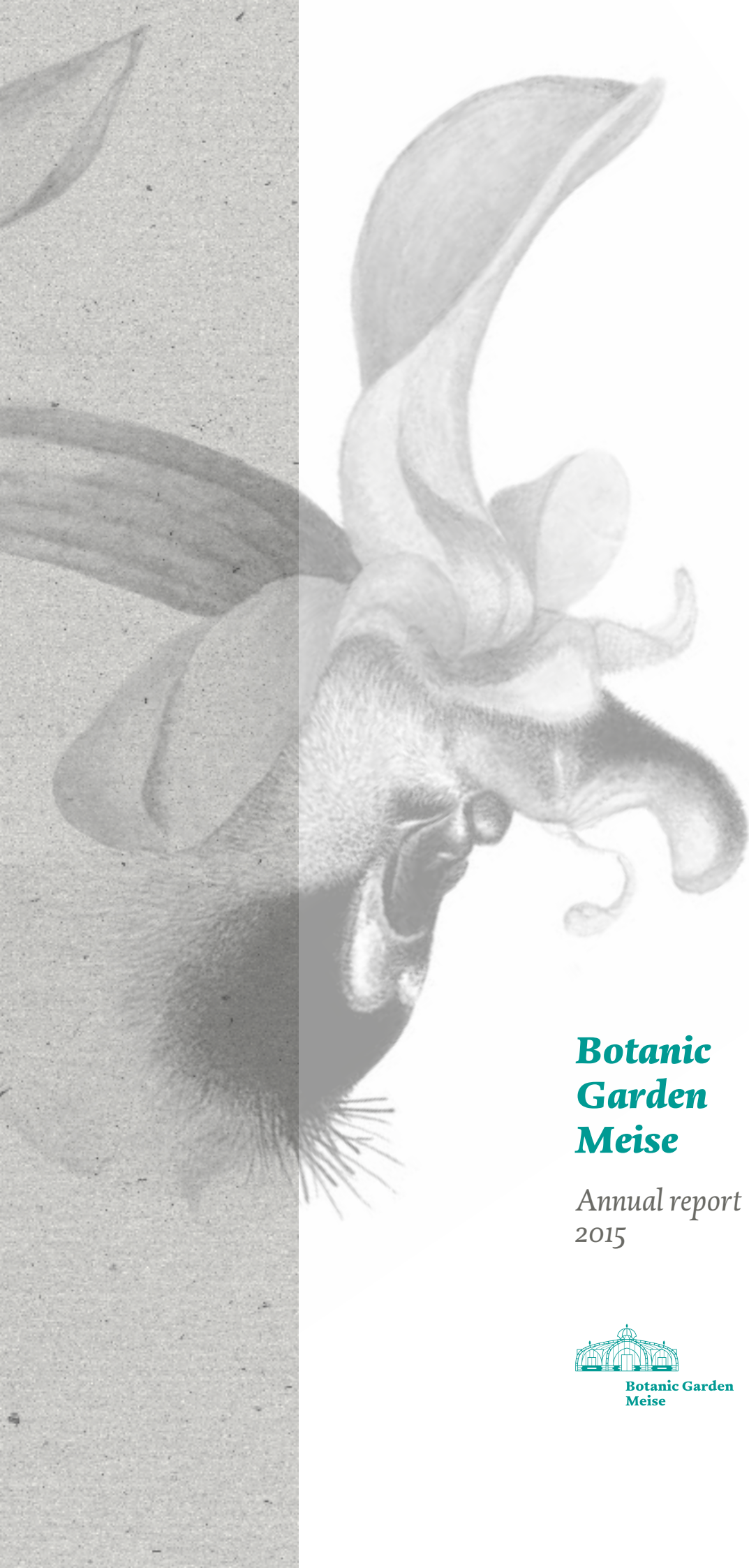

Botanic Garden Meise

Annual report 2015

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Botanic Garden Meise

Foreword

I have visited botanic gardens on every continent and explored their work both in the public gaze and behind the scenes. There are botanic gardens of all sizes and level of importance. Our garden, Botanic Garden Meise, rightly belongs to the group of the most important botanic gardens in the world.

For over 200 years, the Garden has housed its core areas of research, conservation and education under a single academic roof. This offers special challenges and carries special responsibilities to an increasingly global community. Besides being a research institute, the Botanic Garden safeguards threatened biodiversity, both of flowering- and non-flowering plants. Accomplishing our mission in a balanced way in an increasingly changing world is the challenge botanical institutes face the world over.

Botanic Garden Meise has successfully navigated a difficult institutional period. It now needs to look to the future and concentrate on its three core areas of expertise. Besides upgrading its heritage assets, it is vital for investment in cutting-edge, world-leading research. This is only possible by profiling the garden internationally as a great place to work and with great openness and willingness to participate in and establish networks. Openness and networking is important not only for research projects but also in the conservation of living plants and those preserved in the herbarium which provide the essential tools for dynamic research.

Modern communication technology must give wings to our education agenda in order for our messages and activities to extend far beyond national borders. It is the mandate of the Board of Directors to create the environment, both material and abstract, where this is possible. The Board has a listening ear to the Scientific Council with its specific competences. As President of the Board, I want to devote myself to enabling our mission and to support the Garden's staff and especially the CEO.

Being aware of the international challenges facing biodiversity on earth, I know that ensuring Botanic Garden Meise receives the necessary support from the Board of Directors is vital so that the important work of the institute is maintained and developed properly and in collaboration with stakeholders at all levels.

Jan Rammeloo
President of Board of Directors

Content

Introduction

Since its transfer to the Flemish Community in 2014, Botanic Garden Meise has undergone some important institutional and strategic changes. These are only partially the result of the new political situation of the Garden. Increasing globalisation and constant innovation in science and technology mean a continuously evolving business and scientific environment. To efficiently address emerging challenges, new models and strategies were required.

In 2015, the Board of Directors approved the Garden's ambitious Business Plan 2015-2019. The focus remains on six activities linked with the Global Strategy for Plant Conservation: (1) Discovering and recording biodiversity, (2) Understanding ecosystems, (3) Safeguarding plant life, (4) Bringing our heritage to life, (5) (Re-) connecting plants and people, and (6) Inspiring and informing. In addition, the Garden will receive extra funds to invest in 'state-of-the-art' infrastructure for researchers and visitors. There will also be a focus on the organisational management of the Garden to reach the performance targets set by the Flemish Government.

To ensure good functioning of the Garden and a better alignment and integration between its strategic, social and technical components, a new organisation chart was developed. Three departments were created: Research, Collections and Public Outreach. The new structure will be fully operational in 2016 and should facilitate reaching the goals set in the Business Plan.

2015 was marked with numerous achievements thanks to fruitful collaboration between staff members with different skill-sets. In the scientific field, both the number and the quality of scientific contributions reached new levels. Our researchers were active all over the world and contributed significantly to a better knowledge and conservation of flowering plants, fungi, lichens and algae.

In the Collection Department, an ambitious project, funded by the Minister of Work, Economy, Innovation and Sports began. The goal of this project is to digitise 1.2 million specimens and make them accessible worldwide for researchers and the general public. Our staff courageously started this tremendous work by preparing a large part of the specimens for digitisation while the IT infrastructure was updated to cope with the enormous amount of data that will be created.

The Garden offered many activities for the public in 2015, culminating in almost 125,000 visitors. The new winter event Floridylle Winter proved an instant success, while the second edition of the orchid show Flori Mundi attracted almost 20,000 visitors despite Belgium being on high alert due to a terrorist threat during the last three weeks of the exhibition.

In collaboration with the Flemish Building Agency, the restoration of the Garden was planned and several new projects initiated. The first results will be visible during mid-2017 when the Plant Palace will complete its renovations and will be officially re-opened to the public.

The numerous achievements of 2015 were only possible thanks to the unceasing efforts of all collaborators of the Garden. Employees, volunteers, scientific associates and park guides all contributed to last year's successes. The Board of Directors and the Scientific Council also supported the Garden and its mission through sharing their expertise and insights. I confidently look forward to the Garden's future.

Steven Dessein
CEO

Discovering and recording biodiversity

At present the total number of plant species on our planet remains unknown. Many are yet to be discovered, especially in the tropics and in certain groups like fungi and algae. This represents a serious scientific deficit, since species are the fundamental building blocks of ecosystems and knowing them is essential to our understanding of how our living planet works.

Discovering, describing, naming and classifying species is at the core of our scientific research. Our taxonomists combine classic methods, such as morphology, histology and anatomy with modern techniques including scanning electron microscopy, digital imaging and DNA barcoding. The result aims to be a globally accepted, stable and scientific ordering of all life forms in a system that reflects their evolutionary origin. The taxonomic data and identification tools, such as floras, developed by our specialists are crucial for many other fields of research and for commercial purposes.

New to science

The discovery of new plants, algae and fungi remains a major challenge for our researchers. In 2015, field collecting worldwide and studying of herbarium specimens kept in the collections of the Botanic Garden Meise allowed our staff to describe 48 species previously unrecorded by science.

Many of these new species were discovered in restricted areas with outstanding biodiversity, also called 'hotspots', in the framework of field missions conducted by our staff. That is the case in the Congo Basin (Democratic Republic of the Congo) where the lichen *Graphis aptrootiana* Van den Broeck, Lücking & Ertz was found in the depth of the evergreen forests, or with the diatom *Surirella ebalensis* Cocquyt & J.C.Taylor known only from the waters of the Lomami River. Three new Rubiaceae species were also described from the humid lowland forests of eastern and northern Madagascar: *Craterispermum motleyanum* De Block & Randriamb., *C. puffianum* De Block & Randriamb., and C. cervicorne De Block & Randriamb. Other endemic novelties included *Napoleonaea sapoensis* Jongkind (Lecythidaceae) only recorded from swamp forest in the Liberian Sapo National Park, and *Impatiens akomensis* S.B.Janssens, Sonké & O.Lachenaud (Balsaminaceae) growing on wet rocks in the Campo Ma'an/Akom area of South Cameroon.

Researchers from Argentina, in collaboration with staff of the Botanic Garden Meise, described the new genus *Carajasia* from Brazil. Its only species, *Carajasia cangae* R.M.Salas, E.L.Cabral & Dessein is restricted to the summits of the Carajás mountain range where it exclusively grows on ferric soil as part of the saxicolous scrubby vegetation. The mountains are situated at 580-850 m elevation and surrounded by Amazonian rainforest at lower elevations. Mining activities already destroyed part of the suitable habitats. The species therefore faces a high risk of extinction in the near future.

— Photo by Pedro Viana.

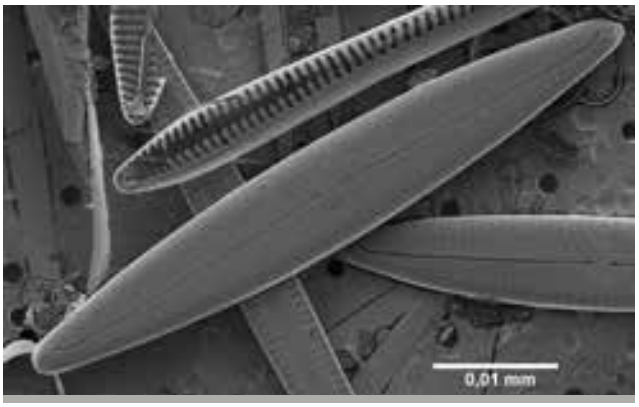
— *Napoleonaea sapoensis*, a new Lecythidaceae from Liberia. Photo by Carel Jongkind.

Many of the new taxa are already considered threatened. Despite the remoteness of their distribution, the quality of their habitats is regularly altered by human activity such as logging and mining. By assessing their IUCN conservation status, our staff sensitise the local authorities to protect this endangered biodiversity. It is not only flowering plants, such as *Carajasia cangae* R.M.Salas, E.L.Cabral & Dessein (see box), that are considered under threat. A new Andean fern *Serpocaulon obscurinervium* D.Sanín (Polypodiaceae) falls outside the Colombian and Ecuadorian System of Protected Areas and its endangered status is worth drawing attention to.

Further south, our researchers investigated the freshwater and limno-terrestrial diatom flora of the Antarctic Region. Samples gathered and sent to Botanic Garden Meise were observed under light and scanning electron microscopes to reveal an amazing diversity of unicellular siliceous algae in the lakes and wet seepage areas of the Maritime Antarctic islands. Among them, three new representatives of the genus *Craticula* (*C. australis* Van de Vijver, Kopalová & Zidarova, *C. obaesa* Van de Vijver, Kopalová & Zidarova, and *C. petradeblockiana* Van de Vijver, Kopalová & Zidarova) confirm once again the endemic nature of the Antarctic diatom flora.

Closer to home, our staff discovered a new diatom species in some rivers and canals of the Meetjesland using bio-indicators to analyse the watercourse quality in the framework of the monitoring required by the European Union. Because the species was until now only found in Flanders, it was named *Navicula flandriae* Van de Vijver & A.Mertens.

Publications: 2, 6, 8, 21, 51, 53, 62, 93



— *Navicula flandriae*, a new diatom discovered in Flanders. Photo by Bart Van de Vijver.

— Bart Van de Vijver sampling in Crater Lake on Deception Island (South Shetland Islands, Maritime Antarctica) during the 2015 expedition. Photo by Katerina Kopalová.

— Mt. Kinabalu. Photo by John Kong / Sabah Parks.

Mount Kinabalu – cradle of biodiversity on a single summit

Tropical mountains are renowned for their exceptional number of species. This species richness is mainly the result of increased elevation from the surrounding area causing differences in temperature, precipitation and associated environmental variables. Despite having a good view on species richness in the tropics, it remains difficult to establish the origin of this massive diversity in tropical montane areas. In order to tackle this important evolutionary question, a group of scientists organised a field expedition to Mount Kinabalu on the island Borneo in 2012. Not only did they discover over 160 previously unknown species, together with scientists from Botanic Garden Meise they also investigated the evolutionary history for each of the endemic species occurring only on this 'holy' mountain. During this study, it was demonstrated that the enormous biodiversity on the mountain consists of a mixture of species that colonised Mount Kinabalu from remote overseas areas and species that gradually evolved from local Bornean species and adapted to the environmental conditions on the mountain. In addition, this study allows us to make predictions for the future concerning the abilities of endemic species to evolve in a changing climate. The discovery and results of this expedition were recently published in the prestigious journal Nature.

— *Impatiens kinabaluensis*. GNU License.

Publication: 38

Hypseocharis from the tropical Andes

An extensive knowledge of biodiversity is invaluable to understand and conserve plant diversity. The tropical Andes are considered the most important hotspot for plant diversity worldwide; nonetheless our knowledge of the tropical Andes flora is very limited. The genus *Hypseocharis* is a nice example of a little-known plant group that is endemic to the tropical Andes and can provide valuable insights in the creation of plant diversity. *Hypseocharis* is closely related to the horticulturally important *Pelargonium* and *Geranium* species. To increase our knowledge of taxonomy and ecology of *Hypseocharis*, a four-week field study was organised in the Cochabamba region of Bolivia in February 2015. The expedition occurred in cooperation with researchers from the Universidad Mayor de San Simon (UMSS) and additional funding was provided by the 'Leopold III fonds voor natuuronderzoek en natuurbehoud' and the Research Foundation – Flanders (FWO).

Although *Hypseocharis* is assumed to be rare, *Hypseocharis* populations were found to be fairly abundant in the Cochabamba region. A total of 25 *Hypseocharis* populations were observed and meticulously recorded. In each population herbarium specimens were collected and we made detailed descriptions of the habitat and the associated plant species. Based on flower colour, two or three *Hypseocharis* species could be differentiated. Plant traits such as size, leaf shape and root shape varied strongly both between and within populations and are therefore not useful to differentiate species.

The first white-flowered species was encountered at altitudes between 3,500 and 4,000m a.s.l. This species appears to be fairly common at higher altitudes and grows primarily in dry habitats with associated genera such as *Puya*, *Eryngium* and *Polylepis*. A second species with orange or red flowers was observed at altitudes between 2800 and 3600 m. It grew in a range of disturbed habitats such as intensively grazed meadows and field edges. A single population of a possible third species with pale yellow flowers grew at 3600 m. This population was growing on a strongly eroded clay soil in sparse vegetation.

It became clear during the expedition that genetic analyses are necessary to clearly delimit different *Hypseocharis* species. Sufficient fresh material was collected to perform such analyses in the Botanic Garden. The collected herbarium specimens will be examined by researchers from the UMSS and compared with type specimens in the National Herbarium of Bolivia in La Paz. During a second field trip in April 2015, viable seeds were sampled in the previously localised population. A portion of the seeds was sent to the Botanic Garden Meise. Currently we have about fifty of these unique *Hypseocharis* plants in our living collection. These plants will be primarily used for research and eventually added to the large Geraniaceae collection curated in the Botanic Garden.

— Researchers of the Universidad Mayor de San Simon during the preparation of herbarium specimens. Photo by Filip Vandelook.

— White-flowered *Hypseocharis* growing south of Cochabamba at 3900 m altitude. Photo by Filip Vandelook.

Good progress on *Flore d'Afrique centrale*

The year 2015 was productive for *Flore d'Afrique centrale*; treatments of no less than nine plant families were published. This was especially rewarding after a long period of inactivity. Botanic Garden Meise is pleased to notice that efforts to bolster production is delivering fruit.

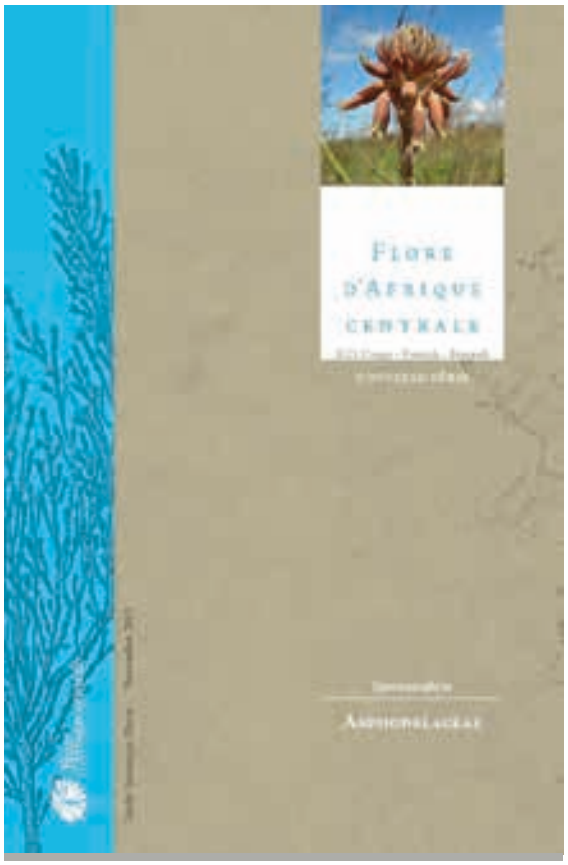
These new publications increase the number of published species by 107. That brings the total number published in the series to around 6,100, with an estimated 4,000 remaining. During 2015, an average production of around two species per week was maintained. While this sounds reasonable, our goal is to deal with, on average, five species per week. Only with that rate of progress will we achieve our goal to finish this monumental task by 2028.

To reach this target, we rely heavily on a large team of taxonomic experts from all over the world, who are committed to contribute to this endeavour. The task is great. Researchers need to painstakingly study all available herbarium specimens from the Central African region, mainly at Meise but also elsewhere, study variation within and the differences between the individual species and establish the correct name for each. Only then are they able to publish their work including user-friendly identification keys. These keys are the essence of a Flora serving as the basic and indispensable tool to base further research allowing others to identify plants belonging to particular families. These keys are used by a wide range of professions for different reasons, such as an ecologist finding out which fruits are eaten by certain birds, a conservationist developing a specific management plan for a rare or threatened plant, or a botanist performing an environmental impact study for a mining company. In short, without a Flora it is much more difficult to arrive at an effective plan to wisely and durably use and protect botanical resources. This is what drives our institute to pursue this great project.

Recently, our institute joined an even larger and more ambitious initiative: the World Flora Online. This consortium, encompassing a large number of renowned botanical institutes, is focused at achieving Target 1 of the Global Strategy for Plant Conservation and create a first version of a web-based World Flora for all known species by 2020. As such, our efforts towards completing the *Flore d'Afrique centrale*, but also other work in the Garden, such as the *Flora of Belgium* and the *Flore du Gabon*, feed into this global challenge.

Publications: 112, 113, 118, 120, 121, 123, 124, 126, 132

— Members of the World Flora Online Council, in Rio de Janeiro, Brazil, during their bi-annual meeting. Photo by Julia Dalcin.



— Cover of the *Flore d'Afrique centrale* volume on Asphodelaceae, a family which includes the well-known genera *Aloe* and *Kniphofia*.

Understanding ecosystems

In a world increasingly under environmental pressure, plants, ecosystems and the services they provide need to be maintained to keep our planet healthy. Amongst other things they mitigate the effects of greenhouse gasses, play an important role in the global water cycle, and help combat desertification.

The work of our researchers helps us understand how ecosystems function, and how they can be described and monitored. They also investigate invasive species that influence native species. Throughout the world, in Africa as in Belgium, humankind is fully dependent on healthy ecosystems.

— Our diligent field guide Fils making herbarium specimens on the rainforest floor. Photo by Brecht Verstraete.

Seeing the wood for the trees: dominant rainforest species demonstrate responses to climate change in the rainforest

In February and March Botanic Garden Meise conducted an expedition in the Luki Biosphere Reserve in the Democratic Republic of the Congo together with colleagues from the Royal Museum for Central Africa. Our goal was to sample dominant rainforest trees that serve as a proxy for the entire forest. We investigated whether rainforest trees had already responded to climate change by altering a range of climate-induced traits. While our colleagues investigated wood traits, our research focused on leaf characteristics. One of the major advantages of working in this particular reserve is the availability of historical material collected during the last century and which is deposited in our herbarium. We were therefore able to construct a time series of leaf traits over the course of the past century and compare these with recently gathered leaves.

We found the gathered leaves are now bigger and had less stomata than historical specimens. This shows that the African rainforest has already undergone changes in response to climate change and probably will keep changing in the years to come.

