LOGOTYPE

Central Fountain in Jardim Botânico Da Ajuda

A detail of the fountain was chosen as the emblem for the EuroGard VIII. At the center of the lower level of Jardim Botânico Da Ajuda stands a monumental fountain, the Fonte das Quarenta Bicas (Fountain of the Forty Spouts). The eighteenth-century fountain has actually forty-one water spouts, disguised as serpents, fish or sea horses. Plenty more statues of frogs, shells and ducks decorate the fountain which is placed in the middle of a large basin filled with water plants.

This fountain represents the idea that there was about aquatic animals at XVIII century, and represents also the aquatic biodiversity rarities, as the horses' sea in the top of it.

Presently, represents the fountain of knowledge, since the Botanic Garden, the laboratories of Chemistry and Physics, the House of Drawing and the Natural History Office had made part of the first museology center of Natural History in Portugal.

BOOK OF ABSTRACTS

8th EUROGARD Congress

Lisboa, May 7th-11th 2018

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Designed by: Léna Dos
Gabriella Sógor
Mattia Spagnolo
Edition: ISBN 978-972-8669-75-1
Copies printed: 300
Published by: ISA Press/LEAF
Printed by:
Depósito legal:

EUROGARD VIII

BOTANIC GARDENS, PEOPLE AND PLANTS FOR A SUSTAINABLE WORLD

In support of The United Nations Decade on Biodiversity
and the European Green Week

United Nations Decade on Biodiversity

EU GREEN WEEK | GREEN CITIES FOR A GREENER FUTURE
#EUGREENWEEK
21 > 25 May 2018

Com o alto Patrocínio de Sua Excelência
O Presidente da República

Organized by

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LINKING LANDSCAPE, ENVIRONMENT, AGRICULTURE AND FOOD

Jardim Botânico da Ajuda

With the patronage of

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Convention on Biological Diversity

The Global Partnership for Plant Conservation

Co-organized by

AIMJB

BGCI
Plants for the Planet

EUROPEAN BOTANIC GARDENS CONSORTIUM
European Botanic Gardens Consortium

With the support of

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IrisBG
Botanical Garden Collection Management
Making Record Keeping Easier

Nezahat Gökyiğit Botanik Bahçesi

PTP
Plants People Planet

WELCOME

On behalf of the European Botanic Gardens Consortium, the University of Lisbon and Jardim Botânico da Ajuda (Botanic Garden of Ajuda) on the occasion of its 250th annversary are delighted to invite you to participate in the 8th European Congress of Botanic Gardens – EuroGard VIII, that will be held in Lisbon, 7th-11th may 2018.

Under the theme "Botanic Gardens, People and Plants for a Sustainable World", it is intended to address many of the issues to which Botanic Gardens are contributing, in particular raising public awareness of environmental conservation challenges that our planet faces.

Biodiversity conservation and regulations, and collaborations with developing countries or countries in economic transition, regarding the implementation of the Global Strategy for Plant Conservation, remain the main objectives of Botanic Gardens.

EuroGard VIII aims to bring together the participation of all Botanic Gardens in Europe and other regions such as North Africa, which together with the countries of Southern Europe, constitute one of the most important hotspots in the world – the Mediterranean Region.

Moreover, the 15th Symposium of the Ibero-Macaronesian Association of Botanic Gardens will take place at the same time, during which the aim is to assess the work carried out to meet the Aïchi Biodiversity Targets adopted by the Iberian-Macaronesian botanic gardens for 2020.

Dalila Espírito Santo
Head of Eurogard VIII Congress

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THE CONGRESS

The congress is part of a series of European Botanic Gardens Congresses or EUROGARD which aims at strengthening the capacity and collaboration among European botanic gardens as well as deepening their role in the society at large. EuroGard congresses are organised every three years by the hosting institution and the European Botanic Gardens Consortium with support from Botanic Gardens Conservation International.

THE CONGRESS HOST - Jardim Botânico da Ajuda (JBA)

In 1755, most of the downtown area of the city of Lisbon was destroyed by a catastrophic earthquake and tidal wave. The king, D. José I, decided to move the royal residence to safer ground on the hillside of Ajuda. Refusing out of fear to live in any buildings made of stone, the king instead ordered the construction of a royal pavilion made entirely out of wood, which was completed in 1756. Once installed with his family, D. José ordered the construction of an adjoining botanical garden for the education and entertainment of his grandchildren, Prince José and Prince João (the future King João VI), sons of the king's daughter, D. Maria I.

To build the garden, D. José sent for Domingos Vandelli, a naturalist from Padua, who started work in 1764. The Real Jardim Botânico da Ajuda (Royal Botanic Gardens of Ajuda) was founded around 1768 and was the first botanical garden in Portugal, occupying an area of 3.8 hectares and composed of two south-facing terraces, forming a unique vantage point from which visitors can enjoy a magnificent view of the River Tagus. In the late 18th century, botanical missions to Portugal's overseas colonies greatly enriched the collection, which at that time grew to around 5,000 specimens.

During the French invasions of the early 19th century, many of the garden's botanical specimens were removed to Paris by order of General Junot. However, the garden survived, and through the professional care of Felix de Avelar Brotero managed to regain its prestige. In 1873, with the completion of another botanical garden at the Escola Politécnica, the botanical function of the Ajuda Garden came to an end. The garden passed to the administration of the royal palace and, once again, became a space of leisure for the Portuguese royal family.

With the establishment of the Portuguese Republic in 1910, the garden was renamed as the Jardim Botânico da Ajuda and placed under the care of the Instituto Superior de Agronomia (ISA), which performed a major renovation. The garden has been open to the public ever since, and in recent years has been used to support the ISA course in Landscape Architecture and other courses of Lisbon University.

At the end of the 20th century, the ISA applied successfully for European Commission funding to conserve the architectural heritage of the garden. The funding allowed for important restoration works: between 1994 and 1997, under the guidance of Professor

Cristina Castel-Branco, the architectural and sculptural features of the two terraces were cleaned and restored, and the stone beds that house the botanical collection on the upper terrace were rebuilt according to drawings from 1869. The checkerboard-like pattern of 1,200 stone beds containing herbaceous and small shrubs is organised by phytogeographic area, according to the layout of the bicentennial trees already established in this area. At the same time, the cottage near the Calçada da Ajuda gate was restored and the Jardim de Aromas (scent garden) constructed. In a lively addition to the garden, the greenhouse near the Calçada do Galvão gate was converted into a restaurant, Estufa Real. Also on this occasion the Association of Ajuda Botanic Garden Friends was founded. This Association has an annual program of different kinds of courses related to nature and gardening, organizes cultural excursions all over the world, in particular, to gain knowledge of the art and history of Gardens but also for observation of Nature, and it is responsible for the restoration works made to the JBA in the last years.

Despite the many challenges faced by the Jardim Botânico da Ajuda, most of the original vegetal elements remain to this day, especially its magnificent trees, which include a Dracaena draco, a Ficus microcarpa and a Ficus macrophylla, a Schotia afra and a Ocotea foetens. The live collection in open space has been rebuilt over the years and today numbers 1,602 taxa, all of them labelled. The collection of the orchids of D. Luís I is being restored by Tuliikkii and Pekka Ranta, a Finnish couple who have a collection of 10 000 orchids, at this moment divided between JBA and Jardim Botânico do Faial. The collection of cactus and other xerophytic plants is also under development in another green house. Under the current direction, a seed bank (Banco de Sementes Prof. João do Amaral Franco) was founded in 2010 and since this date has contributed to the Millennium Seed Bank and store of Serra da Arrábida (a protected area) seeds, according to biodiversity conservation principles.

The Jardim Botânico da Ajuda is a space for everyone. Besides its educational and research functions, its airy terraces are the perfect place to go for a gentle stroll and take in the serene beauty of the River Tagus flowing below. It has a programme of guided tours for schools and the general public and organizes very popular cultural events like the Spring Festival.

For more information visit: **www.isa.ulisboa.pt/jba**

CONGRESS VENUE

University of Lisbon – Rectorate building

The University of Lisbon is a public research university in Lisbon, and the largest university in Portugal. It was founded in 2013, from the merger of two previous public universities located in Lisbon, the former University of Lisbon (1911–2013) and the Technical University of Lisbon (1930–2013). The history of a university in Lisbon dates back to the 13th century.

SOCIAL PROGRAMME

GUIDED VISITS

Monday, May 7th, 16:00

To Tropical Botanical Garden

Largo dos Jerónimos, nº 1. Belém, Lisboa

Tuesday, May 8th, 15:30

To Botanical Garden of Lisbon and National Museum of Natural History and Science

Rua da Escola Politécnica 56/58, Lisboa

Thursday, May 10th, 15:00

To Estufa Fria

Parque Eduardo VII, between Alameda Engenheiro Edgar Cardoso and Alameda Cardeal Cerejeira, Lisboa

PRE-SYMPOSIUM EXCURSION FROM LISBON TO PORTO

Wednesday, May 2nd 8:00 ***(from Museu da Cidade, Campo Grande)*** **- May 5th**

This four-day trip will enable you to discover the landscape art of the historical and botanical gardens of Northern and Central Portugal. You will discover recreational estates, monastic grounds, manor gardens and botanical gardens (Porto and Coimbra) and the Alto Douro Vinhateiro landscape – notable examples of the cultural and artistic expression of various periods and styles ranging from the Middle Ages to the 20th century.

MID-SYMPOSIUM EXCURSION FROM LISBON TO SINTRA

Wednesday, May 9th, 8:15 ***(from the Rectory of the University of Lisbon)*** **- 19:30**

Mid-symposium excursion will be held in Sintra. Cultural Landscape of Sintra was classified World Heritage by UNESCO in 1995.Parques de Sintra-Monte da Lua S.A. (PSML) has, among other missions, the responsibility to manage the most important natural and cultural values located in the area of the Cultural Landscape of Sintra and in Queluz: the Park and Palace of Pena, the Gardens and the Palace of Monserrate, the Moorish Castle, the Convent of the Capuchos, the Garden and Chalet of the Countess of Edla and, since 2012, the National Palaces of Sintra and Queluz and the Portuguese School of Equestrian Art based at the historic Gardens of Queluz, with performances and training sessions, open to the general public at the Henrique Calado Riding Ring (Belém). The management of these properties involves their restoration, requalification, revitalisation, conservation, research, publicity and operation, opening them to public fruition and enhancing their touristic valour.

POST-SYMPOSIUM EXCURSION FROM LISBON TO AZORES ISLANDS

From Saturday, 12th May, 12:30 – 18th May, 18:10 ***(Airport of Lisbon, Terminal 1)***

Located on the Mid-Atlantic Ridge, the archipelago of the Azores is the

westernmost part of Europe and the meeting point of unique plant species. Of recent volcanic origin and a temperate oceanic climate, the Azores are an isolated archipelago spread in 9 islands along 600Km. The rich natural history associated with a recent but intensive human settlement, show a diversity of habitats and landscapes where colonization, adaptation and speciation processes are evolving before our eyes. From peat bogs to lava flows of chasmophyte vegetation and Laurel forest, Azorean endemic vegetation is an interesting and beautiful starting point for a visit to one of the hidden gems of the Atlantic.

A journey across three Azores islands.

This seven-day trip will enable you to discover the landscape and gardens of Faial, Flores and S. Miguel, Azores islands

WELCOME DINNER

Monday, May 7th 19:00

Museu Dos Coches

Avenida da India 136., 1300-004 Lisboa

JBA'S 250TH ANNIVERSARY CELEBRATION

Tuesday, May 8th 19:00

Jardim Botanico da Ajuda

Calçada Ajuda, 1300-011 Lisboa

GALA DINNER

Thursday, May 10th 20:00

Pavilhão de Exposições

Tapada da Ajuda, Lisboa

Grounds and Monastery of Tibães

Gardens and the Palace of Monserrate

Landscape of the Azores islands

THEMES

Theme A: Botanic Gardens and Science

A1:Reproductive systems and conservation strategies: understanding the relevance of sexual and asexual reproductive systems for plant collections

A2: Spore Plants – Bryophytes, Ferns and Fern Allies: taxonomy, evolution, ecology and conservation biology

A3: Genetic structure of plant populations to provide practical insight for conservation work

A4: Ecological studies of plant species that are rare or from threatened habitats

A5: Seed science research

A6: Plant-pollinator interactions in botanic gardens

A7: The role of tropical plant collections in European botanic gardens in assisting international conservation efforts

A8: The biology of invasive species, novel approaches to control methods

A9: Understanding evolutionary and migratory processes

A10:Sustainability of horticultural practices including integrated pest management, pest and disease resistance, drought and salt tolerance, climate-adapted plants, green roofs, fair trade and organic produce etc.

Theme B: Botanic Gardens and Global Change

B1: Long-term, multidisciplinary research into the impacts of global/climate change on plant populations and ecological communities, and vice-versa (e.g., assessing vulnerability of local species and communities, collecting weather data, monitoring phenological and other responses to climate change);

B2: In situ and/or ex situ conservation of climate sensitive species;

B3: Assisted migration;

B4: Potentially invasive aliens, including plant pathogens, pests and diseases;

B5: New and/or adapted collection policies taking into account changing climatic situations;

B6: Development of garden management plans for improved sustainability;

B7: Studies on greening cities, e.g. horticultural practices to regulate microclimates or new tree varieties for urban sites;

B8: New involvement of garden visitors in helping to create awareness about human contributions to global change (e.g. through citizen science projects);

B9: Best practice examples for involving political, social, religious, and economic leaders in the development of policies and practices addressing the social and biological impacts of global change.

Theme C: Biodiversity conservation activities

C1: In situ conservation – managing and maintaining nature reserves and other

areas of natural vegetation, including ecological restoration (GSPC Target 4)

C2: Identifying important areas of plant diversity for conservation action (GSPC Target 5)

C3: Conserving threatened species complimentary approaches linking in situ and ex situ conservation (GSPC Targets 7 and 8)

C4: Conserving crop wild relatives and other socio-economically important plants (GSPC Target 9)

C5: Seed banking for long term conservation and insurance (GSPC Targets 8 and 9)

Theme D: Role of Botanic Gardens in the Education Programmes

D1: Learn about the work being carried out by botanic gardens to save and conserve the world's flora;

D2: Gain first-hand experience of plants and appreciate 'nature' as a whole;

D3: Acquire practical skills and theoretical aspects of plant conservation, propagation and landscaping;

D4: Develop the attitudes, behaviours and skills necessary to solve environmental problems.

D5: Provide on-line resources for students and general public.

Theme E: Sustainability of Botanic Gardens

E1: Sustainability policies, strategies, assessments and evaluations in botanic gardens

E2: Staff related projects on sustainability

E3:Citizen science projects on sustainability

E4: Interactions with local, national or international initiatives on sustainable development

E5: Innovative building or planning activities fostering sustainability

E6: Sustainable operation – innovative solutions and good practices

E6.1: for productive intellectual and physical work

E6.2: for saving resources – energy, water, raw materials, waste salvage, etc.

E6.3: for reduction of emissions – heat, air pollution, waste, noise, light

E6.4: for recycling, composting or renewable energy options

E7: Environmentally friendly practices in horticulture and garden management

E8: Sustainable approaches for fundraising for botanic gardens

Theme F: Heritage, Culture and Tourism in Botanic Gardens

F1: Not just knowledge about plants, but also their connection with human history. Good examples could be edible, medicinal or useful plants and their impact for human civilization development.

F2: Examples how plants changed people's history (potatoes, maize, tea, sugarcane

etc.). To find a way how to present it to public could be a way how to attract more visitors to botanic gardens. To tell stories about plants could be a new aim how to present them to the people.

F3: The history of botany and botanical research as an exciting ongoing process of attempts to understand and classify the "green world".

F4: The development of ingenious horticultural skills, tools, and infrastructures to safeguard the survival of plants for display, research and conservation.

And also:

- Tourism and Botanic Gardens.
- Historical, architectural and cultural heritage of botanic gardens.
- Botanic gardens and the link to the city and universities.
- The restoration and conservation of historic botanic gardens.
- Sustainable tourism (International year)

XV Symposium AIMJB: Spanish and Portuguese Botanic Gardens challenges and responsibilities in the countdown to 2020

Botanical Gardens should have a determinant role in support of the Global Strategy for Plant Conservation as well as the CBD's Strategic Plan for Biodiversity 2011-2020 as emerged from the Eurogard VII. In the countdown to 2020 is time for evaluate the progresses and also to identify main gaps and establish priorities.

In Iberian Peninsula and Macaronesia, Botanical Gardens can have a decisive role in this commitment, promoting initiatives, developing research or building capacity, among others.

Two years before the established deadline, the XV. Symposium AIMJB can be an opportunity to present results, share experiences and concerns, propose solutions and new insights, in short providing a 'finger on the pulse' of Iberian and Macaronesian plant diversity conservation status facing the 2020 goals.

Botanic gardens should have a central role in support of the Global Strategy for Plant Conservation, as well as the CBD's Strategic Plan for Biodiversity 2011-2020. In the countdown to 2020 this is time for evaluate the progresses and also to identify main gaps and establish priorities. In Iberian Peninsula and Macaronesia, botanic gardens can have a decisive role in this commitment, for example, promoting initiatives, developing research or building capacity. Two years before the

established deadline, the XV Symposium AIMJB can be an opportunity to present results, share experiences and concerns, propose solutions and new insights, in short, providing a 'finger on the pulse' of Iberian and Macaronesian plant diversity conservation status facing the 2020 goals.

Where are we up to now, regarding these goals?

In the XV AIMJB Symposium we aim to address the issues established in 2002, when the GSPC was adopted by the Convention on Biological Diversity:

- Is plant diversity well understood, documented and recognized?
- Is plant diversity effectively conserved?
- Is plant diversity used in a sustainable and equitable manner?
- Are education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth being promoted?
- Are the capacities and public engagement necessary to implement the Strategy developed?

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DETAILED PROGRAMME

DAY 0 SUNDAY, MAY 6TH, 2018

9:00 I 18:00 Hotel Pestana Sintra Golf

EUROPEAN BOTANIC GARDENS CONSORTIUM MEETING

Hall ground floor (Rectorate building)

15:00 I 18:00 **EUROGARD REGISTRATION**

DAY 1 MONDAY, MAY 7th, 2018

Hall ground floor (Rectorate building)

8:00 I 10:00 **EUROGARD WELCOME, REGISTRATION AND POSTER INSTALLATION**

Room A

10:30 I 11:15 **CONGRESS OPENING CEREMONY** *chair: Dalila Espírito-Santo*

CEREMONY TO LAUNCH PHILATELIC SERIES COMMEMORATING THE 250 YEARS OF JARDIM BOTÂNICO DA AJUDA

Humberto Delgado Rosa – Director for mainstreaming adaptation and low carbon technology in DG Climate Action, European Commission

Paul Smith – President of BGCI

João Barreiros – Vice-rector of Universidade de Lisboa

Amarílis de Varennes – President of Instituto Superior de Agronomia

Helena Oliveira – President of Linking Landscape, Environment, Agriculture and Food Research Unit

Hall first floor

11:15 I 11:30 COFFEE BREAK

Room A

BOTANIC GARDENS, PEOPLE AND PLANTS FOR A SUSTAINABLE WORLD

Opening Conference

11:30 I 12:10 **K01** ***Viriato Seromenho Marques***

The Garden As A Blueprint For A Sustainable Society In The Epoch Of The Global Environmental Crisis

Theme A

BOTANIC GARDENS AND SCIENCE

12:10 I 12:50 **K02** ***Paul Smith***

Botanic Garden Science: Bridging The Gap Between Research And Practice

13:00 I 14:20 LUNCH

Room A

14:30 I 16:10 **Theme A - Session 1** *chair: Eleni Maloupa*

UNDERSTANDING PLANT PROCESSES

(O001) A1 ***Joachim Gratzfeld***

Conservation Horticulture In Times Of Rapid Change – A Fundamental, Yet Underappreciated Role Of Botanic Gardens

(O002) A2 ***Gerda A. van Uffelen***

Apg4 Translated Into Plants- An Updated Systematic Garden

(O003) A3 ***Andrea Kodym, Frank Schumacher, Angelika Senula, Ovidiu Paun, Erwin Köllner, Eva M. Temsch, Rebecca Hood-Nowotny, Tamas Hatfaludi, Olga N. Sekurova, Sergey B. Zotchev & Michael Kiehn***

Conservation Biotechnologies For Endangered Plants In Austria – Using Artemisia Laciniata (Asteraceae) As A Model Species

(O004) A4 ***Sofia Conceição, Ana Sofia Róis, Ana D. Caperta***

Utilization Of Limonium Ex Situ Collections To Study The Occurrence Of Apomixis

(O005) A5 ***Marcin Zych, Justyna Ryniewic, Katarzyna Roguz, Emilia Brzosko, Ada Wróblewska, Izabela Tałałaj, Beata Ostrowiecka, Edyta Jermakowicz, Paweł Mirski***

Effect Of Population Size And Pollinator Availability On The Reproductive Success, Mating System And Population Genetics Of Polemium Caerleum, A Red-Listed Plant

16:10 I 16:30 COFFEE BREAK

Room A

16:30 I 18:30 **Theme A - Session 2** *chair: Ana Caperta*

THE IMPORTANCE OF KNOWLEDGE FOR CONSERVATION ACTIONS

(O006) A6 ***Heidi Lie Andersen, Samson Næss, Per Harald Salvesen***

Genetic Structure Of The Norwegian Vulnerable Rosa Spinosissima As An Example Of The Importance Of Knowledge For Conservation Actions

(O007) A7 ***Katherine O'Donnell, Suzanne Sharrock, Charles Lane, Richard Baker***

The International Plant Sentinel Network

(O008) A8 ***Chantal Dugardin, Paul Goetghebeur***

Coping With Pests In A Small Botanic Garden: 20 Years Of Integrated Pest Management

(P005) A9 ***Alexandr Demidov, Irina Bondorina, Svetlana Potapova***

The Collections Of The Main Botanical Garden Named After N. V. Tsitsin Of The Russian Academy Of Sciences As A Basis For A Wide Range Of Research Work

(P006) A10 ***Anna Rucińska, Jerzy Puchalski, Maja Boczkowska, Anna Kębłowska, Adam Kapler, Maciej Niemczyk, Arkadiusz Nowak***

The New Approach Of Dna Markers Application With Species-Specific Recommendations For Genomic Conservation Of Chosen Highly Threatened Species Of Polish Flora

(P007) A11 ***Maris Rattur, Ruth Aguraiuja***

The Role Of Microhabitat Conditions On The Survival Of Reintroduced Woodsia Ilvensis Sporophytes

(P008) A12 ***Harry Lorenzi***

Ex Situ Plant Conservation In The Plantarum Botanical Garden (Brazil) Of Native Species Extinct In The Wild

(P009) A13 ***Frank Schumacher, Barbara Knickmann, Michael Kiehn***

Horticulture For Science And Conservation: Needs For Horticultural Skills And Resources In Plant Sciences, Conservation And Other Biological Disciplines – With Examples From The Botanic Garden, University Of Vienna

(P010) A14 ***Lauma Strazdiņa, Inese Nāburga-Jermakova, Signe Tomsone***

Development Of Evaluation System For Herbaceous Plant Adaptation – A Tool For Invasion Risk Assessment

(P011) A15 ***David Alves, João Loureiro, Paulo Silveira, António Gouveia, Sílvia Castro***

Mixed Mating Strategy Guarantees Reproduction Under Limited Pollination Resources In The Endemic Verbascum Litigiosum Samp

(P012) A16 ***Kenneth Bauters, Marc Reynders, Elke Bellefroid, Danny Swaerts, Kenny Stevens, Koen Es, Piet Stoffelen, Steven Dessein***

A Walk Through The Diversity And Origin Of Wild And Garden Roses

(P013) A17 ***Sandra Mesquita, Jorge Capelo, Miguel Menezes de Sequeira, Dalila Espírito-Santo***

Plant Lists For Ajuda Botanical Garden From The 18th And 19th Centuries: Preliminary Results Of A Biogeographical Analysis

Room B

14:30 I 16:10 **WORKSHOP - OTOBUR™**

Complete Solution to the Data Management Challenges for Botanic Garden

16:10 I 16:30 COFFEE BREAK

Room B

16:30 I 17:50 **Theme A - Session 3** *chair: Rui Figueira*

DATA BASES

(O009) A18 ***Nils Köster, Jeannine Marquardt***

What Grows Where? Towards An Infrastructure To Connect Collections Of Botanic Gardens For Research And Conservation

(O010) A19 ***Suzanne Sharrock***

BGCI's Databases, Tools To Support Plant Conservation Prioritisation And Practice

(O092) A20 ***Dawn Edwards***

Recording Cultivated Plant Biodiversity To Safeguard Urban Ecologies

(P014) A21 ***Nicole Cavender, Murphy Westwood, Sue Paist***

Increasing International Institutional Standards, Goals, And Capacity For Arboreta Through Arbnet, The World's Only Arboretum Accreditation Program

17:50 I 18:50 **WORKSHOP**

Introduction to IrisBG: Advanced Collection Management Made Easy

Room C

14:30 I 16:30 **AIMJB SYMPOSIUM** *chair: J. Hernandez Bermejo*

(O087) AIM1 ***Pedro Casimiro, Rosana Fraga, João Melo***

Faial botanic garden expansion, an ex-situ conservation project of azores natural flora

(O088) AIM2 ***Magdalena Vicens, Joan Vidal, Magdalena Bibiloni, Eduard Cirer, Jaume Seguí, Giuseppe Fenu, Bertrand de Montmollin***

Actions for conservation of the endangered mediterranean islands flora: the care-mediflora project in balearic islands

(O089) AIM3 ***Carine Azevedo, António Gouveia***

Plants and heritage: the tropical greenhouse of the botanic garden of the University of Coimbra

(O090) AIM4 ***Victoria Eugenia Martín Osorio, Rocío González Negrín, Wolfredo Wildpret De La Torre, Wolf-Hermann Wildpret Martin***

A sustainable garden in the botanic garden of pirámides de güímar, tenerife, canary islands.

(O091) AIM5 ***Paula Redweik, Magda Sousa, Maria Cristina Duarte***

Enhancing botanic and historic information through 3d technology: the tropical botanic garden in lisbon

(P001) AIM6 ***María Del Mar Gutiérrez Murillo***

The attractiviness of ethnobotanical heritage of iberomacaronesian botanical gardens

(P002) AIM7 ***Jose Alfredo Reyes-Betancort, Cristina González-Montelongo, Giancarlo Torre***

Rediscovering the pteridophytes of the jardín de aclimatación de la orotava (tenerife, canary islands)

(P003) AIM8 ***Silvia Villegas, Nuria Prieto, Leopoldo Medina***

Living collections in the royal botanic gardens csic. Bringing together the knowledge of the uniqueness and diversity of the iberian flora

(P004) AIM9 ***Álvaro Queiróz, Dalila Espírito-Santo, Wanda Viegas, Maria Manuela Veloso***

Wild pyrus in portugal: distribution and diversity assessment

16:30 I 16:45 COFFEE BREAK

Room C

16:45 I 18:30 **AIMJB GENERAL ASSEMBLY**

DAY 2 TUESDAY, MAY 8th, 2018

Room A

Theme B

BOTANIC GARDENS AND GLOBAL CHANGE

9:00 I 10:10 **K03** ***Tim Entwisle***

R-E-S-P-E-C-T: How Botanic Gardens Should Response To Climate Change

10:10 I 11:00 **Theme B - Session 1**

EXAMPLES OF POLICIES AND PRACTICES *chair: Mats Havström*

(O011) B1 ***José Sá Fernandes***

Biodiversity Local Action Plan (Blap): A Governance Tool To Spread The Green

(O012) B2 ***Audrius Skridaila, Ramunė Žiemgulytė, Irena Žiemytė, Silva Žilinskaitė***

How To Decide What Plant, What Accession Or What Collection Are Important In Your Garden?

(O013) B3 ***Tommy Prestø***

Should We Stay Or Should We Go? Land Use, Climate Change And Sustainability Of An Alpine Botanical Garden In Norway

(O014) B4 ***Jože Bavcon, Blanka Ravnjak***

City Trees and Role Of Botanic Gardens

11:00 I 11:30 COFFEE BREAK

Room A

Theme C

BIODIVERSITY CONSERVATION ACTIVITIES

11:30 I 12:10 **K04** ***Peter Wyse Jackson***

Developing and Implementing An Effective Plant Conservation Program For Individual Botanic Gardens

12:10 I 13:00 **Theme C - Session 1** *chair: Maïté Delmas*

CONSERVATION ACTIONS

(O021) C1 ***Suzanne Sharrock, Helen Miller***

Capacity Building for Plant Conservation

(O022) C2 ***Patrick Schwager, Christian Berg***

Using Two Approaches Of Species Distribution Modelling (Glm, Maxent) To Find New Sites For Seed Collecting. A Case Study In The Eastern Alps (Styria)

13:00 I 14:20 LUNCH

Room A

14:30 I 15:30 **Theme C - Session 2** *chair: Marko Hyvärinen*

EX SITU AND IN SITU CONSERVATION

(O023) C3 ***Emily Beech, Kirsty Shaw, Malin Rivers***

The Global Trees Campaign – Safeguarding The World´s Threatened Trees From Extinction

(O024) C4 ***Nikos Krigas , Panayiotis Trigas, Irini Vallianatou, Theophanis Constantinidis, Konstantinos Theodoropoulos,Photini Mylona, Nikos Pangas, Evi Matiatou, Sotiris Porevis, Eleni Maloupa***

Ex Situ Plant Conservation In Greece: The Role Of The Newly Established Network Of The Greek Botanic Gardens

(O025) C5 ***Heli Fitzgerald, Åsmund Asdal, Elina Kiviharju, Anna Palmé, Hjortur Thorbjornsson, Jens Weibul***

Nordic Countries Join Forces In Crop Wild Relative Ex Situ And In Situ Conservation

15:30 I 16:10 **CELEBRATION OF THE 250TH ANNIVERSARY OF JARDIM BOTÂNICO DA AJUDA**

K05 ***Cristina Castel-Branco, Ana Luísa Soares, Teresa Chambel, Francisco Castro Rego***

Ajuda Botanic Garden Restoration: Lessons From 20 Years Of History

14:30 I 15:30 COFFEE BREAK

Room A

16:30 I 18:00 **Theme C - Session 3** *chair: Peter Wyse Jackson*

PLANT CONSERVATION STRATEGIES

(O026) C6 ***Maïté Delmas, Denis Larpin, Serge Muller***

Preserving The Flora Of The French Overseas Communities And Territories In Situ And Ex Situ Challenges

(O027) C7 ***Lyudmyla Buyun, Marina Gaidarzhy, Andriy Prokopiv***

Living Collections Of Tropical Plants As National Heritage Collections Of Ukraine

(O028) C8 ***Marko Hyvärinen, Satu Jovero, Pertti Pehkonen, Leif Schulman***

Conservation Of Tropical Montane Forest In Taita Hills – How A Botanic Garden Could Make A Difference

(O029) C9 ***Ruth Aguriuja, Anne Irgens, Johan Lie, Finn Eirik Modahl, Harald Sodemann, Asgeir Sortebberg***

From Single Individual Conservation To The Restoration Of Natural Populations Of Critically Endangered Fern Species

(O030) C10 ***Hart Joke 'T, Ek Renske , Dick Van Dijk***

Botanic Guardians: 25 Dutch Botanic Gardens Cooperate As Botanic Guardians To Preserve Biodiversity

(P020) C11 ***Daniele Trebbi, Piergiorgio Stevanato, Eleni G. Papazoglou, Panayiotis Trigas***

Genetic Diversity Assessment Of Selected Jatropha Curcas Accessions – Implications For Conservation Management

(P021) C12 ***Sílvia Castro, Mariana Castro, João Loureiro***

Cryptic Cytogenetic Diversity: Where Does It Stand In Plant Conservation Strategies?

(P022) C13 ***Romana Rybková, Jana Leong Škorničková, Otakar Šída, Jan Ponert, Andrey N. Kuznetsov, Vlastik Rybka, Karel Petrželka***

Botanical Research Of Prague Botanical Garden In Southern Vietnam

Room B

9:00 I 11:00 **Theme B - Session 2** *chair: Amélia Loução*

BIG PICNIC

(O018) B5 ***Liliana Derewnicka, Helen Miller***

Bigpicnic: Influencing Responsible Research And Innovation In Food Security

(O019) B6 ***Koen Es, Jutta Kleber***

Your Food, My Food: Co-Creating Global Stories At Botanic Garden Meise

(O020) B7 ***Raquel Barata, Ana Teresa Neves, Elsa Prates, Tânia Ferreira***

Plants For Dinner? Team-Based Inquiry For Promoting Healthy And Sustainable Food

(P015) B8 ***Gabriele Rinaldi, Francesco Zonca***

Biodiverse Cart: A Mobile Exhibit Around Food Security Public Engagement

(P016) B9 ***Gabriele Rinaldi, Francesco Zonca***

Teenage Target: Education On Food Choices And Environmental Awareness

(P017) B10 ***Roderick Bouman, Hanneke Jelles***

Big Picnic In The Systematic Garden

(P018) B11 ***Hanneke Jelles, Paul Keßler, Roderick Bouman***

Plant And Eater

(P019) B12 ***María Bellet Serrano, Elena Amat De León Arce & Blanca Olivé De La Puente***

Science Cafés And Food Security

11:00 I 11:30 COFFEE BREAK

Room B

12:10 I 12:50 **Theme B - Session 3** *chair: Biserka Juretić*

SOCIAL CHALLENGES

(O015) B13 ***Krasimir Kosev , Vera Dyankova***

Botanic Gardens Raising The Social Role – Mission Possible

(O016) B14 ***Nicole Cavender, Gerard Donnelly***

Intersection Of Professional Gardens And Urban Forestry To Address Big Challenges

(O017) B15 ***Antal Radvánszky, Vince Zsigmond***

Eastcentgard – Networking Of Botanic Gardens In The Eastern And Central European Region

13:00 I 14:20 LUNCH

Room B

14:30 I 15:50 **Theme C - Session 4** *chair: Suzanne Sharrock*

RESTORATION AND CONSERVATION

(O031) C14 ***Martin Gardner***

Using Every Opportunity To Cultivate And Conserve

(O032) C15 ***Yvette Harvey-Brown***

Botanic Gardens: Working Together To Improve The Quality And Volume Of Science-Based Ecological Restoration

(O033) C16 ***Sean Hoban, Murphy Westwood, Nicole Cavender***

Scientifically Informed Ex Situ Collection Guidelines: Examples In Quercus And Fraxinus

16:10 I 16:30 COFFEE BREAK

Room B

16:30 I 17:45 **Theme C - Session 5** *chair: Manuela Veloso*

PRESERVING BIODIVERSITY

(O034) C17 ***Joanna Gadzińska, Monika Rekoś, Justyna Wiland-Szymańska***

The Role Of Landscape Zonation Of The Botanical Garden Network In The Saving The Geodiversity And Biodiversity In Europe – Case Study Of Poland

(O035) C18 ***Taran Aleksandr***

The Role Of The Sakhalin Botanical Gardens In Preserving The Biodiversity Of The Flora Of Sakhalin And The Kuril Islands

(O036) C19 ***Paulo Farinha-Marques, Filipa Guilherme, Joana Tinoco***

Urban Habitat Survey In Porto Botanical Garden

(P023) C20 ***Jerzy Puchalski, Anna Rucińska, Pawel Kojs, Magdalena Maślak, Justyna Wiland-Szymańska, Grażyna Szymczak & Leszek Trząski***

New Efforts For Integrated Ex Situ And In Situ Conservation Of Polish Rare And Threatened Plants By Means Of Seed And Dna Banking And Natural Populations Restitution – Florintegral Project

(P024) C21 ***Asta Klimienė, Liuda Razmuvienė***

Creation Of Semi Natural Habitat For Coastal Plants In The Ku Botanic Garden: Experience And Problems

Room C

9:40 I 11:00 **Theme C - Session 6** *chair: Michael Kiehn*

TARGET 8 OF THE GSPC IN EUROPE

(O041) C22 ***Katherine O'donnell, Suzanne Sharrock, Helen Miller***

The Global Seed Conservation Challenge

(O042) C23 ***Megan J. Engelhardt***

Conserving The Flora Of Missouri And Beyond: Ex Situ Conservation Of Missouri´S Flora Through Seed Banking

(O043) C24 ***Andreas Ensslin, Sarah Bürli, Markus Fischer***

Ex Situ Plant Conservation And Reintroduction By Botanic Gardens: Establishing A Programme To Safeguard 100 Priority Species In Switzerland

(O044) C25 J. ***Esteban Hernández Bermejo, Francisca Herrera Molina, Marta Hernández Clemente, Catuxa Novo Estébanez***

Towards A Germplasm Bank Of Old Varieties Of Pomegranate In The Alhambra And Generalife (Granada, Andalusia. Spain)

11:00 I 11:30 COFFEE BREAK

Room C

12:10 I 13:10 **Theme C - Session 7** *chair: Elinor Breman*

TARGET 8 OF THE GSPC IN EUROPE (CONT.)

(O045) C26 ***J. Ignacio Alonso Felpete, Magdalena Vicens Fonrés, Alvaro Bueno Sanchez, Inmaculada Porras Castillo, Agustí Agut Escrig, Elena Estrelles Perpiña , Elena Torres Lamas, Ester Vega Elices, Francisca Herrera Molina, Joseba Garmendia Altuna, Alicia Roca Salinas, Miriam Aixart Sahun & Blanca Lasso De La Vaga***

Progresses Towards Reaching GSPC Target 8 By The Spanish Network Of Seedbanks (Redbag) And The Ibero-Macaronesian Botanic Gardens Association (Aimjb)

(O046) C27 ***Pedro G.P. Casimiro, Cátia F. Freitas , João M.B. Melo***

Seed Bank Of Azores, An Instrument For Sustainability

(O047) C28 ***Justyna Wiland-Szymańska, Alicja Kolasińska , Piotr Gawlak, Ryszard Piotrowicz, Sylwia Jurzyk-Nordlöw, Piotr Waloch, Wróbel Mariola, Furdyna Artur, Krzysztof Adamczak***

Reintroduction Of *Groenlandia densa* (L.) Fourr. A Species Extinct In Poland – A Preliminary Approach

13:10 I 14:20 LUNCH

Room C

14:30 I 15:30 **Theme D - Session 1** *chair: Raquel Barata*

EDUCATION PROGRAMMES

(P026) D1 ***Vallianatou,Spanidi E., Gardikis K., Tsoukalas A., Fanouriou E., Koutsianas A***

"Hippocrates Botanical Garden Of Markopoulo, Apivita & Apigea" And The "Vovousa Project"

(P027) D2 ***María Bellet, Blanca Olivé***

A Key Tool To Improve Education Programs In Spanish Botanic Gardens

(P028) D3 ***Camen-Comănescu Petronela***

The Historical Garden: Rediscovering Old Edible Plants

(P029) D4 ***Anastasia Rogazinskaya-Taran, Taran Aleksandr***

Ecological Education In The Sakhalin Botanical Garden

(P030) D5 ***Ognyan Iliev, Anely Nedelcheva***

Hei Pladi Project: Virtual And Practical Mobility. Education Through Botanic Gardens

(P031) D6 ***Jin Chen***

Environmental Education In Botanical Gardens For Children: Theoretic And Practical Perspectives

(P032) D7 ***Manuela Pedro, Lyuba Pencheva, Domingos Francisco, Dalila Espírito Santo, Esperança Da Costa***

Botanical Gardens In Angola, Current State And Perspectives

16:10 I 16:30 COFFEE BREAK

Room C

16:30 I 17:15 **Theme C - Session 8** *chair: Michael Kiehn*

TARGET 8 OF THE GSPC IN EUROPE (CONT.)

(O048) C29 ***Virginia Sarropoulou, Nikos Krigas , Eleni Maloupa***

Sustainable Use Of Rare And Threatened Endemic Species: Asexual Propagation Of Four Endemic Plants Of Greece Maintained At The Balkan Botanic Garden Of Kroussia

(P025) C30 ***Francisca Herrera-Molina, Josefa Prados Ligero, J. Esteban Hernández Bermejo***

The Andalusian Plant Germplasm Bank: An Openbank

DAY 3 WEDNESDAY, MAY 9th, 2018

8:15 I 19:30 **MIDDLE SYMPOSIUM EXCURSION TO SINTRA**

Departure from the Rectory of the University of Lisbon

DAY 4 THURSDAY, MAY 10th, 2018

Room A

Theme D

NEWS IN EDUCATION PROGRAMMES

9:00 I 9:40 **K06** ***Chen Jin***

Environmental Education In Botanical Gardens For Children: Theoretic And Practical Perspectives

9:40 I 11:00 **Theme D - Session 2** *chair: Koen Es*

(O055) D8 ***Michael Kiehn, David Bröderbauer, Martin Rose, Frank Schumacher, Nadja Rauchberger,Birgit Schlag-Edler***

The Botanicum: New Options For Public Outreach And Science Education At The Botanical Garden Of The University Of Vienna

(O056) D9 ***Heidi Lie Andersen, Erlend Hausken, Anne Irgens, Johan Lie, Finn Eirik Modahl, Hans Munthe-Kaas, Harald Sodemann, Asgeir Sortebberg***

A New Interdisciplinary Scientific Maze In The Botanical Garden, University Of Bergen, Norway

(O057) D10 *Costantino Bonomi, Andrea Bianchi, Alessandro Cavagna*

Re-Developing Visitor Displays In The Tropical Greenhouse Of Muse, Trento, Italy

(O058) D11 *Ana Cristina Tavares, Ilídia Cabral, José Matias Alves*

From Botanic Garden To The School: Natural Sciences With The Ibse Methodology Outside Classroom

11:00 I 11:30 COFFEE BREAK

Room A

Theme E

SUSTAINABILITY OF BOTANIC GARDENS

11:30 I 12:10 **K07 *Vernon H Heywood***

The Sustainability Of The Global Botanic Garden Estate

12:10 I 13:00 **Theme E - Session 1** *chair: António Gouveia*

BEST PRACTICES FOR SUSTAINABILITY

(O070) E1 *Elke Bellefroid, Marc Reynders, Thierry Vanderborght, Danny Swaerts, Kenneth Bauters, Ann Van De Vyver, Piet Stoffelen, Steven Dessein*

A New Green Ark To Safeguard Research And Conservation Collections

(O071) E2 *Vytautas Kuzma, Audrius Skridaila*

Looking For Sustainable Use Of Energy At Vilnius University Botanical Garden

13:00 I 14:20 LUNCH

Room A

14:30 I 15:30 **Theme E - Session 2** *chair: Vince Zsigmond*

BEST PRACTICES FOR SUSTAINABILITY (CONT.)

(O072) E3 *Efpraxia-Aithra Maria, Dimitra Manou, Georgia-Panagiota Limniou, Eleftheria Asimakopoulou*

Botanic Gardens As "Registered Collections" Under The Eu Abs Regulation: Paving The Way For Sustainability In Greece

(0073) E4 *Laurent Bray*

Greening Cemeteries, A Law Imposed Challenge For Improving Biodiversity

(O074) E5 *Sónia Azambuja*

The Role Of The Association Of The Friends In The Restoration/ Conservation Works Of The Jardim Botânico Da Ajuda (2010-2018)

Theme F

HERITAGE, CULTURE AND TOURISM IN BOTANIC GARDEN

15:30 I 16:10 **K08 *Christopher P. Dunn***

Impacts Of Climate Change On Indigenous Communities: The Role Of Botanic Gardens In Biocultural Conservation

16:10 I 16:30 COFFEE BREAK

Room A

16:30 I 18:30 **Theme F - Session 1** *chair: Ana Luísa Soares*

LINKING YESTERDAY TO TODAY

(O075) F1 *J. Esteban Hernández Bermejo, Julia Mª Carabaza Bravo, Expiración García Sánchez, Francisca Herrera Molina*

Al-Andalus: A Milestone In The Process Of Globalization Of Diversity: Agriculture, Food, Gardens And Landscapes

(O076) F2 *Monika Kiehn*

The Genus Citrus In The Mediterranean Region In Ancient Times

(O077) F3 *Pekka Ranta*

Recollection Of The Historical Portuguese Orchid Collection From 1879

(O078) F4 *Barbara Knickmann, Michael Kiehn, Frank Schumacher, Maria Petz-Grabenbauer*

Connecting Heritage With Modern Science: The New Systematic Division At The Botanical Garden Of The University Of Vienna

(O079) F5 *Ana Raquel Cunha, Pedro Arsénio, Sónia Talhé Azambuja, Paulo Forte, Ana Luísa Soares, Teresa Vasconcelos*

Lisbon's Historic Gardens: Ex-Situ Biodiversity Conservation Of Endangered Species

	Room B
9:40 I 11:00	**Theme C - Session 9** *chair: Tim Entwisle* PRESERVING BIODIVERSITY (CONT.) **(O037) C31 *Suzanne Sharrock, Kate Davis*** Managing Plant Collections In A Post-Nagoya World: How Are Botanic Gardens Adapting To New Access And Benefit Sharing Regulations? **(O038) C32 *Ho Sang Kang, Miin Bang, Jae Min Chung, Cheul Ho Lee*** Eabcn: Regional Cooperative Network For Plant Biodiversity Conservation In East Asia **(O039) C33 *Esperança Da Costa, Tomásia Adão*** Recovery Of The Angolan Coast Mangroves **(O040) C34 *Raviraja Shetty, G, Rajasekharan, P. E*** Standardization Of Seed And Vegetative Propagation Techniques In Saraca Asoca (Roxb.) De Willd. An Endangered Medicinal Plant Of Western Ghats
11:00 I 11:30	COFFEE BREAK

	Room B
12:10 I 13:00	**Theme D - Session 3** *chair: Esperança Costa* STRATEGIES FOR ENVIRONMENTAL EDUCATION **(O059) D12 *Dawn Sanders, Bente Eriksen*** Beyond Plant Blindness: Seeing The Importance Of Plants For A Sustainable World **(O060) D13 *Ludmila Vishnevska, Andrejs Svilans*** National Botanic Garden Of Latvia – Strategy Of Environmental Education
13:00 I 14:20	LUNCH

	Room B
14:30 I 15:30	**Theme D - Session 4** *chair: Pedro Casimiro* STRATEGIES FOR ENVIRONMENTAL EDUCATION (CONT.) **(O061) D14 *Rosie Peddle Fls, Teresa Chuva*** The World Needs More Gardeners – Using The Barrocal Botanic Garden To Promote Sustainable Gardens In The Algarve

(O062) D15 ***Kadir Arslan, Banu Gökçek, Pelin Okkiran, Sibel Çuhadar, Seda Şahin***

My Ecology Club

(O063) D16 ***Blanka Ravnjak, Jože Bavcon***

Garden Of Flowering Carpet

16:10 I 16:30 COFFEE BREAK

Room B

16:30 I 18:30 **WORKSHOP**

Learn To Engage

Room C

9:40 I 11:00 **Theme C - Session 9** *chair: Jorge Capelo*

A PLANT RED LIST SYMPOSIUM

(O049) C35 ***Malin Rivers***

The Global Tree Assessment

(O050) C36 ***Megan Barstow***

Conservation Assessments For Difficult Tree Species

(O051) C37 ***Emily Beech, Allen D., Malin Rivers***

Assessing The Conservation Status Of Europe´S Trees

(O052) C38 ***Mariana Garcia Criado***

European Red List Of Lycopods And Ferns

(O053) C39 ***André Carapeto, Paulo Pereira, Tiago Monteiro-Henriques, Ana Francisco, Estevão Portela-Pereira, Miguel Porto***

The Innovative Data Management Platform And The Collaborative Working Process Of The First Red List Of Vascular Plants For Mainland Portugal

12:10 I 12:50 **WORKSHOP**

“Target 8 Collection Plan For Europe”

(O054) C40

Working Towards Reaching Target 8 Of The Global Strategy For Plant Conservation 2020 In Europe: Contributions Of The European Native Seed Conservation Network (Ensconet) Consortium

13:00 I 14:20 LUNCH

Room C

14:30 I 15:30 **Ensconet Consortium General Meeting**

16:30 I 17:30 **Theme E - Session 3** *chair: Vince Zsigmond*

BEST PRACTICES FOR SUSTAINABILITY (CONT.)

