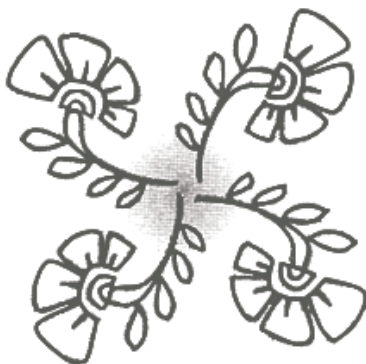




# BALTIC BOTANIC GARDENS

IN 2013-2014



Vilnius, Lithuania  
2015

The periodical issue of Baltic Botanic Gardens. It contains 10 overviews of situation in botanic gardens in Estonia, Latvia and Lithuania in 2013 - 2014 and 9 articles.

Authors themselves are responsible for content of papers.

Technical editor:

Dr. Silva Žilinskaitė

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## Introduction

This periodical issue presents information of botanic gardens in three Baltic States – Estonia, Latvia and Lithuania during period 2013-2014. The Association of Baltic Botanic Gardens, informal organization of botanic gardens in three countries on south coast of Baltic Sea, is producing this publication every two years since 1992. This publication continues the tradition to introduce the situation, activities, achievements, plant collections, significant results of research work of every one member (garden) of the Association. Except of general statistical information (reflecting financial situation, quantity of plant collections, staff, main events, publications of every one garden) each member decides what kind of information or articles should be provided for this publication additionally. This publication except of main reports of 10 members includes 9 articles providing information of gardens history, scientific or other activities, representing plant collections etc.

*President of the Association of Baltic Botanic Gardens  
dr. Audrius Skridaila*

Vilnius, Lithuania  
2015

# Contents

<b>I Overviews of Baltic Botanic Gardens 2013-2014</b>	<b>6</b>
Tallinn Botanic Garden	6
Botanical Garden of Tartu University	13
National Botanic Garden of Latvia	18
Botanical Garden of University of Latvia	22
Arboretum Kalsnava	28
Botanical Garden of Klaipėda University	31
Botanical Garden of Šiauliai University	36
Kaunas Botanical Garden of Vytautas Magnus University	40
Botanical Garden of Vilnius University	47
Marijampolė Station of Nature Research and Environmental Education	54
<b>II Articles</b>	<b>58</b>
<i>H. Tamm, M. Mürk</i> Reproductivity and genetic variability of the populations of <i>Taxus baccata</i> L. in Estonia	58
<i>I. Gudrupa</i> Introduction of the genus <i>Tillandsia</i> in the Botanical Garden of the University of Latvia	62
<i>S. Tomšone, G. Muzikante</i> Art in the Botanical Garden of the University of Latvia	66
<i>R. Nekrošienė</i> Plant database: a pivot of biodiversity knowledge, and sustainable management of plant collections	69
<i>A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė, I. Šakytė, V. Juknevičius, K. Grušas</i> The education activities in the Botanical Garden of Šiauliai University	76

<i>A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė</i> The works of conservation of local flora in botanical garden	82
<i>A. Balsevičius, I. Lukšytė, R. Narijauskas</i> Development of collections and expositions in Kaunas Botanical Garden of Vytautas Magnus University in 2014	89
<i>V. Mildažienė, G. Stuopytė</i> Developing means for attracting visitors to Botanical Garden	96
<i>S. Žilinskaitė, A. Skridaila</i> Vilnius University Botanical Garden in Kairėnai celebrating 40 -year anniversary	100

# I Overviews of Baltic Botanic Gardens 2013-2014

## Tallinn Botanic Garden

### Overview

Address	Kloostrimetsa tee 52, 11913, Tallinn, Estonia
Phone	+372 6062679
Fax	+372 6005529
e-mail	aed@botaanikaaed.ee
www	www.botaanikaaed.ee
Director	Karmen Kähr
Territory area	42 ha

### Living plant collections

Total No. of taxa: (01.12.2014): **8885**

Main taxa	No. of taxa
Indoor plants, including:	2162
Succulents	762
Tropical plants	520
Subtropical plants	440
Orchids	440
Trees and shrubs, including:	2321/2459
trees and shrubs in arboretum	1640/1686
roses	681/773
Herbaceous plants, including:	4200/4264
lilies	352/353
hyacinths	84/80
dwarf bulbous and bulbotuber plants	421/416
crocuses	130/131
daffodils	150/137

tulips	344/337
ornamental onions	129/126
ornamental grasses	172/175
useful plants	265/267
medicinal plants	77/80
mountain plants	681/681
tall perenn	374/421
irises	261/266
peonies	313/306
phloxes	108/110
astilbes	79/82
daylilies	147/146
ornamental perennials around the Palm House	77/73
<b>TOTAL</b>	<b>8683/8885</b>

## Herbarium

<b>Herbarium collection</b>	<b>Number of specimens</b>
Woody plants	9624
Herbaceous plants	8421
Wood collection	395
Carpological collection	741
Fungi (microfungi)	8568
Tree fungi	68
Mosses	15328
Lichens	4364
<b>TOTAL:</b>	<b>47509</b>

## The main activities

### 2013

09.05.2013 – the Baltic Botanic Gardens Conference.

05.-06.2013 – new plant labels and information boards for outdoor collections were installed within the framework of the Environmental Investment Centre (EIC) project.

05.2013 – the Tulip Festival (74 varieties, 550 m<sup>2</sup>).

09.2013 – the translocation of the day lily collection was started.

Throughout 2013, the work continued on the "Garden for the Senses" project (landscape architects Kersti Kuus and Kaija Arroval, senior gardener Ave Viisnapuu).

In 2013 - 2014, the pines of conifer collection were in quarantine due to the infection by *Mycosphaerella dearnessii*.

## **2014**

17.04. and 21.04.2014 – the selection of decorative apple trees, chosen from the seedling experiment started in 1998, were planted to the Arboretum.

05.2014 – the Tulip Festival (75 varieties, 550 m<sup>2</sup>).

For the celebration of the 50th anniversary of the Rose Garden several reparations were conducted (irrigation systems, paths, walls, pergola installation, planting new roses and hedges). During the Days of Roses (11.07.-13.07.2014) 3561 people visited TBG.

06.- 09.2014 – the ditchwork between the Rock Garden and the Rose Garden within the framework of the Citywater project, managed by the Tallinn Environmental Department.

09.2014 – the translocation of the day lily collection was completed.

In 2014, the modernization project of the library, herbarium collections and their databases was started with the funding from Environmental Investment Centre (EIC).

Expert inventories: 105 expert inventories were carried out in 2013. The biggest project was "Expert Analysis of the Boundaries of the Rapla County Parks and Forest Stands", ordered by the Environmental Board.

106 expert inventories were carried out in 2014 (99 woody flora and 7 nature conservation studies). The biggest projects among them were "Maarjamäe Permanent Habitat Inventory and Recommendations on the Permanent Habitat Boundaries and Their Protection", ordered by the Environmental Board; and "Inventory of the Old Manor Parks in the Western Part of Saare



County”, ordered by Consultare LLC.

## **Educational activities**

**Guided tours of TBG collections** are conducted in Estonian, Russian, English and Finnish. The total of 231 tours were conducted in 2013 and 210 tours in 2014.

**An audio guide** is a popular free tour guide for both the greenhouses and the garden collections. The audio guides were used 1868 times in 2013 and 2265 times in 2014.

The Tallinn Botanic Garden has **a new exhibition almost every month**. These are very popular among the visitors of TBG, which is proved by the multiplied number of visitors on the days of exhibitions. The most popular of all is the annual orchid exhibition in March.

**The permanent exhibition of lichens, mosses and tree fungi**, which can be visited throughout the year when there is no snow, is unique in the whole world.

TBG is located in the Pirita River Valley Landscape Protection Area. Here, TBG has set up **educational nature trail** supplied with 22 information boards. Additional knowledge of the nature trail or the permanent exhibition of lichens, mosses and tree fungi can be obtained from **information brochures** provided by TBG in different languages, which the visitors can collect from the ticket office free of charge.

Over 1435 schoolchildren from 19 different schools visited TBG last year (2014) as part of the project-based (the funding from Environmental Investment Centre (EIC)) curriculum related education activities - **Nature School**. At the moment there are 10 ongoing school-programmes providing an exciting opportunity to learn about plants, their uses and their habitats. In 2013, TBG conducted 62 programme days, involving 71 classes with 1419 pupils from 22 different schools.

**A course called “Children of Nature”** for students from the 1<sup>st</sup> to the 6<sup>th</sup> grade runs from October to May. Children find out to identify plants, mosses, lichens; many TBG exhibitions are visited, healthy eating is discussed etc. Various environmental education specialists and many other departments participate in carrying out the programmes.

TBG also shares **botanical information by phone or by e-mail**. Many plant enthusiasts ask advice on plant diseases and pests, unknown plants identification and tips for the growing healthy houseplants.

## Visitors

67 694 people visited TBG in 2013, and 65 405 people in 2014.

## Scientific activities

Research:

The research on biological diversity of the forest ecosystem on the South-East Estonian dune field and its geobotanical analysis, qualitative and quantitative features of their soil. Mari Tilk, MSc.

The research on ecology, population biology and reproductive biology of threatened plant species with the aim of recovery/restoration of their natural populations by combined *ex situ* and *in situ* methods:

Restoration ecology of three endangered fern species (*Asplenium septentrionale*, *Polystichum aculeatum*, *Woodsia ilvensis*) in Estonia. Maris Rattur, MSc.

Restoration ecology of *Oxytropis campestris* ssp. *campestris*(L.) DC. with the support from Environmental Investment Centre (EIC). Krista Kirotar, Sille Janson, Ruth Aguraiuja.

Restoration ecology of three critically endangered Hawaiian endemic fern taxa (*Asplenium dielpallidum*, *Asplenium diellaciniatum*, *Asplenium dielmannii*) on Kaua'i, Hawaiian Islands. Ruth Aguraiuja, PhD.

## Environmental monitoring:

Spatial and temporal trends in heavy metal accumulation in mosses in Estonia. Participation in the United Nations Economic Commission for Europe International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops (UNECE ICP Vegetation) „Heavy metals in European Mosses“. It is one of seven ICPs task Forces that report to the Working Group on Effects of Long-Range Transboundary Air Pollution (LRTAP) Convention on the effects of atmospheric pollutants on different compounds of the environment and health. Siiri Liiv, PhD.

Monitoring of threatened vascular plant species of Estonia. Maris Rattur, MSc.

## Scientific publications

Harmens, H., Norris, D., Mills, G., Aboal Viñas, J., Alber, R., Aleksiyenak, Y., Baceva, K., Barandovski, L., Berg, T., Blum, O., Carballeira Ocaña, A., Chilian, A., Cucu-Man, S.-M., Culicov, O. A., Dam, M., Danielsson, H., Dunaev, A. M., Elustondo, D., Ene, A., Fernández Escribano, J. Á., Frontasyeva, M. V., Gheboianu, A., Godzik, B., Goryainova, Z. I., Hanus, A., Hoydal, K., Infante Olarte, M., Izquieta, S., Jeran, Z., Kapusta, P., Karhu, J., Kubin, E., Laffray, X., Lazo, P., Lebedeva, N. A., Leblond, S., **Liiv, S.**, Magnússon, S., Mankovska, B., Martínez-Abaigar, J., Maxhuni, A., Núñez-Olivera, E., Pihl Karlsson, J. G., Piispanen, J., Poikolainen, J., Popescu, I. V., Qarri, F., Radulescu, C., Riss, A., Ruttens, A., Santamaría, J. M., Skudnik, M., Spiric, Z., Staflov, T., Steinnes, E., Stihl, C., Suchara, I., Sucharová, J., De Temmerman, L., Thelle Uggerud, H., Thöni, L., Todoran, R., Tomás-LasHeras, R., Vergel, K. N., Vikhrova, I. V., Waegeneers, N., Yurukova, L., Zechmeister, H. G., Zinicovscaia, I. Heavy metals and Nitrogen in mosses: spatial patterns in 2010/2011 and long-term temporal trends in Europe. /Eds. Harmens, H., Norris, D., Mills, G.. ICP Vegetation Programme Coordination Centre, Centre for Ecology and Hydrology. Bangor, UK, 2013. 63 pp.

Harmens, H., Mills, G., Hayes, F., Sharps, K., Frontasyeva, M., [Participants of the moss survey: ..., **S. Liiv**, ...]. Air pollution and vegetation: ICP Vegetation Annual Report 2013/2014/ ICP Vegetation Programme Coordination Centre, Centre for Ecology and Hydrology, Environment Centre Wales, Moss Survey Coordination Centre, Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, 2014. 38 pp.

**Kannukene, L. & Pajur, M.** 2013. Heinar Streimanni brüoloogilised kogud Eestis/ Bryological collection of Heinar Streimann in Estonian herbaria. *Samblasõber*, 16: 27-30 (in Estonian with English summary).

**Kannukene, L.** 2014. Veskimetsa salulehtmetsa samblad/ The bryoflora of Veskimetsa broad-leaved nemoral forest). *Samblasõber*, 17: 7-10 (in Estonian with English summary).

**Kannukene, L.** 2014. List of Bryophytes in Tallinn Botanic Garden Herbarium Collections (TALL). <http://www.botaanikaaed.ee/wp-content/uploads/2011/03/TALL-sammalde-nimestik-2014.pdf>

Lorence D.H., Wood, K.R., **Aguraiuja, R.** 2013. Taxonomic reassessment and conservation status of three Kaua'i species of *Asplenium* in the *Diellia* alliance. *American Fern Journal*, 103(3):166-174. 2013.

Klõšeiko, J., Kuznetsova, T., Mandre, **M., Tilk, M.** Short-Term Influence of Clinker Dust and Wood Ash on Macronutrients and Growth in Norway Spruce ( *Picea abies* ) and Scots Pine ( *Pinus sylvestris* ) Seedlings// *Communications in Soil Science and Plant Analysis* (2014) issue 16, pp. 2105-2117. DOI: 10.1080/00103624.2014.929695

## Expeditions:

Fieldwork for population monitoring of *Asplenium dielpallidum*, *Asplenium diellaciniatum*, *Asplenium dielmannii*) on Kaua'i, Hawaiian Islands. Ruth Agurauja, February-April 2013.

## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	10,5	10,5
Dept.of Environmental Education	13	13
Dept.of Outdoor Collections	14	14
Dept.of Tropical and Subtropical Collections	6,8	6,8
Technical Dept.	6	6
TOTAL including:	50,3	50,3
PhD	2	2
Msc	7	7

## Finances (in national currency, national currency = EUR)

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
Revenue	215078	216633
Targeted financing	68408	61258
TOTAL	283486	277891
<b>Expenses</b>		
Operation expenditure	483154	482006
Salaries	450960	473370
TOTAL	934114	955376

# Botanical Garden of Tartu University

## Overview

Address	Lai str. 38, 51005, Tartu, Estonia
Phone	+372 7376180
Fax	-
e-mail	botaed@ut.ee
www	www.ut.ee/botaed
Director	Jüri Sild (head)
Territory area	3,5 ha

## Living plant collections

Total No. of taxa: **9300**

Main taxa	No. of taxa
Indoor plants, including:	<b>1501</b>
Succulent plants	330
Tropical plants	584
Subtropical plants	522
Palms	65
Trees and shrubs	<b>704</b>
Herbaceous ornamental plants, including:	<b>2498</b>
Systematic garden	<b>1255</b>
Medical plants	<b>492</b>
Moss garden	<b>120</b>
Rock Garden	<b>1224</b>
Roses	<b>244</b>
Estonian cultivars	<b>290+</b>
Nursery and experimental garden	<b>900+</b>

## **The main activities**

### **2013**

Thematic days:

- Bird song day (6.04)
- Plants enchantment day (18.05)
- Night of museums (18.05)
- Spring in the garden (8.06)
- Hanseatic day (20.07)
- Medicinal plants day (17.08)
- Researchers night (27.09)
- Spices day (17.12)

Exhibitions:

- Christmas plants from all over the world (18.12-13.01)
- Slash and burn agriculture (2.02-24.02)
- Orchids (6.03-17.03)
- Willows (20.03-07.04)
- BG anniversary (210 years) (20.06-20.07)
- Plant sculptures in the garden (19.07-2.08)
- Day lily (1.-3.08)
- Plant migrates with man (27.09-4.11)
- Spices and spice plants (14.12-12.01)

125 guided tours

20 classes for pupils on different topics

120000 entrances from main gate

17800 tickets to greenhouses

Participations:

13.-16.09.2013 - Conference in Tver „Living in Harmony: Botanic Gardens and Society – Dialogue without Borders“. Tver, Russia.

We acquired an electric vehicle for handicapped and just for touring.



## 2014

Botanical Garden united with TU Natural History Museum

Renovation of the Palm House (closed from may – december)

Budget 600000 € (financed by Tartu University) - total renovation, new frames, renovated carcass, changed glasses to polycarbonate, changed heating system, electricity etc.)



Thematic days:

- Bird song day (12.04)
- Night of museums (17.05)
- Spring in the garden (7.06)
- Researchers night (26.09)

## Exhibitions:

- Orchids (1.-9.03)
- Palms (13-27.04)
- Clematises (22.24.08)
- From carrot to hemlock (26.09-26.10)
- History of breeding ornamentals in Estonia (30.10-23.11)
- Handicraft of employees of BG (24.11-14-12)
- Crazy solstice (19.12-25.01)

68 guided tours (Palm house closed)

7 classes for pupils on different topics

125000 entrances from main gate

13000 tickets to greenhouses (Palm house closed)

## Participations:

Seed banking workshop of the Nordic-Baltic botanic gardens. Botanical Garden of the University of Helsinki, 9-10.09.2014

We acquired a new multifunctional vehicle.



## Projects 2013-2014:

National program on locally bred ornamentals (Genetic resources)  
EstLat program „SmartGardens“

Reintroduction program of *Dianthus superbus* for Estonian Road Administration  
2 expeditions to collect seeds from endangered species of Estonia



## Structure and staff

	<b>2013</b>	<b>2014</b>
TOTAL including:	16	16
PhD	1	1
Msc	4	4

## Finances (in national currency, national currency = EUR)

	<b>2013</b>	<b>2014</b>
Income	510 000 € (395000 from TU, 40000 from ticket selling, 75000 projects)	490 000 € (410000 from TU, 31000 from ticket selling, 49000 projects)

Our budget covers absolutely all expences one can imagine garden needs to run (salary, economic and management cost, heating, electricity, security, cleaning etc.)

# National Botanic Garden of Latvia

## Overview

Address	Miera Street 1, Salaspils, LV-2169, Latvia
Phone	+371 67945460
Fax	+371 67945459
e-mail	nbd@nbd.gov.lv
www	<a href="http://www.nbd.gov.lv">http://www.nbd.gov.lv</a>
Director	Andrejs Svilāns
Territory area	129 ha

## Living plant collections

Total No. of taxa: ~**13132**

Main taxa	No. of taxa
<b>Indoor plants</b> , including:	<b>2580</b>
Greenhouse flowers (gerberas, chrysanthemums, alstroemerias, cyclamen cvs.)	480
Orangery plants	2100
<b>Trees and shrubs</b> , including:	<b>4450</b>
Conifers (incl. new forms)	830
Rhododendrons	200
Crataegus	230
Rosa cv.	500
Other woody plants	2690
<b>Herbaceous plants</b> , including:	<b>4854</b>
Bulbous plants species collection	1800
Dahlia cv.	327
Astilbe cv.	150
Phlox paniculata cv.	137
Hosta cv.	52
Paeonia cv.	153
Hemerocallis	129

Iris	239
Tulips	329
Narcissi, Hiacinths	159
Lillium sp. + cv.	226
Rock garden plants	587
Other perennials	446
Annual flowers	120
<b>Utility plants</b> (berry, technical, medicinal, spice etc.)	<b>1113</b>
<b>Rare and endangered plants of Latvia</b>	<b>135</b>

## Herbarium

50 000 specimens

## The main activities

Traditional NBG plant markets (7 fairs each year – from April to October), with the participation of nurseries and individual plant growers from all Latvia, and also some growers from Lithuania and Estonia.

## Scientific popular activities:

### In 2013

Number of visitors – 25812; 7 plant fairs, 34 scientific popular articles and 2 scientific popular books, 32 consultations, 5 radio, 3 TV programmes, 8 exhibitions, organized „Latvian Tree Meeting“ and „Scientist’s Night“.

### In 2014

Number of visitors – 31152; 7 plant fairs, 47 scientific popular articles and 3 scientific popular books, 43 consultations in mass media, 9 radio, 6 TV programmes, 7 exhibitions,; organized „Scientist’s Night“.

