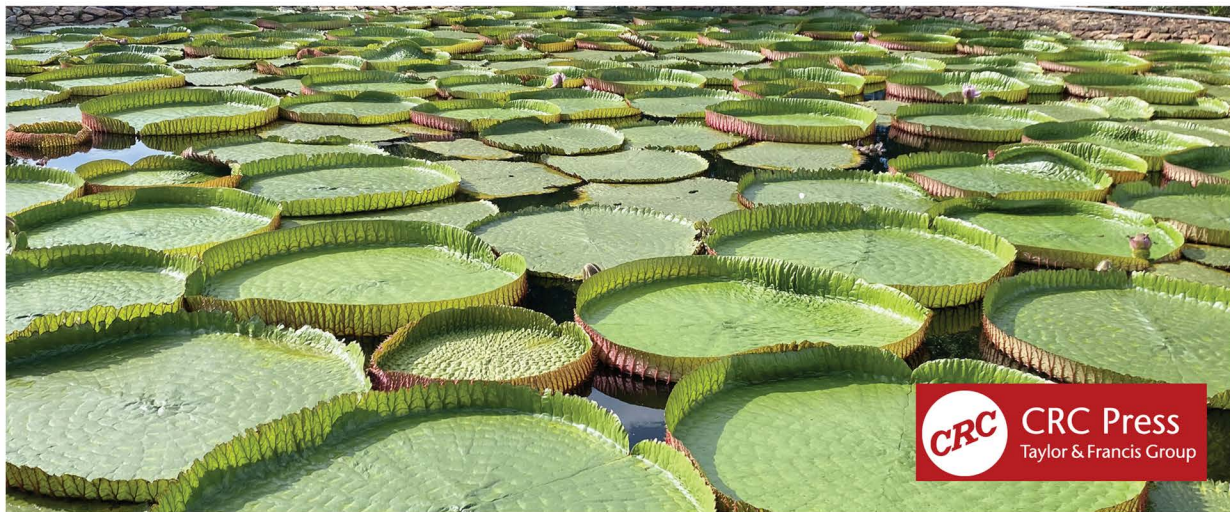
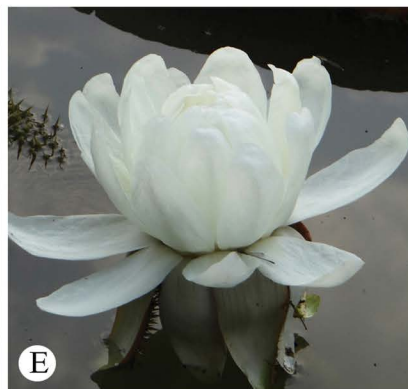
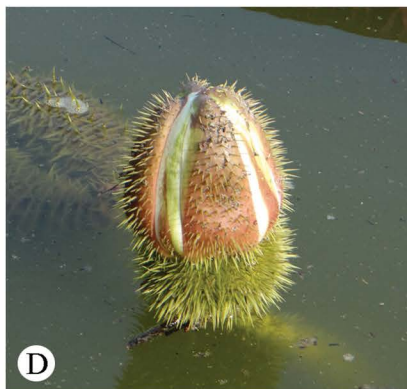
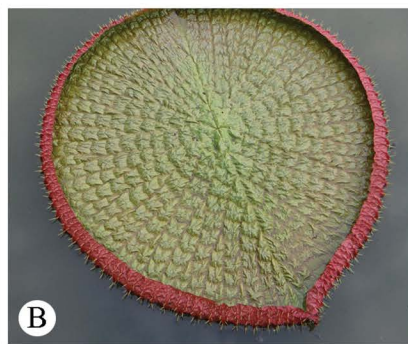


# Botanical Gardens and Their Role in Plant Conservation

European and American Botanical Gardens, Volume 3

Edited by  
T. Pullaiah and David A. Galbraith



# Botanical Gardens and Their Role in Plant Conservation

Approaching the contributions of a world-wide sector of scientific institutions to addressing the extinction crisis, *Botanical Gardens and Their Role in Plant Conservation* brings together a diversity of perspectives. There are more than 3,600 botanical gardens worldwide, where trees, shrubs, herbs, and other plants are studied and managed in collections. They are foremost among efforts to conserve the diversity of living plant species and ensure that crucial biodiversity is available for the future of humanity.

This book is a showcase for plant conservation, restoration, biodiversity, and related scientific and educational work of botanical gardens around the world, featuring both thematic overview chapters and numerous case studies that illustrate the critical role these institutions play in fighting extinction and ensuring plant diversity is available for sustainable use.

## FEATURES

- A wide range of case studies derived from practical experience in a diversity of institutional, national, and biogeographical settings,
- Reviews of topics such as networking amongst institutions, the importance of global policy agreements such as the Convention on Biological Diversity and the Global Strategy for Plant Conservation,
- Profiles of botanical gardens contributions at the national level to conservation priorities,
- Real-world examples of programs in plant conservation for both critically endangered wild plant diversity and unique horticultural or cultural germplasm.

*Botanical Gardens and Their Role in Plant Conservation* includes contributions from institutions from Africa, Asia, Australia, Europe, and the Americas, and institutions of all sizes and histories, from long-established national gardens to new gardens offering their perspectives on developing their roles in this vital undertaking.



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Gardens, Volume 3

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# Contents

Preface.....	vii
Editor Biographies .....	ix
List of Contributors.....	xi
<b>Chapter 1</b> The Role of Botanic Gardens and Arboreta in Plant Conservation in Serbia.....	1
<i>Biljana Panjković, Snežana Vukojičić, Predrag Lazarević, Milica Rat, Ranko Perić, and Snežana Branković</i>	
<b>Chapter 2</b> Botanical Gardens in Slovakia and Their Role in Plant Protection .....	27
<i>L. Ulrych, P. Eliaš jun, L. Martonfiová, and I. Sarvašová</i>	
<b>Chapter 3</b> The Botanical Garden of the National Museum of Bosnia and Herzegovina.....	41
<i>Senka Barudanović, Berina Bečić, Dejan Kulijer, and Sabaheta Abadžić</i>	
<b>Chapter 4</b> The Role of Russian Botanical Gardens in Plant Biodiversity Conservation .....	63
<i>Yuri Gorbunov and Victor Kuzevanov</i>	
<b>Chapter 5</b> Illustrating the Roles of Botanical Gardens in Plant Conservation: The Muséum National d’Histoire Naturelle: Contribution to the Global Strategy for Plant Conservation .....	91
<i>Frédéric Achille, Philippe Bardin, Cécile Bonneau, Maïté Delmas, Marie Di Simone, Olivier Escuder, Marie Fleury, Claude-Anne Gauthier, Thomas Haevermans, Arnaud Horellou, Denis Larpin, Serge Muller, Valérie Priolet, and Germinal Rouhan</i>	
<b>Chapter 6</b> Botanical Gardens and Their Role in Plant Conservation in Greece .....	121
<i>Eleni Maloupa, Ermioni Malliarou, and Nikos Thymakis</i>	
<b>Chapter 7</b> Plant Conservation Programs of the Balkan Botanic Garden of Kroussia and the Greek Gene Bank .....	143
<i>Eleni Maloupa, Ermioni Malliarou, Katerina Grigoriadou, Parthenopi Ralli, and Katerina Papanastasi</i>	
<b>Chapter 8</b> The Role of the Atlanta Botanical Garden in Plant Conservation.....	157
<i>Emily E.D. Coffey, John Evans, Jason J. Ligon, Ashlynn Smith, Lauren Eserman, Carrie Racliffe, Jean Linsky, and Laurie Blackmore</i>	
<b>Chapter 9</b> The Center for Plant Conservation – A Network of Botanical Gardens in USA and Its Role in Plant Conservation .....	177
<i>Joyce Maschinski</i>	



