since the 1950s, as part of donations and the Museum's own purchases, mostly from plant nurseries in Italy. The form

FIGURE 4
The Kamieniec Palace Greenhouse interior
Source: The Kamieniec Palace, 2022

and species selection of the plants are based on the inventories and iconography of a given period. The collection is managed directly by the Garden Department, and the maintenance works are performed by 3 gardeners from a team of 15 people. From time to time the team is supported by volunteers and interns. The plant register, including the number of individual species and varieties is kept in an electronic form. Moreover, a special map is available in the Museum's Spatial Information System, showing the allocation of 128 pieces in the garden. Each plant features a detailed botanical, geographical, historical description, and photographs.

In the years of 2009 and 2011 the Museum completed revalorisation of regular gardens surrounding the palace and restored the first orange trees in wooden pots. Four years later, by the initiative of Łukasz Przybylak and Kamila Domańska, supervising the Garden Department, the pots painted in white and green stripes, which were reconstructed based on a photogrammetric analysis according to an Italian painter named Bernardo Bellotto, returned to Wilanów (Figure 5). They were made by Polish craftsmen using a traditional coopering method. Nowadays, the collection comprises 368 citruses, palm trees and other exotic plants, out of which only 139 are displayed in the gardens. They include: 34 bitter oranges, 15 Canary Island date palms, 13 Chinese windmill palm, 10 scarlet bottlebrushes, 6 bougainvilleas, 6 blue passionflowers, 5 laurel trees. They are complemented by agaves, burgmansias, papyruses, coral trees, banana trees, oleanders, plumbagos and several other species. The plants are displayed in the gardens around the palace and near the most pre-representative buildings, including the old Orangery.

To continue the collection recreation process, the Museum of King Jan III's Palace at Wilanów started cooperation with the Boboli Gardens as part of the "Citri et Aurea" project (Figure 6). The historical basis for the cooperation were the diplomatic relations between Jan III's royal court and the Grand Duke of Tuscany - Cosimo III de' Medici. The Boboli Gardens, managed by the Italian museum, have a unique collection of citruses, including species and varieties dating back to the Medici period. The exchange of knowledge and experience in the area of creating collections and cultivation is supposed to enable the recreation of the historic resources of the orangery in Wilanów. In the future, the collection will include 320 trees, historic

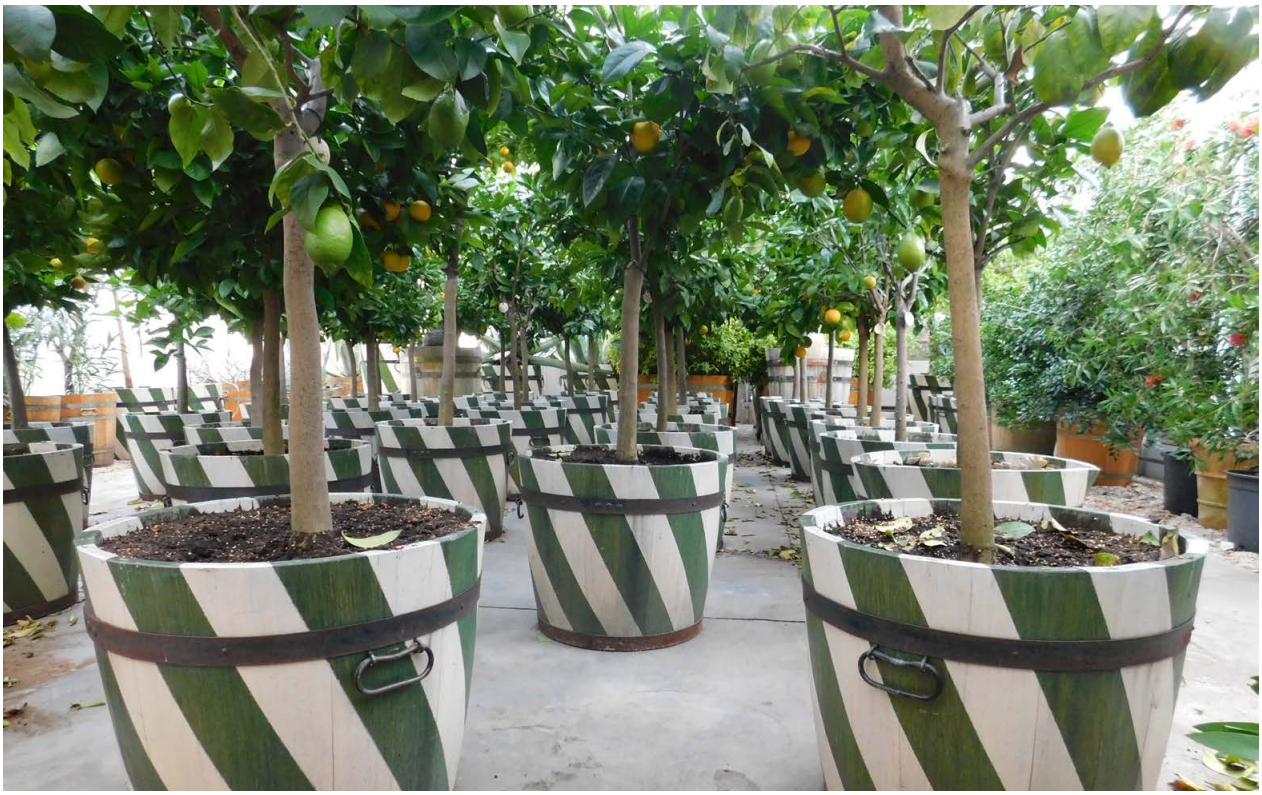

FIGURE 5
The citrus collection at the Wilanów Palace Gardens Store House
Source: Authors, 2020

species and varieties, cultivated in oak pots painted in white and green stripes and in natural colour, as well as glazed ceramic pots and faience vases. The project has been implemented under the patronage of the European Route of Historic Gardens. Previously, a site visit of Polish specialists took place in Italy and an online seminar was held, and its recording is available in English, Italian and Polish on the YouTube channels of the Uffizi Gallery in Florence (@uffizigalleries) and the Museum of King Jan III's Palace at Wilanów (@ MuzeumWilanowskie).

The collection of exotic plants of the **Palace in Nieborów** refers to the most magnificent period of the landscape between 1774 and 1831, when the residence was owned by the princess couple - Michał Hieronim and Helena Radziwiłł. However, its form combines different styles and periods, from the Baroque to the 19th century and contemporary times. The plant resources have been gradually recreated from 1985, after a complete destruction resulting from a fire in the Old Orangery. For this purpose historic inventories, descriptions and iconography, historic catalogues and books are used, and a comparative analysis of other sites from the same period. The plants are donated or purchased, as part of the purchases financed from the Museum in Nieborów and Arkadia's own funds. The collection and the orangeries are managed directly by the Park Department, and the maintenance works are performed by 2 gardeners from a team of 8 people. En electronic register of plants is kept, including a list of the number of individual species and varieties.

In 2023 the collection featured more than 200 exotic plant species, some of the flagship ones include citruses, common figs and bay trees. Each year 102 plants are added to the garden, including 13 common lemon trees, 12 oleanders, 11 bay trees, 10 natal lilies, 10 banana trees, 9 Arabica coffees, 9 common boxes, 5 lesser bougainvilleas, 5 roses of Sharon. They are complemented by European olive trees, bitter oranges, mandarins, ficus trees, fig trees, Canary Island date palms.

The plants adorn the historic main entrance to the palace from the Honorary Courtyard, the Baroque garden parterre and the flower beds near the Amphitheatre. They are also placed along the southern facade of the

FIGURE 6
Meeting of the “Citri et Aurea” project partners at the Wilanów Palace Garden (from the left): Jacek Kuśmierski, Bianca Maria Landi, Łukasz Przybylak
Source: Authors, 2019

FIGURE 7
Orangery plants collection of the Nieborów Palace
Source: Authors, 2023

Old Orangery and on the northern side of the building in the form of a "plant theatre" with shade-tolerant species. They are cultivated in containers in different, distinctive forms referring to traditional patterns. The first ones are oak boxes with metal fittings, on legs made using a carpenter's method. One of the side walls can be opened to allow access to the roots. The external walls are painted in blue-green. Everything looks like the Versailles planter boxes designed by André Le Nôtre for King Louis XIV (Figure 7). Another type are oak pots with metal brackets made using a coopering method. As an experiment, to prevent their quick damage due to humidity, the plants are grown in plastic bags. This procedure is supposed to make it easier to later move them to a new container.

4. Conclusions

In modern orangery culture in Polish historic gardens there is often a delicate balance between preservation of old traditions and acceptance of innovative ideas. The combination of tradition and experiments facilitates further development of the significance of exotic plant collections and greenhouse structures.

Tradition in orangery culture:

Some historic orangeries and greenhouses preserve their primary function of plant storage and cultivation. Modern structures are built with respect to the context of the environment and refer to traditional architectural styles. Based on the rules of sustainable development, recycled building materials are used.

The selection of trees and bushes species in orangeries corresponds to historic inventories, descriptions of gardens and botany books. The most frequently used ones are oranges, lemons, laurel trees, pomegranates, fig trees, olive trees and banana trees. Their form is shaped while preserving their traditional shape.

Boxes and pots are recreated using natural materials, according to the patterns appropriate for the style of a given garden. Their external walls are painted in patterns and colours corresponding to a given historical era. Information about their appearance is derived from descriptions, iconography and comparative studies of other objectives.

Experiments in orangery culture:

Modern greenhouses can serve as universal spaces for plants, exhibitions, workshops, events, a summer café. Such diversification reflects the approach to a single historic purpose of those buildings. In some structures architects experiment with projects, stepping away from traditional aesthetics and moving towards contemporary materials and technologies and energy efficiency.

Attempts at alternative solutions in the cultivation of orangery plants are implemented to make it more effective, e.g. the use of plastic in additional reinforcement of containers. Due to the lack of availability of the plant nursery material, historic orangery plant species are supplemented with contemporary varieties.

Containers for plant cultivation are recreated using innovative research methods (photogrammetry) to restore their historic form to a maximum extent. Their walls are secured with impregnating agents and paints meeting the current quality standards.

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References

Papers

Kuśmierski J., From Florence to Warsaw, „Historic Gardens Review", 2020, No. 41, pp. 11–15.

Kuśmierski J., Polsko-włoskie seminarium ogrodowe "Citri et Aurea" / The "Citri et Aurea" Polish-Italian garden seminar, „Studia wilanowskie", 2020, No. 27, pp. 173–180.

Kuśmierski J., Przybylak Ł., Ziemlewska A., "Citri et Aurea": wymiana wiedzy i doświadczeń w zakresie historycznych kolekcji cytrusów / "Citri et Aurea": the exchange of knowledge and experience in the field of historical citrus collections, „Studia wilanowskie", 2020, No. 27, pp. 163–172.

Laskowska H., Dudkiewicz M., Szot P., Pojemniki i rośliny kubłowe w historycznych parkach i ogrodach / Containers and plants in historic parks and gardens, „Teka Komisji Architektury, Urbanistyki i Studiów Krajobrazowych", 2015, No. 2, pp. 33–41.

Przybylak Ł., Modele działań realizacyjnych i pielęgnacyjnych wdrażanych w ogrodzie wilanowskim w odpowiedzi na współczesne wyzwania rewaloryzacyjne ogrodów historycznych / Models of implementation and maintenance activities implemented in the Wilanów garden in response to contemporary restoration challenges of historical gardens, „Ochrona Zabytków", 2019, No. 2, pp. 93–119.

Przybylak, Ł., Ogrody królewskie w Wilanowie i ich rola w utrzymaniu historycznych wartości ogrodniczych współczesnej Warszawy / Royal Gardens in Wilanów and their role in keeping the historical gardening values in modern Warsaw, „Teka Komisji Urbanistyki i Architektury", 2019, No. 47, pp. 313–326.

Zachariasz A., Rośliny rodzime i introdukowane w kompozycji ogrodowej / Native and introduced plants in garden composition, „Teka Komisji Urbanistyki i Architektury", 2007, vol. 38/39, pp. 175–193.

Manuscripts

Kuśmierski J., Hodor K., Historical orangeries and greenhouses in Poland : typology and preservation (manuscript at the publication process in „Architectus").

Kuśmierski J., Technical, aesthetic and management standards of the exotic plant collections recreation in historic gardens on example of the Wilanów Palace (manuscript of the doctoral dissertation carrying out under the supervision of D.Sc. Ph.D. Arch. Katarzyna Hodor, Prof. PK at the Cracow University of Technology Doctoral School).

Websites

Landi B. M., Kuśmierski J., Cytrusy i oranżerie we Włoszech i w Polsce / Citruses and Orangeries in Italy and Poland, https://tinyurl.com/y84kvtth

Museum of King Jan III's Palace at Wilanów, „Citri et Aurea" Polish-Italian Garden Seminar, https://tinyurl.com/5bkek3ev

Museum of King Jan III's Palace at Wilanów, Wilanów Gardens exotic plants collection, https://gis.muzeum-wilanow.pl/rosliny_egzotyczne/

Polish Tourism Organisation, Palazzi, giardini e agrumi, https://tinyurl.com/bdfc6vv8

The Uffizi Gallery in Florence, „Citri et Aurea" Polish-Italian Garden Seminar, https://tinyurl.com/bdcmb72x

"The Gardens of the 'Reggia di Caserta': Refunctionalization project of the ancient greenhouses"

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Referent of the relations between the Reggia di Caserta and the National and International Associations active in the field of protection and promotion of the Gardens. Follows the activities of the Reggia di Caserta for the *Green Table of the Museums*, in which the main Italian museums with important historical gardens participate. She holds University Masters in the management of ornamental greenery and is currently a PhD student at the University of Bologna with a research project relating to the management of historic gardens. She has produced scientific publications, articles in specialist journals and she has participated in study days and conferences on the theme of ornamental greenery and historic gardens.

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Abstract:

The Reggia di Caserta was not only a sumptuous representative seat for the Bourbon dynasty but, like all Bourbon royal sites, it was also a place of intense productive activities: the products were destined for the royal table and the surplus was sold. The proceeds contributed to the maintenance of the palace and gardens. For this reason, the museum is committed to relaunching some production activities historically practiced on the site such as the collection of oranges to produce jam, the production of a digestive bitterness with aromatic plants from the English garden, the production of wine in the San Silvestro vineyard, the creation of social educational gardens, the recycling of the wood and, above all, the restoration and refunctionalization of greenhouses also for the sale of plants, thanks to the public-private partnership introduced by Legislative Decree 50/2016.

Keywords:

Reggia di Caserta - English Garden - greenhouses - historical catalogues - sustainability challenge

1. Introduction

The Reggia di Caserta is a complex system including the big Square, the Palace, the Gardens the San Silvestro Wood and an aqueduct called "Acquedotto Carolino" - in honour of the King Carlo di Borbone - so it be considered an important Cultural Landscape (World Heritage UNESCO since 1997).