## Scientific activities

Scientific projects, list of scientific publications, expeditions etc.

*2013. Project granted by Scientific Council of Latvia: Nr.09.1549. "Biological*

plant protection, biological diversity conservation and functional importance of plant mineral nutrition in globally changing environmental conditions”, Part C Nr. 09.1295: “Ecological and biological research of wild orchid species as a base for biological diversity conservation of Orchidaceae in Latvia” (Project leader Dr. biol. Gunta Jakobsonsone).

2013-2014 Project granted by Latvian Environmental Protection Fund „Ex situ conservation of Latvian threatened plant species and in situ investigation of some species” (project leader Dr. biol. Dace Kļaviņa)

2013-2014 Doctoral thesis Daina Roze “Influence of ecological factors to the vitality of *Liparis loeselii* (L.) Rich. Populations in Latvia” (planned to be defended in 2015 in Daugavpils University).

2013-2014 INTERREG project “SmartGardens” (in co-operation with Tartu University Botanic Garden)

Finished in 2014 ERDF granted project: - **“Creation of the Infrastructure of ex situ biological diversity conservation”**.

2013-2014 Investigations ordered by business companies: Limited company „KANO”: Investigation of optimal soil mixtures for houseplants (Z. Purne)

## Scientific publications

Kļaviņa D., Grauda D., Priede A., Rashaļ I. 2014. The habitat diversity and genetic variability of *Cypripedium calceolus* in Latvia. In: *Actions for wild plants* (Papers of the 6<sup>th</sup> Planta Europa Conference on the Conservation of Plants”, Kraków, Poland), 91–97.

Roze D., Jakobsonsone G., Megre D., Belogradova I. 2014. Survival of *Liparis loeselii* as an early successional species in Engure region described based on ecological peculiarities during the annual cycle. *Proceedings of the Latvian Academy of Sciences. Section B Natural, Exact and Applied Sciences* **68** (1/2): 93–100. (*Scopus*)

Roze D., Jakobsonsone G., Megre D., Belogradova I., Karlovska A. 2014. Survival of *Liparis loeselii* (L.) Rich. as an early successional species in Engure region described based on ecological peculiarities during the annual cycle. *Proceedings of the Latvian Academy of Sciences. Section B. Vol. 68* (2014), No. 1/2 (688/689), pp. 93-100. DOI: 10.2478/prolas-2014-008.

Roze D., Jakobsonsone G., Megre D., Kreile V., Višņevska L., Belogradova I. 2014. Possible ecological reasons for the threat of *Liparis loeselii* populations in Latvia – preliminary results. In: Mirek Z., Nikel A. & Paul W. (eds) 2014. *Actions for Wild Plants. Papers of the 6th Planta Europa Conference on the Conservation of Plants* (Kraków, Poland, 23–27 May 2011). Committee on Nature Conservation, Polish Academy of Sciences,

Kraków, pp. 125-131.

Hall T. & Seisums A. 2014. 794. *Iris furseorum*. *Curtis's Botanical Magazine* **31** (3): 249-259

Hall T. & Seisums A. 2014. 793. *Iris wallisiae*. *Curtis's Botanical Magazine* **31** (3): 238-248

Roze D. 2014 „Latviskie” augi žurnālā „Atpūta” (20. gadsimta 30. gadi)”. Daugavpils Universitātes Humanitārās fakultātes XXIII Starptautisko Zinātnisko lasījumu materiāli. Vēsture VII. Vēsture: Avoti un cilvēki, Daugavpils, Akadēmiskais apgāds „Saule”, 346-353. ISSN 1691-9297 („Latvian” plants in journal „Atpūta” in 1930’s. In Latvian).

## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	7	7
Scientific staff	15	15
TOTAL including:	85	85
PhD	12	12
Msc	15	15

## Finances (EUR)

<b>Income</b>	<b>2013</b>	<b>2014</b>
State financing (incl. scientific grants)	2435247	2690466
Own income	139481	179298
<b>TOTAL</b>	<b>2574728</b>	<b>2869764</b>
<b>Expenses</b>	<b>2013</b>	<b>2014</b>
Salaries (including taxes)	645029	585724
Other expenses	1500427	2614499
<b>TOTAL</b>	<b>2145456</b>	<b>3200223</b>

# Botanical Garden of the University of Latvia

## Overview

Address	Kandavas str. 2, Riga, LV-1083, Latvia (main territory of the Botanical Garden)	"Rododendri", Spilve, Babite, LV-2101, Latvia (Rhododendron breeding and testing nursery "Babite" – department of the Botanical Garden)
Phone	+371 67450852	+371 67913107
Fax	+371 67450852	+371 67913127
e-mail	botaniskais.darzs@lu.lv	rodod@lanet.lv
www	www.botanika.lu.lv	www.rododendri.lu.lv
Director	Anta Sparinska	Head: Rihards Kondratovics
Territory area	15 ha	11,8 ha

## Living plant collections in the Botanical Garden

Total No. of taxa: **5775**

Main taxa	No. of taxa
Indoor plants, including:	<b>1673</b>
Succulent plants	730
Tropical plants	383
Subtropical plants	433
Azalea	127
Trees and shrubs, including:	<b>871</b>
Rhododendrons	90
Lilacs	74
Magnolias	15
Herbaceous ornamental plants, including:	<b>2054</b>
Dahlias	294
Lilies	77
Hostas	115

Systematic groups of plants	<b>331</b>
Biological and morphological groups of plants, including:	<b>788</b>
Medical plants	290
Poisonous plants	64
Mire plants	<b>38</b>

## Living plant collections in the Rhododendron breeding and testing nursery "Babite"

Total No. of taxa: **324**

Main taxa	No. of taxa
Rhododendron species	76
Rhododendron cultivars	248

## The main activities

### 2013

- Main exhibitions are „Aphrodisiacal plants“ (February - March), „Cactus“ (April), Riga Flower Show (July 4-7).
- Opening of new Azalea Greenhouse at February 20<sup>th</sup>.
- Plant Conservation Day (May 17<sup>th</sup>, ~800 schoolchildren).
- Night of Scientists (September 27<sup>th</sup>).
- Royal Horticultural Society Certificate of international registration: 8 rhododendrons (Rhododendron breeding and testing nursery "Babite")
- Royal Horticultural Society Certificate of international registration: 7 evergreen azaleas (Botanical Garden of the University of Latvia).

### 2014

- Main exhibitions are „Leaf pigments“ (February - March), „Shakespeare Garden“ (May), Riga Flower Show (July 10-13), „Orchids“ (September), „Super succulents – living stones“ (October), „Taste of Italy“ (October-November).
- Plant Conservation Day (May 23<sup>rd</sup>, ~1000 schoolchildren).
- Finished two projects supported by Boris and Ināra Teterev Foundation:
  - 1) Renovation of the expositions of rhododendrons, perennial plants and pond (7000 m<sup>2</sup>);

- 2) Wooden fence exchange to metal fence (739 m).
- Latvian Plant Breeder's Rights certificates: 7 (Rhododendron breeding and testing nursery "Babite").
  - Award: for the contribution to education and popular-science activities Atis Kronvalds Foundation and ARN Ltd. awarded Dr. agr. Dace Grīviņa (the head of the Tropical and Subtropical Plants Laboratory).

## Scientific activities

### Projects

Restoration of Raised Bog Habitats in the Especially Protected Nature Areas of Latvia, supported by European Commission LIFE+ program, Raised Bogs – LIFE08 NAT/LV/000449 (headed by Dr. biol. Māra Pakalne, 2010-2013).

Conservation and management of priority wetland habitats in Latvia, European Commission LIFE+ program (headed by Dr. biol. Māra Pakalne, 2014 -2017).

Rising of proficiency in briology and lichenology of academic staff of the University of Latvia through teacher mobility to the Norwegian University of Science and Technology (headed by Dr. biol. Līga Strazdiņa, 2014).

Botanical Garden UL is a cooperating partner in two projects run by the University of Latvia (supported by EU Structural Funds):

Development of new cosmetic compositions for skin revitalization and pigmentation adjustment using environmentally friendly technology (headed by Dr. biol. Nils Rostoks, Faculty of Biology, 2014-2015).

Energy efficiency and sustainability of low energy buildings in Latvian climate conditions (headed by Dr. phys. Andris Jakovičs, Faculty of Physics and Mathematics, 2013-2015).

## Publications

### 2013

1. I. Apine, S. Tomšone, V. Nikolajeva, I. Jākobsone Some Oxidative Responses in Rhododendron Leaves Infected with *Pythium* and *Phomopsis*, Acta Horticulturae, 2013, 990: 55-60.



2. I. Apine, B. Bankina, V. Nikolajeva, S. Tomsone Powdery mildew on *Rhododendron* caused by *Erysiphe azaleae* in Latvia, Czech Mycology, 2013, 65 (1): 113-123.

3. I. Apine, K. Freidenfelds, D. Megre, K. Dokane, U. Kondratovics The effect of stock plant etiolation on rooting and overwinter survival of deciduous azalea cuttings, Acta Horticulturae, 2013, 990: 465-472.

4. И. Набурга – Ермакова Перспективные виды полыни для применения в озеленении. Цветоводство: традиции и современность. В: Материалы VI Международной научной конференции. Волгоград, 15-18 мая 2013 г. с. 297-300

## 2014

1. И. Набурга – Ермакова Представители рода Седум для озеленения крыш / *Sedum* Genus in Roof Greenery. Formation of Urban Green Areas. Scientific Articles, 2014 (1) 11: 117-177

2. И. Набурга – Ермакова Результаты интродукции представителей рода *Potentilla* в ботаническом саду Латвийского университета / The results of Introduction of some Taxa of *Potentilla* Genus in the botanic Garden of the University of Latvia. Formation of Urban Green Areas. Scientific Articles, 2014 (1) 11: 178-186

3. L. Strazdiņa, L. Strazdiņa, A. Mežaka. Samblaretk Eesti saartele Läti brüoloogide vaatevinklist. (Moss trip to Estonian islands. Latvian bryologist perspective.) Samblasöber, 2014, Nr. 17, 47: 26 – 33.

4. A. Sparinska Biological diversity in Hybrid *Rugosa* roses. Thesis. Rīga, Latvijas Universitāte, 2014, 99.

5. *Index Seminum* 2014-2015, Nr. 78, Rīga 2014, 20 lpp.

## Conferences

### 2013

1. A. Sparinska Multiple use of *Rosa rugosa*. The VI International Symposium on Rose Research and Cultivation, Hannover, Germany, 25.-30.08.2013.

2. A. Sparinska Volatile compounds in flowers of *Rugosa* Hybrids. The 44th International Symposium on Essential Oils (ISEO 2013), Budapest, Hungary, 8.-11.09.2013.

### 2014

1. M. Dakša, S. Tomsone, L. Strazdiņa Educational experience in The Botanical Garden of the University of Latvia, Baltic Botanical Gardens congress, Uppsala,

Sweden 26-28.05.2014.

2. I. Nāburga-Jermakova *Sedum* Genus in Roof Greenery. International scientific-practical conference "Formation of Urban Green Areas 2014: Green Infrastructure". Klaipeda, 23.-24.04.2014.

3. I. Nāburga-Jermakova The results of Introduction of some Taxa of *Potentilla* Genus in the Botanic Garden of the University of Latvia. International scientific-practical conference "Formation of Urban Green Areas 2014: Green Infrastructure". Klaipeda, 23.-24.04.2014.

## Visitors

Botanical Garden:

Year	2013	2014
People	57841	64764

Rhododendron breeding and testing nursery "Babite":

Year	2013	2014
People	15400	18700

## Structure and staff

Botanical Garden

	2013	2014
Administration	3	3
Scientific personal	8	8
Field workers	23	25
Technical personal	8	8
<b>TOTAL including:</b>	<b>42</b>	<b>44</b>
PhD	4	5
Msc	6	5

Rhododendron breeding and testing nursery "Babite"

	<b>2013</b>	<b>2014</b>
Administration	3	3
<b>TOTAL including:</b>	16	16
PhD	2	2
Msc	3	3

**Finances** (in EUR)

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
University of Latvia Grant	95540	100296
Government grant	95539	100615
Income	118841	156742
Research projects (except LIFE+)	0	0
<b>TOTAL</b>	<b>309920</b>	<b>357653</b>
<b>Expenses</b>		
Salary with tax.	301621	295518
Maintenance of infrastructure (except financial resources of Boris and Ināra Teterev Foundation)	31811	25814
<b>TOTAL</b>	<b>333432</b>	<b>321332</b>

Rhododendron breeding and testing nursery "Babite"

	<b>2013</b>	<b>2014</b>
<b>TOTAL Income</b>	198947	199927
<b>TOTAL Expenses</b>	198947	199927

# Arboretum Kalsnava

## Overview

Address	"Slodas", Jaunkalsnava, Madona d., LV - 460, Latvia
Phone	+371 28380280
Fax	-
e-mail	j.zilins@lvm.lv; arboretums@inbox.lv
www	www.lvm.lv; www.mammadaba.lv;
Maneger	Jānis Ziliņš
Territory area	143.96 ha

## Living plant collections

Total No. of taxa: **3251**

Main taxa	No. of taxa
Conifer 12 genera, including:	
Juniperus ( taxa)	78
Picea abies	106
Pinus sylvestris	52
Thuja	49
Deciduous trees, shrubs, liana 157 genera, including:	
Acer (taxa)	44
Malus	103
Syringa	137
Rhododendron	120
Magnolia	5
Paeonia	180

## The main activities 2013

- 3.- 4.05 Plant Parade in Sigulda
- 24.-25.05 Park festival in Kuresare (Estonia)

- 30.05 Program for pupils "Blooming bushes" (120 pupils)
- 16.06 Peony festival (1600 visitors)
- 8.06 Madona region festival (in Madona)
- 24.07 Camp participants of educational program "Know more about forest" – teachers
- 2.08 Silk painting workshop „Leafs on silk“
- 7.08 Children fund camp participants
- 10.08 Jaunpiebalga – plant and craft market
- 31.08 dendrology specialists, scientists group from Finnish arboretum Mustila
- 16.10 International youth camp participants in project "Unusual trees"

## The main activities 2014

- 2.-3.05 Plant Parade in Sigulda
- 10.05 Artists workshop
- 14.05 Madona region pre-school authority culture teams meeting in Madona (250 participants)
- 14.05 Petersburg journalists visit
- 15.06 Peony festival (3900 visitors)
- 22.05 Program for pupils „From the seed a Norway spruce grows“
- 28.06 Auto – photo orienteering day (65 crews)
- 23.07 Camp participants of educational program "Know more about forest" – teachers
- 27.09 Vintage cars reunion

## Publications

### 2013

1. *Index Seminum* 2013 – 2014, Nr. XXXIII, Madona 2013

### 2014

1. *Index Seminum* 2014-2015, Nr. XXXIV, Madona 2014

## Visitors

Years	2013	2014
People	10 000	14 000

## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	3	3
Scientific personal	0	0
Field workers	14	15
Technical personal	1	1
<b>TOTAL including:</b>	<b>18</b>	<b>19</b>
PhD	0	0
Msc	0	0

## Finances (in EUR)

Arboretum

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
S/C Latvia state forests	240 000	404 000
Government grant	0	0
Income	0	0
Research projects (except LIFE+)	0	0
<b>TOTAL</b>	<b>204 000</b>	<b>404 000</b>

# Botanical Garden of Klaipėda University

## Overview

Address	Kretingos str. 92, Klaipėda, 92327 Lithuania
Phone	+370 46 398833, +370 616 40371
Fax	+370 46 398837
e-mail	botanikos.sodas@ku.lt
www	<a href="http://www.ku.lt/bs/">http://www.ku.lt/bs/</a>
Director	Ona Rūta Žadeikienė
Territory area	9.3 ha

## Living plant collections

Total No. of taxa: 3349 (31-12-2014)

Main taxa	No. of taxa
Outdoor plants, including:	3349
Trees and shrubs ( <i>Pinophyta</i> and <i>Magnoliophyta</i> )	1502
Herbaceous ornamental plants	1141
Medicinal and spice plants	455
Indigenous plants on the territory	251

## Educational activities

### 2013

- "Plant Fascination Day 2013" on May.
- A non-formal education programme was prepared for seniors "Decorative plantation and herbal cultivation", which continued two years (2013-2014).
- Seminar for social pedagogues "Stress and its elimination" in Palanga educational and cultural center, on September.
- Seminars during exhibition-fair "My Garden 2013" on August (organized by joint-stock company "Expo Vakarai"): 1) "Herbs in the garden, outdoors and on the windowsill"; 2) "Hedges: plant species diversity, pruning, shaping"; 3) "Annual and perennial flowers for rural homesteads".

We organized 47 guided tours in the Botanical Garden, the number of visitors was more than 12000 per year.

## **2014**

- “Plant Fascination Day 2014” on May.
- Educational lecture for schoolchildren “How to prepare floristic souvenirs” on October.
- Seminar for schoolchildren “Lavender cultivation and usage” on 09 October.
- Seminar for adults “Let’s do a Christmas bouquet” on 11 and 15 December.

We implemented a non-formal education programme for seniors “Decorative plantation and herbal cultivation”, which continued two years (2013-2014).

We organized 45 guided tours in the Botanical Garden, the number of visitors was 14370 per year.

## **Scientific activities**

### **2013**

- In September 12-14 an important event took place in Klaipėda: Forum Sweden 2013 “Integrated strategy for culture, business and society”. It was the 20th Forum between Swedish and Lithuanian partners, the first one being organized by Karlskrona in 1994, and the second - at the end of the same year in Klaipėda. The organizers of the Forum Sweden 2013 were Botanical Garden of Klaipėda University, Klaipėda municipality, Lithuanian – Swedish Friendship societies of Lithuania and Sweden. The Forum created opportunities for new contacts and sharing information - both among state institutions, NGOs, as well as separate delegates. Almost 100 Swedes and Lithuanians arrived to the Forum: social field municipal staff, SME business people, seniors, who are full of initiative and still very active in public life. A large group of young people joined the Swedish delegation.
- Research activities in Klaipėda Municipality programme “Monitoring of plant quality in green spaces of Klaipėda city”.
- National project “Confessional Heritage of Klaipėda Region: Interdisciplinary Research into the Old Cemeteries”. Klaipėda University Botanical Garden analyzed botanical aspects of the old cemeteries.
- Nordplus Framework Programme project (coordinator - Abo Akademi



University, Finland). Project No. HE-2012\_1a-29278 The Nordic Network for Environmental Education – NNEE.

- „Researchers’ Night” project on September. Some educational activities, seminars, guided tours were implemented. More than 500 people visited Botanical Garden of Klaipėda University during these activities.

We collected seeds of rare and endangered plant from Curonian Spit and established sand-dune plants collection. Now there are 32 species of such plant.

## 2014

- National scientific conference-expedition “Soil surface features of Lithuanian seaside” on 02-03 October 2014.
- Activities of international Tourism Day on 26-27 September 2014.
- International project „Researchers’ Night” activities in the Botanical Garden on 25 September 2014.

Klaipėda University BG continued working in Klaipėda Municipality programme “Monitoring of plant quality in green spaces of Klaipėda city: investigation of *Acer negundo* and *Robinia pseudoacacia*”. Dr. Rita Nekrošienė (Klaipėda University BG) is an expert of the Klaipėda Municipality in area of introduction a new alien plant species (invasive plants too) in urbanised green spaces.

It is preparing a new collection of bulb plants.