<b>Chapter 10</b>	Plant Conservation Efforts at the San Diego Botanic Garden .....	183
	<i>Tony Gurnoe, Jeremy Bugarchich, Colin K. Khoury, and Ari Novy</i>	
<b>Chapter 11</b>	Plant Conservation at Houston Botanic Garden.....	197
	<i>Francisco Javier de la Mota Daniel and Brent E. Moon</i>	
<b>Chapter 12</b>	Plant Conservation at the University of California Botanical Garden at Berkeley .....	203
	<i>Holly Forbes</i>	
<b>Chapter 13</b>	Royal Botanical Gardens (Canada): Conservation of Plants and Nature by an Urban Botanical Garden.....	213
	<i>David A. Galbraith</i>	
<b>Chapter 14</b>	The Contribution of the Montreal Botanical Garden to Plant Conservation.....	241
	<i>Stéphane Bailleul, Alain Cuerrier, Simon Joly, Stéphanie Pellerin, and Michel Labrecque</i>	
<b>Chapter 15</b>	A Botanical Garden Dedicated to the Conservation of Plants in the Dry Inter-Andean Valleys of Bolivia .....	251
	<i>Esther Valenzuela C., Mónica Moraes R., Freddy S. Zenteno-Ruiz, and Francisco Saavedra</i>	
<b>Chapter 16</b>	Conservation Efforts for a Threatened Endemic Palm of Bolivia: The Role of Botanical Gardens.....	271
	<i>Mónica Moraes R., Freddy S. Zenteno-Ruiz, Silvia C. Gallegos, Francisco Saavedra, Noelia Alvarez de Román, and Joachim Gratzfeld</i>	
<b>Index</b> .....		289

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# Preface

The conservation and sustainable use of the world's diversity of plants is critical to the future of humanity. Of the approximately 400,000 species of plants, at least a quarter are of direct medicinal, economic, and food security importance, and many are at risk of extinction. Botanical gardens constitute a global network of research, educational, and conservation institutions that direct their efforts to plants. There are more than 3,000 botanical gardens worldwide, where trees, shrubs, herbs, and other plants are studied and managed in collections. They are foremost among the institutions around the world that are leading efforts to conserve the diversity of living plant species, document them, and ensure that this crucial biodiversity is available for the future of humanity.

Botanical gardens are a remarkably heterogeneous group of institutions, with great ranges in size, programs, and capacities. Since the early 1980s, many have taken on the conservation of biological diversity as central to their missions. They are engaging in direct conservation programs focused on at-risk species (both *ex situ* and *in situ*), combating invasive species, supporting public education about conservation issues, and other actions directed at stemming the tide of extinction. More than 80,000 plant species are already protected to some degree in the collections of just 1,200 of these institutions.

As botanical gardens play a pivotal role in plant conservation, we have undertaken to bring examples of these conservation efforts together and showcase their scope, importance, and their own diversity. With this aim, we invited contributed chapters for this multivolume set of books from plant conservation practitioners working at botanical gardens worldwide. The goal of these edited volumes is to bring together experiences and case studies of the contributions of botanical gardens worldwide to the study, preservation, and sustainable use of plant diversity.

This three-volume set positions the work of botanical gardens in light of global needs and initiatives, highlighting the responses of individual institutions to their local circumstances, priorities, and objectives. Forty-five chapters contributed by 183 authors from 23 countries span the three volumes of this set. Nine introductory chapters present overviews of key issues by experts, including summaries of networking among botanical gardens, the role of botanical gardens in protecting food plant species, the state of development of seed gene banks, access and benefits-sharing regimes, plant propagation, and conservation strategies involving botanical gardens. Thirty-six chapters represent programs, collections, and contributions by individual botanical gardens on all continents except Antarctica. No single book or set of volumes could present all of the work of botanical gardens from all countries. It is our intention that these chapters provide a wide range of examples of how botanical gardens are making contributions and also a survey of the kinds of issues botanical gardens involved in conservation face.

The conservation of plant diversity is along the most important environmental, social, and economic concerns of the twenty-first century. As the human population has exceeded eight billion and economic growth remains a high priority for many governments, the pressures that this large civilization places on remaining natural areas, the cradles and reservoirs of biological diversity, are ever increasing. Conversion of natural areas to cultivated, urbanized, or industrialized landscapes; fragmentation of remaining habitats; loss of ecological connectivity and ecological partners; and the global effects of climate change are all immediate and well-characterized threats. At the same time, humanity's ability to study, characterize, and conserve plant species diversity has never been greater. Globe-spanning databases and communications allow for information to be shared and accumulated, and analyzed across the planet, and molecular genetic techniques are expanding our ability to detect, read, and understand the DNA underlying that biological diversity like never before. The responses to threats to plant diversity are numerous too, including the full gamut of *in situ* and *ex situ* approaches to conservation.

Standing in the midst of all of this—of efforts to document diversity, protect it through a range of methods and actions, and critically interpret it to the public, are the world's 3,000+ botanical gardens. Having their origins nearly 500 years ago in the emergence of botany as a science during



the Italian Renaissance, botanical gardens have grown in their missions, capabilities, and collections and have diversified greatly from their start as small university teaching and research gardens to everything from community-led centers for well-being and beautification to major scientific institutions that have taken leading roles in organizing and implementing plant conservation at every level.

Just what botanical gardens can do to address plant conservation issues is under-appreciated. While at their hearts are the development of living plant collections, and thus *ex situ* conservation does figure large in their programs and contributions, *ex situ* conservation (living plant collections and facilities like seed gene banks) is just one tool in an expanding tool-box. While no single institution might undertake all of these, the range of tools botanical gardens are deploying also include in-vitro conservation (preservation of viable tissue or specimens in artificial growth media), cryogenic preservation of germ-plasm (banking tissue in ultracold repositories), propagation, population supplementation, and reintroduction of target taxa into wild habitats, as well as the gathering and analysis of associated data relevant to conservation, plant taxonomy, and field studies of floristics. Increasingly, partnerships with local and Indigenous peoples to bring important new knowledge and approaches to conservation are being seen. These address historical issues of colonialism and recognize that plants are at the heart of human culture.

Above all, botanical gardens focus their attention, and the attention of their many visitors, stakeholders, and partners, on the world of whole-organism plant science. Reductionistic approaches to biology that employ DNA and other sequence data have made staggering advances in our scientific and applied knowledge about plants since the 1960s, but understanding and conserving plants, and being able to relate to them on a human level, remains firmly with the whole organism. Botanical gardens are uniquely equipped to bring that whole organism perspective to the awareness of the public and decision-makers.

These volumes were written during the SARS-COVID-2 pandemic that began in 2020. Following a call for any interested botanical gardens to contribute accounts of their roles in conservation, we found that not only were large institutions involved, but smaller botanical gardens in many countries were already undertaking a variety of plant conservation initiatives, some many years old, and some were just launching their own contributions.

In some ways, this project has been a response to the COVID epidemic, too. As authors were being identified and volume contents organized, what emerged was a symposium in print form, a chance for many voices to come together and be heard on this vital issue. The resulting three volume set provides both topical and geographic coverage. We hope that readers will take away a profound sense of hope and encouragement in the diversity and distribution of these efforts.

Plant conservation is not necessarily an “easy sell” to the public or to decision-makers. Although there are profound economic, social, and even spiritual reasons to conserve the diversity of plant species, other taxa often take precedent in action and conservation funding. A significant part of this is the perception of conservation value and the emotional responses to threats to charismatic megafauna, particularly threatened mammals and birds. These taxa are also of great importance, and conservation should not be viewed as a zero-sum game.

Faced with a multitude of urgent environmental and conservation matters ranging from local damage to climate change, the world’s ability to take action has numerous constraints, ranging from the practical to the political. With the growing recognition that the threats to humanity posed by declines in biological diversity are as profound as the threat of climate change and its numerous consequences, however, not acting is unacceptable. It is our hope that this three-volume set will inspire botanical gardens to further contribute to the conservation of plant diversity, worldwide and close to home.