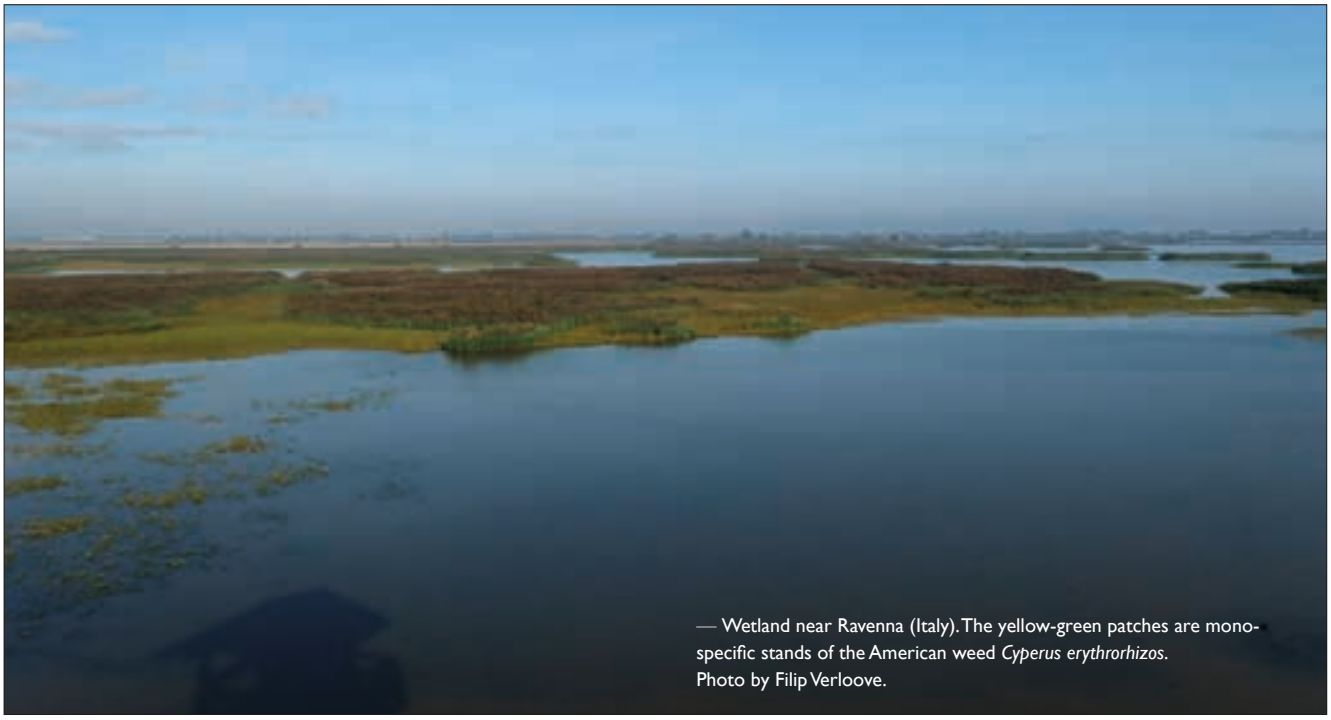
Assessing the global exchange of non-native plants

Human activities have introduced many plants to countries where they are considered alien. This has happened everywhere in the world, even on Antarctica and in the oceans. Nevertheless, information on these invasions is divided across many institutions and countries, so it has been difficult to answer simple questions about the global scale of these phenomena. To better understand this process we wanted to know the origins and host countries for these invasive species; how has the situation changed with time and what can be done to slow the flow?

Recently, the Botanic Garden contributed to a global study to provide answers to these questions. Botanists from 25 different countries provided information on 481 mainland and 362 island regions to give the first global view of invasive species. The paper concludes that more than 13,000 of the world's vascular plant species have become naturalised outside their native range, that is almost 4 % of all those known to science.

The Botanic Garden contributed data from the Congo Basin from our checklist of the region's flora. Knowledge on invasive species in tropical Africa is scarce, even though invasive alien species are causing significant problems for agriculture, forestry and conservation. In Europe we have clear policies on invasive species and considerably more information, but lack of knowledge of the problem in Africa is leading to the irreversible introduction of many weeds. Belgium has a vibrant community of invasive species biologists and this small contribution to our knowledge on a global problem is just one of the many outputs of our invasive plants research group.

Publication: 65



— Wetland near Ravenna (Italy). The yellow-green patches are monospecific stands of the American weed *Cyperus erythrorhizos*. Photo by Filip Verloove.

Invasive Cyperaceae weeds in Europe

The Cyperaceae family accommodates about 92 genera and 4,450 species and has a near cosmopolitan distribution. A number of species in this family are of economic, ethnobotanical and horticultural interest or can be invasive. Many from the latter group are rapidly spreading beyond their native ranges, invading sub- and tropical regions and warm temperate areas of the world, including parts of Europe. It is expected that many weedy species of Cyperaceae will benefit from climate change. Especially taxa with C4 photosynthetic pathways, such as *Cyperus rotundus* ('the world's worst weed') and species of *Eleocharis* and *Fimbristylis*.

Many genera of the Cyperaceae family are notoriously difficult to identify and have confusing taxonomy and/or nomenclature. The correct identity of many introduced species in Europe has long-remained controversial and recent research has shown many species claims to be erroneous. Since most non-native Cyperaceae are reputed to be weeds likely to become invasive in Europe (either as agricultural or environmental weeds) it is important to achieve accurate identification, assess their current frequency, distribution, habitat preference and dispersal modes.

In recent years our taxonomic knowledge of this group of species (in Europe) has improved considerably thanks to efforts from staff at our Botanic Garden. This was achieved by taxonomic revisions and fieldwork.

A number of case studies have been identified highlighting the problem of confusing native species with invasive weeds. For instance, the invasive *Cyperus odoratus* had been overlooked for more than half a century in the Po Valley, Italy. Also in Northern Italy, a previously unknown highly invasive weed has increased in distribution over several decades. This was identified as *Cyperus erythrorhizos*, an American native that had not previously been recorded outside the New World. In cherished and vulnerable heathlands in Northwestern Italy at least some records of the critically endangered *Eleocharis carniolica* were actually *E. pellucida*, an invasive weed from the Far East. Similarly, Canarian records of the rare, native *Cladium mariscus* were in fact the tropical non-native weed *C. jamaicense*. Closer to home, in Belgium we discovered that the very rare and much declining native species *Eleocharis ovata* had been confused with two increasing, closely similar American species, *E. engelmannii* and *E. obtusa* that are considered weeds. These examples highlight the importance of this work and help to target resources on members of the Cyperaceae family with the correct identity.

Publications: 102, 106, 109

— *Eleocharis obtusa* in a temporary pool in a heath in Brasschaat (Belgium), a look-alike of the threatened native species *E. ovata*. Photo by Filip Verloove.

Development and plant-water relations of viviparous propagules of the Black Mangrove in the Victoria glasshouse of Botanic Garden Meise.

With specific adaptations such as aerial roots and salt excluding mechanisms, mangroves are able to cope with saltwater and frequent tidal inundations, adaptations that allow them to thrive along tropical seashores. The reproduction of mangrove trees is remarkable, especially in true mangrove species (Rhizophoraceae), because seeds germinate while the fruits are still attached to the parent tree. This phenomenon is called vivipary. The embryo then develops into an elongated structure known as a propagule. After falling from the parent tree, the propagule floats in the seawater and hopefully washes ashore to establish where new conditions are favourable.

Over the past five years, several species of mangrove have grown along the Victoria glasshouse pond in Botanic Garden Meise. Among them are two black mangroves (*Bruguiera gymnorrhiza*). Remarkably, in contrast to mangroves in the wild, plants at Meise flourish in freshwater with a constant level (without tides). The Meise *Bruguiera*'s, developed into trees and began flowering continuously from the summer of 2014. Using hand-pollination we successfully raised several propagules from these plants during the first few months of 2015.

This phenomenon, unique to this part of the world, gave an ideal opportunity for a scientific study in collaboration with the Biology Department at the Free University of Brussels (VUB). The VUB have been studying mangrove propagules for over a decade, focusing on propagule floating and water transport in adult trees. However, not much was known about the plant-water relations in viviparous developing propagules when attached to the parent tree. Consequently, a number of questions could be investigated such as, are there similar diurnal diameter changes expressed in propagules as in the branches of the parent tree? Do the plant-water relations differ between plants in the Victoria glasshouse and those in nature? To find the answers, dendrometers, instruments that record diameter changes in plant organs correlated with water transport, were attached to propagules and their respective branches and measured, at five minute intervals, for changes in organ diameter. In July, the propagules individually ripened and abscised from the parent tree. After an obligatory floating period lasting two weeks a tiny root appeared on each of the propagules, which were then potted. The dendrometers were then reattached to follow water movements in the developing seedlings.

Currently, seven months of data is being analysed, but initial results are promising and indicate that branches of the parent tree exhibit a clear diurnal rhythm in stem diameter. The propagules demonstrated a weak diurnal response in water uptake. The characteristic diurnal patterns exhibited by adult plants only became apparent in young plants once their first leaves had developed. This study will extend our understanding about mangroves and their unique ecosystems.

— *Bruguiera gymnorrhiza* flowering in the Victoria glasshouse. Photo by Marc Reynders.

— Follow-up of the dendrometer experiment on seedlings of the Black Mangrove in the Victoria glasshouse pond. Photo by Marc Reynders.

— *Strobilomyces strobilaceus*. Photo by Yves Deneyer.

A study of the distribution, ecology and status of macromycetes at the European scale

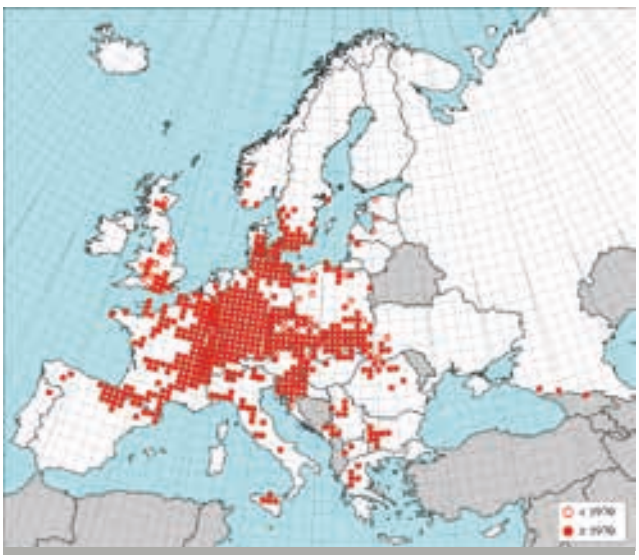
Some years ago, a mapping program was launched by the European Council for the Conservation of Fungi (ECCF) to study the distribution of 51 macromycetes on the European continent, as well as their ecology and status. The selected species belong to different groups of Ascomycetes and Basidiomycetes. Most are threatened in some way, at least in the regional context of Europe. A total of 38 countries participated in the study. In each a national coordinator collected available information with the help of local mycologists. Data was standardised and sent to the two ECCF coordinators of the programme. In total, the results of the study (Fraiture & Otto 2015), were obtained thanks to the efforts of nearly 300 mycologists. An analysis of the results showed countries with the highest number of species are Germany and France (44 species out of 51), Italy and Spain (43 species) and Poland (39 species). This is partly due to the mycological richness of these countries but also due to their relatively large territories.

The species present in the highest number of countries are *Panaeolus semiovatus* (34 countries out of the 38), *Helvella atra* (33 countries), *Strobilomyces strobilaceus* and *Sarcosphaera coronaria* (32 countries). At the other end of the scale, the rarest species were *Tulostoma niveum* (4 countries), *Haploporus odorus* and *Torrendia pulchella* (5 countries).

Comparison between these recently made distribution maps and those published by Lange (1974) clearly shows an increase in known distribution and in the abundance of species. However, rather than being attributed to an expansion of particular species, these increases are more likely the result of a more thorough investigation of the territories (over the preceding 40 years) and better accessibility to data (computerised databases).

The study of the 51 maps allows us to distinguish and comment on species distribution patterns. Some species faithfully follow their host-tree, while others are more influenced by purely geographical factors (Sub-boreal, southern, mountain and coastal species). Five species that seem to be bound to boreal locations are probably more bound to old growth forests, which have almost disappeared from Europe outside of the boreal domain.

In the second part of the work, distribution maps of different species are presented with comments on their distribution (global and European), ecology (trophism, hosts and substrates, syntaxa of vegetation, Natura 2000 habitats, soil requirements, indicator value, phenology) and status (frequency, threat and conservation). Colour pictures of the species are also presented. The work ends with a bibliography of nearly 600 titles.



— Distribution map of *Strobilomyces strobilaceus*.

Safeguarding plant life

It is estimated that up to one third of plant species are currently threatened or face extinction in the wild, mainly due to habitat fragmentation and destruction, combined with climate change. Every plant has a crucial role in a healthy functioning ecosystem. Some may hold unknown treasures such as molecules with helpful medicinal properties. Therefore, the safeguarding of plant species is essential.

Our research contributes to the development of tools for *in situ* conservation in valuable natural sites both nationally and internationally. Off-site or *ex situ* conservation is equally important. We collect plant material from the wild for preservation and propagation in our living collections, and in the collections of partner botanic gardens. Our seed bank holds the seeds of many rare and endangered species, thus safeguarding critical genetic variation. In combining our expertise and collections we are able to assist with the reintroduction of species in natural habitats both now and into the future.

— Taking samples. Photo by Jo Packet.

Distribution and conservation status of *Luronium natans* in Belgium

The rare aquatic plant *Luronium natans* is endemic to West- and Central-Europe and protected by the European Habitats directive. It is a stoloniferous pioneer species with a mixed reproduction strategy and occurs in varying types of habitat with accordingly different phenotypes. Some studies done in other countries show this species to be declining, but its status and trend in Belgium had previously not been investigated.

Consequently, we assessed the past and present distribution of *Luronium natans* in Belgium. This was done in collaboration with researchers from the Research Institute for Nature and Forest (INBO), consulting herbaria, literature and databases, and by conducting fieldwork. We found that around c. 250 sites have been recorded for this species to date, revealing that the Belgian territory accounts for a significant part of its global distribution. The majority of the sites are located in the Campine (phytogeographical) district, a region with sandy soils in northern Belgium. We found a marked decline of observations since 1985, especially outside the Campine district. This decline related to increased eutrophication, but not to anthropogenic acidification.

After visiting nearly all 100 sites recorded post 1971, we discovered only 30 extant populations, all but one located in Flanders. Most populations (70 %) are situated in Special Areas of Conservation, while only 30 % are located in nature reserves. The status of the extant populations was investigated. This showed that most were probably too small to be viable in the long term, are short-lived and have strongly fluctuating population sizes. It is alarming that many populations show little or no flowering, as a perennial seed bank has been mentioned as important for the survival of the species by other authors. On the other hand, a high degree of clonal reproduction was found, based on molecular analysis of leaf samples taken from Flemish populations. Dominant clones were often shared among patches within a water body and occasionally between distant locations. It appears that several populations were founded by one or a few migrants from neighbouring populations and were able to persist mainly through asexual reproduction. In some cases the transportation of clonal fragments must have occurred over land, e.g. by waterfowl or by humans. The only extant population in Wallonia is such an example, as this new location is situated a great distance from other extant populations. Therefore, it is likely to have colonized this area with fish from a pond where *Luronium natans* was growing.

— Flowering plants of *Luronium natans*. Photo by Jo Packet.

Publication: 50

— Small populations of mountain arnica (*Arnica montana*) have lighter seeds, lower germination rates and a higher proportion of empty (aborted) seeds than large populations. Population size is therefore an essential criterion when selecting seed sources for future translocations. Photo by Maarten Strack Van Schijndel.

— Plant vigour prior to transplanting was estimated by measuring rosette diameter or leaf length and width (as shown here for maiden pink, *Dianthus deltoides*). Differences in pre-translocation morphometric variables were detected between seed source populations. Photo by Sandrine Godefroid.

Overcoming challenges with translocation

Plant translocations refer to the movement of plants from one area to another for the purpose of conservation. The existing literature on plant translocations focuses on post-translocation outcome, despite the likelihood that issues directly relating to preparation phases being important. Plant translocation programmes face significant pre-translocation challenges. This is especially true for species at risk because they often have narrow ecological requirements, may produce low levels of viable seed, poor quality seeds and/or might have unknown methods for propagation.

Since a translocation may take years or even decades to stabilise, inadequate planning and preparation can seriously compromise the long-term prospects for success, potentially leading to an inefficient use of conservation funds. As part of a project funded by the European Union LIFE program, scientists of Botanic Garden Meise highlighted important aspects needing focus while planning plant translocations.

Using their experience accumulated with four rare plant species (*Arnica montana*, *Campanula glomerata*, *Dianthus deltoides*, and *Helichrysum arenarium)* recently reintroduced in the wild, the Garden's researchers identified issues that needed to be overcome before translocation. Four steps to translocation preparation were identified: selection and profiling of the target species; seed collection; development of propagation protocols; assessment of plant fitness of the populations used as the seed source.

The following specific considerations need to be taken into account when designing protocols for plant species translocations. Firstly, target species must be selected with caution. Having adequate knowledge of their biology and species ecology can help avoid mistakes. Establishing in advance a detailed profile containing all available information on each species is the recommend method. Secondly, it is essential to identify the most appropriate source populations for seed collection. For instance, population size appears to highly influence seed quality. Thirdly, before propagation, species must undergo tests under different conditions to identify the best protocol. This phase avoids wasting seeds. Finally, pre- translocation fitness measurements can be used as an indicator of genetic diversity. Attention should be paid when fitness differences are observed between source populations, as they can indicate inbreeding depression and/or genetic drift effects, but also local ecological adaptation, which could lead to outbreeding depression in their progeny.

Publication: 17

— *Impatiens parasitica*. Photo by Marc Reynders.

Impatiens – expansion of a valuable collection

Busy Lizzies - or snapweeds - are renowned for their colourful flowers and for this reason many species are popular as ornamental plants in seasonal bedding displays or as houseplants. Other species however have a reputation for being noxious weeds whilst others are threatened with extinction. In truth, most species of *Impatiens* are difficult to grow; consequently *ex situ* collections in botanic gardens are rare.

The main difficulty of their cultivation is because most have very specific habitat requirements. Many occur naturally along streams in tropical mountain forests where environmental conditions are generally stable. Species from tropical montane regions often require cool nights, warm-temperate days and more or less constant day lengths. As a general rule, these high-altitude species are more difficult to grow in glasshouses especially at high and low latitudes. Summer is particularly challenging at these latitudes because the days and especially the nights are usually too warm.

Over several decades, the Botanic Garden of the University of Bonn has assembled a unique research collection of *Impatiens*, with many accessions collected from the wild. Based on the mutual research interests and expertise of researchers in Bonn and Meise, it was decided to duplicate the *Impatiens* collection at both gardens. Growing these very sensitive plants in separate gardens helps safeguard these accessions from unforeseen catastrophic events.

— The *Impatiens* collection in a cool glasshouse at Botanic Garden Meise. Photo by Marc Reynders.

Prior to the transfer of plants from Bonn, cultivation techniques and environmental conditions needed optimising. Previously, the collection of *Impatiens* at Botanic Garden Meise were cultivated in a glasshouse that would have been too warm for highland species to survive. By fine-tuning the substrates in both gardens and transferring high altitude species to the cool and humid fern glasshouse, the plants grew better and flowered continuously. Currently the collection in Meise comprises 79 taxa with almost 120 accessions.

Besides research, the collection has an important conservation value. Plants from high altitudes are sensitive to climate change, especially when they occur in strongly degraded habitats, and some taxa are endangered. A further problem is that seeds of most species are recalcitrant. This signifies that they retain their ability to germinate only for a short period and thus cannot be conserved long-term in a seedbank. For species that cannot be successfully stored in seedbanks, living collections offer the vital refuge for threatened plants. To increase their survival changes, it is important to distribute plants to as many botanic gardens as possible.

— *Impatiens kilimanjari*. Photo by Marc Reynders.

Cultivating the critically endangered *Impatiens bururiensis*

Impatiens bururiensis is known only from the Bururi District in Southern Burundi, where it grows in upland rainforest along the banks of rivers and streams. In 2013, the IUCN assessed the species as critically endangered because of the small size of its geographic range and real threats to its entire *in situ* population from agricultural encroachment (e.g. cattle grazing) and because its habitat shows clear deterioration.

Fortunately, the Bururi Forest Nature Reserve, a small patch of protected but strongly degraded forest (1,500 ha), is located in the distribution area of this beautiful but threatened *Impatiens*. During the summer of 2014, Botanic Garden Meise held a botanical expedition to Burundi. Botanists of our Botanic Garden collected four seed samples from two populations along the banks of the Siguvyaye River in the Forest Nature Reserve.

Seeds of *Impatiens* generally need to be fresh to achieve good germination results, so upon arrival in Belgium the seeds were sown under both glasshouse and laboratory conditions. Thanks to good care from our gardeners and seed bank collaborators, both methods proved successful. The tender seedlings grew into strong and healthy adult plants that then flowered. Artificial pollination produced seeds (although the yield was low), allowing us to cultivate another generation of *I. bururiensis*.

Ex situ conservation of herbaceous plant species with seeds that cannot be stored for a long period of time can only be achieved by maintaining a large number of plants. *I. bururiensis* is very sensitive to fluctuations in the environment, hence plants require constant attention, repotting and propagation from cuttings and seed.

← *Impatiens bururiensis*. Photo by Marc Reynders.

Endangered Species: 50% of IUCN *Euphorbia* species in *ex situ* collection at Meise

Objective 2, Target 8 of the Global Strategy for Plant Conservation (2011-2020) aims to secure 75% of threatened plant species in *ex situ* collections. Botanic Garden Meise contributes to this target by investing in conservation-relevant collections. Currently, the garden reached its 2015 conservation goal by securing 50% of the 199 *Euphorbia* species assessed by IUCN as either vulnerable, endangered or critically endangered with at least one accession per taxon. This includes 15 species of the 36 designated critically endangered. By 2019 the garden aims to expand this collection to cover 75% of *Euphorbia* species considered threatened by IUCN.

IUCN assessments for *Euphorbia* remain largely incomplete. Consequently, the 497 *Euphorbia* taxa housed at Meise await assessment in their native range. Unfortunately it is likely that more taxa will be classified as threatened because succulent *Euphorbias* are predominantly endemics that have a very restricted distribution, rendering them vulnerable to habitat change.