## Main scientific publications

### 2013

1. **Nekrošienė R.** Klaipėdos krašto senųjų liuteronų kapinių aplinkotvarkos ypatumai. Miestų želdynų formavimas, Vol. 1(10). Mokslo darbai / *Formation of Urban Green Areas, Vol. 1(10). Scientific Articles*, Klaipėda, 2013, P. 191-197, ISSN 1822-9778, ISSN 2029-4549 (online).
2. **Nekrošienė R.** Meteorologinių sąlygų dendrochronologinė indikacija Klaipėdos mieste. Miestų želdynų formavimas, Vol. 1(10). Mokslo darbai / *Formation of Urban Green Areas, Vol. 1(10). Scientific Articles*, Klaipėda, 2013, P. 198-207, ISSN 1822-9778, ISSN 2029-4549 (online).
3. **Nekrošienė R.** Paprastųjų pušų būklė skirtingos oro taršos sąlygomis Kauno miesto želdynuose. Dekoratyviųjų ir sodo augalų sortimento, technologijų ir aplinkos optimizavimas. Mokslo darbai / *Optimization of Ornamental and Garden Plant Assortment, Technologies and Environment. Scientific Articles*. Vol. 4 (9), p. 111-117, 2013 m. ISSN: 2029-1906; 2335-7282 (online)

## 2014

1. Skuodienė R., **Nekrošienė R.** The value of green manures in sustainable management in spring barley agrocenoses. Romanian Agricultural Research, No 31, 2014. P. 261-270. ISSN 1222 - 4227 (print); ISSN 2067 - 5720 (on line).
2. Skuodienė R., Katutis K., **Nekrošienė R.**, Repšienė R., Karčauskienė D. The influence of hydrological conditions on sown meadow naturalization processes and productivity. Applied Ecology and Environmental Research (in press).
3. **Nekrošienė R.**, Katutis K., Skuodienė R., Repšienė R., Karčauskienė D. Hidrologinių sąlygų įtaka vejas sudarančių *Poaceae* šeimos augalų paplitimui in situ. Miestų želdynų formavimas / Formation of Urban Green Areas. Mokslo darbai. Nr. 1(11), 2014. P. 187-193. ISSN 1822-9778 print / ISSN 2029-4549 online.
4. **Nekrošienė R.**, Paulauskaitė D. Skirtingų rūšių kaštonų (*Aesculus L.*) fitopatologinė būklė pajūrio klimato sąlygomis. Dekoratyviųjų ir sodo augalų sortimento, technologijų ir aplinkos optimizavimas = Optimization of ornamental and garden plant assortment, technologies and environment. Nr. 5(10), 2014. P. 140-145. ISSN 2029-1906 (spausdintas) / ISSN 2335-7282 (online).
5. **Nekrošienė R.** Pažintis su Klaipėdos universiteto Botanikos sodu. Kn.: Dirvožemio dangos ypatumai Lietuvos pajūryje. Mokslinės konferencijos ekspedicijos vadovas. Akademija, 2014. P. 27-30. ISBN 978-609-449-069-9.

## Structure and staff

	2013	2014
Administration	3	3
Curators of collections	4	4
Researcher	0.75	0.75
Technicians	10.50	10.50
TOTAL including:	18.25	18.25
PhD	0.75	0.75
Msc	2	2

## Finances (in national currency - LTL, 1 EUR =3,45 LTL)

	2013	2014
<b>Income</b>		
State budget subsidy	401 700	409 557
Other income (trade of plants, tickets, territory rent, etc.)	52 625	73 370

TOTAL	454 325	482 927
<b>Expenses</b>		
Salaries (incl. taxes)	424 601	432 557
Infrastructure maintenance and development	28 609	21 370
TOTAL	453 210	453 927

# Botanical Garden of Šiauliai University

## Overview

Adress	Paitaičių str. 4, LT-77156, Šiauliai, Lithuania
Phone	+37069935939; +37014553934
Fax	+37014553934
e-mail	dir@bs.su.lt
www	<a href="http://www.su.lt/botanikossodas">http://www.su.lt/botanikossodas</a>
Director	Asta Klimienė
Territory area	6,5 ha

## Living plant collections

Total No. of taxa: 4340

Main taxa	No. of taxa
<b>Indoor plants, including:</b>	<b>90</b>
Cactaceae and crassulaceae	33
<b>Trees and shrubs, including:</b>	<b>941</b>
Ericaceae	319
Deciduous	346
Coniferous	258
Phenology	18
<b>Herbaceous plants, including:</b>	<b>3309</b>
Department of plant systematic and geography	894
Department of floriculture	1220
Department of mountain plants	1145
Department of medical and spicies	50

**Department of rock garden.** In 2014 there are more than 987 taxa (species and cultivars), mostly species from alpine level. The collection is formed considering some criterions, such as decorativeness, geographical aspects and infrequency of species, plants grouped by geographical distribution of mountains. There is new Ferns section with 28 taxa plants.

**Department of plant taxonomy and geography.** There is about 905 taxa

in this section, including Lithuanian vanishing flora (94 species, 61 included in Lithuania Red book). This section is complementing by plants considering to exclusive morphological, systematic and decorative features of species and geographical subordination.

**Department of woody plants.** At the moment in this collection are about 900 taxa of trees, shrubs and subshrubs. The richest section – *Ericaceae* family collection, with more than 300 taxa of plants.

**Department of floriculture.** At the moment in this collection grow about 1058 taxa annual, biennial and perennial, bulbous and corm, rhizome and tuber flowers from 62 families and 172 genus. The biggest attention is paid for species and genus of decorative perennial flowers, such as *Iris* (in the collection there are 134 species), *Lilium* (64 species) and *Hemerocallis* (120 species).

**Department of Lithuanian flora.** This department was established in 2012. Now there are about 60 taxa mostly of monocotons *Poaceae* family.

**Phenological garden.** Presently is carried out observation of phenological phases of 18 plant species in relation to environmental factors.

## **Herbarium**

No. of specimens: 260

## **The main activities**

In 2013 – 2014 years BG take part in 3 multi institutional organized events of science popularization: “Spaceship Earth”, “Plant Fascinating” and “Researchers’ Night”. Also were organized traditional events: “The ode to delight for spring” and “Assumption in Siauliai”. There were organized a number of new educational events: workshop - “Flowering gardens – fashions by ages”; on “Day of Earth” visitors were invited to take part in action “Let’s plant a tree”. In collaboration with: Siauliai Art school there was organized festival “Flowers in paper”; with Young Naturalist centre in Siauliai - 7- days symposium “Floristic compositions in Botanic garden”. BG took part in Šiauliai City days and in 2 conferences and 3 symposiums for society. Also Botanical garden was a partner for local TV (producing of two broadcasts). BG took part in more than 20 local activities jointly with number of educational, non-government institutions, communities. There were more than 100 excursions organized per year. Number of BG visitors per year - more than 10 thousand.

## Scientific activities

Researchers of Botanic Garden of Šiauliai University carry out investigations in the following main **research areas**: biodiversity *in situ* and *ex situ*; introduction and acclimatization of ornamental plants; on distribution, naturalization and control of neophytes; phenological observations. The Botanic Garden develops a seed fund and the seed interchange is maintained with 250 world botanic gardens.

## The main projects were carried out in years 2013-2014:

1. Šiauliai University BG a coordinator of INTERREG project The Cognition and Preservation of Distinctive Identity through the Environment of Semigallia Region: "Green Environment" LLIII-123;
2. Šiauliai University BG a coordinator of European Agricultural Fund for Rural Development Project "Scientific Innovation and application of the national heritage of rural areas of green spaces" no. 1 PM-PV-12-1-012584-PR001.

Expeditions:

To Joniškis district – 2; Pakruojis – 1; Šiauliai – 3; Pasvalys – 1; Biržai – 1.

## Main scientific publications:

1. A. Dižgalve, R. Sausserde, I. Žukauska, A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė, V. Aleknienė, V. Ramonas, R. Liucvaikienė, E. Ivanova, R. Skirvainienė. Zemgales reģiona vides izzināšana un identitātes atšķirību saglabāšana: "Green Environment". ISBN 978-9984-48-123-4. Rīga: Drukātava Ltd, 2013, 60 p.
2. A. Dižgalve, R. Sausserde, I. Žukauska, A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė, V. Aleknienė, V. Ramonas, R. Liucvaikienė, E. Ivanova, R. Skirvainienė. The Cognition and Preservation of Distinctive Identity through the Environment of Semigallia Region: "Green Environment". ISBN 978-9984-48-124-4. Rīga: Drukātava Ltd, 2013. 60 p.
3. A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė, A. Grišaitė, V. Juknevičius. Index Seminum 2013. ISSN 1822-1238. Šiauliai: VŠĮ Šiaulių universiteto leidykla, 2013, no. 13, 43 p.
4. A. Klimienė, R. Vainorienė, R. Dubosaitė-Lepeškevičė, A. Grišaitė, V. Juknevičius. Botanikos sodo augalų sąvadas. Nr.4. Šiauliai : Šiaulių universiteto leidykla, 2014. 321 p..
5. A. Klimienė, R. Vainorienė. Comparison of morphological features of *Setaria pumila*, grown in ex situ conditions // Journal of Food, Agriculture & Environment. ISSN 1459-0255. 2014, vol 12 (2). (ISI WoS duomenų bazė).

## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	1	1
Researchers	3	3
Specialists	3	3
Other	6	4
TOTAL including:	13	11
PhD	2	2
Msc	1	2

## Finances (in national currency - LTL, 1 EUR=3,45 LTL)

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
From university	43 300	43 500
From others	1000	4 000
TOTAL	44 300	47 500
<b>Expenses</b>	106 000	118 200

# Kaunas Botanical Garden of Vytautas Magnus University

## Overview

Address	Ž. E. Žilibero str. 6, Kaunas, 46324 Lithuania
Phone	+370 37 390033
Fax	+370 37 390133
e-mail	bs@bs.vdu.lt
www	<a href="http://botanika.vdu.lt">http://botanika.vdu.lt</a>
Director	Vida Mildažienė
Territory area (ha)	62,5

## Living plant collections 2014

Total No. of collection examples - 9641

**No. of taxa** – number of species and intraspecific taxa.

**No. of culta** – number of cultivars and groups

**No. of populations** – number of the same taxa from different places.

**No. of unidentified examples** – number of unidentified examples.

**No. of collection examples** – total number of taxa, culta, populations and unidentified examples.

Collections	No. of taxa (species and intra- specific taxa)	No. of culta (culti- vars and groups)	No. of popu- lations	No. of uniden- tified examples	No. of collection examples
<b>Sector of Floriculture</b>	<b>2199</b>	<b>3715</b>	<b>368</b>	<b>137</b>	<b>6672</b>
Glasshouse	1097	103	5	-	1600
<i>Rosa</i>	14	676	-	-	716
<i>Dahlia</i>	6	500	11	41	547
<i>Tulipa</i>	17	306	6	-	356



Annual flowers	45	251	-	-	296
<i>Hosta</i>	15	201	4	3	232
<i>Paeonia</i>	10	175	-	20	210
<i>Hemerocallis</i>	11	187	2	1	208
<i>Lilium</i>	9	194	-	-	204
<i>Astilbe</i>	19	82	11	-	115
<i>Aster</i>	33	70	6	5	107
Ornamental grasses	52	59	33	-	127
<b>Sector of Dendrology</b>	<b>642</b>	<b>701</b>	<b>435</b>	<b>39</b>	<b>1357</b>
<i>Aceraceae</i>	45	23	12	1	69
<i>Chamaecyparis</i>	4	42	18	-	72
<i>Hydrangea</i>	8	61	3	1	76
<i>Juniperus</i>	9	81	12	-	115
<i>Picea</i>	14	38	7	-	73
<i>Potentilla</i>	1	55	-	-	56
<i>Rhododendron</i>	57	53	12	20	141
<i>Syringa</i>	25	6	2	11	32
<i>Thuja</i>	5	49	12	1	105
<b>Sector of Medicinal plants</b>	<b>627</b>	<b>41</b>	<b>658</b>	<b>1</b>	<b>688</b>
Medicinal plants	470	7	480	1	480
Aromatic plants and spices	156	4	160	-	160
<i>Humulus lupulus</i>	1	30	18	-	48
<b>Sector of Pomology</b>	<b>47</b>	<b>365</b>	<b>18</b>	<b>3</b>	<b>437</b>
<i>Vaccinium</i>	14	250	16	-	293
<i>Viburnum</i>	4	19	2	3	23
<i>Actinidia</i>	6	46	-	-	49
<b>Group of Plant Systematics and Flora</b>	<b>396</b>	<b>106</b>	<b>388</b>	<b>7</b>	<b>487</b>
Protected plants of Lithuania	36	-	36	-	36
Energetic plants	47	34	-	-	66
<b>Total:</b>	<b>3911</b>	<b>4928</b>	<b>1867</b>	<b>187</b>	<b>9641</b>

At the present time herbarium contains about 10 000 specimens.

The number of plants included to the list of the national collections increased from 175 to 370 in 2013-2014.

## **The main activities**

### **2013**

In 2013 Kaunas Botanical Garden of Vytautas Magnus University (KBG) celebrated the 90 year anniversary. For this occasion the international conference "Research of Plant Diversity. Present and Future" was organized in Kaunas on June 27-28. This event was followed by the 6th International Conference of Botanic Gardens from the Baltic Sea Region that was organized by LUBSA and KBG and took place in Kaunas (KBG and Dubrava Arboretum) on June 29-30.

The total number of KBG visitors in 2013 exceeded 52 thousands. More than 40 events for visitors were organized including education events, exhibitions, fairs, concerts, ethno-culture and community events.

KBG implemented several projects for science communication and rising environmental awareness. KBG is a partner of the Lithuanian Academy of Science in the project VP1-3.2-ŠMM-02-V-02-003 "Development of a National Science Communication System tools in Lithuania". Since 2012 we have been the national coordinator of „Fascination of Plants Day". In 2013 this event took place in 6 cities, involved about 25 partners and received over 8,000 visitors. Other activities include a program of science laboratory classes for children at KBG "NSO laboratorija", summer field expedition camps for school children and a mobile program of science demonstrations performed in other Botanic Gardens and regional parks in Lithuania. KBG took part in the national science festival Erdvelaivis Zeme / Spacecraft Earth. In the framework of the project VP3-1.4-AM-09-K-02-001 „The school of green ideas" (Green Aleksotas 2) the new exposition of Bioenergy plants was established in KBG. KBG also implemented the project funded by Botanic Gardens International (BGCI) and the Millennium Seed Bank Partnership (MSBP) Fieldwork Fund. Expeditions aimed for collecting seeds and transfer threatened plants from conservation places *in situ* to *ex situ* were performed in the protected areas of South Lithuania.

The project for Cooperation in Science and Technology Program between Lithuania and Belarus TAP LB 01/2013 "Stimulation of plant metabolism and fungicidal protection using pre-sowing seed treatment by cold plasma and

electromagnetic field" was started in 2013. This project was funded by the Lithuanian Research Council.

The collaboration with municipality of Kaunas city was developed - on May 20, 2013 the supplement for the former (2009) bilateral agreement between Kaunas municipality and Vytautas Magnus University was signed concerning the support for activities in KBG.

KBG was accredited as a hosting organization by the European Voluntary Service for the year 2013. The first volunteer from Spain was working in our garden for 9 months. KBG also accepted 23 participants of two international volunteer summer camps.

## **2014**

In the beginning of 2014 KBG was reorganized into two large departments: Plant Collection department (comprised of 4 collection sectors: Dendrology, Floriculture, Medicinal Plants and Pomology, and two groups – Flora Systematics and Phytopathology) and Department of Service and Innovations. The visits of KBG staff to 7 botanical gardens in Latvia, Estonia, Poland and Belarus were organized in order to share the experience, to perform plant exchange and to re-establish professional contacts.

The total number of KBG visitors in 2014 exceeded 62 thousands, more than 50 events for visitors including education events, exhibitions, fairs, concerts, ethno-culture and community events were organized. The collections and expositions have been extended: the number of collection numbers increased by more than 40 %, nine new plant expositions were established, five expositions were reconstructed.

KBG continued implementation of projects started in 2013: the project VP1-3.2-ŠMM-02-V-02-003" Development of a National Science Communication System tools in Lithuania" and VP3-1.4-AM-09-K-02-001 „The school of green ideas" (Green Aleksotas 2)". KBG coordinated „Fascination of Plants Day 2014" - the event took place in 8 cities, involved 30 partners and received over 5,000 visitors. As usual, KBG participated in the programme of the national science festival Erdvelaivis Zeme/Spacecraft Earth 2014.

The project for Cooperation in Science and Technology Program between republics of Lithuanian and Belarus TAP LB 01/2013 "Stimulation of plant metabolism and fungicidal protection using pre-sowing seed treatment by cold plasma and electromagnetic field" was continued in 2014.

KBG has started the implementation the project funded by EEE and Norwegian Environment Agency, grant priority sector Environmental protection

and management programme LT03 Biodiversity and ecosystem services "Estimation of an impact of climate change on biological diversity in The Southwest Lithuania and development of measures for adjustment (*Botanica sudavica*)".

The project „Campaign against *Heracleum sosnowskyi*” was funded by Department of Environment protection of Kaunas Municipality (video: <https://www.youtube.com/watch?v=yQD8ssWpUZ4>). The event „The Night of Scents” was organized jointly with Station of Nature Research and Environmental Education, Marijampole.

KBG was accredited as a hosting organization by the European voluntary service for the year 2014. Three volunteers (from Poland, France and UK) were working in our garden for 9 months. KBG also accepted 12 participants of the international volunteer summer camp.

## Main publications:

1. Česonienė L, Daubaras R., Kraujalytė V., Venskutonis P. R., Šarkinas A. Antimicrobial activity of *Viburnum opulus* fruit juices and extracts // Journal für Verbraucherschutz und Lebensmittelsicherheit = Journal of consumer protection and food safety. 2014, 9, (2), 129-132.
2. Ligor M., Stankevičius M., Wenda-Piesik A., Obelevičius K., Ragažinskienė O., Stanius Ž., Maruška A., Buszewski B. Comparative gas chromatographic-mass spectrometric evaluation of hop (*Humulus lupulus* L.) essential oils and extracts obtained using different sample preparation methods // Food analytical methods. 2014, 7 (7) 1433-1442.
3. Maruška A., Ragažinskienė O., Vyšniauskas O., Kaškonienė V., Bartkuvienė V., Kornyšova O., Briedis V., Ramanauskienė K. Flavonoids of willow herb (*Chamerion angustifolium* (L.) Holub) and their radical scavenging activity during vegetation // Advances in medical sciences. 2014, 59 (1), 136-141.
4. Bartkienė E., Schleining G., Juodeikienė G., Vidmantienė D., Krunglevičiūtė V., Reškšytė T., Bašinskienė L., Stankevičius M., Akuneca I., Ragažinskienė O., Maruška A. The Influence of lactic acid fermentation on biogenic amines and volatile compounds formation in flaxseed and the effect of flaxseed sourdough on the quality of wheat bread // LWT – Food science and technology. 2014, 56 (2), 445-450.
5. Žukauskienė J., Paulauskas A., Varkulevičienė J., Maršelienė R., Gliaudelytė V. Genetic diversity of five different lily (*Lilium* L.) species in Lithuania revealed by ISSR markers // American journal of plant sciences. 2014, 5 (18), 2741-2747.
6. Dobravalskytė D., Venskutonis P.R., Talou T., Zebib B., Merah O., Ragažinskienė O. Antioxidant properties and composition of deodorized extracts of *Tussilago farfara* L // Records of natural products. 2013, 7 (3), 201-209.
7. Šliumpaitė I., Venskutonis P.R., Murkovic M., Ragažinskienė O. Antioxidant properties and phenolic composition of wood betony (*Betonica officinalis* L, syn. *Stachys officinalis* L.) // Industrial crops and products. 2013, 50, 2013, 715-722.

8. Kraujalytė V., Venskutonis P.R., Pukalskas A., Česonienė L., Daubaras R. Antioxidant properties and polyphenolic compositions of fruits from different European cranberrybush (*Viburnum opulus* L.) genotypes // *Food chemistry*. 2013, 141 (4), 3695-3702.
9. Kaškonienė V., Kaškonas P., Maruška A., Ragažinskienė O. Essential oils of *Bidens tripartita* L. collected during period of 3 years composition variation analysis // *Acta physiologiae plantarum*. 2013, 35 (4), 1171-1178.
10. Česonienė L., Daubaras R., Paulauskas A., Žukauskienė J., Zych M. Morphological and genetic diversity of European cranberry (*Vaccinium oxycoccos* L, Ericaceae) clones in Lithuanian reserves // *Acta societatis botanicorum Poloniae*. 2013, 82 (3), 211-217.
11. Juodeikiene G., Cizeikiene D., Ceskeviciute V., Vidmantiene D., Basinskiene L., Akuneca I., Stankevicius, M., Maruska A., Bartkiene E., Ragazinskiene O., Petrauskas A. Solid-state fermentation of *Silybum marianum* L. seeds used as additive to increase the nutritional value of wheat bread // *Food technology and biotechnology*. 2013, 51 (4), 528-538.
12. Šabūnaitė J., Vitas A. Spontaneous regeneration of rhododendron plants : first evidence from Lithuania // *Polish journal of ecology*. 2013, 61 (1), 171-174.

## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	2	2
Department of Plants Pathology	4	4
Department of Dendrology	6	9
Department of Floriculture	18	20
Department of Medicinal plants	6	6
Department of Pomology	6	6
Department of service and innovations	-	4,75
Seasonal staff	12	10
<b>TOTAL including:</b>	<b>54</b>	<b>61,75</b>
PhD	8	9
Msc	1	2

The Department of technical service of KBG is affiliated to the Service of infrastructure of VMU since 2013.