We would like to extend our profound thanks to all the authors who have contributed to these volumes.

**T. Pullaiah**

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**Prof. T. Pullaiah** obtained his MSc and PhD degrees in Botany from Andhra University. He was a post-doctoral fellow at Moscow State University, Russia, during 1976–1978. He traveled widely in Europe and visited Universities and Botanic Gardens in about 17 countries. He joined Sri Krishnadevaraya University as Lecturer in 1979 and became a professor in 1993. He has published 120 books, 345 research papers, and 35 popular articles. His books have been published by reputed international publishers like Elsevier, Springer, CRC Press, Taylor & Francis, Apple Academic Press, Scientific Publishers, Astral International, CBS Publishers, etc. Under his guidance, 54 students obtained their PhD degrees and 34 students their M Phil degrees. He is the recipient of P. Maheshwari Gold Medal, Prof. P.C. Trivedi medal for Editorial excellence and Dr. G. Panigrahi Memorial Award of Indian Botanical Society, and Prof. Y. D. Tiagi Gold Medal of the Indian Association for Angiosperm Taxonomy. He was President of the Indian Association for Angiosperm Taxonomy (2013) and President of the Indian Botanical Society (2014). He was a member of the Species Survival Commission of International Union for Conservation of Nature and Natural Resources (IUCN).

**David A. Galbraith** completed his BSc and MSc at University of Guelph and PhD at Queen's University at Kingston, in Canada. His early research focused on evolutionary ecology of aquatic vertebrates. Following a post-doctoral fellowship in Canterbury, England, he served as executive director and curator of a small AZA-accredited center for endangered wildlife species conservation. In 1995, he joined Royal Botanical Gardens (Canada) to develop biodiversity projects among botanical gardens across Canada in response to the Convention on Biological Diversity. In 2006, he was appointed RBG's Head of Science, overseeing library, archives, and herbarium research and use of RBG resources by outside researchers. He has published many contributions on conservation policy, management, and history of botanical gardens. In 2002, Dr. Galbraith was honored by the American Public Gardens Association with their annual Professional Citation for his innovative work in public horticulture. He was named Hamilton Environmentalist of the Year in 2010 for his efforts to protect nature. Dr. Galbraith has always been passionately engaged in biology, history, cultural heritage, and the arts, and is fascinated by how all of these intersect within botanical gardens. He is an adjunct biology professor at McMaster University, a Fellow of the Royal Canadian Geographical Society, and a Fellow International of the Explorers Club.



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# 1 The Role of Botanic Gardens and Arboreta in Plant Conservation in Serbia

*Biljana Panjković, Snežana Vukojičić, Predrag Lazarević,  
Milica Rat, Ranko Perić, and Snežana Branković*

## CONTENTS

1.1	Introduction .....	2
1.2	The Current State for Plant Conservation in the Republic of Serbia .....	2
1.3	An Overview of Botanic Gardens and Arboreta in Serbia, and Their Role in Plant Conservation .....	3
1.4	Jevremovac Botanical Garden .....	4
1.4.1	Brief History .....	4
1.4.2	The Most Valuable Contents of Jevremovac .....	5
1.4.3	Greenhouse .....	5
1.4.4	The Library .....	6
1.4.5	Herbarium .....	7
1.4.6	Japanese Garden .....	9
1.4.7	Conservation Status .....	9
1.5	Botanical Garden in Kragujevac .....	10
1.5.1	Brief History .....	10
1.5.2	Importance .....	10
1.5.3	Organization .....	10
1.5.4	Projects .....	12
1.6	Court Botanic Garden in Sremski Karlovci .....	12
1.6.1	Brief History .....	12
1.6.2	Importance .....	12
1.6.3	Conservation Status .....	13
1.7	Arboretum of the Faculty of Forestry in Belgrade .....	13
1.7.1	Brief History .....	13
1.7.2	Importance .....	13
1.7.3	Conservation Status .....	14
1.8	The Arboretum of the Institute for Nature Conservation of Vojvodina Province in Novi Sad .....	14
1.9	Scientific Research in Serbian Botanic Gardens and Arboreta .....	15
1.10	<i>In Situ</i> and <i>Ex Situ</i> Conservation .....	16
1.11	Education and Promotion of Natural Values .....	19
1.12	Citizen Science and Popularization .....	21
1.13	Conclusion .....	22
	References .....	23

## 1.1 INTRODUCTION

Botanic Gardens Conservation International (BGCI) defines botanic gardens as institutions that hold documented collections of living plant taxa for scientific research, conservation, exhibition, and education to highlight their role in the conservation of rare and threatened plants, compliance with international policies, and sustainability and ethical initiatives (BGCI, 2023). According to the same source, currently, there are 1,775 official botanic gardens and arboreta in 148 countries across the globe, with many more under construction or being planned. Other sources indicate that there are about 2,500 botanic gardens of different organizational levels around the world (Golding et al., 2010; Chen and Sun, 2018).

It is evident that the role of botanic gardens has changed throughout history as they have been continually adapting in order to serve the societal needs and respond to new emerging challenges. In the sixteenth and seventeenth centuries, botanic gardens were used for the scientific study of medicinal plants, allowing researchers to master the growing techniques needed for species that were brought from tropical areas upon return from expeditions. In the later centuries, they became important resources for the advancement of botanical science but were increasingly used by the general public for daily enjoyment. Since the 1950s, due to the growing interest in conservation of endangered species and ecosystems with the view of preserving genetic, species, and ecosystem diversity, botanic gardens have been recognized as extremely important for plant conservation, owing to their living collections and accumulated scientific knowledge on plant species reproduction. In addition, they have become indispensable for maintaining and improving educational programs. Today, botanic gardens play a central role in scientific research, *in situ* and *ex situ* conservation, as well as utilization and popularization of global plant diversity (Mounce et al., 2017; Chen and Sun, 2018). Officially, the BGCI association provides detailed guidelines on the conditions that must be met by institutions to qualify as botanic gardens, emphasizing not only their importance for plant conservation but also scientific research responsibilities, primarily development of plant taxonomy and genetics, phytochemistry, recording of useful plant properties, and informing the selection of plants that can withstand degraded and changing environments in order to respond to the threats imposed by climate change. According to the BGCI, the staff at the botanic gardens must also actively participate in the transferring of knowledge to different target groups while simultaneously preserving local knowledge and encouraging sustainable use of plant resources.

In Serbia, the first two botanic gardens were founded in the nineteenth century, but only the Jevremovac Botanical Garden has functioned continuously to this day. Since the 1950s, new botanic gardens and arboreta have been established in several institutions across the country. Each of these institutions is successfully adapting in their own way to the challenges of the twenty-first century in the field of plant conservation, focusing on autochthonous species in particular. Given their observable progress in the last 20 years, they are expected to reach pertinent international standards in the coming years, allowing these gardens to become full members of the organization tasked with the preservation of plant stock. In this chapter, we present the current role of botanic gardens and arboreta for plant conservation in Serbia.

## 1.2 THE CURRENT STATE FOR PLANT CONSERVATION IN THE REPUBLIC OF SERBIA

Although the Global Strategy for Plant Conservation (GSPC) is not directly incorporated into Serbian legislation, Serbia does not have a separate national strategy for plant conservation. Nonetheless, several other strategies include segments that fulfill the GSPC objectives and targets, the most important of which are the Biodiversity Strategy of the Republic of Serbia for the 2011–2018 period (Radović and Kozomara, 2011) and Proposal on the Strategy for Nature Conservation, which has been drafted for the 2019–2025 period.