Currently, the *Euphorbia* collection at Botanic Garden Meise comprises 606 taxa comprising 1,202 accessions. Recent additions are largely obtained through a network of nurseries and organisations such as the International *Euphorbia* Society, who aim to release pressure from wild populations by the distribution of cultivated plants.

— The *Euphorbia* collection in one of the most important conservation collections at Botanic Garden Meise. Photo by Marc Reynders.

— *Euphorbia robivelonae* from Madagascar is critically endangered. Photo by Diana Sasson.

Bringing our heritage to life

During its long history the Garden has constantly been collecting and curating a wide range of botanical collections, living plants, books, artefacts, instruments but also buildings, glasshouses and landscapes. Many of these elements still play an active role in our current work; books and archives are consulted by researchers, historic glasshouses protect plant collections and buildings and landscapes are visited and enjoyed by our visitors.

This extensive and diverse collection requires constant specialised care and upkeep and is an irreplaceable source to develop innovative approaches to better fulfill the mission of the Garden in a changing world.

Mass digitisation of herbarium at Botanic Garden Meise

The herbarium of Botanic Garden Meise houses around 3.5 million specimens. The collection consists of two main herbaria, the Cryptogam Herbarium and the Vascular Plant Herbarium. The Vascular Plant Herbarium contains three main collections: the General Herbarium with more than one million specimens; the Belgian Herbarium with about 200,000 specimens; and the African Herbarium comprising at least one million specimens (of which over half is from Central Africa). The Cryptogam Herbarium meanwhile contains mosses, lichens, algae, fungi and myxomycetes making a total of around 800,000 specimens.

In 2014, Botanic Garden Meise received a grant from the Flemish Government to optimise its current digitisation infrastructure and outsource the digitisation of the entire Belgian Herbarium along with 500,000 specimens from the Central African collection. The project was named DOE! after the acronym of the project's title 'Digitale Ontsluiting Erfgoedcollecties' (Digital Access of Cultural Heritage Collections). The work started in January 2015 and will be completed by the end of 2017.

Optimising the current digitisation infrastructure

Our digitisation equipment consisted of two EPSON 10000 XL scanners on HerbScans (enabling digital scanning without inverting specimen sheets) and one Pentacon scan camera. In 2015, five new imaging machines replaced these systems. Four of these will be used for imaging vascular plant herbarium specimens, fruits, seeds, and wood collections. Each of these systems consists of a continuous lightsource and a PENTAX 645Z camera. The fifth set-up, a digital microscope Keyence VHX 5000, will be used to make images of lichens, myxomycetes and seeds. This optical microscope has a large depth of field and takes razor sharp images in seconds.

The new infrastructure has transformed the pace of work, enabling us to digitise specimens ten times faster than before and resulting in high resolution and high quality images.

DOE!
DIGITALE ONTSLUITING ERFGOEDCOLLECTIES

— Preparation team of the DOE! Project. Photo by Sofie De Smedt

Outsourcing the digitisation process of the Belgian and Central African collection

The one million specimens in the African Herbarium have a strong bias towards Central Africa with 57% of the specimens collected in the Democratic Republic of the Congo, Rwanda and Burundi. Due to the time consuming work to separate collections from Central Africa from other African collections we decided to digitise the entire African Herbarium.

In February 2015, we developed a best practice procedure to tackle this project. Sixteen of our herbarium technicians, under the supervision of a curator, prepared the herbarium specimens for the imaging process. This preparation comprises three possible procedures: addition of a barcode to each specimen; re-mount and restore specimens (if required); and decide which specimens do not need to be imaged. The addition of a barcode is vital in that it will be used as the filing name of the image and is the link between the image and the label data in the database. Volunteers and student workers have been deployed in this work. To date two thirds of the collection is ready for imaging.

By issuing a tender we searched for a company to image a maximum of 1,200,000 herbarium specimens. The selected company will start imaging in early 2016 and will do this in-house to reduce transportation costs and minimise damage to the collections.

Another important step in the digitisation process is transcribing label data into our database BG-Base. Since June 2015, our herbarium technicians enter (only for the African collections) minimal required data such as, barcode, filing name, collector, collector's number and country of origin into the database. Up to now, more than 100,000 records have been manually created in the database. The remaining label data will be added to the database after digitisation. This will be done by retrieving information from the field note books of the collectors, via itineraries and published specimen data from the Flora of Central Africa and through the help of an external company which will be recruited during 2016. For the Belgian Herbarium we follow a different approach. Once imaged the specimens will be accessible on the web and through crowdsourcing, label information will be added to our database.

The newly digitised images will be saved in TIFF format and stored in triplicate at the Flemish institute for Archiving (VIAA) at three locations. The Botanic Garden Meise will keep the JPEG2000 and the JPEG files in duplicate on their servers at two locations.

Our final goal is to make all images and data available to the public on a new virtual herbarium. This portal will be fully operational by the end of 2017.

— Herbarium technician working with one of the four PENTAX 645Z setups for digitizing herbarium specimens. Photo by Sofie De Smedt.

— Herbarium technician at work during the preparation phase of the project. Photo by Sofie De Smedt.

The restoration of the wood collection

We recently rediscovered thousands of wooden objects piled up in the basement of the Herbarium building like a forgotten jigsaw puzzle covered with dust. The 'pieces' differed in shape, size and weight, but each bore an embossed number. Elsewhere in the building stood an overlooked wooden cabinet, packed with box files titled 'Inventory Museum Numbers'. Meanwhile, in the Garden's archives lay some 150-year old manuscripts, referring to these forgotten collections of wood. The time was right to do some detective work, fit the puzzle pieces together and link the card index with the wood specimens and manuscripts. This would restore value to the collection that had lain out-of-sight and out-of-mind for far too long.

The newly restored wood collection dates back to between 1870 and 1960. Each piece of wood in the collection is exceptional, a unique fraction of nature with its own history, interest and use. The earliest samples were those acquired by the botanist Carl von Martius and the Museum of the French Colonies, with more recent material gathered from Brazil and Africa. Part of the collection had previously been displayed in the Garden's Museum of Forestry created in 1902.

The information on the oldest labels of wood specimens helped locate their corresponding manuscripts and allowed us to discover their collection data. Many of the labels are beautiful and some have Japanese or Chinese characters, others with surprising information, as they tell the name of a famous distillery from the perfume Mekka in Grasse. Others link specimens to their display at Universal Exhibitions. The latter includes samples belonging to the commercial demonstration series, with half of the wood left natural (untreated) with the remainder polished.

Especially challenging is tracing the oldest specimens from Suriname, Brazil and French Guiana, which only bear the plant's vernacular name on the label. These names are right up the street of linguists with names such as 'monkey ladder lianas', '*bondin à tortues*' in French Guyana and '*escada de macaco*' in Brazil. By consulting literature from the period, common names can often be translated into their current scientific names.

— Madeiras reais, 'royal' hardwood specimens – to be used exclusively by the crown- originating from the collection of the Emperor of Brazil, with the corresponding manuscript of Carl von Martius, dated 1854. Photo by Viviane Leyman.

— From the underground rootstock of the South African tambookie thorn, light summer hats, called pith helmets, were made. Photo by Viviane Leyman.

The wood collection contains several spectacular pieces. From a sculptural point of view, wood roses – also called *Holzrosen* or *fleurs* de bois are true gems, although in essence, they are natural impressions left by semi parasitic plants such as tropical mistletoes. Woodcuts can also be of exceptional beauty, some with spectacular colour differences between the heart- and sap-woods, or decorative patterns produced by the vascular system. The wood from roots can have its own characteristics, the South African *Erythrina acanthocarpa* is a case in point, as it is unexpectedly lightweight and used in the manufacture of summer hats. One old, dusty brown paper wrap enclosed an extremely finely-crafted Brazilian burl, remodeled into a wooden bell filled up with serving plates, each of them made from another Brazilian wood. Another eye-catcher, tending towards optical illusion, is a large series of wooden samples, refashioned into resemble books with a matt front and varnished back cover, which demonstrate the versatility of the wood when used in the construction of furniture.

The wood collection has now been cleaned and frozen (to kill any possible pests and diseases). It numbers 4,645 specimens and is accommodated in the Xylarium of the Garden. Some specimens will soon be placed in the spotlight in the newly planned Wood Museum, due to open at the beginning of 2018.

— Library staff assessing the physical state of one of the sampled books. Photo by Nicole Hanquart.

Conserving the library's holdings: a first survey of the 'health' of our collection

The Botanic Garden's library has collected and preserved literary expertise relating to descriptive botany since its foundation in 1870. Composed of monographs, periodicals, pamphlets and reprints, it is estimated that if placed end-to-end the collection would reach a distance of 5 km.

The collection comprises many important items of literature, including old books and rare magazines, but above all, the wealth and coherence of the entire collection is what makes it of great historical and cultural value. Because of this, the collection requires physical conservation actions to ensure it is maintained in the best possible condition.

To develop a conservation program, it is first important to know the physical state of the collection. To assess this we took part in a Universal Procedure for Library Assessment (UPLA) developed by the Flanders' Heritage Library.

UPLA is a damage assessment model that is developed to provide libraries the insight and tools needed for establishing strong policies regarding damage prevention and remediation. The model uses a reliable sampling method to efficiently and pragmatically gain insight into the physical condition of library collections and into the level of accessibility.

UPLA assesses damage on the collection level. Three hundred randomly selected items are evaluated in twenty-three damage categories. Two basic questions are answered for each item and each of the damage categories: Is the damage moderate or serious? Is the item at risk from further damage when made accessible?

On the basis of this assessment, we deduced that only 3 % of the collection is at risk of further damage when made accessible. This low figure is good news. Nevertheless, even if in most cases damage does not restrain accessibility this does not mean there are no important issues. The survey also assessed the presence of dust. Over 50 % of books had dust, This is a real problem because dust can encourage mould. The survey also accessed traces of non-active mould, which occurred on 6 % of the collection. We also investigated traces of insects on the volumes, which were only observed rarely.

The assessment highlighted that 10 % of books had damaged bindings and 10 % were distorted in some way. In addition, the collection suffered from the common occurrence of paper acidification. This is a process whereby the paper becomes increasingly brittle over time. This is especially true of books printed between 1840 and 1950. The assessment showed that over 50 % of our collection is affected by this acidification process.

A damage chart established on the basis of the survey allows us to construct a tailor-made preservation policy and collection care plan and allows us to prioritise our actions in the future. Conducting a survey such as that described above also provides us with baseline information for future surveys, enabling us to access the 'health' of our library holdings over time.

Publication: 150, 156

Enhancing and exporting our rich library and archive collections

Since the establishment of our Botanic Garden the library has continuously enhanced its collections. In 2015, we acquired by purchase, subscription, exchange or gift 565 monographs and 2,200 issues of periodicals. In botanical studies both recent and past, scientific literature is important especially in taxonomical study, the evolution of flora and vegetation and historical studies. Unlike many other libraries that continuously rationalise their collections, our library acts as a conservation library and accepts and looks after historic publications that are no longer conserved in most libraries. For example, in 2015 we received 80 serial volumes from Ghent University, 46 books from the Royal Zoological Society of Antwerp, some volumes from the *Centrum voor Agrarische Geschiedenis* (KU Leuven) and from the University of Mons.

The retirement of staff also provides an opportunity to enrich our collections when they leave the Garden. Individuals also donate or bequeath their private botanical libraries to our institute. In 2015, the late Professor Jean-Jacques Symoens' family kindly donated over 600 volumes, and we also inherited the scientific archives of the late Professor René Schumacker and 200 books from the late Professor Jacques Lambinon.

All our collections are available worldwide for scientists, students and the public. These can be consulted through our online catalogue (http://193.190.116.6/webopac/Vubis.csp) and also on several common virtual catalogues, namely: the Linnaeus Link Union Catalogue; the common catalogue of the libraries of Belgian federal scientific institutions and public services (bib.belgium.be); the Union catalogue of periodicals in Belgian academic and special libraries (ANTILOPE); and from last year the Union Catalogue of Belgian Libraries (UNICAT). With the integration of our collections into all these catalogues our institution will certainly strengthen its position on the national and international stage.

— Portrait of Apollon Hardy (1846-1929), a Belgian botanist (photograph by J. Nelissen-Gotthold), with a specimen of *Elatine hardyana*, a species named by B. Dumortier in tribute to A. Hardy.

A portrait gallery in the library

In 2015, we uncovered a forgotten collection of around 500 treasured portraits of botanists. This collection, dated from the early 20th century and contained original photographs and printed pictures of significant plant scientists from around the world, some taken as group photographs during International Botanical Congresses.

Many of the portraits are mounted on cardboard with glass covers. These once decorated the walls of the institute's former home in Brussels but had remained crated and hidden until now.

With help from students, each portrait was digitised and described in our online public library catalogue. Descriptions included the name of the individual(s), dates of birth and death, dimensions of the portrait, type of image (original or reproduction), and complementary information (when available) such as: the photographer's name; date of portrait; age of the individual in the picture; annotations made under the portrait or on its reverse.

In truth, there are many questions about the collection and individual pictures that need clarification. For example, some pictures have been removed from publications without additional information, therefore additional work is required to search for the original reference. Other images have a consistent layout and size therefore seem to have been prepared at the same time for an unknown purpose. Sometimes the photographer's name is associated with the photograph, while others lack this information. Further, we have no knowledge about who assembled the collection of images and for what purpose? Therefore, we need to check the archives to see if this can be determined. There is plenty of work to be conducted on this valuable portrait gallery, which has initiated the plan for a comprehensive study of its contents in 2016.

Vast resources for both sciences and humanities: letting the world know

Botanic Garden Meise can be described as a goldmine in terms of its historical and scientific resources. It is not meant to be an inaccessible vault, consequently, outreach is an important part of the work conducted at Meise.

In 2015, our 'historical taskforce' was again busy. Two biographies on 19th century Belgian plant hunters were published by the Royal Academy of Sciences, in Brussels. In addition, several presentations on 'Historical Research from our Collections' were given: one in Florida, USA; another on 'Early Nature Conservation Concerns in Belgium' at the University of Angers in France and a third in collaboration with the National Centre for the History of Sciences. This steady activity ensured our historians and the institute were well represented to both national and international audiences.

As a result of this profile-raising, a member of the garden's staff was appointed as Member to the National Committee for the Centre for Logic and Philosophy of Science, as a Board Member of the National Centre for the History of Sciences, and as collaborator with the Mondes Moderne et Contemporain Research, Université libre de Bruxelles (ULB) and has also been named scientific collaborator in the 3rd year of the bachelor's degree in History at ULB.

When it comes to the popularisation of science, 2015 was another fruitful year. In the wake of the event and exhibition Year of Flora that attracted 20,000 visitors, several articles about Belgian horticulture were published in international journals including the famous French publication, *Hommes et Plantes*, dedicated to botany and gardening. Two further contributions about the history of our succulent plant collections were published in the journal of the Jardin exotique de Monaco. As a consequence, over 20 talks (in both French and Dutch) and television interviews were given. These included subjects on the history of our institution, Belgian horticulture, botany and Darwinism in Belgium. These presentations reached a wide audience both at home and abroad. In honour of this work, the Société Nationale d'Horticulture de France awarded a medal to one of our staff.

Building on the success of previous years, more exhibitions, contributions and presentations are planned for 2016, thus extending the visibility and accessibility of cultural and scientific resources housed at our institute.

Publications: 115, 135, 136, 151, 152

— Photo by Denis Diagre.

Answering historical and botanical requests: scientific fraternity and tradition

With its rich collections of books, reviews, pictures and archives, Botanic Garden Meise is often asked to lend a helping hand to researchers, students and members of the public. During 2015, we received around 250 enquires for scientific data and historical information that would ultimately be used in articles, books and exhibitions.

Our staff often spends hours or even days searching for the appropriate document, best picture or the right journal in order to satisfy fellow botanists, historians and other people's needs. Paying good attention to all requests ensures the scientific reputation of the institution, fosters collaboration with people beyond the Garden and enhances the social value to our institute.

(Re-)connecting plant and people

Everywhere on the planet specific plant and fungi species have provided local populations with food, energy, materials for housing and tools, fibres for clothing and medicines. In many parts of the world plants remain the primary elements in fighting hunger, disease and extreme poverty. Plants also often figure in cultural expressions and religion. Nowadays, cultural plant knowledge is being lost and with it the vital connections we have with plants and fungi.

Our researchers record how plants and fungi are used so that this knowledge can be shared and distributed. Our scientists' ability to identify plants, even from tiny or ancient remains, contributes to fields as diverse as forensic investigation and archaeology, thus constantly identifying and establishing links between plants and people.

Investigating the potential of wild mushrooms to reduce food insecurity in rural Rwanda

Malnutrition is a major concern in Rwanda and household food insecurity constitutes a challenge for rural communities. Until recently, a large part of the local population relied on non-timber forest products (NTFPs), including edible mushrooms. Because of the transformation of natural ecosystems and restricted access to the National Parks, foraging for wild mushrooms and their consumption has progressively declined. Fortunately, this food potential and the associated traditional knowledge of local communities has not completely disappeared and is worth preserving.

It is common knowledge that the cultivation of mushrooms is a cost-effective way of providing protein. Cultivation requires minimal land, a temperate climate, high humidity and can be grown on organic waste material. We convinced the Rwandan governmental 'environment and climate change fund' FONERWA that a low-tech and low-cost cultivation of local edible fungi may be a successful and important endeavour. Funds were made available to Botanic Garden Meise and Kigali Farms, a private local mushroom-growing company, for implementing a research and development project.

In 2015, three field missions targeted the Nyungwe National Park, the Gishwati Forest Reserve, and the Volcanoes National Park. The latter is located along the northern border of Rwanda with the Democratic Republic of the Congo, also named the Virunga Chain, and is famous as the last protected area for mountain gorillas and for its unique bamboo forest vegetation.

Local guides, villagers and park rangers were assigned to collect edible fungi and record local knowledge (e.g. palatability) and 'folk taxonomy' (e.g. local names in Kinyarwanda). In total, 245 reference specimens were collected, of which 46 edible living strains were isolated and cool-stored by Kigali Farms. Cultivation tests of these wild strains were conducted at Kigali Farms. The first positive results were obtained when *Pleurotus cystidiosus* and *P. flabellatus* were successfully cultivated and produced edible fruiting structures.

Our researchers knew the importance of developing media coverage about the project in order to raise public awareness and sensitise local authorities to the challenges of enhancing the value of mushrooms in Rwanda. Consequently, staff from the Public Awareness Department of Botanic Garden Meise joined field missions and wrote a blog describing day-to-day fieldwork and produced a documentary film that will be distributed online during 2016.

The future aim of this project is to train the rural-poor in mushroom cultivation techniques to provide them with opportunities of livelihood, earn a new income and benefit from a healthier diet.

— Jérôme Degreef collecting mushrooms with staff of National Parks in the bamboo zone of Karisimbi volcano. Photo by Franck Hidvegi.

— *Collybia aurea*, a popular edible mushroom growing on the slopes of Rwandan volcanoes. Photo by Jérôme Degreef.

Importantly, this will also help increase food security and reduce malnutrition and consequently defend against the encroachment of national parks in Rwanda.

More info: http://rwandafungi3.blogspot.be

Capacity building for African mycologists

With thousands of undescribed species and virtually no identification tools or skilled experts, the biodiversity-rich but economically poorer tropical African countries face tremendous difficulties to identify, properly use, conserve and share their biological diversity. The vast problems caused by this taxonomic impediment is recognised by many governments and international organisations worldwide.

In Belgium it is addressed by the National Focal Point to the Global Taxonomy Initiative (GTI) which finances young taxonomists from developing countries to improve their taxonomical knowledge and expertise at Belgian research institutes. In 2015, Botanic Garden Meise trained four junior mycologists, from collaborating universities and research institutes in the Ivory Coast and the Democratic Republic of the Congo. Their one-month training consisted of hands-on training in microscopy, writing specimen descriptions, taxonomy, data processing and field techniques. The trainees had access to our library and herbarium collections, allowing them to validate the identifications of their own herbarium specimens and level up the taxonomy presented in their draft Ph.D. thesis and derived papers.

— A trainee busy with a microscopic observation of specimens collected in Yangambi (DR Congo) as part of his Ph.D. Photo Claver Yian.

— Environmental education in the demonstration gardens. Photo by Francesca Lanata.

Capacity building and landscape development in a post-conflict area: realisation of the ecological garden of Matebe (DR Congo)

In 2015, Botanic Garden Meise continued the partnership with the Congo Wildlife Department (ICCN) and the Virunga Foundation, institutions involved in *in situ* conservation in eastern Democratic Republic of the Congo.

The year was marked by the achievement of construction of the 14 megawatt hydroelectric plant in Matebe, in North Kivu, bordering the Virunga National Park. On the 16th December, the plant was officially opened by President, Mr Joseph Kabila and Mr H. Buffet. The sustainable energy flowing from the Matebe hydroelectric plant provided an immediate and positive impact in terms of development of this recent war-torn area.

Botanic Garden Meise provided landscaping and environmental education expertise to ICCN and Virunga Foundation, in order to link this major development project to the core business of the National Park, namely nature conservation.

The main objectives of the Garden's activities in Matebe were to:

- harmonise the hydroelectric plant with the natural landscape;
- restore degraded habitats;
- promote environmental education, benefiting schools, stakeholders and decision-makers in North Kivu.

Developing and landscaping the site of the hydroelectric plant was a challenging and interesting responsibility: a rare experience for any botanic garden.

— Steven Dessein, Francesca Lanata and the gardeners of the nursery for local and ornamental plants. Photo by Nele Nuytten.

The site was landscaped thanks to tremendous effort in planting wherever possible, indigenous plants. Unfortunately, it was impossible to find sufficient quantities of ornamental and local trees and shrubs from the region, therefore nurseries were established on site to produce seedlings and propagate locally threatened species. In total, 500 metres of hedges (2,000 plants) and 60 trees (Jacarandas) were positioned along the canal. A 600 metre length of sloping ground was stabilised against erosion by planting vetiver, bamboo and other local plants, while seven hectares of bush was reorganised with different ecosystem zones and demonstration gardens that enhanced the importance of plants in both a sensitive and educational way.