**Finances** (in national currency - LTL, 1 LTL =0,29 EUR)

	<b>2013</b>	<b>2014</b>
<b>Incomes</b>		
State budget subsidy	1405829	1245660
Other state budget assignments	137698	867626
Projects funding	636765	276843
Private sponsors	70509	8902
Other income (tickets, plant sales, ect.)	296169	413456
<b>TOTAL:</b>	<b>2546970</b>	<b>2812487</b>
<b>Expenses</b>		
Salaries (incl. taxes)	1643205	1571050
Other	931550	1250163
<b>TOTAL:</b>	<b>2574759</b>	<b>2821213</b>

# Vilnius University Botanical Garden

## Overview

Address	Kairėnų 43, LT-10239 Vilnius, Lithuania
Phone	(+370-5) 219 3133
Fax	(+370-5) 231 7933
e-mail	hbu@gf.vu.lt
www	<a href="http://www.botanikos-sodas.vu.lt">http://www.botanikos-sodas.vu.lt</a>
Director	dr. Audrius Skridaila
Territory area	198,85 ha

## Living plant collections

Total No. of accessions – 11225; No. of taxa – 9127 (on 31 December 2014)

Main collections/families/genera	No. of taxa
<b>Indoor plants, including:</b>	<b>785</b>
<i>Crassulaceae</i> DC.	140
<i>Cactaceae</i> Juss.	110
<b>Woody plants, including:</b>	<b>4790</b>
<i>Ericaceae</i> Juss.	650
<i>Oleaceae</i> Hoff. et Link.	192
<i>Ribes</i> L.	423
<i>Syringa</i> L.	135
Conifers	332
Lianas	140
Alpine flora	358
<b>Herbaceous plants, including:</b>	<b>4650</b>
<i>Dahlia</i> Cav.	281
<i>Hemerocallis</i> L.	472
<i>Gladiolus</i> L.	180
<i>Paeonia</i> L.	270
<i>Iris</i> L.	526
<b>Indigenous species growing at the natural habitats</b>	<b>521</b>

## **The main activities**

### **In 2013**

#### Development of the Garden infrastructure

In 2013 started work of the Garden laboratory/administrative building reconstruction (project financial supported by State investment program); was enlarged the system of walkways (by financial support of Vilnius city municipality there were built 1600 square meters of new paths); machinery park added 2 new tractors (Ferrari and Tobroco) as electric car and a few various machines and equipments (wood chipper, compost mixer, sweeping machine, mower / shredder), facility for compost production (with solar energy accumulating system).

#### Teaching and education

Garden staff: delivered lectures of 3 courses at Vilnius University and 1 at other high school; participated in the 3 committees of these defend for a PhD degree; led by 17 graduation work trainings and 6 practices; prepared 7 educational courses for basic school students. The Garden organized: the conference for basic school teachers – “Green spaces of education and training process: dissemination of good practices” (14.11.2013); the competition for students of basic schools and children gardens – “My Green Windowsill” (announcement of finalists took place during the Garden’s main year event – “The international day of biodiversity” organized for general public on 18.05.2013). The Garden collaborated with other organizations implementing the project “Researchers’ Night 2013” (in the Garden took place a few lectures and workshops of this project).

#### Collaboration

In 2013 the Garden has exchanged seeds with 195 other gardens (from 42 countries), close collaborated with Dendrology Institute of Polish Academy of Sciences (carrying out researches of plant mycorrhiza); has signed agreement of collaboration with the Central Botanical Garden of Belarus (Minsk).

#### Visitors, cultural events and entertainments

The number of the Garden visitors per year 2013 grew up to 72500. During this year in the Garden were organized 29 events for the general public, took place the “Midsummer” event organized by embassies of 4 Scandinavian countries (Denmark, Finland, Norway, Sweden).



## **In 2014**

### Development of the Garden infrastructure

In 2014 has been: continued work of the reconstruction of the Garden laboratory/administrative building; enlarged the system of walkways (by financial support of Vilnius city municipality and the State Road Administration there were renewed 1360 square meters of the gardens walkways) created the trail of senses; enlarged the area of ornamental plant collections of 3,2 ha. Machinery park added 1 new tractor (Kioti) and some small mechanisms for the gardens maintenance.

### Teaching and education

Garden staff: delivered lectures of 5 courses at Vilnius University and 1 at other high school; participated in the 5 committees of theses defend for a PhD degree; led 5 trainings and 2 practices. The Garden has organized two conferences: one for basic school teachers – “Green spaces of education and training process: dissemination of good practices” (17.10.2014) and conference – “Herbaceous and woody plant protection, maintenance, usefulness and variety” (20.03.2014); the competition for students of basic schools and children gardens – “My green window table” (announcement of finalists on 24.05.2014). The Garden has collaborated with other organizations implementing the project “Researchers’ night 2014” (in the Garden took place a few lectures and workshops of this project).

### Collaboration

In 2014 the Garden has exchanged seeds with 151 other gardens (from 50 countries); has signed agreement of collaboration with the N. V. Cicin name’s Main Botanical Garden of Russian Science Academy (Moskau); has adopted foreign students for praxis (1 from Slovakia, 7 from France, 6 from Germany); there was organized the workshop of the Association of Baltic Botanic Gardens (on 13-14 November 2014).

### Visitors, service, entertainments

The number of the Garden visitors per year 2014 grew up to 74600. In the Garden took place the “Midsummer” event organized by embassies of Scandinavian and Baltic countries and the office of President of Lithuania. During this year in the Garden were organized: 50 events for general public (including 30 cultural, 20 educational events, 2 plant fairs, the International Day of Biodiversity); 7 popular lectures; 8 art exhibitions; 282 guided excursion; over 6800 visitors got beneficiary of the specific garden

services (for recreation, picnics, weddings, holidays, celebration of different organizations anniversaries, various events, etc.); 2100 visitors have used the service of horses.

## **Scientific activities**

### **Main research areas:**

Plant genotaxonomy and biotechnology of cultivation and reproduction; introduction and investigation of ornamental and fruit plants; accumulation, investigation and preservation of plant genetic resources; investigation of immunogenetics, polymorphism, genetic instability of plants; micropropagation *in vitro*.

### **Projects:**

COST program, activity FP1305 "Linking belowground biodiversity and ecosystem function in European forests". [http://www.cost.eu/COST\\_Actions/fps/Actions/FP1305?management](http://www.cost.eu/COST_Actions/fps/Actions/FP1305?management)

*Ribes/Rubus* European Central Data Base. Dr. D. Ryliskis. The Database is managed by the IPGRI and ECP/GR request. Website: [www.ribes-rubus.gf.vu.lt](http://www.ribes-rubus.gf.vu.lt)

### **Main research activities:**

In 2013 the genetic diversity of blue-berried honeysuckle (*Lonicera caerulea* L.) in 4 Latvian populations (Kemeris, Kandava, Mikelstornis, Ventspils) was analysed by using the ISSR method. In 2014 the genetic diversity of other 130 genotypes in 6 populations was analyzed by using the same methodology. In 2013-2014: the technology of root development of 18 lilacs (*Syringa* L.) cultivars *in vitro* conditions was modified. In 2014 the *ex vitro* plantlets of cultivars were planted in the pots with peat and compost soil mixture substrate and transferred for acclimation *in vivo* conditions. In 2013 the tulips (*Tulipa* L.) cultivars from 15 classification groups were assessed from the point of view of resistance to fungal diseases and according the degree of infection by viral diseases; the genetic differentiation and polymorphism among 12 populations of yew (*Taxus baccata* L.) growing in native habitats of the countries neighbouring with Lithuania was assessed by ISSR method; the diversity of ectomycorrhizal fungal community structures in roots systems of Scots pine (*Pinus silvestris* L.) on peat bogs was investigated, in 2014 the same community structures was investigated in abandoned agricultural

land, poor sand soil, the site contaminated by chemical emissions and forest clear-cut.

## Main scientific publications:

### 2013

G. Brazauskas, I. Pašakinskienė, T. Lübberstedt. Estimation of temporal allele frequency changes in ryegrass population selected for axillary tiller development // S. Barth, D. Milbourne (eds.) Breeding Strategies for Sustainable Forage and Turf Grass Improvement. DOI 10.1007/978-94-007-4555-1...10. Springer+Business Media Dordrecht, 2013.

S. Dapkūnienė. Žolinių bijūnų (*Paeonia* L.) morfologinių ir dekoratyvinių savybių apibūdinimo aprašas (metodinė priemonė). Akademija, 2013, 19 p. ISBN 978-609-8126-00-6.

S. Dapkūnienė. Barzdotųjų vilkdalgių veislių (*Iris* „XXX“) morfologinių ir dekoratyvinių savybių apibūdinimo aprašas (metodinė priemonė). Akademija, 2013, 23 p. ISBN 978-609-8126-03-7.

V. Pranskietis, R. Antanaitienė, A. Meiduvienė, E. Meidus, J. Matelis. Gražūs ir skanūs, „Ūkininko patarėjas“, 2013. ISBN 978-9955-703-35-8. 159 p.

J. Patamsytė, V. Rančelis, T. Česnienė, V. Kleizaitė, V. Tunaitienė, D. Naugžemys, V. Vaitkūnienė, D. Žvingila. Clonal structure and reduced diversity of the invasive alien plant *Erigeron annuus* in Lithuania // Central European Journal of Biology, 2013, 8(9), p.898-911. DOI10.2478/s11535-013-0206-9.

J. Patamsytė, T. Česnienė, D. Naugžemys, V. Kleizaitė, V. Tunaitienė, V. Vaitkūnienė, V. Rančelis, R. Mikaliūnaitė, D. Žvingila. Different habitats show similar genetic structure of *Bunias orientalis* L. (*Brassicaceae*) in Lithuania //Notulae Botanicae Horti Agrobotanici – Cluj-Napoca, 2013, 4(2), p. 396-403. ISSN 0255-965X.

B. Gelvonauskis, J. Labokas, S. Žilinskaitė, D. Gelvonauskienė, L. Česonienė. Conservation and Use of Fruit Genetic Resources in Lithuania // Acta Horticulturae, No 976, 2013, p. 191-197. ISBN978 90 6605 119 5, ISSN 0567-7572.

D. Naugžemys, S. Žilinskaitė, A. Skridaila, V. Kleizaitė, J. Patamsytė, D. Žvingila. Genotyping and Assessment of Genetic Relationships among Cultivars, Genetic Lines and Species of *Lonicera* L. using RAPD //Acta Horticulturae, No 976, 2013, p. 311-317. ISBN978 90 6605 119 5, ISSN 0567-7572.

G. Štukėnienė, R. Juodkaitė and A. Skridaila. Diversity of Lithuanian Gladiolus Cultivars in the Botanical garden of Vilnius University // Acta Horticulturae. Proceedings of the Eleventh International Symposium on Flower Bulbs and Herbaceous Perennials. 2013,

No 1002. ISN 0567-7572. p. 31-35.

R. Juodkaitė, A.M. Baliūnienė, Z. Jančys. Assessment of the Vegetative Reproduction Potential of Tulips (*Tulipa* L.) // Global Science Book: Floriculture and Ornamental Biotechnology: Special Issue Bulbous Ornamentals. Vol. 6, Special Issue Vol. 2. P. 122-132. ISBN 978-4-907060-04-6.

## 2014

S. Dapkūnienė. Raganių (*Clematis* L.) morfologinių ir dekoratyvių savybių apibūdinimo aprašas (metodinė priemonė). Akademija, 2014, 28 p. ISBN 978-609-8126-07-5.

R. Juodkaitė, S. Dapkūnienė. Tulpių (*Tulipa* L.) veislių morfologinių ir dekoratyvių savybių apibūdinimo aprašas (metodinė priemonė). Akademija, 2014, 36 p. ISBN 978-609-8126-21-1.

V. Stakelienė, K. Ložienė. Gynodioecy in *Thymus pulegioides* L., *T. serpyllum*, and their hybrid *T. x oblongifolius* Opiz (*Laminaceae*): Flower size dimorphism, female frequency, and effect of environmental factors // Plant Biosystems (Italy) , 2014, Vol. 148, No 1, p. 49-57. DOI 10.1080/11263504.2012.756435.

A. Aučina, M. Rudawska, T. Leski, A. Skridaila, I. Pašakinskienė, E. Riepšas. Forest litter as the mulch improving growth and ectomycorrhizal diversity of bare-root Scots pine (*Pinus sylvestris*) seedlings // iForest – Biogeosciences and Forestry, 2014, doi: 10.3832/ifor1083-008.

D. Naugžemys, S. Žilinskaitė, A. Skridaila, D. Žvingila. "Phylogenetic analysis of the polymorphic 4x species complex *Lonicera caerulea* L. (*Caprifoliaceae* Juss.) using RAPD markers and noncoding chloroplast DNA sequences" // Biologia (Institute of Botany, Slovak Academy of Sciences). 2014, No 69, p. 585-593. DOI: 10.2478/s11756-014-0345-0.

## Staff

	2013	2014
Administration	8 (including heads of departm.)	9 (including heads of departm.)
Scientists	8,25 (11 persons)	7,25 (10 persons)
Curators of plant collections	13 (17 persons)	14 (19 persons)
Managers, ingenieurs, specialists etc.	6	8
Field workers, technicians etc.	52	54,75

TOTAL including:	87,25	93
D.SC	1	1
PhD	9	9
Msc	4	5

**Finances** (in thousands of national currency – LTL; 1 EUR = 3,45 LTL)

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
State budget subsidy	2205,9	3091,00
Other state budgeted assignments	672,0	1155,5
Vilnius City Municipality	30,0	40,00
Support of other institutions, persons, etc.	14,5	33,00
Grants	517	239,00
Other income (tickets, services etc.)	368,0	432,93
<b>TOTAL</b>	<b>3807,4</b>	<b>4752,43</b>
<b>Expenses</b>		
Salaries (incl. taxes)	2224,4	2452,82
Infrastructure maintenance	846,5	914,08
Infrastructure development	793,5	1306,50
<b>TOTAL</b>	<b>3864,4</b>	<b>4673,40</b>
Balance	- 57,00	+ 79,08

# Marijampolė Station Of Nature Research And Environmental Education

IPEN member since January, 2015 (MARIJ).

## Overview

Adress	Main Office: Vytenio Str. 47, LT- 68281, Marijampolė
	Botanical garden and greenhouse: Lapankos St. 2, Karužai village, Marijampolė municipality
	Annuals expositions: Vytautas Magnus Park, Marijampolė
Phone	+370 343 94120
E-mail	arunas.balsevicius@sesupe.org
www	www.sesupe.org
Director	Arūnas Balsevičius
Territory area	Botanical garden (Karužai village) 2 ha, annuals expositions (Vytautas Magnus Park) 0.2 ha.

## Living plant collections

Total No. of collection specimens (species and intraspecific taxa, culta and populations): 5915.

Main collections	No. of specimens
<i>Dahlia</i>	1000
Annual flowers (incl. <i>Petunia</i> 114)	956
<i>Tulipa</i> and other ornamental bulbous plants	240
<i>Lycopersicon</i>	205
<i>Aquilegia</i>	171
<i>Gladiolus</i>	163
<i>Lilium</i>	142
<i>Allium</i>	111

<i>Capsicum</i>	85
<i>Astilbe</i>	60
<i>Penstemon</i>	60
<i>Mentha</i>	52

## Herbarium

Station of Nature Research and Environmental Education maintains the Herbarium sudavicum. Herbarium sudavicum is registered in *Index herbariorum* (acronymus – HSUD) and in *Biodiversity Collections Index*. 28880 herbarium specimens are deposited in Herbarium sudavicum. Herbarium is composed of 6 sections: Herbarium of Lithuania Vascular Plants, Collection of Lithuania *Bryophyta*, Collection of Lithuania Lichenes, Herbarium of Lithuania *Charophyta*, Herbarium Generale and Herbarium of Marijampolė Botanical Garden Plants. Herbarium sudavicum is the largest Herbarium among Lithuanian botanical gardens.

Station of Nature Research and Environmental Education also maintains database of West and South Lithuania vegetation. It includes 9637 phytosociological relevés.

## The main activities

In 2013 annual flowers expositions were established first time in Vytautas Magnus Park in Marijampolė. 16 expositions encompassed the area of 0.1 ha. In botanical garden we grew 7000 seedlings of 106 species and cultivars, which were used for establishment of flower beds in the park. Collection of flowers cultivars of plant breeders of Suvalkija region has been started to gather (about 150 seedlings) in botanical garden. In Marijampolė (09<sup>th</sup> December 2013) we arranged 14<sup>th</sup> scientific conference of Šešupė River Basin Young Naturalists. Station of Nature Research and Environmental Education along with the rural community “Gegužraibė” organized ethnobotanical event “The Route of Bread” in botanical garden (10<sup>th</sup> August 2013). Event attracted about 600 people. Along with the rural community “Gegužraibė” and Vištytis Regional Park, in botanical garden, organized romantic open-air event “The Night of Scents”. This event attracted about 400 people.

Station maintains annual expositions in Vytautas Magnus Park in Marijampolė in 2014. Expositions were consisted of 25 annual borders and parterres in 2014. 20000 flower seedlings of 140 species and cultivars were used in

expositions (0.2 ha) in 2014. Station has organized 15<sup>th</sup> scientific conference of Šešupė River Basin Young Naturalists on 4<sup>th</sup> December 2014. Station of Nature Research and Environmental Education organized the event "The Night of Scents" jointly with Kaunas Botanical Garden of Vytautas Magnus University and rural community "Gegužraibė" (July 5<sup>th</sup> in Marijampolė, July 25<sup>th</sup> – in Kaunas). Event attracted about 1000 people in Marijampolė. Ethnobotanical event "The Route of Bread" (jointly with Kaunas Botanical Garden of VMU, rural community "Gegužraibė" and Vištytis Regional Park) was organized in Marijampolė (30<sup>th</sup> August 2014). Event attracted about 500 people. In 2014 our collection of Dahlia was the largest among the Baltic botanical gardens.

## **Scientific activities**

Station of Nature Research and Environmental Education participates in EU LIFE+ programme in frame of the project "Securing sustainable farming to ensure conservation of globally threatened bird species in agrarian landscape" (LIFE09 NAT/LT/000233). Project is implemented by Baltic Environmental Forum Lithuania. In this project Station is responsible for vegetation inventory, mapping and monitoring. Project began in 2011 and ends in 2015. In 2014 were carried out investigations of vegetation and flora and estimation of ecological conditions of Lake Alaušas (Utena district municipality).

## **Publications**

Balsevičius A., Narijauskas R. 2013. Changes of tall sedge communities in Šyša polder (2011–2013). In: The International Conference on Aquatic Warbler Conservation. Book of abstracts. November 14–15. Baltic Environmental Forum Lithuania, Vilnius, pp. 19.20.

Balsevičius A., Narijauskas R. 2014. Effect of water level variations on floodplain meadows vegetation changes: a case study from Šyša polder (Western Lithuania). In: *Sovremennoje sostojanije, tendencii razvitija, racionalnoje ispolzovanije i sochranenije biologičeskovo raznoobrazija rastitelnogo mira. Materialy meždunarodnoi naučnoi konferenciji* (Minsk—Naroč, 23–26 sentiabria 2014 g.). *Ekoperspektiva*, Minsk, pp. 281.282.



## Structure and staff

	<b>2013</b>	<b>2014</b>
Administration	2.5	2.5
Department of Floriculture	3.5	3.5
Department of Investigations and Education	1	1
TOTAL including:	7	7
PhD	1	1
Msc	2	2

35 seasonal workers worked in 2013, and 36 – in 2014 (each worker works for two months, according to requirements of Public Works Programme).

## Finances (in thousands of LTL, 1 LTL =0.29 EUR)

	<b>2013</b>	<b>2014</b>
<b>Income</b>		
State budget subsidy	-	114.5
Municipal budget subsidy	265.4	337.0
Projects funding	125.3	18.3
Other income (investigations of vegetation)	18.6	20.0
TOTAL	409.3	483.8
<b>Expenses</b>		
Salaries (incl. taxes)	227.5	292.6
Other	181.8	191.20
TOTAL	409.3	483.8

## II. Articles

### **Reproductivity and genetic variability of the populations of *Taxus baccata* L. in Estonia**

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**Keywords:** endangered woody plant- *Taxus baccata* L., genetic variability of populations, vegetative reproduction.