(P033) E6 ***Kemal Burak Sözen, Rasim Murat Aydinkal***

Using Smart Phones At Nezahat Gökyt Botanic Garden Istanbul For A Garden Guide System

(P034) E7 ***Krasimir Kosev , Mariyana Dimitrova, Lyubka Marinova***

Creation Via Restoration And Conservation

DAY 4 FRIDAY, MAY 11th, 2018

Room A

10:00 I 11:00 **Theme F - Session 2** *chair: Ana Luísa Soares*

LINKING YESTERDAY TO TODAY (CONT.)

(O080) F6 ***Albéric Levain***

The Hanging Gardens (Jardins Suspendus): In Normandy, The Latest French Botanic Garden

(O081) F7 ***Katarzyna Socha, Bartosz Piwowarski***

Endogenic Potential Of Botanical Garden In Kielce (Geopark Kielce) – Se Poland

(O082) F8 ***Bauters Kenneth, Bellefroid Elke., Stevens Kenny, Esselens Hans, Swaerts Danny, Reynders Marc , Stoffelen Piet , Dessein Steven***

Caring For Our Elders: Aging Trees In Botanic Garden Meise

11:00 I 11:30 COFFEE BREAK

Room A

11:30 I 12:50 **Theme F - Session 3** *chair: José Carlos Costa*

PLANTS AND SOCIETY

(O083) F9 *Johannes Rabensteiner , Christian Berg*

Palaeodiversistyria: Reconstructing Ancient Landscape And Agriculture In Styrian Flatlands

(O084) F10 *Nye Hughes*

Interpreting Ex-Situ Conservation To Botanic-Garden Visitors, A Designer'S Perspective

(O085) F11 *Jason Przybylski*

Jstor Plants & Society: Developing A Collection With The Botanic Garden Community To Showcase The Importance Of Plants For Society

(O086) F12 *António C. Gouveia, Alexandre Gamela*

Photosynthesis: The Botanic Garden As Seen By Our Visitors

13:00 I 14:20 LUNCH

Room A

14:30 I 15:30 **Theme F - Session 4** *chair: Matthew Jebb*

PLANTS FOR PEOPLE

(P035) F13 *Narcyz Piórecki, Elżbieta Żygała, Ewa Antoniewska*

Domesticated Plants Of The Bolestraszyce Arboretum As A Bridge Between The Past And The Future

(P036) F14 *Lauma Strazdiņa, Signe Tomsone, Mārīte Neperte, Inga Langenfelde*

Historical Exposition "Biological And Morphological Groups Of Plants" In The Botanical Garden Of The University Of Latvia

(P037) F15 *Biserka Juretić, Vanja Stamenković*

Shady Promenade In Botanic Garden Of Faculty Of Science In Zagreb: A Triple Purpose Project – New Fence, Promenade And Pergola

(P038) F16 Mª *Ángeles Navarro García*

Plants In The Andalusi Gardens And Their Medicinal Uses

(P039) F17 *Maria Del Mar Gutiérrez Murillo*

Museum Of Ethnobotany: 25 Years Bridging The Old And The New World

(P040)F18 *María Del Mar Gutiérrez Murillo, Ángel Montero*

Living Human Treasures. A Contribution Of The Botanical Garden Of Cordoba To Ethnobotanical Heritage

(P041) F19 *Silva Žilinskaitė*

The Heritage Of The Vilnius University Botanical Garden

(P042) F20 *Maria Cristina Duarte, João Alves, Maria Manuel Romeiras*

Tropical Botanical Garden – A Trail In History And Plant Diversity

(P043) F21 *Jason Przybylski*

Livingstone's Zambezi Expedition: Bringing Together Specimens, Primary Sources, And Journals On Jstor To Explore The Historic Expedition

15:30 I 16:30 COFFEE BREAK

Room B

10:00 I 11:00 **Theme D - Session 5** *chair: Ludmila Vishnevska*

STRATEGIES FOR ENVIRONMENTAL EDUCATION (CONT.)

(O064) D17 *Hanneke Jelles, Roderick Bouman*

Verwonderpaspoort / Discovery Passport

(O065) D18 *António C. Gouveia, Diana Craveiro, Alexandre Gamel*

"Every Plant Has A Name": Experiences From A Botanical Podcast

(O066) D19 *Marcin Zych, Iwa Kołodziejska, Krystyna Jędrzejewska-Szmek, Hanna Werblan-Jakubiec*

It Pays Off To Know Your Visitors: Education In University Of Warsaw Botanic Garden

11:00 I 11:30 COFFEE BREAK

Room B

11:30 I 12:50 **Theme D - Session 6** *chair: Ana Sofia Róis*

STRATEGIES FOR ENVIRONMENTAL EDUCATION (CONT.)

(O067) D20 ***Katia Astafieff***

A Pollen Observatory In Nancy (France) Botanical Garden: A Scientific And Pedagogic Prevention Tool Of Pollen Allergies

(O068) D21 ***Natasha De Vere***

Plants And Pollinators At The National Botanic Garden Of Wales: An Integrated Programme Of Research, Education And Public Engagement.

(O069) D22 ***Koen Es, Marc Reynders, Elke Bellefroid, Peter Roels, Kenneth Bauters, Piet Stoffelen, Steven Dessein***

The Plant Palace: A Garden Of The World

13:00 I 14:20	LUNCH

	Room C
9:00 I 11:00	**IABG Accreditation Working Group**
11:00 I 11:30	COFFEE BREAK
11:30 I 13:00	**IABG Council Meeting**
14:30 I 16:00	**Moderators and Organizers Meeting for joint conclusions**
16:00 I 16:30	COFFEE BREAK
	Room A
16:30 I 18:10	**EUROGARD VIII CONGRESS CONCLUSION** ***Maïté Delmas***
18:10 I 18:30	**EUROGARD IX CONGRESS PRESENTATION**

KEYNOTE ADDRESSES

OPENING CONFERENCE

THE GARDEN AS A BLUEPRINT FOR A SUSTAINABLE SOCIETY IN THE EPOCH OF THE GLOBAL ENVIRONMENTAL CRISIS

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The environmental crisis brings us to two different discursive attitudes. From its diagnosis, it is assumed as an ecological criticism of the modern utopian impulse. From its dominant discourse, however, with which that crisis maintains an ambiguous and uncertain relationship, it leads to an unstable, faltering and contradictory reflection. It is public knowledge that the ecological criticism is not limited to denouncing the evil founded in modern utopias which has a strong techno-scientific accent. Sustainable development, today's canonical vision of the ideal future for environmentalists, became popular in the political ***mainstream***, as a result of the Brundtland Report, released in 1987. There are, however, several problems. This concept presents a huge difficulty. It is too Hegelian, too dialectical, and even contradictory, to be understood nowadays. It must be explained and commented on in its details and complexities.

Moreover, "sustainable development" is a concept that aims to describe and depict a political, economic and social process of transformation and change. It is a formula absolutely anti-utopian, in the sense that, in the first approximation, it is neutral from the imagistic point of view. On the contrary, when we think of modern utopias, our thoughts immediately turn to the vision of the Island of Bensalem, to the ***New Atlantis*** (1624) of Francis Bacon, with its House of Solomon, the first scientific academy in the world, and the first outline of technocracy designed by the human mind. Therefore, are we doomed not to have any representation of what could be designated as ecological utopia? Is it that sustainable development does not allow us to open any door to the field of the symbolic, of the iconographic? I think the positive answer to that question drive us to the wide and dense symbolic meaning of the garden as a proto-image of the balanced society envisioned by ecological movements and sustainable public policies. We will follow that long and non-linear path starting with the famous "***Il faut cultivar notre jardin***" (Voltaire, ***Candide***, 1759).

KEYWORDS: Ecological Crisis; Sustainable Development; Gardens As Social Symbol; Utopia And Dystopia; Technological Fix Ideology

THEME A INTRODUCTION

BOTANIC GARDEN SCIENCE: BRIDGING THE GAP BETWEEN RESEARCH AND PRACTICE

PAUL SMITH

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In the 21st Century, botanic gardens are under increasing pressure to demonstrate their relevance to society, particularly as governments seek to reduce levels of public spending. At the same time, botany, plant taxonomy and whole organism plant science rarely feature in modern day university curricula, meaning that botanic garden collections often appear to have little relevance to modern science. For these reasons, botanic garden-based plant science needs to adapt and meet the needs of mainstream scientific disciplines such as biotechnology, ecology and conservation science. Most importantly of all, botanic gardens need to direct their efforts towards the most urgent landscape scale environmental challenges such as food security, water scarcity, renewable energy, human health, climate change and the loss of biodiversity and ecosystem functioning. This means working with foresters, crop scientists, conservationists and other sectors conserving and managing plant diversity in the landscape and maximising the value of our collections to develop solutions for society. In particular, botanic gardens have an obligation to lead efforts to conserve and manage plant diversity for future generations, enabling human innovation, adaptation and resilience. Botanic gardens grow a far greater range of plant diversity across the taxonomic array than any other professional community and, as a result, their collections, data and skills are essential for human survival. In this presentation, the speaker will give examples of how botanic gardens are already conserving plant diversity and tackling some of the most important issues facing humanity. Furthermore, he will argue that there is much more that we can do. Every documented botanic garden collection has the potential to provide data that is critical to human sustainability.

KEY WORDS: Botanic Gardens, Science, Conservation, Innovation, Adaptation, Resilience

THEME B INTRODUCTION

R-E-S-P-E-C-T: HOW BOTANIC GARDENS SHOULD RESPONSE TO CLIMATE CHANGE

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Climate change is a threat to life on Earth. It is our 'biggest challenge', 'most pressing issue' or simply, and starkly, 'a crisis'. As expressed in ***The Xishuangbanna Declaration on Botanical Gardens and Climate Change***, there is much we can do as botanic gardens to help the world mitigate and adapt to global warming. I would summarise our role as R-E-S-P-E-C-T. We have a responsibility to lead, encourage and contribute to Research into the causes, consequences and controls of climate change, particularly relating to plants and their habitats. Our core function, I think, is to Educate, in the broadest sense of that word. We must Safeguard plants through seedbanking and other ***ex situ*** collections and contribute to restoration. Good Planning is essential, and we need to prepare for the succession of our living landscapes. We can Engage on many levels, but most importantly perhaps with policy, politicians and public opinion. Partnerships are essential, and I would encourage botanic gardens to participate actively in peak bodies such as International Association of Botanic Gardens and Botanic Gardens Conservation International, and to Collaborate within regional networks. Finally, show Tenacity – hold firm and true to our purpose, to safeguard plants and to care for people and our planet. In short, RESPECT. Using examples from around the world – but particularly the Royal Botanic Gardens Victoria – I will show how botanic gardens can demonstrate respect for people and our planet. The ***Landscape Succession Strategy 2016-2036*** for Melbourne Gardens (one of the two botanic gardens managed by Royal Botanic Gardens Victoria) is an example the planning needed to respond responsibly to climate change.

KEYWORDS: Climate Change, Botanic Gardens, Adaptation, Seedbanking, IABG, Partnerships, Weeds, Planning

THEME C INTRODUCTION

DEVELOPING AND IMPLEMENTING AN EFFECTIVE PLANT CONSERVATION PROGRAM FOR INDIVIDUAL BOTANIC GARDENS

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The Global Strategy for Plant Conservation (GSPC) of the U.N. Convention on Biological Diversity provides a valuable framework to guide the plant conservation priorities and actions of each botanic garden. While some specific targets of the GSPC may be more important for different botanic gardens than for others, it is important that each botanic garden should consider their own institutional priorities and responses to local, national and international plant conservation needs. This will help them to determine where their resources can be best used and help to ensure that the work of the botanic garden is coordinated effectively, rather than relying on any ***ad hoc*** approach where different staff and departments are responding or acting individually. Building a clear and coherent response to plant conservation needs into the botanic garden's strategic plan will also be a valuable approach.

This presentation will draw on examples of the plant conservation work of the Missouri Botanical Garden. The aim will be to illustrate the approaches to plant conservation challenges being addressed throughout the institution, through different departments, especially in horticulture, research, education and sustainability. The important and unique roles of botanic garden horticulture will be highlighted, including the need for the development of exemplary data recording systems, documenting cultivation and propagation protocols for threatened species and implementing a planned approach to secure the most threatened priority plants in conservation programmes. Educational priorities in plant conservation will also be discussed, including roles in building cooperative and collaborative partnerships for conservation and ecological restoration. New and innovative methodologies in conservation biology research can also help to guide the achievement of valuable conservation results, helping to understand why particular species are threatened and what factors need to be overcome if particular species are to be conserved effectively. The opportunities and strategies for raising funds and attracting new resources for plant conservation programmes in individual botanic gardens will also be considered.

KEYWORDS: Plant Conservation, Strategic Planning

CELEBRATION OF THE 250TH ANNIVERSARY OF JARDIM BOTÂNICO DA AJUDA

AJUDA BOTANIC GARDEN RESTORATION: LESSONS FROM 20 YEARS OF HISTORY

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The Botanical Garden of Ajuda (JBA) was restored twenty years ago (1994-1997) in a process that moved and galvanized the energy of teachers and students at the Higher Institute of Agronomy, of the Lisbon University. The four authors of this paper formed the core-team leading the project and restoration works. The Botanical Garden had long been losing its functions both as a Garden and as a Botanical centre so the restoration gave it a new life thus becoming a place to celebrate the world of plants, the science that classifies them and the beauty that emanates from them. JBA was returned to the public fulfilling the purpose a garden can offer both to Lisbon citizens and to tourism.

The celebration of its´ 250 years reminds us that the JBA pioneered the Botanical Gardens in Portugal and the restoration process of twenty years ago was also innovative in the application of the international rules and scientific methods of restoration in historic gardens mentioned in this paper.

This celebration therefore creates the opportunity for an evaluation, comparing the ideas and expectations seeded in the restoration process with those that were able to survive, to develop roots and to grow in the 20 years following the opening to the public. After all, the main functions of Science in a Botanical Garden were always associated to the evaluation and the publicity of the results of the things that were planted or seeded, being in Botany from the dragon tree of Vandelli or in the Gardens with restoration methods or management alternatives.

The organization of this paper is based in 4 themes that describe: 1) the context of the restoration process in the framework of the Pilot-Project on Cultural Heritage of the Council of Europe with the financial contributions of entities associated to Tourism and Training (the Fundo do Turismo and the Instituto de Formação e do Trabalho); 2) the JBA as a Laboratory for Botany: which species survived after 20 years?; 3) the JBA as a Laboratory for Garden Restoration: what did we learn and what was the experience of the Workshop/School of Gardening?; 4) the JBA as a Laboratory for Economy and Management: the experience of the restaurant Royal Greenhouse and the role of the Association of the Friends of the Garden.

The paper ends with festivity themes: from the Inauguration of the Restoration 20 years ago to the current Celebration of the 250th anniversary of the Garden.

THEME D INTRODUCTION

ENVIRONMENTAL EDUCATION IN BOTANICAL GARDENS FOR CHILDREN: THEORETIC AND PRACTICAL PERSPECTIVES

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As an important informal and/or non-formal education setting for environmental education, botanical gardens' educational programs to children often focuses, but not exclusively, on the following aspects: 1) improve nature experiences such to overcome nature-deficient disorder, 2) knowledge, skills related to environmental science and promoting career intention of being environmental scientists, 3) cultivate conservation willingness, 4) education for sustainability. There has been a lot of practices and activities conducted for environmental education in BGs across both developed and developing countries. However, theoretic model development and evaluation of effectiveness on programs are largely neglected. Furthermore, the integration of formal school education systems with the informal education systems is often lacked or insufficient. In this talk, by presenting some of the research cases and practices in the Xishuangbanna Tropical Botanical Garden (XTBG) of Chinese Academy of Sciences, China, the author wish to highlight the importance of conducting model-based educational program and significance of establishing partnership with schools on environmental education.

KEYWORDS: Career Intention, Effectiveness Evaluation, Formal Education, Informal Education, Natural Experiences

THEME E INTRODUCTION

THE SUSTAINABILITY OF THE GLOBAL BOTANIC GARDEN ESTATE

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While much has been written about the various ways in which individual botanic gardens are adopting sustainable practices in their operations and are able to inform visitors about the nature of the sustainability message, through education and outreach programmes, little consideration has been given to the sustainability of the institutions themselves, individually, nationally or globally. Over the centuries, the roles of botanic gardens have changed and evolved. Many botanic gardens have come and gone as circumstances and demands have changed. In recent years, many of them have taken on responsibilities for issues such as ex situ, in situ conservation, reintroduction and ecological restoration. Today, many botanic gardens are in the curious situation of playing an important part in implementation of various fields of national policy, for example in helping meet their countries' obligations under the CBD and other environmental treaties such as CITES, contributing to some of the key Aichi targets and Millennium Development Goals, alleviating the impacts of climate change through understanding the mechanisms of adaptation of plants and their capacity to track the climatic shifts, yet few of them, including many that are state-run, receive any appreciable government or public support for these assumed mandates. In addition, there is a growing expectation that botanic gardens should be filling gaps in botanical capacity building and training in the light of the decline of botany in the university sector and in other public institutions. At the same time, public attitudes and expectations of the services that institutions such as botanic gardens should offer, have changed and have in many cases affected policy. A further complicating factor is that a considerable number of the world's botanic gardens are struggling to survive and are barely functional. Among the questions that we need to address are:

*What capacity does the current estate of botanic gardens have to meet the challenges they have assumed?

*How do we match the demands to the available capacity, especially given the present highly skewed distribution of botanic gardens and its mismatch with the distribution of global plant diversity?

*How many botanic gardens do we need?

*Should we support failing botanic gardens, and if so how?

*Are the current models of botanic gardens suited for their present functions?

*Should we consider developing different models which are more suited to local conditions and requirements, rather than the current 'western' ones, as has recently been suggested? Few countries have reviewed these issues and much more action is needed at a national and, where appropriate, regional level so that a global overview of capacity and needs can be obtained, recommendations prepared and plans made to address them. Professor Vernon Heywood is Emeritus Professor in the University of Reading and Honorary Fellow, Royal Botanic Garden, Edinburgh. He holds Honorary Professorships in Nanjing (China) and Mendoza (Argentina). A specialist in plant taxonomy and systematics and evolution, he has also worked on biodiversity and conservation issues in many parts of the world, particularly in the Mediterranean. He also works on developing biodiversity conservation methodologies, especially in situ conservation of species and strategies for the conservation of germplasm of wild species of economic importance, including crop wild relatives and medicinal and aromatic plants. He also works on the threats to biodiversity posed by Invasive Alien Plants and has prepared Codes of Conduct for horticulture and botanic gardens to combat these threats. He has had a life-long interest in botanic gardens, their history, development and evolving roles and was the founder director of the IUCN Botanic Gardens Conservation Secretariat (later BGCI). He has published over 75 books and author of over 400 papers in scientific journals.

KEYWORDS: Sustainability

THEME F INTRODUCTION

Impacts of Climate Change on Indigenous Communities: The Role of Botanic Gardens in Biocultural Conservation

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Global climate change is having a significant, and negative, impact on biological diversity and, thus, on the integrity of natural systems. What is less well understood, yet just as critical, are the impacts of climate change and of changes in natural systems on indigenous peoples. In other words, as biological diversity is eroding, so too is the cultural and linguistic diversity of the world. In fact, of the approximately 7000 extant languages still spoken, fully 50% are at risk of extinction, with the vast majority in the tropics and subtropics. This rate of extinction of languages (and thereby of human cultural diversity) is considerably higher than most estimates of extinction risks to plants and animals. In addition, traditional ecological knowledge and livelihoods are being lost. As an example of the latter, many tropical (and other) indigenous cultures rely on phenological or "ecological calendars" to determine appropriate timing of planting, hunting, harvesting, among other necessary activities. Climate change, and consequent impacts on natural systems and resources, is completely disrupting wellbeing of tropical communities. Thus, it is not enough to consider just the effects of environmental change on plant life within the current context of the global conservation initiatives, such as the Convention on Biological Diversity (e.g., Article 8j), the Global Strategy for Plant Conservation (Target 13), and the Aichi Targets (Target 18). Botanic gardens are uniquely positioned to actively engage in understanding the broader impacts of environmental change to biocultural diversity to achieve biological, cultural, and economic resilience. Examples of how botanic gardens in several parts of the world are defining key ways to better understand tropical and cultural conservation will be presented.

KEYWORDS: Biocultural Diversity, Climate Change, Endangered Languages, Traditional Ecological Knowledge

ORAL PRESENTATIONS

CONSERVATION HORTICULTURE IN TIMES OF RAPID CHANGE – A FUNDAMENTAL, YET UNDERAPPRECIATED ROLE OF BOTANIC GARDENS

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As institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education (Wyse Jackson, 1999), botanic gardens provide a unique interface between nature conservation and society. To sustain this relationship, botanic gardens need sufficient, well-qualified and motivated personnel who develop and manage the plant collections, the facilities and the landscapes in which they are maintained. In particular, to serve the institution's conservation function, germplasm acquisition strategies, specific collection types and horticultural skill sets are required that support ***ex situ*** plant holdings that 1) are genetically diverse and representative of the wild target populations; 2) provide propagules and saplings for ***in situ*** conservation including population reinforcement and re/introductions; as well as 3) support conservation education and environmental sensitization. Over the last few decades however, botanic gardens have witnessed a general decline in numbers of staff who perform this pivotal role characterised as ***conservation horticulture*** (BGCI, 2017), against an increase in areas such as marketing, events, exhibitions and corporate services (Rae, 2013). While ornamental and commercial, production horticulture continue to evolve at high speed, lack of capacity in conservation horticulture is having detrimental impacts on the purpose and quality of the plant holdings in botanic gardens. Excellence in conservation horticulture is also of vital significance to plan and manage gardens and plants in response to increasing extreme weather events as well as other hazards such as pests, diseases and invasive species. This talk will highlight the urgent need to improve the profile of conservation horticulture, both within the institutions as well as the wider public, to maintain and enhance the central role that botanic gardens hold for nature conservation and society in a climate of rapid global change.

KEYWORDS: Botanic Gardens, Conservation Horticulture, Plant Collections, Genetic Diversity, Scientific Research, Recovery Programmes, Environmental Education, Capacity Building

APG4 TRANSLATED INTO PLANTS - AN UPDATED SYSTEMATIC GARDEN

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Most plant-related activities start with knowing which plant species you are dealing with. Scientific plant names are the key to this knowledge, although for most people common names are easiest to remember. Nowadays even university students in biology are not expected to spend much time on learning plant species and their scientific names. Therefore it is essential that a university botanic garden like the Hortus botanicus Leiden offers students a way to get to know the plant kingdom, and to help them memorizing plant names. Moreover, relationships between plants may predict certain characteristics, such as the secondary metabolites produced by groups of plants, guiding the choice of species to study for their use in the production of medicines, food, or other substances.

A systematic garden, in which taxonomy is the leading principle in the arrangement of species, is the ideal place for this type of instruction. The publications by the Angiosperm Phylogeny Group (APG), incorporating the latest molecular data, triggered the establishment of a new type of systematic garden, based on cladograms.

In 2005 we laid out our first APG-based systematic garden, consisting of 33 rectangular plant beds. The first five beds illustrate the large steps in plant evolution: 1. the acquisition of chlorophyll, 2. the transition to land, 3. the acquisition of a vascular system, 4. the development of seeds, and 5. the development of flowers. Twenty-seven large beds treat the present 46 orders and 416 families of flowering plants - the 28th bed serves to illustrate a plant theme and may be planted differently every year. Along the 27 beds a cladogram is fitted, each bed containing plants representing one or more orders. It is quite a puzzle to fit a cladogram in such a way that both the linear sequence of taxa (as used in floras and herbaria) and the topology of the cladogram are respected. This had to be done all over again after the publication of APG4 in 2016 (Bot. J. Linn. Soc. 2016, 181, 1-20). In the same year, the first consensus taxonomy of lycophytes and ferns was published by the Pteridophyte Phylogeny Group (PPG1: J. Syst. Evol. 2016, 54(6), 563-603). In 2017 a new layout of our systematic garden was implemented, resulting in the overhaul of more than 20 of the beds.

The information for students, the general public, and our young visitors is now presented separately at the foot of each bed. The scientific part covers two panels, one in Dutch, one in English, with the cladogram of all angiosperms, and a specific cladogram of those families

treated in each particular bed. Scientific publications form the basis of our systematic garden and are explained in such a way that both students and the general public may profit from this newly compiled information. Paleobotanic data will be presented on our website, as insights in paleobotany change even more rapidly than those in recent botany, by the continuous discovery of plant fossils new to science.

KEYWORDS: APG4, PPG1, Plant Taxonomy, Science, Education

O003

CONSERVATION BIOTECHNOLOGIES FOR ENDANGERED PLANTS IN AUSTRIA – USING *ARTEMISIA LACINIATA* (*ASTERACEAE*) AS A MODEL SPECIES

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In vitro technology and cryopreservation are integrated as complimentary tools into the ***ex situ*** conservation of ***Artemisia laciniata***. This species is mainly distributed in South Siberia and Central Asia, while the only extant population in Europe is found in Austria with 13 individuals. In a first step a micropropagation protocol was developed with germinating seeds and ***in vivo*** shoots from the living collection in the Botanical Garden of the University of Vienna, as starting materials. Only fresh seeds could be used as seeds from herbarium vouchers (more than 100 years old) did not germinate. In a second step, a cryopreservation protocol using shoot tips and the droplet-vitrification method was established. Material initiated from ***in vivo*** shoots gave lower regeneration percentages (16%) compared to the material originating from seeds (approx. 60%). Bacteria appearing after cryopreservation in the regeneration medium and reducing regeneration capacity were investigated using

16S rDNA analysis. The most prominent bacteria identified belonged to the genera ***Sphingomonas***. Cytogenetic stability of the plantlets obtained after cryopreservation was assessed using flow cytometry. No ploidy changes and no differences in genome size were detected in the micro propagated and cryopreserved plants. Furthermore, no negative effects of cryopreservation on water use efficiency were found using a method based on carbon isotope discrimination. Restriction site associated DNA sequencing (RADseq) was used to analyse the genetic diversity within ***i)*** the Austrian wild population, ***ii)*** the ***ex situ*** individuals and ***iii)*** throughout the current Asian distribution. The Austrian wild population exhibited genetic diversity and did not appear to be clonal. Further it seemed distinct enough from Asian individuals, providing solid argumentation for further conservation efforts. The study further showed that the ***ex situ*** conservation efforts at the botanic garden managed to conserve only part of the genetic richness of the extant wild population. Seeds from the wild population are now used for the initiation of ***in vitro*** cultures. Micropropagated material will be planted out in a suitable location near the original site to reinforce the wild population.

KEYWORDS: ***In Vitro*** Culture, Cryopreservation, Ploidy, Genetic Diversity, Endophytes

O004

UTILIZATION OF *LIMONIUM EX SITU* COLLECTIONS TO STUDY THE OCCURRENCE OF APOMIXIS

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Circa 2.2% of flowering plants genera are known to contain apomictic species, comprising 78 families, including the sea lavenders genus ***Limonium*** Mill from the ***Plumbaginaceae*** family. This genus is represented by taxonomically complex groups generally characterized by polyploidy, hybridization, and sexual (outcrossing, selfing) and/or asexual modes of reproduction (apomixis). Furthermore, male sterile plants also occur. These reproductive

modes appear to be associated to a pollen-stigma dimorphism linked to a sporophytic self-incompatibility system.

We established an ***ex situ Limonium*** collection (~350 plants) with representative members of several species with the aim to characterize sexual and asexual accessions and hybrid biotypes, as well as to study the occurrence of apomixis. To achieve this goal, we combined a cytogenetic, ovule development, reproductive phenology, and transcriptomic approach using plants from these collections.

Mother plants of ***L. binervosum***, ***L. dodartii L. nydeggeri*** and ***L. ovalifolium*** were characterized cytogenetically through genome size estimations and chromosome counts to assess their ploidy levels. Then, pollen–stigma dimorphisms were examined and ovules in distinct stages of development stages were evaluated. In this way, for each individual sexual and/or apomictic development was determined. These plants were further used to produce F_1 plants using either plant as a male donor or female receiver through crosses among diploid sexuals, and between diploid and tetraploid facultative apomicts. These crosses resulted in a high production of viable seeds, which produced a variable F_1 progeny with distinct phenotypes. Most F_1 plants show similar ploidy level with the female donor, although plants with other ploidy were also found. Moreover, in interploid crosses, most seedlings exhibited pleiocotyly (tricotyl, tetracotyl), and polyembriony was observed in some plantlets

Cytogenetic and transcriptomic studies using these F_1 plants are ongoing to investigate chromosome transmission and epigenetic alterations in the ovule tissue, and to find genetic-molecular factors associated to the occurrence of apomixis.

KEYWORDS: Genetic Crossing, Interspecific Hybridization,Plant Reproduction, Pleicotyly, Polyembriony, Polyploidy

EFFECT OF POPULATION SIZE AND POLLINATOR AVAILABILITY ON THE REPRODUCTIVE SUCCESS, MATING SYSTEM AND POPULATION GENETICS OF *POLEMIUM CAERLEUM,* A RED-LISTED PLANT

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Polemonium caeruleum L. (Polemoniaceae) is a boreal plant species producing dichogamous and predominantly bumble bee-pollinated flowers. Literature data show that occasionally the plant may be pollen limited and suggest that the species may exhibit mixed-mating system. Populations of this plant are in decline throughout the Polish range of the species, and the plant is regarded as vulnerable. It is also red-listed in other Central European countries. Since pollination and mating systems can influence population dynamics, and vice versa, we surveyed 15 ***P. caeruleum*** populations in the Polish range of the species, and, working in the field, over three years, conducted a five-variant pollination experiment and studied pollinators' abundance and their identity. Our study confirmed mixed-mating system of ***P. caeruleum***, and showed that populations exhibit various degrees of compatibility: from clearly self-incompatible (SI) to fully self-compatible (SC) ones. In most SI populations, however, self-pollination occurred via geitonogamous pollen-transfer, rather than autonomous selfing. This was because isolated flowers (those with restricted pollinator access) hardly produced any seeds. We observed a general trend toward decreased pollen limitation index in larger populations, however, only the smallest of the surveyed populations, composed of less than 20 flowering individuals, exhibited significant differences in seed production between open pollinated and supplementally pollinated flowers. This population was also clearly self-compatible, producing significant seed set following induced (geitonogamous) self-pollination. Our study populations were serviced by a diverse assemblage of insect pollinators for several taxonomic order. Furthermore, we observed substantial temporal and spatial variation in insect assemblages in the course of several years, which indicates a generalist pollination system. In order to relate this data to the plant's population genetics we performed AFLP analyses for all studied populations, which will be discussed in the paper. The project was supported financially by the Polish National Science Centre grant no. 2014/15/B/NZ8/00249 to MZ.

KEYWORDS: Compatibility System, Habitat Fragmentation, Mixed-Mating, Pollen Limitation, Pollination, Population Decline, Seed-Set, Threatened Species

GENETIC STRUCTURE OF THE NORWEGIAN VULNERABLE *ROSA SPINOSISSIMA* AS AN EXAMPLE OF THE IMPORTANCE OF KNOWLEDGE FOR CONSERVATION ACTIONS

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On an island west in Norway, lives the only natural populations of the Scotch rose, ***Rosa spinosissima***. On the island of Bømlo, this rose lives with other roses, but most common are ***Rosa mollis***, and a hybrid that we suspect to be between those two. ***R. spinosissima*** is known from Britain and Island, in addition to Europe, but are rare in Scandinavia. Of this reason, this species is evaluated for the Norwegian red list, and listed as vulnerable. As reasons for this listing, introgression is the biggest threat in addition to changed land use.

The Botanical garden started a project to map the genetic structure and chromosome numbers of the species involved in the hybridisation on the island of Bømlo. As introgression was the main threat, we wanted to have knowledge about the hybridisation event before any in situ conservation can start.

We analysed the morphological features, an AFLP dataset of the two roses and the hybrid, in addition to the flow cytometry.

The results showed that ***R. spinosissima*** is indeed a part of the hybridisation process, but as the pollen donor. ***R. mollis***, from the ***canina***-group with its uneven ***canina***-meisosis, is the ovule donor, and this ***canina***.meiosis is inherited to the hybrid. The pollen from the hybrid (with extreme low fertility), will not have the opportunity to fertilise the ovule of ***R. spinosissima*** due to the uneven chromosome number. This means that the risk of introgression, and transferring DNA from ***R. mollis*** to ***R. spinosissima***, is not possible. No conservation efforts are needed for introgression, and the main challenge are change of land use.

The result of this study, shows that knowledge about the underling processes are necessary for conservation actions, and are an example on how botanical gardens can add to this knowledge.

KEYWORDS: Conservation, ***Rosa spinosissima***, Introgression

THE INTERNATIONAL PLANT SENTINEL NETWORK

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Invasive alien plant pests and diseases already pose a considerable threat to plant health worldwide. With the increased globalisation of trade in plants and plant material, and the effects of a changing climate, this threat is predicted to continue to rise. In recent years, the world has seen a sharp rise in the number of these harmful invasive organisms which cause large scale environmental and economic damage. A significant issue in managing this threat is predicting which organisms will pose a threat in the future. Prevention is arguably the most effective way to manage these organisms; however regulation relies upon lists of known pests and diseases. Sentinel plants are individuals found outside their native ranges that can be surveyed for damage by organisms they would not otherwise encounter. Monitoring plant sentinels can also help to build knowledge and understanding of pest/host relationships to support the development of management plans and risk assessments.

Botanic gardens and arboreta are unique and currently under-utilised resources that can support sentinel research. Plant collections are estimated to include 30-40% of all known plant species, many of which are exotic species (and thus potential sentinel plants). Botanical institutes can study a large range of plants, from new saplings to old specimen trees, in multiple regions/countries.

The International Plant Sentinel Network (IPSN) was established in 2013 to generate information valuable to global plant health in order to safeguard against the threat of new introductions. The developing network consists of gardens and diagnostic institutes who work together to provide an early-warning system for new and emerging plant pests and diseases. The IPSN focuses on increasing knowledge and awareness among garden staff, seeking best practise, developing standardised approaches and providing training materials and methodologies for monitoring and surveying. Established as part of a European-funded (EUPHRESCO) project the IPSN is led by the UK's Food and Environment Research Agency (FERA) in collaboration with Botanic Gardens Conservation International (BGCI).

KEYWORDS: Pests; Diseases; Sentinel Plants; Invasive; Monitoring; Capacity Building

COPING WITH PESTS IN A SMALL BOTANIC GARDEN: 20 YEARS OF INTEGRATED PEST MANAGEMENT

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The Ghent University Botanical Garden is a small university garden of 2,75 ha with 4000m² of greenhouses. As the botanic garden houses more than 10 000 taxa, it creates a perfect environment for many organisms both considered harmful or beneficial.

Many years of chemical pest control in the public greenhouses resulted in sterile soil and outbreaks of different pest organisms such as aphids, mealy bugs and soft scale. Integrated pest control was introduced some 20 years ago in order to provide a healthier environment for both gardeners and visitors.

The aim was to minimize pest damage in the greenhouses by reducing the pest organisms to an acceptable level. The success of integrated pest management depends highly on a good knowledge of the life cycle of both pests and beneficial organisms that are present in the garden. Introducing the correct organisms at the right moment is essential to reach optimal results while reducing the costs.

Therefore, a monitoring system was put into place including visual inspection and identification of occurring pest organisms. Actions included improving the greenhouse climate conditions, mechanical control (by means of pruning or hosing) and introduction of beneficial insects (parasites and predators). Interventions with chemical pesticides were kept to an absolute minimum.

Although the initial cost was quite high, we managed to get good results on the management of many of the original pest organisms. Unfortunately, not using chemicals has led to other pests emerging such as armored scale. Amongst the problems we encountered were the lack of identification tools of the different species and the availability of beneficial organisms which is not always ensured.

More recently we started on assessing the health of trees and shrubs in the outdoor collections. As the use of chemical pest control is highly regulated in Belgium, an early warning system using hormone traps was put into place. Although these traps are mainly aimed at monitoring the presence of pest organisms in the garden, they also help to reduce or prevent severe damage to garden plants. Furthermore, a visual tree assessment helps to gather knowledge on occurring problems and supports decision making.

As sustainable management of botanic gardens is imperative, we will discuss how to maintain healthy collections by means of implementing an efficient monitoring system supporting integrated pest control.

KEYWORDS: Integrated Pest Management, Sustainability, Pests, Diseases, Natural Enemies, Greenhouse

O009

WHAT GROWS WHERE? TOWARDS AN INFRASTRUCTURE TO CONNECT COLLECTIONS OF BOTANIC GARDENS FOR RESEARCH AND CONSERVATION

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Collections of botanic gardens are unique living resources for research, conservation and education. For scientific purposes, the value of these collections depends heavily on comprehensive documentation and accessibility. Many botanic gardens manage their collections by means of databases, albeit using multiple different software and representing varying degrees of data quality and completeness. To date, this heterogeneity of collection databases still hampers a thorough and up-to-date overview of the living plant holdings of botanic gardens. In order to efficiently coordinate collection priorities amongst different gardens, a complete and permanently updated plant inventory is crucial.

To address this problem, partners from the universities of Berlin, Heidelberg and Frankfurt initiated a joint project on “Plant Collections in Botanic Gardens as Living Resources for Integrated Evolutionary Research” (Evo-BoGa). Starting in May 2017, this three-year project is funded by the German Federal Ministry for Education and Research and combines evolutionary research with the interconnection of botanic garden’s databases. As a first step, the project involves eight botanic gardens in Germany, with a focus on their collections of bromeliads and epiphytic cacti. Both plant groups are well-represented in botanic gardens, highly attractive to the general public, and ideal models for studying the evolution of biodiversity. In the course of the respective research packages, the accessions are checked for their identity, linked to other collection types such as herbarium vouchers

and DNA samples, and henceforth made accessible for research in a sustainable way.

As a second step, the project aims at developing an online portal that combines all relevant information from the databases of the botanic gardens involved. The portal will be based on the well-established BioCASe provider software, which allows for harvesting collection databases of different types. Individual database structures will be translated into the ABCD standard, enabling a "live" connection to the original data providers. The data portal will be generally accessible, although different user groups such as network members, registered external researchers or interested garden visitors will be able to access data in different detail. Possible benefits of the portal for the collection holders include feedback on data quality and match with the taxonomic backbone, notifications on new determinations of the same accession in other collections, connection of accession data to other collection types (herbarium vouchers, DNA samples, etc.), as well as, statistical evaluations and comparisons with other collections. Thus, the portal will help individual botanic gardens to evaluate their own collections in view of others, to improve their collections and the associated data, and, ultimately, to develop a collection strategy in coordination with other botanic gardens. As a whole, the portal and the exemplified research may also promote the use of living collections for research within the project network and beyond, and strengthen the importance of botanic gardens in maintaining these collections in the public eye.

KEYWORDS: Collection Management, Collection Database, Collection Accessibility, Data Portal, Collection Inventory, Collection Strategy, Evolutionary Research, BioCASe Provider Software, ABCD Standard

O010

BGCI's DATABASES, TOOLS TO SUPPORT PLANT CONSERVATION PRIORITISATION AND PRACTICE

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Botanic Gardens Conservation International (BGCI) has developed a suite of databases to support conservation planning and practice by botanic gardens and the wider conservation community. The GardenSearch database is the only global source of information on the

world's botanical institutions. In addition to over 2,700 botanic gardens and arboreta, GardenSearch also includes gene and seed banks, network organizations and zoos. The database can be searched by country, institution or by a wide range of other fields related to facilties and expertise. PlantSearch is a database of the plant collections (both living and seed) maintained by botanic gardens around the world. It includes records on over 115,000 species, around one third of known plant diversity. Linked to a range of other databases, PlantSearch allows threatened species in ***ex situ*** collections to be identified. To further support the prioritisation of conservation action, BGCI recently launched a new database – ThreatSearch. This is the most comprehensive database of conservation assessments of plants listing global, regional and national red list assessments. It includes over 242,000 conservation assessments, representing over 150,000 taxa. Finally, and as a resource to support the Global Tree Assessment (an initiative to red list all the world's tree species by 2020), BGCI has developed GlobalTreeSearch, the most comprehensive list of tree species and their country-level distributions. All four of BGCI's databases are freely available for public consultation on the BGCI website, with enhanced search facilities provided to BGCI's members through a members' only area of the website. This presentation will introduce the databases and provide examples of how they can be used to support plant conservation in botanic gardens.

KEYWORDS: Databases, Plant Conservation, Prioritisation, Botanic Gardens, ***Ex Situ***

O092

RECORDING CULTIVATED PLANT BIODIVERSITY TO SAFEGUARD URBAN ECOLOGIES

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There is an increasing appreciation of the ecological contribution made by plants in cultivation. A number of studies have shown that non-native plants provide valuable ecosystem services, such as supporting native fauna and regulating urban temperatures.

However, studies are limited due to a lack of data. To enable thorough investigations into the ecological role of cultivated plants, a detailed knowledge of what is grown and where it is grown is required. Floristic accounts have traditionally focused on native plants. Recently, naturalised cultivated plants have been included in these accounts but are otherwise almost entirely excluded. Cultivated plants are recorded in Garden Floras but these generally lack data concerning distribution and abundance. Cultivated plants account for a large part of the biomass in urban areas and any assessment of ecological processes in such very modified environments cannot be effective if cultivated plant biodiversity and its associated ecological information are not recorded alongside native plants.

The Royal Horticultural Society, UK, is undertaking a largescale assessment of the cultivated plants of Britain and Ireland. This will provide a single online resource for all cultivated plants extant in this extremely diverse garden flora. Though information on these plants exists it is highly dispersed in journals, magazines, books, nursery catalogues, registers and databases and is without appraisal of ecological functionality. The proposed RHS database will include traditional horticultural data, such as descriptions, native distribution, cultivation advice, keys, images and commercial availability but will also record ecological data including distribution and contribution to ecosystem services. This will offer a resource that can be used to improve horticultural practices, assist our understanding of the cultural significance of the plants we grow, permit evaluation of the contribution to health and well-being made by cultivated plants and prioritise taxa for conservation. In addition, it will provide a dataset that can be combined with records of native plants to give a holistic understanding of our urban ecologies. This insight will enable us to make informed choices about what to plant in urban areas, based not only on ornamental value, but also on ecosystem services, predicted climate change, interactions with native plants and potential for invasiveness, thus futureproofing our urban environments.

Many botanic gardens are based in urban zones and there exists a huge opportunity for them to contribute to this area of research. We hope that other gardens will be inspired to develop this concept and produce Floras for their areas that include cultivated plants. By working with others to record both cultivated and native plants from across their local areas, botanic gardens can involve the communities of which they are a part in helping to understand better the different roles plants play in urban ecosystems.

Keywords: Ecosystem Services, Non-Native Plants, Urban Ecosystems

BIODIVERSITY LOCAL ACTION PLAN (BLAP): A GOVERNANCE TOOL TO SPREAD THE GREEN

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Lisbon was the first capital in Europe to sign the New Covenant of Mayors for Climate and Energy (CoM). The city intends to be prepared to tackle climate change and climate adaptation is a crucial factor in the upcoming times while heat waves, dry seasons and flash floods are expected to increase.

Ecological planning in the city, since 2012, is based on the green infrastructure increase. It is clear from a Local Governance point of view that, increasing the green infrastructure might be the most cost-efficiency tool to respond to the climate change issue and an overall Climate Adaptation Strategy was designed to integrate the green.

The new Master Plan defines the most sensitive ecological areas for preservation and promotes ecological sustainability, biodiversity and quality of green public space through nine main green corridors, the implementation of NBS drainage systems, more urban tree alignments and saving areas from soil sealing, targeting the increase of 400 hectares of new green areas between 2012 and 2022.

It is extremely important to highlight that the assumption of a climate adapted green infrastructure has been crucial in allowing high rates of implementation (200 hectares in less than 10 years), by choosing rainfed native solutions and mixed typologies where biodiversity and natural capital play a key role in the resilience of ecosystems. This has also enabled rapid implementation of new green initiatives, allowing Lisbon to create lush diverse green infrastructure where woodlands, biodiversity meadows and urban allotment gardens work together with recreational and local parks.

To monitor the effectiveness of the green infrastructure, a biodiversity strategy started to be defined in 2010 and turned in to a Local Action Biodiversity Plan (BLAP) in 2015 based on 23 key performance indicators of ecosystem services, such as ecological continuity, green spaces social covering area, rainwater NBS implementation, carbon CO2 sequestration, native flora and fauna, environmental projects and others.

With Sustainable Energy Climate Action Plan targets (SECAP) to 2030 underway to be submitted to CoM until next June 2018, Lisbon is preparing the updating of its Master Plan as well as a new BLAP that might be re-designed to fit the new and more ambitious goals,

including embodying new data from climate adaptation scenarios. Improving naturalization based on native flora increase in Monsanto Forest Park, bettering NBS solutions under the framework of a new paradigm for water, raising rainfed meadows as a new approach to sustainable green areas and increasing continuity of the green corridors at a Metropolitan Area Scale, are some of the main targets for the next years.

Until 2020 the nine green corridors will be finished with the last "Vale de Alcântara", "Corredor Periférico" and "Corredor Oriental" to be concluded, at the same time as we make streets and backyards greener and more permeable should respond to the climate challenge of heat, drought and surplus rain events.

KEYWORDS: Green Infrastructure, Climate Adaptation, Biodiversity, NBS, Governance

O012

HOW TO DECIDE WHAT PLANT, WHAT ACCESSION OR WHAT COLLECTION ARE IMPORTANT IN YOUR GARDEN?

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There are in many botanical gardens different types of living plant collections. Contemporary collections of Vilnius University Botanical Garden contains more than 10,900 taxa (represented by 12972 accessions) of living plants. These collections were accumulated within last century, under influence of different political, economic and social events, trends and streams in the country. Nowadays the Garden collections represent a wide array of thematic groups and could be divided into 3 larger blocs and 14 smaller groups. The present situation always led to the question of relevancy and the value of a separate collection. Is it worth to have, to keep, to develop one or other collection? How to evaluate the collection? What kind of instrument should be used to have comparable indicators for assessment of collections and accessions? Looking for that kind of instrument there were worked out the policy for development of living plant collections and the methodology for assessment of accessions and collections. As a background of this methodology was

produced the indicator panel - the system which provides possibility to assess everyone accession in collection from the point of view of their value for conservation of biodiversity and genetic resources, utilization value, condition of plants, level of documentation and collected knowledge (information collected during the years of cultivation of plants in the Garden). The indicator panel (the table with 56 positions-questions, which should be answered for every one accession, inscribing scores) provided possibility to compare very different in their matter collections. The system (with maximum total sum - 100 scores, divided into four groups of different weight) reveals not only comparable value of different accessions and collections, but even recognizes gaps of work of staff. Implementation of this system for collections management provides objective background to have clear understanding of priorities and ways to improve quality of living plant collections.

KEYWORDS: Plants, Accessions, Collections, Value, Assessment

O013

SHOULD WE STAY OR SHOULD WE GO? LAND USE, CLIMATE CHANGE AND SUSTAINABILITY OF AN ALPINE BOTANICAL GARDEN IN NORWAY

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Kongsvoll Alpine Garden is located in a subalpine, cultural landscape in Dovrefjell Mountains, Southern Norway. This mountain region has been known for more than 250 years as a hotspot for alpine species. The garden contains naturally occurring local species only. Garden management concentrates on optimizing conditions for long-term preservation and recruitment of local flora for the purpose of public outreach and teaching. The garden is open during the summer season (June to August). Multilingual labels with photos present ca. 330 species; ca. 230 species of vascular plants, 60 lichens, 40 bryophytes and 10 fungi.