At the same time, the Garden has developed local human capital through selection and training of garden staff. A group of local gardeners can now ensure sustainability of the landscape and maintenance of nurseries with an overseeing eye from Botanic Garden Meise's experts who continue to coaching to improve local knowledge.

In 2016, 'Jardin ecologique de Matebe', the name given by Virunga Foundation to the Matebe garden, will evolve into an education and tourist centre. Different Congolese ecosystems will be planted on site and a series of educative panels about plants, people and environment will educate the public to the beauty, qualities and uses of plants along with explaining the key position humans occupy in that ecosystem.

The challenge for the Virunga Foundation and our Garden remains how to build environmental awareness in this post-conflict area in the coming years.

Our objectives for 2016 are to:

- highlight the Park's role among the population in preserving one of the richest regions for biodiversity in Africa;
- reinforce links between Park, ecosystem services and development in a 'modern botanical garden' located around a sustainable energy resource;
- raise awareness and sensitivity on plants and ecosystems (showing different plants from other regions of the DR Congo);
- launch a training program for local guides;
- train students for professions relating to botany, sustainable horticulture, agriculture and forestry;
- organise school visits.

Botanic Garden Meise's success at landscaping the Matebe hydroelectric plant has shown that it is possible to integrate construction with the environment facilitating local capacity to manage botanical activities thus promoting environmental education.

— The gardeners of Matebe and Francesca Lanata.
Photo by Filippo Saracco.

— Landscaping around hydroelectric plant.
Photo by Francesca Lanata.

Inspiring and informing

The Garden is home to 18,000 different kinds of plant, set within 92 hectares of historical domain. It is a beautiful, diverse, green space and a source of enjoyment, wonder and inspiration tempting about 100,000 visitors per year.

Using a broad spectrum of plant displays, museum artefacts, webpages, science communication tools, events, informal learning, awareness instruments and experience-based educational activities, the Garden has the potential to change people's understanding of the importance of plants for human well-being and to emphasise the vital importance of plant conservation.

Building on this understanding, the Garden can stimulate people of all ages, backgrounds and abilities to act in a sustainable and responsible way.

Plant-evolution jigsaw puzzle: a new educational tool to map the history of plants

Charles Darwin's publication On the Origin of Species, which formulated the scientific theory of evolution, was published over 150 years ago. Despite this length of time, teaching of evolution theory is still not always easy as it requires attention to wide and varied fields of biology. Moreover, scepticism or open resistance to studying the theory is now fairly common in some schools.

These difficulties commit us to reflect on teaching practices and inspire us to use innovative educational tools. This is precisely what guided us when we responded to a call for projects (*'Plus tard je serai… Marie Curie ou Einstein!'*) funded by the Brussels-Capital Region and the Brussels Institute for Research and Innovation (Innoviris). The theme of the 'Marie Curie–Einstein Project' for 2014–2015 was 'Origins'. This seemed particularly pertinent to our plan to produce an educational toolkit on evolution. The aim of our toolkit was to engage teachers, provide support and present pupils with scenarios that the school setting does not always provide. We did not have educational kits in our existing educative tools, and we thought our Evolution Glasshouse was under-utilised by school groups, despite tremendous potential for education.

The toolkit contains a number of educational activities including a several metres long timeline that stretches for several meters, a puppet theatre and accessories for role-play and discussion, an active gameplay explaining natural selection mechanisms, a giant poster of a phylogenetic tree showing evolutionary innovations of plant groups and a specially created jigsaw puzzle named the Mikadogram.

The Mikadogram combines principles from the pick-up sticks game Mikado with a cladogram (evolutionary tree). The development of this game went through several stages: firstly, our educational service created a complete and intelligible cladogram, in collaboration with the Garden's researchers. The cladogram represented evolutionary innovations from the first photosynthetic cells to flowering plants. Once the cladogram was selected, we worked with NUNATAK (an educational engineering company based in Lyon) to produce the puzzle. NUNATAK had previously developed a three-dimensional phylogenetic tree for a museum. After feedback from the company, we studied various proposals and worked with them to finalize the Mikadogram. The final version is a large puzzle made from wood and assembled with magnets.

After visiting the Evolution Glasshouse with the educational kit, the pupils then construct the Mikadogram, an activity that synthesizes the knowledge acquired during their day. The educational kit will soon be part of a teacher-training package through the Teaching Service of the Wallonia-Brussels Federation.

— The educational kit title and design line.

— The Mikadogram: all the parts. Photo by Nunatak.

— The Mikadogram: details. Photo by Nunatak.

— Pupils observing economic plants in the glasshouse. Photo by Lies Engelen.

Workshop on sustainability and economic plants

Each year hundreds of school pupils between the ages of 13 and 15 participate in a workshop entitled 'Plants in our Daily Life'. This workshop highlights our dependence on plants for oxygen, food, medicine, textiles and many other commodities.

Due to the obvious connection between economic plants and sustainability, we decided to expand the scope of this workshop towards sustainability. Finding an approach that is both scientifically accurate and appealing to a young public wasn't easy. One easily risks a dumbing down to a level of slogans that seldom cover the complex truth.

We therefore decided to work with a number of case studies, highlighting specific plants that enable us to explain the vocabulary and conceptual framework of sustainability. This is done initially during a guided walk in the glasshouses followed by pupils tackling a range of choices while working in small groups. Which is better: cane sugar or beet sugar? What would you choose: palm oil or vegetable oil? The students first have to gather information on the relationship between the plant they see and a particular product. They then have to make a choice for either product and defend their choice with arguments concerning sustainability.

We hope that in the coming years, hundreds of adolescents will continue leave our garden with knowledge that will influence their way of thinking about their consumption patterns in the future.

Living willow sculpture

Botanic Garden Meise aims to reach every sector of the community. One area considered in need of additional development was a place where children can play and enjoy the garden. Selecting the right type of attraction that would nicely integrate into the unique, historic landscape of the park was important, consequently, structures made from living willow ticked all our requirements.

During autumn 2014 and spring 2015 the Garden commissioned environmental artist Will Beckers, a specialist in creating site-specific installations that explore our relationships with the natural world. The artist gains inspiration from the *Natura Naturans* philosophy (nature doing what nature does; nature has its own process; what is born, is reborn) developed by the Dutch philosopher Benedict De Spinoza (1632-1677).

Beckers crafted a permanent living art installation of three meandering, living willow tunnels that forms a symbiosis with the natural surroundings of the park and terminate at some beautiful old conifers. Thousands of woven living stems make up the tunnels, many have taken root and are growing allowing the artwork to change with the seasons and over the years. Incorporated into the sculpture are objects that entice visitors to consider different aspects of plant life.

As expected, the willow sculpture is a major attraction to children. Soon worn paths appeared in the tunnels, an indication that children were exploring the work of art. The willow sculpture also provides a space where various educational activities can be performed thus extending the Garden's appeal to the community.

— View inside one of the willow tunnels. Photo by Liliane Tytens.

— Light flowers made by the Garden staff. Photo by Peter Lanckmans.

— Floating waterlilies on the Castle pond. Photo by Paul Borremans.

Seasonal celebrations bring natural changes back to the people

Botanic Garden Meise has a tremendous amount to offer visitors in all seasons with distinctive areas and particular plants looking their best as the year progresses. The Garden has always celebrated the best places for visitors to enjoy. However, the education team decided we could celebrate each season by bringing some of the activities together in four themed weekends reflecting the changing seasons. We call these seasonal weekends the Floridylle festivals. The festivals will guide visitors through the most beautiful spots, show off the Garden's best views and spotlight the most spectacular plants of the season.

This move increases the awareness of the natural changes around our busy lives, brings the seasons back to the public and provides a platform to communicate our messages to the press. This should become a great way to celebrate the seasons.

In December 2015, we celebrated our first winter event, Winter Floridylle (18 - 21 December). Visitors were guided along a trail where light, fire and music interplayed, creating a heart-warming seasonal experience. This event was set in romantic light, incorporated a spectacular fire performance outside the castle and illuminated the winter beauty of our trees with carefully positioned lamps. It also showcased our wonderful array of carnivorous plants in the glasshouses and the evergreen splendour of conifers outside. The success of this inaugural event is also anticipated in the spring, summer and autumn Floridylles planned for 2016.

— Spectacular fire performance attended by a lot of visitors. Photo by Paul Borremans.

— Foot bridge crossing the Victoria pond.
Photo by Franck Hidgévi.

Flori Mundi: the second edition!

After the much appreciated and successful first edition of Flori Mundi last year, we challenged ourselves to make the second edition even more splendid and diverse. Our floral festival has evolved into a fascinating triumvirate of horticulture, science and culture.

The Plant Palace was transformed into an enchanting and fairy-like world with thousands of flowers, sounds from nature and mystic lighting of our permanent collections. The best way to experience Flori Mundi is by visiting our festival, but for those who did not make it this year, we will sketch the highlights. Our Gracious Lady statue in the Spring House flaunted in an impressive castle tower covered with red, white and pink *Euphorbia milii* plants. Following a path of colourful *Cymbidiums*, our visitors were led to a frightening two-headed dragon with a 12 m long body made of a palette of mini bromeliads. After dwelling under romantic arches of tropical splendour and an infinite heaven of *Vanda* orchids, people were challenged to climb the stairs of a cheerful pagoda with abundant *Phalaenopsis* orchids to reach the daring footbridge crossing our Victoria pond. An unforgettable experience for both young and old! But we wanted more: 10,000 *Phalaenopsis*, *Vanda* and *Cymbidium* orchids are definitely marvellous, but fail to encompass the incredible diversity of the Orchid family. To show a glimpse of their splendour the journey ended with a display of forty spectacular blooming botanical species and rare hybrids.

— Our Gracious Lady statue, flaunted in an impressive castle tower covered with red, white and pink *Euphorbia milii* plants.
Photo by Franck Hidgévi.

To offer visitors to Flori Mundi a scientific framework, the Garden's educational team designed an exhibition 'European Orchids, Wild Seducers' along the outdoor trajectory of Flori Mundi. Vivid photographs and an inspiring movie revealed the wonderful world of orchid pollination. The texts on the panels elucidated the wealth of their ingenious pollination strategies the flowers have and splendid designs to attract insects. The content of the exhibition was based on the book 'The Flower of the European Orchid - Form and Function', written by Jean Claessens and Jacques Kleynen, two Dutch orchid enthusiasts.

The exhibition 'Elisa Klopfenstein: Orchidaceae belgicae - The Orchids of Belgium' in the Bouchout Castle, added a cultural touch to the Flori Mundi festival. This exhibition was the result of collaboration with S.E.M.O. (Studiegroep Europese en Mediterrane Orchideeën), an association dealing with the study and protection of our native orchids in Belgium. It highlighted a number of original watercolour paintings by Elisa Klopfenstein from the series Orchidaceae Belgicae. These show several life-size Belgian orchid species in their natural setting, together with several details of the flowers. Sixteen watercolour paintings, representing the most popular European orchids, growing in Belgium, were selected for this exhibition. The paintings were accompanied by photographs from S.E.M.O. and information based on the original texts written by Philippe Toussaint, the late husband of Elisa Klopfenstein.

The second edition of our floral festival attracted again many visitors to our Garden in 2015. By unifying horticulture, science and culture we were able to delight and inspire a wide sector of the community, scientists and plant lovers, tourists and regular visitors… In other words, we had it all.

— Exhibition 'European Orchids, Wild Seducers'.
Photo by Franck Hidgévi.

— Lizard Orchid - *Himantoglossum hircinum* (L.) Spreng, watercolour painting by Elisa Klopfenstein.

Development of the peony garden - the 'Flower Theatre'

The idea for the development of a peony garden dates to the 1980s when we acquired a collection of exquisite tree peonies from renowned nurseries in New York, USA (Smirnow) and France (Rivière). It was not until 2007 that funds became available to create a garden large enough. Since peonies are susceptible to disease (such as *Botrytis* and *Phytophthora)* we decided to give them the best possible start by diminishing their risk of infection by providing wide spacing (good air circulation), while raised beds gave good drainage in an open, full sun position. These plants were placed like actors in a theatre.

The peony forms the backbone to the Flower Theatre. Botanical species are divided into herbaceous and woody types and have been arranged according to their distribution in the wild. Cultivars of woody peony hybrids are displayed in areas depicting their origin (e.g. Europe, China and Japan). Herbaceous cultivars are divided into a range of discrete groups. The *Paeonia* collection comprises 162 taxa (173 accessions). Another well-represented group is *Camellia* with 67 taxa (69 accessions) arranged along the rim of the surrounding wood. The *Camellias* are planted in groups of botanical species, *Camellia japonica* hybrids of Belgian origin, camellias of foreign-garden origin and Williamsii-, Lutchuensis- & Higo-hybrids.

Planting was also combined with other genera to avoid the risk of the area looking bland after the peonies' spectacular flowering period during April and May. Emphasis for these plantings was put on horticultural merit. These included *Camellia* hybrids, bearded irises, lilies and climbing roses. Remarkable leaves embellish the planting arena with *Frangula alnus* 'Aspleniifolia' and *Rhododendron macrosepalum* 'Linearifolium'.

— Exquisite eye-catching displays seduce the visitors when peonies are not in flower. Photo by Dirk De Meyere.

— View on the Peony Garden - the Flower Theatre. Photo by Dirk De Meyere.

The Flower Theatre also includes a range of dwarf cultivar forms of plants that often produce large trees: *Broussonetia papyrifera* 'Laciniata', *Ginkgo biloba* 'Troll', *Tilia platyphyllos* 'Compacta' and *Ulmus ×hollandica* 'Jacqueline Hillier'. Examples of trees and shrubs with strange leaf forms or bizarre habit included *Buddleja crispa* var. *farreri*, *Celtis koraiensis*, *Ilex latifolia* and *Corylus avellana* 'Pendula'.

At a season when peonies, camellias, roses or irises will be less prominent the visitor will be seduced, at a glance, by flowering eye-catchers like: *Bletilla striata*, *Cercis griffithii*, *Choysia ternata*, *Daphne ×transatlantica* 'Eternal Fragrance', *Eremurus ×isabellinus* hybrids, *Fritillaria imperialis* cultivars, and *Musa basjoo*. In late summer or early autumn remarkable fruits can be seen on *Idesia polycarpa*, *Neoshirakia japonica*, *Sorbus ×hostii* and *Styrax japonica*. Then comes the time to enjoy the autumn leaves of *Acer circinatum*, *Itea virginica* 'Henry's Garnet', *Rhus chinensis* or the oddly named *×Sinocalycalycanthus raulstonii* 'Hartlage Wine'.

Plant families to which we paid special attention in this garden are Araceae, Lamiaceae, Styracaceae, Zingiberaceae. Half-hardy plants from regions with Mediterranean or even sub-tropical climate are well represented. A few examples taking the onlooker on a global tour includes: *Juniperus thurifera* (Morocco), *Quercus alnifolia* (Cyprus), *Syringa afghanica* (Afghanistan), *Piptanthus nepalensis* (Himalaya), *Diospyros eriantha*, *Lagerstroemia subcostata* (Taiwan), *Hebe albicans* (New Zealand), *Aristotelia chilensis* (Chile), *Alstroemeria pulchella* (Brasil), *Quercus ajoensis* (Mexico), *Gomphostigma virgatum* (South-Africa).

Some alpines are used as ground cover. Other plants were chosen for their fragrance or attractive leaf colours. Bulbs planted in the lawns around the raised beds provide extra colour during spring and autumn.

Plants are sited with purpose - 30 cultivars of bearded iris wind their way through the display giving a snake-like appearance. *Asarum* and *Saruma* were planted together as one name is an anagram of the other. Cultivars of *Camellia japonica* like 'Mathotiana Rosea', 'Mathotiana Rubra', 'Kingyo-tsubaki' and 'Shirokingyoba-tsubaki' are planted side-by-side. While *Paeonia* 'Many Happy Returns' invite visitors to come back frequently.

In total, the Flower Theatre comprises 738 taxa (769 accessions). These are made up of 116 bulbs, 284 herbaceous perennials, 259 shrubs and 79 trees. About 90 plant families are represented and 232 genera. The horticultural importance of the collection is demonstrated by 376 named cultivars while botanical species are represented by 126 accessions from known wild origin.

This garden has taken six years of careful and painstaking selection and planting. In 2015, we can finally say that most planting is complete, although no garden is ever 'finished' as trilliums, epimediums and other members of the Berberidaceae family await their turn on stage.

— Peonies are extremely attractive. Photos by Dirk De Meyere.

Tinctoria, an exhibition from our artist in residence

After the two superb exhibitions by our artist in residence, '*Détours végétaux*' (2011) and '*Legends of the Seed*' (2013), Sandrine de Borman proposed 'Tinctoria', her poetic universe where plants reveal their 'essence' in precise textile prints and surprising sensitive poetic herbaria in botanical diaries depicting travel, made with plants from the Botanic Garden. '*Tinctoria*' tempts visitors to explore the botanical world and has an introduction from French botanist Francis Hallé who visited the Garden in February in partnership with '*Cirque vegetal*'.

Between April 4th and November 11th, the exhibition '*Tinctoria*' was displayed in the tower of the castle. Sandrine also provided 16 guided tours with demonstrations, three days of activities for children and six weekends of workshops for adults. These events were met with great success with participants from all over Belgium, the Netherlands, Germany and France amongst others. A special visit co-animated by Rachel Bouvet, member of La Traversée, Atelier québécois de géopoetique, was also met with great public interest.

The comments reflecting the views of the public included: '*Thank you for this exhibition which is traversed like a dream, tinted by serenity, delicacy… nature with revealed splendours*'; and '*Thanks for chairing the beauty of nature and for opening our eyes*'.

Publications: 114

Realising state-of-the-art visitors and research infrastructure

Botanic Garden Meise is situated in a historic landscape of 92 hectares whose history dates back to the early Middle Ages. The domain is home to more than 50 buildings, including underground ice cellars, tropical greenhouses, a medieval castle and various research and service buildings. Due to lack of investment in the infrastructure of the Botanic Garden for several decades, most buildings are in a very poor condition and renovations are required. We aim to sustainably preserve the scientific collections, which enjoy high international reputation, andcreate an attractive research environment. There will also be investment to improve the entrances so that Botanic Garden Meise further strengthens its international position both as a research institution and as a tourist destination.

— Concept of new entrance of Plant Palace by Low-architecten and Landinzicht.

Phase one of the masterplan begins

In 2015, the first phase of the botanic garden's masterplan (2015-2019) began with a number of exciting projects. Two of these concern the public entrances to the Garden and the glasshouse complex.

Creating welcoming entrances to the Garden

The Botanic Garden intends to develop a modern, welcoming building to provide visitors with a first class reception. It was decided that the entrances at Nieuwelaan and Meise village required substantial redevelopment - these two sites will be treated as a single architectural project to provide uniformity over the domain.

The main entrance at Nieuwelaan will see the renovation of the old Flemish farmhouse. This homestead is a beautiful historical building with heritage value that dates to around 1840 with modifications during the 20th century. The modifications made the property into two separate dwellings, unfortunately, they gave little respect to the building's historical value. Nearby, redevelopment of the historical main driveway to the castle (known as the Eredreef) and the siting of a new building for ticket sales and a visitors' shop will be developed. Negotiations are also underway to purchase the strip of land beyond the Garden between Nieuwelaan and the A12 road, which would provide additional parking for visitors.

The secondary entrance to the garden, close to Meise village, will increase in importance and in visitor numbers when a planned tramline opens between Brussels and Willebroek, and includes Meise village as one of the halts. This entrance will become a fully functional reception centre. The existing caretaker's residence on this site will be retained and architecturally integrated into the new design.

The Flemish Building Agency and the Team Flemish Goverment Architect, will undertake the search for a suitable research and development company to undertake this extensive project.

Landscaping and renovation of the Plant Palace

Exactly 50 years have passed since the Plant Palace was officially opened to visitors. This period of time has meant that some renovation is required and this will be completed in various phases. To develop this project, a team comprising architects and landscape architects have been appointed.

The forecourt with its steps on the park side of the Plant Palace will make room for an impressive water feature that will reflect the north facade of the Plant Palace. The steps will be replaced by gradually sloping pathways allowing accessibility for wheelchair and pram users. The visitors' facilities will undergo refurbishment and deteriorating concrete restored. The facades to the building will also be refreshed and the drainage system repaired. The external landscaping is planned for completion in spring 2017, a date when the interior redesign of the glasshouses will also be complete.

A new glasshouse complex

The existing glasshouses housing the plant collections are, on average, 65 years old, with some of the oldest wooden structures over 85 years. It is therefore with little surprise that two have caved-in while others are in a dire structural state. Consequently, the masterplan incorporates a replacement complex with a surface area of approximately 6,700 m² developed in the central part of the Garden, in an area south of the castle. Additionally, this will include a multi-functional space, technical rooms, toilets, and an outdoor plant nursery. The new glasshouse will be used for conservation collections, house propagation facilities and over-winter frost-sensitive plants. The area will be divided across a number of units corresponding to different climatic conditions to suit the requirements of the plants. Each unit will be controlled by its own programmable technical infrastructure. The requirements of the individual units have been highlighted in a document and handed to the engineering firm who will conduct the work. The seedbank will also be located close to this glasshouse complex to facilitate teambuilding. Part of the design phase will also integrate the existing service building of the collection department. The building will be constructed in phases. In the second phase, the existing old collection glasshouses located in the inner quadrants of the Plant Palace will be demolished.

The new complex will, in the most part, be closed to the public but some limited access will be granted, e.g. in the propagation area. This project is supervised by the Flemish Building Agency, who will assist in finding a suitable research and development company to develop the project

Renewing the water-supply system for plants growing undercover

A basic need of any plant is water. In a glasshouse situation some plants need to be watered daily. For the past five decades, this water has come from a 170m deep well located near the Orangery restaurant in Meise. This site also included two large underground reservoirs, each with a capacity of 240 m^3. After treatment to remove salts and minerals, around 6,000 - 6,500 m^3 of water was pumped through the park to the various glasshouse complexes. For the past half century this system worked well, however, several issues such as a legal ban on the use of deep wells, ageing infrastructure and the great distance between the well and the glasshouse meant a new long-term solution for the supply of water was required and new infrastructure needed.