The entire vascular flora of the Balkan Peninsula is estimated at about 8,000 species (Stevanović, 2022), while the vascular flora of Serbia is estimated to comprise 4,246 taxa of both native and non-native naturalized plants (Niketić and Tomović, 2018; Stevanović, 2022). Bryophytes are presented with 797 taxa (Pantović and Sabovljević, 2017).

Threatened species have a special conservation significance. *The Red Data Book of Flora of Serbia 1* (Stevanović, 1999) documents 171 extinct and critically endangered plant taxa, which comprise approximately 4% of the Serbian flora. A Preliminary Red List of Flora of Serbia (Stevanović et al., 2002) includes more than 1,000 threatened vascular plant species. The revised Preliminary Red List of selected groups of plants, invertebrates, vertebrates, and mushrooms (Anačkov et al., 2016) contains 1,627 taxa, and it is estimated that 38.31% of the national flora in Serbia is presently threatened.

Protection of plant biodiversity in Serbia is regulated by the Law on Nature Protection (Official Gazette of the Republic of Serbia, No. 36/09, 88/10, 91/10, 14/16, 95/2018, 71/21). Two main national sub laws regulate protection of the species and habitat types, incorporating obligations from relevant European Union legislative. According to the *Regulation on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi* (Official Gazette of the Republic of Serbia, No. 5/10; 88/10; 91/10; 47/11; 14/16; 98/16) and the *Regulation on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and on protection of priority habitat types and on protection measures for their preservation* (Official Gazette of the Republic of Serbia, No. 35/2010), 641 strictly protected and 570 protected plant species or 28.5% of the total flora, as well as 255 habitat types of national and international importance, are formally protected. Mostly, *in situ* conservation is implemented in protected areas, ecological networks, and Important Plant Areas (IPAs) (Panjković and Puzović, 2019). In 2018, the total of protected areas in Serbia in which *in situ* conservation programs were applied was estimated at 7.57% of the country's territory. According to *The Decree on the Ecological Network* (Official Gazette of the Republic of Serbia, No. 102/10), the National Ecological Network covers 20.93% of the country's territory, comprising 61 locations of IPAs that cover 8.5% of the country's territory (Stevanović, 2005; Stevanović and Šinžar-Sekulić, 2009). According to Natura 2000 ecological network, the total area of IPAs in protected areas of the continental biogeographical region is 59.68%, and 82.06% of all IPAs in the Pannonian region are formally protected areas. *Ex situ* conservation programs are coordinated by botanic gardens and universities (Panjković and Dučić, 2018; Popović et al., 2019).

### 1.3 AN OVERVIEW OF BOTANIC GARDENS AND ARBORETA IN SERBIA, AND THEIR ROLE IN PLANT CONSERVATION

Emphasizing the need for and the importance of establishing a botanical garden in Belgrade, back in 1881, professor Josif Pančić, a scientist and naturalist with broad views and great education, highlighted the two main tasks of botanical gardens: (1) to compile the flora of their country in a small space where young botanists will be educated and (2) to acquire and cultivate many exotic plants that will represent the vegetation of the rest of the world (Pančić, 1881). Today, 141 years after Pančić wrote these words, his views on the importance and functionality of botanical gardens can be supplemented by the statement that these institutions also have great practical significance in the conservation of endangered plant species of Serbia and the Balkan Peninsula. The perspective shared by Pančić led to the establishment of the Jevremovac Botanical Garden in Belgrade. In addition to this well-known institution and formally recognized botanic garden in Serbia, there are several other institutions that conduct some of the related activities: the Botanical Garden in Kragujevac, the Court Garden in Sremski Karlovci, a private botanical garden "Garden of Health" in the village Tabanovac, the Arboretum of the Faculty of Forestry in Belgrade, and the Arboretum of the Institute for Nature Conservation of Vojvodina Province in Novi Sad. The Nature Monument "Aleksa Šantić Arboreta-Park" located near the settlement of Čonoplja is also noteworthy in this

context as this is one of the oldest arboreta in Serbia, which was built around the castle Fernbach in the nineteenth century, and contains one of the most diverse collections of trees and shrubs in Vojvodina Province. In earlier days, it contained more than 165 species, but it is currently unfortunately neglected (Registar No. 2, INCV documentation). Although it is protected by law, it will not be further analyzed in this chapter due to the stated situation.

## 1.4 JEVREMOVAC BOTANICAL GARDEN

### 1.4.1 BRIEF HISTORY

In line with the decision of the Ministry of Education of the Kingdom of Serbia and at the suggestion of the academician Josif Pančić, the Royal Botanical Garden was founded in Belgrade in 1874. The garden was annexed to the Great School, and its management was entrusted to Josif Pančić, a professor of botany. Originally, the garden was situated in the Belgrade district Dorćol, on the banks of the Danube River (Tatić, 1996). However, due to a set of unfortunate circumstances, it was destroyed by floods twice within a short period of time. When King Milan learned of the need to relocate the garden, he decided to help and sent a letter to the Ministry of Education and Ecclesiastical Affairs on August 2, 1889, stating that he would cede his property in the city center to the state with the expectation that it would be used for the establishment of the botanical garden. It was his wish that the newly built garden be named after his ancestor Jevrem Obrenović, a great admirer and supporter of national education. To this day, the Royal Botanical Garden bears the name “Jevremovac” (Jovanović-Juga, 2005), and it remains a popular venue for the citizens of Belgrade (Figure 1.1).

In the following decades, the garden continued to develop and reached its peak in the 1930s, under the leadership of the great Serbian botanist and academician Nedeljko Košanin (Tatić, 1996). Today, the botanical garden is organizationally defined as the Institute of Botany and Jevremovac Botanical Garden, Faculty of Biology, University of Belgrade (Jevremovac, 2023).



**FIGURE 1.1** Entrance gate to the Jevremovac Botanical Garden.

*Source:* Photo P. Janačković.



### 1.4.2 THE MOST VALUABLE CONTENTS OF JEVREMOVAC

Jevremovac Botanical Garden covers an area of 4.82 ha and includes, in addition to open spaces, a greenhouse, herbarium, library, laboratories, and administrative offices of the Institute of Botany. The dendroflora of Jevremovac consists of about 300 taxa of trees and shrubs (Jovanović-Juga, 2005) and about 800 herbaceous species from the Balkan Peninsula and European and exotic regions, while the number of tropical, subtropical, and desert plants grown in the greenhouse is estimated at almost 1,000 different species (Bjelić-Mesaroš, 2005). Besides the importance of the plant diversity located in the garden, this space has immeasurable value as a unique, botanically diverse oasis of “shaped” nature in the heart of the capital, with educational functions and a positive microclimate, providing aesthetic and the relaxing effect of living and working in the garden.

### 1.4.3 GREENHOUSE

The greenhouse of the Jevremovac Botanical Garden was built in 1892 as a monument to the patriotic intentions of King Milan Obrenović and the Ministry of Ecclesiastical and Educational Affairs of the Kingdom of Serbia. The greenhouse was designed in the Victorian style by the architects of the Dresden’s firm Mozentin and is one of their greatest achievements. At that time, as well as many years later, it was the unique decoration of the garden itself and the city of Belgrade, which became an inseparable part of cultural Europe. When the greenhouse was built, it was one of the largest and most beautiful greenhouses in this part of Europe. Even today it is the ornament of the institution where it is located, as well as of the city of Belgrade (Figure 1.2). Although it was severely damaged by aerial bombardment during the World War II, owing to the reconstruction and restoration efforts that took place in 2014, its old appearance and former splendor has been restored. The greenhouse



**FIGURE 1.2** Greenhouse.

*Source:* Photo I. Stevanoski.



covers an area of 560 m<sup>2</sup> and consists of two wings connected by a central dome. Even 130 years after its opening, it is not only a symbol and trademark of Jevremovac but also a cultural monument of Belgrade and Serbia (Bjelić-Mesaroš, 2005).