The gardens include a large formal park of about 100 hectares and an informal garden of 23 hectares.

Built from the end of the 18th century on the eastern side of the park, the English garden is an extraordinary landscape garden in which to "rediscover" the true essence of Nature.

The idea of a romantic garden in Caserta is due to the intuition of Sir William Hamilton, Ambassador of the English crown to the kingdom of Naples, with the complicity of the Queen of Naples, Maria Carolina of Habsburg.

The botanical project was entrusted to John Andrew Graefer[1], the architectural additions - such as the fake ruins - to Carlo Vanvitelli[2]. In the garden there are, in fact, many fake ruins inserted to satisfy the taste for the ancient and to insert Masonic references.

2. The Botanical Garden and the productive Garden

The Gardens were a leisure place of the Royal Family and the Court and at the same time place of productive activities such as hunting, fishing, breeding, agriculture, and botanical experiment.

FIGURE 1
The English Garden - *The lake of water lilies with fake ruins*
Source: Reggia di Caserta 2024

1 John Andrew Graefer was an English botanist, of Germanic origin, reported by the Royal Society.
2 Carlo Vanvitelli was the son of Luigi Vanvitelli, architect who designed the Palace and the Park, who took over from his father, after the latter's death in 1773, in the direction of the works

For this reason, the museum is committed to relaunching some production activities historically practiced on the site such as the collection of oranges to produce jam, the production of a digestive bitterness with aromatic plants from the English garden, the production of wine in the San Silvestro vineyard, the creation of social educational gardens, the recycling of the wood.

The English Garden was at the same time both a cutting-edge botanical garden and a production site.

2.1 The Botanical Garden

The main characteristics and purposes of the Botanical Garden can be summarized as follows:

- Scientific-botanical interests for the knowledge of the exotic flora discovered in the numerous scientific expeditions of the 18th century
- Botanical experimentation activities with the creation of cold and hot greenhouses to acclimatize, study and produce plants to be spread throughout the Kingdom
- Exchanges with other Italian and European Botanical Gardens and the purchase of plants and seeds from other countries, especially England, France and Holland
- Editing of catalogues

2.2 The productive Garden

The main elements of the productive activities were:

- Fodder testing site
- Orchard
- Citrus grove
- Agricultural garden
- *Potagiera* – Potato jug
- *Asparagiera - Asparagus bowl*
- *Fragoliera* - Strawberry bowl
- *Ananassiere* - Pineapple
- *Semenzai - Seedbeds*
- *Rosaio* - Rose bush
- Cold greenhouses and hot greenhouses (called *Stoves*)
- Sale of reproduced species and surplus horticultural products

FIGURE 2
The English Garden - *The first Camellia japonica (rubra symplex) in continental Europe*
Source: Reggia di Caserta 2024

FIGURE 3
Extension of the greenhouse and vegetable garden area:
1. late eighteenth century; 2. 1876 (Plan of Terracciano); 3. current extension
Source: Reggia di Caserta 2023

The construction of the greenhouses was functional to the dual vocation and fundamental to also start the sale of the reproduced species and surplus horticultural products.

Today, part of the citrus grove and the 3 ancient greenhouses remain of the productive garden (to which are added the post-unification greenhouse and the modern greenhouse).

3. The ancient Greenhouses

The Greenhouses for the production and sale of flowers, vegetables and rare species

In the English Garden there are 4 ancient greenhouses:

- The Masonry Greenhouse
- The Barrel Greenhouse
- The Greenhouse of begonias and succulents
- The Large Greenhouse (extra project scope)

The two Bourbon greenhouses (called barrel and masonry) preserve traces of the ancient heating systems and furnishings useful for the care of vegetation. They were used to shelter plants that could not resist the winter cold, and which were instead placed on shaded steps - the so-called cassoni - during the summer periods.

Agricultural tools - *ordegni da travaglio* - from the late nineteenth century are preserved in the masonry greenhouse, to be offered to visitors in a specific museum display. The recovered tools sometimes bear the Savoy coat of arms and range from pruning ladders to the so-called irrigation bottaline, from carriages for moving visitors and caretakers to carts for transporting plants, from planters and vases to tools with often unusual shapes. There is no shortage of scythes, billhooks, lawn rollers and manual lawnmowers.

The greenhouse in the rose garden area, made entirely of iron and glass at the end of the 19th century, was intended for the collection of begonias and succulents.

Today, the area also includes a modern greenhouse, built in the 1980s and air-conditioned to encourage plant growth. It was included in the project.

FIGURE 4
The Barrel Greenhouse
Source: Reggia di Caserta 2023

FIGURE 5
The masonry boxes called cassoni
Source: Reggia di Caserta 2023

The metal displays and the masonry boxes - called *cassoni* - on which the plants were displayed during the spring and summer months are still present

The rose garden was very important in the productive garden: Director of the botanical garden between the end of the nineteenth century and the beginning of the twentieth century, described the rose bush as a collection of multiple species and more numerous varieties of roses, attesting to the cultivation of *R. gallica, canina, pimpinellifolia, alba, carolina, centifolia, centifolia muscosa, damascaena, bourbon, portland, chinensis*... The first historical information on the presence of a rose garden in the English Garden can already be found in the catalogue of reproduced and salable species drawn up by Giovanni Graefer in 1803 which lists: *Rosa spinosissima, eglanteria , alpina, spinosa flava, muscifera, sempervirens, solphurea centifolia, caroliniensis, pimpinellifolia, belgica carnea, regalis, damascaena menstrualia rubra, centifolia sultana, stebonensis, alba, holosericea, lisbonica*. In the Platea dello Stato di Caserta of 1826 by Cavaliere Antonio Sancio, Administrator of the site, the rose garden is mentioned among the elements of the part of the garden intended for utilitarian activities, near the greenhouses and the agricultural vegetable garden and the catalogs of the following years report a number ever-increasing number of cultivated varieties. Partially reconstituted in the early 2000s, today the perimeter curbs of the flowerbeds remain.

In the new project the area will be used for the display of potted plants.

3.2 Historical catalogues and notes on the purchase and shipment of plants

- *Synopsis plamtarum regii viridarii casertani*, Giovanni Graefer 1803
- *Elencus plantarum Regii viridarii Casertani*, Neapolis 1816, Giovanni Graefer 1816
- *Elenchus plantarum Regii viridarii Casertani ad annum 1827*
- *Notamento delle piante più rare esistenti nella Vaseria del Giardino Inglese in maggio 1839*
- *Catalogo delle piante del Giardino Inglese* 28.4.1840
- *Catalogo delle piante moltiplicate che si vendono nel Real Giardino Inglese di Caserta*, Napoli 1844
- *Catalogo delle piante moltiplicate che si vendono nel Real Giardino Inglese di Caserta*, Napoli 1852
- *Catalogo delle piante vendibili nel Giardino Reale all'Inglese in Caserta*, Caserta 1873 (quarterly)

4. SEMI Project: Sviluppo e Meraviglia d'Impresa alla Reggia di Caserta (Development and Business Wonder at the Reggia di Caserta)

4.1 The redevelopment and refunctionalization project of the Greenhouses

The project is born from the possibility of collaboration between the Reggia di Caserta and private individuals in line with the objectives of the UN Agenda 2030 and the principles of art. 151 Legislative Decree 50/2016 public-private partnership in the field of cultural heritage.

The main objectives of the project are:

- Historical-artistic, cultural and productive recovery of the area of the bourbon greenhouses in the English Garden, once used for acclimatization activities, scientific study and reproduction of many indigenous and exotic botanical specimens, becoming one of the most productive spaces of the royal sites
- Restoration of the productive character, from a perspective of circular economy and sustainability aimed at the marketing of horticultural production consistent with historical catalogues.

A public notice, dedicated to the valorisation and promotion of the Bourbon Greenhouses located in the English Garden of the Reggia di Caserta, has been issued to implement these objectives.

4.2 Public-private partnership in the field of cultural heritage - art. 151 Legislative Decree 50/2016: Recipients

Parties may participate (economic operators in any form constituted, including non-profit entities, Third Sector entities pursuant to Legislative Decree 117/2017) also in the form of groupings with other economic operators and/or non-profit entities and /o Third Sector Bodies

When submitting expressions of interest, individual or aggregate economic operators had to sign a declaration of commitment to avail themselves of scientific collaboration, by signing an agreement, with universities or primary research centres in the botanical field.

Agreed fee and royalty.

They were considered:

- Requirements of all subjects
- Lead Partner Requirements
- Requirements met by at least one subject

4.3 Public-private partnership in the field of cultural heritage - art. 151 Legislative Decree 50/2016: Activities

- Management of the Greenhouses through a production project of green and flowering ornamental plants, floricultural material and seeds intended for marketing in line with the historical-cultural guidelines prescribed by the Palace and the scientific guidelines developed by the University or research centres.
- Marketing activities of plant species.
- Carrying out the conservative restoration and refunctionalization works of the greenhouses and external spaces according to the technical specifications attached to the Notice.
- Custody and maintenance of the greenhouse area and open spaces and of the artefacts
- Organization of guided tours, education and mediation workshops and cultural activities aimed at the public.
- Management of the exhibition point dedicated to the House of Historic Agricultural Tools.
- Planning of cultural itineraries intended for a national and international audience of potential users and visitors of the historic gardens.

4.4 Public-private partnership in the field of cultural heritage - art. 151 Legislative Decree 50/2016: Partnership proposal

The partnership proposal had to contain the following information:

- analysis of the site to be enhanced
- management plan of the Bourbon Greenhouses
- valorisation project compliant with the guidelines described in the project document drawn up by the Museum
- detailed description of the enhancement interventions according to the project document (events, workshops, etc.)
- promotion and communication plan
- economic-financial plan and description of the social impact

4.5 Public-private partnership in the field of cultural heritage - art. 151 Legislative Decree 50/2016: Collaborative Body

For the implementation, monitoring and enforcement of the same, a collaborative body in the form of a PSPP Technical Table will be established with the following functions:

- planning of valorisation activities and control of their correct execution
- evaluation of the objectives achieved, and the impacts produced
- review and any corrective interventions to be made in implementing the project
- reporting analysis
- examination of the definitive design of the necessary recovery and valorisation interventions

4.6 The role of the University in the refunctionalization of the Greenhouses

- Verifying that the principles of research are respected in the production process and the correct multiplication, growth and maintenance techniques are applied in the most suitable places
- Cultivation in the recovery of traditions/Cultivation technically adequate for the third millennium
- Architectural renovation/Adaptation with the use of current techniques
- Correct planting, transplanting and maintenance techniques
- Appropriate techniques for the conservation of specimens on display

FIGURE 6
Work in progress
Source: Reggia di Caserta 2023

4.7 The tender procedure

After publication the call remained active for 5 months.

Given the complexity of the project, only 2 applications for participation were received.

A commission of external experts was appointed.

After the award, the restoration work and the work of the technical committee began.

5. Conclusions: the expected results

The redevelopment project of the ancient greenhouses and the modern greenhouse of the English garden, implemented thanks to the public-private partnership introduced by Legislative Decree 50/2016 is a very serious challenge for the Museum and achieves important results.

First, the redevelopment project and the refunctionalization have allowed the Royal Palace of Caserta to guarantee the historical-artistic, cultural and productive recovery of the area of the bourbon greenhouses in the English Garden, once used for acclimatization activities, scientific study and reproduction of many indigenous and exotic botanical specimens, becoming one of the most productive spaces of the royal sites

Secondly, it will guarantee the restoration of the productive character, from a perspective of circular economy and sustainability aimed at the marketing of horticultural production consistent with historical catalogues.

Finally, the public-private collaboration is destined to become essential for the growth of museums, the improvement of the museum offer and quality standards, projecting them with a view to internationalization

In conclusion this is an essential project for the Green Museum.

Reggia di Caserta: a great vision, source of inspiration!

References

Books

A. Sancio, Platea de fondi, beni e rendite che costituiscono l'amministrazione del Real Sito di Caserta, Stato di Caserta 1826, Archivio Storico - Reggia di Caserta.

E. Ventrella, R. Ventrella, Reali Delizie. Itinerario storico-artistico in Campania Felix, Ventrella Edizioni 2013.

P. Viola, Il Giardino Inglese: armonia e arte in La Reggia della Meraviglia, a cura di la Repubblica, Napoli Guida editori, 2022

ASRC Cataloghi storici delle piante in vendita al Giardino inglese

Legal acts

Public Procurement Code Legislative Decree 50/2016

Agenda 2030 UN

PANEL PRESENTATION:

“Historic Gardens United in challenges: pests and diseases”

Summary

“Pests and diseases of rare and endemic dendroflora plants of Kutaisi Botanical Garden”

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Kutaisi Botanical Garden

Abstract:

The Kutaisi Botanical Garden is the leading regional center for the study and conservation of the Colchian flora, which protects plant diversity in accordance with sustainable development and contributes to the implementation of local environmental policy.

The Kutaisi Botanical Garden is unique due to the variety of plant species, exoticism, and age, and is also distinguished by the features of landscape planning and is considered one of the important objects of horticultural and park construction. Collections of decorative garden plants, floristic corners are a source of aesthetic impact and create an ecological environment of the city along with a visual effect. Plant introduction, conservation of rare and endangered species, educational ecological activities are being carried out in the garden.

In order to preserve plant cover and decorativeness, it is necessary to determine the causes of damage to the natural ecosystem and artificially grown local and exotic plants, and to plan and implement plant protection measures.

The purpose of our research is to determine the causes of damage to the rare and endangered species of woody plants of the Colchian floristic composition of the Kutaisi Botanical Garden, which are included in the “Red List” of Georgia, to assess the degree of damage; Both visual diagnosis and taking of damaged samples, their mycological and entomological analysis were carried out. Identification of harmful objects, pathological-morphological characterization and ecological characteristics of some harmful organisms are discussed. Integrated pest control methods are recommended.

Keywords:

colchian, flora, pests, diseases.

Kutaisi Botanical Garden is a scientific-research, educational-educational and cultural-artistic institution, it was founded in 1969, but it is the successor of the garden that was planted in the city 120-140 years ago in 1847-1850. On the right bank of Bioni river. Thus, the age of the Kutaisi Botanical Garden reaches at least a century and a half, and the age of the plants here, which were introduced during the first introduction, is determined by 150-160 years. The garden, founded in the middle of the 19th century, was originally called "Farm Garden". Later it was known as "Chemi Park" as well. The initiator of the creation of the "farm garden" was Belvavski, the governor of Kutaisi at that time. In archival documents, it is referred to as "Demonstration Nursery". "Demonstration-Model Garden" or "Treasury Garden". create a garden that would be a nursery and at the same time be "exemplary, that is, this garden should function as a kind of school, an illustrative example for people employed in horticulture. At that time, Georgia did not have the necessary specialists for planting such a garden, so they were invited from Europe. They did the same in Kutaisi. The rulers of the city at that time did not shy away from spending money to invite the best specialists in horticultural art. For this purpose, they initially invited the famous horticulturist-specialist French Regner, who laid the foundation for the "farm garden". Regner managed the development of this garden for 15 years. After Regner, the head of the "Farm Garden" was appointed Jacob Mari from Scotland, who was the father of the famous linguist, linguist and historian academician Niko Mari. Nico Mari was born in the garden of the farm and the room where he lived is now a flexible museum.