The yew, *Taxus baccata* is an endangered woody plant species in the Baltic countries and in the Baltic region (Laasimer et al., 1993, Ingelög et al., 1993, Vaher, 2012). In Estonia *Taxus baccata* is included into the 2nd category of the list of protected plants.

One way to increase the number of specimens in the population is to plant young plants into the existing stands. Of course, it is better to use cuttings of the high genetic variability.

The aim of this study was (1) to find out the most variable population of *Taxus baccata* in Estonia as the best genetic resource for the vegetative propagation, and (2) to have additional information of the natural reproductivity of the species.

#### **Methods**

For the preliminary estimation of the natural reproductivity of *Taxus baccata* in populations, the number and the height of young trees in 3 groups (more than 0,5 m, up to 0,5 m and up to 0,1 m) were counted of the 5 m distance around the sample tree.

For the genetic analyses, the twig samples of 30 needles of 22 specimens at Saaremaa, 12 at Hiiumaa, 16 at NW Estonia continental part were collected. 12 samples from Gotland were included. DNA extraction, polymerase chain reaction (PCR) and fragment analysis were carried out by the standards

of the lab of the Institute of Ecology and Land Sciences of the University of Tartu (Talve et al., 2010). The different number of alleles in locus ( $N_a$ ), number of heterozygotes in the population ( $H_o$ ) were studied, expected number of heterozygotes in the population ( $H_e$ ) and the fixation index ( $F$ ) were calculated. High fixation index means the high inbreeding level in the population, and the low  $F$  index shows the higher cross pollination and the higher genetic variability in the population.

## Discussion

Table 1. Reproductivity of *Taxus baccata* in different population in Estonia

Area	N	n	%
Hight of young plants		>0,5m <0,5m <0,1	
Saaremaa	19	5 6(3)-2(1)-0(0)	26,3
Hiumaa	15	8 2(2)-2(1)-28(0)	53,3
NW Estonia	13	5 15(0)-4(0)-8(0)	38,5
	47	18 23(5) 8(2) 36(0)	36,3

N - number of trees, n-number of trees with saplings, (1 )- number of vegetative reproduction plants

In Saaremaa, more young plants were growing in the group of higher than 0,5 m and of lower than 0,1 m were not found. In Hiumaa – more young plants were found in the group of lower tha 0,1 m. In the continental part of NW Estonia– young plants were found in every size group, but most young plants were in the less than 0,1 m group.

Table 2. Genetic variability of *Taxus baccata* in different populations

Pop	N	Na	Ho	He	F
Saaremaa	20,250	4,000	0,140	0,450	0,674
Hiumaa	11,500	2,750	0,089	0,389	0,736
NW Estonia	14,500	3,250	0,255	0,463	0,455
Gotland	12,000	3,750	0,228	0,461	0,484

## Acknowledgements

Authors are thankful to Professor Hedren, who sent samples of *Taxus baccata* from Gotland Island (Sweden).

## Results

Only 36,3 % of studied trees have young plants around the tree. The vegetative reproduction is rare. More young trees were found in the population at Hiumaa. The age structure of populations is variable (mostly contracting) and needs additional investigation.

High inbreeding occurs in the populations at Hiumaa and Saaremaa. The highest F value was found of samplings of Tahkuna site at Hiumaa (F=0,828). Less inbreeding was found in the population at NW Estonia (as the same as it was found in the Gotland population). In NW Estonia, the twigs were collected in two sites and trees of the site at Keibu village had the lowest F value (F=0,121)

According to this study, for the vegetative propagation of *Taxus baccata*, it is recommended to take cuttings of the population of NW Estonia and of Gotland.

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# Introduction of the genus *Tillandsia* in the Botanical Garden of the University of Latvia

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## Introduction

The exposition of subtropical, tropical and succulent plants at the Greenhouses in the Botanical Garden of the University of Latvia holds 1673 different taxa. One of the richest is the collection of Bromeliad family (*Bromeliaceae*) with 26 *Tillandsias* and 36 species from other genera. Thanks to the cooperation with growers of exotic plants and the international seed exchange, collection of *Tillandsias* (Fig. 1) has increased vastly during the last years.

## Survey

Development of *Tillandsia* collection in the Botanical Garden of the University of Latvia

Very first *Tillandsias* – *Tillandsia cyanea* Linden ex K. Koch and *T. usneoides* (L.) L. – were received from the Main Botanical Garden (Moscow, Russia) in 1980 and from the Wilhelma Zoo-Botanical Garden (Stuttgart, Germany) in 1991 (Table 1). Essential was the autumn of 2012 when an exhibition by Orchid and Exotic Plants Society of Latvia (LOEADA) and the group of Lithuanian exotic plant growers (Orchidejos.lt) was held in the Botanical Garden. After this event, close collaboration with both of these societies was set up resulting as 17 new taxa in the collection of *Tillandsias* in the following years.

In 2013, two specimens of *T. usneoides* were received from the Dahlem Botanical Garden (Berlin, Germany) through the international seed exchange, and five additional *Tillandsias* were gained from Prague Botanical Garden and the Botanical Garden of Charles University (both Prague, Czech Republic) during an ERASMUS Lifelong Learning Programme. This experience exchange programme was enriched with guided tours to both Prague Botanical Gardens and the Liberec Botanical Garden where professional advices about cultivation and display of *Tillandsias* were friendly offered by Czech colleagues.

## Description of Tillandsias

*Tillandsia* is a genus of around 600 species and more hundreds of cultivated varieties in the family *Bromeliaceae*. Species are native to the tropical and subtropical forests, mountains and deserts of Central and South America, and the southern United States where they have evolved to inhabit extremely harsh environments. Tillandsias are epiphytes (growing upon another living plants, mainly on the branches and trunks of trees), lithophytes (growing on stones and rocks), or aerophytes (growing on another plants and deriving moisture and nutrients from the air and rain).

Large number of epidermal trichomes (nail-like shaped structures on the leaf surface) absorbs the atmospheric water, mineral and organic nutrients, as the root system is adventitious and reduced to decrease the evaporation. Trichomes are of great importance for species growing in deserts and alpestrine areas where the only source of water is fog.

## Specificity to the display and cultivation of Tillandsias

Similar to display of Orchids and tropical ferns, Tillandsias can be fastened to tree barks or matted osmunda fibre, or hanged in a wire loop. Quite different is *T. duratii* with hook-like leaf endings that support the fastening to a tree branch. Whilst *T. cyanea* is one of the few Tillandsias that grow best when potted – this species has a well-developed root system and wide leaf rosettes. Whereas in alpestrine and desert areas growing species prefer lower air temperature at night and during the wintertime, thus they can be displayed in cacti expositions.

Disadvantage for display of Tillandsias is their small size which encourages the visitors to rip off the cuttings. To avoid the loss of specimens the collection must be kept in locked or partly-accessible parts of greenhouse where visitors can enjoy the plants by distance.

Due to hardiness and tolerance to adverse conditions Tillandsias are easy to grow in greenhouses. Plants must be located in a well-ventilated area where they are provided with enough light and correct moisture conditions. Bright light or filtered sun is recommended, especially in summer and spring. Generally, early morning or afternoon is the best hour for watering. The humidity of air should reach 60-80%, which can be ensured with consistent moistening of greenhouse paths combined with regular sprinkling of the leaves. As the water in water-supply has too high level of lime, it is recommended to collect rainwater for watering. However, if the collection has not a large amount of specimens, watering can be managed by a portable

sprayer. The schedule of watering must be changed by low air temperature, it is recommended to decrease or even avoid watering when temperature is getting under +18 °C as most of Tillandsias do not tolerate humid and freezing conditions. Fertilization of Tillandsias is not absolutely necessary but it will increase the growth and vigor of blooms. As the plants have the ability to capture and hold nutrients within their trichomes, Tillandsias have a tendency to be sensitive to over fertilization. Therefore a 2-4-times less concentrated fertilizer as for Orchids is recommended.

*Table 1.* List of Tillandsias in the Botanical Garden of the University of Latvia

<b>Taxon name</b>	<b>Year of introduction</b>	<b>Origin</b>
T. aeranthos (Loisel.) L.B.Sm.	2012	Orchidejos.lt
T. araujei Mez	2013	LOEADA*
T. balbisana Schult. et Schult.f.	2012	Orchidejos.lt
T. brachycaulos x abdita	2012	Orchidejos.lt
T. bulbosa Hook.	2013	Botanical Garden of Charles University (Prague, Czech Republic)
T. butzii Mez	2013	Botanical Garden of Charles University (Prague, Czech Republic)
T. capitata Griseb.	2012	Orchidejos.lt
T. caput-medusae E. Morren	2013	Orchidejos.lt
T. cyanea Linden ex K.Koch	1980	Main Botanical Garden (Moscow, Russia)
T. duratii Vis.	2013	LOEADA
T. fasciculata Sw.	2012	Orchidejos.lt
T. flexuosa Sw.	2013	LOEADA
T. fuchsii f. gracilis W.Till	2012	Orchidejos.lt
T. ionantha Planch.	2012	Orchidejos.lt



T. juncea (Ruiz et Pav.) Poir.	2012	Orchidejos.It
T. kolbii W. Till et Schatzl	2014	LOEADA
T. pauciflora Baker	2013	Prague Botanical Garden (Prague, Czech Republic)
T. pruinosa Sw.	2014	LOEADA
T. seleriana Mez	2012	Orchidejos.It
T. stricta Sol. ex Ker Gawl.	2012	Orchidejos.It
T. tricholepis Backer	2013	Charles University (Prague, Czech Republic)
T. tricolor Schltldl. & Cham.	2012	Orchidejos.It
T. usneoides (L.) L.	1991	Wilhelma Zoo-Botanical Garden (Stuttgart, Germany)
T. usneoides cv. Major	2013	Dahlem Botanical Garden (Berlin, Germany)
T. usneoides cv. Minor	2013	Dahlem Botanical Garden (Berlin, Germany)
T. usneoides cv. (curly fom)	2013	Prague Botanical Garden (Prague, Czech Republic)

\* LOEADA – Orchid and Exotic Plants Society of Latvia

Fig. 1 *Tillandsia seleriana* in the Botanical Garden of the University of Latvia

# Art in the Botanical Garden of the University of Latvia

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Art pieces, mainly sculptures, have been displayed in the Botanical Garden of the University of Latvia for quite a long time. During the last couple of years the world of art has been steadily advancing into the Garden. The environment of the Garden is interesting for artists who represent different spheres: visuals, sound, modern art etc. Plants, landscape and the overall environment of the Garden is a good source of inspiration, but the mindsets of ordinary garden visitors are a challenge for creative people. On the other hand works of art attract a new public to the Garden. All this brings mutual benefit and some food for thought both for the visitors and artists.

Nearly every year a large song festival takes place in Riga during summer, for example, the International Folklore Festival Baltica, the National Song and Dance Celebration or the World Choir Games etc. Some open air choral concerts also take place in the Garden. This attracts not only singers, but also the general public from regions of Latvia as well as from abroad. People are in a high mood, they are cheerful, and a lot of them are dressed up in national or festive colorful apparel. Poetical afternoons also take place in the Palm house during early spring. An intimate, meditative mood and the background of blooming azaleas inspires the visitors to enjoy poetry by Latvian poets and gives an opportunity to meet them.

Last spring brought a new challenge. During 2014 the world celebrated the 450th anniversary of William Shakespeare's birth. The Botanical Garden took part by the exhibition "Shakespeare's garden" and by inviting young actors to recite Shakespearian sonnets beneath palm trees. Subtropical Mediterranean plants are a suitable environment to present the works of the Renaissance poet and playwright, as a lot of stories created by Shakespeare take place in the South of Europe. Furthermore the acoustics of the Palm house guarantee a place for speaking and singing without an amplification, which is important for these events.

Visual artworks – sculptures, paintings, installations, even gobelin reside among plants in the Palm house and on the open field. The exciting

idea belongs to textile art artist Iveta Vecenāne: to use the Palm house to display her works. The name of the exhibition was "Idleness" reflecting longing for feminine ease. She displayed some ornate hammocks suspended in palm trees as well as gobelin. In the greenhouse of subtropical plants the art works gain an unorthodox dimension never expected in an exhibition hall. For a full impression only a white sand beach and a tropical sunshine are lacking.

The art competition for the Riga Smiles gave several artworks to the Rigan public space. One of it is exhibited in the Garden: „Still life" by Brigita Zelča-Aispure. The sculpture relates to the well-known genre of still life from the 16-17th century when it was at its glory during the Dutch Golden age of painting. Fruits and vegetables painted by the Dutch are replaced with some harvest of Latvian nature - leeks, cherries and apples. The hare has resurrected - a greeting to the ancient art as well as to the modern conceptual art. The dimensions of the sculpture are 5x3x4 metres.

In some cases the environment of the Garden and the plants provide a strong creative flow to the painters. They paint azaleas, rhododendrons or other plants. The painter in the frame of blossoming flowerbeds is sometimes an extra marvel for the visitors. They are able to follow the creative magic of a professional artist.

During June - August 2014 the Botanical Garden hosted a sound focused art exhibition- Skan II. It happened in three parts featuring a rolling programme of numerous works by Latvian and international artists for whom sound was at the very epicenter of their creative work. The works were installed around the Garden, both outside amongst the plants, and inside some of the gardens utility spaces. For example Skan II: Heimo Lattner and Judith Laub's "The Silbadores: Part 4" was broadcast from the Palm house. El Silbo - a whistled language that allows the inhabitants of the Canary Island of La Gomera to communicate across its mountainous terrain, died out in the late 1970s but has since been revived in Gomeran schools. A native whistler performed "The Silbadores" at the exhibition's opening event. Recordings of the whistling were periodically played across the Garden during the following days. The Latvian artist Evelīna Deičmane's kinetic outdoor installation "Chimney" was an audio narrative spoken in Latvian telling a story about wooden manor houses. In time of the article's origin (February 2015) E. Deičmane's installation is nominated as a brilliant event of 2014 of Latvia's visual art.

The biggest art peace was created by Dace Lūce. The Palm house inspired her to create a palm tree silhouette on the huge east facade. During the summer of 2014 the geometrical majestic palm overlooked everything ongoing in the Garden. It was an uncommon trial for the artist to implement

the idea and to look for materials, to solve technical problems and to construct as well as keep big piece (~18 x 18 m) in order in the outdoors under windy conditions and heavy rain.

New trends in art are represented by modern dance performances in the Garden too. These do not take place on a stage but rather on the grass and the paths as well as the technical bridges which surround the Palm house. The dancers continuously change place during their performance and space episodes take place on separate locations, encompassing the entire Garden.

This article only gives a short insight on the everyday cultural life of the Botanical Garden. The Garden becomes interesting both for artists and for the public. Both stumble on new experiences, ideas and feelings. It is an exuberant and fascinating process that gives good results in the nowadays saturated cultural and recreation life. It polishes the image of the Garden and increases publicity and the number of visitors as well as gives many other benefits. However there is a delicate boundary: the priority of the Garden should be plants. Art works and other activities should not trouble plants - their growth, comfort and principles of presentation should not be compromised in favor of anything else. The ambitions for the future are high grade art works inspired by plants and nature. Any art work display in the Garden should be delicate and should represent the harmony between nature and human expression. This, therefore, is our goal for the future.

# Plant database: a pivot of biodiversity knowledge, and sustainable management of plant collections

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## **Abstract**

The necessity to achieve a better management of collections in museums, botanical gardens, and herbariums motivated the first efforts in the direction of developing tools that were based on databases. Botanical Garden of Klaipėda University created the plants database 'Klaibota'. This database provides standardized information concerning all vascular plants. The database displays the elements of all ranks, ranging from kingdom to whatever other rank is chosen; as well as information about plant morphology, ecology, geography and other.

*Keywords:* Botanical garden, plant databases, management.

## **Introduction**

In recent years, taxonomic and other plant databases have become a fundamental tool to support the science of giving names to living organisms. A much-more significant role has been to provide a framework for the organization of biological data, and as a tool for the storage, retrieval, and, more recently, publishing of biological information. The literature shows that the utilization of 'electronic data processing' techniques, to organize, analyze and manage taxonomic data, began in approximately the nineteen-sixties. Examples of the first efforts to build structured tables and matrices of taxonomic and other data were: numerical taxonomy, the organization of national floras, institutional scientific collections (Crovello et al., 1984; Squires, 1966) and scientific nomenclature.

In the nineteen-seventies, the evolution of database systems for handling collections in botanical gardens and herbariums continued (Argus and Sheard, 1972; Beschel and Soper, 1970; Wetmore, 1979) and was

followed by new and important techniques for the development of taxonomy. Numerical taxonomy, the elaboration of algorithms for generating diagnostic keys, and demand for the automated identification of specimens, all led to the creation of new applications for more modern, powerful, and accessible computers (Sneath and Sokal, 1973). At this time, we notice, by review of the literature, the creation of databases to handle descriptive characteristics of specimens (Morse et al., 1971).

Although some of these applications used data that was organized in simple structured text files, or electronic spreadsheets, instead of the use of a database, we can consider these files as the embryo of present-day descriptive species databases. Later, these structured text files were generated by exports from descriptive monographic databases (Adey et al., 1984; Allkin, 1986; Allkin, 1987; Allkin and Winfield, 1990).

## **Material and methods**

During 2006–2008, the Botanical Garden of Klaipeda University, in cooperation with the Russian State University of Immanuel Kant in Kaliningrad, has implemented the 'Neighbourhood Programme Project of Lithuania, Poland, and the Russian Federation Kaliningrad Oblast', "Sustainable Landscape Development: the formation of tourist sites' environment quality by plants". The plants database 'Klaibota' developed during this project. There are analysed literature resources about creating plant databases in this article too.

## **Results and Discussion**

The organization of descriptive data concerning species had a very-clear taxonomic objective: the identification and classification of the species into taxonomic groups. After all, the observation and measurement of morphological and structural characteristics of living organisms is the basis of taxonomic work. Specimens with the same characteristics are congregated in hierarchically structured, and related groups. The main products of databases are diagnostic keys, taxonomic descriptions, and models of classification. The results of these analyses led, in their course, to a demand for other types of databases (e.g., species-descriptive databases, and nomenclature databases).

Compilations of data about specimens are generalized according to the taxonomic groups to which they belong (Adey et al., 1984; Allkin, 1984). Species-oriented databases can assume extremely simple forms (e.g., as a 'checklist') for one (1) defined region; or in more complex forms (e.g.,

nomenclatural databases) that have details about the accepted or valid names, synonyms, authorities and references, as example(s). Moreover, descriptive databases about species have, associated with the species names, information on vernacular names, geographic distribution, morphology, uses, chemical components, chromosome number, etc. It is important to note that, from a data-quality point of view, the information concerning a species is a compilation of the union of all of the information available concerning specimens that belong to this taxon. Therefore, the reliability of the information is directly proportional to how representative is the group, or number of specimens studied; which in turn is affected by the quality of the manual or automated procedures that placed the specimens in the taxon. Obviously, it is impossible for a taxonomist to observe and measure all of the existing individuals of a single determined taxon, in the past, present, and/or future. Thus, taxonomic information is inherently of a lower-degree of reliability than actual specimen observations; although for well-studied groups, this difference is often negligible (Allkin, 1984a; Allkin, 1984b; Pankhurst, 1993).

At the end of the nineteen-nineties, sponsorship by governmental foundations, as a part of a national project, which was aimed at the disclosure and digitalisation of academic collections in The Netherlands, means were found to obtain a new database (i.e., for the five universal botanical gardens mentioned above). A common database should make exchange of information much easier, and enable a uniform presentation of (national) collections on the Internet. It should also combine all kinds of integral small databases into one that is comprehensive, and should disclose the localities of the elements of the collection, by means of a GIS-like functionality.

The world community's growing commitment to sustainable development inspired the CBD; and it now represents a dramatic step forward in the conservation of biological diversity, and the equitable sharing of benefits arising from the use of genetic resources. The CBD includes in its scope two (2) aspects that have strong relationships with plant databases: 'The Clearing-house Mechanism' (viz., <http://www.biodiv.org/chm/>) and the 'Global Taxonomy Initiative' (viz., <http://www.biodiv.org/programmes/crosscutting/taxonomy/>).