The garden was established in 1924. In 1992 the garden was relocated and reopened. Today the garden and species experience a number of challenges, including human and natural causes. Main regional threats from climate change are prolonged growing season and increasing precipitation, particularly summer rain, causing a wetter climate and higher

seed production in boreal species. The two most important local land use changes the last decades are reduced number of grazing domestic animals and lack of logging for firewood, causing shrubification and forestation.

Shrubs like ***Salix glauca***, ***S. lapponum***, ***S. phylicifolia***, ***S. myrsinites***, ***Betula nana*** and ***Juniperus communis*** replaces the open, logged and grazed landscape surrounding the alpine garden. Typically, ***Betula pubescens*** ssp. ***tortuosa*** forest succeeds the shrubs. Shrubs and trees benefit from a longer growing season with more available water. Fewer grazing animals result in establishment of more woody seedlings. Lack of logging leads to more and larger trees and higher seed production, facilitating further tree establishment. The combination of changes in land use and climate is a self-reinforcing process, speeding up the overgrowing of the open, cultural landscape.

The alpine garden is still mainly an open area but the natural populations of many alpine species are diminishing. On the other hand, boreal species are increasing. Recruitment of alpine species becomes more difficult. The invasive shrub ***Lonicera caerulea*** is spreading and establishing in the alpine garden and its surroundings.

At Kongsvoll there's been an alpine garden for more than 90 years. The recent changes in climate and land use forces the University Museum to evaluate three scenarios: 1) continue at present site with changes in garden management and concept, 2) change of site and 3) giving up the alpine garden.

The scenarios for alpine gardens and the potential use of alpine gardens as sustainability projects in environmental teaching and outreach in changing environments are discussed.

KEYWORDS: Alpine Garden, Climate Change, Land Use, Grazing, Cultural Landscape, Invasive Species, Scenarios, Sustainability

O014

CITY TREES AND ROLE OF BOTANIC GARDENS

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Trees are an indispensable part of urban environment. They provide shadow and they help to reduce the city temperature, what nowadays is especially important due to global warming. One of the usual problems for city trees is the space available for the tree under the ground and above it. Because of specific environmental factors in cities, where during the summer shadow and during the winter light is needed, the choice of right tree species, that will give the greatest feeling of comfort to the citizens, is essential. The University Botanic Gardens Ljubljana have a long-lasting cooperation with Ljubljana Municipality. This has intensified since 2007, when Botanic Gardens have been actively participating in urban green policy where city trees play an important role. Hence, we participated by preparation of study about management of city trees. Botanic Gardens were also co-author and publisher of the book City Trees, where management instructions and list of appropriate city trees species are introduced. This was followed by many revisions of planting plans for city trees in Slovenian capital. Later on, also evaluation of tree states and new tree species selection were prepared. Some custom tree species used for centuries (like ***Aesculus hippocastanum***) have nowadays namely become less useful or even useless because of illnesses and pests. For this reason, we started to introduce autochthonous species and their variations into the planting plans. Species diversity is namely very important for the city biodiversity. With our suggestions we became main reference for selection of city trees and for their management. One of the bigger projects where University Botanic Gardens Ljubljana participated, was the renovation of main avenue in Ljubljana. We suggested that the autochthonous tree species ***Fraxinus ornius*** should be planted there. On this avenue now 67 specimens of the aforementioned plant species are growing. In a smaller newly arranged park, 32 trees of ***Sorbus aria*** were planted based on our suggestion. For upcoming projects of street renovation in next year, species like ***Prunus mahaleb***, ***Ostrya carpinifolia*** in ***Carpinus betulus*** were suggested. Also, other Slovenian city municipalities are asking the University Botanic Gardens Ljubljana for advice and assistance on this issue. With help of our knowledge workshops and lectures are being prepared for different shareholders and interest groups. With such activities we want to achieve better treatment of public services with respect to city trees.

KEYWORDS: City Trees, Urban Environment, Autochthonous Species

BOTANIC GARDENS RAISING THE SOCIAL ROLE – MISSION POSSIBLE

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"Botanic gardens are institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education."(Botanic Gardens Conservation International)

Is it possible to redefine the role of the botanic gardens?

The presentation gives an idea how botanic gardens related their social and environmental roles within the modern framework of value, mission and vision. The challenges of 21st century force the botanic gardens to promote biodiversity conservation ***ex situ*** and ecological practices by collaborating with community organization and projects.

The conception of the Green City is a comprehensive one and intertwines with the botanic gardens mission of the institutions with educational, scientific and social role.

In 2017 the botanic gardens in Bulgaria had several good practices and ideas related to urban gardening. The local communities were acquainted with basic horticultural practices through various techniques. There were demonstrations of various approaches in establishing green space in the big cities e.g. terraces, roofs and walls. The visitors gained knowledge about the main benefits of urban gardening. The positive effect of creating green places is mainly on enhancing the quality of life by increasing social interaction; improving hygienic health conditions; reduction of asocial behavior, isolation and stress; education of the younger generation etc.

Activities carried out with traditional or little known edible species in the green space reveal the benefit that this planting has in term of food security.

Examples are given based on the "Green City Guidelines" Project as well as current EC projects of some botanic gardens: Plantscafe, Inquire, Big Picnic.

In conclusion the above mentioned is in compliance with Global Strategy for Plant Conservation: Target 13: *"Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care"* and Target 14: *The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes."*

That is how we can succeed in redefine the role of botanic gardens on one hand and operating them in their basics on the other hand.

KEYWORDS: Green City, Horticulture, Food Security, Urban, Gardening

INTERSECTION OF PROFESSIONAL GARDENS AND URBAN FORESTRY TO ADDRESS BIG CHALLENGES

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As the earth becomes more urbanized and human populations migrate to metropolitan regions, the need for urban greening has never been greater. Trees provide the fundamental infrastructure needed to support urban nature and provide critical services that enhance the quality of life for residents. Evidence is mounting that a healthy forest canopy makes cities more livable and citizens happier. However, trees face unique and acute threats in an urbanized environment. Establishing and caring for trees to maturity is especially challenging and yet research supports that the greatest environmental and social benefits are derived from large trees. Skills and knowledge on how to support a mature and diverse urban forest need to be expanded and deployed across the globe to serve the growing metropolitan populations. Many of these skills are embedded in the professional botanical garden network. The authors are interested in better understanding models of how gardens in Europe and around the world are contributing to their community and urban forests.

The Morton Arboretum, located near Chicago, Illinois, the third largest metropolitan region in the United States of America, has strategically invested in finding solutions to better care for and establish trees in the built environment at both a research and applied level. The Morton Arboretum engages scientists through its Center for Tree Science to advance the knowledge needed to improve the standards for growing, managing and selecting trees in the built environment. The Arboretum also leads a coordinated effort across the Chicago region to build a healthier and more diverse urban forest through its Chicago Region Trees Initiative. This is the largest such initiative in the country, with leading organizations and agencies from across the seven-county metropolitan region working together. In order to tailor and develop strategies for improving the urban forest, an extensive data set has been collected and analyzed with information ranging from land use, canopy cover to socioeconomic considerations, all of which has application for a global framework.

KEYWORDS: Urban Forests, Urban Nature, Botanical Gardens, Science Application, Canopy Data, Built Environments

EASTCENTGARD – NETWORKING OF BOTANIC GARDENS IN THE EASTERN AND CENTRAL EUROPEAN REGION

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Cooperation amongst botanic gardens has a growing importance. Sharing knowledge, exchanging experience, scientific materials or trained staff is indispensable for their activities.

National networks of botanic gardens were established over the last decades in many European countries and the European wide cooperation (European Botanic Garden Consortium) has been supporting the gardens for over twenty years now. Between the national and the European level of networking the need of regional networks raised several partnerships, too.

Besides, being one geographical area, botanic gardens in the region of Central and Eastern Europe have much in common. The organisers of the first two EastCentGard conferences (1st in 2003 Tartu, Estonia, 2nd in 2007 Warsaw/Rogów, Poland) recognized that the political and economic changes in the countries of the area brought a new opening to professional cooperation, improvement of garden management and maintenance and development of collections and infrastructure. The attendance, the number of participants and the representation of the countries of the area at these conferences confirmed the need of the initiative.

However, the continuation of these regional conferences had to wait until 2017, when the 3rdEastCentGardconference was held. On the 25th anniversary of its establishment the Hungarian Association of Arboreta and Botanic Gardens organised the conference again. The number of participants, nearly 80 from 17 countries showed that there is still a significant interest in this regional networking initiative. The poster and the oral presentations, as well, demonstrated the demand of a forum of collection management and development within this area.

EastCentGard initiative is more than periodical conferences, but it is a network providing a forum for botanic gardens to share knowledge and exchange experience. Keeping the network alive may bring new partnerships amongst gardens within the region like Three Seas or Vise Gard Initiatives, etc. or assist to develop new projects. Our declared goal is to promote and improve EastCentGard as a living network.

KEYWORDS: Networking, Regional Cooperation

BIGPICNIC: INFLUENCING RESPONSIBLE RESEARCH AND INNOVATION IN FOOD SECURITY

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Responsible Research and Innovation (RRI) describes a new approach to research and innovation that aims to align the outcomes of scientific and technological advances with the values and needs of society by involving diverse groups of people, including citizens, researchers, policy-makers and businesses, throughout the entire process.

Much of modern research and innovation has the potential to radically influence our lives, from medical advances to new technologies. Yet with this come new risks and unfamiliar ethical concerns. RRI seeks to address such issues by bringing together the public and specialists in discussions around how technology should be used, what research avenues we should pursue, and ultimately what our society and environment can and should look like in the future.

To achieve this, RRI focuses around five key themes: public engagement, open access to scientific publications, gender equality in the sciences, ethical compliance and formal and informal science education.

Botanic gardens already attract, or have access to, many of the diverse audiences which RRI seeks to engage. BigPicnic brings together everyday garden visitors and harder to reach audiences, researchers, policy-makers and industry workers to generate discussion and debate on the topic of food security. By acting as mediators, botanic gardens and other institutions will facilitate dialogue and develop a mutual understanding among researchers and visitors of the ways in which different people work and think.

This approach aims to bring new perspectives to research and innovation on food security, empowering people to take ownership of scientific research and contributing to the development of responsible actors and institutions. The outcomes of events and exhibitions developed as part of BigPicnic, and conversations that they inspire, will provide recommendations for ethically acceptable, sustainable and societal research and innovation, helping to shape the future of our food.

BigPicnic has now passed the half-way mark and so Partners have begun to analyse the data gathered through their public engagement activities to look for common themes that will shape recommendations for RRI in food security that will be delivered to policy makers at the end of the project. Therefore, as well as outlining how BigPicnic is following the RRI approach and how it is adding to this field by developing useful resources, this presentation will outline these preliminary findings. For example, there are areas of major concern for the European population, as well as cultural differences that have been highlighted between nations represented by the project.

KEYWORDS: Responsible Research and Innovation, Food Security

YOUR FOOD, MY FOOD: CO-CREATING GLOBAL STORIES AT BOTANIC GARDEN MEISE

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Co-creation is an innovative and participatory process which aims to create shared ownership of a project between institutions and community partners. Co-creation enables professionals to co-operate with and learn from others, to build a connection between groups that would not normally meet, to raise awareness and sensitivity towards important issues and to build relationships between groups and individuals that will last well beyond the scope of a project.

In BigPicnic, this approach is being employed to develop engagement tools, in the form of travelling exhibitions and science cafes, that are perfectly suited to their purpose, can engage with new and hard-to-reach audiences, raise awareness of the issues that really matter to the European populations and generate public debate around them.

The foundation of the co-creative method is that everyone brings their own unique expertise based upon their personal experience and interests. This expertise adds a new social or cultural perspective to the topic being discussed and helps to enhance understanding between the different worlds we inhabit. Co-creation is driven by exchange of diverse ideas and values. For this reason, co-creation places a strong emphasis on creating conditions of equality among participants, ensuring a level playing field where every degree and form of expertise is equally valued.

Within the vast subject of food security, Botanic Garden Meise have chosen to focus on food issues of Africans living in Belgium. During co-creation sessions in our tropical Glasshouses and around the dinner table, we worked with people of African heritage. Together we have produced a film about their food memories, two small exhibitions, a suite of activities and science cafés on several themes that were raised during the co-creation process. For example, we look at insects as a sustainable food and tubers that are commonly eaten in Africa but not in Europe. In doing this we have seen many successes.

For example:

1. We have strengthened the relationship of our Garden with the African diaspora community.
2. We have obtained useful information on a number of African tropical plants in our Glasshouses, in particular on their use as food and medicine.
3. We have built bridges between our researchers and people of African heritage that have set up projects related to food security in their countries of origin.
4. We have developed new and exciting exhibitions, events and activities.
5. We have developed a strong relationship with a new audience.

PLANTS FOR DINNER? TEAM-BASED INQUIRY FOR PROMOTING HEALTHY AND SUSTAINABLE FOOD

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The term "Inquiry" has been highlighted over the past few decades as corresponding to quality in science learning. The methodologies of active learning in science education (IBSE - Inquiry Based Science Education) aim to provoke curiosity and the creation of scientific questions that lead the search for answers among real contexts while promoting skills of problem solving and the engagement for scientific themes related to daily life.

Science museums and botanic gardens are privileged places in this field, since they allow audiences the opportunity to interact with objects and develop their own avenues of investigation. The collection provides a space for provoking and answering scientific or social questions based on real-life contexts.

The Team-Based Inquiry (TBI) methodology is a teamwork approach that aims to empower education professionals in museums or botanic gardens to obtain the data that will allow a constant improvement of activities and practices in order to increase the audience engagement with science. This methodology is based on the same inquiry-based premise applied to the development of teamwork, promoting a continuous cycle that includes the creation of scientific questions, evaluation research leading to answers and reflection for interpretation and discussion of results in order to increase effectiveness of the initiatives among the different audiences.

For BigPicnic this approach is being using, not only to support the teams at botanic gardens to improve the public engagement tools they are developing, but also as a way of devising the right research questions to support botanic gardens to gather public opinions about food security issues and related RRI.

This presentation will outline how TBI is being applied at the botanic garden at the National Museum of Natural History and Science, University of Lisbon. Here the staff and co-creation team is aiming to promote the Mediterranean diet as a healthy and sustainable food. The results of evaluation research via TBI obtained so far have demonstrated people's perceptions and expectations about healthy and sustainable food, giving important insights for the development of contents and events that may be effective in encouraging awareness, attitudes or even actions and therefore assure the expected impact towards disseminating healthy and sustainable habits about food.

CAPACITY BUILDING FOR PLANT CONSERVATION

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Botanic Gardens Conservation International (BGCI) plays an important role in the implementation of the Global Strategy for Plant Conservation, both through supporting on-the-ground conservation projects as well as building capacity for conservation amongst key groups of practitioners. In the framework of a small-scale funding agreement with the CBD Secretariat, BGCI is developing a range of capacity building materials focused around red listing, ecological restoration and seed conservation. These materials are freely available on-line and are also used by BGCI to support practical workshops and training courses. The training materials consist mainly of self-learning modules, available in a range of languages, supported by a series of videos, webinars and fact sheets. In relation to red listing, BGCI has focused on building capacity for red listing trees on islands, developing a methodology for rapid species prioritisation and Red Listing (to IUCN standards) applicable for Small Island Developing States (SIDS). This has been applied with significant success in Fiji and Haiti. The focus of our work on ecological restoration is to build capacity for the use of native species in forest restoration programmes, with a number of training courses held across eastern and western Africa. Our work on seed conservation contributes to the Global Seed Conservation Challenge and aims to build capacity amongst small, less-well-resourced botanic gardens to collect and conserve seed of endemic and threatened species. This presentation will introduce the capacity building materials that have been developed by BGCI and provide information of the progress made in training plant conservation practitioners in support of GSPC targets 2, 4, 8 and 15.

KEYWORDS: Capacity Building, GSPC, Plant Conservation, Training, Resources

USING TWO APPROACHES OF SPECIES DISTRIBUTION MODELLING (GLM, MaxEnt) TO FIND NEW SITES FOR SEED COLLECTING. A CASE STUDY IN THE EASTERN ALPS (STYRIA)

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Since 2015, the Botanical Garden Graz has been part of the Alpine Seed Conservation and Research Network initialized by the Millennium Seedbank (Botanical Gardens, Kew). The overarching aim of the project is to use the European Alpine Seed Conservation Network to improve the conservation status of endangered plant species and communities in their habitats in the European Alps. Within the project framework the task is to collect seeds from 100 vascular plant species of high conservation value for ex-situ conservation. Some of these species are particularly rare while others are quite common. It often proves difficult to find populations of sufficient size that yield enough seed material (10,000 seeds per species).

Using the example of six alpine plants pecies, this study investigates whether species distribution models can be used to identify suitable collection sites. Two different and widely used modelling approaches [(Generalized Linear Model (GLM), Maximum Entropy Modeling (MaxEnt)] in combination with existing topo-climatic environmental data were used: (1) to examine whether it is possible to model the recent distribution and whether the results are comparable, (2) to interpret model parameters regarding to local conditions, (3) to find out how Species Distribution Models (SDMs) can improve the collection success and (4) whether one approach can be recommended.

Both modelling approaches were able to predict the distribution of the six vascular plant species across the Styrian Alps. The models were able to make plausible predictions and mainly comply with known distributions provided by the Styrian distribution atlas. The prediction maps of both approaches show very similar results for one species, whereby GLM models tend to overestimate the potential distribution. This means that the latter method deemed more regions as suitable for collection.

A simple way to compare the results of both modelling approaches was to contrast the area of occupancy quantified from the prediction maps by using measures of classification accuracy. Thus a threshold was derived from a confusion matrix to create binary maps where sensitivity equals specificity. A pixel is classified as suitable if the value is above this threshold.

The environmental variables used provided good results but the ecological relevance should

be interpreted with caution. The variables that contributed the most in the models were average annual temperature, average summer precipitation and geology. However average mean values do not optimally represent the conditions over the year because seasonal fluctuations are only insufficiently included and do not account for local variations that are caused by topographic complexity (microclimate).

Although it is not possible to make a clear statement about population size the results have shown that SDMs can assist in localizing special areas of collecting interest. With the help of the prediction maps it is possible to restrict field surveys to particular areas that show higher probability values. And this could contribute significantly to the collection success.

KEYWORDS: *Ex-situ* Seed Conservation, Species Distribution, Habitat Suitability, Model, Alpine Plant Species

O023

THE GLOBAL TREES CAMPAIGN – SAFEGUARDING THE WORLD´S THREATENED TREES FROM EXTINCTION

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Botanic Gardens Conservation International (BGCI) provides a global voice for plant conservation and a global network of botanic gardens. Tree conservation has been a strong focus of BGCI's programme for many years. In collaboration with Fauna & Flora International, we run the Global Trees Campaign (GTC), the only global programme dedicated to saving the world's threatened tree species. Since its initiation, GTC has gone from strength to strength, running projects that directly support the conservation of threatened tree species with partners in over 30 countries.

GTC works in four distinct ways to ensure that no tree species goes extinct.

Firstly, GTC prioritises conservation action for threatened trees. GTC carries out conservation assessments for tree species to identify which species are in need of conservation action. GTC has a pivotal role, along with the IUCN/SSC Global Tree Specialist Group, in the Global Tree Assessment (GTA), an initiative to produce conservation assessments for all trees by 2020. The backbone of the GTA is GlobalTreeSearch, the first comprehensive list of

the world's tree species and their country distributions, launched by BGCI in April 2017. Alongside conservation assessments, GTC also carries out ***ex situ*** surveys to determine which threatened species are not found in collections.

Secondly, working with partners on the ground, GTC protects tree species ***in situ*** and carries out reintroduction and restoration projects. Our projects trial new techniques and provide models of best practice.

Thirdly, GTC works to improve tree conservation practice byproducing resources and delivering training. We draw upon the specialist skills of our network and focus our efforts in areas where capacity is particularly limited. We provide recommendations, including guidelines for the consideration of genetic diversity in both ***ex*** and ***in situ*** projects.

Finally, GTC works to ensure that more organisations and individuals are aware of the importance of tree species conservation measures. GTC achieves this through outreach using the GTC website (globaltrees.org), our social media and our participation in conferences and events such as this.

There is an urgent need to scale up conservation action to prevent the extinction of tree species. Here we show the ways in which GTC is currently working and how European botanic gardens can get involved to ensure that no tree species goes extinct.

KEYWORDS: Global Trees Campaign, Build Capacity, International Network, Conservation, Best Practice, Botanic Gardens, Arboreta

O024

EX SITU PLANT CONSERVATION IN GREECE: THE ROLE OF THE NEWLY ESTABLISHED NETWORK OF THE GREEK BOTANIC GARDENS

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Greece is an important hotspot of plant diversity and endemism in the Mediterranean region. The Greek flora consists of at least 6,620 plant taxa (species and subspecies) with an exceptionally high endemism rate (22%) and a large number of socio-economically valuable plants (i.e. medicinal and aromatic plants, crop wild relatives, edible plants etc.).To enhance complementarity of their conservation actions in order to achieve Targets 8 and 9 of the Global Strategy for Plant Conservation (GSPC) at national scale, the Greek Botanic Gardens (BGs) have recently established a network, looking forward to a more effective ***ex situ*** conservation of the Greek plant diversity and the national phytogenetic resources. The Greek Network members have created a large database with extant living plant collections which was supplemented by seed accessions kept in the Greek Seed Banks (SBs); some of the latter contribute with stored accessions in the European Search Catalogue for Plant Genetic Resources (EURISCO; eurisco.ipk-gatersleben.de) and/or the European Native Seed Conservation Network (ENSCONET;http://ensconet.maich.gr/). The database created currently includes 9,418 accessions of at least 1,813 plant taxa (species and subspecies) stored either in Greek BGs and/or SBs. About 27% of all native Greek taxa (n=1707) and 26% of the endemics (n=1460) are represented with at least one collection in Greek BGs and SBs, including 122 threatened taxa assessed as Critically Endangered, Endangered or Vulnerable and another 44Rare or Near Threatened ones. Greek SBs alone have stored at least one accession of 23% of the endemics (on average 1.864/taxon), while BGs maintain at least one living collection of 11% of the endemics (on average 1.544/taxon). The respective percentages of the effectively ***ex situ*** conserved taxa are considerably lower; for example only 3 and 21 Greek endemic taxa are represented with 5 or more accessions in Greek BGs or SBs, accordingly. This highlights that there is still a long way to go if plant diversity conservation in Greece is to essentially meet the requirements of GSPC Targets 8 and 9. The establishment of the Greek Botanic Gardens Network is a response to the need of well-coordinated ***ex situ*** conservation actions for the native Greek plants. A conservation prioritization procedure for all native Greek vascular plants is currently being implemented based on multiple prioritisation criteria, i.e. global and national distribution range, global

and national red list categories, gap analysis of current ***ex situ*** conservation status, potential socio-economic value and legislation. The main objective is to focus on conservation efforts and channel the limited available resources on the effective ***ex situ*** conservation of high prioritized species.

KEYWORDS: Biodiversity, Native Plants, Phytogenetic Resources, Seed Banks, GSPC

O025

NORDIC COUNTRIES JOIN FORCES IN CROP WILD RELATIVE *EX SITU* AND *IN SITU* CONSERVATION

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Crop wild relatives (CWR) are socio-economically important wild species related to cultivated plants. They are one of the keys in addressing the global challenges of food security, sustainable and environmentally friendly agriculture and climate change. Diversity found in CWRs can be essential in improving crop plants adaptation to the changing conditions such as new pests and diseases, waterlogging, droughts, and tolerance to cold or heat. However, many wild relatives are threatened by factors such as changing land use, habitat fragmentation, invasive species and climate change. The need to improve the conservation of CWRs has been recognized in the Convention on Biological Diversity (CBD) 2010 and the Global Strategy for Plant Conservation 2011-2020, which stress the need to safeguard this important genetic resource. The goals set out in the international treaties can be achieved by planning and implementing conservation actions, such as identifying target CWR species, finding gaps in present ***in situ*** and ***ex situ*** conservation, developing CWR genetic

resource conservation methods, and drafting and implementing policy recommendations. In an integrated CWR conservation strategy, ***in situ*** conservation would conserve the target species genetic resources and safeguarding the evolutionary potential of CWRs in the wild. At the same time, ***ex situ*** conservation would act as a backup and could potentially serve as a source for reintroductions and distribution of material for utilization.

A regional Nordic network, which involves representatives from Denmark, Finland, Iceland, Norway, Sweden and the Nordic Genetic Resource Centre (NordGen), has searched measures to meet these goals. The network has planned CWRs ***in situ*** conservation and created policy inputs to enhance the conservation of CWRs. The Nordic ***in situ*** conservation planning included generating a comprehensive regional CWR checklist which was then prioritized by socio-economic value and utilization potential. For these prioritized species, an ecogeographic complementarity analyses was undertaken in order to find potential genetic reserves in the region. The ecogeographic complementarity analysis found a minimum number of sites, both within and without existing conservation areas, which would host a maximum number of target species and maximize the intraspecific diversity conserved. By conserving the largest ecogeographic variability of each species, the largest genetic diversity of adaptive importance would be conserved for future use. These sites are important centers of the target species diversity in the region and potential locations for future genetic reserves.

Ongoing work includes ***ex situ*** conservation analysis and a common Nordic report that will include recommendations on integrated ***in situ*** and ***ex situ*** actions of the region. The ***ex situ*** analysis will find gaps in existing ***ex situ*** collections of the five countries and produce suggestions to future collecting priorities. A policy brief for the actions needed to assure long-term conservation of CWR has been produced which stresses the need to ensure a systematic conservation of CWRs, and have complementary conservation on national and regional levels.

KEYWORDS: Crop Wild Relatives, ***In Situ*** And ***Ex Situ*** Conservation, Food Security, Plant Genetic Resources, Complementarity, Conservation Prioritization

PRESERVING THE FLORA OF THE FRENCH OVERSEAS COMMUNITIES AND TERRITORIES *IN SITU* AND *EX SITU* CHALLENGES

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Biodiversity in France cannot be compared to that of the tropics but through the variety of the terrestrial and marine biomes held in its overseas communities, from the subarctic (Saint Pierre-et-Miquelon) to Antarctic (Terre Adélie), through the tropical zones of three great oceans, it presents a remarkable biological diversity. This positions France as the most biodiversed country in Europe giving it a great responsibility.

The first part of the presentation will describe how France is implementing targets 1, 2, 5, and 7 of the Global Strategy for Plant Conservation in its overseas communities and territories. We will then focus our study on two French Departments of the Indian Ocean: La Reunion and Mayotte, two territories where biodiversity has been well explored.

We will present the current in and ex situ conservation programs and action plans that are already in place in these two territories. Looking more precisely at target 8, we will analyze, using the BGCI PlantSearch tool, the representativeness of the CR and EN threatened flora maintained in ex situ collections, Conservatoires botaniques, botanical gardens and seed banks in these French Departments or in other locations within or outside France.

According to the latest IUCN lists, the Flora of La Reunion island counts 91 taxa that are rated CR and 80 EN and for Mayotte 36 CR and 41 EN. This study will showcase the percentage of critically endangered and endangered taxa that are maintained in ex situ collections, show where they are held and by obtaining information on the accession data of the species of special concern help identify what percentage could be actually used for recovery and restoration programs.

When fully implemented, in Metropolitan France and in the French overseas communities and territories, the array of programs and action plans set up for the implementation of the Global Strategy for Plant Conservation, the Aichi targets 12 and 15 of the Sustainable Development goals should allow to ensure the preservation of the threatened species in their natural habitats.

KEYWORDS: Conservation, Red Lists, Overseas Territories, GSPC, Target 8, Ex Situ Conservation

LIVING COLLECTIONS OF TROPICAL PLANTS AS NATIONAL HERITAGE COLLECTIONS OF UKRAINE

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Ex situ conservation of tropical plants threatened with extinction within their native ranges is one of the highest priorities on research agenda at the Botanic Gardens of Ukraine. The most numerous living plant collections have been accumulated at O.V. Fomin Botanical Garden, Botanical Garden of Ivan Franko National University of Lviv and M.M. Gryshko National Botanical Garden (NBG). All of them have the status of National Heritage Collections of Ukraine. The list of National Heritage units, including the most important science and arts collections, is designated by relevant ministries and agencies and approved by the Cabinet of Ministers of Ukraine.

Diverse studies aimed at protection of rare species are carried out at these institutions with focuses on various families of angiosperms. O.V. Fomin Botanic Garden, founded in 1839, is known to be one of the oldest in Ukraine. Living collections of tropical plants comprise more than 4200 taxa, representing 830 genera and 180 families. It is noteworthy, that more than 60 % of collected samples represent plants with «succulent syndrome» which is considered to be one of the most remarkable examples of convergent evolution within the plant kingdom.

Collections of tropical and subtropical plants, accumulated at Botanical Garden of Ivan Franko National University of Lviv are one of the oldest in Ukraine. Founded in 1852, it is home to 1700 taxa of tropical plants belonging to 475 genera and representing 136 families from various tropical biomes of the world. The most valuable part of this collection is comprised by «living fossils» cycads (***Dioon edule*** Lindl., ***Cycas*** L. and ***Ceratozamia*** spp.), which are the most threatened major group of plants in the world. Besides, the unique relict plants of ***Araucariaceae*** family, ***Agathis macrophylla*** (Lindl.) Mast. (160 years old) (categorized in IUCN Red List as endangered species) and ***Araucaria bidwillii*** Hook., are maintained at the collection.

At present the NBG living collection of tropical plants contains about 4200 taxa representing approximately 900 genera and 164 families. The orchid plants have been a main focus of

the Garden's Living Collections.

While creating the collection, the strategic goal was to represent most widely the floristic, ecological and morphological diversity of ***Orchidaceae***, with an emphasis on rare and vulnerable orchid species.

Current research activities at our Botanical Gardens are focused on the following issues: studies of developmental biology of plants under glasshouse conditions; investigation of structural adaptations and life histories of orchids, succulents, cycads to survival under a wide range of different habitats; development of ***in vivo*** and ***in vitro*** propagation procedures.

To conclude, living plant collections are used as valuable sources of material for diverse scientific, conservational and educational projects.

Plant exhibitions created at each of the Botanical Gardens highlight the diversity of tropical plants, their uniqueness, providing education in issues related to conservation of plant species suffered through over-collecting, global climate changes and irreversible loss of their natural habitats.

KEYWORDS: Tropical Plants, National Heritage Collections, ***Ex Situ*** Conservation, Cycads, Orchids, Succulents

O028

CONSERVATION OF TROPICAL MONTANE FOREST IN TAITA HILLS – HOW A BOTANIC GARDEN COULD MAKE A DIFFERENCE

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Species diversity shows a distinct curve in relation to latitudinal gradient with a peak in the tropics and decline towards the poles. In turn, the curve describing the scientific knowledge on biodiversity shows almost the opposite with highest taxonomic expertise residing in the temperate regions of the northern and southern hemisphere. Therefore, it is crucial to alleviate the discrepancy between the whereabouts of the knowledge and biodiversity through the means of education, facilitation and cooperation.

According to the target five of the GSPC one should identify important areas of plant diversity

for conservation action. The Taita Hills in southern Kenya form the northernmost part of the Eastern Arc Mountains, which are known to harbour a large number of endemic plant and animal species. The indigenous forests of the Taita Hills, which are of greatest importance for conservation, have suffered substantial vegetation loss and degradation since the early 1960´s. To date about 400 ha of original forest is retained in a scatter of three larger remnants. The demise of the forest is largely due to agriculture driven changes in the land use patterns, leading to serious deforestation, soil erosion, and lowering of water tables in the hills. It is obvious that there are no straightforward solutions to the biodiversity crisis in the area. In turn, solutions need to address local livelihoods and community infrastructure as well as take into account the traditional knowledge on indigenous plants.

Taita research station, run by the University of Helsinki, is located in Wundanyi at the altitude of 1400 m in the center of the Taita Hills. In close vicinity to the station there is a three-hectare valley reserved for a new botanic garden. The plan for the garden includes solutions for local water management, agricultural test plots, and a native forest restored using plant material collected from local populations. The new garden would serve both the local community and students from all over the world by introducing them to the indigenous flora as well as showcasing sustainable agricultural practices and ethnobotanical heritage. The project will be carried out in close collaboration and interaction with the local authorities, NGOs and representatives of the neighboring farmers.

KEYWORDS: Taita Hills, Kenya, Restoration, Botanic Garden, Montane Forest, Ethnobotany

O029

FROM SINGLE INDIVIDUAL CONSERVATION TO THE RESTORATION OF NATURAL POPULATIONS OF CRITICALLY ENDANGERED FERN SPECIES

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Long-term research on three critically endangered endemic fern species ***Asplenium dielpallidum*** N. Snow, ***Asplenium dielmannii*** Viane and ***Asplenium diellaciniatum*** Viane resulted in returnal of ***ex situ*** propagated plants to the country of origin (Kauai, Hawaiian Islands) for reinforcement/restoration of their natural populations.

Among 366 endangered Hawaiian plant taxa, 238 are represented by fewer than 50

individuals. For many of these, there is no detailed information about their biology, ecology and reproductive biology. Thus, the research on different aspects of their life strategy and habitat condition is inseparable from ohter conservation activities.

In 2002, the whole population of ***Asplenium dielpallidum*** consisted of 12 reproductive individuals. New location with small population of 39 individuals of ***Asplenium diellaciniatum*** was found in 2001 (Wood, Perlman) and single individual of ***Asplenium dielmannii*** was relocated in 2002 (Arnold, Aguraiuja) after not documented for more than 100 years. Their natural habitats were heavily disturbed by introduced ungulates or overgrown by non-native species.

Simultaneously with population studies (structure, dynamics, adaptations to local climate pattern, potential source populations, dispersal and distribution pattern, community structure and habitat conditions), tests were conducted for selecting the methods most suitable for reinforcement/restoration of populations (reducing the competition with non native species, availability of soil spore bank, sowing the spores to the habitat, testing the tolerance to replanting and translocation, population reinforcement). It was learned that gametophytes and sporelings, rescued from heavily disturbed habitat and boosted up ***ex situ***, could be retuned to the natural habitat and used for population reinforcement in protected areas. The reinforcement tests revealed the importance of considering the microsite conditions and individual life stage during the out-planting.

Laboratory studies at Tallinn Botanic Garden provided essential information about gametophyte generation (perennial life strategy of gametophytes, duration of developmental stages and transitions, obligatory of out-crossing, capability for vegetative and regenerative growth). It was learned that gametophyte cultures of these species could serve well for preserving the gene pool of the species, for ***ex situ*** research and propagation for restoration.

In 2015, altogether 13 thermoboxes with 1790 ferns were translocated as a scientific donation from Estonia to Hawaiian Islands and received by National Tropical Botanical Garden (***Asplenium dielpallidum*** - 848, ***Asplenium dielmannii*** – 465, ***Asplenium diellaciniatum*** – 477 specimens together with 90 units of gametophyte cultures) where they were replanted, and later on relocated to Kauai Mesic Elevation Nursery for further acclimatization to the local natural climate.

Planting to the natural habitat began in 2016 and was conducted under the guidance of Plant Extinction Prevention Program on Kauai. Since, 585 ferns were planted to natural habitat in five locations within protected areas: ***Asplenium dielpallidum*** - 343 individuals in two locations in Kuia Natural Area Reserve, survival 91,6% after the first year in the habitat; ***Asplenium dielmannii*** – 164 individuals in two location, in Na Pali Kona Reserve and Kokee State Park, 96,5 % alive after the first year in the habitat; ***Asplenium diellaciniatum*** – 78 individuals in one location, in Na Pali Kona Reserve.

KEYWORDS: Critically Endangered Fern Species, Long-Term *In Situ*/*Ex Situ* Research and Conservation, Collaborative and Parallel Activities, Reintroduction, Population Reinforcement and Restoration of The System of Populations

BOTANIC GUARDIANS: 25 DUTCH BOTANIC GARDENS COOPERATE AS BOTANIC GUARDIANS TO PRESERVE BIODIVERSITY

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With 'Planting the future', the 25 members of the Dutch organization for botanical gardens (NVBT) have been working together intensively to improve their public visibility as guardians and gatekeepers of biodiversity.

For this purpose, an intensive cooperation has been initiated between the NVBT and the Waag Society in the framework of the project 'Planting the Future' (2013 – 2018), funded by the National Postcode Lottery. This cooperation goes far beyond 'Planting the Future'.

The Dutch gardens initiated a label framing them as ***Botanic Guardians*** in 2016, representing the shared value system in which they actively and visibly focus on preserving biodiversity. To engage the public, a strong logo has been developed to support the campaign to raise awareness about the importance of biodiversity, conservation and simultaneously draw a new and younger audience to the botanic gardens. The logo is inspired by the Fibonacci numbers, which are omnipresent in nature.

The Dutch botanical gardens play their role as botanic guardians in three different ways:

Making the data of their collections accessible.

This implies: uploading their collection data to a publicly accessible online portal (***www.botanischetuinen.nl/plante)*** and enriching the collection data with stories and images. Visitors can now explore the collections of the 25 member gardens online by theme, flowering period, garden or individual plant. In addition the enriched data are used in new educational programs and in an app called Hortus Chat.

2 . Setting up a Living Archive (a national seed collection) of wild native Dutch plants.

The living archive strives to preserve seeds from a wide variety of provenances per species to keep the species genetically diverse. The seeds are sown in botanical gardens (ex situ) and beyond (in situ). Communication to the public about biodiversity is of great importance here.

The living archive can be used for different purposes: the reintroduction of threatend plant species, the improvement of seeds for agricultural crops, the supply of seed mixtures for roadsides and nature reserves and for scientific research. The Living Archive consists of a consortium of scientists, growers, land managers and botanical gardens.

3. Working closely together with all employees and volunteers of the gardens and with great attention for the public.

Also, for Dutch botanic gardens, the whole is more than the sum of its parts. The large amount of joint publicity through the project 'Planting the Future' had a positive effect on all gardens, small and large. The diversity of gardens has flourished through this intensive collaboration. And more and more visitors find their way to the plants in the gardens.

In addition, the logo and campaign allow other brands to join the Dutch gardens in their mission. By displaying the Botanic Guardians logo on their products, organizations show that conserving biodiversity is important to them and they become Botanic Guardians as well. By doing so, the botanical gardens and their mission are introduced into the brand environment of people who may never have heard of a botanic garden. This aspect will be further developed in the near future.

KEYWORDS: Biodiversity, Botanic Guardians, Publishing Plant Collections Online, Cooperation, Seedbanking

O031

USING EVERY OPPORTUNITY TO CULTIVATE AND CONSERVE

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Many threatened plant species are often represented ex-situ in relatively low numbers – the BGCI 2014 Global Survey of ex situ Conifer Collections found that even for this popular group of plants 80% of wild source collections of threatened conifers are represented by only 1-5 genetically unique individuals. For over 25 years the International Conifer Conservation Programme (ICCP), based at the Royal Botanic Garden Edinburgh Scotland, has been developing a network of ex situ sites for threatened conifers in the British Isles. The aim of these 'safe sites' is to broaden the genetic base of threatened conifer species so that they can play an active role in the restoration of depleted wild populations. This network of 150 or more sites holds over 12000 wild origin documented plants. Because space is often at a premium in Botanic Gardens much of the network includes private landowners, public parks and gardens where there is often a better opportunity of establishing relatively large plantings of a single species. For botanic gardens to act as effective insurers against

plant species loss they will need to continue to develop robust strategies to ensure the collections they hold are relevant for conservation purposes. Whenever possible plants should be represented by wild origin collections and curators should be prepared to adopt rigorous deaccessioning policies involving the removal of irrelevant plant material in order to achieve this. In a recent project at RBGE even the Garden perimeter hedge of holly was replaced with a conservation hedge of 2000 ***Taxus baccata*** plants collected from threatened forests in Europe. Today all newly planted hedges at RBG Edinburgh focus of plant species which are of conservation concern. Every opportunity has to be taken to cultivate and conserve and use the knowledge gained to support in situ conservation efforts!

KEYWORDS: Conifer Conservation, Conservation Hedges, Deaccessioning Policies, International Conifer Conservation Programme, ***Taxus baccata***

O032

BOTANIC GARDENS: WORKING TOGETHER TO IMPROVE THE QUALITY AND VOLUME OF SCIENCE-BASED ECOLOGICAL RESTORATION

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The Ecological Restoration Alliance of Botanic Gardens (ERA) was established in 2012 and is an international consortium of botanic gardens actively engaged in ecological restoration. Recognising the vitally important role that botanic gardens, arboreta and seed banks can play in restoring degraded ecosystems, members of the Alliance have agreed to support efforts to scale up restoration of damaged and degraded ecosystems around the world. Thus, contributing to the Sustainable Development Goals and the United Nations' target to restore 15 per cent of the world's degraded ecosystems by 2020. The network is coordinated by Botanic Gardens Conservation International (BGCI).

ERA has gained significant momentum in recent years. The Alliance has now grown to over 30 member botanic gardens, working to restore a variety of different ecosystems in a range of cultural contexts across six continents. Collectively, ERA members manage over 140 active restoration projects, utilising their herbarium, seed and living plant collections, and

botanical and horticultural expertise to put ecosystems back, piece by piece.

ERA is committed to building capacity for restoration and to improving the quality and volume of science-based ecological restoration practice. ERA delivers training courses and produces resources with a strong focus on increasing the diversity of indigenous species involved in ecological restoration projects. ERA resources are being produced, which draw upon the extensive expertise available within the Alliance, including a species recovery manual to provide restoration practitioners with a standard methodology and approach and a series of upcoming online modules on how to restore forests.

Conference attendees will learn more about the work of ERA and resources available to support ecological restoration. Botanic gardens will be encouraged to join the Alliance and apply their skills and collections to help restore the world's degraded ecosystems.

KEYWORDS: Ecological Restoration, Botanic Gardens, Ecosystem Services, Health, Biodiversity, Livelihoods, Resources, Capacity Building.

O033

SCIENTIFICALLY INFORMED *EX SITU* COLLECTION GUIDELINES: EXAMPLES IN *QUERCUS* AND *FRAXINUS*

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Ex situ seed collections from natural plant populations are an important conservation strategy for threatened species, and can provide material for research, habitat restoration, and breeding. It is crucial that these collections capture as much phenotypic and genetic diversity from the species' natural populations as possible. Recent work has suggested that new guidelines are needed for tailoring the size of a collection to a species' biology, especially its reproductive and dispersal modes, and population structure. However, there are almost no examples of sampling designs customized for particular species of concern, based on rigorous scientific data. For well-studied species, such customized protocols may help yield optimized and genetically robust seed collections. This is essential for future conservation success.

We present a case study using modeling for ***Fraxinus excelsior***, an ash species threatened

with catastrophic loss due to an introduced pathogen. Large scale seed collections are being made to safeguard against loss of the species, via the UK National Tree Seed Project. We used spatial-referenced survey data, previous genetic studies, and a simulation model to quantitatively estimate the genetic capture of already collected seed accessions, locate the best sites to collect from next, and determine optimal numbers of seeds and maternal plants to collect from for each site.

Additional case studies include a regional population of a common US ash species and a rare US oak species for which genetic data and knowledge of the species are used to determine optimal seed collection strategies. We are collaborating with seed collectors and botanic garden curators to help prioritize future collection sites to ensure that the most important and genetically valuable accessions are present in our gardens. We demonstrate that this scientific framework can be used to design collection strategies for other high priority species, and may be a useful tool for optimal, effective ***ex situ*** seed conservation.

KEYWORDS: ***Ex Situ*** Collections, Genetic Diversity, Collections Conservation, Genetically Valuable Collections

O034

THE ROLE OF LANDSCAPE ZONATION OF THE BOTANICAL GARDEN NETWORK IN THE SAVING THE GEODIVERSITY AND BIODIVERSITY IN EUROPE – CASE STUDY OF POLAND

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Botanical gardens play very important role in the biodiversity preservation. In Europe their location in the most cases have historical origins. Consequently, spatial distribution of the

botanical garden network is irregular. Then, there is a risk that the richness of the types of natural habitats in Europe is not adequately represented by resources gathered in botanical gardens. This could result in limited possibilities of the preservation of endangered and protected species. We should notice that this issue still has not been fully recognized.

The GENESIS project ('The role of landscape zonation of the botanical GardEnNEtwork in the SavIng the geodiverSity and biodiversity in Europe') aims to analyse the spatial diversity of European botanical gardens in bioclimatic zones in the context of their role as the areas protecting local natural habitats. One of the main outcomes of this project will be the GIS database containing the information about climatic, hydrologic, soil, landform and other conditions of botanical gardens. In the presentation, we would like to focus on the main project assumptions as well as to visualize the spatial distribution of the European botanical gardens network in bioclimatic zones. What more the results of the pilot study will be discussed. This study was conducted in the years 2017-2018 in Polish botanical gardens. Our aim was to assess the possibility of the data collection and to recognize the main problems which are related to this issue. For the research purposes more than 40 questionnaires were sent to botanical gardens in Poland. We wanted to obtain information about the processes of the collection, storage and processing the data on species and habitats. Additionally in the survey we asked also for the identification of natural habitats which are typical for the area where a botanical garden is located.

Based on obtained results we noticed that the organisation of the process of data collection is totally different in every analysed botanical garden. Most of botanical gardens have their unique electronic databases and some of them attempted also to establish their own data management programs. Consequently, there is a lack of uniform standards of the data collection and storage. This seems to be one of the most important barrier in a creation of the national database containing the information about all the resources of botanical gardens in Poland. Therefore, in the next step we developed one uniform database of natural habitats for the whole country. For this purpose, information obtained from questionnaires were utilized with the use of ArcGIS program. In effect, the identification of the diversification level of natural habitats represented in botanical gardens was possible. This study proved that a lot of habitats of 'priority' importance for EU and typical for Poland was not represented in the resources collected in national botanical gardens. With no doubts the results of the study have a great importance for the future researches and activities within the GENESIS project.

KEYWORDS: Botanical Gardens, Biodiversity Conservation, Natural Habitats, Poland, GIS

THE ROLE OF THE SAKHALIN BOTANICAL GARDENS IN PRESERVING THE BIODIVERSITY OF THE FLORA OF SAKHALIN AND THE KURIL ISLANDS

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Sakhalin Botanical Garden is one of the youngest in Russia. Since the first year of its creation, the Garden has been working in three main directions: introduction of plants, ecological education, study and conservation of biological diversity. For 25 years of existence in the garden were introduced about 2500 plant species from various regions of the world. Currently, the garden collection includes over 2,000 taxa of open ground plants.

Particular attention is focused on preserving the biological diversity of the flora of the natural flora of Sakhalin and the Kuril Islands ***ex-situ*** and ***in-situ***. About a third of the territory of the Botanical Garden is a natural forest area where about 450 species of vascular plants grow, more than 50 species of mosses, 85 lichens, 37 species of fungi. An ecological path is laid here and observations of the processes of reforestation are being conducted. To demonstrate the rarest and most endemic species of plants in the garden, a special exposition "The Living Red Book" was created, in which 55 rare species of the flora of Sakhalin and the Kuril Islands and more than 40 species included in the Red Book of the Russian Federation are represented.

Active work is being done to conserve rare plants in wildlife. Employees of the Garden take part in environmental assessments for the construction of large facilities on Sakhalin, give recommendations on the transplantation of rare plants, some of which are taken to their territory. At the insistence of the botanical garden, the route of the main gas pipeline was changed, bypassing the mud volcano Maguntan, where on an area of only 2 hectares, there are four rarest, locally endemic species of insular flora: ***Primula sachalinensis***, ***Gentianella sugawarae***, ***Artemisia limosa***, ***Deschampsia tzvelevii***.