Later, Longe from France, Austrian Barton, Goriasek from Czechia and others worked in the same garden in different years. It was by these specialists that the foundation of the garden was laid in Kutaisi, which was represented by dozens of introduced species along with local endemic species of plants.

The Kutaisi Botanical Garden was established on the basis of a garden with such an interesting history in 1969. Currently, the dendroflora of the garden includes 578 species, these taxa are representatives of 207 genera of 80 botanical families; Of these, 236 are angiosperm species and 48 are gymnosperm species. 260 species are shrubs, among which gymnosperms are represented by only 8 species and only 34 species are lianas, which are angiosperms.

Of all the taxa represented by the Kutaisi Botanical Garden, 160 species are evergreen trees and Shrubs, and 418 species are deciduous. Of the evergreen species, 107 species are angiosperms, and 53 species are gymnosperms. As for deciduous species, 414 species are angiosperms and only 4 species of gymnosperms are deciduous.

From the botanical point of view of the plants of the botanical garden, the complex of Rhytocoenoses rich in Colchian floristic species is particularly important; Among them, there are many rare and endangered species, which are included in the "Red List" of Georgia: Zelkova carpinifolia Pall. is an ancient species, it is distributed naturally in the countries of Transcaucasia, including Georgia, and has been assigned the status of vulnerable (VU. A1cde); Kutaisi Botanical Garden has more than 50 trees of Qzelkvi. They are scattered over the entire area of the garden, but they are compactly found in the old park. The height of the most ancient examples of stone blocks reaches 35 meters, and the diameter of the stamp is 86 cm. It blooms abundantly and bears seeds, it is characterized by good renewal ability. A lot of self-sowing and root sprouts are observed. It is likely that the long-lived specimens of the pillars are plants left over from the time of the creation of the "Farm Garden" (1847-1850).

Colchian boxwood (Buxus colchica Pojark.) It is a rare relic of the Tertiary period Colchian flora, it is included in the "Red List" of Georgia and has a vulnerable status (VU. A2). Numerically, compared to other relics in the garden, it is represented in the largest number, in the old park, the border of the Colchian boxwood, planted in the middle of the 19th century, has survived. The length of this curb is more than 50 meters. Since the border has not been pruned in recent years, its height has reached 3 meters, there are single copies of the Colchian boxwood here. Unfortunately, both curb elder trees and individual specimens were damaged by people at different times - by cutting branches, breaking off the tip, and other more or less undamaged middle-aged Colchian elm specimens - the height of one specimen of the middle-aged Colchian elm reaches 6 meters, and the circumference at a height of 1 meter is 80 cm, ie about 27 cm in diameter. Colchian larch blooms profusely and has many self-seeds. Due to the many important qualities of wood, boxwood was the primary subject of timber imports from Georgia at the end of the 19th century and the beginning of the 20th century, and because of this, its plantations were greatly reduced.

Colchian oak (Quercus hartwissiana Stex-VU. A2); Imerian oak (Quercus imeretina Stev.Ex. Malleev- B1+2c IUCN): Urtkhel (Taxus baccata L-VU. B1b); Georgian maple (Acer ibericum M.Bieb.ex Willd-VU. B1c(iv)); common chestnut (Castanea sativa Mill. - VU. A2); Noble laurel (Laurus nobilis L. - VU. B1b): Staphylea colchica Stev.-A2d; B1b; Kikodze willow (Salix kikodseae Goerz - EN. B1a): Lafan (Pterosarxa Rterocarpa (Michx). Kunth - VU. D2); Walnut tree (Juglans regia L.-VU A2) and others.

In order to preserve the growth and development of decorative plants in the garden and species diversity, the most important role is assigned to their protection from harmful organisms, because the rapid spread of pest-diseases with different and specific variations is the cause of damage to plants. It represents low factors, which suppress the visual effect of decorative plants and ultimately lead to the decline or death of plants.

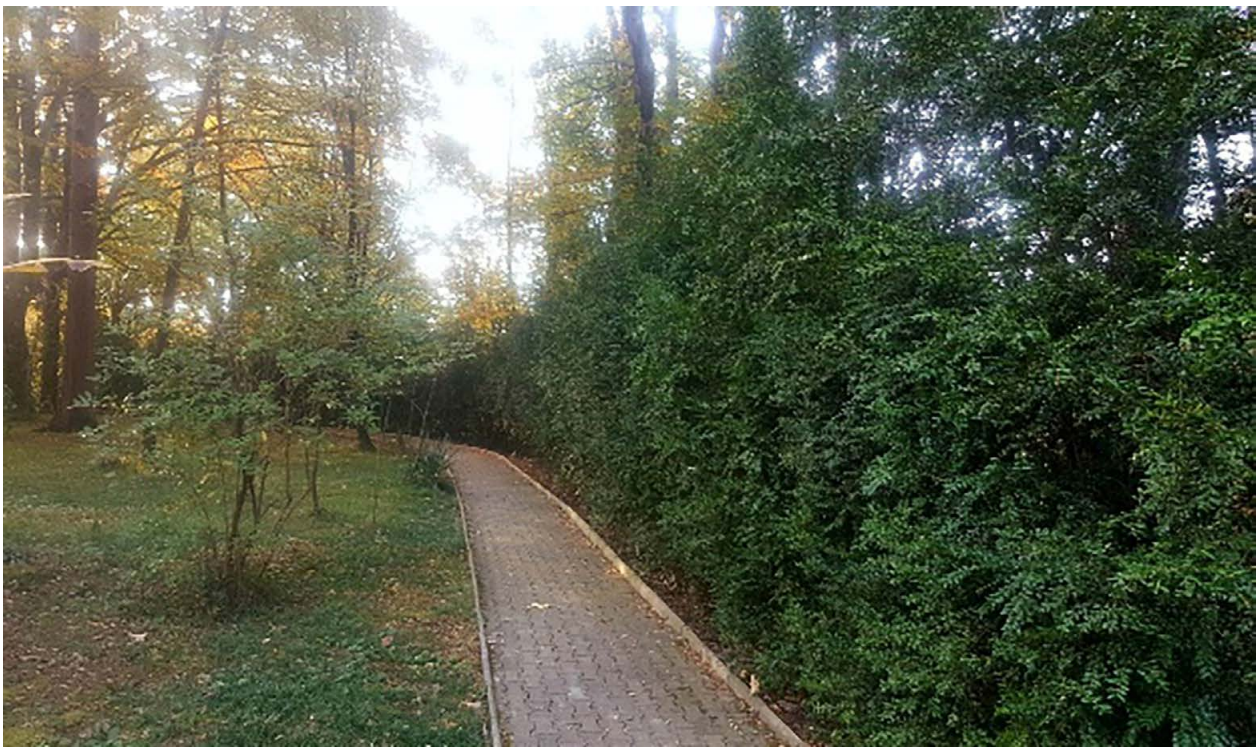
The invasive pest - Cydalima perspectalis Walker, which damages Colchian boxwood groves (Buxus colchica Poiark.), is distinguished by the degree of damage to decorative plants of the botanical garden and its wide range of distribution. It is a pest of all ages in the larval stage, feeding on leaves, twigs and the bark of new branches. The caterpillar hatched from the egg actively feeds on boxwood leaves and goes through 6-7 larval stages-moults. The caterpillar is about 4 cm long before it hatches. Before pupating, the caterpillar weaves an abalone chamber between leaves and twigs. Integrated combat methods are used for the fight against the quarantine pest, seasonal control measures are being planned and carried out according to the development phases.

In the spring of this year in the Imereti region, under the conditions of high humidity, the mycobietic. objects causing diseases became particularly active - Macrophoma Candollei Berk &Broome fungus was found to infect boxwood leaves and branches. Brown spots appear and sometimes cover the entire leaves. In the case of branch disease, the spot has an elongated shape, the fruiting of the fungus is developed in the form of black dots on the surface of the spot, they are single-celled pycnidia, with a short pear-shaped pore and colorless, plate-granular contents - spores. Diseased leaves wither and fall, and branches wither; The fungus causing Colchian boxwood burn (Calenectria pseudonviculatum = Cylindrocladium buxicola Henric.) was also noted as a significant pest. The representative of this species caused massive fall and withering of boxwood leaves in Colchian boxwood groves and undergrowth in western Georgia. Saprophytic fungi (from the genus Capnoium) have also been identified, which develop a soot-like grayish-black snowflake, the causative agent does not parasitize, it is only mechanically attached. The mycelium of the fungus covers the leaves, due to which the assimilation ability of the plant is sharply reduced and the plant is inhibited.

There are 21 species of oaks in the garden, of which Hartwiss oak, Colchian oak (Quercus bartwissiana Stex, Q. armeniaca kot.) is one of the rare and ancient species of Georgian flora. Imere oak (Q. imeretina Stex.) is a rare, relict plant of Western Georgia, Georgian oak (Q. iberica Stex.) is endemic to the Caucasus. Almost all oak species, including the red list" species - Quercus bartwissiana Stex. Imerian oak (. imeretina Stex) - are affected by oak ash (Microsphaera alpoteides Griff.et Maubl.), young plants are especially affected. Most of the time, the leaves and Mauet , young pla shoots are covered with whitish-gray snow, which later turns dark-gray. The fungus overwinters in bagged fruiting bodies in fallen leaves or on oak bark. In the spring, the spores scattered from there first infect young shoots and leaves, and during the summer, the fungus spreads through the conidial stage. During the massive spread of the disease, young seedlings decline or die.

The following fungal organisms have also been identified on oak species - Q. imeretina - Monochaetia flagellate: Coryneum cunzei: Diplodia quercus, Melanconim szemiaewi: Microsphaera alphitoides; Phomopsis quercella: Q. hartwissiana - Microsphaera alrhitoides: Coryneum sp.; Gloesperum variabilisporum. which, under favorable conditions, cause premature leaf fall, weakening of plants in the nursery and culture.

Among the fungi that cause wood rot on old oak trees are abed fungi - the most common are true abeda mushrooms - Fomes fementarius (Lift.) Gill., a parasitic fungal organism, the initial infection is cut from the places of mechanical damage, the mycelium spreads in the wood and causes heartburn. rot. Rotten

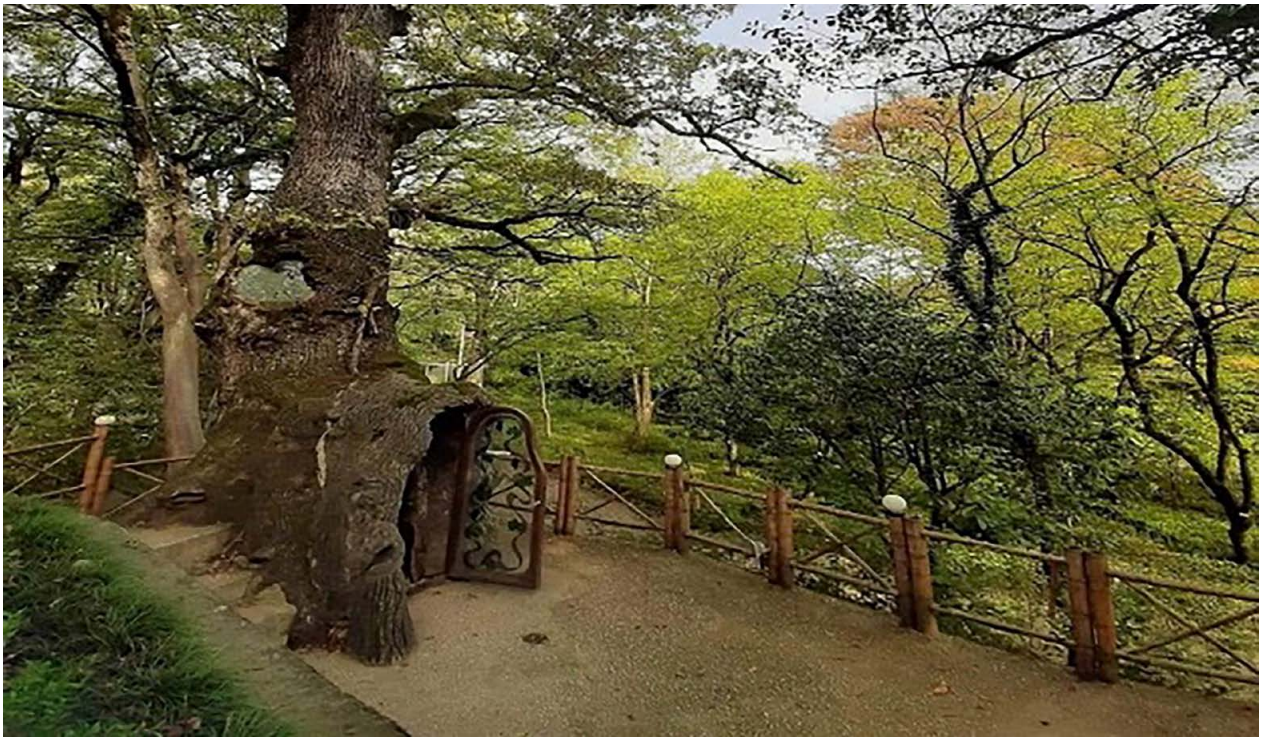


wood is reddish at first, then it becomes yellowish-white, and therefore this disease is also called white rot of the heart, the fungus later develops fruiting bodies., a wood-destroying parasite-liver fungus (Eistulina hepatica Schaeff. With.) can be found on Colchian oak plants, and yellow abeda - fungus is also mentioned. Lactipers sulphurus (Bull.) Murrill, mushroom - Pelverus squamosus (Huds.) Quelet, armillaria, mushroom - Armillariella mellea (Fr.) Kars. etc.

Old (150-250 years old) Colchian oak plants in the garden are damaged by the large oak borer - Cerambyx cerdo acuminatus Motsch, the large oak beetle is black, the beetle emerges from the hole in May, i.e. Its flight begins in May and sometimes lasts until August. Beetles fly, fertilize, lay eggs in the evening and at night. The beetle does not feed and does not cause any harm. It lays eggs separately, in the cracks of trees and roots. The beetle lays its eggs both on the lower part of the tree trunk and along the entire length of the tree trunk. on branching sites and branches. Each female lays 100-150 eggs. The worm hatches from the egg in 10-15 days, then enters under the bark and begins to feed on the leaf. The caterpillar spends its first winter under the bark. In the spring, the second-year caterpillar returns through the same hole and prepares a curved, broad, webbed cradle in which it pupates, pupation beginning about mid-August and continuing through October. The brood phase lasts 25-30 days. The caterpillar, when flying out and making its nest (July-August), throws out the chewed meal. The hole made by an adult worm is 2 cm wide, which damages the tree greatly. Worm holes are first light-colored (wooden) in color, and then the hole is filled with excrement of the worm, due to moisture inside, fungus develops and the holes turn black. A large oak beetle gives one generation every three years. i.e. It is characterized by a three-year generation.