#### 1.4.4 THE LIBRARY

The greats of Serbian botany knew very well that there is no real scientific work without communication with the scientific public all over the world. Therefore, it is not surprising that the Library of the Institute of Botany and Jevremovac Botanical Garden was founded as early as 1853 and is one of the oldest and richest libraries in the area. In addition to 200 scientific and professional journals, the library contains more than 7,000 books. Some of the journals have been continuously obtained for more than 150 years – since 1818. The oldest book in the library is *World History (L'Historie du Monde)* by Pliny the Elder, ancient Roman author and natural philosopher from the first century. Our copy is an Old French translation, printed in Lyon in 1562. Among the oldest editions held at the library is Clusii's *History of Plants (Clusii Historia Plantarum)*, printed in Antwerp in 1601. The real treasure of the library are the ten volumes of *Flora Graeca* (1806–1826) and three volumes of *Plantae Rariores Hungariae* (1802), containing hand-painted plant images (Figure 1.3).



**FIGURE 1.3** *Flora Graeca* and *Plantae Rariores Hungariae*.

Source: Photo I. Stevanoski.

The scientific journal of the Institute of Botany and the Jevremovac Botanical Garden with the title *Bulletin del'Institutet du Jardin Botaniques del'Universite de Beograd* was founded in 1928 by Professor Nedeljko Košanin. Many well-known national and international authors specializing in different fields, especially in the field of anatomy, systematics, ecology, and physiology of plants, have published their articles in this journal. Since 1959, a new series of journals has been published under the title *Bulletin of the Botanical Institute and Garden of the University of Belgrade*, and since 1971, this journal has been published under the name *Bulletin of the Institute of Botany and Botanical Gardens of the University of Belgrade*. Under the new name *Botanica Serbica*, this journal has existed since 2009 (Stevanović, 2009).

#### 1.4.5 HERBARIUM

Modern taxonomic, floristic, and phytogeographical research of a given area is inconceivable without a good herbarium collection that provides a more complete and comprehensive view of the flora of the area being researched. Herbaria are not only an invaluable scientific resource but also hold historical value for the countries to which they belong as they contain a large number of dried herbarium specimens of species that have disappeared from the plant gene pool. On the basis of such exact-material evidence, it is possible to determine and reconstruct the picture of the former flora of a given area as well as better understand the negative anthropozoogenic influences that caused its change (Vukojičić, 1997).

The Herbarium of the Institute of Botany and Jevremovac Botanical Garden of the Faculty of Biology of the University of Belgrade is one of the most important and richest herbarium collections not only in Serbia but in the entire Southeastern Europe. The herbarium was established as early as 1860, when Josif Pančić donated his former collection to the Great School in Belgrade. Many famous botanists subsequently contributed to the enrichment of this herbarium (Vukojičić et al., 2011). Today, 162 years after its establishment, the Herbarium of the Institute of Botany and Jevremovac Botanical Garden has more than 250,000 herbarium sheets with plant material collected in the Balkan Peninsula mostly, as well as a large number of dried specimens obtained through exchanges with other countries in Europe and across the world.

The Herbarium of the Institute of Botany and Jevremovac Botanical Garden is included in the list of official world herbariums under the international code BEOU (acronym according to Thiers, 2022). It is divided into several collections, the most valuable of which are *Herbarium Pancicianum*, established by Pančić as the most important plant collection of the nineteenth century, and the general collection – *Herbarium Generale*, which is the richest in plant specimens collected in the nineteenth and twentieth centuries, not only from the Balkan Peninsula, but also from all over the world. Of no less importance are the more recent collections of the Department of Ecology and Geography of Plants, the Department of Morphology and Systematics of Plants, the collection of Bryophytes, and the wet collection of the Department of Algology, Mycology, and Lichenology (Vukojičić et al., 2011).

The special value of this herbarium lies in the specimens representing nomenclature types of new taxa (holotype, lectotype, neotype . . .), that is, original specimens on the basis of which a new taxon was described for science. The *Herbarium Generale* collection preserves nomenclatural types of newly described taxa by nineteenth-century botanists but also plants described in the late twentieth and early twenty-first centuries, such as *Dioscorea balcanica* Košanin, *Drosera macedonica* Košanin, *Ephedra macedonica* Košanin, *Nartheicum scardicum* Košanin, *Verbascum macedonicum* Košanin & Murbeck (Vukojičić et al., 2014), *Draba bertisceae* Lakušić & Stevanov, *Helianthemum marmoreum* Stevanović, Matevski & Kit Tan, *Iris orjenii* Bräuchler & Cikovac, *Minuartia juniperina* ssp. *Košaninii* Kamari & Stevanović, and *Tulipa serbica* Krivošej & Tatić, etc. (Vukojičić et al., 2011). The *Herbarium Pancicianum* (Figure 1.4) is a collection of plants personally collected by Josif Pančić during his 42 years of botanical research in nowadays Serbia, Montenegro, Bulgaria, Romania, Croatia, and Hungary, as well as during his travels in Italy and



**FIGURE 1.4** *Herbarium Pancinianum*.

Source: Photo S. Vukojičić.

Austria. As the largest scientific and cultural legacy of Josif Pančić, *Herbarium Pancinianum* is under a special processing and storage regime. This collection, currently housed as a separate unit, contains 15,377 herbarium specimens (743 genera) stored in 176 herbarium boxes (<http://pancic.bio.bg.ac.rs>). It is also worth noting that 13,715 exsiccates (89% of the total herbarium material) were determined at species level, while the intra-specific categories and exsiccates from 1,662 herbarium sheets (comprising the remaining 11%) were determined at genus level (Vukojičić et al., 2011). The greatest value of *Herbarium Pancinianum* stems from the plants that Pančić described either himself or in collaboration with other scientists as taxa new to science. In recent years, intensive work has been done to enhance this collection and to ascertain the nomenclatural types of Pančić's newly described taxa from the territory of Serbia, Montenegro, and Bulgaria (Clementi et al., 2014, 2015a, 2015b, 2016; Ronikier and Zalewska-Gałosz, 2014; Vukojičić et al., 2021). In *Herbarium Pancinianum*, there is a considerable number of plants that Pančić listed as new species or possible new species. Since the nineteenth century, those specimens have stimulated researchers to continue the work on the description of the new Pančić's taxa, such as *Lathyrus pancicii* (Jurišić) Adamović (Adamović, 1901), *Cardamine pancicii* Hayek (Hayek, 1918), or *Viola kopaonikensis* Niketić & Tomović (Tomović et al., 2016).

Besides extensive floristic, horological, and taxonomic data of general fundamental importance, this collection also contains valuable information on plant species that are now considered extinct in Serbia, or their distribution and taxonomic status are misinterpreted and inaccurate in the floristic and taxonomic literature. In sum, Pančić's herbarium represents an indispensable source of evidence on the changes in vascular flora that have taken place in the last 170 years, as well as



the former distribution of endangered, rare, and vulnerable species in present-day Serbia. Pančić's herbarium collection contains more than 250 species from the country's territory that are rare and endangered in Serbia today, and some have disappeared from certain localities, or from the whole territory of Serbia (e.g., *Achillea ptarmica* L., *Caldesia parnassifolia* (L.) Parl., *Hymenolobus procumbens* Schintz & Thell. subsp. *procumbens*, *Polemonium caeruleum* L., *Lathyrus pancicii* (Jurišić) Adamović etc.), and even from the global gene pool (e.g., *Althaea kragujevacensis* Pančić) (Vukojičić, 1997).