The Global Taxonomic Initiative (GTI) is concerned with removing, or ameliorating, the so-called 'taxonomic impediment': that is, the knowledge gaps in our taxonomic system, the shortage of trained taxonomists and curators, and the impact these deficiencies have on our ability to conserve, use, and share the benefits of our biological diversity. With the CBD, and other international agreements (e.g., 'CITES' and 'Agenda 21'), in the 1990's,

all aspects of taxonomic information (i.e., sources, generation, maintenance, management, repatriation, sharing, and accessibility) received global attention, and the consequential international political support and priority. This global focus and demand for biodiversity information, together with the phenomenal development of the Internet and the World Wide Web, launched plant databases into a new era, and, gave them especially much-greater visibility (Bisby et al., 2000; Wilson, 2000). Plant databases, in different formats and presentations, became available on the World Wide Web, and the biodiversity information consumers multiplied in unprecedented variety. 'Global Species Databases' and 'Federated Architecture' became new words in the vocabulary. Botanical garden role is to maintain documented collections of living plants for the purposes of scientific research, conservation, display, and education (Uibo, 2013).

The plants database 'Klaibota' was created in 2008 at the Botanical Garden of Klaipeda University. Since this year we made some corrections. This database provides standardized information concerning all vascular plants in the Botanical Garden collections. The database displays the elements of all ranks, ranging from kingdom to whatever other rank is chosen (e.g., class, order, family or genus); as well as information about plant morphology: growth form and rate, growth requirements, as fertility requirement, hedge tolerance, moisture use, reproduction, bloom period, fruit/seed abundance, suitability/use, and ecology (Fig. 1-3).

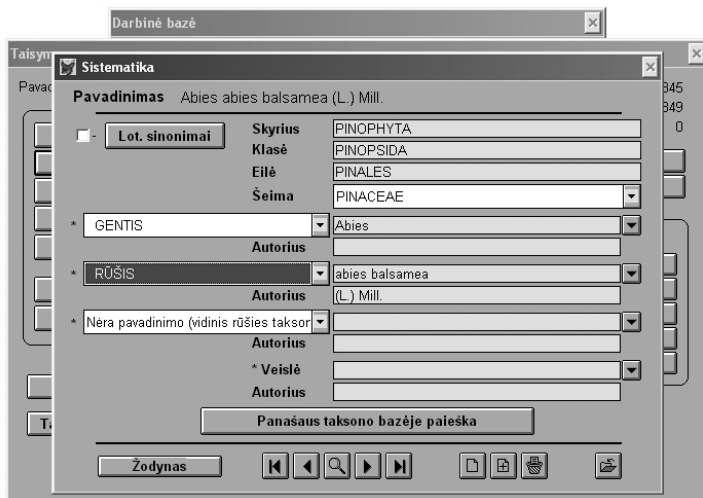


Figure 1. Taxonomic data of *Abies balsamea* in the plants database



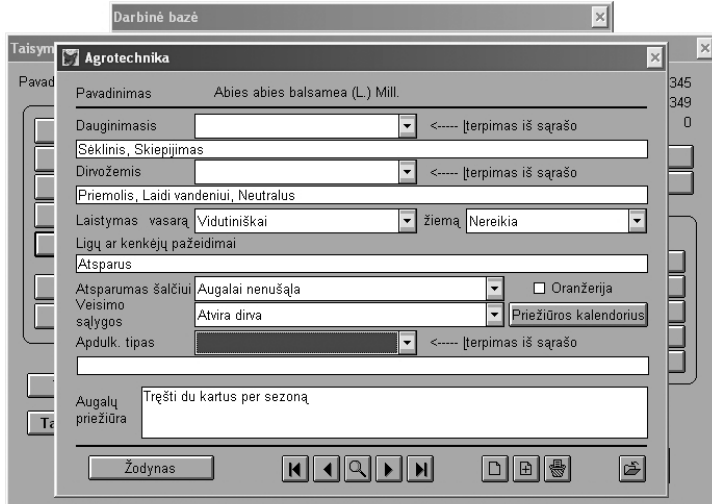


Figure 2. Information regarding the need for environmental factors, and specifics of care of the selected plant.

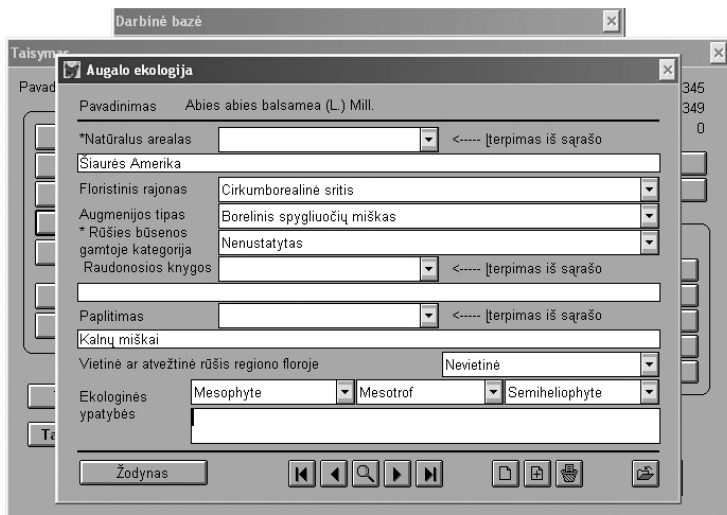


Figure 3. Database contains detailed information about the natural habitat of each plant

Since the beginning of this 21<sup>st</sup> century, plant databases are becoming a pivotal point of the 'Holy Grail' of global biodiversity knowledge, and sustainable management. Taxonomic information breaks through the barrier of the specialized world of scientific taxonomy, to achieve public visibility, and to meet social demand, via the World Wide Web (Dalcin, 2005).

## Conclusions

The creating of plant databases is a difficult process. But databases is very important for management of plant collections. The database 'Klaibota' contains information about plant taxonomic data, morphology, information regarding the need for environmental factors, and specifics of care of the selected plant, detailed information about the natural habitat of each plant.

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# Educational activities in the Botanical Garden of Šiauliai University

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## **Abstract**

BGCI represents over 700 members - mostly botanic gardens - in 120 countries. The aim is to support and empower all members and wider conservation communities so that their knowledge and expertise can be applied to reverse the threat of extinction crisis facing one third of all plants. For this goal very important education activities in all Botanic gardens. BGCI supports botanic gardens to grow their social role; this means working with their local communities on common issues of social and environmental importance, for the enduring benefit of those communities, the gardens themselves, and towards a sustainable future for our planet ([www.bgci.org](http://www.bgci.org)). One of the biggest problems today is that pupils are more far-off the nature than the elder generation. This phenomenon has an impact on the intellectual development as well as on health issues. However the most important aspect here is a social factor. Nowadays the learning and teaching methods are becoming more automatic and the value of the traditional learning tools such as handbooks, exercise books, even a teacher's presence is being decreased. However, the Botanical gardens are a proper place to educate the creativity, to provide practical knowledge and skills which help to form a valuable attitude. According to this, the objective of the research was to increase and to promote the educational activities in the Botanic garden of Šiauliai University.

The aim of this investigation was to propose a model which presents how Botanic garden could also be used for the informal educational activities.

*Keywords:* education activities, Botanic garden, pupils, society.

## **Introduction**

Gardens serve to educate and inform all types of the audiences. Botanical

garden provides information on a printed format, in demonstrations, workshops, volunteer programmes, films, and with herbarium collections. Information was provided in a wide range including school children, elderly people, amateur gardeners, garden clubs and professionals. The research that botanical gardens accomplished includes different ranges such as basic science experiments, the variety of the examinations, research of literature and taxonomic studies. Botanical gardens commonly serve as the center of the plants' preservation and conservation and provide place for people, and wildlife. They have collections of the rare and exotic plant's species and help to manage urban landscapes as well as to restore historical gardens. Botanical garden should serve the public and be a source of community pride. It can attract locals and tourists, provide alternative learning experiences for school children, and offer a place for passive recreation.

In the world Botanic gardens are carrying out different education activities. For example, German Botanic gardens have developed an effective individual studying programme. The system of the labels that presents most interesting plants is especially high qualified (Nekrošienė 2011). In these botanical gardens the information used in individual activities based on natural science involves not only the plants, but also other elements such as: rocks, animals, landscape's forming, etc. Important part of the natural sciences in the field of botanical gardens is various events and exhibitions. In every year there are many events, such as the anniversaries or the other special occasions, some of them are annual, and some – very unique, organized for once. Information about the events is distributed on their websites or at the particular places (Nekrošienė 2011). Moreover, in the Ireland Botanic gardens often organises seminars, courses or workshops for the society. During the events, visitors are introduced with Ireland's native and rare or innocuous plants. They also can participate in various trainings ([www.botanicgardens.ie](http://www.botanicgardens.ie)). There are also thematic tours organised for the pupils of primary or secondary schools. The Botanical Garden of Ireland is also active in the schools' training programme's realisation ([www.botanicgardens.ie/](http://www.botanicgardens.ie/)). In order to educate and introduce people with the variety of plants and horticultural grounds there are organised short courses or individual training sessions in UK Botanic gardens in every year. Visitors are introduced with the diversity of the plants as well as with the certain plant's characteristics during the exhibitions. The youngest visitors could also get the knowledge of the biological diversity in the special creative and interactive playground. English Royal Botanic garden contributes to the process of realising the schools' educational curriculum. There pupils are learning about plants' protection, taxonomy and the ground of botany ([/www.kew.org/education/](http://www.kew.org/education/)).

Lithuanian Botanic gardens are open to the society and usually do the most diverse educational activities. In the Botanic garden of Klaipeda University

according to the data based on the garden's visitors, the main part of them are pupils from the primary schools, than adults, older pupils, students and specialist (Nekrošienė, 2005). Every year more and more visitors come to Vilnius Botanic garden the reason of that is an increased educational and public activities (Žilinskaitė, 2007). Very similar situation is in Kaunas Botanic garden, where during the last few years the main attention was paid to the educational activities and projects (<http://botanika.vdu.lt/educacija/projektai>).

The world practise shows that the most popular and most visiting cultural places are botanical and zoo gardens and wildlife's corners. The international environmental educational programme GLOBE unite world teachers, students and researchers for the investigation and acknowledgement of nature (Augustonytė, 2006).

The most diverse measures such as computers' technology, information system (stands, posters, etc.), plants' collections and natural greenery, small architectural elements all are a great help for the teaching and learning proceses. These and the other measures if used creatively in lectures, seminars and workshops could be effective tools to master the information for both, participants and gardeners. The educational activities held in Botanic gardens can be organised in very diferent forms, first of all as the events for society, excursions with guide, excibitions, fairs, TV and radio shows, articles etc.

## **Material and methods**

During the analyses of the situation in Lithuanian and foreign Botanical gardens there were discovered some peculiarities. First of all, in order to implement the general outdoor training programmes in Botanic garden of Siauliai University there was made a selection for the possibilities of educational activities. This investigation included a scientific studies, the study of methodology papers, documents and information. There was made a questionnaire and analysis data of them.

## **Results and discussions**

The main activities of Botanical Garden of Šiauliai University are: to build up collections of living plants; to explore native flora of the region; to conserve rare species in *ex situ* collections and to disseminate knowledge. Botanic garden of Šiauliai University every year has more and more visitors. Referring

to data, in the year of 2000 there were about 1000 visitors, while in 2014 – more than 10 000 visitors. The most popular time is May, June and September. The majority of the visitors in this time are school groups (from 2 to 5 groups per day). According to the answers from the questionnaire where people got to know about Botanic garden, 70 % of pupils answered that they know about Botanic garden from their parents and wanted to come there with them. The 46 % of teachers answered that they heard about it from their friends. Moreover, about 51 % of visitors in BG comes more than once in a year. For the adults Botanic garden is an important place where they can relax and learn.

91 % pupils know the main mission of BG which is to collect plants from world and to protect the biodiversity. For 24% of adults and 43% of pupils the visiting was based on only one form of an offered educational activities and it was excursion. Only 20% of adults are familiar with the other educational activities, such as lectures, educational games and thematic excursions.

Of course, the best impressions in BG for both, adults (73%) and pupils (50%) was an abundance of different plants, especially the exotic and rare ones. In Šiauliai university BG grown more than 4 000 different taxa plants which are in a common place. The plants are presented in 8 different sections. In every sections there are separated styles and aims to collect. For example, in Mountain section the main target is to collect endemic plants from the different mountains of the planet. Meanwhile in Floriculture collection the focus lies on an ornamental and exclusive flora that has a different breed of perennial flowers.

The Botanic gardens can be the place for learning not only about the plants, trees, scrubs but also to know more about meet and natural world too. In the Common natural science educational programmes there are these topics: „Trees, scrubs, grasses, invertebrates and vertebrates (Common natural science education programmes, 2008). And we know that pupils, especially in the primary schools have difficulty to generalize or imagine something abstract, however they are keen to try everything themselves, the world is known by touching. According to this, the use of natural environment and active learning methods could be integrated in the lessons of natural science there. In order to motivate the pupils there should be used more practical investigations, the variety of visual information as well as informative and communicative technologies (Bikutė, 2009; www.pedagogika.).

To the question of the need of the lessons in the Botanical Garden, both children and teachers answered positively – they would like to use them.

Firstly because these lessons are more liberal, secondly, they allow children to engage directly with the material, which stimulates feelings and cause thinking. There was very interesting thoughts from the pupils about the lessons that could happen in Botanic garden. Of course, the most common thoughts were about the lessons on Biology and Natural science, however, they also suggested such lessons as physical and music.

The pupils from primary school like the trips to the nature, however they like it less in older age. In younger age they are aware of the nature, of the new experiences and adventures. Some part of the pupils underline the cognitive aspect as an opportunity to gain knowledge. However, there are so few field trips for pupils or they are poorly organized (Kuliešiūtė, 2003). So, when we asked teachers about the educational activities in Botanic garden 84% of them thought that the most effective activities are during the particular events. And 36% of the respondents understand the activities during the events organised by the botanical garden as cognitive and recreational.

## Conclusions

1. According to the analysis of the most botanic gardens educational peculiarities we note that just excursions and events are not enough for educational activities. It is needed that the activities would be related with the training programmes in the schools.
2. The Botanic gardens must prepare activities like training weeks or green schools where the subjects of teaching would be related with the school's content.
3. Engaging with the analysis we can make a conclusion, that pupils and teachers need new methods in new places for an effective education and Botanic gardens can help in finding them. Especially, when 91 percentage of the world's botanic gardens' mission is working in educational activities.
4. Modelling the educational activity in Botanic garden of Siauliai university the main attention was paid in perks, in enriching and improving the quality of the collections, in compact places and demand of visitors.

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# The works of conservation of local flora in botanical garden

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## Abstract

Over the centuries botanical institutions have contributed to our greater understanding of the plant kingdom and myriad uses of plants. Today botanic gardens are seeking to play a key role in the conservation of the world's plant diversity (<http://www.bgci.org/>; IUCN-BGCS and WWF, 1989; Convention on the conservation..., 2001). Many botanic gardens are working together or in collaboration with other institutions in order to coordinate and target their conservation activities ([www.botanicgardens.eu](http://www.botanicgardens.eu)). In 2011-2012 Šiauliai University Botanic Garden, in collaboration with Joniškis School of Agriculture (Lithuania) and Latvia University of Agriculture (Jelgava) were pursuing project „The Cognition of Distinctive Identity Through Flora of Semigallia Region“. While implementing this project, researches and scientists of all these three institutions had the opportunity to explore Semigallia region flora. Within borders of this project organised expeditions, workshops, meetings were fruitful and very useful for collecting material of plants, getting new knowledge about flora of Semigallia. This paper presents results of successful cross border collaboration of the regional Botanic Garden and two other institutions from Lithuania and Latvia.

*Keywords:* Botanic garden, plant conservation, local flora

## Introduction

Over the years, regional botanic gardens more and more developed research on local flora, have traditionally focused mostly on *ex situ* collections, however, there are many ways in which gardens can play a more active role in *in situ* conservation, which is generally the preferred method of Conservation (Akopian, 2010, Davis, 2008, [www.botanicgardens.eu](http://www.botanicgardens.eu)). Northern part of Lithuania, which historically is called Semigallia (Ziemgala) region, is peculiar in its natural environment and historical heritage. Semigallia region is unique in its geologic heritage (Gedžiūnas et al., 2006). In this region there

are many areas where rock layers stratified deep in the earth outcrop on the terrain. There is Pailė clay exposure with fossils of Jurassic period known in all the Europe, also near to this it is possible to see limestone exposures, formed in Permian period, in the river valleys there may find dolomite exposures occurred here 360-340 millions years ago. Pasvalys and Biržai regions are famous for karst landscape, sinkholes and karst lakelets, which occurs when underground water washes saline and gypsiferous layers. Climatic differences and local conditions of relief and soil also determined peculiarities of vegetation in northern Lithuania. Leafy forests and mixed trees, such as aspens, black alders, birches, ashes and maples are typical in this region, also firs are quite common in mixed forests. Contrary to other parts of Lithuania, in Northern Lithuania pine forests take very small part of territory there are very few natural meadows and they are located almost only in protected areas or places non effective to agriculture, such as river valleys, acclivities. Plant species of limited prevalence are typical to North and North-west Lithuania, some of these species are included to the Red Book of Lithuania. In this part of Lithuania unique complexes of habitats are found, they had been formed in glacial and postglacial periods, which belong to mountain-Baltic element, including rare mountain species such as *Primula farinosa* L., *Sesleria caerulea* (L.) Ard. and biotopes of other plants. That is why this region takes big interest for conservation activity and why it was chosen as a study object in our project.

## Materials and methods

Šiauliai University Botanical Garden, Joniškis School of Agriculture and Latvia University of Agriculture (Jelgava) were pursuing project -The Cognition of Distinctive Identity Through Flora of Semigallia Region (Green Environment) in the year 2011-2012. In this project, researches and scientists of all these three institutions had opportunity to know Semigallia region while implementing expeditions. Administrative districts of north Lithuania were chosen to the research. Investigations in the nature were pursued by the path method in 2011 summer. Expeditions to the valuable natural objects were arranged. One of the purposes was to accomplish flora researches in well known geologic objects, in some biotops of forests, meadows, swamps of protected areas in North region. Objects of valuable cultural heritage were also included in the routes. Specialists of Šiauliai Botanical Garden and Joniškis agriculture participated in these expeditions.

In the North part of Lithuania was carry out geobotanical description in the rare plant community as: *Seslerietum uliginosae* (Mikaičiai village, Joniškėlis dist.), *Molinietum Caeruleae*, (Pyvesa reserve, in Keneliai village (Pumpėnai

elderate, Pasvalys dist.), Steppe meadows, (In Muša valley near Skaliai, Pasvalys dist.). The typical species characteristics and their frequency of North Lithuania are presented by Lithuania flora (Natkevičaitė-Ivanauskienė et al, 1959-1980).

Phytosociological investigations were carried out applying the J. Braun-Blanquet (1964). Species of the plants were assessed by literature sources, namely Lekavičius (1989), Rothmaler et al. (2001), Jukonienė (2003). Names of vascular plants were assessed by Gudžinskas (1999). Rare species indicated by Red data book of Lithuania (Rašomavičius, 2007).

Rich herbal collected through these expeditions is kept in Šiauliai University Botanical Garden.

## Results and discussion

Semigallia region is unique in its geologic heritage. In this region are formed different types of soil and ground layer. In Pasvalys, Joniškis and Biržai districts are karst landscape, sinkholes and karst lakes, formed when underground water washes saline and gypseous layers. The karst region is typical thinnest in the Lithuania about 2 – 5 m. cover of moraine, after which occur gypseous dolomite layer. In Šiauliai, Pakruojis districts surface lay on rough, rugged layer and is combine with sandy, loam, in places overlay coated by gravel. But in all districts are big places with rich but wet soil. Semigallia region belongs to physical geographical region of Muša – Nemunėis, moraine plain of Venta midstream in west side, Linkuva ridge, and Ziemgala moraine plain on the northern side.

Climatic differences and local conditions of relief and soil determined peculiarities of vegetation and plants species. Leafy forests and mixed trees, such as aspens, black alders, birches, ashes and maples are typical in this region, also firs are quite common in mixed forests. Contrary to other parts of Lithuania, in Northern Lithuania pine forests take very small part of territory there are very few natural meadows and they are located almost only in protected areas or places non effective to agriculture, such as river valleys, acclivities.

Plant species of limited prevalence are typical to North and North-west Lithuania, some of these species are included to the Red Book of Lithuania. There were fixed plants in to three groups: frequent, not very frequent and vanishing. In this part of Lithuania unique complexes are found, they formed in glacial and postglacial periods, which belong to mountain-Baltic element, including rare mountain species such as *Primula farinosa* L., *Sesleria caerulea* (L.) Ard., *Trollius europaeus* L. and biotopes of other plants. There are more then in other places prevalent mat-grass (*Nardus stricta*) (Natkevičaitė-

Ivanauskienė, 2005). The typical plant species in North Lithuania was fixed in the expedition time: *Trollius europaeus*, *Carex flacca* Schreb., *Cirsium acaule* (L.) Scop., *Primula farinosa*, *Sesleria caerulea*, *Deschampsia flexuosa* (L.) Trin., *Carex hostiana* DC, *Empetrum nigrum* L., *Euonymus europaeus* L., *Festuca arundinacea* Schreb., *Pastinaca sativa* L. var. *pratensis* Pers., *Pinguicula vulgaris* L., *Rubus chamaemorus* L.