Over the past ten years, during expeditions, more than 30 new locations of the rarest endemic vascular plant species have been identified (***Callianthemum sachalinensis***, ***Lonicera tolmatchevii***, ***Juglans ailantifolia***, ***Stenantium sachalinense***), and rare lichens (***Icmadophila japonica***, ***Sticta limbata***, ***Lethariella togashii***) of the Sakhalin Region.

The garden staff conducts a comprehensive environmental survey of the region's specially protected natural areas. Complete floristic lists for 2 reserves and 17 Protected areas of another rank have been compiled.

A scheme for the development of specially Protected Natural Areas of the Region has been

prepared, the implementation of which will increase the number of protected natural sites by 21 units and reach 74, and their area will increase by more than 160,000 hectares (12% of the Oblast's Area), thanks to this, real protection will be provided to 90% of all rare under the threat of extinction of plant species. In 2005, the Sakhalin Botanical Garden prepared the Red Book of the Region. At present, the preparation of the second supplemented edition of the Red Data Book of the Sakhalin Oblast has been completed.

KEYWORDS: Far East, Sakhalin Region, Rare And Endemic Plants, Biodiversity

O036

URBAN HABITAT SURVEY IN PORTO BOTANICAL GARDEN

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The Botanical Garden of the University of Porto is a designed outdoor space, with ecological, aesthetical and historical interest. It is a place rich in landscape settings, stories and memories, where the eclectic interventions of the end of 19th century and first half of the XX century stand out.

The proximity of the Atlantic Ocean tempered by the Gulf stream and a granite substrate create favourable conditions for the cultivation of a varied, robust and multi-layered plant community, integrating species from various bioclimatic regions; among these the camellia, conifer and succulent collections show some significance.

It is laid out in three main levels, establishing a mosaic of spaces, habitats and plant groups, full of diversity and surprise effect.

At the higher level, an almost flat terrace accommodates the main house, the entrance woodland gardens and the formal gardens enclosed by high ***Camellia japonica*** clipped hedges, mainly of Portuguese cultivars created by the end of the 19th century; the intermediate levels are mainly occupied by the cacti collection and the green houses; the lower level is dominated by a small arboretum.

In its four hectares, the Botanical Garden reveals a relatively rich assemblage of cultivated habitats, with diverse spatial arrangements and multiple vegetation layers.

These habitats of human origin have been surveyed in a research project on urban biodiversity accomplished in the city of Porto between 2010-2014 (Farinha-Marques et al., 2014). The habitat identification, description and representation was done through the adaptation to the urban landscape of an already established method developed by the European Biodiversity Observation Network (Bunce et al., 2011). Such procedure allowed the development of new habitat survey method dedicated to artificial ecosystems, particularly occurring in the urban context, named Urban Habitat Biodiversity Assessment (UrHBA) (Farinha-Marques et al., 2015).

UrHBA describes the urban habitats based on Raunkiaer life forms, land cover, dominant species, site descriptors and vegetation layers (Bunce et al., 2011; Farinha-Marques et al., 2017). The method is strongly grounded on a spatial narrative and representation, easy to understand by non-specialists. The resulting habitat and site descriptor maps communicate well with the general public and are complemented with detailed plant species inventories for each habitat (Bunce et al., 2011).

Alike in other urban green spaces, the application of UrHBA in the Botanical Garden of Porto was an opportunity to learn more about urban biodiversity and its relation to space morphology, cultivation and invasive species. The outputs allowed to devise guidelines to improve the ecological and aesthetic quality of the Botanical Garden in a context of a more inclusive scientific and cultural dissemination.

KEYWORDS: Cultivated Biodiversity, Designed Spaces, Habitat Assessment

O037

MANAGING PLANT COLLECTIONS IN A POST-NAGOYA WORLD: HOW ARE BOTANIC GARDENS ADAPTING TO NEW ACCESS AND BENEFIT SHARING REGULATIONS?

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Botanic gardens and other ex situ collection holders are both users and secondary providers of plant genetic resources along chains of custody, use and value. The acquisition, use and transfer of genetic resources, as well as associated traditional knowledge, is governed by the Nagoya Protocol on Access and Benefit Sharing (ABS), which came into force in 2014. The Nagoya Protocol is an international agreement which aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way. The Nagoya Protocol offers challenges to collection holders as countries update or develop new ABS laws. National measures may now include clearer guidance on how to access material, but may also include further restrictions regarding use and transfer, and/or measures to monitor utilisation. In the context of a Darwin Initiative funded project, BGCI is collecting practical examples of measures that ex situ collections, research institutions and their networks are taking to ensure that they acquire, use and transfer plant genetic resources and share benefits in compliance with national and international laws, respecting the rights of provider communities and in accordance with mutually agreed terms. Some of the measures are simple, some are more complex, depending on local context, needs and available resources. This presentation will highlight some of the actions being taken by botanic gardens and research institutions around the world to strengthen relationships with communities and to carry out ABS training and awareness-raising within their institutions and via networks. It will also describe some institutional responses to codes of conduct and demonstrate data management systems that help to maintain links between provider and permissions data and material. Finally, the presentation will also provide examples of benefit sharing mechanisms and processes used by botanic gardens.

KEYWORDS: Access and Benefit Sharing, Nagoya Protocol, ***Ex Situ*** Collections, Traditional Knowledge, Genetic Resources

O038

EABCN: REGIONAL COOPERATIVE NETWORK FOR PLANT BIODIVERSITY CONSERVATION IN EAST ASIA

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Upon the background of globally initiated biodiversity conservation goals and strategies, such as Target 15.3 of Sustainable Development Goaland Global Strategy for Plant Conservation (GSPC) 2020, the East Asia Biodiversity Conservation Network (EABCN) was established for the regional cooperation on biodiversity conservation in East Asia by six (6) organizations from five (5) countries (China, Republic of Korea, Japan, Mongolia, Russia) in 2014.The EABCN is institutionalized based on Working Group (WG) conducting collaborative research and data collection to establish a mid- and long-term regional plant conservation strategy in East Asia. Currently, four (4) WGs under the EABCN are in operation. The WG on Flora of Northeastern Asia (Plant Checklist) targets reviewing plant list collected and re-arranging the scientific name and synonyms in response to the GSPC target of completing World Flora, with preparation of web-based platform. Currently, it is completed to combine 130,000 scientific names of plants in Korean peninsula and three (3) provinces of China (Jilin, Liaoning, Heilongjiang), and it will be completed to combine the scientific names of plants in Mongolia and Far Eastern Russia by the mid of 2018. WG on Plant Phenological Monitoring targets monitoring East Asian common, rare and local endemic plants interacting through the website of East Asia Phenological Network, which is also linked with smart phone application. The WG on Joint Publication targets endemic plants in East Asia which tells history, botany, ethnic use, cultural relation etc. for the public, which currently in preparation for the third volume titled “Important Plants of East Asia: Plants above Forest Limits”. It also targets dwarf relict plants in East Asia, which has already published two volumes titled “Resilient Dwarf Relic Plants Tell Stories I & II”. The WG on Vegetation Monitoring in response to Climate Change targets intensive and extensive long-term monitoring in a transitional zone to understand the changes in the species composition and habitat in response to climate change. Currently, the members in this WG are working for publishing the EABCN Special Issue at the Journal of Ecological Research with the keywords of climate change, vegetation monitoring and East Asia. In addition to those four WGs, the pilot joint research project on Genetic Diversity and Differences of ***Pinus pumila*** in East Asia has been conducting to examine genetic variation and differences in geographical and ecological characteristics among member countries. In the future, it is expected that collaborative researches on Invasive Alien Plants and IUCN Red List in East Asia will be conducted, and the partnership with, IABG, IUCN and other regional network will be strengthened. Furthermore, this network will be expanded to Central, Southeast and South Asia for developing into Asia Biodiversity Conservation Network (ABCN).

KEYWORDS: Plant Biodiversity, Conservation, East Asia, Plant Checklist, Phenology, Vegetation Monitoring, Climate Change, EABCN

RECOVERY OF THE ANGOLAN COAST MANGROVES

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Mangroves formations are forests of woody species, occurring in coastal areas of tropical and sub-tropical regions of the Atlantic, Indian and Pacific oceans. Mangroves form an important part of the vegetation along the Angolan coast, occur in the North of the country, notably at the mouth of Lubinda and Chiloango rivers in Cabinda. At the mouth of the Zaire River, the most important areas are found at Soyo, and they are also present in the estuaries of M´Bridge, Loge rivers (Ambrizete), Dande and Cuanza rivers in the Luanda Province. As moving south, the mangroves become less dominant and are reduced progressively to small formations in the Benguela district. In the Angolan mangroves we can identify the six species, ***Rhizophora racemosa*** G. Mey., ***R. harrisonii*** Leechm., ***R. mangle*** L., ***Avicennia germinans*** (L.) L., ***Laguncularia racemosa*** (L.) C.F.Gaertn and ***Conocarpus erectus*** L. This highly productive ecosystem has been suffering anthropogenic pressure, which is the main cause of degradation. With the aim of studying the mangrove communities along the Angolan coast, new studies have been conducted since 2009 to determine their degree of conservation. Field work has been performed in Cabinda, Luanda and Bengo provinces, namely: in the mouth of the Chiloango and Cacongo rivers (2009), in the "Barra of Cuanza" (2009 and 2011), and in "saco dos flamingos" (2017) of Luanda Province, and on Dande and Lifune rivers (2013) of Bengo Province. The results show a significant area of degraded mangrove in the right bank of the mouth of Cacongo and Chiloango rivers in Cabinda and at km 22 of the Cuanza river (Museu da Escratura) at the Luanda Province. At this last place, a program of planting ***Rhizophora*** species has been started in 2010, with signs of almost complete recovery. The mangrove formations present very good conditions with trees having about 20 to 28m of height and field cover always around 100%. The highest threats to the Angolan mangroves are cutting of trees to make charcoal and for construction, fire and the urban expansion.

KEYWORDS: Angolan Coast, Mangrove, Conservation, Threat, Recovery

STANDARDIZATION OF SEED AND VEGETATIVE PROPAGATION TECHNIQUES IN *SARACA ASOCA* (ROXB.) DE WILLD. AN ENDANGERED MEDICINAL PLANT OF WESTERN GHATS

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Saraca asoca (Roxb.) De Willd. is commonly known as Sita-Ashoka or Sorrow less tree is an important evergreen sacred tree whose bark, flowers and seeds are medicinally important. The priority area of research in ***S. asoca*** needs to include conservation and propagation for reintroduction into their natural habitats. Only few studies have been made on the propagation of this Rare, Endangered and Threatened (RET) medicinal plant species. They normally multiply through natural mode of regeneration in forests which is a very slow process. There is a need to find out an alternative, faster method of multiplication in this plant. Hence, the present investigation to standardize seed and vegetative propagation of this very important medicinal plant was undertaken to fulfill the above needs besides conservation of the species. Among the different germination inducing treatments, the seed treated with GA_3 200 ppm recorded early germination (23.73), highest germination rate (2.95%), seedling vigor (6315.10), seedling height (68.40 cm), fresh weight (16.00 g) and dry weight of seedling (8.47 g). In case of vegetative propagation, hard wood cuttings and air layering was carried out. Cuttings treated with IBA 2000 ppm had a significant positive effect on the percentage of rooting (33.41), sprouting (33.70) and number of days taken for sprouting (23.00). In air layering branches treated with Indole[3] Butyric Acid (IBA) 2500 ppm had a significant influence on rooting (88.07%) number of days taken for root initiation (32.00), root diameter (3.53 mm), number of primary roots per layer (6.00), number of secondary roots per layer (40.17) and root length (13.03 cm). Results will be highly useful for large scale multiplication of the plant which in turn helps in conservation and sustainable use.

KEYWORDS: ***Saraca asoca***, Conservation, Seed Propagation, Stem Cuttings And Air Layering

THE GLOBAL SEED CONSERVATION CHALLENGE

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Target 8 of the Global Strategy for Plant Conservation calls for 'At least 75 per cent of threatened plant species in ***ex situ*** collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes by 2020'. Many botanic gardens are working towards achieving Target 8 of the GSPC through their plant conservation programmes with an increasing number of botanic gardens involved in seed banking threatened species.

The Global Seed Conservation Challenge (GSCC) is a network of botanic gardens involved in seed banking. This network links together nearly 200 botanic gardens involved in seed banking and was launched in 2015 by Botanic Gardens Conservation International (BGCI).

This BGCI led initiative is working to increase the contribution of botanic gardens worldwide in conserving seed of threatened species through seed banking. Through the GSCC training and capacity building is provided to support seed collecting and raise seed banking standards. The GSCC is engaging more botanic gardens to become involved in seed banking, working 'outside the garden walls' to bring into ex situ collections threatened species that are not already conserved.

A main aim of the GSCC is to strengthen existing networks at the national and regional levels to help botanic gardens share experiences and resources in seed banking. An online seed collecting 'hub' has been created which will provide a 'one-stop-shop' for seed banking information and training resources.

Skills, knowledge and data built up through the conservation of these collections can be used to support wider plant conservation activities.

KEYWORDS: GSPC, ***Ex Situ,*** Conservation, Seed Banking, Networking

CONSERVING THE FLORA OF MISSOURI AND BEYOND: *EX SITU* CONSERVATION OF MISSOURI´S FLORA THROUGH SEED BANKING

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Missouri Botanical Garden (MBG) established a seed bank in 2012. The goals of the seed bank include 1) centralizing institutional long-term collections from MBG´s horticulture research divisions 2) collecting and conserving samples of Missouri´s entire flora to help address Target 8 of the Global Strategy for Plant Conservation. Species are targeted for collection using a wide range of factors including state and global conservation status, ecoregion fragility, redundancy in ***ex situ*** collections at the Garden or elsewhere, crop wild relative status, and to support additional institutional priorities. We work closely with public and private agencies to target a diverse set of locations for seed collection to maximize genetic variability storage. Data associated with all accessions are recorded in a web-based Living Collections Management System (LCMS) as well as provided to state and local agencies to support their conservation efforts. The MBG seed bank currently holds 3,863 accessions of 761 different taxa including 32 globally imperiled or critically imperiled species (NatureServe). About 27% (564 taxa) of Missouri´s flora is stored in the seed bank, including 64 Species of Conservation Concern. As plants are propagated, data is recorded and stored in the LCMS which gives the ability to produce propagation protocols to aid in plant conservation efforts. Future directions include increase in viability testing, expanding our collection focus outside of Missouri, and supporting capacity building in seed banks around the world.

KEY WORDS: Missouri, Seed Banking, Target 8, Plant Conservation

EX SITU PLANT CONSERVATION AND REINTRODUCTION BY BOTANIC GARDENS: ESTABLISHING A PROGRAMME TO SAFEGUARD 100 PRIORITY SPECIES IN SWITZERLAND

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Ex situ plant conservation is a crucial part of global conservation efforts and a fundamental pillar of botanic garden conservation activities. However, ***ex situ*** conservation lags behind its potential due to uncertainties in best-practice guidelines, poor or insufficient planning of conservation activities, and low reputation and support amongst stakeholders and the public. At the same time, biodiversity is continuously decreasing, increasing the need for effective and prompt conservation actions. In Switzerland, ~30 % of vascular plant species are on the red list and 837 species are listed as priority species, i.e. Switzerland has a high responsibility for their conservation.

In a 4-year project, funded by the Swiss Ministry of Environment, we aim to develop a conservation program for 100 Swiss priority species. This will include the preservation of genetic diversity of the species by storing seeds in the seed bank of the botanical garden of Geneva, establishing ex situ living collections replicated across Swiss botanic gardens and reintroducing or reinforcing populations in the wild. At the same time, we will investigate pivotal open questions in reintroduction ecology such as the risk of inbreeding versus outbreeding depression when mixing origins for reintroductions, the role of genetic diversity and local adaptation for population establishment and persistence, and the implications of climate and land use change for choosing the suitable reintroduction sites. By outreach and dissemination activities such as workshops and training programs, we want to strengthen the network of ***ex situ*** conservation protagonists in Switzerland and Europe, ensure the implementation of current guidelines, and increase the appreciation of the ***ex situ*** conservation and plant reintroduction concept by stakeholders, policy makers and the public.

KEYWORDS: ***Ex Situ*** Conservation, Endangered Plants, Swiss Priority Species, Plant Reintroduction

TOWARDS A GERMPLASM BANK OF OLD VARIETIES OF POMEGRANATE IN THE ALHAMBRA AND GENERALIFE (GRANADA, ANDALUSIA. SPAIN)

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From 2007, the Research Group of the University of Córdoba, which coordinates the first of the authors, with the participation of the Andalusian Plant Germplasm Bank (Junta de Andalucía), has been advising the Board of the Alhambra and Generalife (PAG) on the establishment of the scientific and historical bases for the conservation of the cultural landscapes of this World Historical Site, especially as regards the management of the "Huertas del Generalife", a productive space, but of great beauty and leafiness, that separates the Alhambra from the Generalife Palace and dominates the landscape of the environment. After the study of hundreds of historical documents (archives, engravings, descriptions of travelers, Andalusies agricultural and botanical treatises) and biological (archaeobotanical, surrounding wild flora and the dendrochronological study of the old *Celtis australis* exemplars, that defend the terraces of the Huertas) proceeded to assess the suitability and uniqueness of current crops and redesign the plantations, respecting the value of this cultural landscape and adapting it to a greater commitment to its conservation also as a natural heritage.

In this process, the samples of pomegranate trees (*Punica granatum*) currently existing were evaluated by means of molecular biology techniques, checking that they corresponded to current commercial varieties. The team of conservative technicians of the PAG, together with the advisory team, decided to dedicate part of the Huertas surface to the installation of a collection of ancient varieties, as close as possible to those cultivated in the Nasrid period (14th-15th centuries) initiating the search for these genetic materials in old orchards, historical localities and wild populations of pomegranates throughout the territory of the former al-Ándalus geography, identifying their genetic singularity again through molecular analysis (DNA, with techniques of RAPDs and Microsatellite Markers). These varieties would also be supposed to carry medicinal and food qualities different from the simple use as

fresh fruit of the pomegranates. The process has progressed in a very stimulating way in the last five years and we are proceeding to the propagation of the materials of greater historical interest, traditional use and economic perspectives in programs of innovation and crop breeding of this crop. The start of the in-situ installation of the new germplasm bank is scheduled for 2018.

KEYWORDS: Nasrid Period, Pomegranate Trees, Molecular Analysis, Historical Ethnobotany

O045

PROGRESSES TOWARDS REACHING GSPC TARGET 8 BY THE SPANISH NETWORK OF SEEDBANKS (REDBAG) AND THE IBERO-MACARONESIAN BOTANIC GARDENS ASSOCIATION (AIMJB)

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Facing the ***ex situ*** conservation of threatened plant species in Spain is quite difficult considering that competency for keeping safe the genetic diversity of protected plants is handled by 17 Autonomous Regions, with different policies. Some initiatives boosted by the Spanish Ministry of Agriculture and Fisheries, Food and Environment (MAPAMA) to promote the activity of seed banks had yielded their first results, increasing the number of plant species nowadays conserved within these facilities.

The role of seed banks (as primary data providers) is essential to supply information both to decision makers and scientists working on the definition of an appropriate policy and drafting of adequate strategies to reach the plant conservation objectives delineated by Regional, National, European and Global strategies.

In this work, results derived from the second assessment about the progresses reached by the Spanish Network of Seedbanks(REDBAG) regarding the GSPC Target 8, are presented. Mechanisms and tools developed by REDBAG to facilitate the access to information about how seed collections are dealing with ***ex situ*** conservation objectives are also discussed, in particular the website OpenREDBAG and how it can be used to dynamically evaluate the efforts done by the Spanish seedbanks in this direction. Differences about the biogeographic distribution of vascular plant species protected by the Spanish legislation and the role played by a small number of seedbanks regarding the conservation of threatened plants in Spain are also discussed. Finally, a brief summary of recommendations about improvements to be done by the Spanish seed banks regarding data quality, data sharing and data management about this topic is presented.

The Spanish Catalogue of Protected Species includes a total of 169 vascular plants, 45 of them are included in the Vulnerable (VU) category (following IUCN criteria) and 127 in the "In danger of Extinction" (EN) category. The analysis of the information provided by 17 Spanish seedbanks shows that 140 out of 169 species included in the Spanish Catalogue (only species under VU and EN categories) are conserved in those seedbanks, meaning that more that 80% of those species are somehow conserved for the future. Relative proportion reflects that 32 (71%) are include in the VU category and 112 (88%) are included in the EN category. On this basis, GSPC Target 8 would have been reached in Spain, regarding the species included into the Spanish Catalogue.

Behind these successful data, a deep analysis concerning the representativeness of wild populations into the seedbank collections shows that only about 30% of the conserved species had 10 or more accessions conserved. These data are particularly significant in defining new strategies and priorities to the near future.

KEYWORDS: ***Ex Situ*** Conservation, Seed Banks, GSPC, Threatened Plants, Data Quality, Data Sharing, Data Management

O046

SEED BANK OF AZORES, AN INSTRUMENT FOR SUSTAINABILITY

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Biodiversity is essential for human existence, and the safeguard for the quality of life, contributing to a healthy environment, pure air and good quality of fresh water. The main threats to biodiversity are human activities; the loss of biodiversity is irreparable and brings consequences in ecosystem resilience and vitality. In the Azores, the endemic and native species distribution continues threatened, and it is known that one vascular plant is extinct, and several plant species continue at risk.

Nature Tourism in the Azores Archipelago is a fast-growing tourism sector, based on principles of local development, cultural heritage and environmental sustainability, which includes nature conservation, and is especially important on small, low resource oceanic islands, such as the Azores, where nature finds its state closer to a pristine condition. Thus, it is essential to prepare tools that allow to maintain and preserve the natural heritage of the Azores Islands.

The Seed Bank of Azores is an ***ex-situ*** conservation instrument created to preserve the Azorean Native and Endemic Flora, and whose work goes beyond its doors. It was established in 2003 at Faial Botanical Garden, and it plays an important role on providing seeds and germinated seedlings for the rare plants nursery, housed in the same botanical garden, and whose plants are intended for ***in-situ*** conservation actions.

In the Seed Bank, the species are preserved through the conservation of their seeds at conditions of negative temperature and absence of humidity. In order to achieve its main goal, it was established a target to preserve 80% of all endemic flora possible to bank by 2020.

There are currently preserved at the Seed Bank of Azores 55 endemic and native plants. And in order to ensure the viability of the stored seeds, germination tests are periodically performed.

KEYWORDS: Seed Bank, Azores, Sustainability

REINTRODUCTION OF *GROENLANDIA DENSA* (L.) FOURR. A SPECIES EXTINCT IN POLAND – A PRELIMINARY APPROACH

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Opposite-leaved pondweed (*Groenlandia densa*) is a species occurring mainly in Western Europe, but with some populations in Africa and Western Asia. Endangered or already extinct in many places of its range, it has been put on both the IUCN European and World Red List of Threatened Species. Currently it has the status of a strictly protected and critically endangered (CR) species in Poland, but recent research has shown that it is extinct in the wild (EX). The reasons for this state are not fully understood.

Opposite-leaved pondweed is a small aquatic plant rooted in bottom sediments. It occurs both in natural and artificial reservoirs, in standing or flowing waters in both lowlands and submontane areas. This species prefers sunny or slightly shaded positions with clean water and intense inflow of groundwater rich in iron and calcium.

The Regional Directorate for Environmental Protection in Szczecin plans a reintroduction of *G. densa* within the project LIFE13NAT/PL/000009 LIFE*Drawa*PL called 'Active protection of water-crowfoots habitats and restoration of wildlife corridor in the River Drawa basin in Poland'. This project is co-financed by the European Union within the LIFE+ financial instrument as well as by the National Fund for Environmental Protection and Water Management in Warsaw. The preparation of plants for reintroduction is performed by the Adam Mickiewicz University Botanical Garden under cooperation with specialists from the AMU Faculty of Biology, AMU Geoecological Station in Storkowo, Dendrological Garden in Przelewice and the RDEP in Szczecin itself. The aim of opposite-leaved pondweed's cultivation is its acclimatization, propagation for reintroduction within the project scope as well as better understanding of its biology and ecology.

The specimens for cultivation purposes were taken at the end of October and at the beginning of November 2016 from 3 populations from Austria and 1 from Germany. 15 seedlings of each were placed in the aquariums at the AMU BG, and two populations were

planted in a watercourse of the Garden. One population is cultivated in Storkowo and one in Przelewice. Monitoring of chosen physicochemical parameters of water, observations and photographic documentation of plants have been carried out on a regular basis.

In April 2017, at the AMU Botanical Garden an inventory has shown that about 30% of plants survived as distinct clumps. Within a month, the plants have grown strongly and have created compact and abundantly flowering clumps. In the year 2017 1400 seedlings have been planted on the previously selected sites. The second reintroduction took place at the end of October of the 400 seedlings. Next stages of planting are planned for 2018. After the completion of the project, the ***G. densa*** population in ***ex situ*** cultivation will remain at the AMU Botanical Garden. It will be a source of plants for a possible supplementation or reconstruction of populations established as a result of reintroduction.

Restoration of opposite-leaved pondweed in Western Pomerania is an attempt to fill a gap in the river-basin ecosystem diversity as well as an expression of care for the ecological state of waters in Poland.

KEYWORDS: ***Ex Situ*** Conservation, Botanical Garden

O048

SUSTAINABLE USE OF RARE AND THREATENED ENDEMIC SPECIES: ASEXUAL PROPAGATION OF FOUR ENDEMIC PLANTS OF GREECE MAINTAINED AT THE BALKAN BOTANIC GARDEN OF KROUSSIA

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The Balkan Botanic Garden of Kroussia (BBGK), N. Greece is dedicated to the ***ex situ*** conservation of native plants of Greece and the Balkans. The BBGK has formulated a conservation strategy for the collection and documentation of wild plant material for sustainable utilization, prioritizing firstly the Greek endemic, rare and threatened (critically endangered, endangered and vulnerable) plants found in different regions of Greece

and secondly other socio-economic valuable plants with aromatic-medicinal properties or edible parts. Its aim is to contribute to the implementation of Targets 8 and 9 of the Global and European Strategies for Plant Conservation at local, regional and international scales. In this framework, plant material originating from wild populations of distant areas of Greece and maintained at the Laboratory of Conservation and Evaluation of Native and Floricultural Species was used for asexual propagation with softwood tip cuttings. The species studied are the endangered ***Erysimum krendlii*** Polatschek and***Thymus plasonii*** Adamović, the vulnerable ***Centaurea paxorum*** Phitos & Georgiadis and the rare ***Erysimum naxense*** Snogerup; all are range-restricted, local Greek endemics with small populations in the wild, therefore with conservation priority, showing also potential commercial interest (aromatic-medicinal properties, edible parts or as pot plants for gardening).The effect of the immersion of the base of the cuttings for 1 min in liquid solutions of Indole-3-butyric acid (IBA) at different concentrations (0, 1000, 2000 and 4000 ppm) on root formation was tested for all species. A peat moss (Terrahum): perlite soil substrate in a 1:3 ratio was used for the experiment. The rooting percentage, the number of roots and the root length were analyzed in order to develop special propagation protocols for each species. ***E. krendlii*** showed better results with the use of 4000 ppm IBA showing 100% rooting, 30.86 roots/cutting and 3.71 root length after 5 weeks of maintenance in the mist. Respectively, by the use of 2000 ppm IBA ***T. plasonii*** cuttings performed similar root lengths (1.74-2.15 cm), increased rooting percentage up to almost 86% and number of developed roots up to 12 roots/cutting within a period of seven weeks. Rooting of ***C. paxorum*** cuttings was successfully performed under mist in a period of three weeks exhibiting 100% rooting percentage, 47.86 roots/cutting and 2.61 cm root length with the use of 1000 ppm IBA. ***E. naxense*** gave 85.71% of rooting, 19 roots/cuttings and 3.06 cm root length under the effect of 4000 ppm IBA for eight weeks. All the young individuals produced were transplanted in trays and latter in bigger pots (0.33 and 1Lt) until their final transplanting pot size (2.5Lt), each time in an enriched peat moss (TS2): perlite: soil substrate in a 2: ½: ½ ratio, for their subsequent growth under unheated greenhouse conditions. The successful asexual propagation of the studied species allowed the creation of mother plants for each of them and facilitated the ***ex situ*** conservation and the domestication process of these wild species. This process may currently permit the mass production of plant material for the sustainable exploitation of these valuable and unique genetic resources of Greece. This is an example for the sustainable use of genetic recourses through their commercial use.

KEYWORDS: Cuttings, Greek Flora, Sustainable Use, Aromatic And Medicinal Crops, Rooting, Propagation Protocols, Phytogenetic Resources, ***Erysimum Krendlii, E. Naxense, Thymus Plasonii, Centaurea Paxorum***

O049

THE GLOBAL TREE ASSESSMENT

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The Global Tree Assessment aims to assess the conservation status, every known tree species by the year 2020, focusing attention and directing efforts for ongoing tree conservation assessments where it is needed the most. The outcomes of these analyses provide prioritization information to ensure that conservation efforts are focused on the right species so that no tree species becomes extinct.

To date, we are still lacking information on the conservation status of two thirds of the world's 60,065 known tree species. Of the 20,702 assessed trees, nearly half are already considered threatened with extinction; and of these threatened trees at least 85% are threatened on a global scale. The number of tree conservation assessments carried out varies geographically: some countries have assessed nearly their entire tree flora, whereas other countries have assessed only a few species. Islands and island states are in particular need of further conservation effort, often being home to large number of endemic trees and containing the highest percentage of threatened tree species.

Red list assessments are already an important part of the work of many botanic gardens and their staff. The results from red list assessments help botanic gardens to effectively guide, plan for and raise awareness of the need for conservation on the ground. They can be used for i) prioritisation of conservation action in situ and ex situ; ii) monitoring of conservation action; iii) facilitating education and public awareness of conservation issues; iv) supporting international conservation policy; and v) influencing funding allocations.

KEYWORDS: Tree Species, Conservation Assessments, Extinction Risk, Prioritisation, Tree Diversity, Red List

O050

CONSERVATION ASSESSMENTS FOR DIFFICULT TREE SPECIES

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Only one in six trees has a conservation assessment on the IUCN Red List of Threatened Species. Often the trees that have been assessed are of horticultural value or have been treated by particular specialist groups (i.e. IUCN/SSC Conifer Specialist Group) who hold expert knowledge on the species to be assessed. For other groups and even for our most well-known and charismatic species there is a lack of appropriate or species specific data to produce assessments from. Data gaps exist due to issues with studying trees as they are long-lived; can have complex taxonomy or have poorly known localities.

Botanic Gardens Conservation International (BGCI) has a diverse tree assessment programme producing taxonomically or regionally focused red list publications. BGCI also provides the Secretariat for the IUCN/SSC Global Tree Specialist Group. Since 2016, BGCI have been assessing the conservation status for commercial timber species and agarwoods. Considering the high profile of these species within trade, there is often very limited species specific information available for them in literature, trade records, botanic garden or herbarium collections. Instead, exploring generic level information or regional or country level threat information is needed to inform the conservation assessment for these deficient species. This was particularly relevant when assessing Southeast Asian species such as members of the ***Dipterocarpaceae***.

At the other end of the spectrum, certain timber species, such as those listed on CITES appendices, have a plethora of information available but applying the IUCN categories and criteria is still problematic. The variety of measures used to show the scale of trade and contradictory data from each exporting country can complicate the conservation assessment process. It is therefore important to pick out the relevant information and ensure appropriate proxies and extrapolation is used.It is in the nature of commercial timber species to be widespread and common, otherwise they would not be so frequently utilised and this in itself makes timbers and many other tree species difficult to assess. It is, however, these trees that need attention from the conservation community, including botanic gardens and arboreta; to ensure these economically important species are conserved and used sustainably for generations to come. BGCI are well placed to guide the conservation assessment of these species due to their experience with the IUCN Red List assessment process and their connection with the Global Tree Specialist Group. For the completion of these assessments BGCI is collaborating with botanic gardens and arboreta which are providing expertise throughout the assessment process. Conservation assessments can be used by these institutions to prioritize and monitor conservation action more effectively and provide a valuable tool for raising public awareness and funds.

KEY WORDS: Tree species, Timbers, Conservation Assessments, Extinction Risk, Prioritisation, Red List

ASSESSING THE CONSERVATION STATUS OF EUROPE´S TREES

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The European Red List of Trees, published in early 2018, is a review of the conservation status of European species according to IUCN's regional Red Listing guidelines. Trees are essential for life on earth, but the risk of extinction to the tree species of Europe has never been quantified until now.

Funded by the EU Life project, ***The European Red List of Trees*** reports on assessments of 454 tree species native to Europe. More than 40 experts participated in the assessment and review process.

Overall, 42% of European tree species are considered threatened in Europe (i.e. assessed as Vulnerable, Endangered or Critically Endangered) and therefore having an elevated risk of extinction. A further 3% (13 species) are assessed as Near Threatened, almost meeting the criteria for a threatened category; and 47% (216 species) are considered Least Concern and therefore not of current conservation concern. For 13% of European tree species, there was not sufficient information to assign a conservation status, and they are therefore assessed as Data Deficient. Of the threatened taxa, one hundred and thirty are of the ***Sorbus*** genus.

The main threat to tree species in Europe has been identified as invasive or problematic species, impacting 38% of tree species, followed by deforestation and wood harvesting and urban development (both affecting 20% of tree species). For threatened species, livestock farming and land abandonment and other ecosystem modifications is a major threat, impacting the survival of trees.

Out of all European trees, 358 species (79%) are currently found in at least one protected area and 393 European tree species (87%) are found in ***ex situ*** collections in botanic gardens and arboreta. There are thirty-two threatened species currently not found in any ***ex situ*** collections

In comparison with other groups that have been assessed on a European scale, trees are among the most threatened species in Europe. With 42% threatened species, trees are

only more threatened than European freshwater molluscs and "policy plants".

These assessments complement existing regional or national conservation assessments to allow targeted conservation planning. These assessments should be used to direct policy in order to ensure that the species considered threatened are protected both *in* and *ex situ*.

KEYWORDS: Global Tree Assessment, Trees, European Network, Conservation Assessments, IUCN Red List

O052

EUROPEAN RED LIST OF LYCOPODS AND FERNS

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The European Red List is a review of the conservation status of European species according to IUCN's regional Red Listing guidelines. It identifies those species that are threatened with extinction at the European level, so that appropriate conservation action can be taken to improve their status. So far, over 1,400 species have been assessed on the European Red List. In this context, the European Red List of Lycopods and Ferns was published in 2017 and summarises for the first time the results for all 194 known native European lycopod and fern species, with an individual assessment produced for each species.

These assessments were compiled and reviewed by more than 20 leading European experts on lycopods and ferns. Results show that overall, 19.9% of European lycopod and fern species assessed are considered threatened in Europe and one species is classified as Regionally Extinct (RE). A further 13.4% (26 species) are considered Near Threatened and 63.4% (123 species) are assessed as Least Concern. However, for seven species (3.6%), there was insufficient scientific information available to be able to evaluate their risk of extinction and thus they were classified as Data Deficient (DD). This makes them one of the most threatened group of plants of those assessed so far on the European Red List.

Regarding the population trends of the species, 21.2% (41 species) have declining populations, 63.7% (123 species) are stable and 2.6% (five species) are increasing. 24 of the

53 species (45.3%) that are endemic to Europe are threatened. Overall, the European areas with the highest diversity of species are the Macaronesian islands and several mountainous areas such as the Alps, Pyrenees, Massif Central and the Carpathians. Hotspots of endemic species are mainly found in the Azores, Madeira and the Canary Islands, and the greatest concentrations of threatened species are situated in Madeira, the Azores and the Swiss Alps. The main threat to lycopods and ferns is urbanisation and infrastructure, which includes the building of touristic, recreational, residential, commercial and industrial areas and the construction of roads and railroads. On the basis of these threats, several recommendations are proposed at different levels, including policy measures, research and monitoring, action on the ground, ***ex situ*** conservation and awareness raising.

The European Red List is a key tool that provides crucial information to inform conservation action on the ground. It can also inform policy decisions and guide the implementation of biodiversity legislation such as the EU Birds and Habitats Directives and to measure progress towards biodiversity targets.

KEYWORDS: Red List, Extinction, Ferns, Lycopods, Europe

O053

THE INNOVATIVE DATA MANAGEMENT PLATFORM AND THE COLLABORATIVE WORKING PROCESS OF THE FIRST RED LIST OF VASCULAR PLANTS FOR MAINLAND PORTUGAL

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Undertaking the Portuguese Red List of Vascular Plants had been planned since mid 1990´s, but only in 2016 an approved European funding for the Red List of Vascular Plants for mainland Portugal project (POSEUR-03-2215-FC-000013) paved the way for achieving that fundamental goal. This two-year project is being coordinated by Sociedade Portuguesa de Botânica and PHYTOS in partnership with ICNF and aims to (i) improve the knowledge of the geographical distribution of the native vascular plants; (ii) assess their extinction risk according to the IUCN

Red List categories and criteria; and (iii) publish the first Red List of vascular plants for mainland Portugal.

Due to time and budget constraints, only 620 plants were selected as the target taxa to be assessed. This list of target plants includes all Portuguese endemic species, all legally protected species under the Habitats Directive, together with plants with relevant geographic disjunctions, species almost endemic to Portugal and some taxa already known to be rare in mainland Portugal.

Starting with the database of the Flora-On platform (http://flora-on.pt), which contains geo-referenced observation records for numerous plants, the project focuses on gathering reliable up-to-date fundamental information about each target plant. A great emphasis was placed on collating data from Herbaria specimens, scientific-technical bibliography, and fieldwork in order to fill information gaps concerning distribution area, population size/conservation status, area/quality of habitat and threats. The project database currently holds more than 400 000 occurrence records.

An advanced data management platform with multiple innovative functionalities (https://lvf.flora-on.pt) was developed specifically for this project with the purpose of compiling and processing all collected data and assisting team members in every step of the assessment process - dataset upload, occurrence data management, Herbaria data geo-referencing, taxonomic problems solving, assessment process as per IUCN Red List criteria, integrated peer-review process and text editing. This collaborative platform facilitates working in network with different user roles and ensures that all data are shared in real time among participants. It also has potential for supporting other Red Lists, since it was developed to be general to any taxonomic group or region and its open source code can easily be expanded by anyone if needed.

Another major strength of the project resides in the collaborative working process, which aimed to be inclusive of the whole Portuguese botanical community. The team is composed of 14 technicians plus 75 volunteer collaborators, among which are professors, researchers, environmental consultants and experienced amateur botanists. An IUCN Red List assessor training workshop was given to 30 team members, who are those responsible for the assessments and subsequent reviews.

Preliminary results suggest that almost 50% of the 122 plants evaluated hitherto are threatened. These findings are publicly accessible in the project website (http://listavermelha-flora.pt), where all assessments and the final publication will be available for download at the end.

Ultimately, this project is intended to be a landmark as a collaborative effort of the Portuguese botanical community and will create a solid base for future work in assessing the extinction risk of the entire Portuguese flora.

KEYWORDS: Collaborative Work; Data Management Platform; Portugal; Red List; Threatened Plants; Vascular Plants.

WORKING TOWARDS REACHING TARGET 8 OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION 2020 IN EUROPE: CONTRIBUTIONS OF THE EUROPEAN NATIVE SEED CONSERVATION NETWORK (ENSCONET) CONSORTIUM

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As a follow-up to the EU-funded project "European Native Seed Conservation Network" (ENSCONET, 2004-2009), 31 organizations from 17 European countries decided to continue their seed conservation related activities and, in 2010, established the ENSCONET Consortium coordinated by the Millennium Seed Bank, RBG Kew.

The contributions of these two initiatives towards meeting the Global Strategy for Plant Conservation (GSPC) target 8 until 2020 were assessed in 2017. While the general outcome is positive (62.7% of European threatened species already conserved ***ex situ***), the analysis shows that it is essential to provide guidance on which European-native threatened species should be collected as a priority if the target shall be reached in time.

Therefore, a priority-setting method was designed to guide GSPC target 8 oriented collecting strategies, based on current holdings of European seed banks documented in the ENSCObase database. One result of this study is a country-based checklist of European threatened taxa to be collected and stored ***ex situ*** by 2020.

The workshop aims at a discussion of this checklist and of key action points identified by the ENSCONET Consortium to support the implementation of an integrated collecting strategy across Europe on national and regional levels. Potential collaborative and coordinated efforts of different institutions in- and outside of the ENSCONET-Consortium shall be evaluated and activities to optimize options for reaching GSPC target 8 in Europe by 2020 shall be defined.

Besides these GSPC oriented issues, the ENSCONET Consortium, through that workshop, also seeks to:

1) strengthen communication and links within the network and with other conservation and plant biology related institutions and stakeholders;

2) promote seed research activities and the exchange of seed conservation related

knowledge, best practices and experiences; thus ensuring that seed collections are suitable and available for conservation projects including seed-based restoration activities.

KEYWORDS: GSPC Targets 8 And 9; Conservation; Seed Collection, Storage And Curation; ENSCObase; Seed Research; ENSCONET Consortium

O055

THE BOTANICUM: NEW OPTIONS FOR PUBLIC OUTREACH AND SCIENCE EDUCATION AT THE BOTANICAL GARDEN OF THE UNIVERSITY OF VIENNA

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Since its establishment more than 25 years ago our ”Green School” program has been successfully triggering curiosity and excitement about natural sciences. Digging deep into the world of plants, target audiences of all ages and social backgrounds gain first hand experiences about the beauty and importance of biological diversity. The green oasis in the city centre invites to expeditions into the world of plants and to scientifically based workshops on all kind of biological questions (for a list of topics see grueneschule.univie.ac.at). Meanwhile, the success of the program has been widely recognized.

In 2015 the University of Vienna decided, as part of the celebrations of its 650th anniversary and with support of a sponsor, to build a special facility for the “Green School” at the garden: the Botanicum. This building will allow to widen the scope of topics and to offer activities the whole year around. The program will be streamlined addressing three target groups: (1) children and school classes, (2) (future) teachers and educators, and (3) the general public.

From the beginning, the ”Green School“ successfully served the needs of the University to train students of biology as well as students of biology education. The synergies resulting from these links between the outreach program and the educational tasks of the university will be further explored, and if possible, expanded in accord with the relevant curricula.

The offered courses and programs and the interactions with the target groups will continue to be subject of evaluation and research, aiming at knowing more about the different audiences and their interests. These studies shall result in optimizing the programs, approaches and tools, and shall strengthen the knowledge base, competence and fitness of teachers and educators to create curiosity and to deliver scientific contents as appealing as possible.

KEYWORDS: Science Education, Public Outreach, Science Communication Research

O056

A NEW INTERDISCIPLINARY SCIENTIFIC MAZE IN THE BOTANICAL GARDEN, UNIVERSITY OF BERGEN, NORWAY

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As a part of the renewed Botanical Garden at the University of Bergen, Norway, a large hedge maze is under construction.

The new gardens vision, called Adiabata, the Rain garden, focuses on the advantages and challenges of being located in one of the world's rainiest places. Through its vision, Adiabata is based on four basic fundaments; biological diversity, food & humans, sustainability, and climate & environment. Rain and water will be a main theme throughout the new garden.

In this context, the maze has the following goals; amusement, education, outreach and science. Through the interdisciplinary planning between mathematics, geophysics, botany, art, landscape architecture, didactics, and communication, we will make a maze that will fulfill these goals.

In the frames set up by the landscape, the mathematical planning of the layout of the passages and walls within the maze give rise to a unique pattering in this maze.

The hedges are of English Yew (*Taxus baccata*), a native wild plant with the Norwegian main distribution in our area. English Yew are categorized in Norway as vulnerable in the national list of threatened plants.

In the center or goal of the maze there will be focus on the rain, as the target is a giant rain gauge incorporated in a tower, designed by the artist, Finn Eirik Modahl.

There will also be themes in mathematics, botany and geophysics that will meet you on your way through the maze. This will have an educational purpose.

The interdisciplinary work has given a unique effect of creativity and inspiration that spread from the working group and have an amazing effect on the people involved in this project. We will continue to make the maze an interesting place, in order to increase the actuality of the garden.

When the maze is opened (autumn 2018), we will expand the number of disciplines that will be in focus. That involves psychology, history and others.

KEYWORDS: New Botanical Garden, Maze, Interdisciplinary, Science, Education

O057

RE-DEVELOPING VISITOR DISPLAYS IN THE TROPICAL GREENHOUSE OF MUSE, TRENTO, ITALY

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MUSE new Tropical greenhouse opened to the public in summer 2013, specifically focusing on Tropical East Africa as the target biogeographical region to illustrate. Considering that MUSE did not maintain previously any tropical collection and also taking into account the difficulty to source plants from East Africa, many provisional plants had to be put on display. Right from the beginning, these plants were intended as “stand-ins” or “doubles”, chosen among large specimen readily available in the horticultural trade and belonging to genera present in Africa, or generally resembling plants native of the area, to be

progressively replaced as the true native species could be sourced via exchanges with other botanic gardens or international collaborative projects. Two years ago the museum tropical propagation facilities became finally operational and a diversity of plants could be raised from seeds and new plans could be developed for the replacement of the existing displays. A new pond was the first new feature developed allowing to grow water plants of the region such as ***Nymphaea caerulea*** and the carnivorous ***Utricularia prehensilis*** and ***U. gibba***. The dry scrub forest area came second, re-developed with a totally new layout introducing a selection of native species of that habitat, like ***Adenium obesum var. multiflorum, Adansonia digitata*** and ***Amorphophallus impressus*** The diversity of tropical crops in the highland cultivated zone of the greenhouse also increased in numbers. To be noted the neglected and underutilized crop ***Telfairia pedata,*** a Tanzanian endemic. In parallel the visitor interpretation is being upgraded to highlight the importance of using the native species of the target biogeographical region of the display for the conservation value of the collections and the parallel horticultural research that is being carried out in the propagation area aiming at finding out the best conditions to grow key local species ex situ. Such research will give a valuable insight on how to grow local endemic species, a critical know-how to build capacity in the region to propagate and reintroduce the local native endemics.

KEYWORDS: Tropical Greenhouse, Tanzania, Tropical East Africa, Tropical Display, Visitor Interpretation

O058

FROM BOTANIC GARDEN TO THE SCHOOL: NATURAL SCIENCES WITH THE IBSE METHODOLOGY OUTSIDE CLASSROOM

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Non-formal educative settings, such as gardens and museums, as well as the Inquiry-based

Science Education (IBSE), a multifaceted and student-centered methodology, play an essential role as educative tools (Matteman & Damsa, 2017; Tavares, Silva & Bettencourt, 2015). The educative processes with IBSE outdoor lessons, being or not guided by a formal curricula, are flexible and adapt to the needs and interests of the students (Ainsworth & Eaton, 2010), who can gain first-hand experience and appreciate 'nature' as a whole and a human-nature relationship to develop curiosity and greater environmental awareness.

Our aim is to study the integration of IBSE outside classroom in a formal school context, to understand the impact of this methodology in Natural Sciences learning, and in the opinions and educative products of 10 to 12 years old students.

Within a partnership with a School and a Science Teacher of the 5th year level (first year of the second cycle of basic education) and trained in IBSE, seven thematic classes on biodiversity and sustainability were taken from the Educational Program developed in a Botanical Garden. Fulfilling the curricular demands these lesson plans were integrated in the classes and adopted and adjusted to the school conditions and resources (Tavares, 2017).

The cognitive learning of the students in the Natural Sciences topics, and their opinions, were regularly monitored, validated and statistically evaluated by seventy-two pair of pre and post-questionnaires and also analyzed in a semi structured interview with the teacher.