#### 1.4.6 JAPANESE GARDEN

As a part of the project “Japanese Garden in Belgrade,” financed by the Commemorative Association for the Japan World Exposition (1970), a plot of land was laid out in early 2004 where a small watercourse, a lake with several waterfalls and cascades, as well as a tea house and a bridge were created in the spirit of the Japanese garden (Figure 1.5). The art of Japanese gardens is expressed through the simplicity of lines and colors. Whether large or small, Japanese gardens have retained their special, intimate form. They are neither symmetrical nor monumental. They reflect the beauty of nature by insisting on its simplicity and harmony. Stone, water, and plants are the three basic elements in Japanese gardens, each with its own symbolism.

#### 1.4.7 CONSERVATION STATUS

Due to its specific natural and cultural characteristics, the Jevremovac Botanical Garden is protected as a natural monument (“Official Gazette of the Republic of Serbia”, No. 23/1995) and cultural monument (“Official Gazette of the Republic of Serbia”, No. 30/2007).



**FIGURE 1.5** Japanese Garden.

Source: Photo N. Kuzmanović.

## 1.5 BOTANICAL GARDEN IN KRAGUJEVAC

### 1.5.1 BRIEF HISTORY

As a part of the biodiversity protection program, in 1993 the Government of the Federal Republic of Yugoslavia (FRY) adopted the Resolution on Biodiversity Conservation Policy in Federal Republic of Yugoslavia, in which the formation of botanical gardens was envisaged as one of the important measures. In accordance with this perspective, the Botanical Garden was founded in Kragujevac in cooperation with the relevant ministry and local government institutions. The Botanical Garden was opened on 21 October 1997 as a special organizational unit of the Institute of Biology and Ecology, Faculty of Sciences, University of Kragujevac. It is located within the Memorial Park, occupying an area of 18.4 ha, and is one of the largest botanical gardens on the Balkan Peninsula (PMF, 2023).

### 1.5.2 IMPORTANCE

As a scientific-teaching base and a large outdoor laboratory, the Botanical Garden provides great scientific and educational opportunities. In addition to the students of the Faculty of Sciences (Institute of Biology and Ecology, University of Kragujevac), high school students are also receiving both theoretical and practical lessons in this garden (Figure 1.6). An important function of the Botanical Garden is the cultivation and conservation of endangered, relict, and endemic plant taxa in recognition of the fact that unsustainable use and destruction of natural resources leads to their endangerment. At the same time, other autochthonous species (woody, shrubby, medicinal, and decorative plants; forest fruit trees; and spicy and aromatic herbs) are cultivated that are used in traditional local medicine and culture, and for food, and thus provide benefits (Cvetković et al., 2007).

### 1.5.3 ORGANIZATION

The Botanical Garden area comprises an Exhibition section (entrance and decorative part, School Biological Center, arboretum, alpinetum, special collections, etc.), an Administrative-Scientific



**FIGURE 1.6** Entrance to the botanical garden in Kragujevac.

Source: Photo Snežana Branković.



section (administrative building), and an Economic-Production section (nursery, greenhouses, organic gardens, warm beds).

The most valuable part of the Botanical Garden is the Exhibition area, designed in a number of thematic units and zones with different plant species, including floral zones of Asia, Europe, and the Balkan Peninsula; rocky with hzampophytic and succulent plants; forest orchard zone; dendrarium; green labyrinth with autochthonous species of trees and shrubs (Figure 1.7); a zone with medicinal and spicy plants; a school biological center with facilities adapted for preschool and school age children; an area with demonstration gardens and hot beds; an earthworm section for the production of organic fertilizers; a mini greenhouse; a children's fun corner with interactive toys; an animal corner; etc.

The Asian flora zone features several species from that geographical area, such as *Cryptomeria japonica* (Thunb. ex L.f.) D. Don, *Styphnolobium japonicum* (L.) Schott., *Metasequoia glyptostroboides* Hu & W. C. Cheng, *Abies nordmanniana* (Steven) Spach, *Picea orientalis* (L.) Peterm., *Pinus wallichiana* A.B. Jacks., *Cedrus deodara* (Roxb.ex D.Don) G.Don., *Magnolia kobus* D.C., *Ginkgo biloba* L., *Cercis siliquastrum* L., etc.

The European flora zone is the dominant segment of the garden and contains the most characteristic representatives of that flora, such as *Quercus cerris* L., *Quercus frainetto* Tenore, *Betula pendula* Roth, *Alnus glutinosa* (L.) Gaertn., *Larix decidua* Mill., *Pinus nigra* Arn., *Picea abies* (L.) Karsten, *Juniperus communis* L., *Celtis australis* L., *Corylus avellana* L., *Carpinus betulus* L., *Salix alba* L., *Populus tremula* L., *Berberis vulgaris* L., *Forsythia europaea* Degen & Bald., *Ulmus minor* Mill., *Spiraea media* F. Schmidt, *Rosa canina* L., *Pyrus piraster* Burgsd., *Malus sylvestris* Mill., *Crataegus monogyna* Jacq.s.lato, *Sorbus austriaca* (Beck) Hed., *Sorbus torminalis* (L.) Crantz, *Prunus spinosa* L., *Acer campestre* L., *Acer platanoides* L., *Acer pseudoplatanus* L., *Acer*



**FIGURE 1.7** The water well at the entrance to the labyrinth with autochthonous species.

Source: Photo S. Radovanović.



*tataricum* L., *Aesculus hippocastanum* L., *Cornus mas* L., *Thelycranium sanguinea* (L.) Fourr., *Euonymus europaea* L., *Fraxinus ornus* L., *Fraxinus excelsior* L., etc.

The Balkan flora zone is characterized by the species from the Balkan Peninsula, including *Picea omorica* (Pančić) Purk., *Pinus peuce* Griseb., *Acer heldreichii* Orph. ex Boiss., etc.

#### 1.5.4 PROJECTS

Most of the Botanical Garden contents were financed through various projects and donations, while the work on the formation of the Botanical Garden was primarily made possible by the projects of the Ministry of Environmental Protection of the Republic of Serbia: Arrangement of the Botanical Garden in Kragujevac (2004), formation of the presentation program of the Botanical Garden in Kragujevac (2005), *ex situ* conservation of Serbian flora (2010–2012), and a project co-financed by the Foreign Development Assistance Fund: Development of the botanical garden in Kragujevac (2006). In addition, the Erasmus+ project “Kindergarten under the canopy-development of forest pedagogy,” which commenced in early November 2021, is implemented by the preschool institution from Kragujevac with partners from the kindergarten Beltinci from Slovenia in cooperation with the Faculty of Natural Sciences in Kragujevac.

## 1.6 COURT BOTANIC GARDEN IN SREMSKI KARLOVCI

### 1.6.1 BRIEF HISTORY

The Court Garden in Sremski Karlovci, covering an area of 7.29 ha, was built in 1848 on the property of the Karlovac Metropolitanate. In the eighteenth century, the Court Garden was a utilitarian garden that, owing to the care of Metropolitan Pavle Nenadović, grew into a beautifully landscaped garden with an orchard. In 1794, botanist Andreas Wolny (1757–1827) became a professor at the Karlovac High School and used this opportunity to introduce interactive teaching methods that stimulated students’ interest in botany. The Court Garden still serves as a valuable resource in the development of botanical science and teaching. During this period, Wolny also established the herbarium collection with approximately 7,300 sheets in the Gymnasium of Sremski Karlovci, which is the oldest known collection in Serbia (Rat, 2023). It consists of authentic material (197 sheets) provided by Wolny, a general school collection (about 6,800 sheets), and material supplied by Josif Pančić (270 sheets) (Marčetić, 1950, 1952). Owing to the active participation of students and professors in the construction of the Court Garden, its appearance has been preserved to this day. A new chapter in the history of the Court Garden was marked by the Metropolitan (later the Patriarch) Josif Rajačić, who set aside an area of 6.97 ha and invited an architect from Vienna to landscape it. It is assumed that the design was completed in 1848, and its implementation began in 1849. Upon the project’s completion, the Court Garden was transformed into an exemplary park with a magnificent flower garden and a winter glass-covered garden, along with a fountain and stone benches. The larger upper area was designated for a freely arranged park with coniferous and deciduous trees and ornamental plants. At the height of the main alley, the classically shaped fountain gained a dominant place, while in the smaller lower ground floor area, various types of flowers were planted. As a special decoration, exotic and Mediterranean trees and plants were planted in wooden pots that were then kept in a greenhouse. Until World War II, the Court Garden was properly maintained by professional gardeners, both domestic and recruited from the Czech Republic and Italy. It is currently owned by the Patriarchate of the Serbian Orthodox Church (Mladenović et al., 2011).