The *Seslerietum uliginosae* is community from Red data book (II category) is frequent in North West part of Lithuania (Balevičienė et al., 2000). We were investigating plants community in Joniškio distr. Mikaičių village and was establishing very strong anthropogenically damaged. The grassland not pastures and there grow scrubs and shoddy trees. Near at the forest equip wild animal feeding place, there are destroyed natural cover, richly grow weeds, probably which seeds come by the food. After geobotanical description in this field the herb cover was at 95 %. There was inventory 47 species of plants. In the community the dominant species is *Sesleria caerulea*, she is in pregnable category. The frequent species – *Cyperaceae* family, *Carex flacca* Schreb., *Carex flava* L., *Carex panicea* L. consist of the association. In the community plenty wet meadow species: *Filipendula ulmaria* (L.) Maxim, *Succisa pratensis* Moench, *Deschampsia cespitosa* (L.) P. Beauv., *Cirsium oleraceum* (L.) Scop., *Trollius europaeus*. There grow rare, ornamental, wet meadows orchid plant *Listera ovata* (L.) R.Br. In the meadow is potential risk for species included in the Red data book like *Dactylorhiza longifolia* (Neuman) Aver, *Dactylorhiza incarnata* (L.) Soó. *Inula salicina* L. abundantly grown in this community and have threat for biodiversity.

The biodiversity of community near at river Pyvesa (Pasvalis district) rich in species. There is big *Molinietum Caeruleae* plant community. There dominate high grass, and herb cover is over 95 %. In the description are fixed 38 species of plants. Typical community species *Molinia caerulea* (L.) Moench, *Gladiolus imbricatus* L., *Selinum carvifolia* (L.) L., *Potentilla erecta* (L.) Raeuschel. *Gladiolus imbricatus* is protected rare species, that can be found in almost all Lithuania but not so frequent in North and North West regions. This plant likes light therefore it is very important to eliminate bushes sprouting there. Characteristic community species are *Carex hostiana*, *Juncus conglomeratus* L., *Ophioglossum vulgatum* L., *Trollius europaeus*. Some mature individuals of *Dactylorhiza* grow in community but widely sprouting bushes and tall grass determine possible extinction of this plant.

In Muša valley near Skaliai hill the meadow of average moist remains as narrow swath bordering on the river from one side and cultivated fields from another side. There was evaluating steppe meadows community with carbonaceous soils, warm and open place. In the investigate community the scrubs compound 5%, herb cover - 90%. In this community was inventory 40 species of plants, and there grow typical and frequent species *Agrimonia*

*eupatoria* L., *Trifolium montanum* L., *Veronica teucrium* L., *Fragaria viridis* (Duchesnes) Duchesnes), *Anthyllis vulneraria* L., *Cirsium acaule* (L.) Scop., *Medicago falcata* L., *Campanula glomerata* L. Rare plant of Lithuania *Gentiana cruciata* L. grows there too. Population is composed from several individuals only. There is very important to start some environment protecting works and protect this valuable place.

In expedition time in Žagare (Joniškis district) was evaluate another steppe meadow. Common species of plants in the dry meadows are *Helictotrichon pratense* (L.) Besser., *Agrimonia eupatoria*, *Fragaria viridis*, *Trifolium montanum*, *Veronica teucrium* which forms community. *Helictotrichon pratensis* (L.) Besser protected species, it is found only in Northern and Western parts of Lithuania. Other plants of *Poaceae* family grow together, they are *Phleum phleoides* (L.) H. Karst., *Festuca ovina* L. and *F. pratensis* Huds., *Helictotrichon pubescens* (Huds.) Pilg., *Arrhenatherum elatius* (L.) P.Beauv. ex J. Presl et C. Presl.

In the investigate biotops the rare plants not rich grow and was very fragment in the small areas. In the expedition time were found 19 species from Red data book: 1 - lichen, 5 - moss, 1 - fern, 12 - flowering plant species. The rare moss and frequent only in North part of Lithuania was found in the dolomite exposure in the Biržai and Joniškis distr. Very rare moss, *Bryum funckii* Schwaegr., was found on the moist calcareous dolomite wall in the shady place. This growing place is the only one known in Lithuania. This moss is very small, the stalk is only 1-2 cm of height.

Lichen inscribed in Red Book of Lithuania, *Lobaria pulmonaria* (L.) Hoffm., grows on the old ashes, this species of lichen is classified as vulnerable. Microclimate is very important for them. *Lobaria pulmonaria* to live only on several trees and there is protected all natural complex (Pakruojis district). The moss *Neckera pennata* (L.) Hedw. grown nearby on the trunks of old trees. This species is inscribed in the Red Book of Lithuania as a vulnerable species. This moss is prevalent in all Lithuania though it disappears when forests are cut or destroyed. Therefore the number, extent and vitality of these populations are decreasing.

The rare of Lithuanian flora *Ophrys insectifera* L., sprouts in the calcareous, moist and peaty soil. Therefore it is especially important to follow the state of species and timely how overgrowing bushes.

Unfortunately two populations of *Gentiana cruciata* is very small, only a few individuals left, so it is very vulnerable. These populations may vanish as the tall grass settles in the community. Therefore environment protecting implements are necessary on the purpose to save population of this rare

plant.

After project and expeditions in Botanic garden of Siauliai University was found new North Lithuanian flora section. This section is partition in to several zones: water, dry, steppe and natural meadows.

## Conclusions

1. The Botanic garden work together in order to coordinate and target their conservation activities in the in country and in the region.

2. In Northern Lithuania climatic differences, local conditions of relief and soil determined peculiarities of vegetation and plant species unique. In the expedition time was fixed in North Lithuanian prevalent plant species: *Carex flacca*, *Carex hostiana*, *Cirsium acaule*, *Primula farinosa*, *Empetrum nigrum*, *Festuca arundinacea*, *Pastinaca sativa* var. *pratensis*, *Pinguicula vulgaris*, *Rubus chamaemorus*, *Trollius europaeus*. And in North West Lithuania prevalent species: *Sesleria caerulea*, *Deschampsia flexuosa*.

3. In expedition time were evaluate 3 areas of Red data book communities. In the investigate areas was estimate 5 species from Red data book: *Gladiolus imbricatus*, *Sesleria caerulea*, *Dactylorhiza longifolia*, *Dactylorhiza incarnata*, *Gentiana cruciata*.

4. In the investigate biotops the rare plants species not very rich, mostly fragmentary and grow in the small areas. In the expedition time was investigate 19 species plants from Red data book, respectively: 1- lichen, 5 - moss, 1 - fern, 12- flowering plant species.

4. The rare plant community are sensitive and pregnable for anthropogenic influence. In the *Seslerietum uliginosae* community (II rarity category) is necessary nature management works: to make hay of meadows, scrubs and tries cutting, transfer animal feeding places.

5. In Botanic garden was created North Lithuanian flora section with 4 different semi-natural communities.

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# Development of collections and expositions in Kaunas Botanical Garden of Vytautas Magnus University in 2014

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## **Abstract**

9641 collection specimens belonging to 4025 taxa and 4822 culta comprise collections of Kaunas Botanical Garden (KBG), VMU. Used terms in database of KBG are described and proposals for specimen grouping of living plant collections are discussed. Living plant collections are subject for research and a tool for establishing new expositions for public. In order to make garden more attractive to visitors new collections of ornamental plants have been started to collect and old ones – have been enlarged. New expositions have been developed and old ones – renewed.

*Keywords:* Botanical collections, living plants expositions, taxa, culta.

## **Introduction**

In 2013, the feasibility study of KBG was carried out, and the report stated that substantial development in the organization structure and management is needed to foster changes leading to improved performance of multiple functions. In order to meet the requirements for modern university botanical garden, in the end of 2013 the structure of KBG was changed and new programme of renovation has been started to implement. Currently all departments of collections and expositions are joined to the Collection Department that consists of four sectors (Floriculture, Dendrology, Medicinal Plants, and Pomology) and two groups (Flora and Plant Systematics, and Phytopathology). The plan of actions for 2014 was constructed and the main attention was concentrated on developments of inventory, documentation, extension, renovation, and handling plant collections and expositions.

## Materials and methods

Plant names and authors refer to Tropicos (<http://www.tropicos.org>). Nomenclature for all taxa conforms to the current International Code of Nomenclature of Algae, Fungi and Plants (McNeill et al., 2012). Nomenclature for culta conforms to the International Code of Nomenclature for Cultivated Plants (Brickell et al., 2009).

## Results and discussion

The most important task for 2014 was to complete the inventory of plant collections in KBG. Until 2014, full inventory of plants has not been implemented and data on plant numbers was collected in each sector separately. Compiled data confirmed that KBG plant collections are composed of 6940 collection specimens (species, intraspecific taxa, cultivars and populations). The declared number of collection specimens in the feasibility study of KBG (2013) was 7300.

## Documentation and development of living plant collections

A lot of confusion, inaccurateness and even difficulties occur in the determination and characterization of botanical diversity in botanical gardens (BGs). In BGs of the Baltic States there is a vivid tradition to specify just the count of taxa. For example, it is indicated in the publication on Baltic Botanic Gardens 2011–2012 (Aher, 2013) that only National Botanical Garden of Latvia maintains cultivated plants collections, i.e. cultivars of genera as: *Alstroemeria* L., *Astilbe* Buch.-Ham. ex D. Don, *Callistephus* Cass., *Chrysanthemum* L., *Cyclamen* L., *Gerbera* L., *Hosta* Tratt., *Iris* L., *Phlox* L., and *Lilium* L. According this resource, cultivated plants are not maintained by other botanical gardens or they are not listed in the database - only counts of taxa are declared.

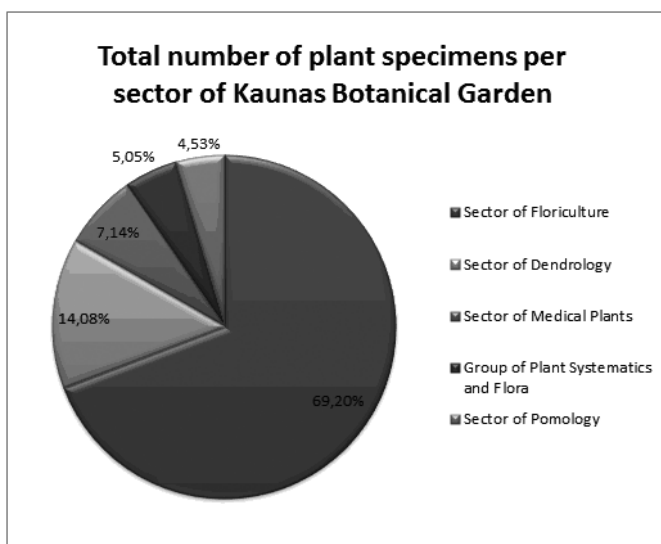
In order to avoid confusion and inaccurateness, **KBG** collection specimens were divided into 4 groups. Wild plants were assigned to taxa (species and intraspecific taxa), according to International Code of Nomenclature for algae, fungi, and plants (McNeill et al., 2012). Collection specimens of cultivated plants were assigned to taxa and culta (cultivars and groups), according to International Code of Nomenclature for Cultivated Plants (Brickell et al., 2009). Specimens of wild plants, in case if there were 2 and more specimens of the same taxon but with different origin, were counted as populations. Unidentified specimens of wild and cultivated plants have also been summed up. So, all collection specimens were divided into 4 groups: taxa, culta, populations and unidentified specimens.

In 2014, the database of **KBG** living plant collections was created and

it is currently maintained. It includes 9644 collection specimens. Thus, the total number of collection specimens increased up to 2704 (28 %) in 2014. In February 2015, **KBG** became a member of IPEN (International Plant Exchange Network), and therefore all collection specimens have IPEN codes.

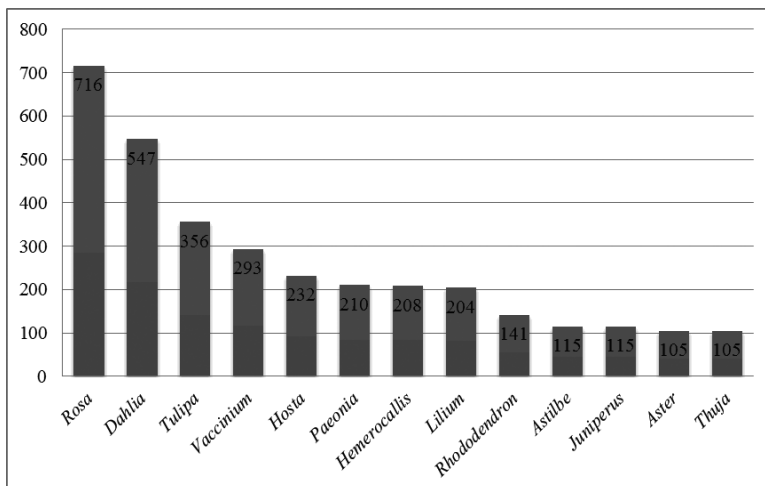
The largest **KBG** collections have been compiled by Sector of Floriculture (6672 collection specimen) and Sector of Dendrology (1357 collection specimens) in 2014. The smallest living plant collections are maintained by Sector of Pomology (437 collection specimens) (Fig 1).

Fig. 1. Total number of plant specimens per sector of Kaunas Botanical Garden.



The prominent field collections (counted by collection specimens) are composed of these genera: *Rosa* (716), *Dahlia* (547), *Tulipa* (356), *Vaccinium* L. (293), *Hosta* (232), *Paeonia* L. (210), *Hemerocallis* (208), *Lilium* (204) (Fig. 2). KBG maintains the largest rose collection in Lithuania.

Fig. 2. The largest field collections in KBG.



Certain part of collections in KBG is closed for visitors and used for biochemical and genetic research of berry and medicinal plants. Only a part of ornamental herbaceous plant collections is presented for visitors. After assessment of aesthetic value of KBG living expositions, it was decided to enlarge collections of outdoor adornment herbaceous plants. In order to make botanical garden more alluring to people, newly obtained plants will be used for renovation of expositions and establishment of the new ones. (Table 1).

Table 1. Development of living plant collections in KBG (2014).

No.	Genera	New collection specimens, 2014	All collection specimens	Enlarge-ment in %
1.	<i>Rosa</i> L.	337	716	47
2.	<i>Hosta</i> Tratt.	200	232	86
3.	<i>Dahlia</i> Cav.	124	547	23
4.	<i>Lilium</i> L.	121	204	59
5.	<i>Petunia</i> Juss.	82	0	100
6.	<i>Astilbe</i> Buch.-Ham. ex D. Don	69	115	60

7.	<i>Hemerocallis</i> L.	69	208	33
8.	<i>Hydrangea</i> L.	67	76	88
9.	<i>Paeonia</i> L.	51	210	24
10.	<i>Panicum</i> L.	47	48	98
11.	<i>Sedum</i> L.	44	109	40
12.	<i>Iris</i> L.	40	87	46
13.	<i>Callistephus</i> Cass.	38	0	100
14.	<i>Aster</i> L.	35	107	33
15.	<i>Geranium</i> L.	25	44	57
16.	<i>Heuchera</i> L.	24	63	38
17.	<i>Phlox</i> L.	24	92	26
18.	<i>Campanula</i> L.	22	54	41

Considerable amounts of collection specimens are obtained of following genera: *Rosa* (337), *Hosta* (200), *Dahlia* (124), *Lilium* (121), *Petunia* (82), *Astilbe* (69), *Hemerocallis* (69), *Hydrangea* (67), *Paeonia* (51) in 2014. Plants of these genera are attractive for visitors and useful for creating of new expositions. Collections were significantly increased of *Callistephus* (100 %), *Petunia* (100 %), *Panicum* (98 %) and *Hydrangea* (88 %). In 2014, new systematics plant expositions were created of these genera (excl. *Panicum*). In 2014, we started to create a new collection of annual flowers as the most decorative element for garden expositions.

New plants were obtained in different 5 ways:

- seeds and plants were purchased using dotation of the Ministry of Education and Science of the Republic of Lithuania and garden incomes;
- exchanging of living plants with other botanical gardens (mostly with National Botanical Garden of Latvia and Station of Nature Research and Environmental Education in Marijampole);
- gifts from private collectors and plant breeders;
- seed exchange programme with other botanical garden;
- expeditions for collecting of wild local flora.

## Development of expositions

A larger part of expositions in central segment of the garden was reconstructed (partly or fundamentally) in 2014. A lot of these expositions

had been established quite long ago. For example, the most important exposition of flora and systematics was initiated in 1968. Reestablishment of the expositions was implemented keeping attention to historical plans of the garden envisioned by the founder of botanical garden prof. Constantin Andreas von Regel. E.g., the Southeast part of the central segment of the garden was provided for creation of expositions of Lithuania flora.

In 2014, seven expositions were renovated:

- exposition of *Paeonia* (partly);
- exposition of *Rhododendron* (partly);
- exposition of flora and systematics (reconstructed basically);
- exposition of *Dahlia* (including cultivars of Lithuanian origin);
- Rose garden extended and reconstructed basically;
- *Iris* genus plants are transplanted to special collection plot;
- *Tulipa* and other ornamental bulbous plants exposition.

In 2014, 29 new expositions were established:

- exposition of *Potentilla fruticosa* and decorative conifers;
- exposition of *Hydrangea*;
- exposition of medicinal and spice plants;
- 4 new expositions composed of *Hemerocallis*, *Hosta* and perennial adornment plants;
- 1 mixed exposition composed by perennial and annual flowers (*Hemerocallis*, *Tradescantia* L., *Tagetes* L. and *Crocasmia* Planch.);
- exposition of *Petunia*;
- exposition of *Callistephus*;
- 16 new expositions of annual flowers (13 in KBG and 3 in public area in Kaunas city centre);
- educational vegetable garden;
- exposition of energy crops;
- establishment of aquatic plants exposition has been started.

## Conclusions

In 2014, collections of KBG were comprised by 9644 collection specimens which are assigned to 3911 taxa (species and intraspecific taxa), 4928 culta (cultivars and groups), 1867 populations, and also 187 unidentified specimens. In 2014 in KBG, the largest collections are maintained by Floriculture (6672 collection specimens or 69 %) and Dendrology (1357 collection specimens or 14 %) sectors. The largest field collections (counted by collection specimens) are compiled of the following genera: *Rosa* (716), *Dahlia* (547), *Tulipa* (356), *Vaccinium* L. (293), *Hosta* (232), *Paeonia* L. (210), *Hemerocallis* (208), *Lilium* (204). Huge amount of *Rosa* (337), *Hosta* (200), *Dahlia* (124), *Lilium* (121),

*Petunia* (82), *Astilbe* (69), *Hemerocallis* (69), *Hydrangea* (67), *Paeonia* (51) were obtained. A considerable increase in number among all genera is of *Callistephus* (100 %), *Petunia* (100 %), *Panicum* (98 %), *Hydrangea* (88 %), *Astilbe* (60 %), *Lilium* (59 %), *Geranium* (57 %) and *Iris* (46 %).

7 expositions are partly or basically reconstructed and 29 new expositions are established in 2014.

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# Developing means for attracting visitors to Botanical Garden

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*Keywords:* visitors, plant collections, public events, education.

The aim to increase the importance of botanical gardens for the society raises new challenges and requires permanent testing of conventional and innovative ideas. The key activities for maintaining of plant collections, the use of collections for research and studies, for presentation of plant diversity for visitors in expositions are basic duties for the curators and researchers in botanical gardens. However, for making botanical garden successful in attracting visitors, this list has to be supplemented by activities that require entirely different competencies needed for developing modern education programs, organizing education and other events at different scale - for family, community and public, for making marketing, publicity and public relations, etc.

Therefore in the beginning of 2014 Kaunas botanical garden was reorganized into two departments: Plant Collection department (large department for basic functions) and Department of Service and Innovations (much smaller department for activating „social functions“). The results show that separation of these functions was favorable for the both departments, of course with the condition that their mutual interaction is ensured. Additional reason for the success was substantial dotation received from the Ministry of the Education and Research, that in 2014 initiated special program for the institutions having complex infrastructure.