The oak borer Corythucha arcuata Say. is characterized by a wide range of distribution, it damages the leaves from the lower side, especially young seedlings, the chlorotic leaves are characterized by white or pale yellow spots and wither.

It is also mentioned that the one-color oak moth - Tischeria complanella Hb. causes damage in the larval stage, which is manifested by damage to the leaf parenchyma and the formation of different-shaped gray spots (mines) on it. It also causes damage to oak leaves Leaf flea Haltica saliceti Ws., the beetle is blue or green in color. In the garden, the mentioned insect damages the oak leaves of all arthropods in both caterpillar and beetle stages, the newly hatched caterpillars first feed on the surface part of the leaf and cause skeletonization of the leaf, older caterpillars completely destroy the soft part of the leaf so that only the veins remain. Affected leaves darken to light brown and shrivel. Oak leaf flea is considered the primary pest of oak crops. The beetle hibernates in the dead saArshi and in the cracks of the bark.



Representatives of the Cynipidae family, which parasitize plants, can be found on oak species. A small (3-6 mm) insect, the female lays eggs in the pulp of the leaf, chemicals secreted by the pupae or newly hatched larvae cause growth of the surrounding tissues and result in growths of various shapes and sizes. The most common species of oak maggots in the garden is Neuroterus numismalis Four., which are characterized by a particularly massive settlement on the young branches and undersides of leaves of Colchian and Imer oaks. It has both bisexual and agamous (parthenogenetic) generations and forms two distinct galls on oak leaves: silk button and blister. The shape of buttons is up to 3-5 mm in diameter, shiny, golden-brown, gives the impression of a silk thread, has an indentation in the center and is tightly attached to the leaf. Round shape looks like porous formations, the color can be greenish-white, yellowish-reddish, often yellow-red on the side. The structure of the gall is soft and loose, the inner contents are porous, in the center there is a small chamber, inside which the larva develops. The larva continues to develop and hibernate under the cover of fallen leaves. Adult insects emerge the following spring.

Neuroterus quercusbaccarum Linnaeus. - flat disks on the underside of oak leaves, with a clearly protruding center, hairy, first yellow-green, later reddish, attached to a short stalk. The diameter of the galls is up to 4-6 mm, with a whitish or yellow lower surface; It ripens in September, sheds its leaves and falls to the ground before the leaves begin to fall.

Andricus foecundatrix Hartig, the cone-shaped mechaclura causing damage, has also been identified., as the name implies, galls develop on modified axillary or terminal leaf buds. Brown, scaly, cone-like galls are mostly formed at the ends of branches, up to 13 mm in diameter and 20 mm long, single-chambered. Young galls are initially green, tightly closed, but when mature, they open, releasing a small internal ovoid chamber, 2-3 mm long, which falls to the ground, where the insect completes its development, in the fall, the so-called cone galls fall and the larva hibernates in it. The sexual generation of maggots begins to develop in April, matures in May, and adult insects immediately emerge from them. Imagoes of the asexual generation emerge the following spring in April, but some remain in diapause in leaf litter for another year.

The mass formation of galls leads to the mass reproduction of parasitic insects, which leads to premature leaf fall, disruption of the natural process of photosynthesis, significant slowing down of plant growth, weakens plants and may cause them to wither.

Ornamental plants provide food and shelter for many representatives of the living world, while most of them are garden sanitation. From decorative plants, decorative plants clean the air from harmful gases and other impurities, they capture about 70% of the dust particles in the city. In order to protect the decorative plants of the botanical garden and to improve their decorative value, it is necessary to use integrated methods of fighting against harmful organisms, aimed at reducing the number of harmful populations, in order to maintain the existing ecologically safe environment.

Used literature

1. Aleksidze G., - Protection of plants. Tbilisi, 2014;
2. Gegenava G., Integrated protection of plants. Tbilisi, 1993;
3. Gritishvili m., Kacheishvili:-Tavartkiladze st. - Materials for studying the diversity of Georgian mushrooms. Tb. Bot. garden Sh., 93, 2003,;
4. Tvalodze b. - The most important plants of Kutaisi Botanical Garden. Kutaisi. A.S.S.U. Publishing House 2007;
5. Kanchaveli G. Supatashvili sh. "Forest Entomology". "Education" publishing house, Tbilisi, 1968.

“Preliminary observations on the occurrence of diseases and pests on fruit trees in the garden in Nieborów, Poland”

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The main goal of her research:
- occurrence of pests and beneficial fauna in orchards and soft fruit plantations,
- biological, integrated and ecological plant protection methods
- biological effectiveness of plant protection products and their impact on non-target organisms.
She also takes part in the implementation of national and international research projects. She is the author or co-author of several dozen scientific publications, popular science articles, chapters in two books.

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Abstract:

The competition between gardeners, pests and plant diseases, has been going on for centuries. Gardeners struggle with many problems connected with keeping plants healthy, using available natural and chemical means, as well as advice from specialists such as entomologists and phytopathologists.

Particularly many challenges arise in the case of the protection of historical garden structures, one of which are utility gardens in the form of traditional orchards is part of landscape elements. Their restoration and maintenance is important for future generations. Establishing new orchards next to old, dying ones, causes the spread of diseases and pests to young fruit trees. The public nature of the garden in Nieborów creates great difficulties in selecting effective methods of protecting trees, affecting the life and health of animals and people as little as possible.

The article presents the most important problems regarding the protection of fruit trees growing in the historical garden, along with the activities undertaken by the Museum in Nieborów and Arkadia, Poland.

Keywords:

Utility garden, orchard, espalier fruit trees, old apple cultivars, monitoring, pests and diseases

1. Introduction

Nowadays, when gardeners and caretakers of European historical gardens pay so much attention and are devoted to the boxwood moth and its caterpillars /*Cydalima perspectalis*/, which decimates intricately trimmed boxwood hedges /*Buxus sempervirens*/, little attention is paid to diseases and pests of fruit trees.

The article illustrates the scale of this phenomenon and indicates characteristic pests and diseases of fruit trees. And thanks to the help of a group of experts from the National Institute of Horticultural Research in Skierniewice – entomologist PhD Małgorzata Sekrecka and phytopathologist Hubert Głos, it also presents the results of their preliminary research, both field and laboratory.

This article also contains an analysis of the sources of pathogens on the example of two orchards, of completely different nature, growing in the historical park in Nieborów – an integral part of the Museum in Nieborów and Arkadia (a branch of the National Museum in Warsaw).

Finally, we would like to present the protective measures that the employees of the Garden Department try to introduce in their everyday work.

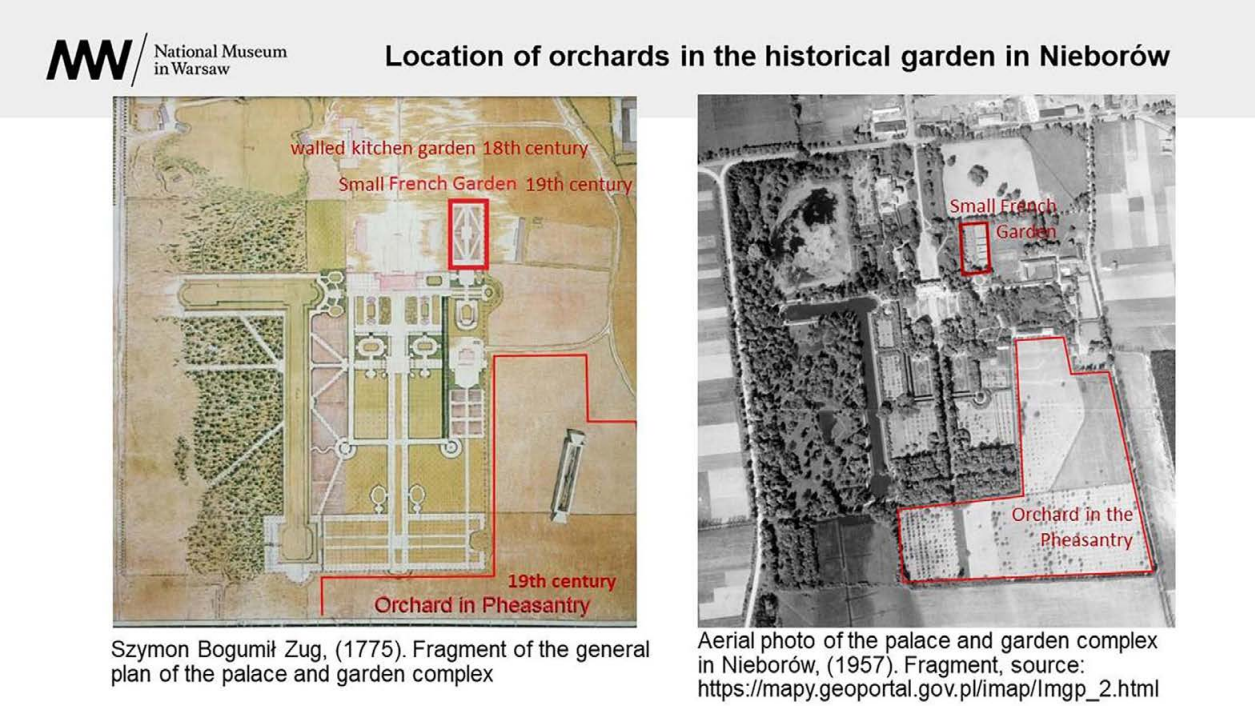

FIGURE 1

Location of orchards in the historical garden in Nieborów.

Location of orchards in the historical garden in Nieborów. At the top, marked in red the walled kitchen garden established in 1774- in the 19th- century called *Small French Garden*. In the bottom right corner, marked in red, the 19th century *Orchard in the Pheasantry.*

Author: Own work Katarzyna Żak-Zatorska, (April 2024).

1.1 The residence of the Radziwiłł family in Nieborów

In the years 1774- 1944 Nieborów was the center of Mazovian estates of the Radziwiłł family, near Warsaw. The palace played at that time the role of the country residence of the owners. In 1945 it became a museum – a branch of the National Museum in Warsaw.

The entire complex is kept in the Baroque style with some elements of a naturalistic, irregular park. In the present spatial arrangement are visible well-kept elements of utility gardens in the form of orchards, an inspection garden and a kitchen garden.

In 1774, the estate became the property of Duke Michał Hieronim Radziwiłł. Together with his wife, Duchess Helena Radziwiłł née Przeździecka, he recomposed and developed the entire palace and garden complex under the guidance of the famous architect Szymon Bogumił Zug.

The garden underwent numerous transformations in the second half of the 19th century, thanks to its owner, Duke Michał Piotr Radziwiłł. According to the positivistic idea of organic work, the garden was then enlarged and its utilitarian character was emphasized.

2. Ochards in the historical garden in Nieborów

The first of them, the 18th century walled kitchen garden (later called the *Small French Garden*), is located to the northeast of the palace. The second one is the 19th century *Orchard in the Pheasantry* located to the east.

2.1 Walled kitchen garden and the Small French Garden[1]

Historical mentions of a kitchen garden appear in the second half of the 18th century. It was intended: "*for growing ornamental, spice and medicinal plants as well as vines and berries, and also dwarf varieties of trees and shrubs*[2]."

FIGURE 2
Everyday life in Nieborów

The view of the interior of the *Small French Garden*, in the foreground the owner of Nieborów, Duke Michał Piotr Radziwiłł, with his wife Maria and a gardener.

Museum in Nieborów and Arkadia. The Album nr MNW NB Al. 52/84, (4046) author: Michał Piotr Radziwiłł. {Album of Michał Piotr Radziwiłł Par Łowicz à Nieborów – Le Ménage Bun, 1879-1880. The illustrations, drawn mainly in pencil, partly colored with watercolor (vignette and introductory page), have the character of a cartoon story about everyday life in Nieborów. Also designs of interiors and artistic crafts, drawn in pencil by Duke Michał Piotr Radziwiłł}

1 *Small French Garden* - a utilitarian garden, modeled on the royal kitchen garden in Versailles, intended for growing dwarf fruit trees, formed into delicately shaped crowns. Propagated in Poland by professor Edmund Jankowski in the 1870s.

2 Piwkowski Włodzimierz, *Nieborów. Mazowiecka rezydencja Radziwiłłów. The Residence of the Radziwiłł Family in Mazovia*, Warsaw 2005, p. 120;

Over the centuries, the walled kitchen garden underwent some transformations. In the 19th century the trapezoidal arrangement disappeared. The transverse walls appeared dividing the interior of the kitchen garden. The increase of the number of walls was probably intended to obtain a larger area for growing fruit trees with an appropriate exposure to sun. The area of the *Small French Garden* was used to the maximum, which is proved by the guidelines from the contemporary gardening guides, indicating planting vines under not yet developed fruit tree crowns. Bushes of red currant, black currant (*Ribes* L., *Ribes nigrum* L.) and gooseberry (*Ribes uva-crispa*) were also planted under the tree crowns.

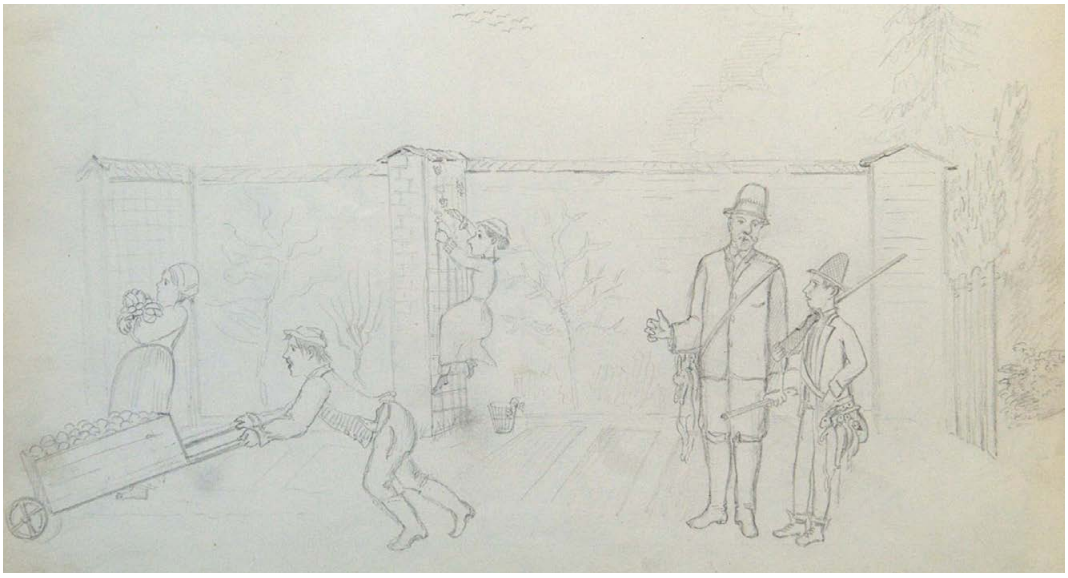

FIGURE 3
Everyday life in Nieborów

The view of the interior of the *Small French Garden,* in the foreground the owner of Nieborów, Duke Michał Piotr Radziwiłł returning from hunting. In the background his wife Maria is climbing the trellis. On the left a man pushing a wheelbarrow and a woman carrying some crops.