The results evidence a cognitive improvement of the students in all curricular themes evaluated, as referred elsewhere. The emphasis is now to highlight the positive feedback from students and their teacher view on the work developed.

After completing the innovative approach in class, the motivation involved 92% of the students, with evidences of responses in 99% of them and new learning felt by all; 89% of the students showed satisfaction in the activities experienced and in the documents produced.

Both the teacher and the students want to continue this teaching and learning format at School, favoring questioning, as an enlarged and creative alternative for Natural Sciences knowledge. Moreover, lesson plans and resources produced are replicable and can be important instruments to be used again or by other educational communities and diverse stakeholders, directly, or as ideas to new activities for schools. Applying those effective educative strategies in a regular basis, either in a museum, a botanic garden or a school garden, will improve them as valuable places to develop knowledge, encouraging imagination and a stronger sensitivity for nature, plants and their importance for life.

KEYWORDS: Active Learning; Natural Sciences; Spaces Outside The Classroom; Ibse; Curricular Innovation; Experimental Methodologies

BEYOND PLANT BLINDNESS: SEEING THE IMPORTANCE OF PLANTS FOR A SUSTAINABLE WORLD

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Humans are becoming an urban species. Living in megalopolitan cities reduces intimate contact with the natural world thus placing greater emphasis on 'presented nature' settings, such as zoos, botanic gardens and natural history museums. Botanic gardens provide opportunities for aesthetic interactions with the plant world. However, previous research has demonstrated that 'plant blindness' inhibits human perceptions of plants. Increased extinction levels mean the world can no longer afford our citizens to see 'nothing' when they look at plants, the basis of most life on earth. Despite a key educational role identified in the global plant conservation strategy 2011–2020 botanic gardens, and allied settings, have received limited research attention. In the Swedish context the education system should provide students with knowledge about nature, the environment and sustainable development. Given the critical role of plants in ecosystem resilience it is imperative to motivate teaching and learning that can move beyond 'plant blindness' towards experiences in which teachers and learners see the importance of plants for a sustainable world. Contemporary research sources suggest that multimodal and sensoric experiences in 'presented nature' settings might create shifts away from plant-blindness towards reading the importance of plants.

The proposed paper will present an overview of key findings from a recently completed three-year interdisciplinary research study 'Beyond Plant Blindness – seeing the importance of plants for a sustainable world', funded by The Swedish Research Council (Dnr 2014-2013). The sample of research participants in this three-year study focuses on trainee teachers studying at Gothenburg University and everyday visitors to the two institutions Universeum Science Centre and Gothenburg Botanic Garden. The main research question was: what impacts do presented nature settings a) with animals b) without animals have on plant-based learning experiences? This question was investigated in situ in the two aforementioned 'presented nature' sites. The main question was complemented by a series of questions in an online survey concerning trainee teachers' knowledge and perceptions of plants and inquiries made concerning responses to specific artworks.

In making our presentation we will draw on qualitative and quantitative data from four different research methods:

An online survey (trainee teachers)

Mapped conversations in two scientific education centres (trainee teachers and everyday visitors)

Recorded impressions at three specific art installations constructed by artist members of the research team (trainee teachers and everyday visitors)

Trainee teachers written responses to three science posters developed by the scientist member of the research project.

The research team brings together specialists in art-based research, taxonomic science and education. This interdisciplinary focus is considered a critical element of our approach, which is centred on the notion of reading the story of Life as Plant and included art-based research installations in Gothenburg Botanic Garden.

Our key findings demonstrate the value of connecting with plants through sensory interactions with living specimens, artistic and scientific narratives and the importance of visual methods of communication. Moreover, we will show the power of personal memories and emotions in building connections between plants and people. The presentation will include a discussion of the implications of our results for education and interpretation in contemporary botanic gardens and allied institutions and highlight issues for further study.

KEYWORDS: Plant Blindness, Artistic and Scientific Narratives, Emotions, Memories, Research Study

O060

NATIONAL BOTANIC GARDEN OF LATVIA – STRATEGY OF ENVIRONMENTAL EDUCATION

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National Botanic Garden of Latvia (NBG) was organized in 1956 as a scientific institution (one of the scientific institutes of the Academy of Sciences), paying main attention to research in botany, plant physiology and breeding. The education and public engagement were less important. In 2006 the Garden was handed over to the Ministry of Environment Protection and Regional Development, and its role as institution of biodiversity conservation and public education had to be much more developed. The essential part of the NBG mission

today is to educate visitors about the environment and biodiversity conservation issues. That is why we had to work out the strategy of environmental education.

As a result of SWAT analysis of existing situation and potential possibilities of NBG in environmental education (plant expositions, exhibitions, guided excursions, school educational program, lessons, events, information panels, homepage and accounts in social networks, press releases, booklets and popular scientific issues), the conclusion was made, that essential growth of audience can be achieved by creation of special infrastructure – the Center of Environmental Education and Information (CEEI). The construction and equipping of that Center is planned in the framework of a larger project performed by the Ministry of Environmental Protection and Regional Development, financially supported by European Cohesion Fund, and will last until 2021.

The CEEI should facilitate awareness of processes occurring in the nature, the interest in plant life, and to educate about necessity and means of environment protection and nature conservation in attractive, intelligible and entertaining form, as well as to enhance NBG educational capacity, to broaden audiences, and to increase number of visitors.

The main audience should be groups of children starting from 5 years of age until the end of high school, and families with children, the secondary – all other garden visitors.

The CEEI exposition should be placed in two-storeyed building in the place of former NBG main office. The structure of exposition: Introduction (plant's importance for life on the planet); Roots, Trunk, Leaf, Flower, Fruits and Seeds, Final exposition (ecology, global environment problems, biodiversity conservation a.o.).

KEY WORDS: Education, Public Awareness, Engagement, Biodiversity Conservation, Nature Protection, Audience, School, Children

O061

THE WORLD NEEDS MORE GARDENERS – USING THE BARROCAL BOTANIC GARDEN TO PROMOTE SUSTAINABLE GARDENS IN THE ALGARVE

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Although much conservation work is the responsibility of government agencies and global

organizations, local associations also have a huge part to play. The Global Strategy for Plant Conservation 2020, and the subsequent Nagoya Protocol of 2010, makes special mention of the role of gardeners in plant conservation and species recovery.

The Barrocal is one of three ecological areas of the Algarve (Serra, Barrocal and Litoral). It has natural conditions of high scientific interest and biodiversity. It is urgent to share with all those involved with management and conservation knowledge about the flora of this special territory. The Barrocal has a well documented flora of 1001 taxa, 461 genera and 101 botanical families. The area runs along the length of the Algarve between the Serra and the coastal strip and comprises an extensive range of mesozoic carbonated soils.

The strong desire to see plant life continue and thrive needs the support of individuals. The Mediterranean Gardening Association promotes links between knowledgeable gardeners, academics and professionals in horticulture. Since its start in 2016, the Barrocal Botanic Garden project has attracted interest across the botanical and horticultural community. There is also an economic case to be made based on the benefits of botanic and demonstration gardens in this region as it already attracts a high number of tourists and is seeking to expand the ´out of season´ visitor opportunities. Our links to organizations also dedicated to Mediterranean gardening and landscapes present an opportunity to share this resource internationally.

Our chosen site has been abandoned land for many decades, allowing native plants to recover and with the typical vestige woody plants of carob, almond and olive trees present. The land currently involved in this project (approx. 1,000sq m) is part of a larger area in secure private ownership with existing demonstration gardens. The prospect of in situ conservation of a rich natural plant community is a remarkable opportunity in a region under enormous pressure from tourist and other developments. The challenges of restoration ecology, pressure on water supplies and habitat loss are all present in the Mediterranean climate zones, and the Algarve is no exception. The promotion of sustainable gardening knowledge and skills using native plants is an urgent and necessary task.

Aims of the Barrocal Botanic Garden:

Demonstrate the enormous potential for using the native plants of the Barrocal.

Provide a resource for environmental education and skills training in the gardening/ landscaping/horticultural industries on the benefits of using native plants.

Link Government, academic and training institutions to pass up-to-date knowledge onto the next generation.

Demonstrate the use of native plants to deliver beauty and diversity with minimum interventions and low to nil water use.

Engage all ages and nationalities in the life of the garden, throughout the year, through various activities including workshops, planting and open days and identification sessions.

KEYWORDS: Education, Building Skills, Gardens, Gardeners, Native Plant Gardening, Multi-Disciplanary Approach

MY ECOLOGY CLUB

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The Botanical Garden has been starting to be active at Park Garden and Green Areas Department of Gaziantep Metropolitan Municipality since 2009. The garden holds the distinction of being first and unique sample in the region. It has 10 designed gardens in 17.000msq.

The botanical gardens are areas that have lots of importance in many different branches. In this context, the topic we are leading is education. The area in which we organize educational activities is the 'Ecological Classroom', which is one of 10 special design gardens. This garden is a garden that has educational qualification. The ecological classroom is a garden that nursery elementary, secondary, high and university students besides the citizens interested in the plant world benefit as well. Within this scope, many training activities are organized.

Our education projects is being prepared by observing developments and requirements of individual. Our target is to raise individuals who are aware of nature and ecology

We make an effort in regional, national and international especially about education and share our best practicing on these platforms.

We have reached 1 million people with our training projects since 2009. We reached mass with 15 different education projects. Journey to the Botanical World, Course in Nature, Unimpaired Nature, Feeling Nature, Silent Nature, Nature on Canvas, Sound of Nature etc.

End of all these things, we just started to perform our last project to ensure sustainability what is named '' My Ecologic Club''. We worked 216 public schools. After this project, The Ecology Clubs will be established in these schools. The schools will have a specified certificate as Ecological School. They will have started to have ecological activities with their leads of club and pupils.

KEYWORDS: Gaziantep, Botanical garden, Education

GARDEN OF FLOWERING CARPET

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For the last few years University Botanic Gardens Ljubljana successfully collaborates with Municipality of Ljubljana (Slovenian capital) where the Gardens are situated. As institution with rich history and as institution helping with advices and work at creation of green urban policy, Botanic Gardens has gained a good reputation. The result of this past fruitful collaboration, was the transfer of municipal land near our Botanic Gardens into permanent and free-of-charge use, to University Botanic Gardens Ljubljana. The wish of Ljubljana Municipality was to design this area as a place constantly available to citizens and bringing an added value to the area itself. Based on this wish there we created so-called "Garden of flowering carpets", where beds with melliferous plants will interweave with autochthonous moor plant species. Aforementioned area is namely located on Ljubljana moor. We also created this new place in a way that it could be managed with low costs and minimal effort. In the first phase all invasive plant species and bushes were removed from the area. During the second phase beds for plants and grass paths have been arranged. This was followed by sowing of melliferous plants like ***Melilotus albus***, ***Onobrychis viciifolia*** in ***Trifolium incarnatum***. Melliferous plants beds will provide a bee pasture for urban bees. Furthermore, in that part of area where water is stagnating we planted moist meadow with autochthonous hydrophilic plant species, while on the other, dryer part drought-loving species were planted. At the border of the area there are water channels where autochthonous water and shoreline plants were planted. On those parts ***in-situ*** conservation of moor plants will be performed. In collaboration with Municipality of Ljubljana and Faculty of architecture also a learning bee-house has been placed in front of plant beds before the beginning of summer 2017. It will serve for introduction of beekeeping to public and for scientific purposes. Beside ***in-situ*** conservation of moor plants and growing melliferous plants, the "Garden of flowering carpets" will be a place for various events connected with beekeeping and ethnobotany.

KEYWORDS: Melliferous Plants, ***In-Situ*** Conservation, Low Cost Management

CLASSROOM VERWONDERPASPOORT / DISCOVERY PASSPORT

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Each year the botanical collections of the Hortus botanicus Leiden are visited by many schoolchildren of the Netherlands. They get to enjoy the tropical greenhouses, the monumental trees and our changing exhibits such as the carnivorous plant show. Often the learning stops after the trip as the experience is replaced with new impressions. Children can now continue the experience at home with the discovery passport.

Eleven educational organizations from the Leiden area are collaborating in an innovative way to present regional primary schools with various classes on nature, science, technology and sustainability.

To increase and extend learning about science, nature and technology, the organizations in the city of Leiden decided to work together to streamline their workshops for schools and families. A new online platform forms the connection between classroom and museum/ garden workshops with extended learning at home. The schools request a membership card for all the children in a class. The children can then visit any participating location, such as the Leiden Botanical Garden, with their school, and participate in an educational program. During this program they will be introduced to various subjects, which are discussed with the class. For the teachers at school, the discovery passport offers an overview of participating organizations to visit. For children, the discovery passport presents a new way to learn both at school and home in a playful manner with additional rewards when various parts susch as treasure hunts are completed. Here the children process their experiences through various means of gamification. Where there has been a recent decline in the attention to general botany and in the number of students studying plant biology, we expect the discovery passport to create a renewed interest among younger generations. In this way we hope to encourage a long lasting relation between the participating children and botany. The Verwonderpaspoort concept won the Dutch National Museum education prize in November 2017.

KEYWORDS: First-Hand Experience, Appreciate ‘Nature’ As A Whole, Edible Plants, Sustainability, Pollinators

"EVERY PLANT HAS A NAME": EXPERIENCES FROM A BOTANICAL PODCAST

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In the autumn of 2016, the Botanical Garden of the University of Coimbra started producing a weekly podcast with the purpose of answering diverse questions about the life, characteristics and myths of plants, in a matter-of-fact approach to communicate science by the voice of the researchers.

No botanical doubt was trivial: "Are trees plants?", "Why do cacti have thorns?" or "Is it safe to have plants in the bedroom?", are questions that can seem deceptively simple, but still, they persist. Our goal was to provide answers to these and other common questions, in a straight forward yet rigorous way, for a non-specialized audience.

It is one of the first Portuguese podcasts that specialize in the subjects of plants, botany and ecology.

Each show had the average duration of 1'30'' and was broadcast as feature in a morning show of a local, University student run radio (Rádio Universidade de Coimbra), and shared online through several platforms and social networks, reaching a broader geographical scope than we usually would through our traditional platforms.

Since podcasting became lately a well-accepted format for many users, it seemed to be the perfect option to reach new, wider and more diverse audiences, being the listen count in the tens of thousands in the 50 episodes we produced.

The podcast became also a regular feature as a column in a regional paper (Diário de Coimbra), which allowed us to have access to a more traditional audience.

The results of the first season were so compelling, we are already starting the production of a modified version of the podcast, where we'll try to create a bridge between the audience and the researchers, allowing dialogue through direct questions and personal experiences, clarified by the scientists' knowledge, in accessible terms for the non-specialists.

In this talk, we explore the importance of using multiplatform contents in Botanic Garden's outreach mission and the future opportunities to make plant knowledge current to our ever-evolving audiences.

KEYWORDS: Botany, Plant Ecology, Science Communication, Podcast

IT PAYS OFF TO KNOW YOUR VISITORS: EDUCATION IN UNIVERSITY OF WARSAW BOTANIC GARDEN

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University of Warsaw Botanic Garden is firmly established in the city structures and celebrating in 2018 its 200 anniversary. Despite that, as a part of the Faculty of Biology, the Garden should rather act primarily as a scientific institution where the public education is of secondary importance. For many years we felt, however, that creating, transferring and being responsible for a considerable share of the knowledge on plants in the present world, botanic gardens must actively act as an interface between science and society. Therefore, with very limited resources, we started to develop our first integrated public education programme based mostly on self-guided tours. Surprisingly, this move did not result in a significant increase of public interest in the garden. To overcome this problem we started to build up a professional education team and in order to get to know our audiences, a sociological research was conducted three years ago, to verify who and why comes to our Garden. Audiences which were reaching at that time where mostly elderly people, families and school children. The results also showed that many visitors are attracted by the beauty of the site rather than by the scientific and educational values. In 2015 and 2017 for the first time we conducted pilot anthropological research on the Night of the Museums (annual festival of the museums), during which we observed the behaviour and reaction of the visitors to the event. That allowed us to broaden our knowledge about the audiences and their needs, and resulted in collaboration with NGOs which gives new communication pathways and a linkage to professionals with different background. This may, however, also cause difficulties. Crossing the garden's borders by going out with educational actions to the communities allows to reach people who never visit the garden. During the talk we will present some examples of events that where co-created with different community groups, migrants, artists and pupils, we will also invite to participate in BGCI's 10th International Congress on Education in Botanic Gardens to be held 9-14 September 2018 in Warsaw.

KEYWORDS: Environmental Education, Sociological Research, Audience, Strategy, City Garden

A POLLEN OBSERVATORY IN NANCY (FRANCE) BOTANICAL GARDEN: A SCIENTIFIC AND PEDAGOGIC PREVENTION TOOL OF POLLEN ALLERGIES

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In Europe, 25 % of the population is allergic to pollen. Nancy botanical garden created a garden where most important species of allergenic plants are grown and a learning path to raise public awareness about allergies. This garden is a prevention tool of pollinosis for educational and scientific purpose (phenological observations)

Visitors can read panels and labels illustrating allergenic plants. Sensitive people can identify plants that cause allergic reaction.

The “allergy garden” is part of a project call “pollen observatory”, managed by ATMO Grand Est and ORSAS-Lorraine (Regional observatory of health and social affairs), in partnership with Lorraine University and the ARS (Health Regional Agency).

A list of 25 plants emitting allergenic pollens in the Lorraine area has been established by botanists and allergists. A phenological monitoring is made all year round, from one to two times per week, depending on the season. Plants are monitored in the allergy garden and in different collections of the botanical garden. The date of each stage of development is recorded for each species, particularly dates of the first and last pollen release, and communicated to sensitive people with Atmo Grand Est newsletters.

Moreover, observations were compared to the aerobiological data of Nancy, which have been conducted between February and October, in close coordination with the French aerobiology network (RNSA). The collected data are conserved for future studies about climate change.

An original participatory science system has been created: Pollin’air. A network of volunteer observers follows the flowering, the beginning and the end of the pollination of allergenic plants on the whole area of Lorraine in order to give a geolocated information. Citizens are invited to take part in a network of professional and amateurs who report in real time the arrival of pollens to sensitive people.

Anyone interested in pollen activity can consult the interactive map of allergenic pollens and subscribe to the Newsletter to receive personalized information (www.pollinair.fr). Thus, they can adapt their behaviour to prevent and reduce their symptoms.

KEYWORDS: Allergy, Pollinosis, Participatory Science, Citizen Science, Allergenic Plants, Pollen Observatory

PLANTS AND POLLINATORS AT THE NATIONAL BOTANIC GARDEN OF WALES: AN INTEGRATED PROGRAMME OF RESEARCH, EDUCATION AND PUBLIC ENGAGEMENT

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Pollination is a vital ecosystem service and a key consideration for food security. Globally, 75% of crops depend on animal pollination with vegetables and fruits being the most dependent on insects. Despite their importance, managed honeybees and wild pollinators are facing declines throughout the world due to habitat loss, agricultural intensification, pests, disease and climate change. Pollinating insects require access to suitable plants for foraging and as native habitats decrease gardens may become increasingly important refuges. Plants labeled as beneficial to pollinators are widely sold and popular with the public, but there is a lack of scientific evidence to which plants are actually best for different pollinators and the plants available may have been grown using harmful insecticides and without due consideration for sustainability.

At the National Botanic Garden of Wales we tackle the pollinator crisis in a multidisciplinary way. Our research programme uses DNA barcoding to investigate which plants pollinators use and the extent to which these can be provided within gardens. Our education and engagement activities provide accurate advice and training on gardening for pollinators. We use our Apiary and Bee Garden, Butterfly House and art-science exhibitions to inspire visitors about the importance of pollinators and pollination. Finally, we are developing a Plants for Pollinators Assurance Scheme, as part of our Growing the Future project. We provide knowledge transfer and support to seed and plant producers; helping them to grow pollinator-friendly plants based on sustainable practices and a firm evidence base of which plants pollinators use.

KEYWORDS: Plant-Pollinator Interactions, Science And Society, Dna Barcoding, Knowledge Transfer, Education Programme

THE PLANT PALACE: A GARDEN OF THE WORLD

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Since 1956, the Plant Palace of Meise Botanic Garden takes visitors on a tour among the plants of the world. While in the first period the main focus was on a scientific collection in pots, grouped in geographic greenhouses, from the 1990's onwards, the 13 public houses have been landscaped for better access and to reach the public better. Since then there has also been a stronger emphasis on educational programs, information boards and guided tours. In September 2017 the main entrance of the Plant Palace was renewed and the landscaping of 11 of the 13 houses was completed. In the same year the garden started regrouping the current and future greenhouses, gardens and museums into 5 thematic walks. The plant palace forms the "Garden of the world", taking visitors through the different biomes with an emphasis on the adaptations plants have developed in the various climates and habitats. During 2018 the information boards of the different houses will be rethought in this theme and made uniform. Each climatic zone will be introduced by a totem board with information on its dominant biome. Classic information boards will be further supplemented with interactive elements to make the information more accessible for children. Currently the palace includes a rainforest wing (among which the recently opened canopy trail with epiphytes and a Central African rainforest). Further there are separate houses for the desert, savanna & monsoon, tropical wetlands, broadleaf evergreen forest and anthropogenic biomes along with the evolution house. The montane and Mediterranean houses will be landscaped by 2021 including a thematic focus on carnivorous plants. In addition, to include all major biomes of the world, also plants from deciduous forest, prairie, taiga and tundra vegetation belts from the outdoor collections will eventually be tuned in the garden of the world.

KEYWORDS: Adaptations, Biomes, Botanic Garden Meise, Education, Plant Palace

A NEW GREEN ARK TO SAFEGUARD RESEARCH AND CONSERVATION COLLECTIONS

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Botanic Garden Meise currently has two glasshouse complexes. These comprise over 40 small interconnected glasshouses used for propagation, conservation of endangered species and cultivation of research and orangery collections. Built in the 1930s and 1950s, most are in a very bad state and some have already collapsed. Heating a large number of small glasshouses is very inefficient on energy usage and the growing conditions for the plants are not at all optimal.

Consequently, our Garden plans to build a new glasshouse complex to be known as the 'Green Ark'. It will be around 7,100m2 and include a multi-purpose room where the scientific work of our Garden can be explained and demonstrated to the public. An existing building will adjoin the complex and after renovation will house the seedbank and offices for the staff of the Living Collections. The total budget for the project is €10.4 million (excluding taxes and fees). In collaboration with the Flemish Building Agency, the Garden launched a European tender to find an architect team.

Botanic Garden Meise has chosen, after a thorough screening, for the design of the temporary association NU and ar-te, because of the excellent integration in the existing landscape, the attractiveness for the visitors, and the functionality of the greenhouses.

The design team and the Garden aim at combining the scientific purposes of the new buildings with a qualitative access for the visitors. An iconic public pavilion is surrounded by the glasshouses to give the public an insight into our scientific collections, while the pavilion gives room for interpretative panels as well as temporary exhibitions.

The seedbank, our main asset in terms of conservation, will be renewed to become a state-of-the-art modern seedbank. To communicate and demonstrate our work in the field of conservation, the short-term seed storage room is made visible for visitors by means of smart glass technology.

The combination of these plans will form a powerful tool to increase our scientific strength and to raise public awareness around ex situ plant conservation.

KEYWORDS: Botanic Garden Meise, Glasshouse, Seedbank, ***Ex Situ*** Conservation

LOOKING FOR SUSTAINABLE USE OF ENERGY AT VILNIUS UNIVERSITY BOTANICAL GARDEN

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In recent years general awareness has been achieved of the necessity of energy savings in all aspects of life as for preservation of environment, as for economic reasons. Botanical gardens, especially those having large greenhouse structures, situated in countries of temperate climate latitudes, are consumers of a lot of energy. There are some gardens (in UK, USA, Netherlands), which have successfully implemented solutions of using alternative energy sources, even covering 100% of their energy consumption, using ecological energy sources. But the horticulture without being a fossil energy devourer still is a big dream for the most of botanical gardens round the world. The one of the main reasons of that situation – the lack of finances, but otherward not enough of ideas how could it be improved using not only expensive equipment but even simple constructions and physical laws of passive use of energy. The Vilnius University Botanical Garden has implemented a few measures and ideas by using renewable resources like solar energy, geothermal energy, etc. Nowadays we have solar cells which were installed for two different reasons. First section of solar cells was built in the field in common with the box for composting green wastes. Because of thermal processes this decision made a faster decomposition of organic waste process. As a result, we have a high quality of compost which we use for planting in our BG. Second section of solar cells was installed on a laboratory building which includes a laboratory of genetics, administration and experimental greenhouse. It was made for heating necessary amount of water during summer period. Also, there was installed geothermal heating and cooling system in a laboratory building. It makes warm water the whole year. Apart from that the geothermal energy we use for heating the building during the heating season. In summer that system makes a cooling process, so we needn't air conditioners. All these implemented ideas help our botanical garden to reduce gas and electricity consumption. We are planning to expand the use of renewable resources in the nearly future. For example, to install more solar cells or wind power system for lighting the BG territory, etc. The implemented ideas and future plans of Vilnius University Botanical Garden in more details will be presented in the conference.

KEYWORDS: Botanical Garden, Ecological Energy, Renewable Resources, Solar Cell, Geothermal

BOTANIC GARDENS AS "REGISTERED COLLECTIONS" UNDER THE EU ABS REGULATION: PAVING THE WAY FOR SUSTAINABILITY IN GREECE

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Being characterized as one of the most biodiverse countries in Europe, Greece constitutes a Mediterranean country with an unprecedented wealth of flora and a high level of endemism. Under international law, the ***Nagoya Protocol*** (NP) sets out a legally binding framework for conservation and sustainable use of biological diversity through the establishment of a system of access and benefit sharing (ABS). Pursuant to the ***Aichi Targets*** (Target 16) and the ***EU Strategy for Biodiversity 2011-2020*** (Target 6, Action 20), ***EU Regulation 511/2014*** ("ABS Regulation") transposes the NP into European law and introduces the concept of due diligence in respect of the acquisition and utilization of genetic resources. ***EU Implementing Regulation 1866/2015*** establishes an EU Register of collections ("the register"), laying down detailed rules as regards the monitoring user compliance and best practices. By consequence, users obtaining a genetic resource from a collection included in the register shall be considered to have exercised due diligence. In this light, compliance with EU Regulations presumes that the goals of biological conservation and sustainable use are fulfilled. Taking into account that botanic gardens are generally defined as "documented collections of living plants" under the ***International Agenda for Botanic Gardens in conservation***, EU botanic gardens could be classified as "registered collections" under the abovementioned EU Regulations. Greece has already developed a regulatory framework and related administrative practice acknowledging the multi-functionality of ***ex situ*** conservation, and especially the contribution of botanic gardens, streamlined with the ***National Biodiversity Strategy and Action Plan***. Notwithstanding that EU Regulations constitute directly applicable law in EU Member States, domestic implementation is a challenging endeavor for Greece which undergoes a long period of economic austerity and disposes limited public funds. Despite the current problems concerning the progress of enforcement of and compliance with international and EU commitments, Greek Botanic Gardens may see the EU Regulations as an opportunity to create and/or strengthen national and international networks, as well as to support new initiatives for sustainable use and biodiversity conservation. The newly established Greek Botanic Gardens Network gives great momentum for the undertaking of all necessary preparatory steps towards compliance with international and EU law.

KEYWORDS: Botanic Gardens, Genetic Resources, Registered Collections, Sustainable Use, Due Diligence

GREENING CEMETERIES, A LAW IMPOSED CHALLENGE FOR IMPROVING BIODIVERSITY

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The city of Limoges maintains 1'500 ha of natural and green spaces, including the Eveche botanical garden, as well as historical cemeteries that will be soon greened for the benefits of biodiversity. Since 2017 January 1st, the use of chemical pesticides is forbidden by law for all public organizations (ex: public hospitals, local governments). This law for Energy transition and green development generally applies to parks and gardens, and cemeteries if used a promenade. The city of Limoges – a historical city with 140'000 inhabitants is accredited as 'Ville sante citoyenne', conducts many actions for its citizens' health and wellbeing: Except for sports greens, it has therefore totally stopped the use of chemicals in all green spaces including gardens and cemeteries and has initiated a project for greening the Louyat Cemetery.

The Louyat Cemetery was built in 1806 and its 30 ha and 80'000 graves make it one of the biggest in France. As many south European countries, ***i.e.*** Latin countries, it has not been landscaped. There are few trees and cultivated materials but a high density of tombstones and mausoleums. The density of graves is 1'700 per ha. With such a high density, there are few spaces between and weeds are very noticeable and difficult to control. The results of the new law have therefore greatly increased the need for human resources to maintain the cemetery. As with many local governments, increasing human resources is challenging and a conceptual change is necessary for sustainable management.

After preliminary benchmarking of other national and international cemeteries, Limoges has started "greening to avoid weeding". Slow-growth grass has been used in pedestrian alleys, and customized mixes of native ground covers have been seeded between graves. The maintenance of cemeteries is a highly sensitive subject for the public, and a deliberate public relations campaign has been launched: exhibitions, information panels, radio interviews and TV reports. Tree plantations are also planned, and technical studies are being conducted. In 2019, the Louyat cemetery will be landscaped and planted for the public and for the benefits of biodiversity. Results to date will be presented including benchmarking results, current and projected situation, plants chosen, greening and propagation methodologies, PR operation, costs and benefits analysis.

KEYWORDS: Native Species, Sustainability, Ecological Corridors, Greening Historical Sites, Public Cemetery, Limoges, Sustainability

THE ROLE OF THE ASSOCIATION OF THE FRIENDS IN THE RESTORATION/CONSERVATION WORKS OF THE JARDIM BOTÂNICO DA AJUDA (2010-2018)

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Two decades after the project of restoration of the Jardim Botânico da Ajuda [Botanic Garden of Ajuda] (1993-1997), by a team coordinated by professor Cristina Castel-Branco, the first botanical garden in Portugal continues to face some challenges to maintain this heritage. Association of the Friends of the Jardim Botânico da Ajuda (AAJBA) is a non-profit association founded in 2000 at Lisbon, with the primary purpose of supporting the conservation and restoration of the Jardim Botânico da Ajuda (JBA). It is important that the AAJBA presents and discusses the work that has been developed in recent years in favor of this garden, and that can be applied in other gardens. AAJBA has almost 400 members and develops a community of volunteers around JBA. AAJBA organizes visits to historic gardens, cultural landscapes, monuments, museums and heritage all over the world. It promotes also gardening courses and cultural lectures. The income obtained from these initiatives, more than 150 000 € between 2010 and 2018, has enabled AAJBA to fund and coordinate the works of conservation and restoration of the JBA. The main works and projects of AAJBA in the JBA were:

I. Replacement of the glasses of the Greenhouse (2010-2011);

II. Illumination of the path next to the balustrade (2011);

III. Lower Terrace Pavement Project, area of 9434 m2 (2013-2014);

IV. Upper Terrace Pavement Project Pavement, area of 5930 m2 (2014-2015);

V. Acquisition of a Machine for the Labeling of the botanic collection (2013-2016);

VI. Conservation/Restoration Project of the Central Fountain and two Circular Lakes (2017-2018).

Due to its nature, historic botanic gardens require a continuous investment in conservation and restoration. This paper aims to contribute to the discussion of the role of associations of friends in safeguarding historic botanic gardens.

KEYWORDS: Jardim Botânico da Ajuda; Association of the Friends of the Jardim Botânico da Ajuda (AAJBA); Botanic Garden; Historic Garden Restoration; Lisbon

Al-Andalus: a milestone in the process of globalization of diversity: agriculture, food, gardens and landscapes

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Biodiversity at all levels of organization has suffered throughout the history of humanity a process of globalization that manifests positive and negative aspects. Among the latter are the impact of invasive alien species, the uniformization of landscapes and farming and feeding systems, an accelerated process of extinction of species and varieties and the exploitation of genetic resources without economic compensation to communities of origin that they discovered and domesticated. The positive side, the face of that currency, is that it has facilitated access to a huge diversity of food sources, raw materials and medicines of biological origin and to the knowledges associated to the use of these resources, which otherwise would have been reduced to a much more restricted use in societies and regions of origin.

Al-Andalus (Iberian area under Muslim domain in the Middle Ages) represents from this perspective, an important milestone in this process of globalization. Especially during the X-XIV centuries arrived at the Iberian Peninsula innumerable species of alimentary, medicinal, ornamental interest or of other uses and virtues, coming from Africa, Near and even Far East. The cultivation and use of many other crops until then scarcely known was also consolidated. We are talking about species such as rice, sugar cane, cotton, aubergines, artichokes, spinach and cucumbers, saffron, a large part of citrus and other fruit species, ornamental trees such as Rusian olive (***Elaeagnus angustifolia),*** the Judas tree (***Cercis siliquastrum)*** or the chinaberry tree **(*Melia azedarach***) or even flower species like the tulip (***Tulipa*** sp.). In those centuries, important advances in botanical, agronomic and pharmaceutical knowledge and a powerful development of gardening were also produced. They translated or made known such important works as Materia Medica de Dioscorides, Natural Stories of Theophrastus or Pliny and Nabatean Agriculture. And above all, important

treatises on botany and agriculture were written, some of them which are still ignored by a good part of the modern scientific field.

The translation and identification of the works written by the Andalusian geographers, naturalists and pharmacologists allow us to identify and glimpse in an increasingly clear way species and agricultural and forest landscapes of the Andalusian territory. In this effort, the authors of this communication have been working for more than 25 years, analyzing species, varieties and associated knowledge of the wild, agricultural and forestry flora of al-Andalus. The authors are convinced that this time and geography represented a true Renaissance advanced in four centuries, which would later live the rest of Europe and the Western world. In practical terms, the results allow to rescue numerous NUS and knowledge, to reconstruct landscapes virtually and to establish foundations for the management of gardens and historical groups.

KEYWORDS: Cultural Landscapes, Historical Ethnobotany

O076

THE GENUS *CITRUS* IN THE MEDITERRANEAN REGION IN ANCIENT TIMES

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This presentation looks at species of the citrus family (***Rutaceae***), in particular sweet orange (***Citrus*** x ***aurantium*** subsp. ***sinensis***), bitter orange (***C.*** x ***aurantium*** subsp. ***amara***), lemon (***C. limon***) and citron (***C. medica***), and evaluates the theories about their introduction history into the Mediterranean world in ancient times. It first takes all available sources from antiquity, their translations and their interpretations into account. Then it deals with the numerous recently published historical and (archeo)botanical papers on ***Citrus***. Some of them provide new hypotheses on introduction times and pathways of the different ***Citrus*** species into the Mediterranean area. A number of wrong interpretations and assumptions are identified especially in the newer literature. Besides mistakes in translations or perceptions of ancient texts and images, one of the reasons for these errors is a non-reflective citation of wrong "old" interpretations.

The presentation starts with a short discussion of the history of the oranges in the Mediterranean. Based on the evidence from the historical sources any speculation about the presence of "sweet oranges" or bitter oranges in ancient times is shown to be wrong. The different hypotheses about the introduction times and pathways of lemon and citron into the Mediterranean region are carefully analysed. Every putative evidence for the presence of ***Citrus limon*** in Roman times is proven to be incorrect. This relates to archaeological findings as well as to interpretations of images in mosaics or wall paintings. Theories proposing an introduction of citrons across the Near East and the Eastern Mediterranean region are supported, while recently proposed connections between the introduction of this species and Phoenician trade appear very doubtful. Confusions, also observed in modern publications, caused by the fact that the name "citrus" in Roman antiquity was used not only for citrons, but also for the sandarak tree (***Tetraclinis articulata***) of the cypress family (***Cupressaceae***), are dealt with as well.

KEY WORDS: ***Citrus medica***, ***Citrus limon***, ***Citrus aurantium***, Antiquity, Introduction History

O077

RECOLLECTION OF THE HISTORICAL PORTUGUESE ORCHID COLLECTION FROM 1879

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This collection was started during the time when the greatest eager to get orchids from tropics was already over. For some previous decades the situation was described by the following words: "Thus hundreds of beautiful species, which had been collected at great cost and risk, and were purchased by eager amateurs at home, oftentimes at high prices, rapidly died out, simply from the prevailing ignorance of the climatal conditions of the localities in which they had been collected. (Orchid Growers Manual, 1893. p. 2)

At the same period some of the great names of biology, important for knowledge of orchids, had passed away or came to the end of their scientific life (Darwin, Lindley, Reichenbach) And some of the most important professional companies to grow and sell orchids just started to get form.

The new orchid house in Jardim Botanico da Ajuda was designed keeping in mind the problems of earlier orchid houses around Europe. It was a modern orchid house at its time. The house was filled by orchids so that 1881 there was about 420 different orhids. They all disappeared during revolution. The leading manual for orchid growers had in the 1877 years edition 930 orchid species described. Calculating the names of the historical collection using the same criteria as that book, the number is 470. So the historical collection of King Luis I of Portugal had about 50 % of the orchid species that were typical for the best orchid collections and trade with orchids at that time. It must be considered as a prominent collection.

When we are now making a replica of that historical orchid collection, we are handling problems of different kind. First we must identify the orchid that made the collection. Less than 50% of those orchids have today the same name as they had 1881. We must follow the chain of new namings made by new generations of botanists. But that is not enough. In many cases it seems that a description of an orchid flower written 140 years ago is different from what the corresponding name gives today. So we must also try to find orchids that look like the old descriptions – no matter what the name is today.

The second problem is to find and buy those orchids. Lucky for us we already have in our family collection (Coleção de orquídeas Ranta) about 250 orchid species and natural hybrids that seems to be plants that are in those old lists. To find an buy the rest will take one or two years.

But then comes a problem of totally different kind. The historical collection has once disappeared. It can disappear again. The other problem of this kind is the slow dying of plants. Situation today is not as bad as it was 1830s or 1850s. But even today we can record rate of species deaths in public collections at levels 5...10% per year. Our simple method against this problem has been to keep at least three plants of each species to get time to react.

To keep the collection there must be correct facilities and persons with proper qualities. This part of the work is at this moment quite fragile. How many botanic gardens have courage to boast that they have all that is needed to start to take care of an orchid collection of 10 000 orchids or at least 1200 orchids. And to have the collection in good shape after 10 or 20 years.

KEYWORDS: Orchid Collection, King Luis I, Coleção de Orquídeas, Jardim Botanico da Ajuda

Connecting heritage with modern science: the new systematic division at the Botanical Garden of the University of Vienna

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Botanical research at the University of Vienna has always been famous for its focus on systematic research. Because the directors of the garden always were University professors involved in systematics, new botanical theories were likely to make their way directly into layout of the plantings in the garden. This already dates back to the times of Nikolaus Joseph von Jacquin (1727-1817). During his directorship from 1768–1796, he established a systematic division showing the plants according to the Linnean classification.

Nowadays, the systematic division covers about one third of the garden area. Its size and the historical background are both outstanding features of the garden. Plant arrangements in this way have a long and well documented history. They reflect changes in views about systematic concepts or groupings of flowering plants. Such historical features are worthwhile to be conserved, but also need explanations to understand the "different time-layers". With the recent raise of molecular phylogenetic approaches in plant systematics, there was a growing need for the University garden to exhibit these latest results in systematic research.

The Endlicher-Fenzl-Kerner-trail („EFK-trail") was established in 2015 within the framework of the 650th anniversary of the University of Vienna. It highlights an important period of the garden development (between c. 1840 and 1900) and the perception of botanical systematics influenced by the garden directors Stephan Endlicher, Eduard Fenzl and Anton Kerner von Marilaun. They all were significantly involved in the layout and content of the systematic divisions.

The EFK-trail aims to combine the history of botanical science reflected in the garden with the newest classification approaches. The whole project is embedded into the implementation of the APG IV system in the systematic divisions. It explains rationals of historical concepts still preserved in the woody taxa and reasons for actual changes in placements. The „heart of the trail " are eight boards highlighting selected plant families or genera along the trail and the changing views about the taxonomic placements of taxa planted in their immediate surrounding. Three boards provide information about the biographies of the directors, and some additional boards give citations fitting to the context.

That way, the EFK-trail provides a look back in time, helps to understand the processes of systematic studies based on research carried out in Vienna, and provides information about important Viennese botanists and their merits for botanical research. It also triggers

curiosity about the plants growing in the whole systematic division.

The trail is well perceived by the garden visitors. It is used in university teaching and is subject of guided garden tours. A folder gives short information about its position in the garden and about its aims. An elaborated text informing about the EFK-trail is available on the homesite of the garden.

Historical traits in botanical sciences based on local achievements as featured at the EFK-trail thus provide a valuable background to a major task of a university garden: to present and explain the most actual developments in botanical research and classification.

KEYWORDS: Historical Heritage, Botanical Systematics, APG IV

O079

LISBON'S HISTORIC GARDENS: EX-SITU BIODIVERSITY CONSERVATION OF ENDANGERED SPECIES

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The aim of research project LX GARDENS- Lisbon's Historic Gardens and Parks: Study and Landscape Heritage Inventory (financed by FCT: PTDC/EAT-EAT/110826/2009) was study the historic and botanical components of Lisbon's historic gardens (from the 18th century up to the 1960's). This research, from 2011 to 2014, studied the historic and botanical components of 64 Lisbon's historic gardens as part of the city's Cultural Heritage including

the four botanical gardens of Lisbon (Botanical Garden of Ajuda, Tropical Botanical Garden, Lisbon Botanical Garden and Botanical park of Tapada da Ajuda). One of the aims of this study was to contribute to the identification and assessment of Lisbon's historic gardens tree diversity. The tree inventory includes plants survey (height > 2 m), of each garden that was identified and placed on a map with GIS localization tools.

The taxonomy study of these plant collections has been carried out. 27 610 trees and shrubs were identified (799 species belong 103 families) publish in EBOOK- ***Levantamento Arbóreo dos Jardins e Parques Históricos de Lisboa***. However, this paper is only concerned the species included in the International Union for Conservation of Nature (IUCN) categories: EW-Extinct in the Wild, CR- Critically Endangered; EN-Endangered; Vu-Vulnerable.

Among the taxa studied were found 38 species, in different categories. EW: ***Brugmansia arborea*** (L.) Steud.; ***B. pittieri*** (Saff.) Moldenke; CR: ***Araucaria angustifolia*** (Bertol.) Kuntze, ***Pinus torreyana*** Parry ex Carrière; EN: ***Abies pinsapo*** Boiss., ***Brahea edulis*** H.Wendl. ex S.Watson, ***Chamaecyparis formosensis*** Matsum., ***Chrysophyllum imperiale*** (Linden ex K.Koch & Fintelm.) Benth. & Hook.f., ***Cunninghamia konishii*** Hayata, ***Cupressus goveniana*** Gordon, ***Ginkgo biloba*** L., ***Juniperus cedrus*** Webb & Berthel., ***Malus niedzwetzkyana*** Dieck ex Koehne, ***Metasequoia glyptostroboides*** Hu & W.C.Cheng, ***Pinus radiata*** D.Don, ***Sabal bermudana*** L.H. Bailey, ***Schefflera elegantissima*** (Veitch ex Mast.) Lowry & Frodin, ***Sequoia sempervirens*** (D.Don) Endl.; VU: ***Afrocarpus mannii*** (Hook.f.) C.N.Page, ***Araucaria heterophylla*** (Salisb.) Franco, ***Butia eriospatha*** (Mart. ex Druce) Becc., ***Caesalpinia paraguariensis*** (Parodi) Burkart, ***Cedrela odorata*** L., ***Cedrus libani*** A.Rich., ***Ceratozamia mexicana*** Brongn., ***Colletia paradoxa*** (Spreng.) Escal., ***Cupressus bakeri*** Jeps., ***C. macrocarpa*** Hartw., ***Dracaena draco*** (L.) L. subsp. ***caboverdeana*** Marrero Rodr. & R.Almeida, ***Encephalartos altensteinii*** Lehm., ***Howea belmoreana*** (C.Moore & F.Muell.) Becc., ***H. forsteriana*** (F.Muell.) Becc., ***Jacaranda mimosifolia*** D.Don, ***Jubaea chilensis*** (Molina) Baill., ***Macadamia integrifolia*** Maiden & Betche, ***M. tetraphylla*** L.A.S.Johnson, ***Sideroxylon mirmulans*** R. Br., ***Torreya californica*** Torr.). The germplam collections of these green areas of Lisbon are a very important heritage to our ***ex situ*** biodiversity conservation.

This systematic study constitute a tool to protect and enhance the gardens and their botanical assessment in order to protect and promote this legacy as cultural heritage with high ecological, recreational, artistic, aesthetic, social and tourism value.

KEYWORDS: Portugal, Heritage, Biodiversity Conservation

THE HANGING GARDENS (JARDINS SUSPENDUS): *IN NORMANDY, THE LATEST FRENCH BOTANIC GARDEN*

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The Hanging gardens are the latest French garden labelled as botanic by the association of the French and French speaking botanic gardens, in September 2017, simultaneously with the 500th birthday of the city of Le Havre.

It is a garden, created in the city of Le Havre, Normandy in an ancient XIXth century fort, abandoned by the army in the 70's. Opened to the public in 2008 as a local park, it is still the main garden of its neighborhood, but moreover it has become one of the main touristic attraction of the city (150 000 visitors/year) as well as a recognized young botanic garden.

Within its 10 ha, the garden tries to reveal the relationships between man, ocean and the plants by testifying how the main temperate regions of the word such as eastern north America and Asia or the austral regions, re-discovered by the Europeans during the last centuries, have successively enriched the gardens of western Europe. Some of the expeditions that gathered new plants have left from Le Havre. To emphasis these strong relationships, a part of the garden is dedicated to the newly described and/or introduced plants (that can grow in Normandy!). In addition, 3000 m² of greenhouses present more than half of the 5100 taxa of the garden while the small Cayeux garden honors the horticultural production of this former supervisor of the botanic garden of the polytechnic school of Lisbon.

After working for 5 years with a "godfather" garden, the Hanging gardens are now a modern botanic garden, strongly related to its city and its history. The energy and implication of the staff, as well as the help from other botanic gardens and friends, and despite the lack of political resonance have been fundamental, to walk the way, step by step, towards the agreement.

There is still work to do, especially regarding the conservation of local flora and the participation to scientific programs. These items are the most difficult to achieve for a young municipal botanic garden, but with the right local partners, we are confident we could achieve those goals.

The presentation will focus on the steps we took to be labelled botanic garden and how we try to remain a modern public garden.

KEYWORDS: Le Havre, Normandy, Public Garden

ENDOGENIC POTENTIAL OF BOTANICAL GARDEN IN KIELCE (GEOPARK KIELCE) – SE POLAND

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Kielce is the capital city of świętokrzyskie voivodeship, one of 16 in Poland, situated in south-east part of the country. Kielce is also situated in the center of Świętorzyskie Mts. – one of the oldest in Europe. Świętokrzyski region is not only mountains – it is also uplands and lowlands, among which, the most interesting is Nidziańska Basin with the Nida valley. Świętokrzyski region has also very rich geological diversity, among not only Poland but whole Europe (in the relatively small area you can see unveiling rocks of all geological periods), and vegetation diversity.

One of the institutions that deals with promotion of Kielce City and all region in terms of geological values is Geopark Kielce, which in 2004 had been given a task to build and organize Botanical Garden in Kielce. This garden perfectly complements the existing gap in the network of polish botanical gardens.

Whole idea of creating The Botanical Garden in Kielce has already 50 years, but the built had been started in 2009. The Garden occupies the area of 15 ha which is situated in the south-east hillside of Karczówka Mt. (340 m asl). Karczówka Mt. is built with Devonian origin limestone rocks and there is situated a Bernardine (actually Pallotine) Monastery from XVII century on its top. The difference of height of area of the Garden is 20 m. From the exposure part of the Garden you can see a great view of whole Kielce City and surrounding mountain ranges. The presence of all geological, botanical and culture values has been caused by specific geological structure of this area. Calcareous grassland belong to class ***Festuco-Brometea*** with its whole botanical richness of rare and endangered species can be seen here. Actually, the Botanical Garden in Kielce provides conservative actions for calcareous grassland ***in situ*** and implements ***ex situ*** protection, focusing on presentation local and regional vegetation.