As a result of the concerted activities of both KBG departments (to some extent fuelled by the dotation), the total size of plant collections in 2014 increased by more than 40%, the number of KBG visitors has increased by 19% (with seasonal fluctuations decreased), and the income increased by 39%.

The Plant Collection department concentrated efforts for the development of Floriculture and Dendrology collections. Nine new expositions were established,



5 expositions renovated and reconstructed. The largest contribution to the improving the attractiveness of garden for visitors was made by establishing numerous colourful parter beds of annual flowers (composed by dr. Arunas Balsevičius, Indre Luksyte and Zibute Baskiene, Rita Marseliene).

Second factor by the importance was organizing a large scale event early in the season (such as „Fascination of Plants day“ on May 18) so that thousands of visitors and can see and appreciate the beauty of new expositions, and also to experience that very diverse and interesting programme of science communication and art performances may be suggested for public in botanical garden. Together with broadcasting (TV and radio) they widely disseminate the message about attractive innovations. Due to the efforts of the Department of Service and Innovations, the artistic programme of the closing part of the „Fascination of Plants day“ was also exclusively attractive – colour lights on plants in the Green House, romantic songs by singers of musical theater in the white swan shaped boat lighed by torches on the central pond (Fig. 1.), and effective 3D light show on the building „Night dance of flowers“ in the final part. That was not usual and not expected, so that impressed spectators got the message to pass to many others. As a result, the number of visitors clearly increased above the average of several last years in three weeks following after this event.



*Fig. 1. Closing program of „Fascination of Plants Day 2014“*

The next impetus for the raise of visiting was given in June by another public event entitled „The night of Scents“ that was first time organized in Kaunas together with Station of Nature Research and Environmental Education in Marijampole and Horticulture institute of Lithuanian Research Center for Agriculture and Forestry. The programme concerned all possible aspects of plant scents and taste: excursions, expositions, potherbs, parfumes, cosmetics, destilations, degustations, lectures, selection of the most

fragrant plant, exhibitions and musical program. Effect of crowd-pulling and involvement of broadcasting again resulted in a clear after-effect in the curve of visitor number, thus the organizing efforts were rewarded in spades. The number of visitors started to decline again in August and September. However, the idea to organize exotic butterfly show in the Green house in October, after seasonal closure of outdoor expositions was extremely helpful – the income in October significantly exceeded monthly incomes in July, August and September, and in November and in December it still was several times higher than usual.

We consider that these three main events made a great contribution for increasing number of visitors. Nevertheless, other important events organized for local schools and community cannot be underestimated – the traditional spring event „Day of placing birdhouses“, Cleaning days at the Kaunas botanical garden, the Campaign against *Heracleum sosnowskyi*“ (Fig. 2., project funded by Department of Environment protection of Kaunas Municipality, video: <https://www.youtube.com/watch?v=yQD8ssWpUZ4>), as well as Public campaign for protection of *Aesculus hippocastanum* from *Cameraria ohridella* (seminar, collecting and composting leaves) helps to mobilize hundreds of local people to be active members of the society and participate in the environmental movement.



Fig. 2. The Campaign against *Heracleum sosnowskyi*.

VMU Kaunas botanical garden has an extraordinary science laboratory for kids – “NSO laboratory”. The name NSO comes from latin *Naturales Scientiae Omnibus* (means Nature Science for Everyone). This laboratory attracts young explorers, who can come here and feel like a real scientists. Our educator gets help from academics of VMU and other universities. There are few types of education here. First one – is an extra-curricular activities, when kids come

here after school, learn all types of things of botany, biology, chemistry and etc. The second one is when the whole class comes with teacher for having special lesson relevant to the programme of nature sciences in "NSO laboratory". It is important that these lessons include practical work, where kids can make experiments by their hands, they learn how to use chemical dishes and laboratory tools and how to behave in a laboratory (Fig. 3.). Short videos are produced to help for those who wish to reproduce simple experiments at home or in the classroom (e.g. <https://www.youtube.com/watch?v=9-wCROG-fI0>, etc).



*Fig. 3. Experiments for young scientists in NSO laboratory*

In the year of 2014 the educational programs of NSO laboratory have been extended and improved. Recently a novel combination of education with family event became popular – „Young Scientist birthday“. It is a great way to encourage children working in a group with close friends (birthday guests) and to gain an interest in nature sciences. Kids can learn important things while making some spectacular experiments. The experiments are safe and mainly food products like milk, baking soda, vinegar, food coloring, water and pepper are used.

The improvements led to the number of more than 3000 children from Lithuania who came to "NSO laboratory" to deepen their knowledge in nature sciences. More than 50 Young Scientist birthday parties were organized as evidence that kids really want to learn more than they get in their schools.

In summary, the experience on organizing public activities and attracting visitors in our garden in 2013-2014 shows that combining skills and synergistic collaboration between curators of botanical collection (Collection department) and educators and event management (Service and Innovations department) can successfully lead to substantial achievements.

# Vilnius University Botanical Garden in Kairėnai celebrating 40 - year anniversary

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## **Abstract**

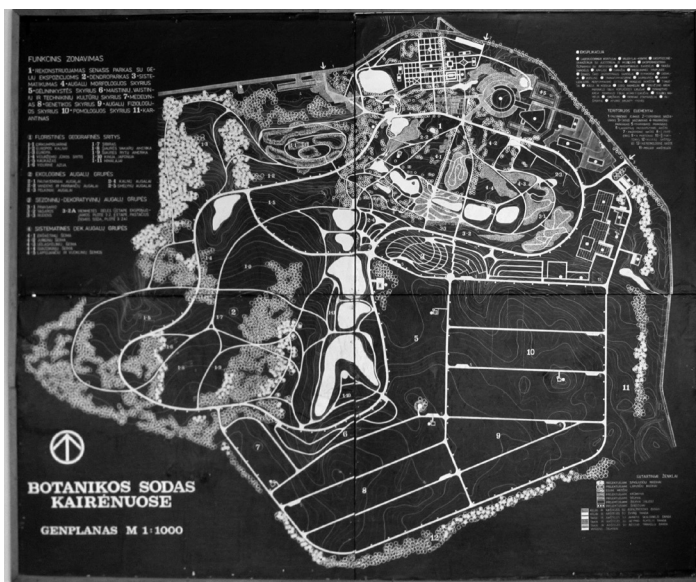
Since the foundation in 1781 Vilnius University Botanical Garden had changed its location four times. In the last location, in Kairėnai the history of Vilnius University Botanical Garden began in 1974. It was decided that the previous Garden's area in Vingis Park was too small for large University research projects and experiments, and the best way to guarantee prosperity for the garden in the future, to obtain a 148 ha plot of land in Kairėnai. Today it is a place with the richest collections of plants in Lithuania, a well-developed and visitor-friendly infrastructure, broad-based educational and cultural programs, and tens of thousands of visitors every year. Forty years is not a long time in the history of botanical garden, but a good opportunity to present what was done during this time. The purpose of this article is to present a concise and brief overview of the 40-year activity of the Vilnius University Botanical Garden in Kairėnai.

*Keywords:* Vilnius University Botanical Garden, history, development.

## INCEPTION AND DEVELOPMENT OF THE GARDEN IN 1974-2014

### **Development of divisions and infrastructure**

By Order of the Lithuanian Council of Ministries, on 14 May 1974, a plot of land (148 ha), the remains of an old former manor place and garden in Kairėnai, was given to Vilnius University to found an experimental research station with botanical garden. The master plan for the development of this new land to the garden was prepared by staff (group headed by architect D. Juchnevičiūtė) of Institute for the Restoration and Conservation of Monuments. Various teams of experts had prepared the technical and engineering plans for the planned buildings and grounds. There were completed over 40 volumes of technical documentation until 1982. The territory was planned to be divided into exhibition, experimental fields and support/research facilities zones (Picture 1).



Picture 1. The master plan of VU Botanical Garden in Kairėnai, 1982.

In fact the scenery was beautiful: there were a lot of native springs, ponds, expressive landscape, and many units of heritage. On other hand the land, buildings of former manor and all other facilities of inherited infrastructure was neglected. Nevertheless the work of garden development started. The first personnel (first employee - agronomist V. Raubienė) began work in the Garden in 1974. Next year there were established the first departments (of Plant Genetics and Experimental Pomology), an administrative team was assembled. The Garden was headed by new director - Juozapas Meidus. In 1976 the Dendrology Department, in 1977 - the Plant Physiology Department were established. In order to coordinate the work of these departments and to help young researchers, volunteers from various departments of the Vilnius University Faculty of Natural Sciences served as research advisers. But the main burden of organizing the work of the Garden for its first sixteen years and related worries fell on the shoulders of the Garden's first director Juozapas Meidus. Work began on construction of new infrastructure: of laying water and sewage lines and building roads to the site, even before the general plans for the garden development were completed. Reconstruction of 8 old ponds and building of 5 new ponds began in the spring of 1978 and was continued for many years. The circle road building project was started in 1978 and completed during 1980-85 (this asphalt covered road inside the garden connected different parts of it in distance of about 3.5 km). About 4.5 km of smaller gravel roads throughout the garden were completed by

1990. Step by step, from the first years of the Garden's inception in Kairėnai, former residents (26 families) of the garden territory were relocated.

In 1990 dr. Evaldas Vylius Navys became the new director of the Garden. On his initiative, and with the help of investment funds from the government, a number of new projects were carried out: the garden territory was fenced (1991-1994); about 3 km of new roads and pathways were laid; the system of ponds was further developed; the garden Laboratory of Plant Physiology and Isolated Tissue Cultures began to function (in 1991); the new Floriculture Department was established in a several hectare plot (in 1992); a plant marketplace was opened (1994); new equipment was purchased; and financing for the garden improved. Until 1996, the remaining eight families were relocated from the property. A year later, with financial support by the Cultural Heritage Department, major renovation work began on the one of former manor buildings (stable), being preserved as architectural monument of XIX century. The renovation of its exterior was completed in the fall of 2002.

On 1 September 2002 a new director – dr. Audrius Skridaila took office. In 2003 was renewed general master plan of the garden, prepared new plan of the garden development strategy. In the same year the garden prepared an application to the State Investment Program for a new large investment project for development of the garden infrastructure. Application was successful adopted and implementation of the project started in 2004. During 2004-2012, the following work of this project was completed: the electrical grid was re-constructed; a modern greenhouse (tunnel for nursery), workshops with a garage and new horse stables were built; the main gas pipeline, optical fiber lines, new water supply system, waste water collection lines were laid and the garden's sewage system was completed and connected with the city's system. The re-construction of the garden administration and laboratory building began in 2013 (project should be finished in 2016, with total amount of 2,9 mln. €). During 2003-2009, with funds (amount of 0,291 mln. €) from the Cultural Heritage Department, the remains of the secondary manor's house and the mill were conserved. During 2003-2014, with funds from the Vilnius municipality (of amount 0,244 mln. €) many of the Garden's old pathways and exhibits were renovated. Another major investment project was completed during 2007-2008 with Lithuanian state and EU structural funds (total amount of 2,1 mln. €). The goal was to adapt the garden's infrastructure to tourism needs: three former manor buildings, which are protected architectural monuments of 19th century, were reconstructed as well as several other smaller infrastructure objects completed (Picture 2).





Picture 2. Reconstruction of the former manor buildings, 2008.

During 2013-2014, implementing another project, financed by Lithuanian foundation for environmental investment (of total amount 0,177 mln. €), new maintenance equipment was acquired: two tractors, an electro mobile, and five pieces of equipment for dealing with green waste etc. In the fall of 2014, major work began on the reconstruction and enlargement of woody plant collections, of renovation of two ponds in the southern part of the old park. Over forty years the territory of the Botanical Garden increased from 148 ha in 1974 to 191.5 ha in 1997. Nowadays there are in Kairėnai well working botanical garden. Nevertheless the work on the development of general infrastructure of the Garden, plant collections and exhibits continues in a systematic way.

## Collecting of plants

The plant collections in Kairėnai were started in 1975, with first plants of genus *Ribes* L. It was started by the first division (organized in that time at the Garden) – Department of Pomology. In 1975–1985 collections of this department grew the fastest. Since 1985 the leading position of collection grows became Dendrology Department. The first list of seed exchange (*Index Seminum*) with names of the seeds gathered at the Botanical Garden in Kairėnai was published in 1985. A list of plants of the Pomology and Dendrology Departments (with 1,089 entries), the *Index Plantarum*, was published in 1992. The staff of the garden participated in three expeditions: to the Altai region in Siberia (in 1990) and to the Far East (in 1985 and 1992). After 1992, gardens plant collections grew the fastest at the new organized Floriculture Department – specimens of over 3,000 taxa there were collected in a few years. After Lithuania regained its independence in 1990, garden

personnel were free to travel abroad and were no longer limited to just the botanical gardens in the former Soviet Union. They traveled to botanical gardens, arboretums and nurseries in Poland, the Czech Republic, Germany, Sweden, Finland, Belgium and United Kingdom. New ties were established. Thousands of plants and seeds were brought back. This contributed greatly to the growth of the collections. In 1997, the number of plant taxa in the collections of the Garden (including the quite stable collection of Vingis Department, of 1500 taxa) was 7,430; in 1999 – 8,000; in 2005 – 9,950 and in 2010 it reached number of 10000 taxa.

## THE GARDEN IN MODERN TIME

### **Organizational structure and staff**

Since 2011, the Botanical Garden is a core nonacademic division of Vilnius University. The following departments and divisions are located in Kairėnai: the Department of Plant Collections with subdivisions of Woody plants, Herbaceous ornamental plants, Fruit plants, Natural and induced mutants, Lithuanian flora and Indoor plants; the Department of Scientific Programs with the subdivision of Plant Diversity and Taxonomy and the Biotechnology and Genetics Laboratory; the Department of Public Relations with the Information Center and Museum; the Administration Office and the Maintenance and Service Department. Since 2003, the Botanical Garden is also the headquarter of the Lithuanian Ornamental Plant Genetic Resources Coordination Center and the European *Ribes* L. and *Rubus* L. plant genera database registration center.

At the Botanical Garden are working 87 employees: one habilitated doctor, 10 doctorates in the natural sciences, 16 collection curators, 9 technical services specialists, 48 workers and 3 administrators.

### **Nowadays plant collections**

VU Botanical Garden has the largest in Lithuania and one of the largest in the Baltic States plant collections. As of 2014, over 8,400 plant taxa are grown in Kairėnai (together with collection of the Vingis Department about 10,000 of taxa). They includes: 102 taxa of plants listed in the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species; 49 taxa of plants listed in the Lithuanian Red Data Book; 4 taxa of the CITES (the Convention on International Trade in Endangered Species) list; 1,972 plant taxa (of species rank) listed in the Botanical Gardens Conservation International (BGCI) database; 298 accession numbers of specimens of plants listed in the Lithuanian Ornamental Plant Genetic Resources database. Core



collections of the Garden: *Tulipa* L. – 670; *Ribes* L. – 451 taxa; *Hemerocalis* – 599; *Rhododendron* L. – 360; *Dahlia* L. – 333; *Paeonia* L. – 259; *Iris* – 354; *Syringa* L. – 139, *Astilbe* L. – 90; *Vitis* L. – 85 etc.

## **Researches, international ties and collaboration**

The main garden's research topic for 2011-2015 – the "Biological and molecular study of plant genetic resources and biotechnologies." It is a part of Vilnius Universities' sixth research area: "Genomics, biomolecules and biotechnologies." The research involved *in vitro* studies of plant reproduction and mycorrhiza (root symbiosis with fungi) in the European yew (*Taxus baccata* L.), the blue-berried honeysuckle (*Lonicera caerulea* L.) taxonomy and studying bio ecological peculiarities' of tulips (*Tulipa* L.) cultivation. Dissemination of research results and, in general, of knowledge about the kingdom of plants is an important function of the Garden.

For many years, the Garden has been part of the International Plant Exchange Network: exchanging seeds with 300 partners in 50 countries. Every year we send out about 800 packets of plant seeds to research institutions around the globe and receive about the same amount in exchange.

The Botanical Garden successfully collaborates with and is a member of many Lithuanian and international organizations. Since 1992, the Garden is a member of the Baltic Botanic Gardens Association (Estonia, Latvia and Lithuania). In 2003, it joined the Botanical Gardens Conservation International and, in 2004, the Botanical Gardens Consortium of the European Union. On 24 February 2005, the Association of Botanical Gardens of Lithuanian Universities (LUBSA) was founded, with its headquarters at the VU Botanical Garden. In 2008, the Garden joined another international network, - the Botanic Gardens in the Baltic Sea Region, which encompasses the nine nations around the Baltic Sea: Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Germany and Denmark - 20 botanic gardens in all. During the last few years, the VU Botanical Garden has increased its collaboration with other botanical gardens and institutions by signing collaborative agreements with: the I. V. Michurin All-Russian Research Institute of Horticulture (2009), the Belarus Institute of Horticulture (2011), the Central Botanical Garden of the National Academy of Sciences of Belarus in Minsk (2013), and the N. V. Cicin Main State Botanical Garden in Moscow, Russia (2014). The Garden collaborates with many other organizations, such as the International Plant Genetic Resources Institute (Italy); Plant Gene Bank (Lithuania), the Lithuanian Florists' Union, the Lithuania Forest Association etc.

## The educational, cultural and social role

Garden researchers teach courses to Vilnius University and Vilnius College students. Educational programs about the environment and environmental protection for children and adults take place at the garden. There are seven special education programs for school children. Qualified specialists lead about 170 to 290 excursions each year. Since 2013, the Garden together with the Lithuanian Students' Non-Formal Education Center have organized an competition entitled "My Green Windowsill" for pre-school and school children as well as international conferences for teachers. The Garden works together with the Medardas Čobotas Third Age University to organize educational programs for seniors. In fact, the Garden works together with many organizations and individuals. Over 1,700 volunteers show up each year on garden clean-up days. In 2013, fourteen volunteers from foreign countries worked in the garden, and thirteen in 2014.

The Garden has been open to visitors since 2000. In 2008, it was added to the Vilnius City's scenic tours map, which made it easier for first-time visitors to find us. Every year the Garden has become more and more attractive to visitors, and this is reflected in growing of their numbers: 15,000 visitors in 2005; 50,000 – in 2010 and 72,000 – in 2014 (in Kairėnai).

Over the last decade a new category of visitor has emerged - the virtual visitor. The Garden's website ([www.botanikos-sodas.vu.lt](http://www.botanikos-sodas.vu.lt)) was created in 2001. Since then, the Garden has joined Facebook (2009), Twitter (2012) and Google+ (2013). Garden staff sends photographs to Panoramio.com and Instagram.

The Garden organizes numerous events throughout the year. Public events and festivals such as "Spaceship Earth" (since 2007), "Researchers' Night" (since 2009) have been very popular at the Garden. Some of them have become the Garden's calling card, such as: International Biodiversity Day (organized since 2002), Land Art exhibitions (since 2003), exhibitions in the museum (since 2008). Every year at the Garden there are organized: a plant fair *Lietuvos žiedai* (Lithuanian Blossoms) since the fall of 2009; summer festivals' "*Kristupo vasaros*" (Summers of Christopher), youth festivals' *Flora Jazz* (since 2011), as well as *Bardų vasaros* (Bard summers' festival, since 2013) concerts. Some of the highlights of the cultural activities at the garden included: the project "Several sculptures for Kairėnai Park" (2006); the traveling international exhibition *Hard Rain* by Mark Edwards (2007); the international project "Bridges between European Universities" - the unveiling of the sculpture "Fertility" by A. G. Gaberi (2007); demonstrations of Japanese flower arrangement (*Ikebana*) by Japanese masters (2010 and 2011) and others.

The founding of the Friends of the Vilnius University Botanical Garden

Club in 1997 helped to spread the news about the Garden in Kairėnai even further. This initiative significantly improved the Garden's relationships with many other organizations (NGOs, private companies, guilds of artists etc.) as well as private persons and local community. Together with the last one the garden started implementation of a new social project (of creating new zone for recreation and sporting) by support of private finances.

## **Conclusion**

Today, the Vilnius University Botanical Garden in Kairėnai takes up a huge territory (about 191.5 ha). When you arrive at the Garden in Kairėnai (on north-east outskirts of Vilnius city), you find yourself in an unusually large island of fresh air, peace and quiet. There is enough space here for everything: large plant collections, many wild plants and animals, and, obviously, many visitors. Celebrating 40-year anniversary of the Garden in Kairėnai we are proud of what were done there during that period. But the life of the garden is going forward and we are looking for new challenges, new perspectives and possibilities to create it more attractive, more engaging public and more qualified managed.