### 1.6.2 IMPORTANCE

Court Garden is an excellent example of landscape architecture and, together with the architectural landmarks of the old town, it forms the cultural and historical heritage of Sremski Karlovci. The

garden was carefully planned and executed as a part of a professional architectural landscaping project. Since its construction in 1848, the condition and function of buildings and other facilities have changed significantly, while the original concept has been largely preserved. Once conceived as a garden–architectural space for teaching and living, during the second half of the twentieth century, the greenhouse, as well as all cultivated, tropical species, collapsed due to lack of maintenance. The first preserved data on woody species date back to 1957, when about 200 species and lower taxon units in the garden and inside the greenhouse were recorded (Mladenović et al., 2011). In 1986, 137 species and 24 lower taxonomic units were registered (Ninić-Todorović, 1986). According to the latest census, about 200 species of the more than 300 species present in the area have been preserved, including species that are protected by law, such as *Ruscus aculeatus* L. and *Galanthus nivalis* L. (Atanacković, 1993).

From the construction of this area until the 1950s, this park had been arranged and maintained with clearly defined spaces that are characteristic of botanical gardens (Mladenović et al., 2011).

### 1.6.3 CONSERVATION STATUS

Due to the richness of dendroflora, preservation of the original design, landscape attractiveness, ecological function, cultural–historical significance, and other values, the Court Garden in Sremski Karlovci was placed under state protection as a natural monument by the Decision of the Municipal Assembly of Novi Sad in 1974 (No. 03–6/42–74, 29.05.1974).

## 1.7 ARBORETUM OF THE FACULTY OF FORESTRY IN BELGRADE

### 1.7.1 BRIEF HISTORY

The Arboretum of the Faculty of Forestry of the University of Belgrade was built on the outskirts of the city center in 1955–1956. It covers an area of about 6.69 ha and is located on the northwestern slope of Košutnjak, above the left bank of the Topčiderska river, at an altitude of 110–125 m. Since 1987, the Arboretum has existed as a special working unit, which in 1991 became an integral part of the Belgrade Teaching Base within the newly established Center for Teaching and Scientific Facilities of the Faculty. According to the Statute of the Faculty of Forestry from 2006, the Arboretum was annexed to the Department of Forest Ecology. In line with the latest statute from 2019, the Arboretum is one of the three protected areas that belong to the Faculty.

### 1.7.2 IMPORTANCE

The Arboretum of the Faculty of Forestry of the University of Belgrade is of great botanical value as it was established on the former site of a climatogenic forest community – the mixed deciduous forest of Hungarian oak and Turkey oak, and is spatially and functionally connected with the urban green system (Živanović et al., 2020).

The Arboretum is recognized primarily for its educational and scientific purpose. It has a rich collection of trees and shrubs, originating from various natural habitats and geographical areas, which can be used for conducting scientific research and education, as well as protecting endangered species and preserving the gene pool of woody and shrubby species. With 200 tree and shrub species, as well as experimental fields, it is a valuable source of genetic material for endangered and rare tree species (Živanović et al., 2020).

The most common genera of coniferous species in the Arboretum are *Taxus*, *Pinus*, *Picea*, *Abies*, and *Cedrus*. The most common genera of deciduous plants are *Prunus*, *Acer*, *Corylus*, *Tilia*, and *Quercus*. Species with one specimen each include *Taxodium distichum* (L.) Rich., *Pinus wallichiana* A.B.Jacks., *Pinus mugo* Turra, *Metasequoia glyptostroboides* Hu et W. C.Cheng, *Cupressus arizonica* Greene, *Castanea sativa* Mill., *Alnus incana* (L.) Moench, *Albizia julibrissin* Durazz.,

*Aesculus × carnea* Zeyh., *Aesculus parvifolia* Walter, *Fagus sylvatica* L. “Purpurea,” *Cotinus coggygria* Scop., *Magnolia grandiflora* L., *Ruscus aculeatus* L., *Frangula alnus* Mill., *Sorbus aucuparia* L., etc. (Živanović et al., 2020).

Several plant species from the IUCN Red List that are protected in their natural habitats or are interesting dendrological rarities can also be found in the Arboretum, such as *Picea omorika* (Pančić) Purk., *Acer hyrcanum* subsp. *intermedium* (Pančić) Bornm., *Forsythia europaea* Degen & Bald., *Prunus laurocerasus* L., *Laburnum anagyroides* Medik., *Fraxinus pallisae* Willmott, *Ilex aquifolium* L., *Quercus trojana* Webb, *Taxus baccata* L., *Pinus heldreichii* H. Christ., and *Petteria ramentacea* (Sieber) C. Presl, which is endemic to the Balkan Peninsula and a globally endangered species (Živanović et al., 2020).

Part of the Arboretum is reserved for an alpinetum that contains a unique geological, botanical, and dendrological collection with perennial plantations and decorative seedlings of coniferous and deciduous trees. The floristic diversity of the Arboretum is reflected in the large presence of exotic, autochthonous, and allochthonous trees and shrubby species. Such a biodiversity, distributed according to systematic affiliation on connected units (fields and plots), makes this arboretum extremely important for the preservation of the Balkan dendroflora, which is under increasing pressure due to climate change. The Arboretum has an instructive and educational function and is intended for scientific and professional circles as well as the general public and interested citizens (Živanović et al., 2020).

### 1.7.3 CONSERVATION STATUS

Due to its unique, botanically diverse collection of dendroflora, and in order to preserve and improve the gene pool of autochthonous, allochthonous, and exotic dendroflora as well as rare, endemic, and relict species intended for scientific research and education, the Arboretum of the Faculty of Forestry was granted protected status as a natural monument in 2011 (Assembly of the City of Belgrade, in the Decision on the proclamation of the protected area “Arboretum of the Faculty of Forestry” in Belgrade (No. 501–515/110-C; 7. 07. 2011)).

## 1.8 THE ARBORETUM OF THE INSTITUTE FOR NATURE CONSERVATION OF VOJVODINA PROVINCE IN NOVI SAD

The Arboretum of the Institute for Nature Conservation of Vojvodina Province in Novi Sad is located on the Institute’s grounds. It was built in 1995 in the free landscape style of garden art (Đaković, 1995), and 38 trees and shrub species from the National Park Fruška Gora are planted on its area of about 15 acres. Along with a nature exhibition located at the Institute, various manifestations are held in the Arboretum, some of which are intended for visitors of various ages, while others focus specifically on children.

At the same institution, the herbarium collection that was officially inscribed on the list of world botanical collections in 2018 under the international code PZZP (acronym according to Thiers, 2022) is deposited. The collection contains pressed and wet samples that have been collected since 1812 at the territory of former Yugoslavia and, to a lesser extent, the countries of Central and Southeast Europe.

The Herbarium Collection of the Institute for Nature Conservation of Vojvodina Province (PZZP) in Novi Sad is one of the few institutional botanical collections in Serbia with about 30,000 sheets containing vascular plants, mosses, and liverworts originating mostly from Serbia, FYR Macedonia, Bosnia and Herzegovina, and Montenegro. Though established in 1949, the majority of the herbarium comprises specimens that have been collected since the 1980s (Perić et al., 2018). Some of the specimens in the PZZP herbarium collection were collected in the nineteenth century from Pančić (Perić et al., 2012), Wirzbicky, Lehmann, Langa, Kovacs, Degen, Simonović, and other famous botanists and naturalists.