Museum in Nieborów and Arkadia. The Album nr MNW NB Al. 52/73, (4046) author: Michał Piotr Radziwiłł,

FIGURE 4
Small French Garden

The view of the interiors of the *Small French Garden* in Nieborów, current state.

Author: Tomasz Wójcik, (May 2024). Museum in Nieborów and Arkadia.

In the 19th century, thanks to Duke Michał Piotr Radziwiłł [1853- 1903], the owner of Nieborów, the area underwent significant transformations. It was given the name the *Small French Garden*.

Currently, the problems with the fruit trees in the *Small French Garden* result from the location of new planting of young fruit trees in the vicinity of old trees - planted in the 1950s. The problem is establishing new orchards next to old dying trees, which causes the spread of diseases and pests to young fruit trees.

2.2 The Orchard in the Pheasantry

The second example of a utility garden in Nieborów is *the Orchard in the Pheasantry*, located in eastern part of the garden complex in Nieborów. Historical documentation and descriptions on the plan from the 19th century [1888-1889] indicate a characteristic compositional arrangement of the fruit trees called **quincunx**.[3]

Plant inventories from the second half of the 19th century show the dynamic development of fruit tree orchards on the premises of the estate of the Radziwiłł family in Nieborów.

A detailed description in the margin of the plan of the *Orchard in Pheasantry* 1888-1889 provides information about the apple varieties used to set up the orchard, these were: *'Kalville Blanche'*, *'Reine de Reinette'*, *'Reinette'*, *'Blaumont'*, *'Alpiston'*, *'Reine du Canada'*, *'Bedfordshire Foundling'*, *'Mougi'*, *'Antonovka'*, *'Belle Josephine'*, etc. The choice of the varieties is also confirmed in the letter of Duke Radziwiłł to his mother: *"I am sending you, my beloved Mother, 104 apple trees from Nieborów, seven- year- old ones [...] chosen from four varieties: 1) Bedfords foundling[4], [...] 2) Antonovkas, 3) Gloria Mundi, 4) Queen of Reinette..."*.[5]

Among the fruit trees there was the lower level of plants consisting of gooseberry bushes and currant bushes. In 1894, 8,000 gooseberry bushes were planted.

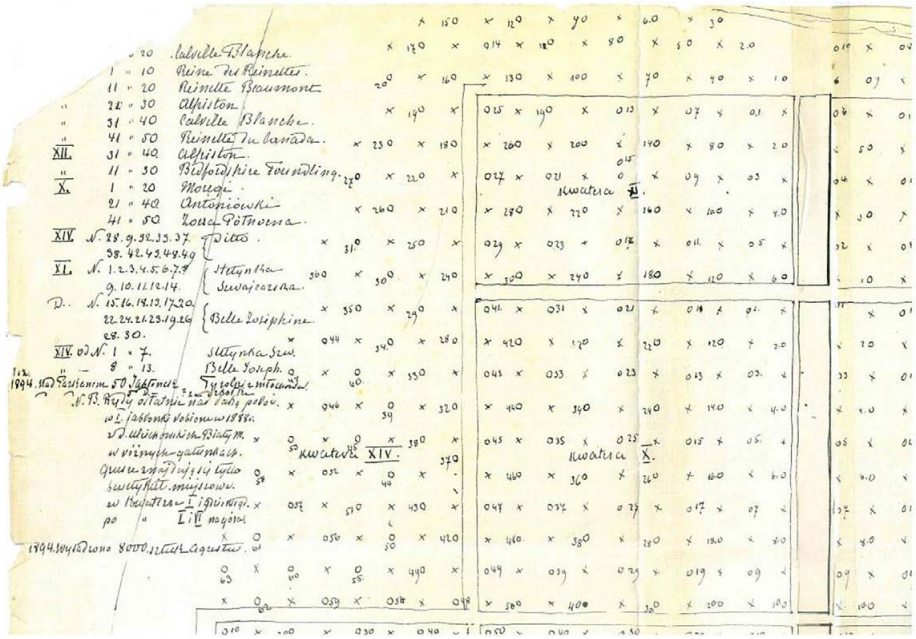

FIGURE 5
Orchard in the Pheasantry
Museum in Nieborów and Arkadia, Author unknown (1888-1889) the *Orchard in the Pheasantry.* The plan, fragment of fruit tree plots behind the ha-ha, specifying their varieties 1888-1889.

3 *Quincunx*- an arrangement of five objects with four at the corners of a square or rectangle and the fifth at its centre, used for the five on a dice or playing card, and in planting trees. Józef Borecki - the gardener of Duke Zygmunt Radziwiłł, wrote *Józef Borecki's Rapport* in 1867, in which he describes the establishment of a new plot on which apple trees of *"good varieties"* were planted in a chessboard arrangement.

4 Exactly: *'Bedfordshire foundling'* apple tree. Synonyms: *'Bedford Foundling', 'Cambridge Pippin'*. A British cooking apple grown from the end of the 19th century in the Bedfordshire area. Fn.: K. Żak-Zatorska

5 Letter from Michał Piotr Radziwiłł to his mother Jadwiga Radziwiłł, née Sobańska, November 18, 1889, letter no. 238, p. 116: The Central Archives of Historical Records in Warsaw, Radziwiłł Archives from Nieborów, Correspondence, file no. 52, part VII.

Moreover, the gardener Ludwik Michałowski, in his *Inventory* from 1894, specifies the numbers of fruit trees in the orchards: *old apple trees 1,466 pcs, young apple trees 800 pcs, [...], pear dwarf trees 165 pcs, walnut trees 100 pcs, wild plum trees 1,080 pcs [...].*[6]

The *Orchard in the Pheasantry* formed the buffer zone of the baroque garden on the eastern side and the southern side.

For over 20 years, the Museum in Nieborów and Arkadia has been trying to reconstruct the orchard by planting old varieties of apple trees, grafted with shoots from old trees.

3. Entomological research on fruit trees in the *Small French Garden*

The observations conducted on the trees growing in the *Small French Garden* and the *Orchard in the Pheasantry* regarded the presence of pests and the damage caused by them.

The number of agrophags was assessed visually by checking the trunks, branches, shoots and leaves in search for pests and the symptoms of their feeding.

3.1 Colony of woolly apple aphid /Erisoma lanigerum/ in the Small French Garden

The biggest problem concerning the apple trees of the cv. *'Close'* growing in the *Small French Garden*, was the presence of woolly apple aphid /*Eriosoma lanigerum*/. As early as the beginning of April 2024, the aphid colonies were visible on tree trunks and branches (Figure 6 and 7).

This species often occurs on wounds caused by, for example, tree pruning and inhabits natural cracks in the bark. Characteristic thickenings (so-called bumps) appear in the sites of the aphid feeding. Additionally, various pathogens causing bark and wood diseases penetrate the plant through cracked bark (bumps). Attacked young shoots often develop canker that prevent bud development. Heavily infested trees are susceptible to frost.

FIGURE 6 AND 7

A colony of woolly apple aphid *(Erisoma lanigerum)* in the *Small French Garden*

Małgorzata Sekrecka (March 2024) A colony of woolly apple aphid on the bark of trunks and branches of apple tree cv. 'Close'.

6 The Central Archives of Historical Records in Warsaw, Radziwiłł Archives from Nieborów (Property and economic newer records), file no. 30, *List of plants and fruit trees left by Michałowski*, 1894, pp. 329 -330.

FIGURE 8 AND 9

Pests on apple trees in the *Small French Garden*

On the left: A leaf rosette damaged by tortrix moth caterpillars /mainly *Adoxophyes orana, Archips rosana/*. On the right: The flower damaged by white spotted rose beetle */Oxythyrea funesta/*

Both photos, author: Małgorzata Sekrecka (April 2024).

Apart from woolly aphids, on apple trees of the cv. *'Close'*, other observations were made: the presence of other pests attacking the bark and wood, minor leaf damage caused by the feeding of tortrix moth caterpillars /mainly summer fruit tortrix moth - *Adoxophyes orana,* rose tortrix moth - *Archips rosana/* (Figure 8), as well as single occurrences of damage to flowers and flower buds caused by white spotted rose beetle / *Oxythyrea funesta/* (Figure 9).

On young espalier apple trees of the cv. *'Gala'* in the *Small French Garden,* a large population of brown mite */Bryobia rubrioculus/* was observed. Signs of feeding in the form of chlorotic spots on the upper side of the leaf were clearly visible (Figure 10). The large number of brown mites on leaves at the early stages of efflorescence was probably due to the fact that they grew in the espalier arrangement at the walls dividing the *Small French Garden*. Such an arrangement provides protection against wind, at the same time, however, it causes an increase in temperature in the immediate surrounding and leads to a fast propagation of brown mites.

Monitoring and effective chemical control is very difficult. This is due to the small size and the fact that during development the mites spend most of the time in the buds or under the surface of the leaves.

A biological method was used to restrict the numbers of the pest. It was based on the introduction of a predatory mite */Typhlodromus pyri/* into the trees. The phytoseiid mites */Phytoseiidae/* are natural enemies of spider mites and in conducive conditions are able to keep the population of this pest at a low level for many years. Cloth strips[7] with this predatory mites were hung on the trees at the beginning of April.

On subsequent observation dates, the presence of both eggs and mobile stages of the mite were noticed on the leaves, which proves a successful introduction and good acclimatization on the fruit trees. The pres-

7 Cloth strips are the special bands with hibernating predatory females collected from apple orchards in the autumn. In the spring, cloth strips are placed on the trunks of the apple trees. Sekrecka M., Niemczyk E. 2006. Introducing *Typhlodromus pyri* (Phytoseiidae) into apple orchards in Poland. Journal of Fruit and Ornamental Plant Research Vol. 14 (Suppl. 3): pp. 203-207.

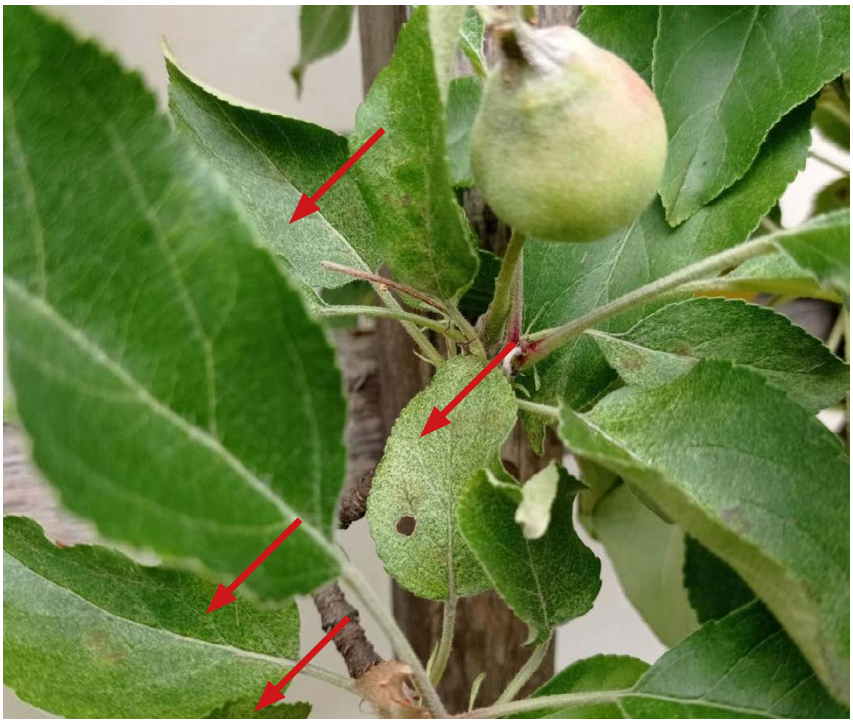

FIGURE 10
Leaves with the symptoms of damage caused by brown mite */Bryobia rubroculus/*
Author: Małgorzata Sekrecka (April 2024)

FIGURE 11
Gangs on leaves in the form of blisters – a symptom of pear leaf blister mite */Eriophyes pyri/*
Author: Małgorzata Sekrecka (April 2024)

ence of the predator reduced the number of brown mites later in the season, and the newly grown leaves no longer showed any damage caused by the feeding of spider mites.

3.2 Pests on pear and apple trees in the Small French Garden

The health of pear trees was also checked in the espalier plantings of the *Small French Garden*. No presence of the pear psylla */Cacopsylla pyri/* was recorded on the shoots taken from trees. On the other hand, symptoms of damage caused by the feeding of the pear leaf blister mite */Eriophyes pyri/* were observed in the form of vesicular growths (Figure 11). Moreover, damage caused by the pear leaf midge /*Dasyneura pyri*/ was visible on the apical leaves.

The presence of the pear leaf blister mite and pear leaf midge in young plantings is particularly dangerous. Both species are multi- generational pests. Young trees attacked by them have poor growth and, in extreme situations, may even die. Additionally, feeding symptoms reduce the decorative value of trees.

Part of the life cycle of both species takes place in hiding, which makes contact between the preparation and the pest difficult. In order to prevent an increase in the number of these pests, a recommendation was issued to cut out shoots with leaves infested with the pear leaf blister mite and a procedure was carried out to control the pear leaf midge larvae with an insecticide.

4. Entomological research on fruit trees in the *Orchard in the Pheasantry*

In *the Orchard in the Pheasantry*, injuries caused mainly by deer and roe-deer were observed. Intensive browsing of twigs and young shoots caused by deer and roe-deer can kill or limit the growth of tree seedlings (Figure 12 and 13).

As a preventive measure, the park fence was reinforced to minimize the risk of game animals entering the *Orchard in the Pheasantry* area.

Apart from that, the tortrix caterpillars /mainly *Adoxophyes orana, Archips rosana*/ were noticed. These caterpillars feed on leaves – often spinning them together into a roll for protection and also attack the fruits of apples and pears, causing considerable damage.

FIGURE 12 AND 13
Browsings on the shoots caused by game animals
Author: Małgorzata Sekrecka (April 2024)

FIGURE 14
A caterpillar of *Hedya nubiferana* feeding on a leaf rosette
Author: Małgorzata Sekrecka (April 2024)

In addition to pests, beneficial fauna was observed on the trees growing in the *Small French Garden* and the *Orchard in the Pheasantry*, including predatory and parasitic species and pollinating insects. Such a large diversity of species proves the richness of ecosystems functioning in the garden complex of the Museum in Nieborów and Arkadia.