In 2015, three shallow-drilled wells in the vicinity of the glasshouses were made for pumping water into a newly-sited concrete buffer tank. The wells provide a combined volume of 3 m^3 per hour. Water is then treated by reverse osmosis and stored in a second buffer tank, from where it is distributed throughout the Plant Palace by a newly installed pumping unit connected to the existing network of pipes and taps. Demineralising the water is necessary because some plant collections are very sensitive to certain salts.

The combined new infrastructure was built to high technological standards and designed with ease of maintenance in mind. This will guarantee a steady uninterrupted supply of water for the living collections in our glasshouses well into the future.

— The new reverse osmosis instalation. Photo Wim Speliers.

— Preperations for the casting of two underground concrete water basins. Photo by Danny Swaerts.

— The refurbished interior of the tavern. Photo by Danny Swaerts.

Refurbishment of the conservatory

The Orangery is a neoclassical building built around 1818. It was commissioned by Baron Vanderlinden d'Hoogvorst who resided in a castle that once stood at the end of the long pond in Meise. The Orangery was built and used for the protection of frost-sensitive plants. The building was completely renovated in 1957 to become a tavern and restaurant. The windows facing the walled garden were blocked up and the interior was refurbished into a functional tavern and kitchen and toilet facilities were positioned on either side.

In 2015, the interior has again been refurbished. The dining area was transformed to contemporary tastes and the old lavatory was upgraded to allow access for wheelchair users. The bricked-up window was opened up once more and the space redesigned to accommodate a glass door entrance allowing splendid views of the walled garden. A ramp was constructed to link the garden with the elevated building. This allows easy access for wheelchair users and young families with prams and meets the legal requirement for access in public places. This new door's design reflects historic references to the original window combined with modern building regulations.

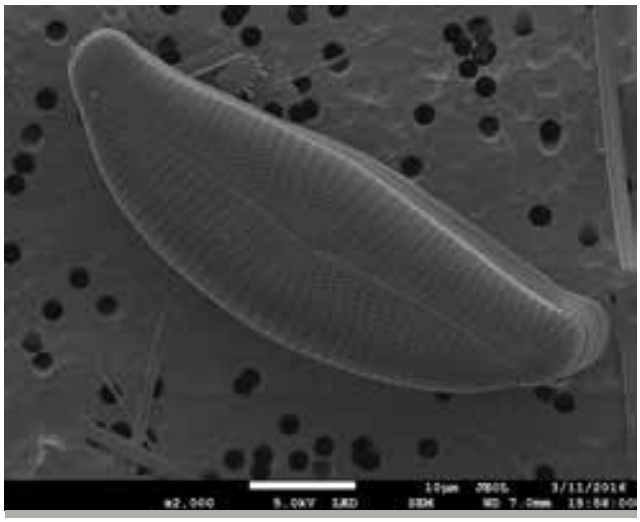
— The walled garden with the new entrance to the tavern in the background. Photo by Danny Swaerts.

A new tool to unravel the hidden living world

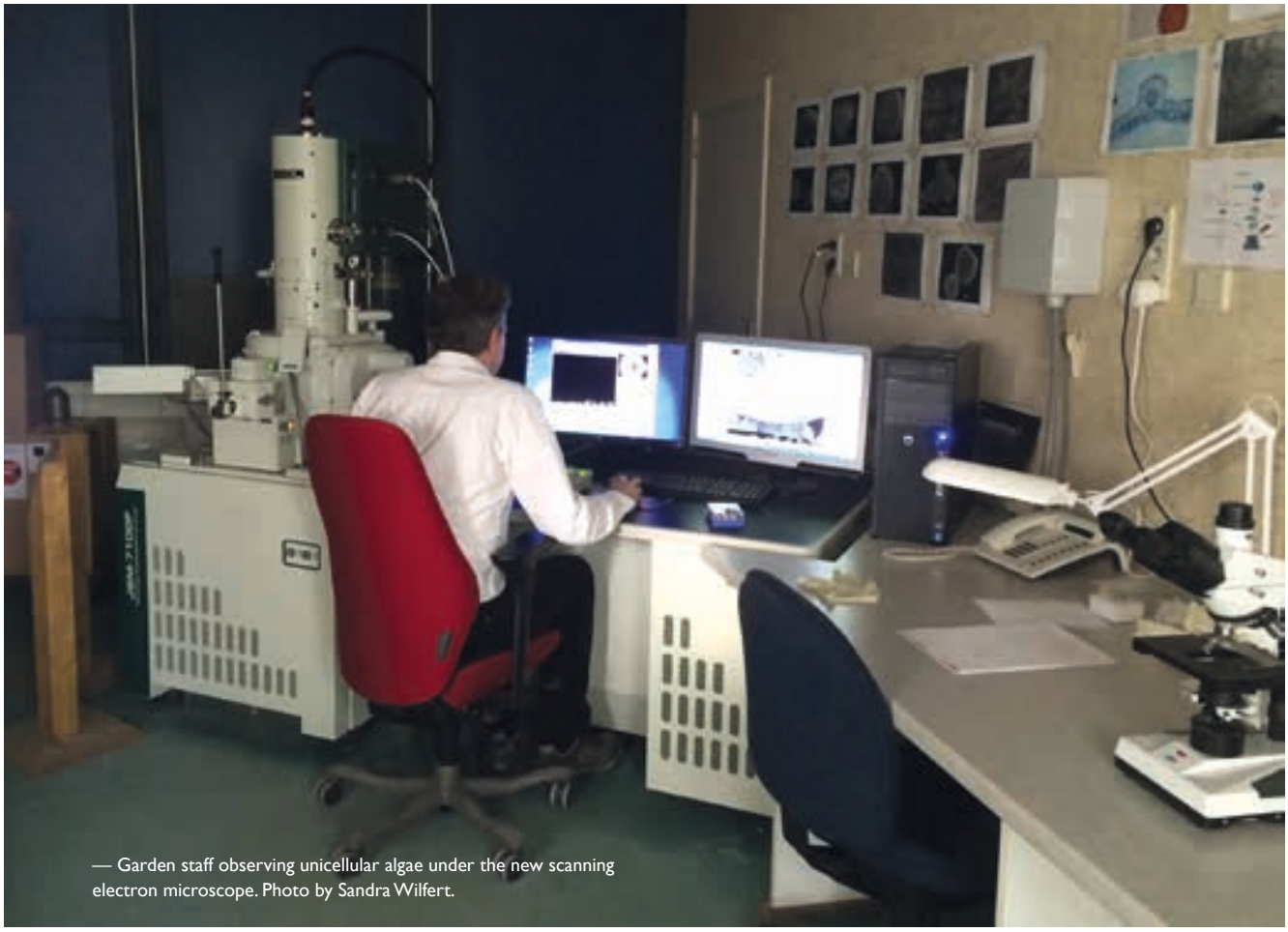
Part of the research at Botanic Garden Meise is focused on the morphology and classification of plants and fungi. Although a large part of the living world around us is visible with the naked eye, smaller organisms, such as unicellular algae, require special tools to visualise their details. A light microscope allows us to magnify these structures up to 1,500 times but beyond this magnification, a scanning electron microscope (SEM) is the only scientific instrument that helps scientists to unravel even the smallest features.

In 2015, with the help of the Agency for Innovation by Science and Technology (IWT), the Botanic Garden invested 250,000 euro to purchase a new SEM. By using this equipment it is now possible to detect even the smallest plant characteristics at a magnification of 150,000 and over. The large depth of focus that can be obtained with the new JEOL-JSM-7100F creates a strong 3-dimensional effect that cannot be obtained from light microscopes.

The presence of these new SEM facilities in the Botanic Garden is therefore an important asset in modern taxonomic research, especially within mycology, algology and pollen research, allowing our researchers to meet the highest standards of international excellence in their research and curatorial activities.



— *Encyonema prostrata*. Photo by Bart Van de Vijver.



— Garden staff observing unicellular algae under the new scanning electron microscope. Photo by Sandra Wilfert.

Organisation

Our Garden is an ever-changing organisation with about 180 members of staff, more than 100 volunteers and 20 guides. They join forces to reach the Garden's goals and to prepare for future challenges.

In memoriam

In 2015, the Botanic Garden sadly lost three of its collaborators. They will live on in our memories and through their publications.

Herman Stieperaere (1945-2015)

With heathland landscapes full of interesting plants within cycling distance from his home near Bruges, Herman Stieperaere developed a special interest in species-rich grasslands with heather on poor soils (*Nardetea)* from an early age. In 1965, the year he graduated as a schoolteacher, he produced a study on this type of grassland, the result of numerous field excursions and extensive self-study.

In time, Herman felt increasingly attracted to scientific research. He enrolled as a student at Ghent University and in October 1981 started a new career as a bryologist at Botanic Garden Meise, without, however, neglecting his research on grasslands. Based on his graduate dissertation, he soon published a standard list of the Belgian flora, which would later be cited in numerous papers. In 1990 he finished his doctoral dissertation on the *Nardetea* of Atlantic Europe, based on fieldwork that extended to Ireland in the west and northern Spain in the southwest. Between 1990 and 2001, he was editor of the Botanic Garden Meise's journal Dumortiera.

Preceding his appointment to the Botanic Garden, Herman had played a pioneer role in nature conservation and nature management in Belgium, showing great didactic and research skills. The nature reserve Gulke Putten, in Wingene, became his favourite terrain, where he guided interested visitors, experimented with new management techniques (including grazing with sheep), helped students with Ph.D. work, and studied the local vascular plants and mosses. Based on the combination of a thorough knowledge of plant ecology and an interest for historical land use, Herman developed a special proficiency for reading the history of a landscape, based on traces left by earlier human activities. This ability was not restricted to woods and heathland, but also extended to historic castle estates and outmoded small flower gardens.

Herman's bryological publications reflected his wide interest. In 1994 he published a paper on the liverwort *Lophocolea semiteres* in Belgium, an exotic species from the southern hemisphere that would occupy him till the end of his life. When archaeological sites yielded remains of well-preserved mosses that had been used as caulking material in ships or in the construction of a Roman well, Herman was asked to study this material and attempt to evoke features of long-vanished landscapes. After retirement, he stayed actively involved in the activities of the bryological workgroup (VWBL, Vlaamse Werkgroep Bryologie en Lichenologie), both as a participant in excursions and editor of its newsletter, Muscillanea.

— Photo Geert Raeymaekers

Jacques Lambinon (1936-2015)

Before the end of the 1950s, the publications of the young botanist, Jacques Lambinon, already indicated the course he would follow throughout a long career as a scientist and naturalist. Titles of short publications in a range of journals included *Cardamine palustris Peterm. à 2 n = 64 à Chertal*, but also Quatre adventices sur les trottoirs de la ville de Liège. To topics such as taxonomy and nomenclature of vascular plants, fungi, lichens and bryophytes, the flora of tropical Africa, plant galls and non-indigenous plants, he later added nature conservation. In 1969, he was one of the authors of *Plantes rares, disparues ou menacées de disparition en Belgique*, a precursor of the IUCN Red Lists of threatened plants.

In 1967, Jacques Lambinon was one of seven authors of the Flore de la Belgique, du Nord de la France et des Régions voisines, the last of a series of floras published by Editions Desoer in Liège. Six years later, by then professor at the University of Liège, Lambinon was, with Constant Vanden Berghen, the principle author of the *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des Régions voisines*, published by the then National Botanic Garden of Belgium. This collaboration with Botanic Garden Meise was to last for four decades and resulted in six editions of the Nouvelle Flore (often called 'the Blue Flora' or 'the Lambinon') and three editions of Flora van België (often called 'the Red Flora'). The archives of the *Nouvelle Flore* have been donated to the Botanic Garden.

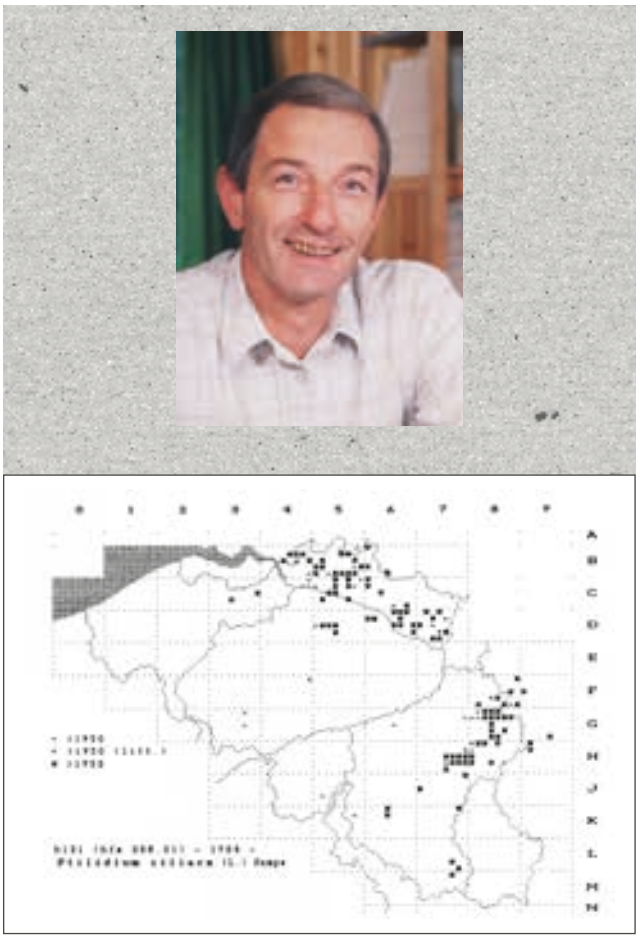
From the early 1970s until 2004, Jacques Lambinon played a key role in the activities of the *Société pour l'Echange des Plantes vasculaires de l'Europe occidentale et du Bassin méditerranéen*, yielding numerous specimens for the herbarium of the Botanic Garden.

— The French (blue) and Dutch (red) editions of the Belgian Flora. Together, they sold over 50,000 copies.

René Schumacker (1937-2015)

Throughout his career, René Schumacker was primarily interested in the study of the Hautes-Fagnes, near to his birthplace, and bryophytes. In the 1970s, he turned the Station scientifique des Hautes-Fagnes (Mont-Rigi) into an important multi-disciplinary meeting ground for amateur and professional botanists, zoologists and conservationists.

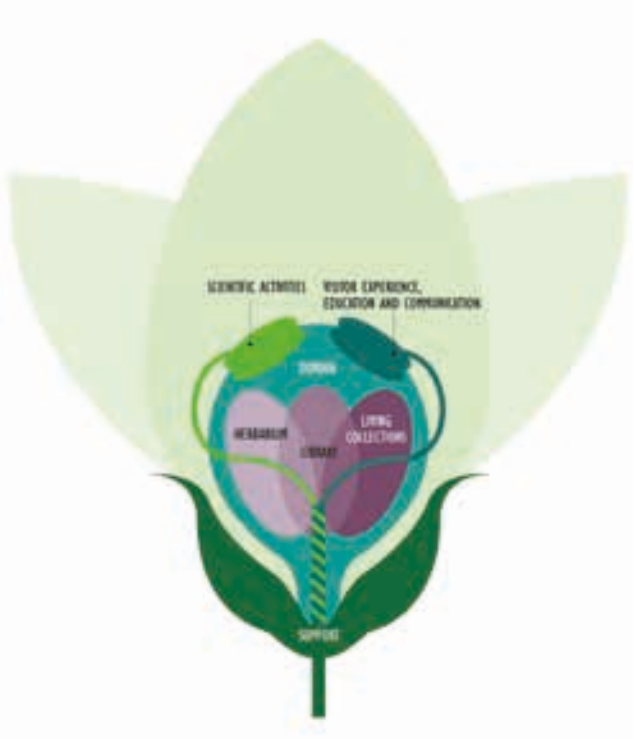
Years before the advent of personal computers, René Schumacker explored the possibilities of using digital databases to produce distribution maps of plants. In 1985 he created a series of distribution maps of hepatics that were published by Botanic Garden Meise. The same computer program was later used by other researchers in a range of publications. Because of his in-depth knowledge of certain groups of the Belgian flora (e.g. Lycopodiales) he was recruited as a collaborator for the Nouvelle Flore de la Belgique.

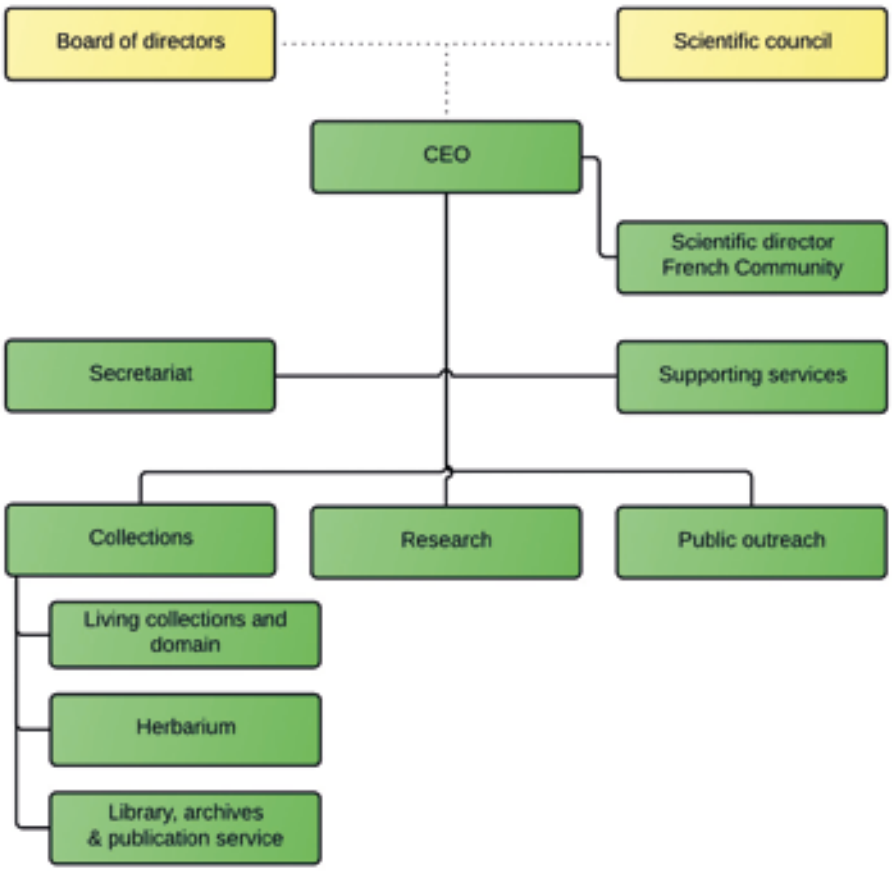


— Distribution map of *Ptilidium ciliare* in Belgium and Luxembourg.

New organization chart

The old organisation chart was essentially built around two research departments, i.e. the Department of Spermatophytes and Pteridophytes and the Department of Bryophytes and Thallophytes. This organisation model does not target the contemporary challenges of a modern botanic garden. The activities of Botanic Garden Meise are situated around three poles: the preservation of collections; conducting research; and providing a visitor experience to the widest sector of the public. The processes involved in these activities are very different; consequently, they will be housed in separate departments: Research, Collections, and Public Outreach. This will result in better alignment and integration between the strategic, social and technical components of the Garden and increase interactions between these three major groups of activities. This will be ensured by the integration of different activities at project level. The new structure will be fully operational in 2016 and should facilitate reaching the goals outlined in the Garden's Business Plan.





Facts and figures

Finances

Financial Result (K€)

The available budget for 2015 was 12,662 K€ of which 12,530 K€ was used for the financial year in question.

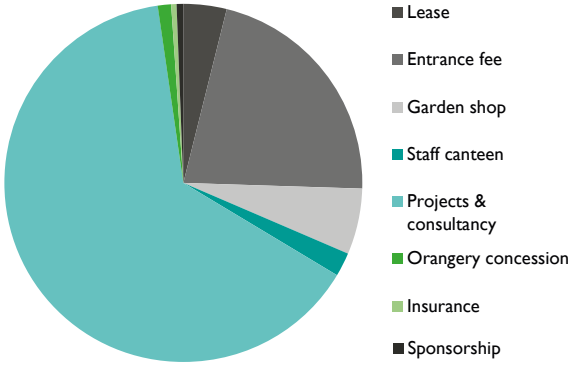
	2014	2015
Acquisitions	12,064	12,662
Expenses	11,535	12,530
Budgetary year balance	529	132

Breakdown of financial income (K€)

Financial income consisted of 10,576 K€ from the Flemish Government and 2,086 K€ in total from self-generated income. This internal income came mostly from projects, consultancy work and ticket sales. There is a sharp increase in the income from projects. This is mainly due to project subsidies by the Flemish Government for the digitalisation of collections, the purchase of a scanning electron microscope and the start-up of the renovation works as part of the realization of the masterplan for the Botanic Garden.

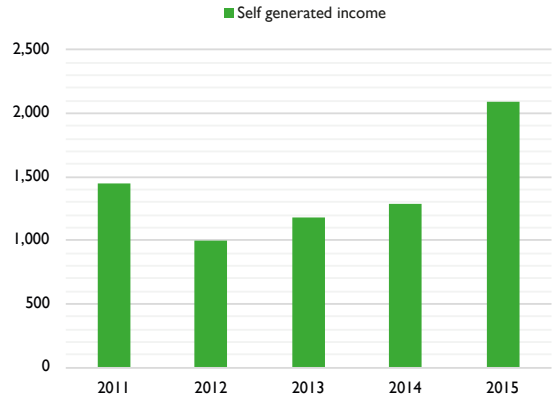
Self generated income (K€)

Lease	81
Entrance fee	451
Garden shop	124
Staff canteen	45
Projects & consultancy	1,338
Orangery concession	25
Insurance	10
sponsorship	13
Total	**2,086**



Evolution of self generated income

2011	2012	2013	2014	2015
1,449	1,002	1,181	1,288	2,086

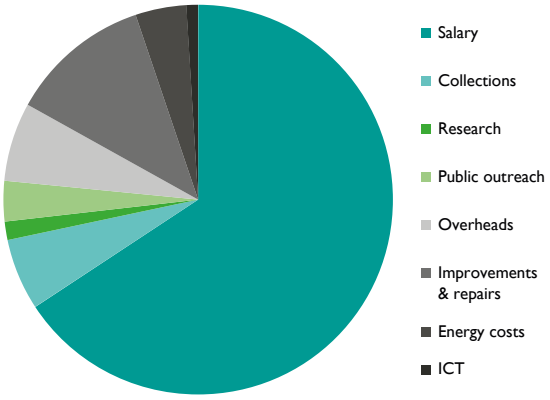


Expenditure

Salary costs accounted for a little over 70% of the total budget in 2015. Energy costs accounted for somewhat less than 5%. For our plant collections, research activities and public outreach there was, respectively, 743 K€, 310 K€ and 421 K€ available.