Location of The Garden on the hillside gives also possibility to expose the limestone rocks with fossils that lived here over 360 million years ago. Furthermore, in the area of Karczówka Mount the lead ore had been mined since the middle ages. The underground emptiness was found in 2016 in the area of The Garden which could be a either cave or historical adit/mining sidewalk.

Endogenic potential of The Botanical Garden in Kielce is enormous and multidimensional, determining interdisciplinary activity. The Garden creates ecological awareness of citizens as well as gives them green area of recreation. It also concentrates tourism movement and gives new job places and opportunities. The Botanical Garden in Kielce will be partly available to see in spring 2018 and whole opening will be given in 2020.

KEYWORDS: Botany, Geology, Culture, Landscape, Garden, Ex Situ, Świętokrzyskie Mts., Świętokrzyski Region

CARING FOR OUR ELDERS: AGING TREES IN BOTANIC GARDEN MEISE

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Botanic Garden Meise has over 3.000 trees in collection and many more in the woodland areas. Although the Botanic Garden only moved to Meise in 1939, many trees were planted long before that year. Historic notes, although few, make note about century old oaks, limes, beeches and elms possibly planted during the late 17th century. The oldest trees still remaining are presumably from around the late 18th or early 19th century.

In order to sustain the lives of these ancient and historic trees, it is vital that the trees and land around them are properly cared for. The aim of managemental activities should be to keep trees alive for as long as possible, without causing safety issues for visitors. It is necessary to clearly identify actual and potential threats of old trees in order to enable appropriate management.

Visual inspection of all trees is performed each year. An initial risk assessment is made for older trees and those trees portraying some health issues. By this we determine the health status of the trees. Crown, branches, foliage, trunk and roots are evaluated. Also, fungi and possible diseases are observed and identified, and their possible effect on the tree is estimated. Another challenge is e.g. the compaction of rooting area caused by pedestrian or vehicular traffic. Every year these 'care trees' are re-evaluated.

A first inspection of a tree is done by one of our gardeners trained to perform these health checks. After his first risk assessment a second inspection is carried out by the collection management team. Ultimately, a decision is made about the action to be taken. Each action to be undertaken gets a certain priority from 'not urgent' to 'high priority/urgency'. Actions are: (1) 'do nothing', (2) further (professional) investigation is needed, (3) pruning is necessary (4) eliminate tree or (5) other action (e.g. decompaction of the soil). In the case of pruning it should always be considered to spread the work over several years, since this minimizes the pruning wounds created. Elimination is only considered when a tree poses safety issues for the visitors or staff.

KEYWORDS: Care Trees, Botanic Garden Meise, Risk Assessment

PALAEODIVERSISTYRIA: RECONSTRUCTING ANCIENT LANDSCAPE AND AGRICULTURE IN STYRIAN FLATLANDS

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Earliest Neolithic settlements in southern Styria and north-eastern Slovenia are evidenced to about 5000 B.C. From that time anthropogenic influence on the landscape dramatically increased caused by development of different regimes in agricultural land use and forestry.

Since 2016 the Botanical Garden of Graz is involved in the Project PalaeoDiversiStyria, History of Styrian Landscape and its Biodiversity from prehistory up to the discovery of the new World. This project was enabled due to the Interreg V-A Slovenia-Austria 2014-20 cooperation program, funded by the European Regional Development Fund (ERDF) and is realized through the cooperation of Austrian and Slovenian Partner institutions. The aim of the project is to receive a better understanding of the development of the regional cultural landscape using archaeological as well as on archaeobotanical, archaeozoological and palynological approaches. This will help to draw an image of early time's agriculture, nutritional habits and life management based primarily on the local natural resources.

As outputs of the project we will publish a public database of plants from archaeological contexts, giving information about excavations, culture, history and botany of found plants species containing cereals, legumes, oilseeds and staining plants as well as herbaceous and woody wild plants, some of which experienced special use by humans in the past. Selected species are cultivated in the Botanical garden for the development of a seedbank in order to store and distribute seeds of species with local archaeological background and for the supply of reference material for further archaeobotanical analysis. For reaching a broader publicity a cereal field was cultivated in western Styria, in close vicinity to a main excavation site with tools rebuilt from prehistoric models. We will furthermore use the scientific results of this interdisciplinary project as a basis for the development of tourism concepts within the region. Through the cooperation with farmers and producers the knowledge about previous important crops becomes more and more vivid and products with special archaeological background are created.

KEYWORDS: Landscape History, Archaeobotany, Land-use, Ancient Crops

INTERPRETING EX-SITU CONSERVATION TO BOTANIC-GARDEN VISITORS, A DESIGNER'S PERSPECTIVE

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A key activity of many botanic gardens (BGs) is the ***ex situ*** conservation of plants – maintaining the genetic diversity of plants by growing them outside their native habitat. But visitors to botanic gardens may remain unaware of these activities during their visit – and the opportunity to communicate the wider role of BGs is lost.

Visitor interpretation is a crucial tool to remedy this. Panels, trails, leaflets, apps and direct interpretation from staff, such as garden guides, can all help communicate the importance of conservation and how BGs contribute to this. Effective interpretation helps visitors understand that BGs are not just parks, but institutions actively involved in the research and preservation of plant diversity.

The presenter is a designer and interpretive professional with a background in ecology and environmental education. During his current employment, as well as in his prior role in the education department of Royal Botanic Garden Edinburgh, he has worked on projects that engage and explain plant conservation to the visiting public. Partnership with botanists and horticulturists have resulted in books, field-guides, websites, and interpretive installations all of which bring the work of BGs to diverse audiences.

This oral presentation will focus on some of the practical challenges to communicate conservation work, particularly using long-term panel-based interpretation. How can the interpretation fit in visually with the garden without becoming obtrusive? How can complex information be communicated in a way that still engages visitors? How much text is appropriate, and what kind of language to use? What type of images can be used to help tell the story? The presenter has come to understand some of these challenges and will offer insight into practical solutions.

The talk will draw on examples of panel-based interpretation of the ***ex situ*** conservation of Chilean plants and trees at Royal Botanic Garden Edinburgh and a large area of ***ex-situ*** planting in Benmore Botanic Garden, Argyll, Scotland. It will highlight the challenges of creating and installing a new Biodiversity Education Garden in Nepal as a case-study. Using these examples the presentation aims to give some practical advice to BG professionals considering similar projects.

KEY WORDS: Interpretation, Conservation, Design, Visitor Engagement, Biodiversity Education Garden Nepal, Chilean Hillside Benmore, Scotland

JSTOR PLANTS & SOCIETY: DEVELOPING A COLLECTION WITH THE BOTANIC GARDEN COMMUNITY TO SHOWCASE THE IMPORTANCE OF PLANTS FOR SOCIETY

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JSTOR Global Plants (http://plants.jstor.org/) – with support from The Andrew W. Mellon Foundation and in cooperation with hundreds of botanic gardens, herbaria, and libraries worldwide – developed a database of over two million plant type specimens, ensuring the preservation of and increasing access to these fundamental scientific materials. JSTOR is now embarking on a new project, called Plants & Society, working with botanic gardens to bring increased attention to their rich collections of non-specimen materials – including historical, horticultural, and ethnobotany materials – and show the importance of these materials to the scientific community and society at large. Plants & Society will focus on the historical, cultural, aesthetic, and environmental implications and uses of plants in society, developing pathways of study between the sciences, humanities, and social sciences. Content for inclusion in the collection is being identified following four subject modules: Plant History & Exploration; Useful Plants; Horticulture, Gardens, & Landscape; and Ecology & Biodiversity. JSTOR is currently working with several partners to develop this project and explore future digitization projects. We plan to bring in new partners as the project develops and receive feedback from the botanic garden community. The project's goal is to preserve and increase access to the rich collections of botanic gardens, introducing new audiences to the important work of botanic gardens and showcasing their importance to society.

KEYWORDS: Botany; Livingstone, David; Herbaria; Mapping; Specimens

PHOTOSYNTHESIS: THE BOTANIC GARDEN AS SEEN BY OUR VISITORS

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The Botanic Garden of the University of Coimbra is a privileged setting for the photographic memories of those who visit us. Through time, thousands of visitors took photos among the plants, capturing different time periods of the Garden's history, recording along those personal moments, the shifts in the botanical collections and built heritage. After an open call, where people could share with us their historical images and stories of the Garden, we created an open-air exhibition, showing the Garden as perceived by our visitors. We were able to compile a personal archive of the Garden that continues to grow online.

By directly addressing our visitors, the project "Photosynthesis: the Garden by our Visitors" was a successful initiative of the Botanic Garden of the University of Coimbra, as it seamlessly brought together a scientific institution and its publics, creating a strong engagement of the community, and projecting an image of the Garden as an historical but relevant scientific, touristic and leisure venue of Coimbra and the country.

Its multiple facets, from the online archive to the open-air exhibition, generated interest in each of its moments and brought us closer to our public, by valuing their knowledge and participation in our daily life. We had more than 5000 registered visitors, and many more unregistered as we have free entrance, and its effects endure online, where we keep receiving photos. This unusual project also brought more people to the Garden, closer to plants and their scientific value, fostering our mission of engaging people in the knowledge and conservation of the plant world.

This project also integrates perfectly within participatory/citizen science activities, as the photo elicitation with contextual descriptions provide an opportunity for society to contribute with historical private records, but that can provide data for multiple disciplines (*eg*: anthropology, sociology, architecture, biology, etc.).

FAIAL BOTANIC GARDEN EXPANSION, AN *EX-SITU* CONSERVATION PROJECT OF AZORES NATURAL FLORA

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Located on the Mid-Atlantic Ridge, the archipelago of the Azores is the westernmost part of Europe and the meeting point of unique plant species. This true Noah's Ark of plants is a priceless treasure that should be protected as a legacy for the future.

Part of the Regional Government of the Azores, and belonging to Faial Natural Park, the Faial Botanic Garden is an important regional center for Azorean flora conservation and a vehicle for awareness and research. This center carries out a conservation program comprising ***in-situ*** and ***ex-situ*** measures, with the premise that ***in-situ*** conservation actions are the ultimate goal for ***ex-situ*** conservation that should be regarded as a safeguard and supplier of the necessary inputs.

The main goals of this program are:

- Carrying out conservation actions in priority habitats and landscapes;
- Establishing Action Plans for the Conservation of all priority species of the Azores flora;
- Environmental education and scientific research.

The Garden keeps the most complete collection of native and endemic plants from the Azores, offering visitors extensive information. In addition to this important conservationist collection, the garden keeps some of the most representative plants of the exotic flora from the Azores divided into different collections: Medicinal and Aromatic Plants; Orchids House; Traditional Agricultural Crops; Ornamental Plants and Invasive Plants.

It also houses a propagation facility, which is focused on rare species for population and habitat recovery, while collecting biological data, a Seed Bank, that implements a regional campaign for seed collection, seed sample preparation and germination tests, providing extensive data on seed biology.

Wide areas of Faial Nature Park are being intervened under the coordination of Faial Botanic Garden, especially by controlling invader plants but also other risk factors, and focuses on population, habitat and landscape protection.

Being the most important regional center dedicated to the conservation of the Azorean

natural flora and in order to continue to fulfill this important mission, is currently being implemented the "Faial Botanic Garden expansion, an ***ex-situ*** conservation project of Azores natural flora". This project aims to increase the capacity of ***ex-situ*** conservation by expanding the area dedicated to the plant collection of the garden, thus creating different areas with associations of plant species characteristic of natural habitats classified as a priority for conservation; and the construction of a new Seed Bank infrastructure that meets the international seed banking standards.

In addition, in this new expansion area, is being built the new Orchidarium of the Azores that will house one of the largest collections of orchids in Europe. This orchidarium will receive Henrique Peixoto's collection, until then kept in a small greenhouse in Faial Botanic Garden; some orchids species and hybrids acquired by the Regional Government of the Azores; and the collection provided by the Ranta family, one of the most important private donations made to the region to date, not only for its heritage but also for its scientific value.

KEYWORDS: Azores; *In-Situ* Conservation; *Ex-Situ* Conservation

O088

ACTIONS FOR CONSERVATION OF THE ENDANGERED MEDITERRANEAN ISLANDS FLORA: THE CARE-MEDIFLORA PROJECT IN BALEARIC ISLANDS

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Mediterranean islands represent a center of plant diversity featured by an endemic richness rate higher than mainland areas. However, such plant richness is threatened by several physical and biological factors. Given that, many plants of these islands are facing the risk of a severe impoverishment and require urgent protection measures. The CARE-MEDIFLORA

project, an initiative of seven institutions with long experience in plant conservation, is using *ex situ* collections to experiment with *in situ* management actions and measures for some taxa in the Mediterranean islands.

The involved institutions work to address both long-term and short-term needs, including: (1) *ex situ* conservation of the most endangered plant species of the Mediterranean islands through the collection and seed banking of representative accessions of the overall diversity of the selected taxa;(2) use part of this genetic material conserved in the seed banks to test *in situ* conservation for some of the most endangered plant species of the Mediterranean islands through active management actions (e.g. reintroduction, reinforcement, fencing, etc.), in collaboration with the most relevant local authorities to ensure the sustainability of the results; and (3) establishing a network connecting scientific institutions from the Mediterranean islands in order to ensure the circulation of information, knowledge and project results sustainability.

The Soller Botanic Garden, as a partner uncharged of Balearic Islands, is carry out 7 *in situ* actions and 111 seed lots representative of 58 taxa has been collected and will be stored in the Soller Botanic Garden seed bank and as well duplicated in another seed bank of the Spanish network REDBAG. The final objective of the project will significantly contribute to the achievement of the GSPC targets in the Mediterranean islands.

KEYWORDS: Botanic Gardens, Mediterranean Islands, Threatened Flora, Endemic Plants, Seed Bank, *Ex Situ* Conservation, *In Situ* Conservation.

O089

PLANTS AND HERITAGE: THE TROPICAL GREENHOUSE OF THE BOTANIC GARDEN OF THE UNIVERSITY OF COIMBRA

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Historically, the importance of building a hot greenhouse for tropical species in the Botanic Garden of the University of Coimbra (BGUC), was already recognized in the early 19th century, but its construction started only in 1855, being populated with the first plants 10 years later. It was built exclusively by Portuguese factories and it is also of one of the first iron and glass buildings in Portugal.

Throughout its 150 years of life, the greenhouse received many small interventions to guarantee the best acclimation conditions of its plant collections, but in 2013 the biggest requalification intervention ever made in this structure began, completed in 2017.

The intervention involved the restoration and recovery of the existing structures, whilst maintaining the original architectural features, privileging the historical and patrimonial rehabilitation and revaluation. Technical solutions were implemented to provide energetically efficient, environment-friendly and ecologically sustainable conditions adequate to plant development, namely concerning the heating, humidification, ventilation and shading.

Due to the demands of the intervention, the existing plants inside the greenhouse were transferred to other areas of the BGUC, to assure their preservation, always respecting the most favorable edapho-climatic conditions for the acclimatization process.

The greenhouse was subjected to changes in the organization of its areas to increase the diversity of species in the botanical collections. The three wings that compose the greenhouse were provided with conditions to host species of tropical distribution, particularly aquatic plants, carnivore plants, plants for human usage such as food crops, medicinal species, etc.

This profound rehabilitation of the structure allowed for the development of a renovated visiting and educational program of the greenhouse, with the creation of new botanical, taxonomical, ecological, ornamental, and science communication contents, to provide the visitors a richer experience in this space of unique architectural and historical value.

In this presentation we will demonstrate how this requalification project allowed the modernization the greenhouse while simultaneously preserving its architectural and historical value and enrich the botanical collection of the Garden, and create new attractions for our visitors, reinforcing its importance in the organic composition of the Botanic Garden of The University of Coimbra.

This rehabilitation project is a significant contribution to the Botanic Garden and to the University of Coimbra, classified as a World Heritage Site by UNESCO since 2013.

KEYWORDS: Historic Greenhouse, Heritage Garden, Tropical Plants, Rehabilitation, Botanical collection

A SUSTAINABLE GARDEN IN THE BOTANIC GARDEN OF PIRÁMIDES DE GÜÍMAR, TENERIFE, CANARY ISLANDS

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The ethnographic park and Botanical Garden of Pirámides de Güímar, with a surface of 64.000 m2, was founded in 1998 by the famous Norwegian researcher Thor Heyerdahl. In addition to Heyerdahl's legacy, the first fifteen years of the new century have been a time of growth and maturation. Six big routes on the open allow the visitor to enjoy the more than 20.000 m2 of gardens.

The planning and denomination of the Botanical Garden of Pirámides de Güímar as such is based on the following botanical collections:

1.- Collection of Canarian Flora, specially the one around the municipality of Güímar.

2.- An Arboretum made out of several trees of canarian and exotic species, fruit trees and Mediterranean trees.

3.- Poison Garden.

4.- Sustainable Garden.

The Sustainable Garden of Pirámides de Güímar exposes in its 1000 m2, the environment of a Canarian water flow, a traditional ravine with its autochthonous flora, with the objective of educating the visiting population on this model of gardening and to put value in such a scares resource in the islands, namely, water.

The design and replication of this natural habitat has the objective of encouraging this model of sustainability for gardened areas in the Canary Islands through the application and respect to the three sides of the concept of Sustainability: the environmental, economical and social.

- The environmental because it uses autochthonous species of the Canary Islands
- The economical because it supresses the need for irrigation, fertilization, pesticides, etc.
- The social because it acts as way for the awareness and environmental education for the population in regards of the conservation of the Canarian natural environment.

KEYWORDS: Sustainable Garden, Canary Endemic Flora, Sustainable Tourism

O091

ENHANCING BOTANIC AND HISTORIC INFORMATION THROUGH 3D TECHNOLOGY: THE TROPICAL BOTANIC GARDEN IN LISBON

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The Tropical Botanical Garden (Jardim Botânico Tropical, JBT) of Lisbon is one of the three botanical gardens hold by the University of Lisbon. It is located in a historical and excellence zone in the city of Lisbon, near emblematic monuments like the Mosteiro dos Jerónimos, or the Torre de Belém, memorials that celebrate the age of the discoveries and are classified as UNESCO World Heritage Sites.

This garden was created in the beginning of the XX century (1906) to support tropical agronomic studies in former Portuguese colonies. Nowadays, the JBT preserves the testimonials of its history in the buildings, sculptures and other cultural assets and where the crucial component – the living collection of plants – is maintained with educational, research and leisure purposes.

The nature of the plant collection – mainly focused in tropical and subtropical species with economic interest – differentiates this botanical garden, which houses plants used for food and medicine, as well as ornamental, oil plants, etc. and aims to enhance the importance of these natural resources to human well-being.

Following the recent publication of a guidebook of the species in the garden (Plants of the Tropical Botanical Garden, 2016), it is now intended to make this information freely available in the internet through the development of a searchable dynamic 3D digital model.

Starting from the existing database of the species mapped in a geographic information system (GIS), this 3D model is being developed at the Faculty of Sciences, using the most up to date technology for 3D urban modelling, merging an attractive online resource with the scientific information including a vast array of data (e.g. taxonomic, phenological, ethnobotanic, chorological, and conservational).

With the development of this virtual model, we aim to support the visits of the public to the Tropical Botanical Garden as well as providing them with botanical and historical information that cannot be included in the usual paper format (such as advertising leaflets or brochures). While enriching their visit, we aim to contribute to the improvement of citizen awareness for species conservation and about the importance of plants to human life as well as promoting the taste for scientific culture.

KEYWORDS: Botanical Garden, 3D Virtual Model, Conservation Awareness

POSTERS

THE ATTRACTIVINESS OF ETHNOBOTANICAL HERITAGE OF IBEROMACARONESIAN BOTANICAL GARDENS

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In the Ethnobotanical Project, the AIMJB has collected information on collections, archives and materials of ethnobotanical interest from theirs Botanical Gardens. Also collected information about its activities in this field and on collections of other institutions linked to its research work.

We have verified that some gardens conserve living collections, propagules, herbarium sheets and objects with scientific and cultural value. Their origin as well as their management systems are diverse. These collections are living witness of some of the biological diversity that they guard. Some gardens guard reference material from their research works. Others do not incorporate the ethnobotanical perspective in the formation of their collections. Some of them plan to do it soon.

We have assembled and grouped a set of materials according to their function and traditional applications: pharmacopoeia, food, poisons, household supplies, agricultural and livestock artefacts, hunting and fishing tools, dyes, textiles, cosmetics, soap dishes, toys, musical instruments, ornamental, vegetal structures, folklore, rituals and ceremonies, among others. Some of them make up the exhibition "***Cultures and Plants***". Its main objective is to show the ethnobotanical aspect of biodiversity conservation research of iberomacaronesian Botanical Gardens.

The exhibition is itinerant and shows a selection of objects that have technical and aesthetic quality to be exposed. Includes some thematic panels with images on different applications of vegetables. The bulk of the materials corresponds to the Iberomacaronesian area scope. There are also representations of objects related to ethnobotanical activities and the history of the Gardens in Africa, America and Asia. The exhibition was inaugurated in Lisbon during the XIII Symposium of the AIMJB. It was the beginning of an itinerancy.

Over the course of several years, the exhibition has travelled to different Botanical Gardens showing an attractiveness hitherto little known from the Gardens. The exhibition has encouraged the Botanical Gardens to promote this type of studies, to host and exhibit cultural artefacts related to their collections, as well as to conserve and musealize the materials available to them.

KEYWORDS: Culture, Plants, Ethnobotany, Collections, Cultural Heritage, Exhibitions, Samples.

REDISCOVERING THE PTERIDOPHYTES OF THE JARDÍN DE ACLIMATACIÓN DE LA OROTAVA (TENERIFE, CANARY ISLANDS)

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The correct identification of the species growing in a botanic garden is an essential issue because they are the base for all of the activities. A well ordered, documented, and labelled collection of living plants, that is open to the general public, is very important for research and education.

For a long time the lycophytes and ferns of the Jardín de Aclimatación de La Orotava have been forgotten from a taxonomic point of view so an accurate identification and names updating of many of them are needed.

Although we can found different species of ferns distributed throughout the garden the main collection is located along an artificial wall of volcanic rocks near to main entrance.

According to recent bibliography the lycophytes and ferns growing in the botanical garden have been assessed.

Here, we show the actualized checklist of the pteridophytes collection of the Jardín de Aclimatación de La Orotava.

As stated by the Pteridophyte Phylogeny Group (PPG) 2016, except ***Selaginella dentata*** (Lycopodiopsida) the others species belong to Polypodiopsida where ***Psilotum nudum*** is the only one representative of Ophioglossidae while the rest are included in Polypodiidae.

Our fern collection is represented by 54 species belonging to 15 families. Pteridaceae is the commonest with 13 species whilst ***Pteris*** is the genus best represented with 7 species. Different life-form can be observed, from prostrate herbaceous of ***Selaginella*** to a tree type of *Sphaeropteris cooperi*.

Seven species are autochthonous whilst the rest come from different parts around the world.

One species (*Cyrtomium falcatum*, Japanese holly fern) has been included in the Spanish Catalogue of Invasive Exotic Species (Real Decreto 630/2013, de 2 de agosto) specifically for our region, so we started a program of control and eradication of this weed in the botanical garden.

KEYWORDS: Botanic Garden, Conservation, Fern Collection, Invasive

LIVING COLLECTIONS IN THE ROYAL BOTANIC GARDENS CSIC. BRINGING TOGETHER THE KNOWLEDGE OF THE UNIQUENESS AND DIVERSITY OF THE IBERIAN FLORA

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For the last 10 years the Horticultural Unit at the Royal Botanic Garden, CSIC in collaboration with scientists of the ***Flora Iberica*** Project, has been working to create a series of living collections of wild origin in order to gather the greatest possible diversity of taxa in the Iberian Peninsula and Balearic Islands.

The living material has been gathered from the work of genera´s authors in the different volumes of ***Flora Iberica***, from collections carried out by RJB technicians, from private collections and donations from other botanical gardens.

These collections have three main points of interest: Firstly, they serve the main functions of the Botanical Garden in terms of the representation, conservation and exhibition of the diversity of the Iberian Peninsula and the Balearic Islands flora. Secondly, they can be used in the display and education of wild flora in the Iberian Peninsula, showing the public some of the most striking taxa, both for their appearance and for their rarity. In this way they will help to raise awareness about the flora of our territory. Thirdly, these collections are scientifically important because they provide a diverse source of living material for research.

The collections have been selected because they represent a unique part of the Iberian flora: the wild roses collection (***Rosa*** sp.), the collection of bulbous monocots (pp. Liliaceae, pp. Amaryllidaceae and pp. Iridaceae) and the living collection of taxa of Iberian endemic and subendemic genera (e.g., ***Dethawia***, ***Ortegia***, ***Pseudomisopates***).

The display of each group has been chosen with great care to ensure its proper conservation and maintenance; the collection of roses are in the lower terrace of the Botanical Garden next to the old variety of roses allowing comparison of different species, the monocotyledonous bulbous collection are grown in clay pots which makes their maintenance and display to the public during the different flowering periods much more versatile and the endemic genus collection, currently in work, is being planted in the order beds and in pots, with the aim of forming an educational walk for the visiting public.

The maintenance of these collections requires a highly skilled team of gardeners and specialists and the advice of the research group of the ***Flora Iberica*** project, thanks to who the collections are in the last stages of their formation.

The living collections from natural origin in the Iberian Peninsula in Botanical Gardens are an important resource from the point of view of conservation, education and research.

KEYWORDS: Living Collections, Diversity, Conservation, Exhibition, Education, Research

WILD *PYRUS* IN PORTUGAL: DISTRIBUTION AND DIVERSITY ASSESSMENT

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Three wild pear species (***Pyrus*** spp.) occur naturally in Portugal: ***Pyrus cordata*** Desv., ***Pyrus pyraster*** (L.) Burgsd. and ***Pyrus bourgaeana*** Decne***.*** The aim of this study was to: i) assess the distribution of the wild pears in Portugal; ii) analyze their genetic diversity using microsatellite markers (Simple Sequence Repeats or SSR).Three populations of ***P. cordata*** (North of Portugal- Minho region), single individuals trees of ***P. pyraster*** (North of Portugal-Minho region) and three populations of ***P. bourgaeana*** (one in South of Portugal – Algarve region, one in Santarém region and one in Lisbon region) were identified. Fruits and leaves were collected during the two years (2010-2011). For pear trees genotyping, six nuclear SSRs were used selected among those available in the literature and previously proven to be suitable for pears characterization [1]. A total of 105 trees were studied and 30 different alleles were scored (15 alleles for ***P. cordata***, 6 alleles for ***P. pyraster*** and 9 alleles for ***P. bourgaeana***). Unlike ***P. pyraster***, ***P. cordata and P. bourgaeana*** showed a marked tendency for vegetative multiplication since neighboring plants shared the same genotype in several ***P. cordata*** populations, and both Lisbon and Santarém ***P. bourgeana*** populations (with seven and nine adult plants sampled) turned to be clonal stands with differing genotypes while plants from the Algarve population (fifteen plants) showed six distinct SSR profiles. Differences for some of the Algarve trees referred to only one ***locus*** seeming therefore to result from a clonal mutation. Our study besides indicating that the set of microsatellite markers employed is useful for the identification and discrimination of wild pear genotypes simultaneously revealed a large clonal multiplication in ***P. bourgaeana*** and ***P. cordata*** populations, important to delineate future conservation strategies for wild pear in Portugal.

KEYWORDS: Genetic Resources, SSR Genotyping, ***In Situ*** Conservation

P005

THE COLLECTIONS OF THE MAIN BOTANICAL GARDEN NAMED AFTER N.V. TSITSIN OF THE RUSSIAN ACADEMY OF SCIENCES AS A BASIS FOR A WIDE RANGE OF RESEARCH WORK

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The collection fund of the Main Botanical Garden includes 18889 taxa, 11040 species, 7757 sorts, 92 hybrids. It is necessary to have wide representation of natural types that is important for preservation of a gene pool of plants. The Garden's collections serve primarily as a basis for a wide range of research work. Its purpose is to create a comprehensive theory of the 'introduction and acclimatization of plants that would facilitate the determination and selection of the most productive forms of useful plants and their genetic properties.

Maintenance of introduction populations is still the principal method of plant conservation *ex situ.* The MGB RAS has been the first botanical garden, where the method of artificial phytocenoses has been substantiated and carried out in practice. New ecological niches, appeared in such artificial many-layer communities, replaced species diversity of introduced plants. Development of plant propagation methods, including the biotechnological ones, has also caused a significant increase in the number of introduced plant species. Plant conservation *ex situ* is complemented as far as possible by studies *in situ.* Combination of both methods facilitates plant repatriation from introduction populations into natural ones.

KEYWORDS: Botanic Collections

P006

THE NEW APPROACH OF DNA MARKERS APPLICATION WITH SPECIES-SPECIFIC RECOMMENDATIONS FOR GENOMIC CONSERVATION OF CHOSEN HIGHLY THREATENED SPECIES OF POLISH FLORA

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The main prerequisite of successful ***ex situ*** plant conservation is understanding and recognizing plant diversity. It expands the knowledge about plants, their history, biology and interactions with other organisms. Information about plant genetic diversity is necessary for the development of appropriate strategies in conservation biology, as well as, in many other applied fields of science. Despite the significance of genetic variation in many disciplines, likewise molecular population genetics, conservation genetics and genomics, relatively little empirical data are available concerning the range of genetic diversity for dynamics of small populations. Small ***ex situ*** populations in botanical gardens offer special opportunities as a model populations for understanding the pattern of genetic structure and different factors that influence the level of genetic diversity in plant population. Attention should be focused on the genetic consequences of ***ex situ*** cultivation as an example of problems facing small natural populations such as: genetic drift, loss of genetic diversity or inbreeding depression.

The conservation genomics era has opened up possibilities for genomic analyses of threatened species that previously were limited to model organisms. The genotyping by sequencing (GBS) DArTSeq technology was applied to gather detailed information based on genome-wide data set about the genetic structure of ***ex situ*** (living plant collections) with relation to their source wild (***in situ***) populations of endemic for Polish flora polish scurvy-grass ***Cochlearia polonica*** (E. Fröhlich) which is described from only one existing secondary population on natural site. The data set of DArTSeq markers obtained with next-generation sequencing allowed to extend the knowledge on the genetic profile of both types (***in situ*** vs. ***ex situ***) of populations based on a very high density of generated markers, both dominant silicoDArT (10338) and codominant (4816) SNP. The complementary research on comparative characterization of the genetic structure of ***ex situ*** populations established with material from few source populations of critically endangered in Central Europe lady bell ***Adenophora liliifolia*** (L.) Besser were performered with anonymous molecular markers - ***Inter Simple Sequence Repeats*** (ISSR). The molecular studies on genetic diversity and differentation of 17 populations of this species in Poland are also carried on.

The knowledge on detailed characterization of ***in situ*** populations of above mentioned species provides practical conservation implications to improve ***ex situ*** conservation strategies of those species and will be useful to develop protocols of sampling, collecting and curate plant materials for conservation purposes. Moreover the protocols will include the information about mature seed germination ability of ***C. polonica*** and ***A. liliifolia*** obtained during the previous studies. According to these protocols the genetic diversity of

this species of high conservation status will be conserved and genotypes for reintroduction will be chosen for conservation effort in the framework of EU project "FlorIntegral – The integrated ***in situ*** and ***ex situ*** conservation of rare, threatened and high priority species of Polish flora"

KEYWORDS: Botanical Garden, Population Genetics, Genomic Conservation, Dartseq Genotyping, ISSR Genotyping, Ex Situ Conservation, Seed Bank

P007

THE ROLE OF MICROHABITAT CONDITIONS ON THE SURVIVAL OF REINTRODUCED *Woodsia ilvensis* SPOROPHYTES

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Woodsia ilvensis is a small rock fern with circumboreal distribution. Estonia is at the south-eastern margin of its Scandinavian disjunction and this species has always been rare here due to lack of areas with suitable habitats. According to herbarium materials suitable habitats for this species in Estonia are old stone fences made of granite stones and in some cases it was found growing in the cracks of big boulders. Last seen in 1970-s, it was assumed to be extinct from four historically known locations in Estonia. In 1998 *Woodsia ilvensis* restoration experiment was carried out and 12 out of 15 plants (80%) survived and producing spores. In 2009 spores were collected from the former transplants of *Woodsia ilvensis* and second part of the experiment was started. Transplants were grown from spores under laboratory conditions and in 2010 sporophytes where planted out on the top of old 1.2-1.5 m high stone wall in the groups of five plants. All the plants of *Woodsia ilvensis* were labelled and mapped. Population was monitored at least three times during growing season, plant parameters and environmental data were collected. As habitats are divided usually into smaller microhabitats, it is important to know specific preferences of the species. The aim of this study was to investigate the growth and survival

of reintroduced ***Woodsia ilvensis*** sporophytes at the same study site but in different microhabitat conditions. Seven years after planting 12 out of 55 transplants (21.8%) survived and only 8 (14.5%) are vital and producing spores. The results suggested that more sporophytes of ***Woodsia ilvensis*** survived in microhabitats with less open canopy where soil moisture was higher. Regeneration is an important aspect in fern restoration. No evidence of natural regeneration might indicate that even though sporophytes of ***Woodsia ilvensis*** are capable to grow at the selected study site, conditions for regeneration might be unfavourable, further research would be necessary.

KEYWORDS: ***Woodsia ilvensis***, Microhabitat, Reintroduction

P008

EX SITU PLANT CONSERVATION IN THE PLANTARUM BOTANICAL GARDEN (BRAZIL) OF NATIVE SPECIES EXTINCT IN THE WILD

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The Plantarum Botanical Garden (Jardim Botânico Plantarum - JBP) is a private non-profit organization located in the Southeastern part of Brazil (State of Sao Paulo) with 4.100 plant species (mostly Brazilians), of which 165 are in the Brazilian Red List of endangered species and 4 already extinct in nature. The JBP is very much engaged in achieving the objectives of the Global Strategy for Plant Conservation (GSPC).

In order to conserve the extinct species (brought into the garden many years ago), in spite of the small genetic variability available for all four species, the JBP started a research program on reproductive systems and conservation strategies to learn more about these species to take back into nature in a way that they could survive by themselves to eventually repopulate the areas where they use to live.

The main reason these species went to extinction was the destruction of their natural environment, but one of the characteristics of them, observed when they still existed live in nature was the difficulty of reproduction. Considering this, studies of reproduction and seedling development were our starting point.

The species studied were the following:

Sinningia hirsuta (Lindl.) G. Nicholson (*Gesneriaceae*)

Butia leptospatha (Burret) Noblick (*Arecaceae*)

Syagrus lilliputiana (Barb. Rodr.) Becc. (*Arecaceae*)

The reproduction studies (germination and seedling establishment) of *Sinningia hirsuta* were a success, allowing to understand its behavior under natural environmental conditions, necessary to reintroduce successfully the species into the wild, which is going to happen in the next two years.

The arecaceae species, due to the small amount of seeds produced and the very slow growth rate, the studies proved difficulty in stablishing germination and developmental patterns for all species, but the main successful finding was the development of seed dormancy breaking technics through physical stratification, necessary to obtain better seed germination. Due to the narrow relationship of these species with the environment, more ecological studies are necessary before a reintroduction program in the wild could be implemented. For a while, small amounts of seedlings of all four species are being distributed to selected palm collectors located in the respective regions of each species.

KEYWORDS: Plant Conservation, Extinct Species, Reproduction Studies, Seed Germination, *Arecaceae, Gesneriaceae*

P009

HORTICULTURE FOR SCIENCE AND CONSERVATION: NEEDS FOR HORTICULTURAL SKILLS AND RESOURCES IN PLANT SCIENCES, CONSERVATION AND OTHER BIOLOGICAL DISCIPLINES – WITH EXAMPLES FROM THE BOTANIC GARDEN, UNIVERSITY OF VIENNA

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With the raise of new methods (esp. molecular studies) in biology and conservation and as a side effect of legislative restrictions on access to living plant material from nature, the importance of well-maintained and-documented plant collections for research, education

and conservation has been continuously increasing in recent years. This adds to an also growing demand for "model" plants produced in higher quantities and in standardized conditions for short term projects. Both developments are observed at the Botanic Garden of the University Vienna and relate to the number, foci and dimensions of research projects. Fields of current activities include, i.a.:

Basic plant research: major projects focus on long term studies, e.g., systematics and evolution of Bromeliaceae (especially of Tillandsioideae), evolution of genomic variation within and between species (e.g. in the genus ***Populus)***;

Applied research in conservation: e.g. ***in vitro*** propagation and development of horticultural skills for the conservation of native plant species used in the regeneration of degraded landscapes and cryo-conservation (e.g. ***Artemisia laciniata)***.

Interactions with zoological research: e.g. evolution, ecology and conservation of the butterfly genus ***Maniola***.

Interdisciplinary studies beyond biological disciplines: e.g., mathematic modelling, e.g., measuring and modelling surface roughness across scales. biological control of docks (***Rumex*** sp.): development and implementation with dock-***Pyropteron***.

For all the activities described above, numerous unique and special horticultural resources, skills and experiences are prerequisites for success, such as:

Engagement, skills and knowledge of staff members with experience in the cultivation of taxa mostly uncommon in cultivation.

Facilities (like greenhouses, sites, soil, equipment) designed to cope with the special needs of thousands of plant species native to different climates and habitats.

Facilities and horticultural skills for ad hoc propagation of "unusual" plant species in larger amounts for short term projects or education.

Systems for exact and reliable documentation and labelling of accessions.

Garden infrastructure pooling and documenting individual experiences to make them available for following generations and for research.

Linkages of horticultural staff and institutional structures with professional and amateur stakeholders of plant collections to share expertise and enable access and exchange.

Knowledge on international and national legislation to safeguard and allow access to plants from foreign countries.

All these important characteristics for successful scientific work with plant collections are not found outside of the botanic gardens community. Unfortunately they are often not recognized as important, in spite of the fact that they are of high relevance, e.g., for the success of conservation measurements or for application and management of research projects.

At the Vienna University Botanical Garden potential informal and formal structures and

procedures to develop and secure high quality "horticulture for science, conservation and education" are supported. The management is actively promoting the importance of horticulture for science, even by taking the lead in research projects. This includes a flux of information between horticulture and science and might require additional activities (as, e.g., English, the language of science, is not always understood easily by all horticultural staff).

KEYWORDS: Plant Science, Research, Conservation, Horticulture, Skills, Botanic Garden.

P010

DEVELOPMENT OF EVALUATION SYSTEM FOR HERBACEOUS PLANT ADAPTATION – A TOOL FOR INVASION RISK ASSESSMENT

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In botanical gardens, the majority of plants in collections are species with a native origin and in greatest part they are alien taxa at the particular garden. Whether introduction of new taxa will be successful, depends on its adaptation abilities to the new site's conditions. The adaptation ability is of great importance not only while establishing the collections. It must be considered also when introducing new taxa for landscape use, planning weed control or assessing spread of escaped garden plants. Moreover, adaptation ability is closely related to evaluation of plant's invasiveness risk. On the background of climate change, more than ever biological diversity of native floras is endangered by invasiveness risk caused by development of horticulture, agriculture, and trade. Therefore a method for evaluation of adaptation is important tool for invasion risk assessment.

The aim of this study was to evaluate the adaptation potential of herbaceous perennials and to specify main qualities that influence these adaptations. Data analysis was based on phenological observations of 536 taxa from collection of the Botanical Garden of the University of Latvia overlapping time period from 1991 to 2016. Following parameters were analyzed: (1) the general condition of plants in the beds, (2) overwintering capability, (3) resistance against diseases and pests, (4) type of vegetative expansion, (5) vegetative and generative mobility, and (6) self-sowing. These data were associated with information about species origin, life-form and duration of the cultivation in present location. The

main objective was to initiate assessment of connection between life-form, taxa origin and accession longevity in the present location of the Garden.

Plants were grouped in four acclimatization degrees: low, medium, good and high (potential invasive). Results showed that most of the taxa were good (46%) or medium (41%) acclimatized, whereas only minor part of species were high (9%) or low (4%). All of the species that had good acclimatization potential represented also high generative and/or vegetative self-reproduction. They already tend to invade artificial and seminatural plant communities – at least 11 species of herbal perennial ornamentals have been recognized as garden escapers in Latvia, for example, ***Geranium phaeum, Echinops sphaerocephalus, Rudbeckia laciniata***. Results showed that some taxa from the collection of the Botanical Garden have high invasiveness potential. Simultaneously with the development of the adaptiveness evaluation method, the gained results will improve the strategy for further development of perennial herbaceous plant collection in the Botanical Garden.

KEYWORDS: Introduction, Invasion Risk, Adaptation

P011

MIXED MATING STRATEGY GUARANTEES REPRODUCTION UNDER LIMITED POLLINATION RESOURCES IN THE ENDEMIC *Verbascum litigiosum* SAMP.

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Verbascum litigiosum Samp. (Scrophulariaceae) is an endemic plant from Portugal where it extends in centre and southwest coasts, from the Serra da Boa Viagem, Figueira da Foz to Algarve, over an area of occupancy estimated in 1,800 km². Currently, its main threats are the expansion of urban and touristic areas, agricultural activities, and the extraction of inert materials, activities that lead to continuous habitat degradation and to a severe

fragmentation of its populations. ***Verbascum litigiosum*** has been classified by IUCN as Vulnerable B2 and is legally protected in Portugal, being listed on Annex II of the Habitats Directive. However, no information is available about the biology of this species. Considering that IUCN recommended to increment the knowledge of the biology of this species, as an important conservation measure, the objective of this work was to study the reproductive biology of ***V. litigiosum***. For that, we studied the floral development and the reproductive system of this species and examined pollen germination under controlled pollinations. The conditions necessary for the germination of the seeds were also evaluated. The results revealed a mixed mating strategy, i.e., the flowers have a short lifespan remaining open for 2-3 days, only; before anthesis the anthers open over the stigma, spontaneously depositing numerous pollen grains in the stigmatic papillae; because the plant is self-compatible, the pollen deposited before the flower opening fertilizes part of the ovules, guaranteeing some levels of fertilization, while afterwards it enables pollinator's visits and outcrossing. This mixed mating strategy partially secures pollination in the absence of mating partners and/or pollinators, with pollinator visits incrementing reproductive fitness. The seeds successfully germinated in all the laboratory conditions, suggesting that seed germination is not a limiting factor for population dynamics. These results revealed that ***V. litigiosum*** presents a reproductive strategy that guaranties pollination, which might be important to sustain its populations under limited pollination resources.

KEYWORDS: Hand Pollinations, Mixed Mating, Plant Conservation, Pollen Germination, Pollination, Pollinators, Reproductive Strategies, Seed Germination

P012

A WALK THROUGH THE DIVERSITY AND ORIGIN OF WILD AND GARDEN ROSES

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During the past decades Botanic Garden Meise has been building an elaborate collection of wild roses comprising 125 of the approximately 150-200 known taxa. In addition,

the gardens collections hold also 115 horticultural accessions. To disclose this rich and attractive collection the garden opted for an innovative concept that makes the collection worth visiting the whole year round. This is a challenge as the flowering peak of most wild and old cultivated roses is only very short in early summer. In addition, tender plants need to be integrated as orangery plants.

The heart of the 9000 m^2 large rose garden is landscaped as two spirals entangeling one another. Each spiral represents a major group of wild roses as found in molecular phylogenetic research. One spiral represents a clade with Asian and European roses, while the second spiral includes Asian and American species. At the center of these spirals, the oldest extant group of roses is found, the desert roses. Each plant bed will house plants from different clades, as found in recent molecular phylogenetic studies of roses. Biogeographic and molecular clock data are available, making it possible to take visitors along the intriguing story of the origin and the natural history of roses.

Around the spirally arranged plant beds with wild species roses, the story of old and modern garden roses will be told. This story starts with the historic Chinese and European roses and unfolds towards the origin and evolution of modern rose hybrids with a focus on resistant selections and winners from local breeders.

This approach allows for integration of a pleasant walk through the garden with the possibility to organise educational programs on different themes as plant evolution, classification, hybridisation and the role of modern molecular studies in resolving relationships in a both natural and cultivated plant group.

KEYWORDS: Rose Garden, Botanic Garden Meise, Systematics, Wild Roses

P013

PLANT LISTS FOR AJUDA BOTANICAL GARDEN FROM THE 18TH AND 19TH CENTURIES: PRELIMINARY RESULTS OF A BIOGEOGRAPHICAL ANALYSIS

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Ajuda Botanical Garden was the first botanical garden in Portugal, the 15th in Europe. It was commissioned to the young Italian botanist Domenico Vandelli (1735-1816) in 1768. He was assisted in establishing the plans for the gardens and greenhouses by Julio Mattiazzi, until then master gardener at Padua Botanical Garden, Europe's oldest botanical garden.

In 1771, Vandelli wrote a list of the plants he had, by then, collected for the future garden, including a short description, in Latin, of each ***taxa***. This manuscript is housed at the Portuguese National Library and lists almost 1400 plant species, native plants not included, as well as several Brazilian plants yet to be identified. Vandelli was Professor of Botany in the University of Coimbra from 1772 to 1791, visiting Ajuda Botanical Garden sparsely. According to Vandelli, the plant collection, which had had over five thousand species, was disregarded during these years. He was the garden's first director on his return, from 1791 to 1810, but he was also responsible for the Natural History Museum and other scientific establishments, as well as one of the mentors of the Sciences Academy of Lisbon.

Felix Avellar Brotero (1744-1828), the most distinguished Portuguese botanist of his time who was also Professor of Botany in the University of Coimbra, succeeded Vandelli as director of the garden, from 1811 to his death, in 1828. He kept a register of the plants cultivated in the garden, of which several manuscript copies are known. It was published posthumously in parts in the Journal of the Portuguese Pharmaceutical Society (1836-1837) and as an added chapter to the second and updated edition of his "Compendium of Botany" (1837-1839). This list comprises around 1360 taxa.

Preliminary results of a comparative study of these two lists are presented. They include more than 2200 taxa, whose names were updated according to current nomenclatural procedures, which were analysed considering their biogeographical origin and biological types. These results can be used to enrich the present plant collection of the garden, which still includes some of the original plants.

KEYWORDS: Vandelli, Brotero, Historical Plant Lists

INCREASING INTERNATIONAL INSTITUTIONAL STANDARDS, GOALS, AND CAPACITY FOR ARBORETA THROUGH ARBNET, THE WORLD'S ONLY ARBORETUM ACCREDITATION PROGRAM

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ArbNet is an interactive, collaborative, global community of arboreta that supports the common purposes and interests of tree-focused public gardens. Sponsored and coordinated by The Morton Arboretum (Lisle, USA), ArbNet was launched in 2011 to facilitate the sharing of knowledge, experience, and other resources to help arboreta meet their institutional goals and to raise professional standards. Through ArbNet, arboreta around the world can work collaboratively as part of a broad network to help advance the planting and conservation of trees. ArbNet provides a variety of resources and services to support arboreta, many of which are directly applicable to the science and practice of plant conservation, including: 1) the ArbNet Arboretum Accreditation Program to recognize standards of excellence in tree-focused gardens, including "non-traditional" arboreta such as municipal tree collections and school or university arboreta; 2) a centralized database of open-access resources to improve arboretum management, operations, collections curation, research, conservation, and educational programming; 3) the Morton Register of Arboreta – a global database of over 1200 arboreta and other public or private gardens that have a substantial focus on woody plants; 4) a curated collection of current arboretum-focused news and events from around the world; 5) an online discussion forum and active social media presence, connecting tree-focused professionals; and 6) annual funding opportunities that support capacity building and collaboration efforts for accredited arboreta.