5. Phytopathological research on fruit trees in the *Small French Garden* - fungi as a cause of diseases

5.1 Bark and wood diseases, mainly European canker /Neonectria ditissima/

1. Field and laboratory observations carried out in the spring of 2024 showed the occurrence of bark and wood diseases, mainly on old apple trees cv. *'Close'* growing in the *Small French Garden*. The main agent of the disease was *Neonectria ditissima*, a polyphagous fungal pathogen that causes wood canker.
2. The European canker is very dangerous, because in Poland currently there are no fungicides registered to control this disease. Cutting of shoots and branches with necrosis symptoms is the only way to protect trees.

The cause of **fruit tree canker (European canker),** the fungus *Neonectria ditissim*a (synonym *Neonectria galligena*) is polyphagous. In addition to fruit trees, the pathogen also infects forest and park trees, including: rowan trees, poplars, ashes, beeches, oaks, hawthorns and willows. One-year-old and two-year-old shoots, as well as tree branches and trunks may be infected. On shoots, these are most often wounds that penetrate the tissue, where the bark peels off, turns brown and necrosis.

Severe tree trunk infestation often causes the death of entire trees. On dead wood and bark, in autumn, fruiting bodies of the fungi (perithecia) grow, in which ascospores are formed, which carry out primary infections. During the season, conidial spores are produced on fresh wounds, which carry out secondary

FIGURE 15
Necrosis on branches and young shoots of fruit trees
Author: Hubert Głos (April 2024)

infections. Diseased trees are most often characterized by discoloration of the bark and weakened growth, and the fruit becomes smaller.

In mild winters observed in Poland for many years, the pathogen can develop almost all year round.

During pruning, the disease is easily transferred to healthy trees on gardening tools, such as saws or pruners. The occurring disease symptoms significantly deteriorate the aesthetic value of trees and the surroundings in which they are located.

5.2 The apple powdery mildew /Podosphaera leucotricha/

During lustration of trees **apple powdery mildew** was also observed. This pathogen infects leaves and flowers causing deformations and covers the infected tissues with white floury layer of fungal mycelium and spores. The fungus without fungicide control causes many infections during growing season, reducing the aesthetic value. Moreover, heavily infected trees during wintering are more susceptible to frost.

The pathogen overwinters in leaf buds and on shoots infected during the previous growing season. This element of the life cycle allows for very rapid development of the disease on young, growing leaves and flowers every year. The floury mycelium coating with spores very quickly covers the entire surface of the blades, and the abundantly produced conidial spores inhabit subsequent, adjacent leaves. Infected flowers do not set fruit. Rainfall is not necessary for the development of the disease, only high air humidity during night periods and warm, sunny days. The disease is caused by a high density of tree crowns, which hinders their ventilation. Leaves and shoots with visible first symptoms of the disease should be removed mechanically, and the first chemical treatments against the occurrence of the disease should be performed in the green/pink flower bud phase. The presence of the disease on the leaves causes their dehydration, twisting, drying and premature falling, and the infected shoots are a source of infection for the following year.

FIGURE 16
Symptoms of apple powdery mildew /*Podosphaera leucotricha*/
on leaves and flowers of the apple tree, cv. 'Close'

Author: Hubert Głos (April 2024)

5.3 The apple scab /Venturia inaequalis/

Another very important disease of apple trees in gardens in Nieborów is **apple scab**, caused by *Venturia inaequalis*. In commercial orchards, the number of sprays to control against the disease may exceed 20 during the growing season. The control in gardens around historical buildings is difficult and cannot be as intensive as in commercial orchards. Treatments are limited to such an extent that the disease cannot spread in an uncontrolled manner and does not cause fruit fall or excessive damage to the leaves.

The pathogen infects leaves and fruits, causing spots, which during high disease intensity significantly reduce photosynthesis processes, and severely infected leaves and fruits fall prematurely. In such a situation, trees are unable to prepare appropriately for the winter dormancy period during the growing season and, as a result, become more susceptible to frost.

In addition, the symptoms of the disease significantly worsen the visual effect of the trees, which is important for visitors to the Museum in Nieborów and Arkadia.

In spring, during rainfall, primary infections occur, which are caused by ascospores. Trees become susceptible to infection already at the moment the leaf buds burst. Properly conducted chemical protection at this time ensures a significant reduction in the source of infection in the second part of the season. The risk of ascospores spreading next year is also limited, because the pathogen overwinters on fallen leaves. Chemical protection should most often be started before flowering.

During the first inspections, attention was drawn to the need to perform preventive treatments against apple scab and powdery mildew, as well as to the need to successively prune trees browsed by animals in the *Orchard in the Pheasantry* in order to reduce the surface of wounds that constitute the gateway to infection.

FIGURE 17
Symptoms of apple scab on leaves and fruits
Author: Hubert Głos (April - May 2024)

The inspections carried out allowed us to draw attention to specific issues related to protection, indicate the optimal dates of treatments and select appropriate methods to combat specific diseases.

6. Conclusions

Summary

1. Based on observations carried out in orchards in the historical garden in Nieborów, different pests and diseases were found whose presence to a significant extent affects both the health and aesthetic value of trees.

2. Among the diseases, the greatest threat is posed by a high incidence of apple powdery mildew, apple scab, as well as bark and wood diseases.

3. A large population of woolly apple aphids on the cv. *'Close'* was found in the *Small French Garden*. Numerous damages were observed in espalier plantings of pear trees caused by the feeding of pear leaf blister mite and on the apple tree - injury caused by spider mites.

4. In *the Orchard in the Pheasantry* (young plantings), significant damage caused by game animals was visible in the form of browsed shoots. Moreover, damage was found on many tree flowers caused by the feeding of white- spotted rose beetles.

5. In order to reduce losses caused by the occurrence of pests, various methods of tree protection have been used:

- agrotechnical (formative cutting, thinning of tree crowns, removal of fallen fruit mummies, raking up fallen leaves),

- biological (introduction of a predatory mite *Typhlodormus pyri* to control of spider mites)

- and chemicals (spraying trees with fungicides and zoocides as recommended).

6. It is necessary to continue regular monitoring of the occurrence of diseases and pests, which is the basis for making decisions about the need to carry out protective treatments and thus maintain fruit trees in good phytosanitary condition.

It is worth spending time and energy on caring for fruit trees, especially those of old cultivars, to maintain biodiversity in a historical garden and preserve them for future generations.

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(Translation: Jacek Gajewski)

References

Books

Apple Scab: Biology, Epidemiology and Management. By William E. MacHardy. St. Paul, Minnesota: The American Phytopathological Society (1996), pp. 570;

Atlas chorób drzew owocowych. Sobiczewski P., Broniarek-Niemiec A., Bryk H., Cieślińska M., Masny S., Meszka B., Hortpress, Warsaw 2016;

Atlas szkodników drzew owocowych. Łabanowska B.H., Płuciennik Z., Tartanus M., Warabieda W., Piotrowski W., Hołdaj M., Gorzka D. Hortpress sp. z o.o., Warsaw 2017. ISBN 978-83-65782-17-5. (only in polish);

Pests of Fruit Crops. A Colour Handbook (second edition) by Alford D.V. 461 pp. CRP Press Taylor & Francis Group (2014). ISBN 978-1-4822-5420-4;

Płuciennik Z., Olszak R.W. 2005. *Zwójkówki w sadach*. 56 pp. Plantpress, Kraków. ISBN: 83-85982-87-6 (only in polish);

Ciołek Gerard, *Ogrody Polskie*, Warsaw 1954;

Jankowski Edmund, *Wspomnienia ogrodnika*, Warsaw 1972;

Majdecki Longin, *Historia Ogrodów* t. I i II, Warsaw 1981 and edition supplemented by Anna Majdecka-Strzeżek Warsaw 2008;

Piwkowski Włodzimierz, *Nieborów. Mazowiecka rezydencja Radziwiłłów. Nieborow. The Residence of the Radziwiłł Family in Mazovia*, Warsaw 2005;

Papers

Sekrecka M., Niemczyk E. 2006. Introducing *Typhlodromus pyri* (Phytoseiidae) into apple orchards in Poland. Journal of Fruit and Ornamental Plant Research Vol. 14 (Suppl. 3): pp. 203-207.

Strickland D. A., Hodge K. T. and Cox K. D., *An Examination of Apple Powdery Mildew and the Biology of Podosphaera leucotricha from Past to Present, 2021, Vol. 22, No. 4, pp. 421-432.*

Online publications

Chatzidimopoulos, M.; Lioliopoulou, F.; Sotiropoulos, T.; Vellios, E. Efficient Control of Apple Scab with Targeted Spray Applications. *Agronomy* 2020, *10*, 217. https://doi.org/10.3390/agronomy10020217

Weber, R.W.S., Børve, J. *Infection biology as the basis of integrated control of apple canker (Neonectria ditissima) in Northern Europe. CABI Agric Biosci* 2, 5 (2021). https://doi.org/10.1186/s43170-021-00024-z

Archives

Collections of the Museum in Nieborów and Arkadia;

List of albums, sketchbooks and albums of the Radziwiłł family from Nieborów;

Album no. 52, (inventory no. MNA Biblioteka 4046) Album of Michał Piotr Radziwiłł *Par Łowicz à Nieborów – Le Ménage Bun*, 1879-1880.

The Central Archives of Historical Records in Warsaw- archival materials,

The Central Archives of Historical Records in Warsaw (AGAD), Radziwiłł Archives from Nieborów (Property and economic newer records), file no. 30*, List of plants and fruit trees left by Michałowski,* 1894, pp. 329 -330.

The Central Archives of Historical Records in Warsaw, Radziwiłł Archives from Nieborów (Property and economic newer records), file no. 30*, Józef Borecki's Rapport*, 1867, str. 77-79.

The Central Archives of Historical Records in Warsaw, Archive of the Radziwiłł family from Nieborów, Correspondence, reference number 52.

Maria Soborska, diploma thesis 1950. *Description of trees in the parks of Nieborów and Arkadia /Opis roślinności drzewiastej w parkach Nieborowa i Arkadii/* Warsaw 1950. Work started in 1939.

Nieborów - *The plan from 1947 - before reconstruction*, scale 1:1000, compiled Dr. G. Ciołek, Eng. St. Miłoszewski based on the inventory height – size, engineer J. Kasperski, The National Institute of Cultural Heritage (NID) collections.

Nieborów - *Reconstruction project*, 1948-1953, scale 1:1000, ed. Dr. Gerard Ciołek, Eng. St. Miłoszewski, The National Institute of Cultural Heritage (NID) collections, Teki Ciołka pl. 705;

Nieborów near Łowicz, *Tree inventory,* 1959, scale 1:1000, ed. R. Andrzejewski, archive of the Museum in Nieborów and Arkadia.

Archival photographs from the collections of the National Museum in Warsaw, branch of the Museum in Nieborów and Arkadia.

"Measures for Combating Tree Pests and Diseases in Zugdidi Botanical Garden"

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Tamar Zarandia graduated from the public school of Jikhashkari village and became a student of Zugdidi Independent University. From 1996 to 2016, she has been working as a biology teacher at Jikhashkari public school N2. At the same time, she was studying for a post-graduate course and later became a doctoral student of Agrarian University. Since 2015, she has been working as a manager of agricultural programs, as an agroconsultant, in Agrohouse.
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Abstract:

The paper discusses the pest and diseases spread to some introduced trees and plants in the Zugdidi Botanical Garden in 2021-2023, depending on the climate, and measures to combat them. Biology of pest species, physical-mechanical and chemical methods.
In order to extend the life of a diseased plant, feeding the plant with complex preparations and immunity-enhancing agents was studied.
We studied the main moments of the biology and ecology of pest species and modern methods of combating them, where a system of differentiated measures to combat them was developed.
Pests common in the Zugdidi Botanical Garden include: aphids (Aphidodea), scale insects (Diaspididae), false scale insects (Coccidae), oak weevil (Cerambyx Cerdo), psyllids (Psyllidae), scale insects (Geometridae), boxwood weevil (Gydalima Perspectalis), moths (Tineidale), mollusks (Mollusca), Asian falcon (Halyomorpha halus) and others.
Among the diseases, the following are worth noting: powdery mildew (Erysiphaceae), gray rot (Botrytis), wood rot caused by Abeda fungi (Polyporaceae), pine diplodia (Diplodia pinea), etc.
Plants have a defense system with which they repel thousands of pests and disease-causing microbes until they can fight the invading pathogen with their own immunity.

Keywords:

Keywords: introduction, analysis, animals, fungus, medicine

Introduction

The climate and nature of Samegrelo contributed to Queen Ekaterine's efforts, and over ten years, such a magnificent garden was established that it had no parallel in Transcaucasia before or after. Large-leaved magnolias, bignonias, paulownias, mimosas, cypresses, and oleanders grew to immense heights, forming entire avenues of trees. The garden also had exceptional greenhouses and ground shelters containing more than 500 species of fruit trees, including oranges, lemons, pomelos, bananas, and other rare varieties. However, the most remarkable section was the flower division: thousands of different types of roses, some reaching up to two meters in height, created an impressive collection. The camellia collection was also diverse. In short, Zugdidi Botanical Garden was outstanding in every way and had no equal in Transcaucasia. This is how a Russian official, who spent thirteen years (1854–1867) in Georgia, described it.

Unfortunately, there is no documented information on which plant pests and diseases were managed in the greenhouses, ground shelters, or nurseries of that time. However, Ermile Nakashidze's 1929 book, which discusses viticulture and winemaking in Guria-Samegrelo, Adjara, and Abkhazia in the second half of the 19th century, mentions a fungal disease—powdery mildew. This suggests that these terms were not unfamiliar in Samegrelo and that Georgian phytopathological research kept pace with European studies.

Current State of Plant Protection in Zugdidi Botanical Garden

Due to the climate in Zugdidi Botanical Garden, the fight against pests and diseases is a daily necessity. The health of ornamental plants in a recreational zone is of great importance. We strive to study the biology and ecology of harmful plant organisms and develop a modern, differentiated system of control measures against them.

The pests found in Zugdidi Botanical Garden include aphids (Aphidoidea), scale insects (Diaspididae), false scales (Coccidae), the great oak capricorn beetle (Cerambyx cerdo), psyllids (Psyllidae), geometer moths (Geometridae), the box tree moth (Cydalima perspectalis), tineid moths (Tineidae), mollusks (Mollusca), the brown marmorated stink bug (Halyomorpha halys), and others.

Diseases include powdery mildew (Erysiphaceae), gray mold (Botrytis), wood decay fungi (Polyporaceae), and pine diplodia (Diplodia pinea), among others.

Plants have their own defense systems, which allow them to resist thousands of pests and disease-causing microbes. However, there comes a moment when the balance is disrupted, and the effects of infestations become visible—damage to stems, leaves, roots, and flowers, which diminishes their decorative value. At this point, expert intervention is required. Initially, we apply physical methods, ensuring proper plant nutrition based on their needs. We check for deficiencies in micro or macro elements. If we identify a pest or disease-causing agent, we determine the plants' susceptibility to plant protection products and carry out treatments, considering temperature and humidity conditions.