## 1.9 SCIENTIFIC RESEARCH IN SERBIAN BOTANIC GARDENS AND ARBORETA

The most active botanic gardens and arboreta in Serbia are established at universities and are thus directly involved in research and education. This organizational framework is likely the main contributor to the continuity of these institutions throughout their history as the universities grew and developed, allowing them to attract the best experts in the field. Taking into account the size of the population in Serbia, it is unexpected to have a correspondingly large number of experts in the given fields and at the same time a larger number of institutions singled out. Therefore, close collaboration among institutions in different sectors is one of the ways to overcome this problem. The Jevremovac Botanical Garden is officially an equal partner of the Institute for Botany at Faculty of Biology, University of Belgrade. The Botanical Garden in Kragujevac and the Arboretum of the Faculty of Forestry in Belgrade are part of the University of Kragujevac and the University of Belgrade, respectively. These botanic gardens and arboreta serve as scientific and teaching bases and thus facilitate continuous work on the study and conservation of floristic and ecosystem diversity, as well as contribute to the preservation of the gene pool of autochthonous species, which is of great practical importance for trees that are most affected by climate change.

Jevremovac Botanical Garden is a teaching unit of the Faculty of Biology, University of Belgrade, a scientific and cultural heritage in which the national scientific center of botanical disciplines is located. It is the seat of the Institute of Botany with its departments: Department of Ecology and Geography of Plants, Departments of Algology, Mycology and Lichenology, Department of Morphology and Systematics of Plants, Department of Microbiology and the Department of Plant Physiology. In addition to teaching activities, these departments carry out scientific work in diverse areas such as taxonomic research of plants and fungi, floristic research of Serbia and the Balkan Peninsula, phytogeographical research of plant species and vegetation of Serbia and the Balkan Peninsula, ecology of plant species and communities, protection of rare and endangered plants of the Balkan flora, research on the bioindicator role of microorganisms and plants in the detection of the state of the environment, development of microbiological tests to detect damage to the hereditary basis of agents from the human environment, identification of herbal ingredients with antimutagenic and anticancer properties, fundamental research on photosynthesis and hormonal regulation in plants, and propagation of plants by the tissue culture method, with special emphasis on the preservation of the gene pool of the Balkan flora. In order to organize and efficiently conduct the aforementioned research projects, the related activities are assigned to appropriate departments.

The Botanical Garden in Kragujevac is a separate organizational unit of the Department of Biology and Ecology, Faculty of Science, University of Kragujevac, and represents a scientific and teaching base where fundamental research of biology takes place, including morphology, systematics and phytogeography of plants, ecology of plant species and communities, taxonomic research of plants, floristic research of Serbia, protection of rare and endangered plant species of Serbian flora, and research on the indicator role of plants and animals in the detection of the state of the environment (Avramović et al., 2007; Pavlović-Muratspahić et al., 2010).

The Arboretum of the Faculty of Forestry of the University of Belgrade was purposely built to facilitate scientific work and education of students. Experimental fields for multidisciplinary scientific research are set up in the nursery situated in the Arboretum. These facilities are utilized for experiments carried out as a part of projects in the field of genetics, plant breeding, seed production, nursery, and other related domains. The arboretum is also important for the monitoring, acclimatization, and naturalization of allochthonous and exotic species. The scientific project "Mediterranean floral elements on the green areas of Belgrade in the conditions of climate change" is particularly relevant for achieving these objectives. Scientific research and educational activities are also carried out in the greenhouse of the nursery where decorative planting material is produced with active participation of university students and pupils of vocational secondary schools. The importance of the Arboretum from the plant conservation perspective is reflected in

the development of a system for the protection of the gene pool of rare, endangered, and protected tree species as well as in the improvement of breeding methods and conditions for reintroduction processes (Živanović et al., 2020).

Experiments are regularly conducted in the Arboretum of the Institute for Nature Conservation of Vojvodina Province in Novi Sad, thus directly contributing to the conservation of selected plant species. This research endeavor is a part of a larger global system in which the impact of climate change on early spring species is monitored, and experiments in eight Carpathian countries have been set up in the area. For example, in the Arboretum, the time of flowering and the emergence of first leaves of the genus *Galanthus* L. was monitored as a part of the “*Galanthus*” Global Warming Project 2020–2015 (200924 *Galanthus* HU-FÜR F118B). The flowering time of the extremely endangered species *Eranthis hyemalis* (L.) Salisb., which was transferred to the Arboretum from its natural habitat, is also monitored at this facility (Budak, 1999). Monitoring of flowering occurrence and species abundance has also been established in the natural habitat (Panjković et al., 2003; Panjković and Stojšić, 2009; Panjković et al., 2015; Popović et al., 2019).

### 1.10 IN SITU AND EX SITU CONSERVATION

At the global level, botanic gardens are playing an increasingly important role in plant conservation and have become anthropogenic refuges for many plant species that are endangered in nature or are on the verge of extinction. This direction of development of botanic gardens is a consequence of sound organizational strategies and scientific–professional collaborations that have been established over time. Today, botanic gardens are the most suitable spaces for the study and *ex situ* conservation of endangered plant species, which includes active methods and procedures of growing, as well as propagating and preserving plants outside their natural habitats under permanent professional supervision (Jovanović and Lakušić, 2006).

The program implemented in the Jevremovac Botanical Garden, is aimed at *ex situ* protection of rare, endemic, and threatened taxa of the flora of Serbia and the Balkan Peninsula. Thus, in addition to exotic plants, dendroflora of the Botanical Garden includes species that are endemo-relict to the Balkan Peninsula, such as *Forsythia europaea* Degen & Bald., *Picea omorika* (Pančić) Purk., *Pinus heldreichii* H. Christ, and *Pinus peuce* Griseb. In addition, there are many other rare and threatened, such as *Cardamine serbica* Panč., *Cardamine waldsteinii* Dyer, *Eryngium serbicum* Panč., *Genista nissana* Petrović, *Haberlea rhodopensis* Friv., *Helleborus serbicus* Adamović, *Paeonia officinalis* subsp. *banatica* (Rochel) Soó, *Paeonia peregrina* Mill., *Prunus tenella* Batsch, *Pulsatilla montana* (Hoppe) Rchb., and *Scopolia carniolica* Jacq.

The significance of the Jevremovac Botanical Garden is reflected in the presence of representatives of the family Gesneriaceae, endemic and relict species of the Balkan Peninsula, *Ramonda serbica* Panč. (Figure 1.8), and *Ramonda nathaliae* Petrović & Panč. (Figure 1.9) as well as the natural hybrid between these two species, which stands out as an exceptional curiosity. For more than 30 years these species have been successfully grown in the garden, while investigations and *in situ* conservation activities are continually conducted all over the Balkan Peninsula (Lazarević et al., 2013, 2014; Rakić et al., 2014).

Among the current *ex situ* conservation projects that also include active *in situ* conservation (which involves management of natural habitats and strengthening of natural populations viatranslocation), special attention is given to the restoration of the species *Cardamine serbica* Pančić (Figure 1.10), which is endemic to the Western Balkans (southeast parts of the Dinaric Arc). It has fragmented distribution at several locations in Montenegro, Bosnia and Herzegovina, and Serbia (Pančić, 1884; Jovanović-Dunjić, 1972; Kučera et al., 2008, 2010; Stupar et al., 2021). In Serbia, the entire population of this plant has been reduced to only one microhabitat in the western part, in the Drina canyon, near Perućac settlement. The conservation program includes the collection and conservation of its seeds and multiplication of plants for the purpose of strengthening the natural