Expenditure

Salary	8,237
Collections	743
Research	191
Public outreach	421
Overheads	820
Improvements & repairs	1,466
Energy costs	532
ICT	121
Total	**12,530**

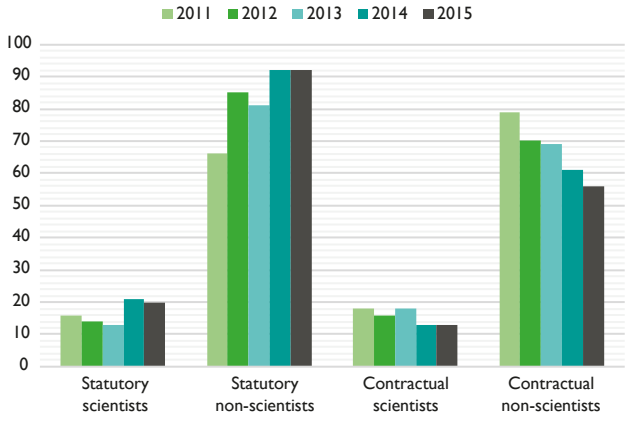


Staff

Overview of staff (situation as of 1 January for each calendar year)

The number of staff (including temporary staff) dropped by six from 2014 to 181. This was due to a considerable decrease in the number of contractual non-scientists.

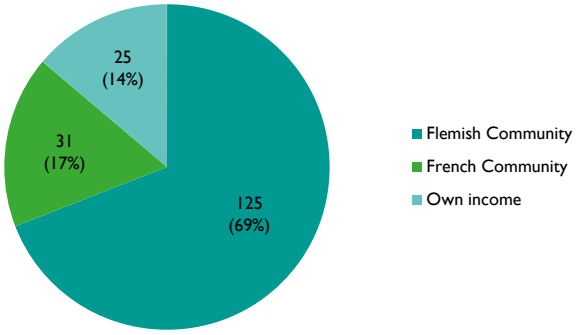
	2011	2012	2013	2014	2015
Statutory scientists	16	14	13	21	20
Statutory non-scientists	66	85	81	92	92
Contractual scientists	18	16	18	13	13
Contractual non-scientists	79	70	69	61	56
Total	179	185	181	187	181



Breakdown of staff according to the source of income (situation as of 1 January 2015)

The salaries of Botanic Garden staff were funded by income arising from the Flemish Community (125 staff members, 69 %), from the French Community (31 staff members, 17 %), and from own resources (25 staff members, 14 %).

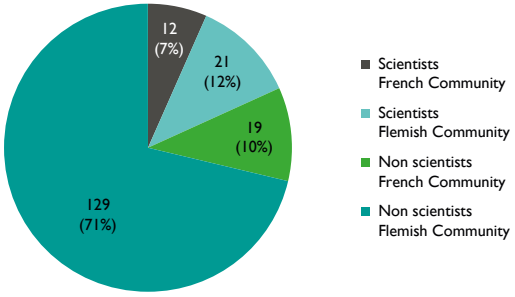
	2015
Flemish Community	125
French Community	31
Own income	25
Total	181



Staff breakdown per community and function (situation as of 1 January 2015)

About 19 % of the staff are scientists of which a third is financed by the French Community. The French Community also pays for 19 persons (10 % of total) that are engaged in other activities of the Botanic Garden.

	2015
Scientists French Community	12
Scientists Flemish Community	21
Non scientists French Community	19
Non scientists Flemish Community	129

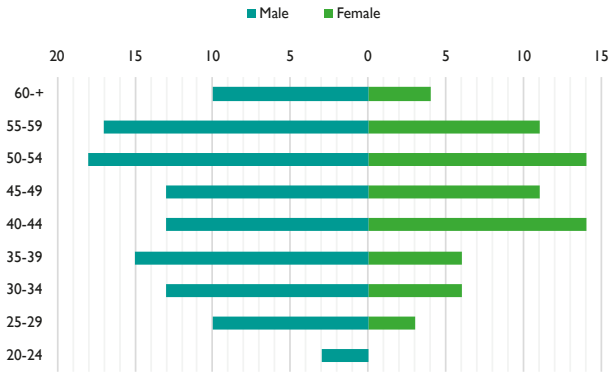


Age pyramid

Almost two third of the personnel is older than 40 and more than one third is older than 50 with 10% older than 60. Personnel of the French Community is on average younger than that of the Flemish Community with 40% aged between 35 and 44. Approximately 40 % of staff is female, but the distribution between the various services is very variable, for example most of our gardeners are male.

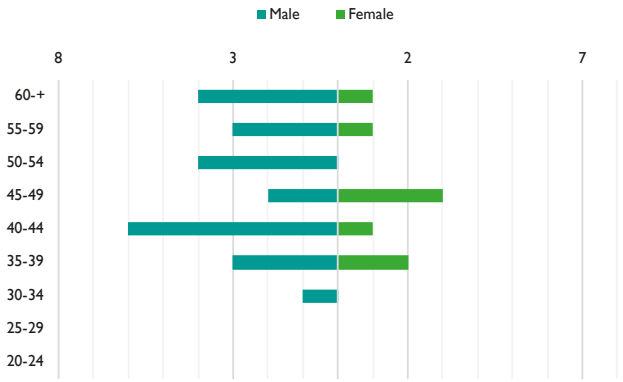
All 2015

	Male	Female	Total
60-+	10	4	14
55-59	17	11	28
50-54	18	14	32
45-49	13	11	24
40-44	13	14	27
35-39	15	6	21
30-34	13	6	19
25-29	10	3	13
20-24	3	0	3
Total	112	69	181



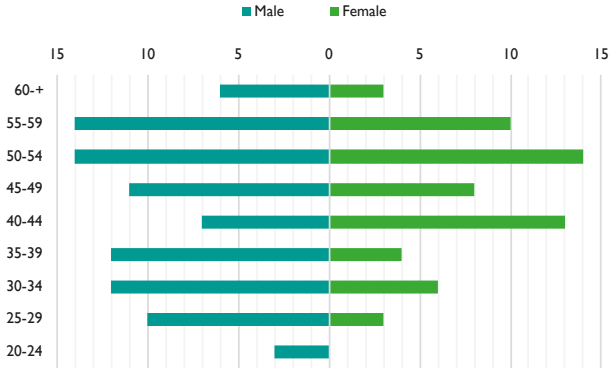
French Community

	Male	Female	Total
60-+	4	1	5
55-59	3	1	4
50-54	4	0	4
45-49	2	3	5
40-44	6	1	7
35-39	3	2	5
30-34	1	0	1
25-29	0	0	0
20-24	0	0	0
Total	23	8	31



Flemish Community

	Male	Female	Total
60-+	6	3	9
55-59	14	10	24
50-54	14	14	28
45-49	11	8	19
40-44	7	13	20
35-39	12	4	16
30-34	12	6	18
25-29	10	3	13
20-24	3	0	3
Total	89	61	150



Interns and placements

The Garden offers many places for trainees and people seeking work place experience. Our goal is to make them better prepared to take up their place in the labour market.

Number of interns and placements

	Total	Paid	Unpaid
2014	**32**	**1**	**31**
2015	**30**	**0**	**27**

Interns and placements with disability

	Total	Paid	Unpaid
2014	**3**	**0**	**3**
2015	**1**	**0**	**1**

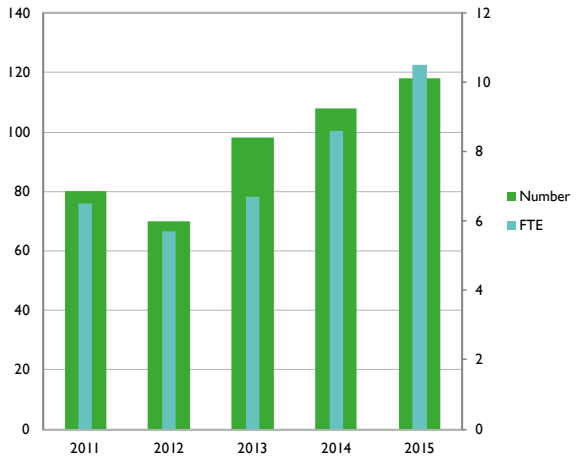
Interns and placements with migration background

	Total	Paid	Unpaid
2014	**11**	**0**	**11**
2015	**13**	**0**	**13**

Volunteers

The number of volunteers increased to 118 or 10.5 in terms of fulltime equivalents based on the norm of the Flemish Government (1,520 hours/year). They play a very important role in all activities of the Botanic Garden: from welcoming visitors to scientific work.

	2011	2012	2013	2014	2015
Number	**80**	**70**	**98**	**108**	**118**
FTE	**6.5**	**5.7**	**6.7**	**8.6**	**10.5**

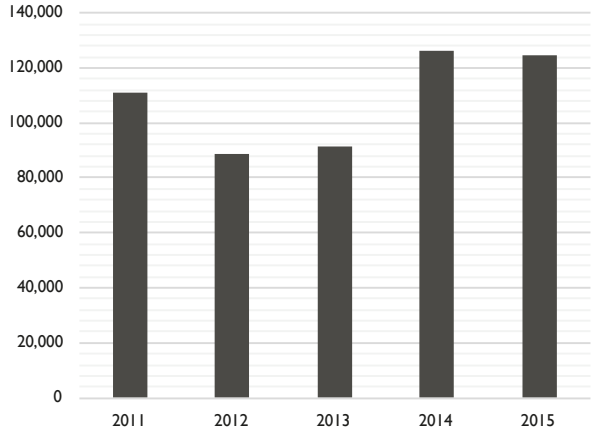


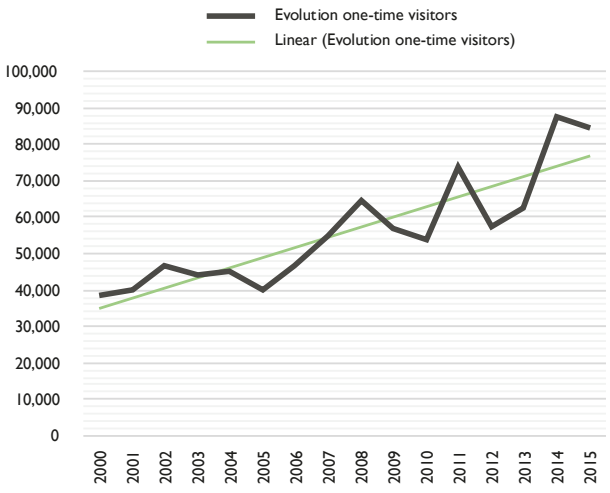
Visitors

Number of visits

The number of visits in 2015 nearly equaled the record year 2014. In comparison with 2000, the year when visitor numbers were for the first time systematically registered, the number of unique visitors have more than doubled (this figures excludes visits from year card holders and free visits by the inhabitants of Meise village). The orchid show Flori Mundi in November attracted again many visitors; also the event Floridylle Winter was a great success.

	2011	2012	2013	2014	2015
Number of visits	**110,909**	**88,612**	**91,171**	**126,486**	**124,781**

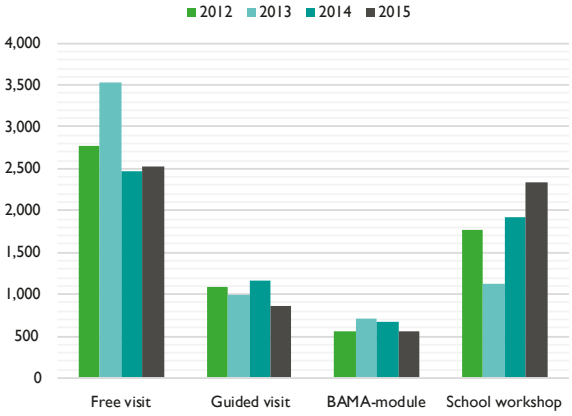




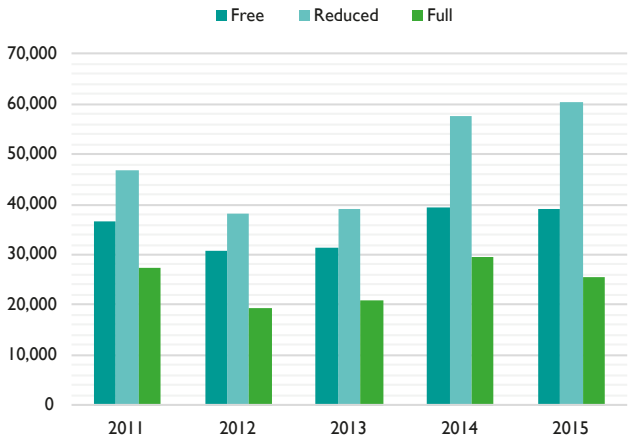
Participation in organised educative visits

The number of school visits increased. Especially noteworthy was the increase in workshops.

	2012	2013	2014	2015
Free visit	2,771	3,523	2,467	2,529
Guided visit	1,091	989	1,156	857
BAMA-module	551	713	671	566
School workshop	1,763	1,127	1,917	2,330
Total	6,176	6,361	6,211	6,282



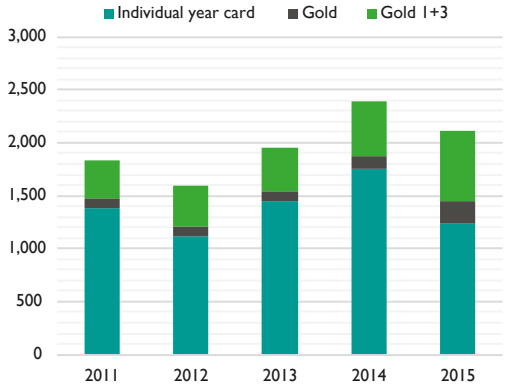
	2011	2012	2013	2014	2015
Free	36,602	30,913	31,368	39,312	39,059
Reduced	46,820	38,215	38,992	57,676	60,339
Full	27,487	19,484	20.811	29,498	25,383



Year card subscriptions

There was a drop in the number of year cardholders with about 10 %. Notwithstanding, there was a noteworthy increase in the number of persons subscribing to a year card Gold (+ 90 % for individual year card Gold; + 30 % for year card Gold 1+3).

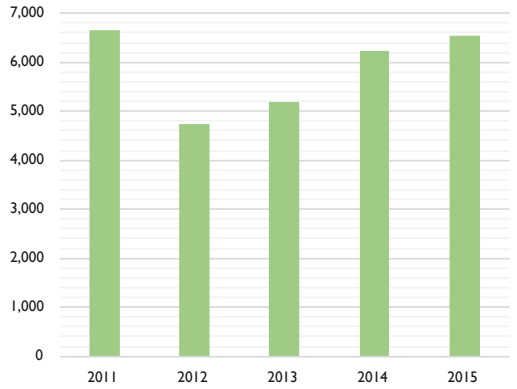
	2011	2012	2013	2014	2015
Individual	1,382	1,113	1,443	1,756	1,233
Gold	99	100	94	112	213
Gold 1+3	353	384	411	514	673
Total	1,834	1,597	1,948	2,385	2,119



Visitors to the garden shop

In total almost 6,550 visitors made a purchase in the garden shop. Typical Botanic Garden Meise products, such as our Meise honey and Meise coffee remained very popular.

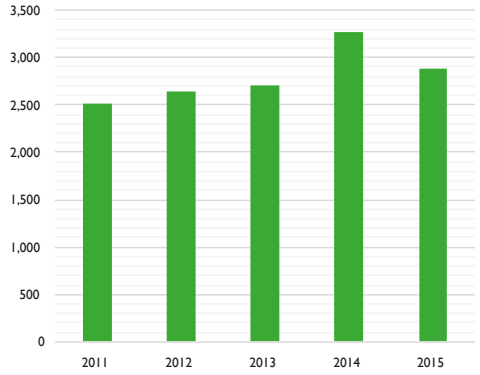
	2011	2012	2013	2014	2015
Visitors	6,655	4,729	5,189	6,244	6,547



The Botanic Garden in the news and social networks

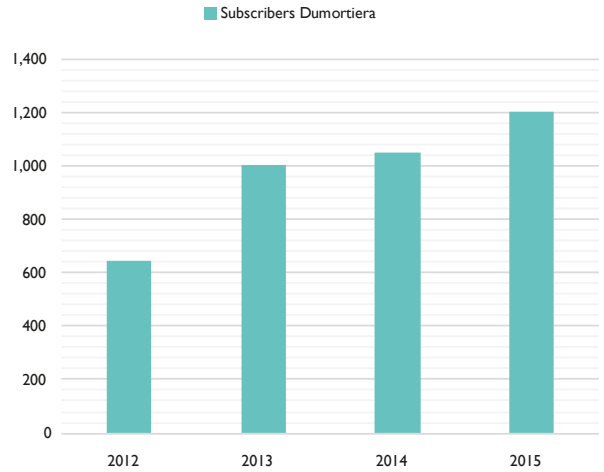
The Garden issued 25 (12 Dutch and 13 French) press releases in 2015. At this moment, 2,880 persons have a subscription with the digital newsletter Musa, which is published every season in Dutch and French. On the Facebook page of the Botanic Garden, 90 messages in French and Dutch were posted.

	2011	2012	2013	2014	2015
Musa subscriptions	2,515	2,640	2,715	3,270	2,880



The number of subscribers to *Dumortiera*, a digital periodical for floristry, further increased to 1,205.

	2012	2013	2014	2015
Subscribers Dumortiera	643	1,000	1,050	1,205



Collections

Living collections

The living collections are made up of all accessions for which are available either as living plants and/or seeds. At this moment it is made up of 33,109 accessions from 18,638 taxa. 90% belongs to the Federal Government scientific patrimony, 10% is the property of the Flemish Community.

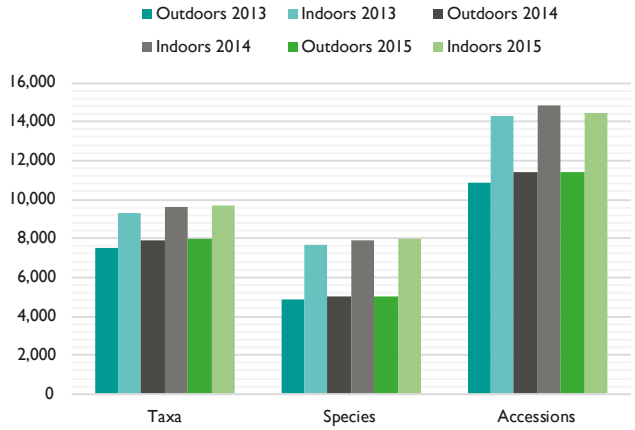
	Federal	Flemish	Global
Taxa	17,134	2,672	18,928
Species	12,850	2,149	14,000
Accessions	29,836	3,273	33,109

Living plant collections

Currently, the living plant collections are made up of 25,861 accessions. They represent 349 families, 3,060 genera, 17,609 taxa and 12,985 species. They are spread over the greenhouses (56 %) and open park land (44 %). The best represented plant families in the greenhouses are the Cactaceae (2057 accessions), Orchidaceae (1641), Euphorbiaceae (1374), Liliaceae (1029), Rubiaceae (564), Crassulaceae (499), Araceae (480), Agavaceae (397), Aizoaceae (392) and Bromeliaceae (351).

In the open park collections, the best representated plant families are Ericaceae (785 accessions), Rosaceae (744), Liliaceae (506), Asteraceae (476) and Malaceae (418).

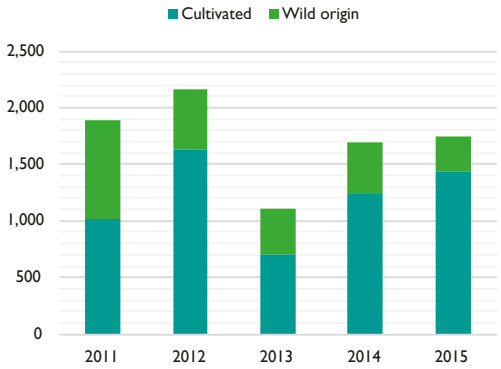
	Outdoors 2013	Indoors 2013	Outdoors 2014	Indoors 2014	Outdoors 2015	Indoors 2015
Taxa	7,526	9,307	7,887	9,637	7,942	9,667
Species	4,887	7,675	5,024	7,937	5,015	7,970
Accessions	10,894	14,291	11,390	14,869	11,391	14,470



Evolution of the acquisition of living plant material

The strong increase recorded in 2014 is confirmed this year again. The high number of new acquisitions chiefly concerns succulents for the greenhouses including *Aloe*, *Haworthia*, Cactaceae and Euphorbiaceae.

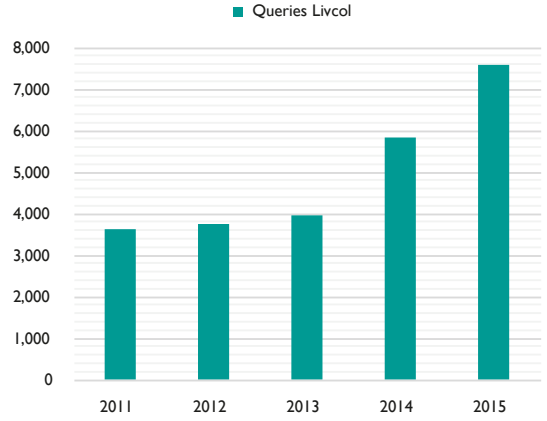
	Cultivated	Wild origin	**Total**
2011	1,021	863	**1,884**
2012	1,631	528	**2,159**
2013	710	404	**1,114**
2014	1,233	465	**1,698**
2015	1,440	312	**1,752**



Evolution of queries entered in LIVCOL

LIVCOL is an in-house databank that is used for the daily management of the living collections and supporting scientific documentation. This database is partially accessible via the internet site of the Botanic Garden. The number of searches is continuously increasing.