In our garden, priority is given to physical-mechanical pest control, which involves removing and destroying infected plant parts. Therefore, maintenance pruning is conducted regularly and timely, serving as an excellent way to rejuvenate century-old trees!

We pay great attention to winter treatment, aiming to reduce overwintering pest forms. This involves treating tree trunks with mineral oil, especially those with damaged wood, as damaged wood serves as a pest shelter. This year, monitoring identified such damage in chestnut-leaved oak and magnolia. Even after treatment, deep cracks in these trees were further opened and cleaned.

A significant portion of the garden's plants are introduced species, requiring considerable effort to adapt to local conditions. Their immunity is relatively low, making them more susceptible to various pathogens and pests.

As trees age, their bark becomes more irregular, developing deep cracks that trap water, making the bark moist and encouraging pathogenic microbial growth. These cracks also provide shelter for harmful insects. Our botanical garden has multiple examples of this issue. By slightly opening damaged bark, we have identified pests responsible for its mechanical damage, leading to crack formation. If maintenance work is delayed, these cracks can eventually lead to cavities. To prevent this, bark care is essential. When necessary, chemical treatments are applied to prevent cavity formation.

For nearly 30 years, no maintenance work was conducted in the botanical garden. Before rehabilitation efforts began, 128 trees were documented as having cavities that needed filling. Additional trees were added to this count after rehabilitation.

Lightning also poses a threat to trees. This year, lightning struck an Atlas cedar, damaging its trunk along its entire length. During treatment, a cavity was discovered at a height of 7 meters, which was cleaned and treated with a mixture of copper-based preparations and insecticide. After drying, slaked lime was applied, and about a week later, the cavity was filled with concrete. The damaged area was then coated with oil-based paint. Treating damaged wood helps to extend the life of the cedar.

Our rehabilitated specimens include two magnolia trees, a deer antler tree, and an Atlas cedar. Currently, several other trees require similar treatment and cavity filling.

New damage has been discovered on cedar and hornbeam trees, where dark-colored liquid seepage was noted.

Cracks and wounds on trees serve as an entryway for wood-decay fungi. These fungi are considered decomposers of tree trunks and branches, affecting both agricultural and forest trees. They infect trees through mechanical injuries, spreading nearly everywhere and causing white, brown, or mottled rot in wood. Wood-decay fungi vary in size, color, texture, and structure. Once their fruiting bodies appear on the trunk, it indicates that the fungal spores entered the wood years ago and developed mycelium before producing fruiting structures. Chemical treatment is ineffective against them, and the disease progresses chronically, ultimately killing the tree.

To prevent healthy trees from being infected, infected specimens must be removed. If removal is not possible, fruiting bodies should be removed and burned before the spores mature and spread. To prolong the life of an infected tree, it should be nourished with complex fertilizers and immunity-boosting substances. Each spring, we remove wood-decay fungi and treat trees with lime mixed with copper-based preparations and insecticide.

Conclusion

In Zugdidi Botanical Garden, pest and disease monitoring is conducted regularly. When harmful organisms are identified, appropriate control measures are taken in a timely manner, ensuring the use of environmentally safe plant protection methods.

"Diseases of thuja and their control in the greening of the city"

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- The 19th-century mycological herbarium and a live collection of micromycetes strains and prospects for maintaining and renovating FR/571/7-120/14;
- Development of innovative methods in organic viticulture in Georgia #216934;
- Promotion of production of bio nuts with environmentally safe, innovative methods FR17_581;
- Dictionary of pests and diseases of agricultural and forestry crops, SP-21-609.

Mzia Beruashvili has published 97 scientific and scientific-popular works related to plant pests and diseases, their biological protection and organic agriculture. She is the author of the textbooks "Plant Protection" and "Biological Farming" published within the framework of the joint project of the Center for Educational Quality Enhancement and the United Nations Development Program (UNDP). She has participated in many international conferences and forums.

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In 2013, by her leadership the international conference "Modern Challenges of Sustainable Forest Management in the Caucasus" was organized. She also works as a lecturer at the Forestry Faculty of the Agricultural University of Georgia. She is the author of more than 90 scientific articles, brochures, monographs, books, dictionaries. She is a participant of several international conferences and congresses.

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Abstract:

Greenery of the cities is the important priority in the planning of the cities, that's depending as on the ecological as decorative goals. Thuja is the most widespread plant in the greenery. It is usually planted not only for the arrangement of parks and gardens but for the greenery of private houses' yards. However various patogens stop normal functioning of plant very much.
In the presented research work are studied the deseases of thuja and make ecologically safe measures against them in Tbilisi and suroundings. It's remarkable that thuja diseases have been studied for the first time in Georgia.
After studies were determined thuja diseases, were registered their spreading, development intensity, damage and durability different sorts of thuja with the diseases.
In this research it is discussed effective measures against thuja diseases in the cities. It is selected ecologically safe methods and it is processed issues of integration of measures.

Keywords:

Thuja; Fungal diseases; Greening of the city; Diseases control

1. Introduction

The realm of botanical life holds immeasurable significance and multifaceted functionality within the human sphere. Among its myriad roles, the ornamental function stands out, catering to the aesthetic inclinations of individuals and serving as a key element in the spatial organization of residential, industrial, and public domains.

Ornamental flora encompasses a diverse array of wild and cultivated plant species spanning different botanical families. These plants play an active role in urban beautification through the deployment of both perennial and annual varieties. They not only contribute to the visual appeal of cityscapes but also hold sanitary-hygienic and protective value. Deciduous and coniferous ornamental trees and shrubs are prominently featured in garden landscapes, parks, squares, as well as street and windbreak installations, creating an ambiance of profound aesthetic allure (Dirr, 2011).

Urban greening stands as a pivotal priority in city planning and the orchestration of urban life, driven by ecological imperatives and aesthetic considerations. Leading global metropolises accord significant importance to urban greening, recognizing its pivotal role in fostering a harmonious relationship between humanity and the natural world, thereby safeguarding human well-being. This imperative resonates strongly in the Georgian context.

Among the plethora of plants employed in urban landscaping, Thuja emerges as a stalwart presence, surpassing many counterparts in popularity and prevalence. With its striking appearance and malleable growth patterns, Thuja is increasingly favored. Its adaptability to diverse environmental conditions, coupled with its ornamental allure, positions Thuja as a prime candidate for urban greening initiatives. Its widespread utilization in producing various greenery types for garden and square embellishments, as well as residential yard greening, underscores its significance.

The purpose, relevance and novelty of the research: The research endeavors to explore the value, relevance, and novelty surrounding Thuja in urban landscaping. While Thuja holds substantial value in this domain, the presence of detrimental organisms poses a significant challenge, often leading to plant wilting. The study of Thuja diseases and the development of ecologically sound mitigation strategies hold paramount importance on a global scale and particularly in the Georgian context. Notably, this comprehensive study on Thuja diseases represents a pioneering effort in Georgia, shedding light on previously uncharted territory (excluding the report by I. Matsiakh (2014) on Phytophthora citricola in relation to Thuja in protected areas of Georgia). No instances of cultivated Thuja diseases have been reported in Georgia, including the vicinity of Tbilisi.

Study site and object: The study was conducted through a combination of fieldwork and laboratory analyses. Field surveys were carried out in various locations in Tbilisi and its environs, while laboratory investigations were conducted at the Phytopathology Laboratory of the Agrarian University of Georgia. The study focused on several Thuja varieties commonly found in the Tbilisi region (Thuja (Biota) orientalis, Thuja occidentalis "Brabant", Thuja occidentalis "Smaragd") and their associated diseases.

Research methods: Research methods included route surveys to determine disease spread and development intensity, the intensity of disease spread and development was determined by S. Shamrai, V. According to Glushchenko (Шамрай, Glushchenko, 2006). graded using a 5-point severity scale.

Disease monitoring was conducted biweekly in spring and summer and every 3-4 weeks in autumn-winter, with symptoms observed on shoots and cones. Diseased samples were analyzed in the laboratory for pathogen isolation, microscopic examination, and disease identification. Plant protection products were selected in accordance with the Georgian state catalog of pesticides. Statistical analysis and data summarization were integral components of the research process.

2. Registration and characterization of Thuja diseases in Tbilisi and its environs

2.1. Pathological manifestations and identification of Thuja diseases

Following an extensive research endeavor spanning from 2019 to 2023, a spectrum of symptoms indicative of Thuja diseases were unveiled. Noteworthy manifestations encompassed light brown and dark blackish-brown lesions on shoots, light brown and yellowish-brown discolorations on pine needles, and darkening of the root neck, browning, and subsequent rotting of the roots.

FIGURE 1-4
Diseased twigs and needle-like leaves on thuja
Author: M. Beruashvili, 2019

FIGURE 5-6
Diseased thuja leaves from the Tbilisi area (Baratashvili Street, Trinity Cathedral yard, Digomi)
Author: M. Beruashvili, 2022

Laboratory investigations yielded crucial insights into the diseases afflicting Thuja, alongside the identification of their respective causative agents:

Alternaria - characterized by brownish lesions on pines and branches, attributed to: *Alternaria sp.*

Sordaria - targeting pines and branches, marked by the emergence of dark blackish-brown lesions on the infected tissues. Caused by: *Sordaria sp.*

Trichotecium - associated with light brown lesions on pine needles, induced by: *Trichotecium sp.*

Fusarium - responsible for the browning and decay of roots, attributed to: *Fusarium sp.*

TABLE 1
Pathogens isolated and identified from different organs of Thuja

Name of the identified pathogen	Diseased part of the plant
Alternaria sp.	leaves and twigs
Sordaria sp.	leaves and twigs
Trichotecium sp.	leaves and twigs
Fusarium sp.	roots

Conclusively, the research findings underscored that the prevalence of pathogens affecting Thuja in Tbilisi and its nearby regions is relatively limited in number and lacks significant diversity. Nonetheless, these pathogens exhibit notable deleterious effects on the health and vitality of the Thuja specimens.

2.2 Distribution and progression dynamics of Thuja diseases

Through comprehensive surveys, it was discerned that in Tbilisi and its neighboring regions, the diseases affecting Thuja exhibit varying degrees of distribution and developmental intensity. Notably, the prevalence of Alternaria did not surpass 8-10%, Sordaria was limited to 1-2%, Trichothecium ranged from 2-3%, and root rot was observed at a mere 1% incidence.

TABLE 2
Spread of thuja diseases in Tbilisi and its surroundings in 2019-2023

Disease	Pathogenw	Spread of diseases (%)		
		2019	2022	2023
Alternariosis	*Alternaria sp.*	8	10	8
Sordaria diseases	*Sordaria sp.*	2	1	1
Trichothecium disease	*Trichotecium sp.*	3	2	3
Root rot	*Fusarium sp.*	1	1	0

Detailed data concerning the development intensity of Thuja diseases are outlined in Table N 3.

TABLE 3
The intensity of thuja disease development in 2019-2023 in Tbilisi and its surroundings

Disease	Pathogen	Intensity of thuja disease development (%)		
		2019	2022	2023
Alternariosis	*Alternaria sp.*	12	10	9
Sordaria diseases	*Sordaria sp.*	14	80	90
Trichothecium disease	*Trichotecium sp.*	4	5	3
Root rot	*Fusarium sp.*	100	100	-

Analysis of the provided table reveals that disease progression rates for Alternaria range from 9-12%, Sordaria from 8-14%, Trichothecium from 3-5%, and root rot, as commonly acknowledged, showcases a 100% development rate, leading to complete plant demise.

3. Impact of diseases on the growth and development of Thuja and associated damage in urban greening initiatives

The proliferation of diseases within the realm of Thuja poses a substantial threat and inflicts notable harm upon the urban greenery. Beyond the aesthetic ramifications of altered cone coloration and undesirable visual appeal, untreated afflictions can culminate in the desiccation of Thuja specimens.

Within the scope of our disease identification efforts, complete wilting was observed in instances of root rot and scorch induced by Sordaria. Afflicted Thuja specimens exhibited a spectrum of symptoms, including diminished growth vigor, altered pine cone coloration, heightened cone shedding, stem and branch deformities, pine cone discoloration, and pigmentary alterations.

Discussion on the resistance of Thuja varieties centered on disease frequency, developmental intensity, and pathological alterations within the plant. Among the selected Thuja varieties under scrutiny, Thuja “Biota” and Thuja “Brabant” demonstrated heightened resilience against diseases, while Thuja “Smaragda” exhibited comparatively weaker resistance.

It is pertinent to highlight that in regions with minimal emissions, such as the outskirts of Tbilisi, disease prevalence and development remained relatively subdued across all varieties. Conversely, within the urban confines of Tbilisi characterized by elevated air pollution levels, disease dissemination percentages were notably amplified.

4. Utilization of ecologically safe methods and strategies to combat harmful organisms affecting Thuja

To safeguard and mitigate Thuja diseases, it is recommended to implement the following preventive measures:

FIGURE 7
Monitoring of thuja diseases in Tbilisi and its surroundings
Author: M. Beruashvili, 2023

- Agro-technical practices: Ensuring adequate water supply and proper irrigation, nutrient supplementation, mulching, and appropriate pruning.
- Mechanical method: Removal of diseased branches and pine cones through physical intervention.
- Sanitary-hygienic method: Disposal and disinfection of pruned branches and pine cones.
- Selective method: Cultivation of resistant Thuja varieties.

In combatting root rot instigated by Fusarium, it is advised to employ biopreparations containing the antagonist Trichoderma (such as "Biocatena," "Trichodermin," "Serenade-Aso," among others) or chemical agents containing propamocarb hydrochloride, aluminum fosetyl, and phosphoric preparations. Acid mono and dipotassium salts (e.g., Geophyte) can be utilized against Fusarium and root rot in Thuja. For other fungal diseases, biopreparations based on antagonistic fungi or bacteria, as well as algae-derived solutions like "Fitocatena," "Agrocatena," "Blox," and "Dynamic," are effective. Chemical treatments involving copper-containing preparations (e.g., copper oxychloride or copper sulfate) can also be employed.

In nurseries, against harmful organisms of thuja, it is possible to use all the above methods and means of plant protection, and under the conditions of the city, according to the technical regulations (Ordinance of the Government of Georgia. Technical regulation - "Rules for storage, transportation, sale and use of pesticides and agrochemicals" Resolution No. 451, 31.12.2013), chemical means are not used (except preparations containing copper) or is strictly limited.

The utilization protocols are subject to strict regulation. For instance, within forest-parks and botanical gardens, a single application of chemical agents and two applications of biological agents are permissible throughout the entire vegetation cycle. Similarly, within urban parks, squares, boulevards, and avenues, the same protocol applies with a stipulated minimum dosage threshold of substances, while considering the establishment of a sanitary-protective buffer zone spanning a minimum of 50 meters from residential structures. The usage of any pesticides is explicitly forbidden within the first and second perimeters of the sanitary protection zone encompassing children's facilities, sports venues, medical institutions, educational establishments, public dining establishments, rivers, water conservation regions, lakes, reservoirs, water sources, in close proximity to residential dwellings, and air intake mechanisms. In cases necessitating treatment within yards and adjacent plots, selective focal application of pesticides is permissible with the minimum recommended application rate.