ArbNet provides the mechanism to identify and connect with other arboreta to collaborate on scientific, collections, and conservation activities. In 2017, ArbNet and BGCI launched their joint garden Partnership Programme, an international partnership building initiative that aims to facilitate the exchange of knowledge, skills and resources within the botanic garden and arboretum community. Through the program, arboreta are paired together based on mutual interests to work towards a common goal or project. An annual funding opportunity is offered to strengthen the partnership and achieve the collaborative initiative.

While acknowledging that arboreta have a variety of missions and goals (e.g. display, public education, horticulture training, providing green space to the community, etc.), and that arboreta of different sizes will have varying capacities, it should be emphasized that even small gardens can take big steps to improve the conservation quality and practices related

to their programming and collections. With the numerous resources available through ArbNet, arboreta at all levels of expertise and capacity are enabled to advance educational programming, garden operations, collections curation, research, and conservation. Through these efforts, ArbNet encourages the planting and conservation of trees and other plants for a greener, healthier, and more beautiful world.

KEYWORDS: Accreditation, Collaboration, Resources, Network, Global

P015

BIODIVERSE CART: A MOBILE EXHIBIT AROUND FOOD SECURITY PUBLIC ENGAGEMENT

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Biodiverse Cart is a mobile exhibit developed by Bergamo Botanical Garden to engage a wide range of public in fairs, festivals and meetings out of the garden. Its special shape with drawers, shelves, boxes and other interactive equipment make the mobile exhibit very flexible.

The project was selected among the works created by the students attending the Museology course of the Design degree of University Politecnico of Milan after a lecture of the Director of the Botanical Garden of Bergamo on 'Museum out of the Museum'. Its first application has been for the European Union Big Picnic project.

The purpose of the mobile exhibit is to collect data and to make Food security concept popular, involving people that otherwise would remain unaware of its true meaning. In fact, Food security is commonly thought in relation with hygienic and healthy aspects of food, but hardly ever in relation with environmental conditions, ecological footprints, sustainability, social inequality, natural resources overexploitation which are also as important.

Three versions of the exhibit have been already exposed for different events:

"Fa' la cosa giusta" (Do the Right Thing) a fair in Milan entirely devoted to sustainability items, food, energy, travels, garments, education, fair trade, mobility, life style and so on. In

this occasion our Biodiverse Cart was set up involving teenagers, especially showing safe, sustainable and biodiverse snacks to be eaten during school breaks, but also collecting data about their food habits.

"La fiera dei Librai" (Booksellers Fair) in Bergamo, a temporary market in the centre of town, full of events for adults and children. Our Biodiverse Cart, situated right in the central point of the fair, was focused on Food security meaning and definition, with panels making the public think about diet impact contents. The visitors were free to get involved, sometimes they were engaged by volunteers. It was possible for the public to vote the sustainable diet they would preferred.

"Festival dell'Ambiente" (Environment Festival") in Bergamo showing a lot of stands in the main pedestrian- street of town focused on alternative energy, sustainable life style, volunteer associations, organic food, workshops for schools and so on. Our Biodiverse Cart was focused on food ecological footprints and on food security definition.

The results of these experiences and the new perspectives for new projects will be analysed.

KEYWORDS: Bergamo Botanical Garden, Big Picnic Project, Sustainable Diet

P016

TEENAGE TARGET: EDUCATION ON FOOD CHOICES AND ENVIRONMENTAL AWARENESS

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Food policies have a direct impact on life styles and on ecosystem, but the public awareness about food is focused almost exclusively on their own health. In other words, the general attention is on internal environment, and hugely less it is for the external environment, even though the food chain, agriculture, is one of the major threat to the World biodiversity.

Actually, the food impact is both on ecosystems close to the consumers and on ecosystems far away in the planet. How can we make people more aware about these themes?

The Bergamo Botanical Garden is developing co-creation activities with high school students, one of its target audience for the Big Picnic European project, analysing the eating habits of small groups of students involved in an internship project with the Botanical Garden.

Starting from their personal experiences, such as the menu of the previous dinner, or the snack eaten during the morning break at school, it was possible consider the environmental footprints of single ingredients, almost neglected. It was also possible to analyse the freedom of the students in choosing their diet.

The analyses were based on the observation of the food pyramid, the environmental pyramid, the footprints impact of every single ingredients, the nutritional values of the ingredients written on the labels of packaged food and using the footprint calculators about life styles. It has also been calculated the number of edible plants eaten by every student, choosing from a list of 300 species in order to make them aware about biodiversity.

As far as their relation to Nature, simple questions were submitted to the students involved such as: would you change your life style in order to save a tropical forest? Very interesting answers came out!

Our observations reveal a general unawareness regarding the wild biodiversity values but also distrust in the role of personal choices to influence the global problems.

Regarding food habits, healthy and sustainable food are often considered in the same way. It would be interesting to foster the trend toward a healthy life style in order to promote a healthy planet also in young generations. Here we present the results and the strategies to pursue environmental awareness.

KEYWORDS: Bergamo Botanical Garden, Big Picnic European Project, Environmental Awareness

P017

BIG PICNIC IN THE SYSTEMATIC GARDEN

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The systematic garden is one of the greatest examples on how to showcase both plant diversity and showcase the evolutionary history of different lineages what lead to the spectacle we see today. The Leiden Botanical Gardens used the recent publication of APG4 as an opportunity to not only update the systematic gardens' story, but also put edible plants and pollinators at the center. During the summer of 2017, the garden was updated to

put relevant issues in the spotlight and to reflect the latest phylogenetic results. Interactive rotating signs make active explorers out of any otherwise passing visitor, while students are exploring even more options to help visitors to look even better to the wondrous world of plants. The new interactive signs present information in a playfull manner for both the interested child and the greater public that wants a little bit more. Aside from the update on plant systematics, the garden beds offer information on other important and ongoing themes, which include the importance of pollination and the production of food crops. For the Horizon 2020 project "Big Picnic" ongoing studies are being done on how to best communicate these issues to the general public and get them involved. Through various co-creation sessions, play and (mild) competition was found to be an accessible way to make young and old learn and interact about plants and food. Organized at the Leiden Botanical Gardens for the Horizon 2020 "Big Picnic" project, various play-related products where developed and tested through team based inquiry and RRI and held against current scientific literature on education and gamification. The systematic garden plays a key role with informing the public and a separate part will be used for a yearly changing exhibit. In 2018 these two separate beds have been with vegetables while another focuses on the pollination of food crops.

KEYWORDS: Systematics, Interactions, Conservation, World Flora, Botany

P018

PLANT AND EATER

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For the Horizon 2020 project "Big Picnic", the Hortus botanicus Leiden is completely in the theme of food security in 2018. This can be seen in the many exhibits and workshops organized this year of which "Plant and Eater" will be on display this summer. Eleven botanical gardens, a museum and an author co-created a diverse exhibition that will be on display at twelve different places in the Netherlands. The exhibit will be accompanied by a scientifically sound publication on plants and eating. This unique project has its roots in the Horizon 2020-project "Big Picnic", and has led to a diverse programming from Buitenpost to Oudenbosch. With the recent global decline in pollinators combined with a growing global

population size, food security will be one of the most important subjects in the coming years.

Each location will have their own accents and focus, which will all work around the themes of edible plants, sustainability and pollinators this year. The subjects displayed in each garden are quite diverse and include; local forgotten vegetables, tropical food forest, genetic diversity, environmental footprint, from history to nutrition and personal health. During this exhibit, the public can discover the stories around well and lesser known food crops, and everything involved in their production. By expanding the knowledge on the provenance and background of plants, we hope that it will affect the choices people make. This will be beneficial for the common health and food security in the world. The subject of "edible plants" has now also been adopted by the Dutch society of botanical gardens. The societies' website now offers information on edible crops in all 25-member gardens. The participating organizations will also present the exhibit on national events to draw attention to food security.

KEYWORDS: First-Hand Experience, Appreciate 'Nature' As A Whole, Edible Plants, Sustainability, Pollinators

P019

SCIENCE CAFÉS AND FOOD SECURITY

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Botanic gardens are uniquely placed to address both social and scientific issues surrounding food security. Throughout history, botanic gardens have continuously responded to pressing societal and environmental changes and needs. Their collections of living plants provide an essential resource for scientific research, conservation and public engagement. Thus, the BIGPICNIC project (Horizon 2020) joins 19 partner organisations, spanning 13 countries

across Europe, and one in Africa to develop activities and rise food security related topic to the current debate in society.

One of the main focus in the project are SCIENCE CAFES, and we bring here successful experiences developed by Real Jardín Botánico Juan Carlos I, UAH and Real Jardín Botánico, CSIC (both in Madrid Region) which are the Spanish partners working in this project.

Two issues are really relevant to the Project and thus to SCIENCE CAFÉS: co-creation and responsible research and innovation. **Co-creation** is an innovative and participatory process, which aims to create shared ownership of a project between institutions and community partners. Co-creation enables professionals to co-operate with and learn from others, to build a connection between groups that would not normally meet, to raise awareness and sensitivity towards important issues and to build relationships between groups and individuals that will last well beyond the scope of a project. **Responsible Research and Innovation (RRI)** describes a new approach to research and innovation that aims to align the outcomes of scientific and technological advances with the values and needs of society by involving diverse groups of people, including citizens, researchers, policy-makers and businesses, throughout the entire process. Through both, voices of people from different countries, backgrounds and interest will be heard and have into account.

KEYWORDS: Real Jardín Botánico, BIGPICNIC Project, Co-creation, Responsible Research and Innovation

P020

GENETIC DIVERSITY ASSESSMENT OF SELECTED *JATROPHA CURCAS* ACCESSIONS – IMPLICATIONS FOR CONSERVATION MANAGEMENT

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Jatropha curcas L.(*Euphorbiaceae*) is a small tree native to Central America, but its exact

natural distribution is still uncertain. It is cultivated in tropical and subtropical regions worldwide, mainly for bioenergy production and is characterized by especially high drought and heat tolerance, allowing the production of high-quality oil and seed proteins under cultivation in degraded soils. Thus, Jatropha is a socio-economically important crop plant, especially towards a sustainable agricultural production in developing tropical and subtropical countries.

Previous genetic analyses indicated that genetic diversity is highest in germplasm originated from Central America and Mexico. In almost all cases, with the exception of some accessions from Guatemala and Mexico, the estimated heterozygosity level in Jatropha germplasm was generally low. At this study we aim to assess genetic diversity in 273 Jatropha accessions originated from 15 countries and three continents. Wild accessions from seven Mexican state populations, as well as from Guatemala, were also included. A total of 18 genetic markers (10 SNP, 5 SSR and 3 EST-SSR), selected on different chromosomes to maximize genome coverage, were analyzed.

The results of cluster analysis performed by population, as well as by single accession revealed the presence of two main genetic groups. All landraces collected in Africa, Asia and South America formed a distinct clade with a high degree of homozygosity, indicating an especially high homogeneity of the worldwide cultivated accessions. All populations collected in Mexico and Guatemala formed a second clade characterized by high genetic polymorphism and degree of heterozygosity. Native Jatropha populations originated from Guatemala and Jalisco region of Mexico presented the highest genetic variability and degree of heterozygosity in this study.

The especially high genetic uniformity and homozygosity of all cultivated accessions of ***J. curcas*** worldwide, together with the high genetic variability and heterozygosity observed in native populations of Mexico and Guatemala, indicate the great and still unexploited breeding potential of that species. Our results have also important implications on the conservation of ***J. curcas*** germplasm, as certain native populations reach especially high genetic variability, setting definite conservation priorities for this socio-economically important plant.

KEYWORDS: Biofuel, Energy Crops, Genetic Variability, Heterozygosity, Physic Nut

CRYPTIC CYTOGENETIC DIVERSITY: WHERE DOES IT STAND IN PLANT CONSERVATION STRATEGIES?

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Polyploidization, i.e. duplication of complete chromosome sets, is widely considered an important mechanism of plant evolution and sympatric speciation. Recent molecular and fossil studies show that polyploidy is a pervasive phenomenon in nature being not only linked with radiations in species diversity throughout evolutionary history, but also present in current days. Indeed, the standing incidence of polyploid species is estimated at 35%, with higher values being observed in specific geographic regions such as the Mediterranean basin (up to 47%).

Because of the differences in chromosome number, polyploidy immediately gives rise to new entities within the parental populations. These entities are expected to be reproductively isolated from the parentals and, in the course of the time, may establish, spread and diverge originating new taxa. Consequently, polyploidy is often related with complex taxonomy of specific plant groups, creating uncertainty about what to conserve. This is a particularly important issue for floras from locations with environmental fluctuations such as the Mediterranean regions where hybridization and polyploidy are involved in the origin of new entities, frequently giving rise to endemic species of conservation concern. Still, identifying taxonomic units suitable for conservations is particularly difficult in polyploid complexes without extensive cytogeographic surveys.

Within the scope of the project "Red List of the Vascular Flora from Continental Portugal" we have compiled information for specific taxa and provide detailed cytogenetic information for targeted taxa. The information compiled shows the existence of cryptic cytogenetic diversity in several plant taxa of conservation interest that should be taken into account when defining units of conservation and targeted conservation actions. The existence of this largely neglected cryptic diversity within polyploid complexes is presented and discussed within a conservation framework.

KEYWORDS: Chromosome Numbers, Cytotypes, Plant Conservation, Polyploid Complexes, Mixed-Ploidy Populations.

BOTANICAL RESEARCH OF PRAGUE BOTANICAL GARDEN IN SOUTHERN VIETNAM

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Mountains of southern Vietnam shelter high botanical diversity and are still not fully explored. Hon Ba mountain ridge is reaching height 1567 m a.s.l. and Bidoup is the second highest peak of southern Vietnam with height 2267 m a.s.l. and flora of both areas has been poorly studied. Our aim was to contribute to knowledge of local vegetation and to characterize distribution of selected plants in these areas. Four expeditions to the areas of Hon Ba and Bidoup were undertaken. Based on the Memorandum on Cooperation, concluded between Botanical Garden of Prague and Institute of Tropical Biology, Hochiminh City, aiming at the study of biodiversity of Hon Ba Nature Reserve, Khanh Hoa Province in Vietnam, first part of joint field works has been implemented in June – July 2011, followed by second field trip carried out in February – March 2012 and the last trip has been implemented in January 2013. Bidoup-Nui Ba National Park was explored in March 2017. Majority of data were collected in the field, but selected plants (mostly gingers, ferns, orchids and gesneriads) were brought to Prague Botanical Garden with all necessary permits and are part of its tropical collections. Results are provided to respective Vietnamese authorities to allow more efficient protection of local flora.

The joint team in Hon Ba confirmed in situ 1200 taxa, among this number are many species, listed by the Red Data Book of Vietnam and IUCN Red List. Some records seem to be first confirmation of their occurrence in Vietnam. Interesting feature of the area is a mixture of northern floral elements such as ***Acer, Carpinus, Quercus, Salix, Anemone, Viola*** and tropical elements such as palms like ***Pinanga***, ***Plectocomia,*** but also families as ***Ancistrocladaceae, Balanophoraceae, Gleicheniceae, Lecythidaceae*** and ***Zingiberaceae***. Conifers are important vegetation component in both mountains with rare species such as ***Pinus krempfii***, ***Fokienia hodginsii*** and ***Nageia wallichiana***. However the main focus was on herbs in forest floor and epiphytes. Some new species were recognized and subsequently scientifically described – ***Arisaema claviforme***, ***Cleisostoma yersinii***, ***Vanilla atropogon*** and ***Zingiber discolor.*** From Bidoup-Nui Ba National Park two new species of genus ***Amomum*** and one ***Aspidistra*** are in process of being described. Numerous plants deserve further study and consultation with specialists within Vietnam or abroad to provide an accurate determination. However, it is certain, that the number of vascular plants of Hon Ba Nature Reserve is at least the multiple of the previously existing official list.

Keywords: Field Research, Botanical Inventory, Vietnam, Plant Diversity, Zingiberaceae, Orchidaceae

NEW EFFORTS FOR INTEGRATED EX SITU AND IN SITU CONSERVATION OF POLISH RARE AND THREATENED PLANTS BY MEANS OF SEED AND DNA BANKING AND NATURAL POPULATIONS RESTITUTION – FLORINTEGRAL PROJECT

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One of the main aims of the Polish Academy of Sciences Botanical Garden in Warsaw activity is to monitor and conserve in ***ex situ*** conditions the diversity of Polish native plants with the special emphasis on endangered ones throughout the implementation of national nature and biodiversity conservation programs and international strategies. In 1992 the first in Poland cryogenic seed bank devoted to native plants was established for the long-term plant diversity conservation. In the years 2004-2009 PAS Botanical Garden in Warsaw participated in EU FP6 project ENSCONET as a leader of Activity Group "Seed Curation", what gave a good experience in efficient seed collecting and seed curation. In the years 2009-2013 our botanical garden participated, together with the Forest Gene Bank Kostrzyca, in EU "Environment and Infrastructure" project FLORNATUR dedicated to ***ex situ*** conservation of 129 rare and threatened plants in Poland. As a continuation of these projects new FLORNATUR-ROBIA project was conducted by the Council of Botanical Gardens and Arboretums in Poland to establish a network of Polish seed bank in 5 botanical gardens (PAS in Warsaw, in Mikołów, in Poznań, in Lublin and in FGB in Kostrzyca). As a result of collaboration with the Polish national parks and participation inseveral European and national projects, conducted during last 25 years by Polish Academy of Sciences Botanical Garden, 225 endangered, rare (mainly endemics) and protected by law species of Polish flora, collected from 756 natural localities, are at present preserved as cryogenic seed bank accessions. Among them 117 (24%) are listed in different threat categories on the Red List of Threatened Vascular Plants in Poland (third edition, 2015), 110 (38%) are described in the Polish Red Data Book of Plants (2004). 122 (40%) of them represent the species protected by the national law in Poland. 26 species have the international conservation value as protected by the EU Habitat Directive. At present (2017) it could be concluded

that 40% of protected and endangered species of Polish native flora are preserved in this cryogenic seed bank.

Our future plans are focused on integrating the ***ex situ*** with ***in situ*** conservation activities in the framework of new EU "Environment and Infrastructure" project FLORINTEGRAL (approved by the Polish Ministry of Environment in October 2017), which will be carried on in the years 2018-2020. The project is based on two main goals: 1. the comprehensive ***ex situ*** conservation of 31 rare, endangered and high priority conservation species of Polish native flora by means of seed and DNA banking with specific genetic recommendations for these species, 2.the reintroduction of 8 chosen plant species, extinct or endangered on their primary localities in 2 national parks (Kampinos NP and Ojców NP), as well as, in Natura 2000 sites, together with the habitat restoration or natural populations restitution for threatened species: ***Adenophora liliifolia*** (L.) Besser (CR), ***Apium repens*** (Jacq.) Lag.(CR)***, Dianthus gratianopolitanus*** Vill. (EN)***, Carex praecox*** Schreb. (V) and protected by national law: ***Veratrum nigrum*** L., ***Stipa joannis*** Celak. S. Str.***, Anemone sylvestris*** L. and ***Camplanula sibirica*** L.

KEY WORDS: Botanical Gardens, Bio-Banking, EU Project, Native Flora, Plant Diversity, Poland, Seed Storage

P024

CREATION OF SEMI NATURAL HABITAT FOR COASTAL PLANTS IN THE KU BOTANIC GARDEN: EXPERIENCE AND PROBLEMS

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The micro-environmental conditions of different soil habitats are influenced by prevailing vegetation, soil texture, soil color and other variables with incoming and outgoing solar energy. The biodiversity is poor in sand dunes due to shifting substrate buried by sand, the porous nature of sand and the little or no organic matter that lead to bare areas among plants, especially during the early stages of dune development. In coastal dune systems,

the plant communities are mainly subjected to interactions due to disturbance of the substrate which is influenced by high wind velocities, salt spray episodes, sand accretion levels and other factors of the environmental complex. There is a close correlation between sand movement and species composition, coverage and density [1;2;3;4;5]. In Lithuania, the dunes are formed mostly on the Baltic Sea costal area. The most beautiful and valuable dunes are in the Curonian Spit, which is a narrow strip of sand, stretching 97 kilometres along the Baltic Sea in western Lithuania. Fifty kilometres of Curonian Spit belongs to the Republic of Lithuania and the remaining belongs to the Russian Federation. The dunes are an exclusive element of the Curonian Spit landscape. In this area are important European habitats: the Embryonic shifting dunes (Habitat code – 2110) and the White dunes (Habitat code- 2120) with specific plants, such as: ***Ammophila arenaria, Leymus arenarius, Festuca arenaria, Lathyrus maritimus, Hieracium umbellatum***. In those habitats, grow rare plants that are included in the Lithuanian Red Book, such as ***Linaria loeselii***. In formed grey dunes also grow characteristic plants, such as: ***Carex arenaria***, ***Cerastium arvense***, ***Cladonia*** spp., ***Corynephorus canescens, Helichrysum arenarium, Hieracium umbellatum, Jasione montana, Pilosella officinarum, Polytrichum piliferum, Racomitrium canescens, Rumex acetosella, Sedum acre, Thymus serphyllum, Trifolium arvense, Viola littoralis*** [4]. In 2015, semi- natural dune ecosystem was established in Klaipėda University Botanic garden, not only for conservation of costal local plants but also for education purposes. A landscape was formed, with sand soil and plants of 48 species. Only 11 species were the most successfully adapted, the majority of them are common to both white and grey dunes. The enduring species were: ***Ammophila arenaria***; ***Festuca arenaria, Leymus arenarius, Trifolium arvens, Hieracium umbellatum, Tragopogon pratensis, Salix daphnoides, Honkenya peploides***. The seeds of all plants were taken from nature. The permission for collecting rare species has been received from Lithuanian Environment Agency. For the moment, the two dune zones, emrbyo dunes and white dunes are present. In 2017, a part of seeds of ***Eryngium maritimum*** and ***Linaria loeselii*** has been prepared for growing ***in situ*** and the remaining seeds were sowed in semi natural dune.

KEYWORDS: Botanic Garden, Dune, Semi-Natural Habitat, Plant Species

THE ANDALUSIAN PLANT GERMPLASM BANK: AN OPENBANK

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The Andalusian Plant Germplasm Bank (BGVA), located in the Royal Córdoba Botanic Garden (Spain), began its activity in 1981. Its management model was renewed in 2001, acquiring a greater commitment to the conservation and management of flora and plant genetic resources. This change was a consequence of its recognition by the Andalusian Ministry of the Environment as the ***ex situ*** conservation tool for the flora of Andalusia, through a new agreement with the University and the Town Council of Córdoba. This model means of greater social, regional and even international commitment to ensuring the preservation of Andalusian plant heritage and promotes various cooperation mechanisms in the field of dissemination, education, innovation, research and conservation.

After 17 years of application of this model of integrated management, progressively modified, the BGVA (Andalusian Plant Germplasm Bank) conserves between its own collections, deposits and donations, about 11,300 accessions of seeds, corresponding to 3,270 taxa of Andalusian flora, Iberian endemisms, wild populations of neglected crops and other species of forest, ethnobotanical or economic interest.The collection of wild flora includes 84% of the taxa included in the Andalusian catalog of threatened species. Nevertheless, the BGVA works basically with the criterion of conserving populations, not species.

Some consequences of the application of this management model are:

Various activities of ***ex situ*** and ***in situ*** conservation in species such as ***Rosmarinus tomentosus, Buxus balearica, Erodium cazorlanum, Betula*** sp.***, Artemisia granatense, Diplotaxis siettiana, Sarcocapnos*** sp.***, Antirrhinum charidemi, Rhamnus cathartica, Rhamnus alpina*** and ***Punica granatum*** (ancient varieties and wild populations). Many of them are based on works that include molecular biology techniques, GIS applications, prediction models and studies of possible refuges in different climate change scenarios

Having promoted or participated in cooperation networks with other PGBs at a national or international level in Europe (ENSCONET) and Latin America (Cuba, Argentina, Mexico, Chile, Ecuador). At the national level, besides promoting the creation of REDBAG, a prominent role has been played in the Spanish Strategy for Phytogenetic Resources of Forestry Interest. Phyto-resources from other institutions are also kept in deposit (e.g.in cooperation with the Andalusian Seed Network)

Participation in various dissemination and teaching activities (Science Week, Night of the Researchers, GeoBio digital magazine), Visitors Center, scheduled visits to special centers (annual average of 400 visitors between researchers and students), collaboration in courses of Degree and Masters of the University, innovation programs with simultaneous contents of ethnobotany, biology of conservation, kitchen and food, etc.

As an indicator of the quality of accessions conserved in the BGVA, germination tests are carried out continuously (since 2001, more than 2,300, of about 862 taxa). The accessions are documented by means of a database of their corresponding passports and with the high-resolution scan of their types (1320). This big data constitutes a documentary background of online consultation.

KEYWORDS: Andalusian Seed Bank, Management Model, Molecular Biology Techniques, GIS Applications, Dissemination, Education, Innovation, Research And Conservation

P026

"HIPPOCRATES BOTANICAL GARDEN IN MARKOPOULO OF APIVITA & APIGEA" AND THE "VOVOUSA PROJECT"

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Hippocrates 2500 years, Hippocrates Botanical Garden in Markopoulo of APIVITA & APIGEA, GR-19003, Industrial Park, Markopoulo-Mesogaia, Greece
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Hippocrates Botanical Garden in Markopoulo of APIVITA & APIGEA (member of BGCI) was created in 2013 in the surrounding area and on the rooftops of the bioclimatic building

of APIVITA S.A. in Markopoulo near Athens, where the headquarters of APIGEA S.A. also occur. It belongs to the "Hippocrates Botanical Gardens" ("HBGs") Network of the NPO "Hippocrates 2500 years" which is committed to researching, studying, promoting and disseminating Hippocrates' work and whose vision is the foundation of HBGs- consisting of the herbs that Hippocrates has been cited in writings to use in the treatment of his patients- as well as the conservation and promotion of local flora. The main sponsors of the organization are the Greek Companies of natural products APIVITA and APIGEA. On the other hand, Vovousa is in N Pindos sierra, is crossed by Aoos river which originates in the northern slopes of Pindos and belongs to the villages of E Zagori region. During the 17th, 18th and 19th centuries, Zagori became the most famous center of folk medicine in the Balkan Peninsula. After 1960s a significant reduction in the use of medicinal plants was observed. Few years ago, the Aoos river diversion was announced by the government. The construction site of the diversion works had to be located close to Vovousa and within the largest Greek protected land area (Natural Park of N Pindos), whose ecological and aesthetic value is very high. Every summer since 2013 locals organize the Vovousa Festival to prevent the diversion, to promote and protect mountainous ecosystems and advocate sustainable development. Since 2014 HBG of Markopoulo, APIVITA & APIGEA participates in the Festival and carries out its Vovousa project. The actions of the project are: 1. Floristic study of the area and recording of medicinal species. 2. Field walks and workshops. They take place each year on the slopes around Vovousa in order to raise awareness about the plant diversity of the area and to inform about rarity, historicity, properties of species etc. During walks wooden labels with Latin and Greek common names of species are installed in front of specific perennial plants. 3. Education and training of locals about the law referring to the collection and cultivation of wild herbs as well as their exploitation and creation of basic natural products. 4. Establishment of a Garden with Hippocrates Botanical Collection. 5. "Eco-literacy" programs at schools of Pindos mountain region in cooperation with Greek NGOs Agoni Grammi Gonimi and New Wrinkle, funded by 100% profit of the sale of the PINDOS WILD HERBS body care range products· These products have been created by APIVITA using three species growing wild in the cultivations of the village, though as weeds and uprooted by locals (***Saponaria officinalis*** L., ***Salvia nemorosa*** L., ***Mentha longifolia*** (L.) Huds.). Through these programs, children will learn how they can combine nature, the unique biodiversity of their area and its unique local characteristics with healthy, sustainable and innovative entrepreneurship. Teachers and professors who implement it have been trained at the Embercombe Institute.

KEYWORDS: Pindos, Wild Herbs, Medicinal Plants, Sustainable Development, Hippocrates 2500 Years

A KEY TOOL TO IMPROVE EDUCATION PROGRAMS IN SPANISH BOTANIC GARDENS

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The role botanic gardens play in education programs can be greatly enhanced by working together in teams, as partners in national and international projects. Moreover, if those programs aim to be efficient in reaching out to the public, they need to develop activities and strategies adapted to new challenges and the new ways of facing them.

This paper shows the participation of two Spanish botanic gardens: Real Jardín Botánico Juan Carlos I (University of Alcalá) and Real Jardín Botánico de Madrid (CSIC), in the Big Picnic Project (nº 71780, H2020) which aims to engage the public with responsible research and innovation in food security, one of the major challenges to be adressed this century.

The aim of the Project is to encourage citizens to participate in public debates, provoking careful reflection about the way we feed ourselves, the environmental impact of this process, and how we might be able to achieve food security in our societies.

The project is mainly using two kinds of tools: outreach exhibitions on food security and science cafes, to create public debate. Both events bring together participants with similar interests in food security issues and involvement in any of the phases of the food chain. The same venue may host policy makers, people from consumer associations, from agricultural associations, local producers and representatives from a variety of other sectors, depending on the event.

In both gardens, which are working in collaboration, several activities have already been organized. Of particular note have been two outreach exhibitions with a full schedule of conferences, workshops, and exhibitions, and four science cafes.

Very interesting debates have already emerged from those events, on topics such as: the quality of university canteens, the problems of local organic food producers, the real situation of access to fresh high-quality food, the sustainable production of food in our cities or the impact of our individual decisions on the generation of food waste.

The project will end in April 2019, so it is envisaged to develop new and innovative events to boost public interest in botanic gardens and their activities and to connect with other target groups apart from schools, which have to date been the most frequent participants in our education programs.

KEYWORDS: Education, Sustainability, Food Security, Biodiversity

THE HISTORICAL GARDEN: REDISCOVERING OLD EDIBLE PLANTS

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Plants have always been the basis for our existence, especially as a source of food and medicine. The project Historical Garden tells stories about the Romanian culinary past and about the permanent relation between people, plants and the natural world. The garden was founded in 2017 as a complement of the Grandmother's Garden, in Botanic Garden "D. Brandza", and is the first of its kind in Romania. It is a garden created and preserved with the help of our volunteers and it addresses mainly the young generation.

The idea started from the observation that although the younger generations lost their connection to the nature, they want to return to plants and eat healthily as our ancestors. Therefore, our garden was created to encourage people to use plants in their alimentation, especially plants belonging to the spontaneous flora. In this way, our project attempts to answer a few questions: What were the Romanians eating before the arrival of plants from the New World? What was picked and eaten from the spontaneous flora? What were the looks and what was cultivated in a medieval Romanian garden?

Over 100 species of edible plants are cultivated in this garden, some of which have been used starting from ancient times and still being used, some having once been cultivated and throughout the time replaced or harvested from the spontaneous flora and forgotten. Their choice was based on the study of the botanical books, but mainly of old Romanian, as well as European, recipe books, the oldest dating back to 1690.

Because people learn better through experiences, using their senses, spaces for creative workshops, culinary anthropology, including a portion of experimental gastronomical archaeology were created. Cooking workshops with plants from the Historical Garden, consisting in preparing bread, fermented beverages, as well as planting workshops through which the garden's biodiversity is explored were designed.

KEYWORDS: Edible Plants, Education, Historical Garden

ECOLOGICAL EDUCATION IN THE SAKHALIN BOTANICAL GARDEN

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In 2017 the “Leaves in the palms” project was developed within the framework of the “I Cognize the World” program to improve environmental education using the collection funds of the Sakhalin Botanical Gardens.

The goal of the project: development of cognitive interest, attention, thinking, memory and careful attitude to nature in children. Develop a plan for conducting classes with the target audience, based on excursions and practical assignments, development of the excursion route, preparation and production of methodological aids and visual materials.

An excursion was organized on the theme of the project “Leaves in the palms” which lasts 2-3 hours, includes 9 training stations for various ecological, biological and botanical topics. Methodical materials are a text document with illustrations in which 9 training stations are described in detail. For the excursion, the necessary visual handouts (cards, charts, tables, etc.) on the morphology of plants are made. The herbarium of leaves is decorated, the seeds and fruits of various plants are collected. The “Ecological Dates” banner was developed: the ecological calendar contains information on the most important Russian and international holidays, memorable dates. Places for classes and a road-tropic network are laid out (gravel paths are paved, landscapes for training at stations are made well, wooden decking is made, decorative perennial plants are planted).

This project will become the basis for the development of the ecological education activities of the Sakhalin Branch the Botanical Garden-Institute FEB RAS, which will further develop the botanical garden as a center for the dissemination of botanical, ecological and environmental knowledge for the population of the Sakhalin region. This project has allowed to form a holistic picture of the perception of the world for children, widened their horizons, aroused the interest of children to the nature of their native land, laid the foundations of ecological education.

KEY WORDS: Ecological Education, Botanical Garden

HEI PLADI PROJECT: VIRTUAL AND PRACTICAL MOBILITY. EDUCATION THROUGH BOTANIC GARDENS

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HEI-PLADI (Higher Education Innovation in Plant Diversity: flexible learning paths for emerging labour market) project is funded by EU Programme Erasmus+ trough Agenzia Nationale Indire, Firenze. This project relays on a constructive cooperation between seven different educational institutions, botanic gardens and one research institute all from Italy, Portugal, Malta, Bulgaria, Poland and Greece, coordinated by University of Molise, Italy.

Main output of the HEI PLADI Project is to provide teaching materials available as "open learning objects" in an e-learning platform for a wide number of professionals beside students. The project also developed seven short-term training activities as part of the "flexible blended pilot program" which includes field works, field visits, practical and laboratory activities focused on developing skills and deepening the knowledge on topics treated in the e-learning courses.

University Botanic Gardens are a partner, responsible for coordination and development of the "Plant management: Botanic Gardens" topic. E-learning courses and practical activities include 5 learning objects focused on: botanic garden's history and contemporary development; plant collection and collection policies; landscape planning and zoning; education, research and training at botanic gardens; management of the botanic gardens and arboretums, based on knowledge of national and international biodiversity legislation and network organizations of Botanic gardens.

Participants from several universities had an opportunity to take part in a series of interactive activities, fieldwork, theoretical, educational and research tasks during practical mobility in the Black Sea botanic gardens in Bulgaria. The program presented different aspects of the tasks and responsibilities of the administrative, scientific, educational and garden personnel in a botanic garden. The courses were designed in accordance with the missions of the botanic gardens and the trends specified in the Manual for the Management of Botanic Gardens, issued by the BGCI.

As a long-lasting result HEI PLADI Project promotes the idea that conservation and sustainable utilization of plant diversity have a pivotal role in contributing to food and

nutritional security. Furthermore, the Convention on Biological Diversity (CBD), the Global Strategy for Plant Conservation (GSPC) and International Agenda for Botanic Gardens shall be recognized as important documents to build scientific and technological skills in plant taxonomy, in situ biodiversity management and ex situ conservation of both wild and domestic biodiversity.

KEY WORDS: Botanic Gardens, Biodiversity, E-Learning, Education

P031

ENVIRONMENTAL EDUCATION IN BOTANICAL GARDENS FOR CHILDREN: THEORETIC AND PRACTICAL PERSPECTIVES

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As an important informal and/or non-formal education setting for environmental education, botanical gardens' educational programs to children often focuses, but not exclusively, on the following aspects: 1) improve nature experiences such to overcome nature-deficient disorder, 2) knowledge, skills related to environmental science and promoting career intention of being environmental scientists, 3) cultivate conservation willingness, 4) education for sustainability. There has been a lot of practices and activities conducted for environmental education in BGs across both developed and developing countries, however, theoretic model development and evaluation of effectiveness on programs are largely neglected. Furthermore, the integration of formal school education systems with the informal education systems such as BGs' environmental education is often lacked or insufficient. In this talk, by presenting some of the research cases and practices in the Xishuangbanna Tropical Botanical Garden (XTBG) of Chinese Academy of Sciences, China, the author wish to highlight the importance of conducting model-based educational program and significance of establishing partnership with schools on environmental education.

BOTANICAL GARDENS IN ANGOLA, current state and perspectives

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Angola is the seventh country with the largest surface area in Africa, inserted in the intertropical zone between the parallels 5° and 18° S and meridians 11° and 24° E. The action of two regions with different physiographic and climatic characteristics, the narrow coastal strip, the central plateau zone, make up a high plants diversity. In all country there are some fragmentations of the environment with lost of biodiversity. Biodiversity in Angola is protected by the law of the Environment (No.5/98 of June) and by the Convention of Biological Diversity. Botanical gardens, as repositories of plant diversity and botanical knowledge, are one of the ways of conserving plant species. According to the "Botanic Gardens Conservation International" in Kew, there are about 1,700 botanical gardens, fundamental to the achievement of the objectives of Sustainable Development, means of maintaining threatened plant species in ***ex situ*** collections of unique and endemic species. The present work analyzes the current situation of botanical gardens in Angola, refers to the state of Quilombo garden in N'Dalatando, as well as the efforts of the Provincial Government of Luanda to implement a Botanical Garden in the Municipality of Luanda. It also refers, as well as the steps given by the Botanical Center, for the creation of a Botanical Garden on the University Campus in Belas, Luanda, for the preservation and conservation of endangered and rare plant species, contributing for a sustainable environment. For this last one, an agreement was established in 2014 with the Instituto Superior de Agronomia, to support its design and advise on the establishment of the parameters that the Botanical Gardens must comply with.

In all these gardens, special focus will be given to plants useful to man, in particular medicinal plants. Education programs will be established for schools and for the general population to increase awareness about biodiversity conservation and how to take advantage of nature without harming it.

KEYWORDS: Botanical Gardens, Gonservation, Endangered Species, Sustainable, Angola

USING SMART PHONES AT NEZAHAT GÖKYİĞİT BOTANIC GARDEN İSTANBUL FOR A GARDEN GUIDE SYSTEM

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One of the main functions of Botanic Gardens is to inform the public and provide scientific information including using the latest technological innovations.

A QR code (abbreviated from Quick Response code) is a type of matrix barcode first designed for the automotive industry. More recently, the system has become popular outside the industry due to its fast readability and comparatively large storage capacity. The information encoded can be made up of any kind of data. The QR Code may contain information such as a web address, normal text, contact information, Geographic information, business card details etc. With QR Code scanning software available on most modern smartphones.

Since 1995, Nezahat Gökyiğit Botanic Garden (NGBB) has provided an important bridge to carry such information to its visiting public. The prevalent use of the internet and mobile devices shows the need for an information transfer path that utilises these two technologies. At NGBB, a Mobile Garden Guide web application has been created to disseminate scientific information not available on garden labels or on interpretation boards.

Using the two dimensional QR code, system the application provides a convenient, easy and fast way for, visitors to find their way around the Garden, find which plants are in flower and their location, listen records about areas and plants, watch the video records for a special plant such as Venus Fly Trap and to discover additional information about different areas of the Garden. Also, this type of technology can make it much easier to create enthusiasm and interest among younger visitors, such as school children and students.

The Mobile Garden Guide uses the PHP programming language and the MySQL database system and unlike others, this application is a web application and does not require any installation on smart devices. The guide has a customizable infrastructure that can be developed over time and can be customized to suit other botanic gardens and institutions.

KEYWORDS: Botanic Garden, Mobile Garden Guide, QR code, Mobile Phone

CREATION VIA RESTORATION AND CONSERVATION

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The park complex in Balchik was founded in the beginning of the 20th century and used to be the summer residence of a particular royal person and the royal entourage. The composition of the garden consists of architecture and vegetation, which is a public interest from a historical and an artistic point of view and which, according to the Florence Charter (1981), determines the garden as a 'historic' one.

Due to political reasons, the status of the garden has been changed several times over time, reflecting on its neglect appearance and gradual abandonment. The renaissance of this cultural and historical treasure begins with its refunctionalization in 1955 with the establishment of the botanical garden. From a restricted area, the garden has become a special purpose place of wide public access dedicated to science and education. The architectural and park complex "The Palace", located on the territory of the botanical garden, has the status of a monument of architecture and garden-park art with a category of "national importance".

The status of the garden as a cultural and historical treasure determines the need for responsible maintenance, restoration and conservation. The basis for carrying out these activities is the knowledge of its authenticity. According to the Florence Charter, restoration or reconstruction of a historic garden can not be undertaken without thorough prior research, thus ensuring a science-based concept for its management and sustainable use.

University Botanic Gardens carry out historical research of documents and pictures stored in national archives to establish the authenticity of the garden. Components of the Charter of Florence have been studied, defining the architectural composition of the garden- plan and topography, vegetation, structural and decorative characteristics and water effects. The conclusions made are the basis for carrying out the conservation activities of this cultural heritage. In the context of its refunctionalization, ex-situ conservation of plant biodiversity and various educational and social activities have been initiated.

KEY WORDS: Historic Garden, Botanical Garden, Refunction, Accessible Environment, Historical Survey, Biodiversity

DOMESTICATED PLANTS OF THE BOLESTRASZYCE ARBORETUM AS A BRIDGE BETWEEN THE PAST AND THE FUTURE

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Plants play a crucial role in human life, especially those broadly understood as domesticated plants. A strong tendency to find and preserve historical species and varieties has been observed these days. The south-eastern region of Poland, where Bolestraszyce is located, is characterized by favorable climatic and soil conditions for horticulture. In the 19th and early 20th centuries such villages as Krasiczyn, Podhorce, or Beńkowa Wisznia could boast rich and well-stocked nurseries, which were the source of different varieties of apple and pear trees. In 1986 the Bolestraszyce Arboretum initiated the research of old orchards of the Subcarpathian region in the south-eastern Poland, joining the national program of protecting old fruit tree varieties. That was the last possible moment for finding old orchards, which either naturally grew old or were displaced by new plantings. Since 2004 the Bolestraszyce Arboretum has actively participated in a research project funded by the Ministry of Agriculture, whose objective is to protect genetic resources of the old varieties of apple and pear trees. The field collection included within the national gene bank consists of 1,374 apple trees of approximately 100 different varieties and 632 pear trees of around 20 varieties. One of the main goals of this research project is to preserve the diversity of orchard plants**,** thus the Arboretum popularizes old varieties of apple and pear trees through fruit exhibitions and tasting, workshops, and, above all, the sale of trees.

In the past the Cornelian cherry (***Cornus mas*** L.) was commonly cultivated in city parks and manor gardens of the Subcarpathian region. Its tasty fruit was appreciated and used in many ways, and the research has also proved its health properties. Since 1990 ***Cornus mas*** has been cultivated in Bolestraszyce in 12 different varieties. The Arboretum popularizes this plant, as well as its fruit and products, during the annual International Festival of Cornelian Cherry. What is more, the Arboretum has been conducting research on technologies of producing food with pro-health properties, in cooperation with the University of Rzeszów, the Wrocław University of Environmental and Life Sciences, and the Wrocław Medical University.

The educational collection of domesticated plants is exhibited in the Arboretum as Ogród Kalwaria (the Calvary Garden).Around the 19th-century rural house, moved from its original

location in the village of Kalwaria Pacławska, a space was isolated and designed to create a flower garden, a vegetable garden with herbs, as well as small fields with crop plants such as cereals, oilseeds, fodder plants, and root crops. What is more, a variety of dye plants and wild edible plants have been planted. The collection is also a space of education about the rural folklore, as lectures on ethnogeography and ethnobotanical subjects are regularly held there. Another interesting event in the garden is the exhibition of traditional scarecrows, prepared by children and teenagers and displayed in the cereal crops collection. It is also a place where tourists can experience the nostalgic atmosphere of an old Subcarpathian village.

KEYWORDS: Bolestraszyce Arboretum, Historical Varieties, Old Orchards, Apple Trees, Cornelian Cherry, Education

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HISTORICAL EXPOSITION "BIOLOGICAL AND MORPHOLOGICAL GROUPS OF PLANTS" IN THE BOTANICAL GARDEN OF THE UNIVERSITY OF LATVIA

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The Botanical Garden of the University of Latvia is the first botanical garden in Latvia established in 1922. It was developed as a place for studies of botany both for students and general public. The first two created expositions were "Biological and Morphological Groups of Plants" (BMGP) and "Family beds" arranged according to the classification by German botanists A. H. G. Engler and C. A. E. Prantl at the turn of the 19th-20th century.

BMGP was created during late twenties of 20-th century and up to these days the arrangement has not been changed – it keeps a consistent botanical structure and planting beds, the same coarse sand paths and borders. It has preserved despite the fact the teaching methods have changed and serves as a memorial to founders of the garden and the garden culture of that time.

The exposition is divided in four sections: A – Plant adaptation, B – Plant propagation and spreading, C – Leaves and flowers, D – Pollination. Plants with characteristic features are grown according to this layout to demonstrate morphology on the spot.

The section for Plant adaptation (A) demonstrates specific exterior features of plants that have been formed as a result of different external conditions. One can study the way plants have adapted to protect themselves against animal attacks, to survive excessive drought or humidity, too strong sun radiation etc. The section for Plant propagation and spreading (B) exhibits a variety of seeds, fruits, examples of vegetative propagation, and adaptions for seed dispersal by wind, animals and human. The section for Leaves and flowers (C) displays morphology of leaves (lamina, leaf margin, shape, venation, divergence, movements) and the wide diversity of flowers and their morphology (structure, raceme, colour, symmetry). Plants in the section for Pollination (D) demonstrate the dichogamy, heterostyly, the difference between cross-pollination and self-pollination, adaption to wind or insect pollination, etc.

There are more than 500 different taxa in this exposition, including woody plants, herbaceous perennials, annual and biennial plants.

KEYWORDS: Garden History, 20th Century, Plant Morphology

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SHADY PROMENADE IN BOTANIC GARDEN OF FACULTY OF SCIENCE IN ZAGREB: A TRIPLE PURPOSE PROJECT – NEW FENCE, PROMENADE AND PERGOLA

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The oldest Botanic garden in Croatia has never had a properly arranged southern fence alongside the railway embankment. The main concept in the new southern fence project is its triple function and role. Other than just a new fence, the construction will be shaped as a pergola with several gazebos and a lookout tower as well as a public pedestrian promenade.

The promenade is going to connect the new pedestrian bridge serving as the eastern gateway to the Garden with the street along the Gardens western fence, thus acting as a corridor for the citizens even after the visiting hours.

The first pergola in the Garden, constructed three years after the Gardens establishment

(1889) and other wooden supports for climbing plants from early 20th century, were lost by 1940s, but on their existence, the new fence was designed as a pergola – an ancient element in the garden architecture.

The new fence – pergola with total length of more than 300 meters will procure ample space for a numerous and diverse climber plants collection. The collection will contain four different groups of plants planted in four sections. First section of the pergola will be planted with ornamental heliophytes, such as climbing and rambling Rose cultivars, Jasmines and ***Trachelospermum.*** Climbers with strong, woody stems and suspended inflorescences, like Wisterias and Laburnums will be supported by brick pillars and wooden arches. The third group will contain cultivars of ***Clematis*** and ***Honeysucles***, as well as annual climbers, e.g. ***Ipomoea, Cobaea***, ***Lablab*** and ***Asarina***. The last section of the pergola will be planted with evergreen vines- ***Akebia, Hedera, Aristolochia, Periploca, Parthenocissus*** etc.

Through the realization of this project, our Garden will gain a new attractive, multi-purpose space intended to stroll in the shade of flowering plants and for the more curious visitors, to learn about biology of numerous climbing plants from all around the Globe.