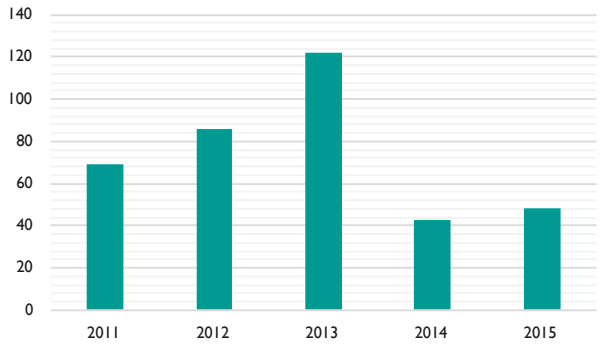
	2011	2012	2013	2014	2015
Queries LIVCOL	3,633	3,734	3,962	5,838	7,602



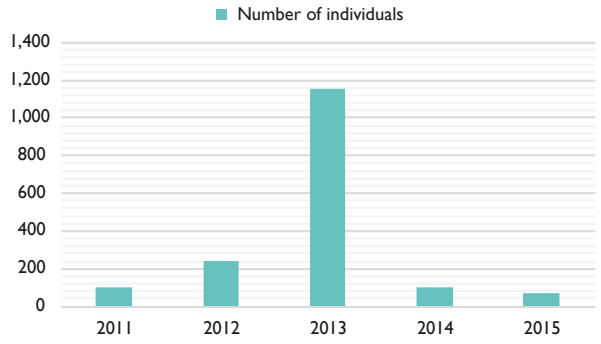
The seizure of plant material prohibited under CITES

In 2015, the Belgian customs authorities carried out nine confiscations under the international legislation of CITES. The seized plant specimens were housed in the Botanic Garden. The number of confiscations reflect a falling trend since 2011. The nine confiscations of 2015 were made up of 48 introductions and 72 specimens.

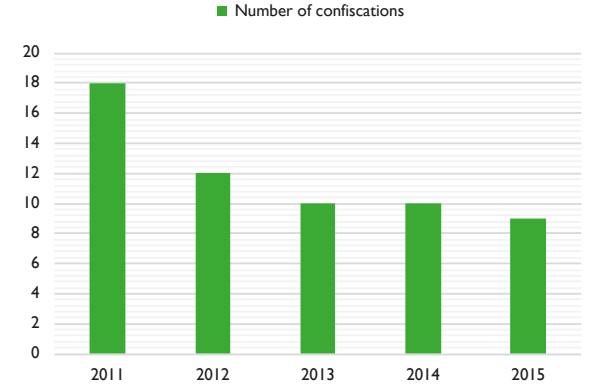
	2011	2012	2013	2014	2015
CITES accessions	69	86	122	43	48



	2011	2012	2013	2014	2015
Number of individuals	105	240	1,152	102	72



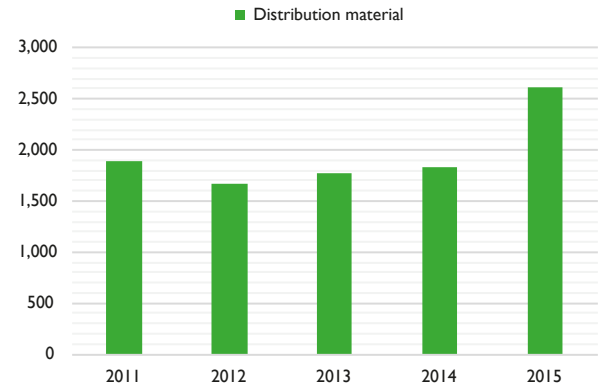
	2011	2012	2013	2014	2015
Number of confiscations	18	12	10	10	9



Distribution of living material

The number of plant or seed specimens sent out varies from year to year. In 2015, a particularly high number of 2,610 specimens were sent out; 75% of this total were seeds.

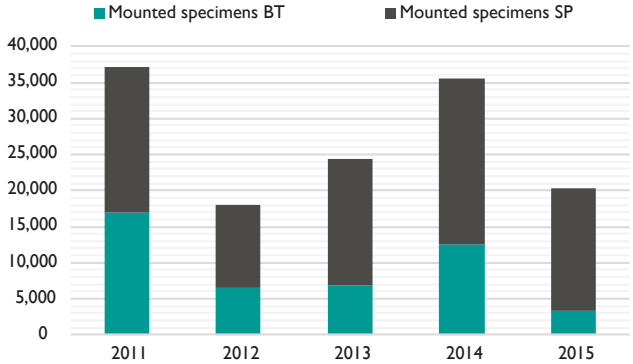
	2011	2012	2013	2014	2015
Distribution material	1,889	1,664	1,770	1,830	2,610



Mounting of herbarium specimens

The mounting of specimens is an important and time-consuming activity that facilitates the long term storage of plant material. The number of mounted specimens decreased in 2015 to 20,300. This is explained by the fact that our herbarium staff was mainly involved in preparing the collections for digitalization for the DOE! project

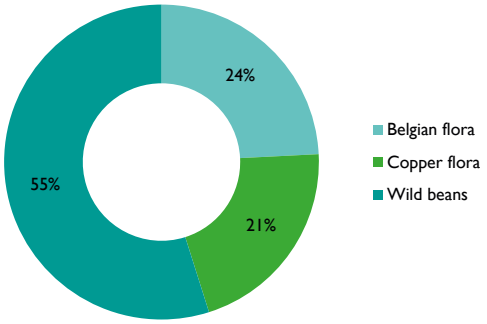
	2011	2012	2013	2014	2015
Mounted specimens BT	17,000	6,500	6,811	12,440	3,300
Mounted specimens SP	20,191	11,596	17,500	23,074	17,000
Total	**37,191**	**18,096**	**24,311**	**35,514**	**20,300**

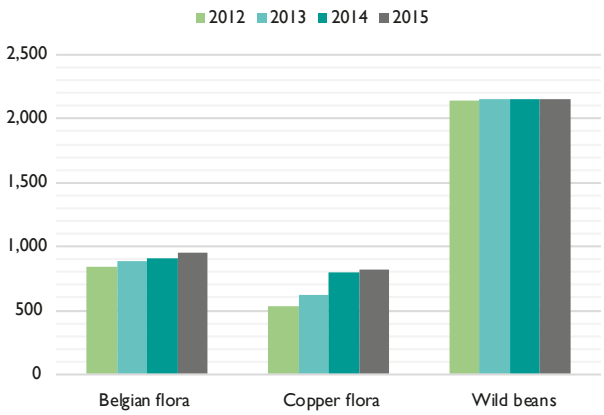


Long term seed conservation

The seed bank is a very important ex situ conservation tool to support in situ conservation projects. It facilitates, over a long period of time (more than 100 years), the conservation of a very broad range of genetic diversity in a very limited area. At this moment, the seed bank of the Botanic Garden conserves some 949 accessions of wild Belgian species, 820 accessions of copper plants from Katanga and 2,152 accessions of wild species of beans.

	Belgian flora	Copper flora	Wild beans
2012	841	536	2,144
2013	890	626	2,152
2014	906	803	2,152
2015	949	820	2,152

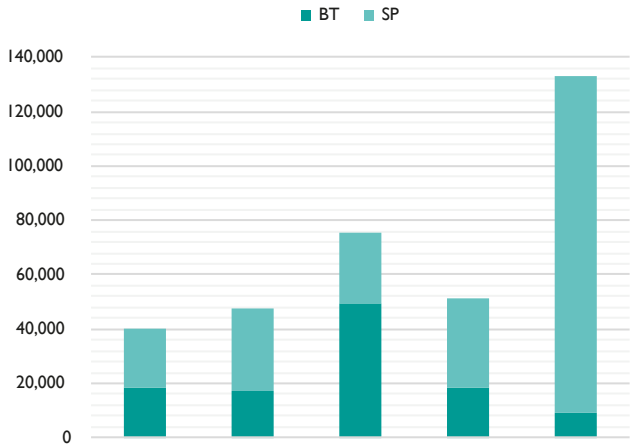




Databasing the collections

Herbarium specimens hold valuable information about the distribution, ecology and use of plants. Imaging and databasing the collections make this information available to interested users. In 2015 the number of encoded specimens increased sharply. This high number is the result of 'rapid databasing' for the digitalisation project DOE!

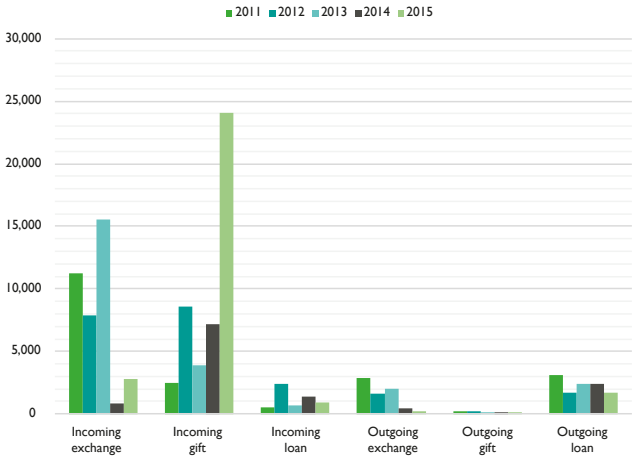
	2011	2012	2013	2014	2015
BT	18,159	17,487	49,341	18,289	9,246
SP	21,880	30,324	26,105	32,748	123,882
Total	**40,039**	**47,811**	**75,446**	**51,037**	**133,128**



Loans and exchange program

The transfer of herbarium specimens between herbaria worldwide is an important step to facilitate botanical research. Specimens can be transferred between herbaria on a temporary basis as loans or on a permanent basis as a gift or as part of a specimen exchange program. The number of specimens received by gifts is particularly high in 2015. This is essentially the result of two gifts: one by the family Van Buggenhout to the Flemish scientific patrimony and one of the University of Mons to the Federal Government scientific patrimony.

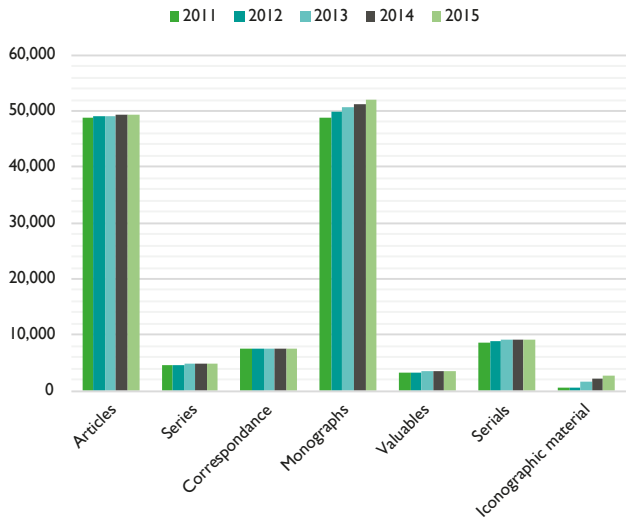
	2011	2012	2013	2014	2015
Incoming exchange	11,261	7,892	15,536	853	2,758
Incoming gift	2,463	8,591	3,918	7,141	24,054
Incoming loan	539	2,391	678	1,394	904
Outgoing exchange	2,897	1,655	1,991	459	183
Outgoing gift	221	175	128	116	132
Outgoing loan	3,114	1,701	2,366	2,430	1,719



Library database

The number of records in our library database grew steadily. The complete catalogue, available online, contains now more than 130,000 records. The cleaning of the database resulted in a decrease of the number of articles and serials and the increase of the number of monographs.

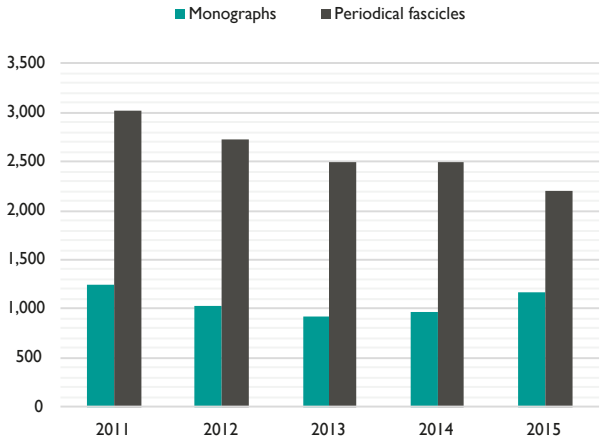
	2011	2012	2013	2014	2015
Articles	48,834	49,030	49,150	49,404	49,330
Series	4,596	4,695	4,789	4,828	5,007
Correspondance	7,443	7,444	7,444	7,444	7,452
Monographs	48,796	49,969	50,743	51,268	52,010
Valuables	3,385	3,386	3,421	3,461	3,465
Serials	8,742	8,979	9,117	9,168	9,118
Iconographic material	500	560	1,554	2,185	2,640
Total	121,796	123,503	124,664	127,758	129,022



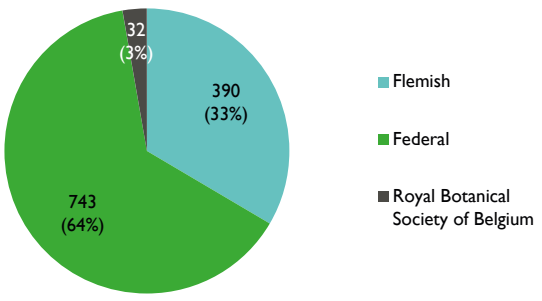
Acquisition to the library

The number acquisitions to the library slightly decreased in 2015. Approximately one third of the acquisitions belonged to the Flemish scientific patrimony. Two thirds were added to the Federal Government scientific patrimony: it essentially concerns books donated by Prof. Symoens. A small number of books are the property of the Royal Belgian Botanical Society, whose library was accommodated in the Botanic Garden.

	2011	2012	2013	2014	2015
Monographs	1,244	1,035	926	965	1,165
Periodical fascicles	3,025	2,733	2,500	2,500	2,200



	Flemish	Federal	Royal Botanical Society of Belgium
Monographs	390	743	32

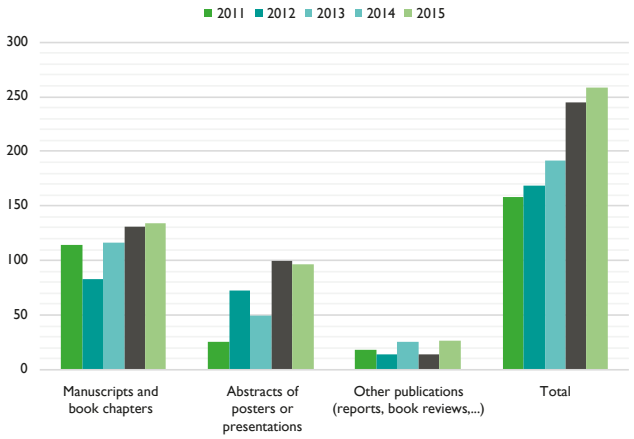


Research

Number of publications

The number of scientific contributions by members of the staff further increased. The ratio between publications with impact factor and without impact factor reached its highest level and is now 67%. It is the intention to let this rise further, without losing sight of more local, but often very important research.

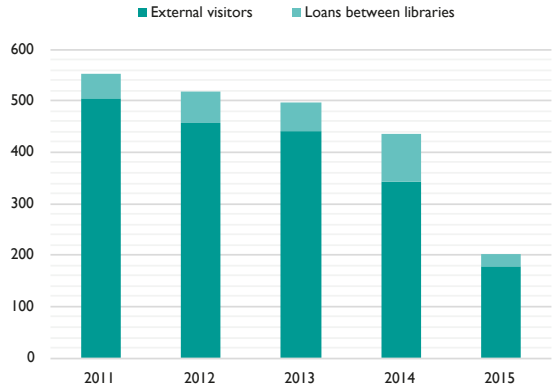
	Manuscipts and book chapters	Abstracts of posters or presentations	Other publications (reports, book reviews,...)	**Total**
2011	114	26	18	158
2012	83	72	14	169
2013	116	50	26	192
2014	131	100	14	245
2015	134	97	27	258



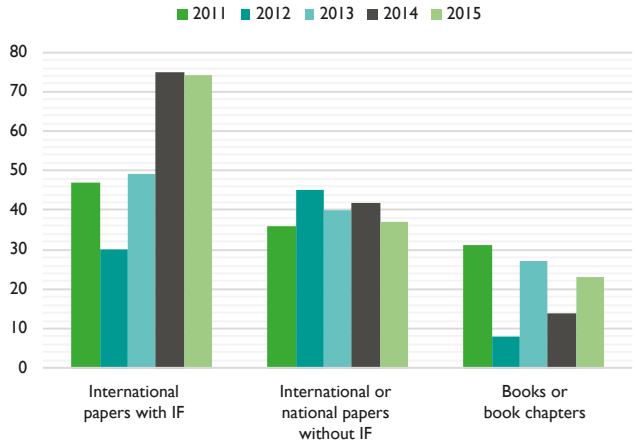
External library consultation

The library is accessible to the public. However, the number of visits has further fallen in 2015. This trend is expected to continue considering that many botanical publications are now available on-line.

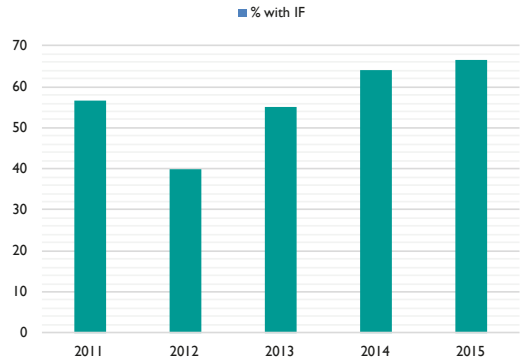
	2011	2012	2013	2014	2015
External visitors	504	457	440	342	177
Loans between libraries	49	61	58	95	25



	International papers with IF	International or national papers without IF	Books or book chapters
2011	47	36	31
2012	30	45	8
2013	49	40	27
2014	75	42	14
2015	74	37	23



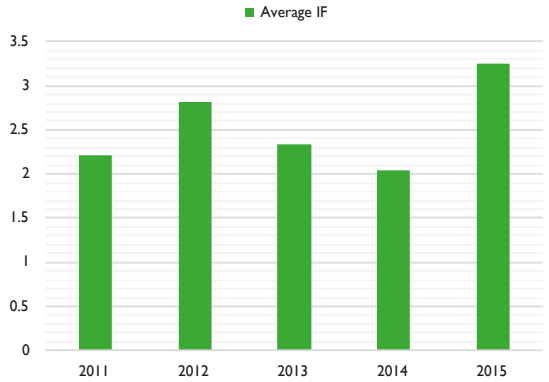
	Papers with IF	Papers without IF	% with IF
2011	47	36	57 %
2012	30	45	40 %
2013	49	40	55 %
2014	75	42	64 %
2015	74	37	67 %



Average impact factor

The average impact factor of the manuscripts by staff members of the Botanic Garden increased to 3.25. This sharp increase is explained by a few co-authorships in the word's best scientific journals.