Treatment of urban greenery is conducted utilizing hose apparatus during the early morning or evening hours when temperatures are at their lowest, insolation is minimal, and air movement is restricted (permitting treatment even during daylight hours under overcast and cool weather conditions). Preservation of greenery within parks, squares, and other municipal green spaces is safeguarded by allowing pesticide spraying solely at night, between 10 pm and 7 am, in calm weather conditions.

Emphasis is placed on the specialized treatment of plants. Precautionary measures should be taken to alert the populace prior to treatment. Warning signage must be prominently displayed along the perimeters of treated areas for a designated duration, during which access by individuals and domestic animals is prohibited.

Aerial operations are solely conducted when there is a necessity to treat expansive areas within a limited timeframe. In the execution of operations, preference is given to aerial machinery, including lightweight devices such as agrodrones, renowned for their low altitude flight (not surpassing 2-5 meters above vegetation) and efficient application rate of working solutions ranging from 1-10 liters per hectare, ensuring precise pesticide distribution and averting contamination of neighboring regions.

For the management of thuja plant ailments in urban settings, a holistic approach integrating monitoring-based control strategies is advised. The integrated system of thuja protection should encompass both preventive and therapeutic measures for optimal efficacy.

Conclusion

- Noteworthy for the first time in Georgia's climate, fungal pathogens were observed on Thuja, including Alternaria sp., Sordaria sp., Trichotecium sp., and Fusarium sp. The research indicates that while the prevalence of these pathogens in Tbilisi and its environs is relatively low, they exhibit considerable deleterious effects, although lacking in diversity.
- Thuja varieties "Biota" and "Brabanti" demonstrated superior resistance to diseases compared to other cultivars, with "Smaragda" exhibiting the lowest resistance.
- The management of Thuja diseases in urban settings adheres to technical regulations, with strict limitations or absence of chemical interventions.
- Recommendations for controlling Thuja diseases in urban environments suggest an integrated approach rather than specific measures.

References

Dirr, M. A. Dirr's Encyclopedia of Trees & Shrubs. 1st Ed. Timber Press, Inc., Portland, 2011;

Shamray S.H., Glushchenko V.I. Fundamentals of field research in phytopathology and phytoimmunology. Kharkov, 2006. – 64 p.

Matsiakh, I. Assessment of Forest Pests and Diseases in Protected Areas of Georgia, Tbilisi, 2014;

Ordinance of the Government of Georgia. Technical regulation - "Rules for storage, transportation, sale and use of pesticides and agrochemicals" Resolution No. 451, 31.12.2013

"Challenges of plant protection in the baroque garden of Eszterhaza"

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Ms Ágnes Balogh (MSc in landscape architecture, Hungarian University of Agriculture and Life Sciences, Budapest, 1997; Executive Master of Business Administration, Corvinus University of Budapest, 2023) is a landscape architect with two and a half decades of experience. She has gained complex knowledge in landscape design, construction and maintenance of private gardens and public spaces. As a practicing expert she manages her own micro company since 2003 undertaking landscape design and green area construction. She is based near Lake Balaton, one of the most popular tourist destinations of Hungary, she designed and conducted the plantings of annual flowerbeds of the Tagore Promenade at Balatonfüred (2005-2009) and received a certificate of appreciation from the Municipality for her work in public space renewal and urban development. Between 2019 and 2023 she managed the maintenance of prominent historical gardens (Dég, Bajna, Tata, Nádasdladány) as part of the National Castle Program of the Hungarian Government. As chief landscape architect of, Eszterházy Castle at Fertőd since 2023, Ágnes is devoted to the sustainable and efficient management of the historic castle garden. She is a member of Chamber of Hungarian Architects.

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Abstract:

Eszterháza, also known as the Hungarian Versailles, enjoyed its glory years between 1770 and 1790 and was a cultural centre of contemporary Hungary and Europe. The present appearance of the park is due to late 19th century renewal by Countess Margit Cziráky and the 20th century developments based on scientific research. The park's originally structured avenues are lined by chestnut (Aesculus hippocastanum) and lime (Tilia cordata) trees. Box (Buxus sempervirens)hedges are also present as common plants in the baroque square structure. The restoration of the former rose garden was carried out in 2015.This rose garden has a collection of Hungarian rose varieties as well as foreign ones, with a total of around 8,000 rose plants. The presentation focuses on the challenges and practical solutions to the maintenance of these plants of historical value.

Keywords:

Eszterhaza, Hungary plant protection, rose protection, horse chestnut leaf miner, box tree, Cydalima perspectalis, Cameraria ohridella, Margit Cziráky rose-garden

1. Introduction

Fertőd Eszterháza is a baroque rococo palace and is located in the northwestern corner of Hungary. The ensemble, also known as the Hungarian Versailles, had its heydays between 1770 and 1790, during the reign of Prince Miklós Esterházy „The Magnificent". It was a European aristocratic entertainment centre of its time where Joseph Haydn was employed as a composer. When the Baroque park reached its final form it measured around 200 ha and was divided into seven distinct functional units. These 7 units were the chamber gardens, the ornamental or flower garden with the orange house, the leisure garden, the game reserve and the so-called 'boar garden' as well as other heterogeneous green areas.

The picture shows its appearance today which is the result of the second golden age or the neo-baroque period from the turn of the 19th and 20th centuries. Today we maintain 35 ha from the original 200 ha with 9 physical workers and 2 graduate professionals.

2. Plant protection of box trees at Eszterhaza

Probably every professional working in historic gardens faces the significant challenge considering this plant. We have small hedges in the courtyard framing flowerbeds, and a large curved hedge of Buxus can be found in the ornamental garden. Next to this there is an alley with Taxus and Buxus plants. These plantings are approximately 120 years old.

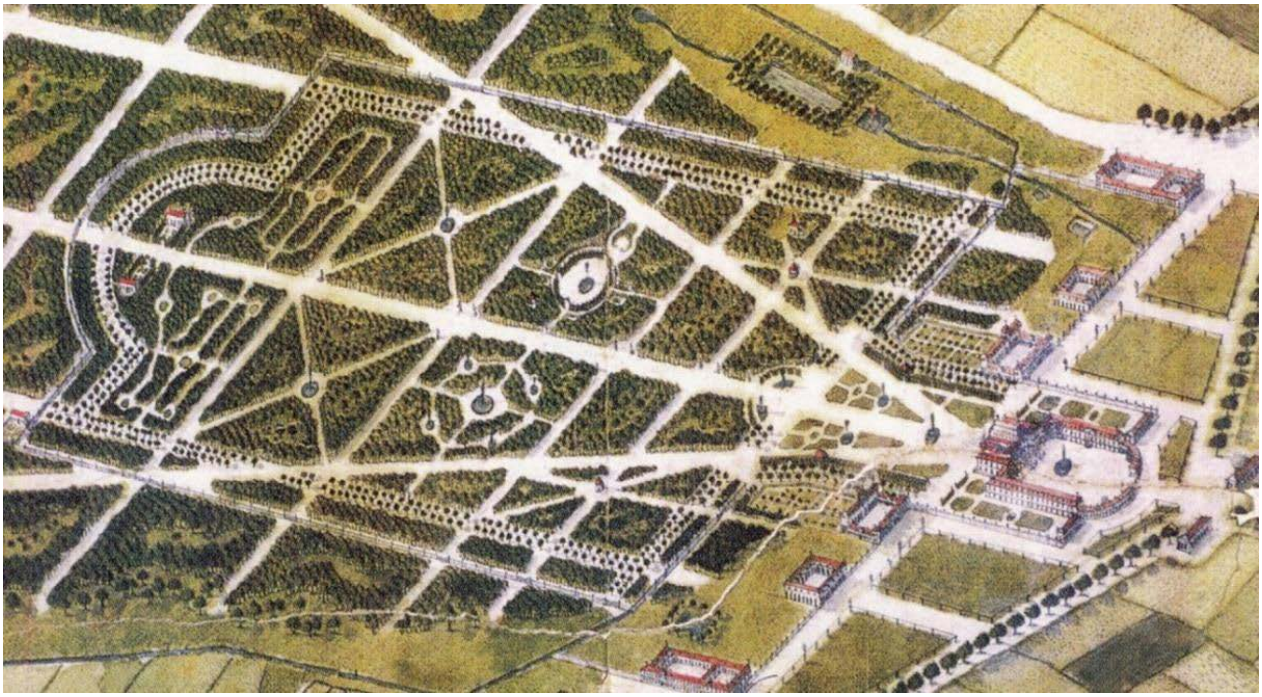

FIGURE 1
Unknown master after the draft of Nicolaus Jacoby: Perspective view of Eszterháza, 1760s (detail)
Photo by Károly Kincses, 2016

FIGURE 2
Curved box hedge at Eszterháza
Photo by the author, 2024

The Cydalima perspectalis or box tree moth appeared in Hungary in 2011 and first here in our territory. When we observed this, we called for help from the University of Horticulture of Budapest, where experts helped us to identify this previously unknown pest. In Hungary we have 3-5 generations of this month per year.

We spray it by observation of the larvae, usually 4-5 times a year using contact and absorbent insecticides as well together with adhesion enhancer. We always use complex fertilizer in the mixture too. As active substances, we give preference to those with low environmental impact. Here I would like to highlight the Bacillus thuringiensis which is a biological pesticide. This one is regarded as environmentally friendly, with little or no effect on wildlife, pollinators and also used inorganic farming. It is effective against the young caterpillar form (L one-L two forms). Since the larvae pass through five to seven forms we need other active substances as well in order to eliminate them. What we commonly use for the other forms is the substance acetamiprid. Our experience is that different plants react differently to the presence of the insect. Although the amount of spray applied is the same, the degree of damage is different on each bush. Application of the insecticides is avoided during flowering of the box tree in order to protect bees.

Concerning the long term perspective in this common problem we first try to strengthen the condition of our plants. We use fertilizer during spraying but our intention is to shift towards organic materials more and more using microbiological soil improvement. It appears that in Europe birds have rapidly adapted to the presence of the Box Tree Moth. There are records that Great Tit (Parus major) feeds its chicks with larvae and pupae of this pest. It is estimated that well over 50% of the weight of food brought to the nest consisted of these caterpillars. It seems that small caterpillars were not caught. So if we consider the Bacillus thuringiensis against L1 and L2, enhancing birds activity and presence could be a solution against the larger larvae forms replacing or reducing the pesticides used.

Last but not least, replacement of these plants should be taken into consideration as well in the long run. In my practice as a landscape architect, I found that Lonicera pileata and L. nitida can serve this purpose.

FIGURE 3
Cheif gardener Eva Kotai with Mark Gergely's climbing variety 'Rosalia' and 'Mami'
Photo by the author, 2024

3. Plant protection in the Margit Cziráky rose garden

Our rose garden was created in the park's second or neo-baroque period in 1908 and it is dedicated to Countess Margit Cziráky's favourite plant. The size of it is 1 ha and was reconstructed in 2015 based on historical documents. Today we use a complex watering system and employ 4 physical workers for the maintenance of the rose garden. Chief gardener Éva Kótai is the professional expert and head of the maintenance of the rose garden since its recreation.

We cultivate approximately 8000 rose plants from about 300 varieties. In 2015 only Hungarian varieties were planted here, exclusively the varieties of Gergely Márk, a Hungarian rose gardener, who made altogether 400 new varieties in his life. His excellent varieties were given the name of Hungarian historic persons or famous actors. The climbing rose called 'Mami' was named after his wife.

Over the years it became evident that not all originally planted Hungarian rose varieties are well suited to the conditions here, due to the windy climate and poor soil conditions. So we have replaced some of them with more resistant, ADR certified, Kordes varieties. The vulnerability of certain Gergely Márk varieties can be observed still.

Our plant protection process in the rose garden includes using fungicide and insecticides with adherence enhancer and complex nutrient in each spraying. We spray based on observation 10-12 times a year from March till November. In planning the next spraying we take into consideration the detection of the pest monitoring service to determine the swarming peak and the optimal timing of the next spraying. Special attention is paid to determining the exact hour of spraying during the day as well, taking into account the swarming hours of the bees. We carry out this early in the morning or before sunset.

In the future we would like to reduce the amount of chemicals used. To achieve this goal, we are working to improve the plants' defences and general health. As a primary way of achieving this, we aim to improve soil life and increase its microbial activity.

FIGURE 4
The Margit Cziráky rose garden
Photo by the author, 2024

We find it important to keep track of new research in the field of biological plant protection and on resistant new rose varieties. We continue to replace sensitive varieties with more resistant ones.

4. Cameraria ohridella in the historic ales of the castle

In the ornamental garden next to box trees we have plant protection problems with our horse chestnut trees that are affected by the insect, horse chestnut leaf miner (Cameraria ohridella). The goosefoot promenades of the park are formed mostly by the horse chestnut tree too. It is also the tree species of the triple tree-lined alleys. These plantations are 100-120 years old.

Being the plants of a pruned tree-lined promenade the trees were heavily truncated during their lifetime. This caused a weakened health condition. Furthermore, some of our walkways are not managed by us, but by the forestry. As the forestry does not carry out any plant protection activity, the risk of re-infection of our trees is significant.The first generation of the moth emerged in May this year. In recent years we have not sprayed our chestnut trees at all because of the reinfection danger from the territory of the forestry. Fallen leaves infested with pupae are mulched in autumn to reduce the number of overwintering insects.

In the long term we aim to inject our chestnut trees with pesticides as this method was used successfully in other Hungarian historic gardens and it protects the tree for 2-3 years. Replacing Aesculus hippocastanum with more resistant chestnut tree species is also an opportunity. Although this has some controversies. Namely that Aesculus carnea ‘Briotii‘ is more resistant to Cameraria but on the other hand more sensitive to chestnut mildew.

5. Conclusions

In conclusion we can say that we are faced with many challenges and the effects of climate change are inevitable. Our first aim is a shift towards environmentally friendly technologies, more biodiversity, more wildlife habitat protection that helps the self-regulatory mechanisms. We need continuous learning, and keeping up with new discoveries and exchange of experiences with other historic gardens.

References

Mihály Mőcsényi: Eszterháza through the ages, Eszterháza Kulturális, Kutató- és Fesztiválközpont, Fertőd, 2017

Márk Gergely: Magyar rózsák könyve, ed. Mezőgazda Kiadó. Budapest 2004

László Maráczi: Díszfák, díszcserjék védelme, Nyugat-Dunántúli Díszfaiskolások egyesülete, Szombathely, 2013

Box Tree Moth (Cydalima perspectalis) http://www.cydalima-perspectalis.de

Bacillus thuringiensis Toxins: An Overview of Their Biocidal Activity, https://pmc.ncbi.nlm.nih.gov/articles/PMC4280536/

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