KEY WORDS: Education, Climber Collection, Historical Gardens

P038

PLANTS IN THE ANDALUSI GARDENS AND THEIR MEDICINAL USES

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The gardens built during the Islamic rule in the Iberian Peninsula (VIII-XV centuries) enjoyed great prestige and importance as we learn from the large amount of data provided by both the study of Arab sources and archeology. They were enclosed spaces where numerous ornamental plants, gardening vegetation, light, marbles, ditches and fountains were combined with landscaping purposes, evocative of the Paradise Garden promised in the Qur'an to the Muslims, though very often these beautiful enclosures fulfilled many other functions. The extensive Andalusi geoponic literature, written in Arabic between the X-XIV centuries, shows plenty of evidence on how the gardens in al-Andalus became centers

of study and acclimatization for the new species, hitherto unknown, brought to the new conquered territory by the emirs and Umayyad caliphs, while the so-called garden-orchard housed a variety of fruit trees, spices, aromatic and horticultural plants for cultivation and culinary uses.

Since the eighth century, many new plants have become part of the peninsular gardening landscape: saffron, date palm, cotton, safflower, rice, licorice, sugar cane, citron, basil, cumin, sesame, bitter apple and many others cultivated along with the native species already known. The transmission of the deep knowledge obtained about these plants and their medicinal and dietary applications is the main objective of the scientific literature legated by the Andalusi naturalists, in the form of medical, botanical, pharmacological and dietary treaties. They discover in front of us a wide range of traditional plants that made up the Andalusi gardens, focusing on those uses and applications whose purpose was to preserve human health what, undoubtedly, meant a decisive and obvious progress in the medieval pharmacopoeia.

KEYWORDS: Andalusi gardens, Andalusi dietetics, Andalusi medicine, Andalusi therapeutics

P039

MUSEUM OF ETHNOBOTANY: 25 YEARS BRIDGING THE OLD AND THE NEW WORLD

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In 1992 the Museum of Ethnobotany (housed in the Botanical Garden of Córdoba, Spain) was created within the context of the celebration of the V centenary of the "discovery" of America. It was a project of the city council of Córdoba. Some plant material and artefacts that are presently housed in its collections come from Latin America before 1992. This museum develops collections programs and several lines of research and dissemination.

Along 25 years, many changes have occurred in the Museum of Ethnobotany. A factor with negative effects on the collections has been the competition between care and preservation

on one hand, and another institutional priority on second hand.

During the last ten years (2008-2018), several initiatives have led to gradual improvements in collections care, new priorities, museography, and content of collections. Major strides have been made in promoting new and better approaches to collections management care.

Over the years, the museum has bridging the Old and the New World. Through the efforts of researchers, the museum has managed to preserve the tangible and intangible record of ethnobotanical knowledge for future generations. A significant representative sample were gathered as part of an actual research project. The documentation care and custody of iberomacaronesian and American ethnobotanical heritage is now a priority.

Nowadays, the Museum of Ethnobotany is a stable institution that is planning for greater collection use. Its ethnobotanical collections contain a wide variety of different kinds of specimens and objects. They play a central, irreplaceable role, not only in systematic studies, but also in broad-based programs on biodiversity. Every specimen becomes a treasure that must receive the most intensive care possible. Given that the present use of collections will be a key factor in safeguarding them for future use, a major challenge in the future is maintaining the delicate balance between preservation and utilization.

KEYWORDS: Ethnobotany, Museum, Collections, Córdoba, Anniversary.

P040

LIVING HUMAN TREASURES. A CONTRIBUTION OF THE BOTANICAL GARDEN OF CORDOBA TO ETHNOBOTANICAL HERITAGE

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The Museum of Ethnobotany (Botanical Garden of Cordoba, Spain), in its 25th anniversary, awarded a group of people related to ancestral ethnobotanical knowledge with the distinction of “Living Treasure”.

The consideration awarded was “Living Treasure”, a distinction, recognition and official institutional gratitude, to people identified as bearers of traditional intangible knowledge about plants and their applications, representative of each locality. These living treasures

are fully aware of the meaning and importance of their knowledge. They are encouraged to continue to transmit younger generations. It has been granted in the spirit of UNESCO´s recommendations in its program "Living Human Treasures", persons who possess to a high degree the knowledge and skills required for performing or recreating specific elements of the intangible cultural heritage.

The authorities of the city council of Cordoba distinguished 14 people with this award: ***Important intangible heritage bearers: traditional ethnobotanical knowledge***. They are talented practitioners, bearers of high extent of knowledge, exceptional skills and expertise necessary to interpret nature and its uses, oral expressions and traditional craft techniques, non commercial, representative of the localities where they were born, live, or which they are linked. It is an intangible cultural heritage at risk to disappearance.

The present work describes the selection process, criteria and thematic categorization of knowledge and competences documented in people, for their consideration within a system of living human treasures linked to the Botanical Gardens. This initiative is the first time it takes place in the Iberian Peninsula, signed by its authorities and public institutions about botanical traditional knowledge.

This system will begin to develop in the Ethnobotany Working Group of AIMJB. It can be a useful tool for others, as well as a new contribution of them to the safeguarding of European ethnobotanical heritage.

KEYWORDS: Botanical Traditional Knowledge, Bearers

P041

THE HERITAGE OF THE VILNIUS UNIVERSITY BOTANICAL GARDEN

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The Vilnius University Botanical Garden (the Garden) is the oldest (since 1781) and the largest (area 199 ha) botanical garden in Lithuania with the most numerous collections (11 000 names of plants in 2016) too. Since 1781 the Garden was sited in four different places: the yard in Pilies Str. 22 (1781–1799), Sereikiskes (1799–1842), Vingis Park (since 1919),

where Vingis Department is now, and Kairenai (since 1974). The Garden represents as an interesting heritage complex too: historical (related to history of the Garden and the areas where the Garden was located), archaeological, architectural and landscape.

In 1781 the Garden was established by French professor Jean Emmanuel Gilibert in a small plot of 200 square metres as a part of the Department of the Nature History (the first scientific institution of nature science in Lithuania). In 1784-1787 the Garden was headed by German traveler and scholar Johann Georg Adam Forster, who participated in the second voyage of James Cook. In 1799 the transfer of the Garden to a new location in Sereikiskes began professor Stanislaw Bonifacy Jundzill. The glory time of the Garden was the first half of 19th century, but this period was interrupted by big geopolitical changes. The Garden was closed in 1842. The best part of greenhouse plants, herbaria, seeds, books and other collections were given away to other universities. Now first two locations are only of historical interest because no longer belong to Vilnius University.

Only in 1919 a new period of the Garden started as a part of the Stephen Bathory University (SBU) in a new place – Vingis Estate. The hardest period was in 1939-1944: big geopolitical changes in 1939 and war in 1941-1944. The true revival of the Garden began only in 1954. Later the Garden was becoming cramped, therefore, in 1974 a new plot of nearly 150 hectares was allocated in Kairenai. The Garden in Vingis was reorganized to the Department.

The Vingis estate history is related to the spread of reformation (1551-1593), Jesuits activity (1593-1774), the Russian-French War in 1812 and others. The remind of these times is protected buildings-landscape complex: the wall of Jesuit time, buildings of 19th century, 200 years old lime tree lane and others.

The Garden in Kairenai toock over neglected complex of buildings and an old park of the former estate. Now the Garden has a well-developed and visitor–frendly infrastructure. The oldest place is the 4-6th centuries AD Baltic barrow (archeological site). Kairenai estate dates come back to 1545. Over the years estate was changed from renaissance architecture and regular park to classicism architecture and English style park. Now estate complex of 19th century is protected: buildings (stables, mill, coach house, housekeeper house, stableman‘s house and barn) and landscape- old park with 14 ponds system.

The heritage makes the Garden more attractive, visitors get acquainted not only with plants, but also with the history and architecture of the country.

KEYWORDS: Botanical Garden, History, Estate Heritage

TROPICAL BOTANICAL GARDEN – A TRAIL IN HISTORY AND PLANT DIVERSITY

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Created in 1906, in accordance with a proposal designed during the kingdom of D. Carlos I, the Tropical Botanical Garden (University of Lisbon) preserves both a particular plant collection, with approximately 600 species, most from tropical and sub-tropical regions, and a rich and diverse historical background revealed in the cultural and artistic patrimony.

In this communication we present a small tour to the garden, highlighting some of the noteworthy specimens, like the impressive palm exemplars of ***Washingtonia filifera*** and ***Washingtonia robusta***, at the entrance; the useful plant species like the astonishing african sycamore tree (***Ficus sycomorus*** L.) widely used for the edible fruits, as firewood, for building artifacts, and for medicinal purposes, or the Arabica coffee (***Coffea arabica*** L.), a stimulant plant native to Ethiopia and the plateau of Boma in Sudan; and rare plants like the palm of Guadalupe (***Brahea edulis*** H.Wendl. ex S.Watson), native from the island of Guadalupe (Caribbean), classified as "Endangered" in IUCN categories and also an iconic specimen as it was planted by the first President of the Portuguese Republic, on 1913. Also, we emphasize several artistic and cultural assets that reflect the historical inheritance of the garden, such as the Condes da Calheta Palace, a sober construction from the XVII century, at the top of the hill where the garden spreads; the Principal Greenhouse, built in 1914, designed from scratch for the garden, with an admirable structure of cast iron and glass; the Casa da Direção, whose courtyard is entirely covered by beautiful tile panels representing tropical themes, built in 1940 for the occasion of the Portuguese World Exhibition; and, scattered throughout the garden, statues such as the "Roman Charity" by Bernardino Ludovice (1737) or the fourteen busts by Manuel de Oliveira, reproducing features of various races, also reporting to the Portuguese World Exhibition.

KEYWORDS: Conservation, History, Inventory, Plant Collection, Symbolic Plants, Tropical Flora

LIVINGSTONE'S ZAMBEZI EXPEDITION: BRINGING TOGETHER SPECIMENS, PRIMARY SOURCES, AND JOURNALS ON JSTOR TO EXPLORE THE HISTORIC EXPEDITION

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JSTOR Global Plants (http://plants.jstor.org/) – with support from The Andrew W. Mellon Foundation and in cooperation with hundreds of botanic gardens, herbaria, and libraries worldwide – developed a database of over two million plant type specimens and 200,000 historically important objects, such as correspondence, field notes, and artwork. While this size makes the resource indispensable to botanists and plant taxonomists, it makes the resource difficult to approach for non-specialists and undergraduates. Our poster will provide details of a new beta site JSTOR built that explores a different approach to bringing together specimens and historic materials around a specific botanical expedition, called Livingstone's Zambezi Expedition (http://labs.jstor.org/zambezi/). We hypothesized that by focusing on a specific historic event we could create a resource that better highlights related but otherwise difficult-to-find materials and demonstrate the importance of the scientific and cultural objects in JSTOR Global Plants to both specialists and non-specialists. The site overlays maps drawn during the expedition on a present day map and plots items from the expedition – plant specimens, letters, illustrations, economic botany materials, and journal articles written during the expedition – by time and location, allowing the user to follow along on the expedition and see specifically when and where materials were collected. JSTOR had several goals with this project – testing a different way of presenting and highlighting materials from the vast amount of content on the Global Plants site, introducing the importance of plant specimens to a new audience by showing their relation to historic events, and exploring the idea of including more non-specimen primary sources from our Global Plants partners. Livingstone's Zambezi Expedition provides a new way to explore the content in JSTOR Global Plants that is accessible to the specialist and non-specialist alike. The resource enables new discoveries by highlighting the stories told through the materials in Global Plants, which are often hidden by the collection's vast size.

KEYWORDS: Botany; Livingstone, David; Herbaria; Mapping; Specimens

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Esselens Hans	F	8	O082	2018.05.11	10:00	11:00	Room A
Ester Vega Elices	C	26	O045	2018.05.08	12:10	13:10	Room C
Estevão Portela-Pereira	C	39	O053	2018.05.10	9:40	11:00	Room C
Eva M. Temsch	A	3	O003	2018.05.07	14:30	16:10	Room A
Evi Matiatou	C	4	O024	2018.05.08	14:30	15:30	Room A
Ewa Antoniewska	F	13	P035	2018.05.11	14:30	15:30	Room A
Expiración García Sánchez	F	1	O075	2018.05.10	16:30	18:30	Room A
Fanouriou E.	D	1	P026	2018.05.08	14:30	15:30	Room C
Filipa Guilherme	C	19	O036	2018.05.08	16:30	17:45	Room B
Finn Eirik Modahl	C	9	O029	2018.05.08	16:30	18:00	Room A
Finn Eirik Modahl	D	9	O056	2018.05.10	9:40	11:00	Room A
Francesco Zonca	B	8	P015	2018.05.08	9:00	11:00	Room B
Francesco Zonca	B	9	P016	2018.05.08	9:00	11:00	Room B
Francisca Herrera Molina	C	25	O044	2018.05.08	9:40	11:00	Room C
Francisca Herrera Molina	C	26	O045	2018.05.08	12:10	13:10	Room C
Francisca Herrera Molina	F	1	O075	2018.05.10	16:30	18:30	Room A
Francisca Herrera-Molina	C	30	P025	2018.05.08	16:30	17:15	Room C
Francisco Castro Rego			K05	2018.05.08	15:30	16:10	Room A
Frank Schumacher	A	3	O003	2018.05.07	14:30	16:10	Room A
Frank Schumacher	D	8	O055	2018.05.10	9:40	11:00	Room A
Frank Schumacher	F	4	O078	2018.05.10	16:30	18:30	Room A
Frank Schumacher	A	13	P009	2018.05.07	16:30	18:30	Room A
Furdyna Artur	C	28	O047	2018.05.08	12:10	13:10	Room C
G. Raviraja Shetty	C	34	O040	2018.05.10	9:40	11:00	Room B
Gabriele Rinaldi	B	8	P015	2018.05.08	9:00	11:00	Room B
Gabriele Rinaldi	B	9	P016	2018.05.08	9:00	11:00	Room B
Gardikis K.	D	1	P026	2018.05.08	14:30	15:30	Room C
Georgia-Panagiota Limniou	E	3	O072	2018.05.10	14:30	15:30	Room A
Gerard Donnelly	B	14	O016	2018.05.08	12:10	12:50	Room B
Gerda A. van Uffelen	A	2	O002	2018.05.07	14:30	16:10	Room A
Giancarlo Torre	AIM	7	P002	2018.05.07	14:30	16:30	Room C
Giuseppe Fenu	AIM	2	O088	2018.05.07	14:30	16:30	Room C
Grażyna Szymczak	C	20	P023	2018.05.08	16:30	17:45	Room B
Hanna Werblan-Jakubiec	D	19	O066	2018.05.11	10:00	11:00	Room B
Hanneke Jelles	D	17	O064	2018.05.11	10:00	11:00	Room B
Hanneke Jelles	B	10	P017	2018.05.08	9:00	11:00	Room B
Hanneke Jelles	B	11	P018	2018.05.08	9:00	11:00	Room B
Hans Munthe-Kaas	D	9	O056	2018.05.10	9:40	11:00	Room A
Harald Sodemann	C	9	O029	2018.05.08	16:30	18:00	Room A
Harald Sodemann	D	9	O056	2018.05.10	9:40	11:00	Room A
Harry Lorenzi	A	12	P008	2018.05.07	16:30	18:30	Room A
Hart Joke ,T	C	10	O030	2018.05.08	16:30	18:00	Room A

Heidi Lie Andersen	A	6	O006	2018.05.07	16:30	18:30	Room A
Heidi Lie Andersen	D	9	O056	2018.05.10	9:40	11:00	Room A
Helen Miller	C	1	O021	2018.05.08	12:10	13:00	Room A
Helen Miller	C	23	O042	2018.05.08	9:40	11:00	Room C
Helen Miller	B	5	O018	2018.05.08	9:00	11:00	Room B
Heli Fitzgerald	C	5	O025	2018.05.08	14:30	15:30	Room A
Hjortur Thorbjornsson	C	5	O025	2018.05.08	14:30	15:30	Room A
Ho Sang Kang	C	32	O038	2018.05.10	9:40	11:00	Room B
Ilídia Cabral	D	11	O058	2018.05.10	9:40	11:00	Room A
Inese Nāburga-Jermakova	A	14	P010	2018.05.07	16:30	18:30	Room A
Inga Langenfelde	F	14	P036	2018.05.11	14:30	15:30	Room A
Inmaculada Porras Castillo	C	26	O045	2018.05.08	12:10	13:10	Room C
Irena Žiemytė	B	2	O012	2018.05.08	10:10	11:00	Room A
Irina Bondorina	A	9	P005	2018.05.07	16:30	18:30	Room A
Irini Vallianatou	C	4	O024	2018.05.08	14:30	15:30	Room A
Iwa Kołodziejska	D	19	O066	2018.05.11	10:00	11:00	Room B
Izabela Tałałaj	A	5	O005	2018.05.07	14:30	16:10	Room A
J. Esteban Hernández Bermejo	C	25	O044	2018.05.08	9:40	11:00	Room C
J. Esteban Hernández Bermejo	F	1	O075	2018.05.10	16:30	18:30	Room A
J. Esteban Hernández Bermejo	C	30	P025	2018.05.08	16:30	17:15	Room C
J. Ignacio Alonso Felpete	C	26	O045	2018.05.08	12:10	13:10	Room C
Jae Min Chung	C	32	O038	2018.05.10	9:40	11:00	Room B
Jan Ponert	C	13	P022	2018.05.08	16:30	18:00	Room A
Jana Leong Škorničková	C	13	P022	2018.05.08	16:30	18:00	Room A
Jason Przybylski	F	11	O085	2018.05.11	11:30	12:50	Room A
Jason Przybylski	F	21	P043	2018.05.11	14:30	15:30	Room A
Jaume Seguí	AIM	2	O088	2018.05.07	14:30	16:30	Room C
Jeannine Marquardt	A	18	O009	2018.05.07	16:30	17:50	Room B
Jens Weibull	C	5	O025	2018.05.08	14:30	15:30	Room A
Jerzy Puchalski	A	10	P006	2018.05.07	16:30	18:30	Room A
Jerzy Puchalski	C	20	P023	2018.05.08	16:30	17:45	Room B
Jin Chen	D	6	P031	2018.05.08	14:30	15:30	Room C
Joachim Gratzfeld	A	1	O001	2018.05.07	14:30	16:10	Room A
Joan Vidal	AIM	2	O088	2018.05.07	14:30	16:30	Room C
Joana Tinoco	C	19	O036	2018.05.08	16:30	17:45	Room B
Joanna Gadzińska	C	17	O034	2018.05.08	16:30	17:45	Room B
João Alves	F	20	P042	2018.05.11	14:30	15:30	Room A
João Loureiro	A	15	P011	2018.05.07	16:30	18:30	Room A
João Loureiro	C	12	P021	2018.05.08	16:30	18:00	Room A
João M.B. Melo	C	27	O046	2018.05.08	12:10	13:10	Room C
João Melo	AIM	1	O087	2018.05.07	14:30	16:30	Room C
Johan Lie	C	9	O029	2018.05.08	16:30	18:00	Room A

Johan Lie	D	9	O056	2018.05.10	9:40	11:00	Room A
Johannes Rabensteiner	F	9	O083	2018.05.11	11:30	12:50	Room A
Jonas Müller	C	40	O054	2018.05.10	12:10	12:50	Room C
Jorge Capelo	A	17	P013	2018.05.07	16:30	18:30	Room A
Jose Alfredo Reyes-Betancort	AIM	7	P002	2018.05.07	14:30	16:30	Room C
José Matias Alves	D	11	O058	2018.05.10	9:40	11:00	Room A
José Sá Fernandes	B	1	O011	2018.05.08	10:10	11:00	Room A
Joseba Garmendia Altuna	C	26	O045	2018.05.08	12:10	13:10	Room C
Josefa Prados Ligero	C	30	P025	2018.05.08	16:30	17:15	Room C
Jože Bavcon	D	16	O063	2018.05.10	14:30	15:30	Room B
Jože Bavcon	B	4	O014	2018.05.08	10:10	11:00	Room A
Julia Mª Carabaza Bravo	F	1	O075	2018.05.10	16:30	18:30	Room A
Justyna Ryniewic	A	5	O005	2018.05.07	14:30	16:10	Room A
Justyna Wiland-Szymańska	C	17	O034	2018.05.08	16:30	17:45	Room B
Justyna Wiland-Szymańska	C	28	O047	2018.05.08	12:10	13:10	Room C
Justyna Wiland-Szymańska	C	20	P023	2018.05.08	16:30	17:45	Room B
Jutta Kleber	B	6	O019	2018.05.08	9:00	11:00	Room B
Kadir Arslan	D	15	O062	2018.05.10	14:30	15:30	Room B
Karel Petrželka	C	13	P022	2018.05.08	16:30	18:00	Room A
Katarzyna Roguz	A	5	O005	2018.05.07	14:30	16:10	Room A
Katarzyna Socha	F	7	O081	2018.05.11	10:00	11:00	Room A
Kate Davis	C	31	O037	2018.05.10	9:40	11:00	Room B
Katherine O'Donnell	A	7	O007	2018.05.07	16:30	18:30	Room A
Katherine O'donnell	C	22	O041	2018.05.08	9:40	11:00	Room C
Katia Astafieff	D	20	O067	2018.05.11	11:30	12:50	Room B
Kemal Burak Sözen	E	6	P033	2018.05.10	16:30	17:30	Room C
Kenneth Bauters	D	22	O069	2018.05.11	11:30	12:50	Room B
Kenneth Bauters	E	1	O070	2018.05.10	12:10	13:00	Room A
Kenneth Bauters	A	16	P012	2018.05.07	16:30	18:30	Room A
Kenny Stevens	A	16	P012	2018.05.07	16:30	18:30	Room A
Kirsty Shaw	C	3	O023	2018.05.08	14:30	15:30	Room A
Koen Es	B	6	O019	2018.05.08	9:00	11:00	Room B
Koen Es	D	22	O069	2018.05.11	11:30	12:50	Room B
Koen Es	A	16	P012	2018.05.07	16:30	18:30	Room A
Konstantinos Theodoropoulos	C	4	O024	2018.05.08	14:30	15:30	Room A
Koutsianas A.	D	1	P026	2018.05.08	14:30	15:30	Room C
Krasimir Kosev	B	13	O015	2018.05.08	12:10	12:50	Room B
Krasimir Kosev	E	7	P034	2018.05.10	16:30	17:30	Room C
Krystyna Jędrzejewska-Szmek	D	19	O066	2018.05.11	10:00	11:00	Room B
Krzysztof Adamczak	C	28	O047	2018.05.08	12:10	13:10	Room C
Lauma Strazdiņa	A	14	P010	2018.05.07	16:30	18:30	Room A
Lauma Strazdiņa	F	14	P036	2018.05.11	14:30	15:30	Room A

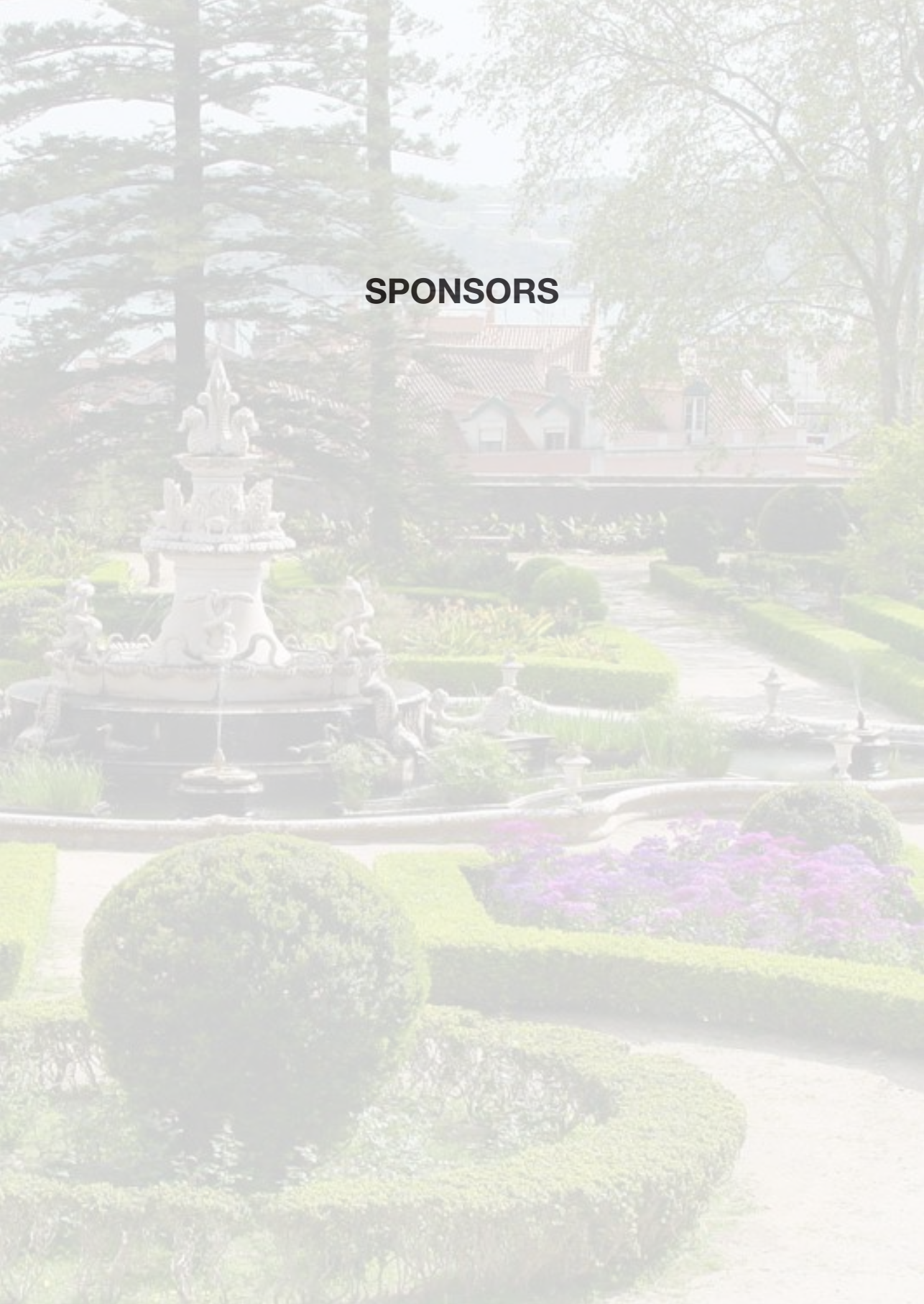
Laurent Bray	E	4	O073	2018.05.10	14:30	15:30	Room A
Leif Schulman	C	8	O028	2018.05.08	16:30	18:00	Room A
Leopoldo Medina	AIM	8	P003	2018.05.07	14:30	16:30	Room C
Leszek Trząski	C	20	P023	2018.05.08	16:30	17:45	Room B
Liliana Derewnicka	B	5	O018	2018.05.08	9:00	11:00	Room B
Liuda Razmuvienė	C	21	P024	2018.05.08	16:30	17:45	Room B
Ludmila Vishnevska	D	13	O060	2018.05.10	12:10	13:00	Room B
Lyuba Pencheva	D	6	P031	2018.05.08	14:30	15:30	Room C
Lyubka Marinova	E	7	P034	2018.05.10	16:30	17:30	Room C
Lyudmyla Buyun	C	7	O027	2018.05.08	16:30	18:00	Room A
Mª Ángeles Navarro García	F	16	P038	2018.05.11	14:30	15:30	Room A
Maciej Niemczyk	A	10	P006	2018.05.07	16:30	18:30	Room A
Magda Sousa	AIM	5	O091	2018.05.07	14:30	16:30	Room C
Magdalena Bibiloni	AIM	2	O088	2018.05.07	14:30	16:30	Room C
Magdalena Maślak	C	20	P023	2018.05.08	16:30	17:45	Room B
Magdalena Vicens	AIM	2	O088	2018.05.07	14:30	16:30	Room C
Magdalena Vicens Fonrés	C	26	O045	2018.05.08	12:10	13:10	Room C
Maïté Delmas	C	6	O026	2018.05.08	16:30	18:00	Room A
Maja Boczkowska	A	10	P006	2018.05.07	16:30	18:30	Room A
Malin Rivers	C	3	O023	2018.05.08	14:30	15:30	Room A
Malin Rivers	C	35	O049	2018.05.10	9:40	11:00	Room C
Malin Rivers	C	37	O051	2018.05.10	9:40	11:00	Room C
Manuela Pedro	D	7	P032	2018.05.08	14:30	15:30	Room C
Marc Reynders	D	22	O069	2018.05.11	11:30	12:50	Room B
Marc Reynders	E	1	O070	2018.05.10	12:10	13:00	Room A
Marc Reynders	A	16	P012	2018.05.07	16:30	18:30	Room A
Marcin Zych	A	5	O005	2018.05.07	14:30	16:10	Room A
Marcin Zych	D	19	O066	2018.05.11	10:00	11:00	Room B
Mari Miranto	C	40	O054	2018.05.10	12:10	12:50	Room C
María Bellet Serrano	B	12	P019	2018.05.08	9:00	11:00	Room B
Maria Cristina Duarte	AIM	5	O091	2018.05.07	14:30	16:30	Room C
Maria Cristina Duarte	F	20	P042	2018.05.11	14:30	15:30	Room A
Maria Del Mar Gutiérrez Murillo	F	17	P039	2018.05.11	14:30	15:30	Room A
María Del Mar Gutiérrez Murillo	AIM	6	P001	2018.05.07	14:30	16:30	Room C
María Del Mar Gutiérrez Murillo	F	18	P040	2018.05.11	14:30	15:30	Room A
Maria Manuel Romeiras	F	20	P042	2018.05.11	14:30	15:30	Room A
Maria Manuela Veloso	AIM	9	P004	2018.05.07	14:30	16:30	Room C
Maria Petz-Grabenbauer	F	4	O078	2018.05.10	16:30	18:30	Room A
Mariana Castro	C	12	P021	2018.05.08	16:30	18:00	Room A
Mariana Garcia Criado	C	38	O052	2018.05.10	9:40	11:00	Room C
Marina Gaidarzhy	C	7	O027	2018.05.08	16:30	18:00	Room A
Maris Rattur	A	11	P007	2018.05.07	16:30	18:30	Room A

Mārīte Neperte	F	14	P036	2018.05.11	14:30	15:30	Room A
Mariyana Dimitrova	E	7	P034	2018.05.10	16:30	17:30	Room C
Markus Fischer	C	24	O043	2018.05.08	9:40	11:00	Room C
Marta Hernández Clemente	C	25	O044	2018.05.08	9:40	11:00	Room C
Martin Gardner	C	14	O031	2018.05.08	14:30	15:50	Room B
Martin Rose	D	8	O055	2018.05.10	9:40	11:00	Room A
Megan Barstow	C	36	O050	2018.05.10	9:40	11:00	Room C
Megan J. Engelhardt	C	23	O042	2018.05.08	9:40	11:00	Room C
Michael Kiehn	A	3	O003	2018.05.07	14:30	16:10	Room A
Michael Kiehn	C	40	O054	2018.05.10	12:10	12:50	Room C
Michael Kiehn	D	8	O055	2018.05.10	9:40	11:00	Room A
Michael Kiehn	F	4	O078	2018.05.10	16:30	18:30	Room A
Michael Kiehn	A	13	P009	2018.05.07	16:30	18:30	Room A
Miguel Menezes de Sequeira	A	17	P013	2018.05.07	16:30	18:30	Room A
Miguel Porto	C	39	O053	2018.05.10	9:40	11:00	Room C
Miin Bang	C	32	O038	2018.05.10	9:40	11:00	Room B
Miriam Aixart Sahun	C	26	O045	2018.05.08	12:10	13:10	Room C
Monika Kiehn	F	2	O076	2018.05.10	16:30	18:30	Room A
Monika Rekoś	C	17	O034	2018.05.08	16:30	17:45	Room B
Murphy Westwood	A	21	P014	2018.05.07	16:30	17:50	Room B
Murphy Westwood	C	16	O033	2018.05.08	14:30	15:50	Room B
Nadja Rauchberger	D	8	O055	2018.05.10	9:40	11:00	Room A
Narcyz Piórecki	F	13	P035	2018.05.11	14:30	15:30	Room A
Natasha De Vere	D	21	O068	2018.05.11	11:30	12:50	Room B
Nicole Cavender	B	14	O016	2018.05.08	12:10	12:50	Room B
Nicole Cavender	C	16	O033	2018.05.08	14:30	15:50	Room B
Nicole Cavender	A	21	P014	2018.05.07	16:30	17:50	Room B
Nikos Krigas	C	4	O024	2018.05.08	14:30	15:30	Room A
Nikos Krigas	C	29	O048	2018.05.08	16:30	17:15	Room C
Nikos Pangas	C	4	O024	2018.05.08	14:30	15:30	Room A
Nils Köster	A	18	O009	2018.05.07	16:30	17:50	Room B
Nuria Prieto	AIM	8	P003	2018.05.07	14:30	16:30	Room C
Nye Hughes	F	10	O084	2018.05.11	11:30	12:50	Room A
Ognyan Iliev	D	5	P030	2018.05.08	14:30	15:30	Room C
Olga N. Sekurova	A	3	O003	2018.05.07	14:30	16:10	Room A
Otakar Šída	C	13	P022	2018.05.08	16:30	18:00	Room A
Ovidiu Paun	A	3	O003	2018.05.07	14:30	16:10	Room A
P. E. Rajasekharan	C	34	O040	2018.05.10	9:40	11:00	Room B
Panayiotis Trigas	C	4	O024	2018.05.08	14:30	15:30	Room A
Panayiotis Trigas	C	11	P020	2018.05.08	16:30	18:00	Room A
Patrick Schwager	C	2	O022	2018.05.08	12:10	13:00	Room A
Paul Goetghebeur	A	8	O008	2018.05.07	16:30	18:30	Room A

Paul Keßler	B	11	P018	2018.05.08	9:00	11:00	Room B
Paul Smith			K02	2018.05.07	12:10	12:50	Room A
Paula Redweik	AIM	5	O091	2018.05.07	14:30	16:30	Room C
Paulo Farinha-Marques	C	19	O036	2018.05.08	16:30	17:45	Room B
Paulo Forte	F	5	O079	2018.05.10	16:30	18:30	Room A
Paulo Pereira	C	39	O053	2018.05.10	9:40	11:00	Room C
Paulo Silveira	A	15	P011	2018.05.07	16:30	18:30	Room A
Pawel Kojs	C	20	P023	2018.05.08	16:30	17:45	Room B
Paweł Mirski	A	5	O005	2018.05.07	14:30	16:10	Room A
Pedro Arsénio	F	5	O079	2018.05.10	16:30	18:30	Room A
Pedro Casimiro	AIM	1	O087	2018.05.07	14:30	16:30	Room C
Pedro G.P. Casimiro	C	27	O046	2018.05.08	12:10	13:10	Room C
Pekka Ranta	F	3	O077	2018.05.10	16:30	18:30	Room A
Pelin Okkiran	D	15	O062	2018.05.10	14:30	15:30	Room B
Per Harald Salvesen	A	6	O006	2018.05.07	16:30	18:30	Room A
Pertti Pehkonen	C	8	O028	2018.05.08	16:30	18:00	Room A
Peter Roels	D	22	O069	2018.05.11	11:30	12:50	Room B
Peter Wyse Jackson			K04	2018.05.08	11:30	12:10	Room A
Photini Mylona	C	4	O024	2018.05.08	14:30	15:30	Room A
Piergiorgio Stevanato	C	11	P020	2018.05.08	16:30	18:00	Room A
Piet Stoffelen	D	22	O069	2018.05.11	11:30	12:50	Room B
Piet Stoffelen	E	1	O070	2018.05.10	12:10	13:00	Room A
Piet Stoffelen	A	16	P012	2018.05.07	16:30	18:30	Room A
Piotr Gawlak	C	28	O047	2018.05.08	12:10	13:10	Room C
Piotr Waloch	C	28	O047	2018.05.08	12:10	13:10	Room C
Ramunė Žiemgulytė	B	2	O012	2018.05.08	10:10	11:00	Room A
Raquel Barata	B	7	O020	2018.05.08	9:00	11:00	Room B
Rasim Murat Aydinkal	E	6	P033	2018.05.10	16:30	17:30	Room C
Rebecca Hood-Nowotny	A	3	O003	2018.05.07	14:30	16:10	Room A
Reynders Marc	F	8	O082	2018.05.11	10:00	11:00	Room A
Richard Baker	A	7	O007	2018.05.07	16:30	18:30	Room A
Rocío González Negrín	AIM	4	O090	2018.05.07	14:30	16:30	Room C
Roderick Bouman	D	17	O064	2018.05.11	10:00	11:00	Room B
Roderick Bouman	B	11	P018	2018.05.08	9:00	11:00	Room B
Roderick Bouman	B	10	P017	2018.05.08	9:00	11:00	Room B
Romana Rybková	C	13	P022	2018.05.08	16:30	18:00	Room A
Rosana Fraga	AIM	1	O087	2018.05.07	14:30	16:30	Room C
Rosie Peddle Fls	D	14	O061	2018.05.10	14:30	15:30	Room B
Ruth Aguraiuja	A	11	P007	2018.05.07	16:30	18:30	Room A
Ruth Aguriuja	C	9	O029	2018.05.08	16:30	18:00	Room A
Ryszard Piotrowicz	C	28	O047	2018.05.08	12:10	13:10	Room C
Samson Næss	A	6	O006	2018.05.07	16:30	18:30	Room A

Sandra Mesquita	A	17	P013	2018.05.07	16:30	18:30	Room A
Sarah Bürli	C	24	O043	2018.05.08	9:40	11:00	Room C
Satu Jovero	C	8	O028	2018.05.08	16:30	18:00	Room A
Sean Hoban	C	16	O033	2018.05.08	14:30	15:50	Room B
Seda Şahin	D	15	O062	2018.05.10	14:30	15:30	Room B
Serge Muller	C	6	O026	2018.05.08	16:30	18:00	Room A
Sergey B. Zotchev	A	3	O003	2018.05.07	14:30	16:10	Room A
Sibel Çuhadar	D	15	O062	2018.05.10	14:30	15:30	Room B
Signe Tomsone	A	14	P010	2018.05.07	16:30	18:30	Room A
Signe Tomsone	F	14	P036	2018.05.11	14:30	15:30	Room A
Silva Žilinskaitė	B	2	O012	2018.05.08	10:10	11:00	Room A
Silva Žilinskaitė	F	19	P041	2018.05.11	14:30	15:30	Room A
Sílvia Castro	A	15	P011	2018.05.07	16:30	18:30	Room A
Sílvia Castro	C	12	P021	2018.05.08	16:30	18:00	Room A
Silvia Villegas	AIM	8	P003	2018.05.07	14:30	16:30	Room C
Sofia Conceição	A	4	O004	2018.05.07	14:30	16:10	Room A
Sónia Azambuja	E	5	O074	2018.05.10	14:30	15:30	Room A
Sónia Talhé Azambuja	F	5	O079	2018.05.10	16:30	18:30	Room A
Sotiris Porevis	C	4	O024	2018.05.08	14:30	15:30	Room A
Spanidi E.	D	1	P026	2018.05.08	14:30	15:30	Room C
Stéphane Rivière	C	40	O054	2018.05.10	12:10	12:50	Room C
Steven Dessein	D	22	O069	2018.05.11	11:30	12:50	Room B
Steven Dessein	E	1	O070	2018.05.10	12:10	13:00	Room A
Steven Dessein	A	16	P012	2018.05.07	16:30	18:30	Room A
Stevens Kenny	F	8	O082	2018.05.11	10:00	11:00	Room A
Stoffelen Piet	F	8	O082	2018.05.11	10:00	11:00	Room A
Sue Paist	A	21	P014	2018.05.07	16:30	17:50	Room B
Suzanne Sharrock	A	7	O007	2018.05.07	16:30	18:30	Room A
Suzanne Sharrock	A	19	O010	2018.05.07	16:30	17:50	Room B
Suzanne Sharrock	C	1	O021	2018.05.08	12:10	13:00	Room A
Suzanne Sharrock	C	31	O037	2018.05.10	9:40	11:00	Room B
Suzanne Sharrock	C	22	O041	2018.05.08	9:40	11:00	Room C
Svetlana Potapova	A	9	P005	2018.05.07	16:30	18:30	Room A
Swaerts Danny	F	8	O082	2018.05.11	10:00	11:00	Room A
Sylwia Jurzyk-Nordlöw	C	28	O047	2018.05.08	12:10	13:10	Room C
Tamas Hatfaludi	A	3	O003	2018.05.07	14:30	16:10	Room A
Tânia Ferreira	B	7	O020	2018.05.08	9:00	11:00	Room B
Taran Aleksandr	C	18	O035	2018.05.08	16:30	17:45	Room B
Taran Aleksandr	D	4	P029	2018.05.08	14:30	15:30	Room C
Teresa Chuva	D	14	O061	2018.05.10	14:30	15:30	Room B
Teresa Chambel			K05	2018.05.08	15:30	16:10	Room A
Teresa Vasconcelos	F	5	O079	2018.05.10	16:30	18:30	Room A

Theophanis Constantinidis	C	4	O024	2018.05.08	14:30	15:30	Room A
Thierry Vanderborght	E	1	O070	2018.05.10	12:10	13:00	Room A
Tiago Monteiro-Henriques	C	39	O053	2018.05.10	9:40	11:00	Room C
Tim Entwisle			K03	2018.05.08	9:00	10:10	Room A
Tomásia Adão	C	33	O039	2018.05.10	9:40	11:00	Room B
Tommy Prestø	B	3	O013	2018.05.08	10:10	11:00	Room A
Tsoukalas A.	D	1	P026	2018.05.08	14:30	15:30	Room C
Vallianatou	D	1	P026	2018.05.08	14:30	15:30	Room C
Vanja Stamenković	F	15	P037	2018.05.11	14:30	15:30	Room A
Vera Dyankova	B	13	O015	2018.05.08	12:10	12:50	Room B
Vernon H Heywood			K07	2018.05.10	11:30	12:10	Room A
Victoria Eugenia Martín Osorio	AIM	4	O090	2018.05.07	14:30	16:30	Room C
Vince, Zsigmond	B	15	O017	2018.05.08	12:10	12:50	Room B
Virginia Sarropoulou	C	29	O048	2018.05.08	16:30	17:15	Room C
Viriato Seromenho Marques			K01	2018.05.07	11:30	12:10	Room A
Vlastik Rybka	C	13	P022	2018.05.08	16:30	18:00	Room A
Vytautas Kuzma	E	2	O071	2018.05.10	12:10	13:00	Room A
Wanda Viegas	AIM	9	P004	2018.05.07	14:30	16:30	Room C
Wolf-Hermann Wildpret Martin	AIM	4	O090	2018.05.07	14:30	16:30	Room C
Wolfredo Wildpret De La Torre	AIM	4	O090	2018.05.07	14:30	16:30	Room C
Wróbel Mariola	C	28	O047	2018.05.08	12:10	13:10	Room C
Yvette Harvey-Brown	C	15	O032	2018.05.08	14:30	15:50	Room B



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Rasim Murat Aydınkal and Salih Sercan Kanoğlu

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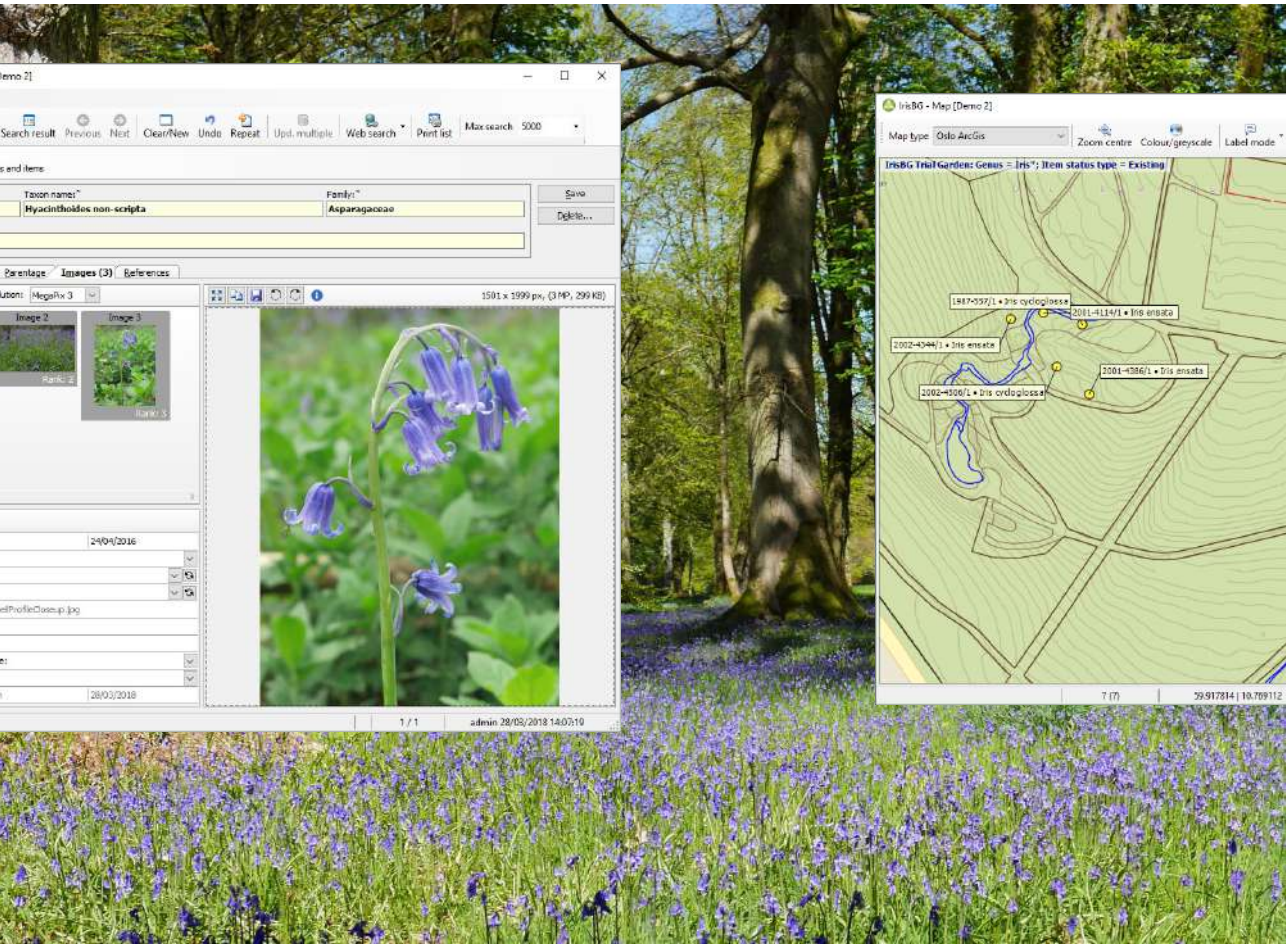

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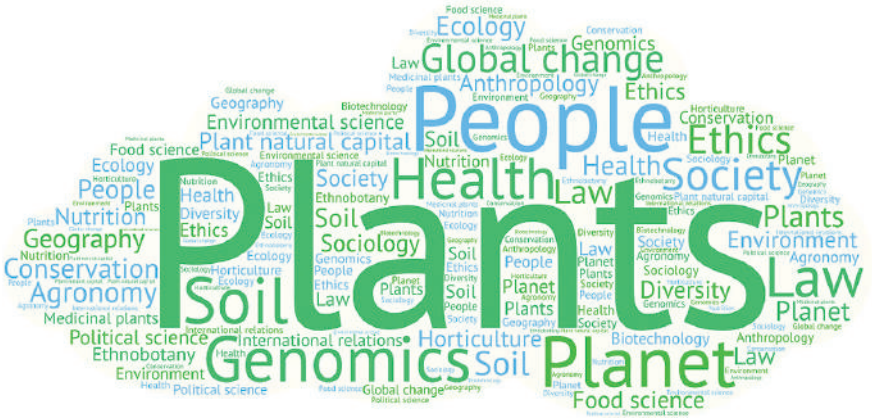

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