	2011	2012	2013	2014	2015
Average IF	2.21	2.81	2.33	2.04	3.25



Publications

Publications in journals with IF

1. Aptroot, A., **Ertz, D.**, Silva, J.D.R., Grube, M. & Cáceres, M.E.S. (2015) The phylogenetic position of *Coniarthonia* and the transfer of *Cryptothecia miniata* to *Myriostigma* (Arthoniaceae, lichenized ascomycetes). Phytotaxa 218: 128-136. (IF 2014: 1,318)
2. Beauger, A., Voldoire, O., Mertens, A., Le Cohu, R. & **Van de Vijver, B.** (2015) Two new *Navicula* species (Bacillariophyceae) from western and northern Europe. Phytotaxa 230: 172-182. (IF 2014: 1,318)
3. Breteler, F.J., Bakker, F.T. & **Jongkind, C.C.H.** (2015) A synopsis of *Soyauxia* (Peridiscaceae, formerly Medusandraceae) with a new species from Liberia. Plant Ecology and Evolution 148: 409-419. (IF 2014: 0,986)
4. Carlier, A., Fehr, L., Pinto, M., Schâberle, T., Reher, R., **Dessein, S.**, König, G. & Eberl, L. (2015 online) The genome analysis of Candidatus *Burkholderia crenata* reveals that secondary metabolism may be a key function of the *Ardisia crenata* leaf nodule symbiosis. Environmental microbiology. doi:10.1111/1462-2920.13184 (IF 2014: 6,201)
5. Chen, J., Zhao, R., Parra, L.A., Guelly, A.K., **De Kesel, A.**, Rapior, S., Hyde, K.D., Chukeatirote, E., Alva, P. & Callac P. (2015) *Agaricus* section *Brunneopicti*: a phylogenetic reconstruction with description of five new taxa. Phytotaxa 193: 145-168. (IF 2014: 1,318)
6. **Cocquyt, C.** & Taylor, J.C. (2015) New and interesting *Surirella* taxa (Surirellaceae, Bacillariophyta) from the Congo Basin (DR Congo). European Journal of Taxonomy 133: 1-15. (IF 2014: 1,312)
7. **De Block, P.**, Razafimandimbison, S.G., **Janssens, S.B.**, **Robbrecht, E.** & Bremer, B. (2015) Molecular phylogenetics and generic assessment in the tribe Pavetteae (Rubiaceae). Taxon 64: 79-95. (IF 2014: 3,299)
8. **De Block, P.** & Randriamboavonjy, T. (2015) Three new species of *Craterispermum* (Rubiaceae) from Madagascar. Phytotaxa 206: 79–89. (IF 2014: 1,318)
9. Divakar, P.K., Crespo, A., Wedin, M., Leavitt, S.D., Hawksworth, D.L., …, **Ertz, D.**, … & Lumbsch, H.T. (2015 online). Evolution of complex symbiotic relationships in a morphologically derived family of lichen-forming fungi. New Phytologist. doi:10.1111/nph.13553 (IF 2014: 7,672)
10. **Ertz, D.**, Irestedt, M., Frisch, A., Thor, G. & van den Boom, P. P. G. (2015) A large-scale phylogenetic revision of Roccellaceae (Arthoniales) reveals eight new genera. Fungal Diversity 70: 31-53. (IF 2014: 6,221)
11. **Ertz, D.** & Diederich, P. (2015) Dismantling Melaspileaceae: a first phylogenetic study of *Buelliella*, *Hemigrapha*, *Karschia*, *Labrocarpon* and *Melaspilea*. Fungal Diversity 71: 141-164. (IF 2014: 6,221)
12. **Ertz, D.**, Diederich, P., Lawrey, J.D., Berger, F., Freebury, C.E., Coppins, B., Gardiennet, A. & Hafellner, J. (2015 online) Phylogenetic insights resolve Dacampiaceae (Pleosporales) as polyphyletic: *Didymocyrtis* (Pleosporales, Phaeosphaeriaceae) with *Phoma*-like anamorphs resurrected and segregated from *Polycoccum* (Trypetheliales, Polycoccaceae fam. nov.). Fungal Diversity: doi:10.1007/s13225-015-0345-6 (IF 2014: 6,221)
13. **Ertz, D.**, Flakus, A., Oset, M., Sipman, H.J.M. & Kukwa, M. (2015) A first assessment of lichenized Arthoniales in Bolivia with descriptions of two new species. Phytotaxa 217: 1-25. (IF 2014: 1,318)
14. Essl, F., Bacher, S., Blackburn, T.M., Booy, O., Brundu, G., …, **Groom, Q.J.**, … & Jeschke, J.M. (2015) Crossing Frontiers in Tackling Pathways of Biological Invasions. BioScience 65: 769-782. (IF 2014: 5,377)
15. Ewango, C.E.N., Bongers, F., Makana, J-R., Poorter, L. & **Sosef, M.S.M.** (2015) Structure and composition of the liana assemblage of a mixed rain forest in the Congo basin. Plant Ecology and Evolution 148: 29-42. (IF 2014: 0,986)
16. Frisch, A., Ohmura, Y., **Ertz, D.** & Thor, G. (2015) *Inoderma* and related genera with distinct conidiomata in Arthoniaceae. Lichenologist 47: 233-256. (IF 2014: 1,454)
17. **Godefroid, S.**, **Le Pajolec, S.** & **Van Rossum, F.** (2015 online) Pre-translocation considerations in rare plant reintroductions: implications for designing protocols. Plant Ecology 216. doi:10.1007/s11258-015-0526-0 (IF 2014: 1,463)
18. **Groom, Q.J.** (2015) Piecing together the biogeographic history of *Chenopodium vulvaria* L. using botanical literature and collections. PeerJ, 3. doi:10.7717/peerj.723 (IF 2014: 2,112)
19. **Groom, Q.J.** (2015) Using legacy botanical literature as a source of phytogeographical data. Plant Ecology and Evolution, 148, 256-266. (IF 2014: 0,986)
20. Hautekèete, N-C., Frachon, L., Luczak, C., Toussaint, B., Van Landuyt, W., **Van Rossum, F.** & Piquot, Y. (2015) Habitat type shapes long-term plant biodiversity budgets in two densely populated regions in north-western Europe. Diversity and Distributions 21: 631-642. (IF 2014: 3,667)
21. **Janssens**, **S.B.**, **Sonké**, **B.**, **Lachenaud**, **O.**, Lemaire, B., Simo, M. & Smets, E.F. (2015) Morphology, molecular phylogenetics and biogeography of *Impatiens akomensis* (Balsaminaceae), a new species from Cameroon. Plant Ecology and Evolution 148: 397-408. (IF 2014: 0,986)
22. Jayasiri, S.C., Hyde, K.D., Ariyawansa, H.A., Bhat, J., Buyck, B., Cai, L., Dai, Y.-C., Abd-Elsalam, K.A., **Ertz, D.**, …, **Raspé, O.**, … & Promputtha I. (2015) The Faces of Fungi database: fungal names linked with morphology, phylogeny and human impacts. Fungal Diversity: doi 10.1007/s13225-015-0351-8. (IF 2014: 6,221)
23. **Jongkind, C.C.H.** (2015) *Eugenia sapoensis* Jongkind from Liberia and *Eugenia breteleri* Jongkind from Gabon, two new forest species (Myrtales: Myrtaceae). European Journal of

Taxonomy 113: 1-9. (IF 2014: 1,312)

24. **Jongkind, C.C.H.** (2015) Description of *Gaertnera luteocarpa* (Gentianales: Rubiaceae), with two subspecies, a new forest shrub species from Liberia, Ivory Coast and Ghana. European Journal of Taxonomy 126: 1-8. (IF 2014: 1,312)
25. **Jongkind, C.C.H.** & de Winter, W. (2015) *Blotiella confusa* Jongkind & W. de Winter, sp. nov. (Dennstaedtiaceae), a new species from lowland tropical West Africa, and its distinction from *B. reducta* (C.Chr) R.M.Tryon. Adansonia, sér. 3, 37: 7–12. (IF 2014: 0,5)
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27. **Jongkind, C.C.H.** (2015). *Tragia liberica* Jongkind (Euphorbiaceae), a new forest species from Liberia. Candollea 70: 249-252. (IF 2014: 0,468)
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29. Kidane, B., Van Der Maesen, L.J.G., Asfaw, Z., **Sosef, M.S.M.** & van Andel, T. (2015) Wild and semi-wild leafy vegetables used by the Maale and Ari ethnic communities in southern Ethiopia. Genetic Resources and Crop Evolution, 62(2), 221-234. (IF 2014: 1,461)
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33. **Lachenaud, O.** & **Sonké, B.** (2015) The genus *Oxyanthus* DC. (Rubiaceae) in West Africa: description of a new species. Candollea 70: 241–247. (IF 2014: 0,468)
34. **Lachenaud, O.** & **Zemagho, L.** (2015) Two new anisophyllous species of *Sabicea* Aubl. (Rubiaceae) from Gabon. Candollea 70: 219-229. (IF 2014: 0,468)
35. Luong, T.T., Hovenkamp, P.H. & **Sosef, M.S.M.** (2015) Revision of the fern genus *Orthiopteris* (Saccolomataceae) in Malesia and adjacent regions. PhytoKeys 53: 39-71. (IF 2014: 0,686)
36. Majewska, R., De Stefano, M., Santoro, M., Bolaños, F., Chaves, G. & **Van de Vijver, B.** (2015) Two new gomphonemoid diatom genera (Bacillariophyta) living on marine turtles from Costa Rica. Phytotaxa 233: 236–250. (IF 2014: 1,318)
37. Mangambu, J.D., Muhashy, F., **Robbrecht, E.**, Janssen, T., Ntahobavuka, H. & van Diggelen, R. (2015) Ferns and Fern Allies: Bio indicators of changes occurred in the structure of the mountain forests within the Kahuzi-Biega National Park in Eastern D.R. Congo. International Journal of Biological Sciences 16: 350-370. (IF 2014: 4,509)
38. Merckx, V.S.F.T., Hendriks, K.P., Beentjes, K.K., Mennes, C.B., Becking, L.E., ..., **Janssens, S.B.**, …, Schilthuizen, M. (2015) Evolution of endemism on a young tropical mountain. Nature 524, 347-350. (IF 2014: 41,456)
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40. Muggia, L., Kopun, T. & **Ertz, D.** (2015) Phylogenetic placement of the lichenicolous, anamorphic genus *Lichenodiplis* and its connection to *Muellerella*-like teleomorphs. Fungal Biology 119: 1115-1128. (IF 2014: 2,342)
41. Neupane, S., **Dessein, S.**, Wikström, N., Lewis, P.O., Long, C., Bremer, B. & Motley, T. The *Hedyotis-Oldenlandia* complex (Rubiaceae: Spermacoceae) in Asia and the Pacific: Phylogeny revisited with new generic delimitations. Taxon 64: 299-322. (IF 2014: 3,299)
42. Nobis, M., Ebel, A.L., Nowak, A., Paszko, B., Bobrov, A.E., ..., **Verloove, F.**, …, Pliszko, A. (2015) Contribution to the flora of Asian and European countries: new national and regional vascular plant records, 4. Acta Botanica Gallica 162: 301-316. (IF 2014: 0,479)
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46. Riaux-Gobin, C., **Compère, P.**, Hinz, F. & Ector, L. (2015) *Achnanthes citronella*, *A. trachyderma* comb. nov. (Bacillariophyta) and allied taxa pertaining to the same morphological group. Phytotaxa 227: 101-119. (IF 2014: 1,318)
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160-170. (IF 2014: 0,986)

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54. **Sonké, B.**, Bidault, E. & Droissart, V. (2015) Taxonomic revision of the genus *Massularia* (Rubiaceae, Gardenieae), with a new species from Central Africa. Phytotaxa 2013: 263-270. (IF 2014: 1,318)
55. Sterken, M., Verleyen, E., Jones, V.J., Hodgson, D.A., Vyverman, W.G., Sabbe, K. & **Van de Vijver, B.** (2015) An illustrated and annotated checklist of freshwater diatoms (Bacillariophyta) from Livingston, Signy and Beak Island (Maritime Antarctic Region). Plant Ecology and Evolution 148: 431-455. (IF 2014: 0,986)
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62. **Van de Vijver, B.**, **Kopalová, K.** & Zidarova, R. (2015) Three new *Craticula* species (Bacillariophyta) from the Maritime Antarctic Region. Phytotaxa 213: 35-45. (IF 2014: 1,318)
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65. van Kleunen, M., Dawson, W., Essl, F., Pergl, J., Winter, M., …, **Groom, Q.J.**, ..., Pysek, P. (2015) Global exchange and accumulation of non-native plants. Nature 525: 100-103. (IF 2014: 41,456)
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- Van den Broeck, Dries
- Van den Broeck, Mia
- Van Den Troost, Gery
- Van Der Beeten, Iris
- Van der Jeugd, Michael
- Van der Plassche, Thierry
- Van Eeckhoudt, Jos
- Van Eeckhoudt, Lucienne
- Van Grimbergen, Dieter
- Van Hamme, Lucienne
- Van Herp, Marc
- Van Hoye, Manon
- Van Humbeeck, Jos
- Van Humbeeck, Linda
- Van Kerckhoven, Ken
- Van Opstal, Jan
- Van Ossel, Anja
- Van Paeschen, Bénédicte
- Van Renterghem, Koen
- Van wal, Rita
- Van Wambeke, Paul
- Vandelook, Filip
- Vanden, Abeele Samuel
- Vandendriessche, Yuri
- Vanderstraeten, Dirk
- Vanwinghe, Petra
- Vekens, Odette
- Verdickt, Paul
- Verdickt, Nathalie
- Verdonck, Carina
- Verissimo Pereira, Nuno
- Verlinden, Kevin
- Verlinden, Willy
- Verloove, Filip
- Vermeerbergen, Jochen
- Vermeersch, Bart
- Versaen, François
- Versaen, Ilse
- Verschueren, Alice
- Verstraete, Brecht
- Verwaeren, Leen
- Vleminckx, Kevin
- Vleminckx, Sabine
- Vloeberghen, Jos
- Willems, Stefaan
- Zérard, Carine

Staff French Community

- Beau, Natacha
- Charavel, Valérie
- Degreef, Jérôme
- Denis, Alain
- Diagre, Denis
- Dubroca, Yael
- Ertz, Damien
- Etienne, Christophe
- Fabri, Régine
- Fernandez, Antonio
- Fraiture, André
- Galluccio, Michele
- Gerstmans, Cyrille
- Godefroid, Sandrine
- Hanquart, Nicole
- Hidvégi, Franck
- Jospin, Xavier
- Lahaye, Chantal
- Lekeux, Hubert
- Magotteaux, Denis
- Mamdy, Guillaume
- Orban, Philippe
- Raspé, Olivier
- Reubrecht, Guy
- Rombout, Patrick
- Salmon, Géraud
- Stuer, Benoit
- Telka, Dominique
- Van Onacker, Jean
- Van Rossum, Fabienne
- Vanderborght, Thierry

Volunteers

- Adams, An
- Aerts, Lutgarde
- Bailly, Francine
- Belmans, Lucie
- Berckx, Anna-Maria
- Bockstael, Annie
- Bonnin, Jacques
- Boyker, Viktor
- Buelens, Luc
- Cammaerts, Lisette
- Cappeleman, Ingrid
- Claes, Philippe
- Claessens, Alfons
- Coen, Marie-Laure
- Cuvry, Bruno
- De Baerdemaecker, Helga
- De Beer, Dirk
- de Borman, Sandrine
- De Cock, Marianne
- De Coninck, Hans
- De Cuyper, Jef
- De Hondt, Eugeen
- De Praetere, Claude Anne
- De Ronghé, Rose-Marie
- De Smet, Françoise
- De Wit, Daniël
- Dehaes, Mimi
- Delière, Sandra
- Devolder, Christiane
- Doutrelepont, Hugues
- Dubois, Martine
- Dumont, Anne Marie
- Durant, Daniël
- Erpelding, Nathalie
- Exsteen, Walter
- Fabré, Lisette
- Fourmanois, Frédéric
- Gelbgras, Florence
- Gheysens, Godelieve
- Gonçalves, Bianca
- Goossens, Flor
- Gyssens, Paola
- Hendricx, Philippe
- Horions, Christiane
- Houben, Guido
- Huriaux, Thierry
- Jacobs, Ludo
- Jessen, Georgette
- Kozloski, Elisabeth
- Laureys, Myriam
- Lecomte, Josiane
- Lepage, Pierre
- Lokadi, Valère
- Lucas, Mireille
- Mager, Gertrude
- Malevez, Philippe
- Martyniak, Stefania
- Maton, Bernard
- Mignolet, Vinciane
- Minost, Claire
- Moesen, Piet
- Mortelmans, Bieke
- Moulaert, Colette
- Peeters, Henrica
- Petri, Vitalija
- Peyman, Arefi
- Putman, Didier
- Puttemans, Barbara
- Rackham, Linda
- Ray, Anne
- Roeck, Robert
- Rombauts, Luc
- Scheers, Patricia
- Scheiba, Maria
- Schotte, Marleen
- Seynaeve, Isabelle
- Shutt, Richard
- Speeckaert, Claudine
- Sroka, Gabriela
- Staveloz, Sonia
- Sterckx, Marie-Louise
- Strack, Maarten
- Swyncop, Muriël
- Tack, Florent
- Tavernier, Paul
- Thielemans, Lea
- Tielemans, Elza
- Traïbi, Malika
- Valles, Maria
- Van Asch, Solange
- Van Bueren, Gerda
- Van Camp, Karel
- Van Capellen, Gisèle
- Van Conkelberghe, Luc
- Van De Casteele, Geertrui
- Van der Straeten, Elza
- Van Kerckhoven, Leo
- Van Lier, René
- Van Rossem, Maria
- Vandeloo, Rita
- Vanden Baviere, Cécile
- Vanden Baviere, Nelly
- Vanhoucke, Wendy
- Verelst, Tim
- Verlinden, Hugo
- Vermoere, Simon
- Verswyvel, Myriam
- Vivignis, Patrick
- Wagemans, Emiel
- Wagemans, Philip
- Wilfert, Sandra
- Würsten, Bart

Student workers

- Ait Aadi, Aicha
- Anthoons, Bastien
- Bozinofski, Nicolas
- Chahbouni, Jaouad
- Cuypers, Laura
- Daelemans, Robin
- De Coninck, Dieter
- De Pauw, Karen
- Decoene, Isaak
- Delgat, Lynn
- De Raedt, Laura
- D'Haese, Zoltan
- Didden, Lore
- Dierckx, Joke
- El Atrach, Julia
- Fabri, Sofie
- Geels, Alexandra
- Goeman, Rob
- Heyman, Lisa
- Hoebeke, Laura
- Impens, Daan
- Jacquemyns, Maxim
- Jespers, Floris
- Malcorps, Sanne
- Mariën, Laura
- Mariën, Toon
- Marrocco, Lionel
- Martens, Koen
- Masy, Cindy
- Masy, Sven
- Masy, Tim
- Masy, Kelly
- Meganck, Kenny
- Merckx, Jef
- Ohanian, Aren
- Philippot, Alexandre
- Poppeliers, Sanne
- Robberecht, Cindy
- Rogiers, Ona
- Rombout, Fiona
- Rostovceva, Ouliana
- Sax, Yannick
- Scheere, David
- Schelfhout, Lindsey
- Semmouri, Ilias
- Stevens, Laurenz
- Telka, Shane
- Tiebackx, Matthew
- Tilley, Amber
- Van Den Eynde, Wouter
- Van Roy, Simon
- Van Thielen, Tessa
- Vander Meulen, Sara
- Vanrespaille, Helena
- Willems, Liselotte

Trainees

- Birimgamine Mugoli, Elisabeth
- Bukasa Odiia, Axel
- Buyle, Celine
- Casa, Valeria
- De Foy, Cyprien
- Delhez, Pauline
- De Roeck, Bart
- Duke, Fiammetta
- Foets, Jasper
- Fundiko, Marie-Cakupewa C.
- Gelbgras, Florence
- Gyssens, Paola
- Kasongo, Bill
- Leabu, Linda
- Lolai, Dorian
- Mertens, Arne
- Milenge Kamalebo, Héritier
- Moyson, Michiel
- Nankabirwa, Angela
- Simons, Eline
- Slepcevic, Julie
- Temple, Sophie
- Tiebackx, Matthew
- Thongbai, Benharong
- Van Caenegem, Ellen
- Van Herp, Michiel
- Vanie, Louyounan
- Vasiliki, Lianou
- Verelst, Tim
- Vinsolva, Petra
- Yian Gouve, Claver

Guides

- Bailly, Francine
- Benit, Danielle
- De Cock, Marianne
- De Cuyper, Jef
- Delière, Sandra
- Doutrelepont, Hugues
- Geernaert, Inge
- Kozloski, Elisabeth
- Mortelmans, Bieke
- Proost, Alida
- Silverans, Michel
- Steensels, Steven
- Talloen, Paul
- Tavernier, Patrick
- Van Acoleyen, Roger
- Van Conkelberge, Luc
- Van de Vijver, Martine
- Van den Broeck, Martine
- van Lidth, Bénédicte
- Vandeloo, Rita
- Vanderherten, Frank
- Verschueren, Frans
- Wayembergh, Lisiane
- Wymeersch, Miet

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- Billiet, Frieda
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- Compère, Pierre
- Geerinck, Daniel
- Jongkind, Carel
- Kopalová, Katerina
- Malaisse, François
- Pauwels, Luc
- Rammeloo, Jan
- Robbrecht, Elmar
- Sanín, David
- Sharp, Cathy
- Sonké, Bonaventure
- Sotiaux, André
- Stévart, Tariq
- Stieperaere, Herman
- Vanderpoorten, Alain
- Vanderweyen, Arthur
- Vanhecke, Leo
- van der Zon, Ton
- Verstraete, Brecht
- Vrijdaghs, Alexander

Botanic Garden Meise
A portrait

A Garden with a long history…

Older than Belgium, the earliest roots of Botanic Garden Meise can be traced to 1796, meaning that we have been working with plants for over two centuries. The Garden comprises 92 ha and includes many historical buildings, including a castle that dates back to the 12th century.

With unique collections…

The Garden has a large herbarium housing about 4 million specimens and containing the largest *Rosa* herbarium of the world and important historical collections from Brazil and Central Africa. It also has a botanical library holding over 200,000 volumes, comprising publications from the 15th century to modern day.

With the mission to conserve plants…

The Garden holds a collection of about 18,000 different kinds of living plants, among which several are threatened, such as the Laurent cycad (Encephalartos laurentianus). The Garden also houses an internationally recognised seed bank including inter alia the seeds of numerous wild bean species.

To study plants and fungi…

Activities of our scientists to inventory and study plant, fungal and algal diversity span the globe; from Antarctica to the rainforests of Congo. The scientific work focuses on the correct and scientific identification of plant species. What are the characteristics of a species? How many species are there? How do we distinguish one species from another? Without answers to these questions no economic activity based on plants or plant derived product could function. Knowing the correct scientific name of a species is the key that unlocks all information on this species. Correctly identifying a species helps us to recognise poisonous species from related medicinal ones. It helps us to establish if a plant species is threatened by extinction and in need of protection.

To teach about plant diversity…

On a yearly basis approximately 100,000 people visit the Garden. Most of our visitors come to explore the glasshouses and the gardens, but, of course, there is more. Our scientists fully realise the importance of sharing their knowledge, passion and enthusiasm with the public. Botanic Garden Meise has developed a range of tools to spread knowledge about plants and to raise public awareness about plant conservation. Our website www.botanicgarden.be offers an overview of current activities in the Garden.

Our mission

Building a sustainable future through discovery, research and conservation of plants.

Our values

The six guiding values of the Garden, necessary to keep us growing and flourishing.

One team, one mission

The staff of the Botanic Garden are team players. We combine our talents to realise our goals; through a process of consultation we are all responsible for its success.

Respect for diversity

We should be respectful and considerate to everyone with whom we come into contact. We appreciate their individuality and diversity. Our colleagues deserve respectful cooperation and professionalism.

Delivering a professional service

In performing our tasks and developing new ideas we always have the needs and expectations of our internal and external customers in mind.

An eye for sustainability

As professionals in environmental sciences, we have a responsibility for being role models in creating a healthy environment for people and plants.

Open communication

We should communicate openly and honestly in our daily work and decision making. Sharing useful information serves the common good. Problems should be shared and solutions sought together with discretion where necessary.

Strive for excellence

Our objectives are achieved to a high standard in an efficient and honest manner. We are always open to constructive criticism and we should critically evaluate our work and dare to make adjustments where necessary.

Board of Directors

Mark Andries – *government commissioner*
Véronique Halloin – *member*
Steven Dessein – *secretary*
Chantal Kaufmann – *member*
Jan Rammeloo – *member (president as of 11/2015)*
Jan Schaerlaekens – *member*
Raf Suys – *government commissioner*
Jurgen Tack – *president (until 10/2015)*
Ann Van Dievoet – *member*
Mieke Van Gramberen – *member*
Yoeri Vastersavendts – *member (as of 11/2015)*
Mieke Verbeken – *member*
Renate Wesselingh – *member*

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Erik Smets – *Naturalis The Netherlands*

Representatives Botanic Garden Meise

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Petra De Block
Jérôme Degreef
Régine Fabri

Secretary

Steven Dessein

Text : Botanic Garden Meise & BotanicalValues

This report is also available in Dutch and French and can be downloaded from our website www.botanicgarden.be

The Botanic Garden is supported by the Flemish Community and French Community

Printed on recycled FSC labeled paper with plant-based inks, without ip alcohol or solvents.

Botanic Garden Meise

BotanicalValues

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